Kawasaki

Super SHERPA

Motorcycle Service Manual

LIST OF ABBREVIATIONS

A	ampere(s)	lb	pounds(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	min	minute(s)
ATDC	after top dead center	N	newton(s)
BBDC	before bottom dead center	Pa	pascal(s)
BDC	bottom dead center	PS	horsepower
BTDC	before top dead center	psi	pound(s) per square inch
°C	degree(s) Celsius	r	revolution
DC	direct current	rpm	revolution(s) per minute
F	farad(s)	TDC	top dead center
°F	degree(s) Fahrenheit	TIR	total indicator reading
ft	foot, feet	V	volt(s)
g	gram(s)	W	watt(s)
h	hour(s)	Ω	ohm(s)
L	liter(s)		

Read OWNER'S MANUAL before operating.

Quick Reference Guide

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

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

EMISSION CONTROL INFORMATION

To protect the environment in which we all 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.

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 this motorcycle. The fuel and ignition system of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

The Clean Air Act, which is the Federal law covering motor vehicle pollution, contains what is commonly referred to as the Act'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 its 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..."

NOTE

○ *The phrase "remove 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.*
2. *Tampering could include:*
   - *a. Maladjustment 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 THESE PROVISIONS 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 compliance 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 air 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, the 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 makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

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

To get the longest life out of your vehicle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Motorcycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki motorcycles are introduced by the Service Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

For example, if you want ignition coil information, 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 Ignition Coil section.

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

⚠ WARNING

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

CAUTION

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

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

NOTE

○ *This note symbol indicates points of particular interest for more efficient and convenient operation.*

- ● Indicates a procedural step or work to be done.
- ○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.
- ★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

General Information

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Table of Contents

Before Servicing

Before starting to service a motorcycle, careful reading of the applicable section is recommended to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations, a certain amount of basic knowledge is also required for successful work.

Especially note the following:

(1) Dirt

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 installing a new part, clean off any dust or metal filings.

(2) Battery Ground

Remove the ground (-) lead from the battery before performing any disassembly operations on the motorcycle. This prevents: (a) the possibility of accidentally turning the engine over while partially disassembled. (b) sparks at electrical connections which will 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 this service Manual has installation or assembly procedures, follow them. Note parts locations and cable, wire and hose routing during removal or disassembly so they can be installed or assembled in the same way. It is preferable to mark and record the locations and routing 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 of them 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 especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the screw heads.

(7) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

(8) High-Flash Point Solvent

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

(9) Gasket, O-Ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(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 block 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 wheel bearing, should first be coated with oil on its outer or inner circumference 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 any ball or needle bearings that were removed with new ones, as removal generally damages bearings. Install bearings with the marked side facing out applying pressure evenly with a suitable driver. Only press on the race that forms the press fit with the base component to avoid damaging the bearings. This prevents severe stress on the balls or needles and races, and prevent races and balls or needles from being dented. Press a ball bearing until it stops at the stops in the hole or on the shaft.

(13) 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 pressed 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 shaft passes through a seal, apply a little high temperature grease on the lips to reduce rubber to metal friction.

(14) 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 compress or expand them only enough to install them and no more.

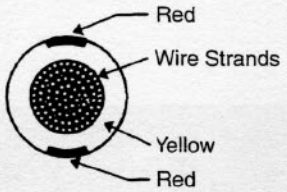
(15) Lubrication

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

Don't use just 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. This manual makes reference to molybdenum disulfide grease (MoS_2) in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(16) 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 to make red the main color.

Wire (cross-section)	Name of Wire Color
	Yellow/Red

(17) Replacement Parts

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

(18) Inspection

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

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

(19) Specifications

Specification terms are defined as follows:

"Standards": show dimensions or performances which brand-new parts or systems have.

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

Model Identification

KL250-G Left Side View:

KL250-G Right Side View:

KL250-H Left Side View:

KL250-H Right Side View:

General Specifications

Items	KL250-G	KL250-H
Dimensions and weight:		
Overall length	2,080 mm (81.89 in.)	← (GR) 2,060 mm (81.10 in.)
Overall width	780 mm (30.71 in.)	←
Overall height	1,190 mm (46.85 in.)	← (GR) 1,130 mm (44.49 in.)
Wheelbase	1,375 mm (54.13 in.)	← (GR) 1,360 mm (53.54 in.)
Road clearance	270 mm (10.63 in.)	← (GR) 265 mm (10.43 in.)
Seat height	830 mm (32.68 in.)	← (GR) 810 mm (31.89 in.)
Dry weight (mass)	113 kg (249 lb)	← (GR) 107 kg (236 lb)
Curb weight (mass)	128 kg (282 lb)	← (GR) 122 kg (269 lb)
Fuel tank capacity	9 L (2.4 US gal)	←
Performance:		
Minimum turning radius	1.8 m (5.9 ft)	←
Engine:		
Type	4-stroke, single cylinder, DOHC, 4 valves	←
Cooling system	Air-cooled	←
Bore and stroke	72.0 × 61.2 mm (2.83 × 2.41 in.)	←
Displacement	249 mL (15.19 cu in.)	←
Compression ratio	9.3:1	←
Maximum horsepower	(US)(CN) - - -	(AS)15 kW (20.4 PS) @ 8,000 r/min (rpm) (GR)19.1 kW (26 PS) @ 8,000 r/min (rpm)
Maximum torque	(US)(CN) - - -	(AS) 20.6 N·m (2.1 kg·m, 15.2 ft·lb) @ 6,000 r/min (rpm) (GR) 25.5 N·m (2.6 kg·m, 18.8 ft·lb) @ 6,500 r/min (rpm)
Fuel system	Carburetor, Mikuni BST 34	←
Starting system	Electric starter	←
Ignition system	DC-CDI	←
Timing advance system	Electronically advanced (digital)	←
Ignition timing	BTDC10° @1,300 rpm ~ BTDC30°@ 5,750 rpm	(AS) (GR) BTDC10° @2,500 r/min ~ BTDC30°@5,750 r/min
Spark plugs	NGK CR8E or ND U24ESR-N	←
Valve timing:		
Intake open	BTDC 31°	←
Intake close	ABDC 61°	←
Intake duration	272°	←
Exhaust open	BBDC 61°	←
Exhaust close	ATDC 31°	←
Exhaust duration	272°	←
Lubrication system	Forced lubrication (wet sump)	←

Items	KL250-G	KL250-H
Engine oil:		
Grade	SE, SF, or SG class	←
Viscosity	SAE10W-40, 10W-50, 20W-40, 20W-50	←
Capacity	1.5 L (1.6 US gt)	←
Drive Train:		
Primary reduction system : Type	Gear drive	←
Reduction ratio	2.800 (84/30)	←
Clutch type	Wet multi disc	←
Transmission:		
Type	6-speed, constant mesh, return shift	←
Gear ratios: 1st	3.090 (34/11)	←
2nd	2.125 (34/16)	←
3rd	1.500 (27/18)	←
4th	1.148 (31/27)	←
5th	0.961 (25/26)	←
6th	0.851 (23/27)	←
Final drive system: Type	Chain drive	←
Reduction ratio	3.071 (43/14)	←
Overall drive ratio	7.325 @ top gear	←
Frame:		
Type	Tubular, semi-double cradle	←
Caster	28°	←
Trail	107 mm (4.21 in.)	←
Front tire : Type	Tube type	←
Size	2.75-21 45P	←
Rear tire : Type	Tube type	←
Size	4.10-18 59P	←
Front suspension: Type	Telescopic fork	←
Wheel travel	230 mm (9.06 in.)	← (GR) 220 mm (8.66 in.)
Rear suspension: Type	Swingarm (uni-trak)	←
Wheel travel	186 mm (7.32 in.)	← (GR) 170 mm (6.69 in.)
Brake type: Front	Single disc brake	←
Rear	Single disc brake	←
Electrical System:		
Battery	12 V 6 Ah (maintenance-free battery)	←
Headlight : Type	Semi-sealed beam	←
Bulb	12 V 60/55 W (quartz-halogen)	←
Tail/Brake Light	12 V 5/21 W	←
Alternator : Type	Three-phase AC	←
Output	15A-14V/@7,000 r/min (rpm)	←

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

(AS) : Australian Model
(GR) : Greek Model
(US) : U.S. Model
(CN) : Canadian Model

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 vitally important and must not be neglected.**

FREQUENCY / OPERATION	Whichever comes first → ↓ / Every	* ODOMETER READING							
		1 000 km (600 mile)	6 000 km (4 000 mile)	12 000 km (7 500 mile)	18 000 km (12 000 mile)	24 000 km (15 000 mile)	30 000 km (20 000 mile)	36 000 km (24 000 mile)	
Spark plug — clean and gap†			●	●	●	●	●	●	
Valve clearance — check†				●		●		●	
Air cleaner element — clean †#				●		●		●	
Fuel hoses connections — check†			●	●	●	●	●	●	
Throttle grip play — check†		●		●		●		●	
Idle speed — check and adjust†		●		●		●		●	
Spark arrester — clean (US, CN)			●	●	●	●	●	●	
Engine oil — change #	6 months	●	●	●	●	●	●	●	
Oil filter — replace		●		●		●		●	
Clutch — adjust		●	●	●	●	●	●	●	
Drive chain wear — check†#			●	●	●	●	●	●	
Drive chain — lubricate#	600 km								
Drive chain slack — check†#	1 000 km								
Brake pad wearr — check†			●	●	●	●	●	●	
Brake hose, connections — check†			●	●	●	●	●	●	
Brake fluid level — check†	month	●	●	●	●	●	●	●	
Brake fluid — change	2 years					●			
Brake master cylinder cup and dust seal — replace	4 years								
Caliper piston seal and dust seal — replace	4 years								
Brake pedal play — check†		●	●	●	●	●	●	●	
Brake light switch — check†		●	●	●	●	●	●	●	
Steering — check†		●	●	●	●	●	●	●	
Steering stem bearing — lubricate	2 years					●			
Front fork oil — change	2 years					●			
Rear shock absorber oil leak — check†				●		●		●	
Front fork oil leak — check†				●		●		●	
Tire wear — check†			●	●	●	●	●	●	
Spoke tightness and rim runout — check†		●	●	●	●	●	●	●	
Swingarm pivot, uni-trak linkage — lubricate				●		●		●	
General lubrication — perform				●		●		●	
Nut, bolt, and fastener tightness — check†		●		●		●		●	

: Service more frequently when operating in severe conditions; dusty, wet, muddy, high speed, or frequent starting/stopping.

* : For higher odometer readings, repeat at the frequency interval established here.

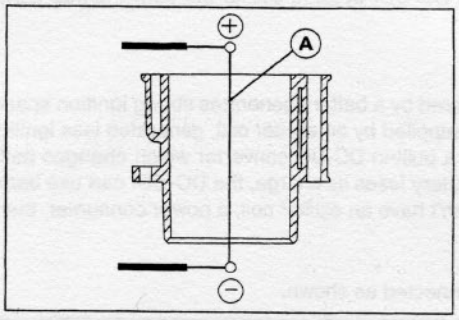
† : Replace, add, adjust,clean,or torque if necessary.

(US): U.S. Model

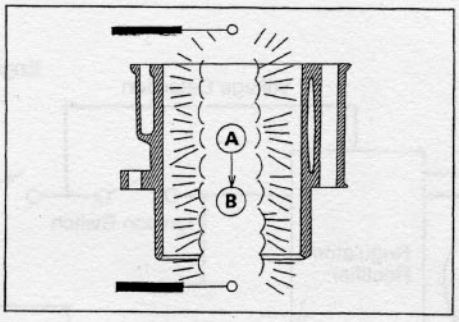
(CN): Canadian Model

Technical Information - Electrofusion Cylinder

A conductive wire [A] is placed at the center of a machined cylinder made with an aluminum alloy. A high-voltage, large current is applied instantaneously from the two ends of the conductive wire to cause the conductive wire to explode. The explosion melts the conductive wire and converts it into fine particles that collide with the interior wall of the cylinder at high speeds. The particles deposit themselves onto the cylinder and produce a strong coating.

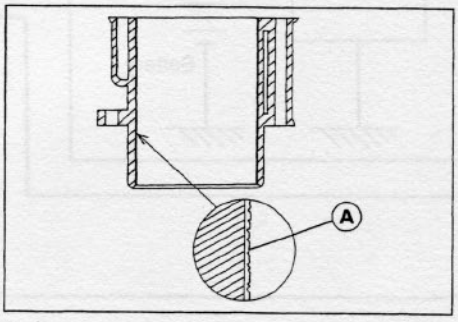


Using conductive wires composed of molybdenum and carbon steel, it is possible to produce a strong coating by thermal-spraying them alternately. At first, a current with a 20,000 V voltage is applied to explode a 1 mm molybdenum wire [A] to thermal-spray the interior wall of the cylinder, and this process is repeated. Secondly, a 2 mm carbon steel conductive wire is exploded using a 15,000 V current [B] to thermal-spray the interior wall of the cylinder. The thermal-spraying process is carried out by repeating the three-step explosion process more than 30 times.



Characteristics

Thermal-sprayed coating has small pore [A] that can hold oil. This coating welds completely with the aluminum alloy with which the cylinder is made. The thinness of the coating confers a high degree of thermal conductivity. For these reasons the Electrofusion cylinder offers superior performance characteristics in wear resistance, seizure resistance, and cooling capacity when compared with conventional cylinders. The extreme thinness of the coating, however, makes the cylinder unsuitable for boring. On the other hand, the high degree of seizure resistance permits lean combustion, and this facilitates the achieving of low fuel consumption and a reduction in harmful emissions. The high degree of thermal conductivity allows the piston and the cylinder to expand uniformly. This, in turn, permits a reduction in the gap between piston and cylinder, thus reducing the amount of blow-by, reducing oil consumption, and increasing the power output. The elimination of the need for a liner helps to reduce the weight of the cylinder.



Technical Information - DC-CDI (Direct Current-Capacitor Discharge Ignition System)

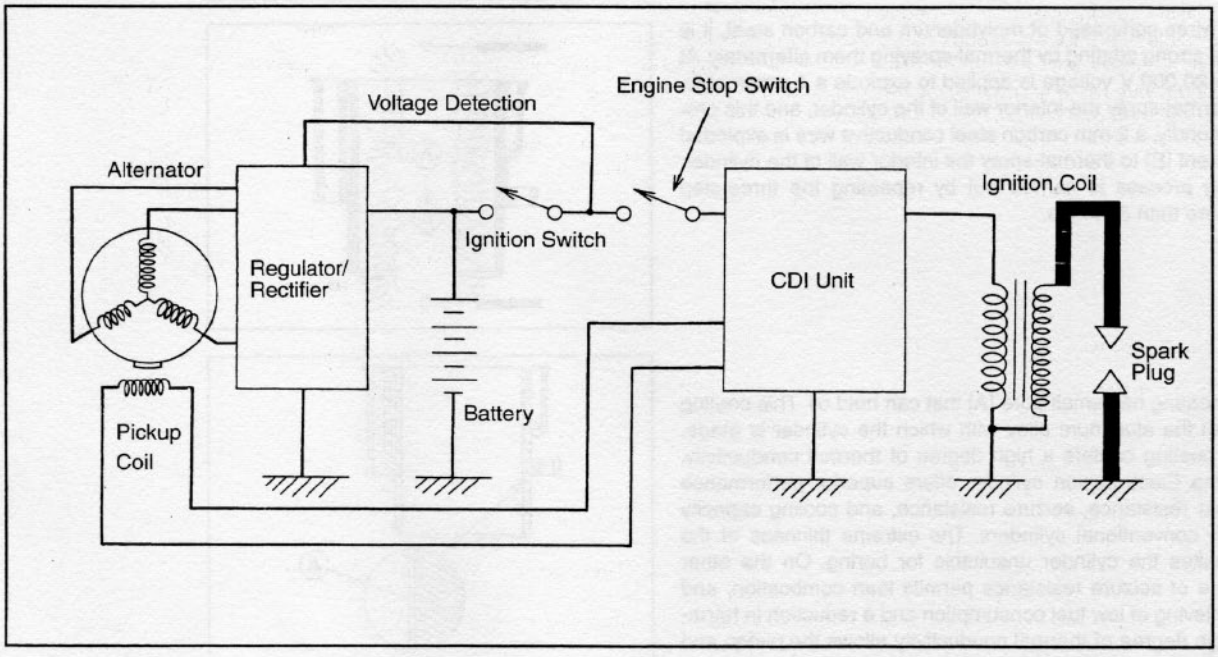
The KL250 has a DC-CDI system. Unlike the conventional CDI, the DC-CDI uses a battery instead of a magneto as a power source.

Description:

- ○ The DC-CDI powered by a battery generates strong ignition spark even at low engine speeds. The conventional CDI, which uses AC voltage supplied by an exciter coil, generates less ignition spark at low engine speeds.
- ○ The DC-CDI has a built-in DC-DC converter which changes battery voltage or battery-charging voltage into high voltage AC. Even if the battery loses its charge, the DC-CDI can use battery-charging voltage.
- ○ The DC-CDI doesn't have an exciter coil, a power consumer, therefore the battery is charged better.

Ignition System:

The DC-CDI is connected as shown.



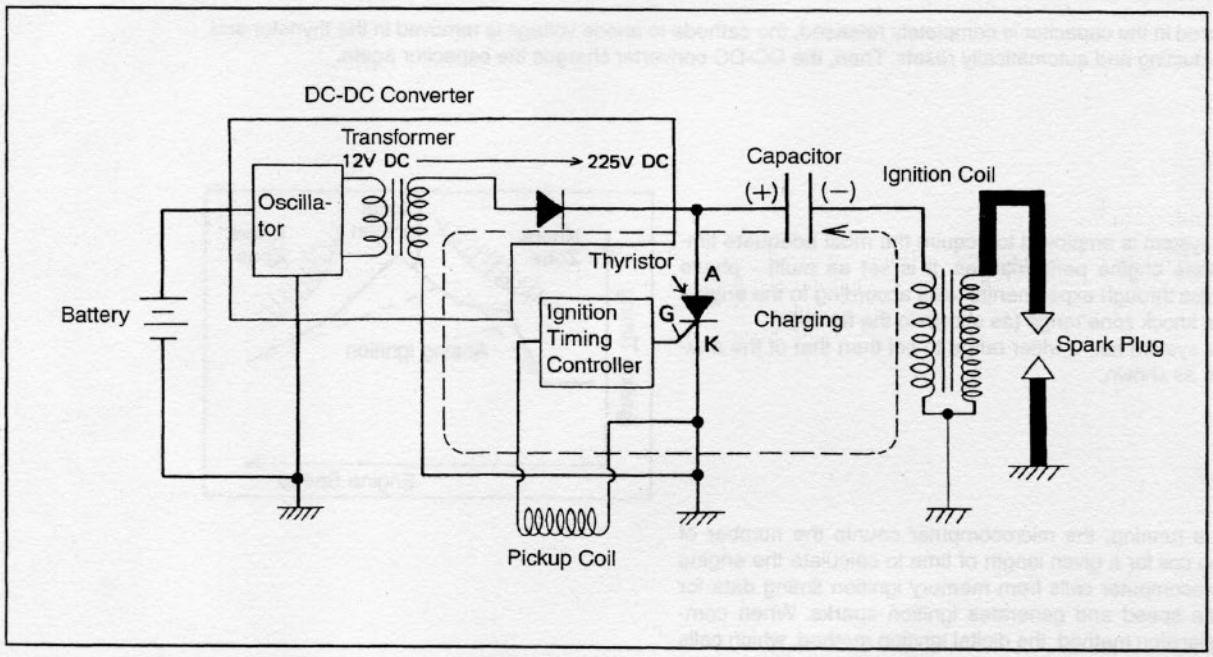
Operation:

The DC-CDI circuit consists of a battery, a DC-DC converter, a diode, a capacitor, an ignition timing controller, a pickup coil, a thyristor, an ignition coil, a spark plug, an ignition switch, and an engine stop switch. If the ignition switch or the engine stop switch is turned to the OFF position, the battery power supply is cut off, and no spark is generated.

The DC-DC converter has a built-in transformer, which changes 1 2 V battery voltage or battery-charging voltage into AC voltage. The diode converts the AC voltage into about 225 V DC to charge the capacitor.

First step - Charging the Capacitor

The converter generates the current to charge the capacitor through the diode with 225 V DC. During this process, the current changes slowly through the primary coil winding so that the secondary coil winding does not produce enough voltage to fire the spark plug.

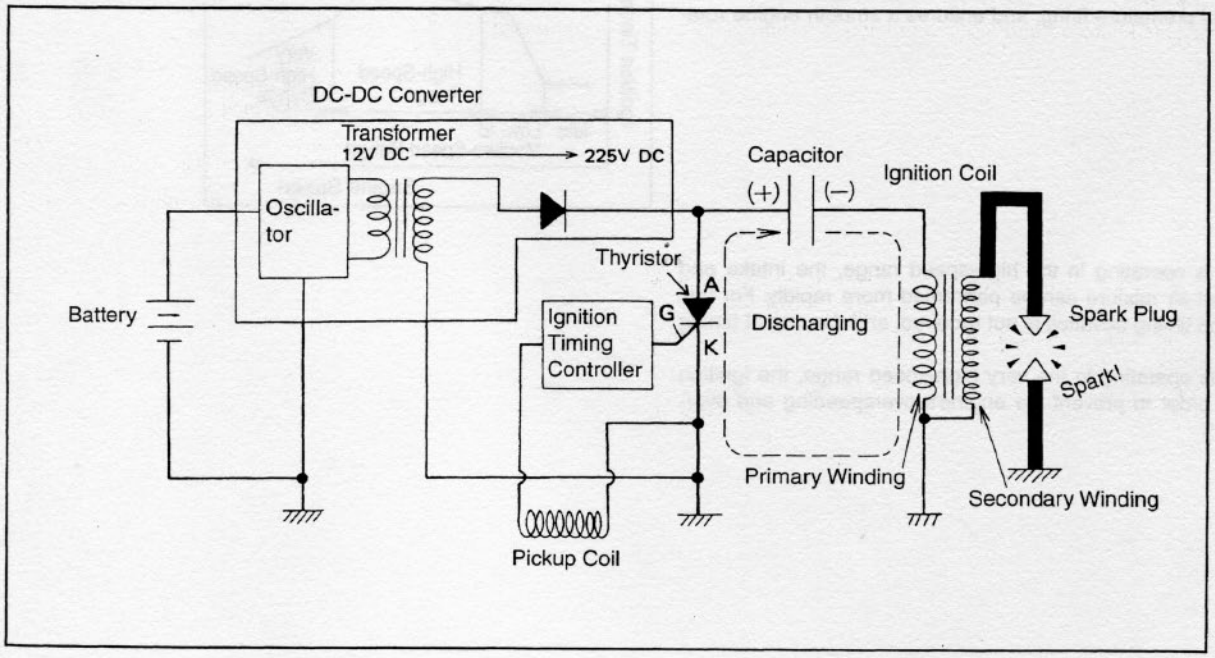


Second step - Thyristor conducts

After charging, the pickup coil and ignition timing controller send a trigger signal to the gate through the cathode (K → G in the figure) in the thyristor. When this happens, the current flows from the cathode to the anode (K → A) in the thyristor.

Third step - Surging current into the Primary Winding

When the thyristor conducts, the charge stored in the capacitor is released suddenly, flowing through the primary winding, back through the thyristor to the capacitor.



This sudden change in the primary current induces a primary voltage (counterelectromotive force) which is equal to the capacitor voltage (about 225 V) but against the discharging current. The primary voltage induces a high secondary voltage in the secondary coil, generating spark in the spark plug gap. The secondary voltage multiplied by winding ratio (about 90 : 1) reaches about 20,000 V.

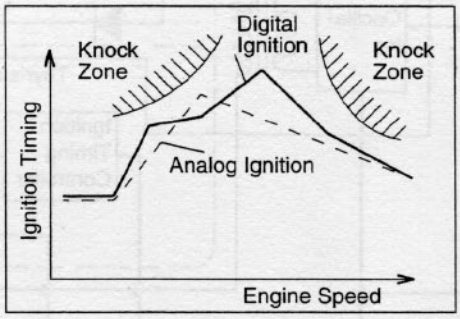
Final step – Thyristor resets

After the charge stored in the capacitor is completely released, the cathode to anode voltage is removed in the thyristor and the thyristor stops conducting and automatically resets. Then, the DC-DC converter charges the capacitor again.

Ignition Timing:

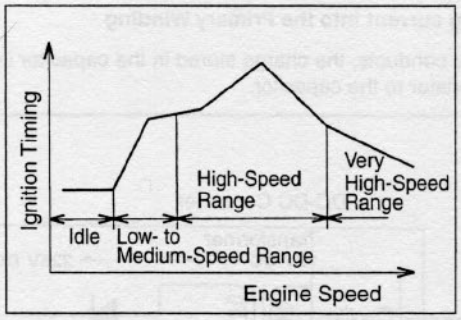
The digital ignition system is employed to acquire the most adequate timing essential to increase engine performances. It is set as multi - phase advanced characteristics through experimental tests according to the engine speed preventing from knock zone range (as shown in the figure).

The digital advance system has a wider range to set than that of the analogue advance system as shown.



When the vehicle is running, the microcomputer counts the number of pulses from the pickup coil for a given length of time to calculate the engine speed. Then, the microcomputer calls from memory ignition timing data for the determined engine speed and generates ignition sparks. When compared with the analog ignition method, the digital ignition method, which calls ignition timing data from memory, achieves a higher precision in ignition timing due to the absence of device-produced variability. The results are the optimal ignition timing and a stable and high engine output.

The ignition timing changes in accordance with the engine speed. In the full-speed range of the engine, the spark plug fires at the before-top-dead-center (BTDC). When the engine speed is in the low- to medium-speed range, the ignition timing advances in proportion to the engine speed. This prevents knocking and premature firing, and ensures a smooth engine rotation.

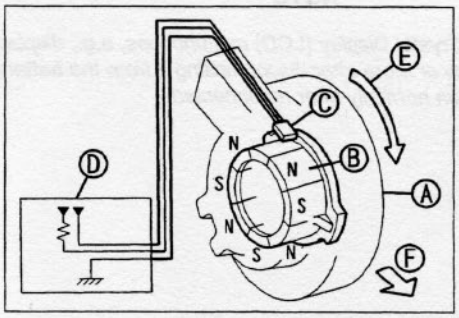


When the engine is operating in the high-speed range, the intake and combustion of the fuel-air mixture can be performed more rapidly. For this reason, a large ignition timing advance is not required, and the rate of timing advance levels off.

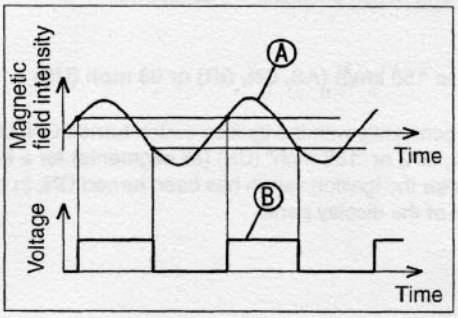
When the engine is operating in the very high-speed range, the ignition timing is retarded in order to prevent the engine's overspeeding and overheating.

Technical Information - Digital Meter

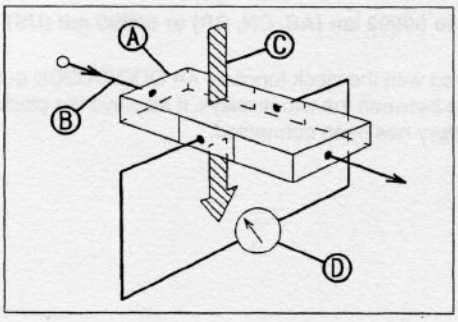
Operating Principles



○ The speed sensor [A] attached to the front wheel hub comprises a magnet [B] and a Hall element [C].
Meter [D]
Direction of rotation [E]
Front side[F]



○ The rotation of the wheel causes the magnet, which meshes with the wheel inside the speed sensor, to rotate and produce a change in the magnetic field [A]. The resulting Hall effect generates voltage pulses [B]. The voltage is read by a meter that displays the speed of the vehicle on an LCD.



○ The "Hall element" refers to a semiconductor device made with GaAs (gallium arsenide), InAs (indium arsenide), or InSb (indium antimonide). The Hall effect, which occurs specifically in these devices, is utilized in the operation of ammeters and voltmeters. The "Hall effect" is a phenomenon in which a voltage [D] is generated in a direction perpendicular to the current and the magnetic field when a current [B] is passed to a Hall element [A] and when a magnetic field [C] is applied in a direction perpendicular to the Hall element.

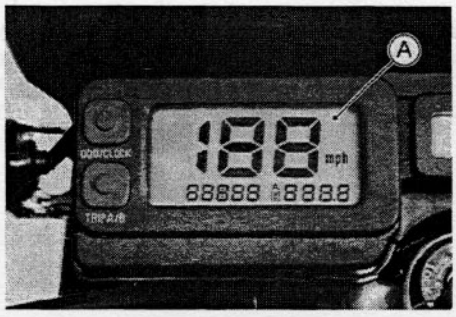
How to use the digital meter:

- Even when the ignition switch is off, the clock continues to run on battery. If the vehicle is not used for a long period of time (approximately three months), the battery becomes depleted. When a motorcycle is not used for a long time, the battery should be removed from the motorcycle and stored in an appropriate place.
- Turning the ignition switch off clears speedometer, odometer, and trip meter displays. Although this erases any information contained in the memory for the speedometer, the odometer and trip meter momory contents are preserved.
- Even when the ignition switch is off, the clock continues to display time. However, disconnecting the battery erases any clock display and memory contents. When the battery is reconnected, the clock starts ticking by displaying a time "1:00".
- Removing the battery erases trip meter memory while preserving odometer memory contents.

NOTE

○ *In case the Liquid Crystal Display (LCD) malfunctions, e.g., display freezing, wait 30 seconds or more after disconnecting it from the battery. The LCD will function normally after reconnected.*

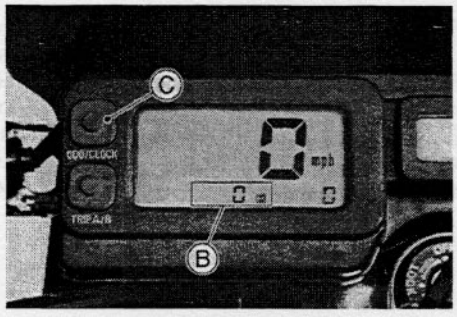
○ The meter displays and button positions are as follows:



Speedometer

Display Range: 0 to 150 km/h (AS, CN, GR) or 93 mph (US)

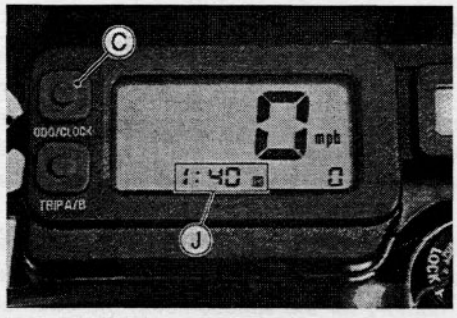
○ Displays speed [A] constantly with the ignition switch turned ON. Displays "188 km/h" (AS, CN, GR) or "188 mph" (US) (all segments) for a few seconds immediately after the ignition switch has been turned ON, in order to check the operation of the display panel.



Odometer [B]

Display Range: 0 to 99999 km (AS, CN, GR) or 99999 mil (US)

○ This display is shared with the clock function. An ODO/CLOCK button [C] is provided to toggle between the two displays. It displays the clock immediately after the battery has been connected.

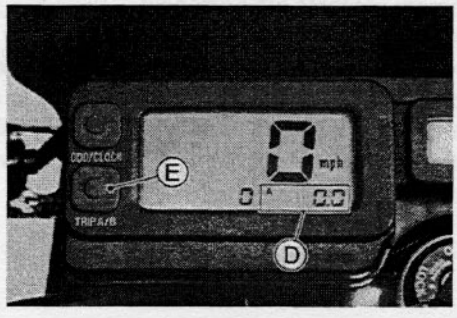


Clock

Display Range: 1:00 to 12:59; 12-hour display without AM/PM distinction.
(hours):(minutes)

Minimum display unit: 1 minute

○ This display is shared with the odometer function. An ODO/CLOCK button [C] is provided to toggle between the functions. Immediately after the ignition switch has been turned ON, it displays the clock [J] with its center segment flashing.



Tripmeter [D]

Displays: **Two displays are provided, Trip A and Trip B. A TRIP A/B [E] button is provided to toggle between the two displays.**

Display Range:

Trip A: 0.0 to 999.9 km (AS, CN, GR) or 999.9 mil (US)

Trip B: 0 to 9999 km (AS, CN, GR) or 9999 mil (US)

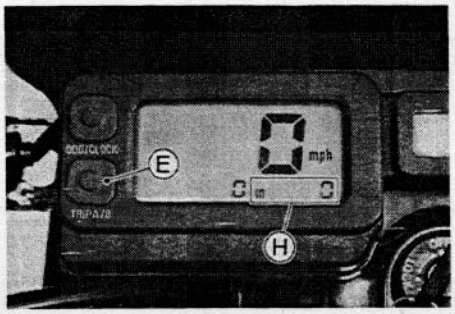
○ Immediately after the ignition switch has been turned ON, the Trip A display shows "0.0", and starts counting the driven distance.

ODO/CLOCK Button

○ Toggles between the odometer and clock displays.

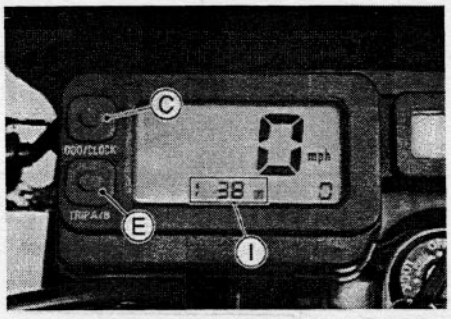
TRIP A/B Button

○ To toggle [H] between the Trip A and Trip B displays, press the TRIP A/B button less than 2 seconds and release it.
● Pressing the switch longer than 2 seconds resets the tripmeter display to "0".

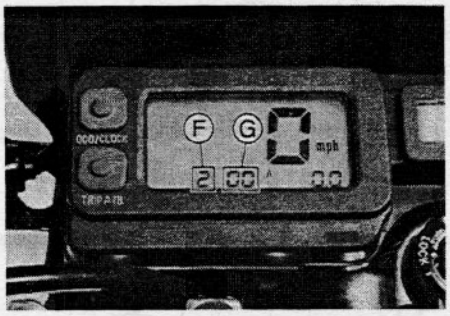


Clock Setting

● Press the ODO/CLOCK button [C] to show the clock in the odometer display.
● Keep the ODO/CLOCK button pressed and turn the TRIP A/B button [E] ON to enable the display to assume the Hour/Minute setting mode [I] in which the numbers flash, thus enabling you to set the time on the clock.
○ Starting with the Hour/Minute setting mode, each pressing of the ODO/CLOCK button changes the setting modes as follows:
Hour/Minute Setting Mode → Hour Setting Mode → Minute Setting Mode



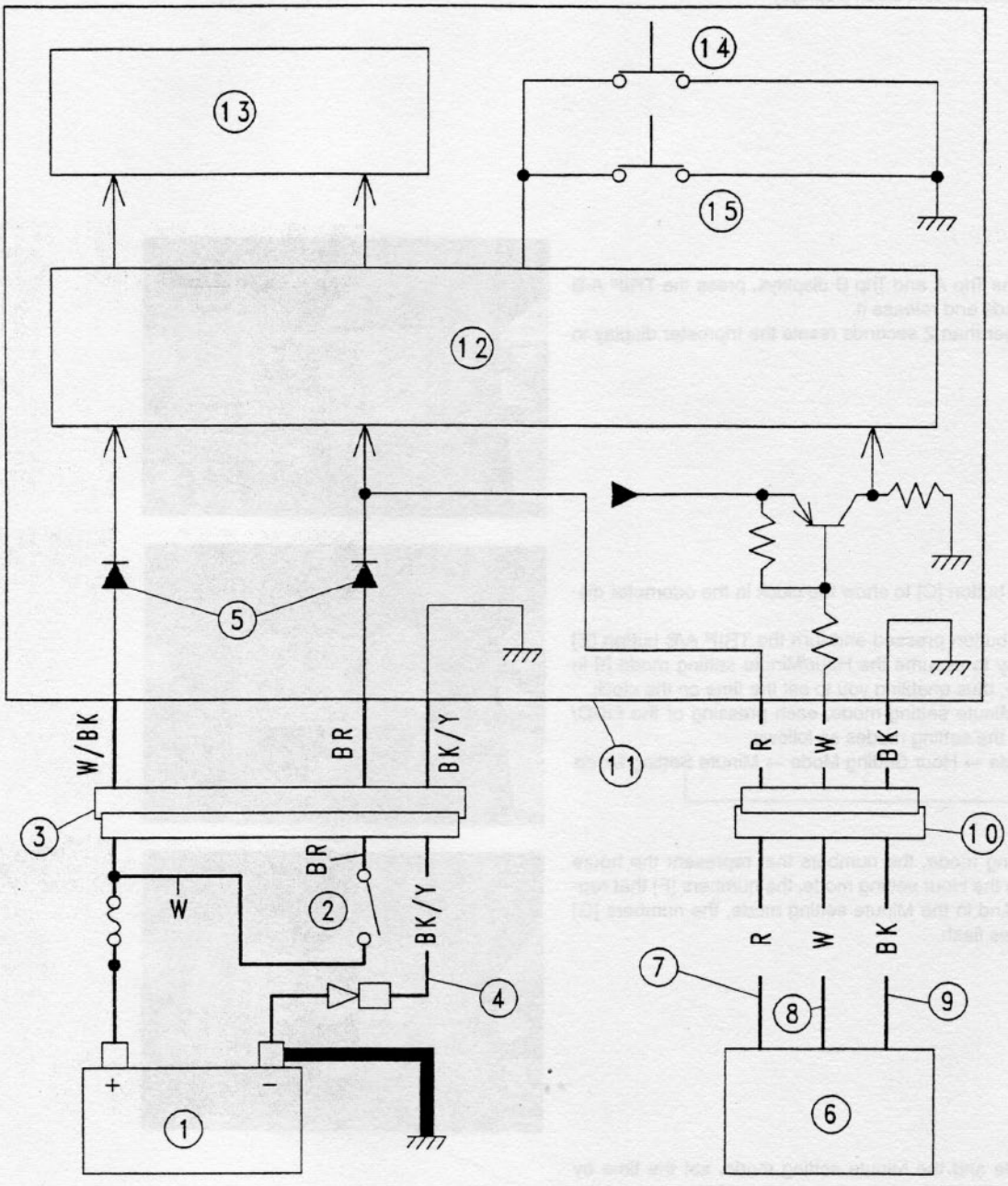
○ In the Hour/Minute setting mode, the numbers that represent the hours and the minutes flash. In the Hour setting mode, the numbers [F] that represent the hours flash. And in the Minute setting mode, the numbers [G] that represent the minutes flash.



● In the Hour setting mode and the Minute setting mode, set the time by pressing the TRIP A/B button to increase the number of Hours and Minutes.
● Then, change to the Hour/Minute setting mode and press the TRIP A/B button to complete the time setting process.

(AS) : Australian Model (CN) : Canadian Model
(GR) : Greek Model (US) : U.S. Model

[Digital Meter System Diagram]



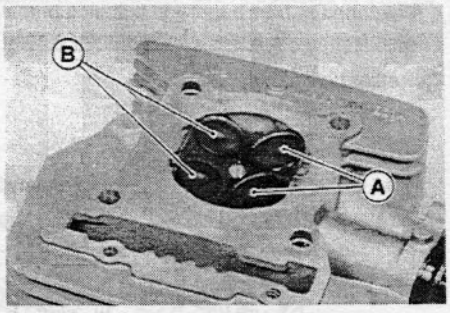
1. Battery
2. Ignition Switch
3. 9-Pin Connector
4. Ground Lead
5. Diode
6. Speed Sensor
7. Speed Sensor Power Lead
8. Speed Sensor Output Lead
9. Speed Sensor Ground Lead
10. 3-Pin Connector
11. Digital Meter Unit
12. Microprocessor
13. LCD (Liquid Crystal Display) Unit
14. ODO/CLOCK Button
15. TRIP A/B Button

Technical Information - Four-Valve System

Four valves (two each for intake and exhaust) are provided per cylinder to improve the engine's horsepower and torque.

Large intake and exhaust port areas must be provided to achieve proper intake and exhaust efficiency in the combustion chamber. There is a limit to how much the intake port area can be achieved with one intake and one exhaust valve per cylinder. For this reason, a four-valve system has been adopted.

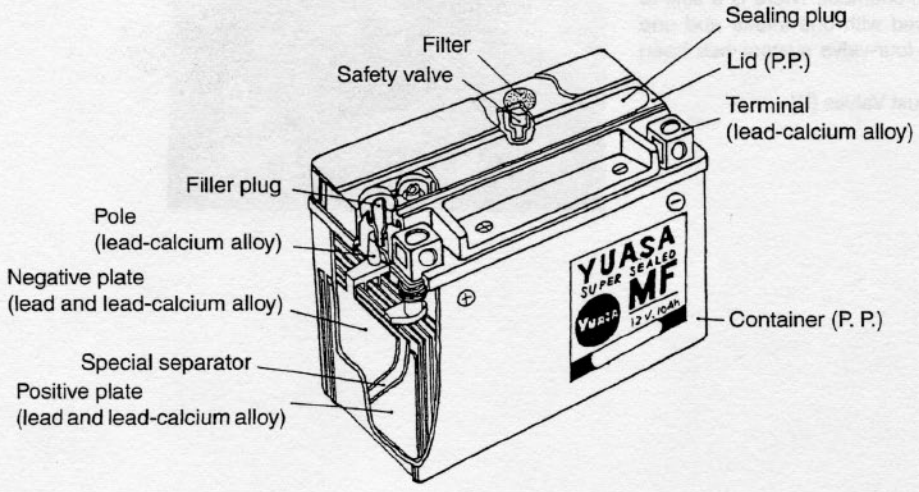
Intake Valves [A] Exhaust Valves [B]



Technical Information - Maintenance Free Battery

A maintenance free battery is installed in this model. The maintenance free battery is a sealed type. So it is impossible to check the electrolyte level. No electrolyte should be added after the initial service.

(I) Construction



(II) Main Features

1) Maintenance free ..... It is not necessary to check the electrolyte level and top-up the electrolyte.
2) No electrolyte leakage ..... As the electrolyte is retained firmly in the special separators, there is no free electrolyte in the battery.
3) Instant activation system ..... It can be used instantly after filling only the electrolyte without initial charge.
4) One-push motion electrolyte filling ..... It is possible to fill the electrolyte by easy one-push motion.
5) Safety construction ..... If the battery internal pressure rises abnormally high, the safety valve opens to release the gas inside the battery to restore the normal pressure and prevent the battery from rupturing. After restoring the normal pressure, the safety valve closes and the battery is sealed again. Moreover, a ceramic filter is disposed on top of the safety valve under the lid to remove risk of ignition or explosion caused by fire from outside.
6) Compact and high performance ..... No presence of free electrolyte allows the battery made lower in height, thus resulting in enhanced volume efficiency. Moreover, gas being absorbed inside the battery eliminates the need for a gas exhaust tube.
7) Strong charge/discharge characteristics ..... It can amply withstand deep charge/discharge cycles.

(III) Principle of Sealing Structure

(+)			(–)	Discharge	(+)			(–)
PbO_2	+ $2H_2SO_4$	+	Pb	$\rightleftarrows$	$PbSO_4$	+ $2H_2O$	+	$PbSO_4$
(Lead peroxide)	(Sulfuric acid)		(Spongy lead)	Charge	(Lead sulfate)	(water)		(Lead sulfate)
Positive active material	Electrolyte		Negative active material		Positive active material	Electrolyte		Negative active material

Normally in an ordinary lead-acid battery when it comes to an end of a charge, where the lead sulfate being a discharge product returns to lead peroxide and spongy lead, the charge current flowing thereafter is used exclusively to decompose electrolytically water from the electrolyte, thus resulting in generation of hydrogen gas from the negative plate and oxygen gas from the positive plate. The gases so generated are released out of the battery, causing the amount of electrolyte decreased to require occasional water replenishment.

A maintenance free battery, however, is so designed that, when it is overcharged, even if the positive plate is fully charged, the negative plate remains not fully turned to spongy lead. Therefore, even when the positive plate is overcharged generating oxygen gas, the negative plate is no fully charged, hence generating no hydrogen gas.

Moreover, the oxygen gas generated from the positive plate immediately reacts with the charged active material on the negative plate, and returns to water, with the ultimate result of no water loss

Pb	+	1/2 O_2	→	(PbO)
Negative active material (charged state)		Oxygen generated from positive plate		Negative active material

(PbO)	+	H_2SO_4	→	$PbSO_4$	+	H_2O
		Electrolyte		Negative active material (charged state)		Water

Thus, the negative plate is made as not to get fully charged. Even if the overcharge continues, the oxygen gas generated inside the battery is absorbed by the negative plate, a process called oxygen cycle, which keeps water loss theoretically at nil, and allows the battery to be sealed.

Torque and Locking Agent

Use a torque wrench to tighten bolts and nuts to their specified torque values. If too little torque is applied, the bolts and nuts could loosen and fall out. If too much torque is applied, the threads of the bolts and nuts could collapse or the threads could be sheared off.

To tighten a bolt or a nut, or to check their torque, loosen the bolt or nut one-half turn before tightening it to the specified torque.

Letters used in the "Remarks" column mean:

G: Apply grease to the threads.
L: Apply non-permanent locking agent to the threads.
Lh: Left-hand threads.
M: Apply molybdenum disulfide grease to the threads and seating surface.
O: Apply engine oil to the threads and seating surface.
R: Replacement part.
S: Tighten the fasteners following the specified sequence.
St: Stake the fasteners to prevent loosening.

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

Thread Diameter (mm)	Tightening 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	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

Item	Tightening Torque			Remarks
	N·m	kg·m	ft·lb	
Fuel System:				
Carburetor Holder Bolt	12	1.2	104 in·lb	
Carburetor Drain Screw	2.0	0.20	17 in·lb	
Float Bowl Screw	2.0	0.20	17 in·lb	
Upper Chamber Cover Screw	2.0	0.20	17 in·lb	
Coasting Enricher Cover Screw	2.0	0.20	17 in·lb	
Choke Plunger Cap	2.5	0.25	22 in·lb	
Choke Cable Locknut	5.9	0.60	52 in·lb	
Main Jet	1.8	0.18	16 in·lb	
Pilot Jet	0.8	0.08	7.1 in·lb	
Pilot Air Jet	1.2	0.12	10 in·lb	
Fuel Tap Plate Screw	0.8	0.08	7.1 in·lb	
Fuel Tap Diaphragm Cover Screw	1.0	0.10	8.7 in·lb	

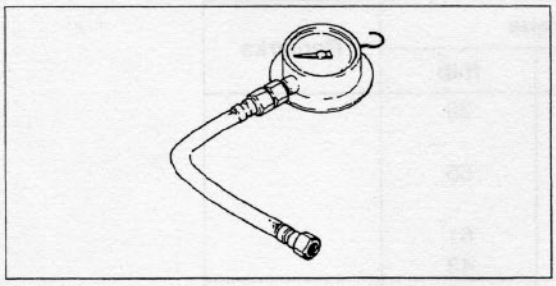
Item	Tightening Torque			Remarks
	N·m	kg·m	ft·lb	
Engine Top End:				
Spark Plug	13	1.3	9.4	
Cylinder Head Cover Bolt	7.8	0.80	69 in·lb	
Chain Tensioner Mounting Bolt	11	1.1	95 in·lb	S, L
Chain Tensioner Cap	20	2.0	14	S
Chain Tensioner Lock Bolt	11	1.1	95 in·lb	S
Camshaft Cap Bolt	12	1.2	104 in·lb	S
Camshaft Sprocket Bolt	9.8	1.0	87 in·lb	L
Oil Pipe Banjo Bolt	9.8	1.0	87 in·lb	Cylinder Head
Oil Pipe Banjo Bolt	20	2.0	14 in·lb	Clutch Cover
Cylinder Head Bolt ø 10	49	5.0	36	S, M (Also to be applied to the rubber portion.)
ø 6	12	1.2	104 in·lb	S
Exhaust Pipe Stud Bolt	25	2.5	18	
Muffler Cover Screw	–	–		L
Cam Chain Guide Mounting Bolt	25	2.5	18	
Cam Chain Guide Holder Bolt	9.8	1.0	87 in·lb	
Timing Inspection Plug	2.5	0.25	22 in·lb	
Rotor Bolt Plug	2.5	0.25	22 in·lb	
Carburetor Holder Bolt	12	1.2	104 in·lb	
Vacuum Hose Fitting	5.9	0.6	52 in·lb	
Clutch:				
Starter Lockout Switch Screw	1	0.10	8.7 in·lb	
Clutch Cable Holder Bolt	9.8	1.0	87 in·lb	Clutch Cover
Clutch Cover Bolt	9.8	1.0	87 in·lb	
Clutch Cover Damper Bolt	5.9	0.6	52 in·lb	L
Clutch Spring Bolt	3.1	0.32	28 in·lb	
Clutch Hub Nut	78	8.0	58	
Primary Gear Nut	98	10	72	
Engine Lubrication System:				
Engine Oil Drain Plug	15	1.5	11	
Oil Filter Cover Bolt	9.8	1.0	87 in·lb	
Oil Pump Cover Screw	5.0	0.5	43 in·lb	
Oil Pump Mounting Screw	5.0	0.5	43 in·lb	
Oil Pipe Banjo Bolt	20	2.0	14	Clutch Cover
Oil Pipe Banjo Bolt	9.8	1.0	87 in·lb	Cylinder Head
Oil Pipe Banjo Bolt	9.8	1.0	87 in·lb	Crankcase
Oil Seal Holder Bolt	12	1.2	104 in·lb	Clutch Cover
Oil Cooler Plug	25	2.5	18	Clutch Cover
Oil Pump Passage Blind Plug	18	1.8	13	Clutch Cover
Oil Pressure Relief Valve	15	1.5	11	L
Engine Removal/Installation:				
Engine Mounting Bolt, Nut	44	4.5	33	ø 10
Engine Mounting Bracket Bolt	23	2.3	17	ø 8
Cylinder Head Bracket Bolt	23	2.3	17	ø 8
Swing Arm Pivot Nut	88	9.0	65	

Item	Tightening Torque			Remarks
	N·m	kg·m	ft·lb	
Crankshaft/Transmission:				
Crankcase Bolt	9.8	1.0	87 in·lb	
Crankcase Allen Bolt	15	1.5	11	
Oil Pipe Banjo Bolt	9.8	1.0	87 in·lb	Left Crankcase
Primary Gear Nut	98	10	72	
Shift Mechanism Cover Bolt	9.8	1.0	87 in·lb	
Shift Mechanism Cover Nut	9.8	1.0	87 in·lb	
Shift Mechanism Cover Screw	5	0.5	43 in·lb	
Shift Return Spring Pin	37	3.8	27	L
Neutral Switch	15	1.5	11	
Shift Drum Cam Bolt	12	1.2	104 in·lb	L
Gear Set Lever Nut	9.8	1.0	87 in·lb	
Wheels/Tires:				
Tire Air Valve Nut	1.5	0.15	13 in·lb	
Front Axle	88	9.0	65	S
Front Axle Clamp Nut	9.3	0.95	82 in·lb	S
Rear Axle Nut	88	9.0	65	
Spoke Nipple	2.0 ~ 3.9	0.20 ~ 0.40	17 ~ 35 in·lb	
Final Drive:				
Rear Axle Nut	88	9.0	65	
Rear Sprocket Nut	27	2.8	20	
Rear Sprocket Stud	–	–		L
Chain Guide Bolt	7.8	0.80	69 in·lb	
Upper Engine Sprocket Cover Bolts (1)	–	–	–	L
Brakes:				
Caliper Bleed Valve	7.8	0.8	69 in·lb	
Brake Hose Banjo Bolt	25	2.5	18	
Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Brake Lever Adjuster Locknut	5.9	0.60	52 in·lb	
Front Brake Reservoir Cap Screw	1.5	0.15	13 in·lb	
Front Brake Light Switch Screw	1.0	0.10	8.7 in·lb	
Front Master Cylinder Clamp Bolt	8.8	0.9	78 in·lb	S
Caliper Mounting Bolt (front, rear)	25	2.5	18	
Disc Bolt (front)	23	2.3	17	
Rear Master Cylinder Mounting Screw	7.8	0.8	69 in·lb	
Rear Master Cylinder Push Rod Locknut	18	1.8	13	
Rear Brake Reservoir Cap Screw	1.5	0.15	13 in·lb	
Disc Bolt (rear)	15	1.5	11	
Front Brake Hose Clamp Bolt	6.9	0.70	61 in·lb	
Suspension:				
Front Fork Clamp Bolt (upper, lower)	21	2.1	15	S
Front Fork Top Plug	22	2.2	16	
Front Fork Bottom Allen Bolt	30	3.0	22	L
Front Axle Clamp Nut	9.3	0.95	82 in·lb	S

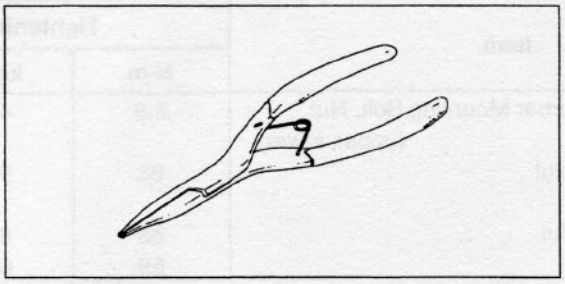
Item	Tightening Torque			Remarks
	N·m	kg·m	ft·lb	
Rear Shock Absorber Mounting Bolt, Nut (upper, lower)	3.9	4.0	29	
Swingarm Pivot Nut	88	9.0	65	
Unitrack				
Rocker Arm Nut	83	8.5	61	
Tie-Rod Nut	59	6.0	43	
Steering:				
Steering Stem Head Nut	49	5.0	36	
Steering Stem Nut	4.9	0.5	43 in·lb	
Handlebar Clamp Bolt	25	2.5	18	S
Front Fork Clamp Bolt (lower)	21	2.1	15	S
Frame:				
Rear Step Holder Bolt	25	2.5	18	
Side Grip Bolt	25	2.5	18	
Electrical System:				
Spark Plug	13	1.3	9.4	
Pickup Coil Screw	2.5	0.25	22 in·lb	
Timing Inspection Plug	2.5	0.25	22 in·lb	
Rotor Bolt Plug	2.5	0.25	22 in·lb	
Torque Limiter Cap Bolt	9.8	1.0	87 in·lb	
Alternator Cover Bolt	12	1.2	104 in·lb	
Alternator Rotor Bolt	120	12	87	
Alternator Stator Bolt	9.8	1.0	87 in·lb	
Starter Motor Terminal Locknut	6.9	0.70	61 in·lb	
Starter Motor Terminal Nut	4.9	0.50	43 in·lb	
Starter Relay Terminal Screw	4.9	0.50	43 in·lb	
Starter Motor Assembly Bolt	4.9	0.50	43 in·lb	
Starter Motor Mounting Bolt	9.8	1.0	87 in·lb	
Starter Clutch Bolt	12	1.2	104 in·lb	L
Handlebar Switch Housing Screw	3.4	0.35	30 in·lb	
Turn Signal Light Screw	1.0	0.10	8.7 in·lb	
Neutral Switch	15	1.5	11	
Side Stand Switch Bolt	6.9	0.70	61 in·lb	L

Special Tools and Sealants

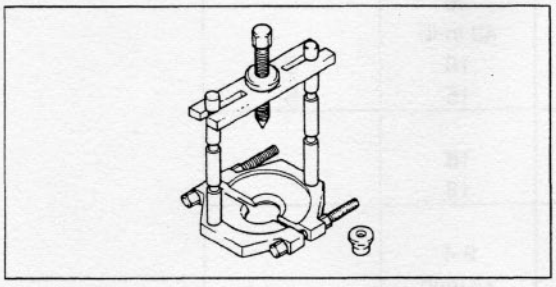
Oil Pressure Gauge, 5kg/cm²: 57001-125



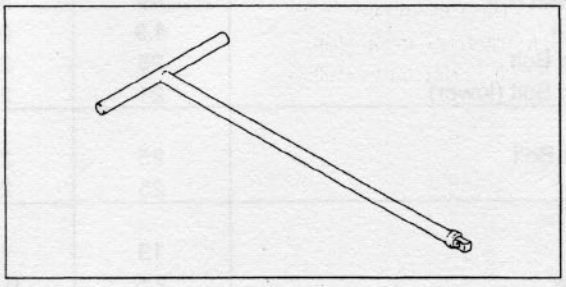
Outside Circlip Pliers: 57001-144



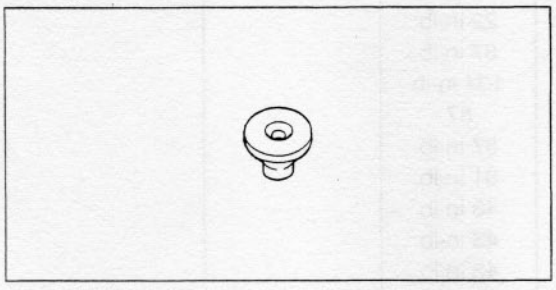
Bearing Puller: 57001-135



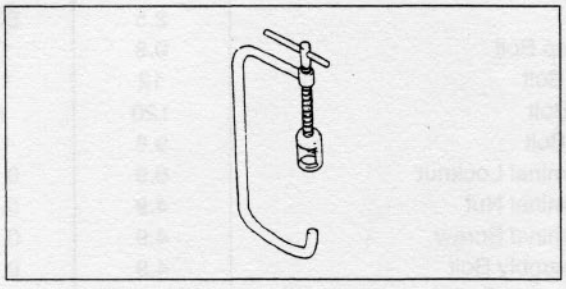
Fork Cylinder Holder Handle: 57001-183



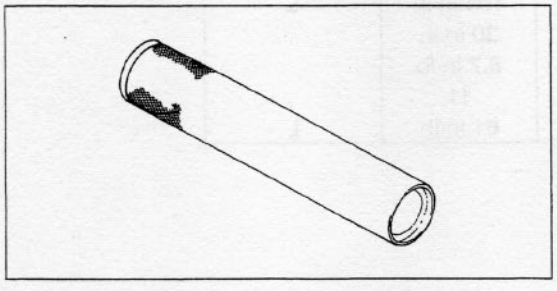
Bearing Puller Adapter: 57001-136



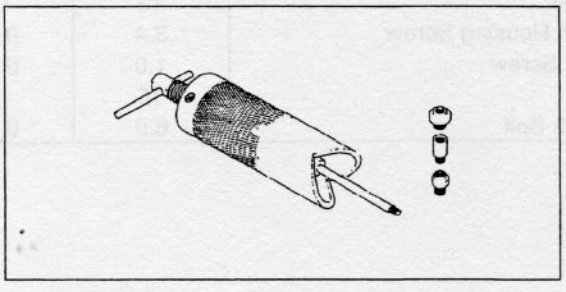
Valve Spring Compressor Set: 57001-241



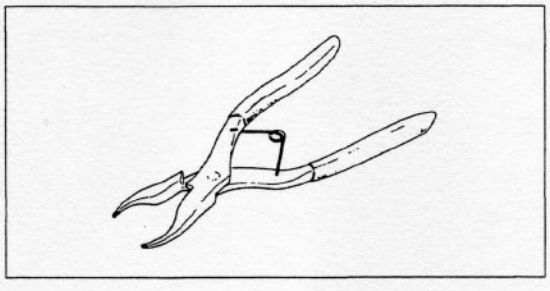
Steering Stem Bearing Driver: 57001-137



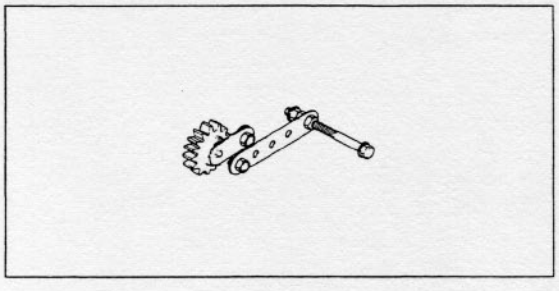
Piston Pin Puller Set: 57001-910



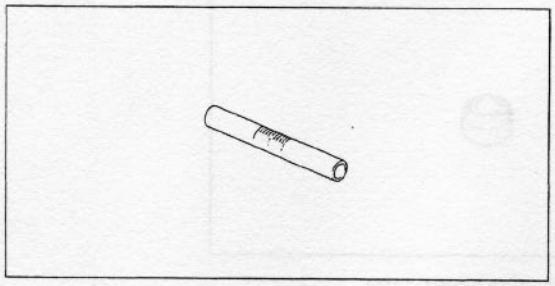
Inside Circlip Pliers: 57001-143



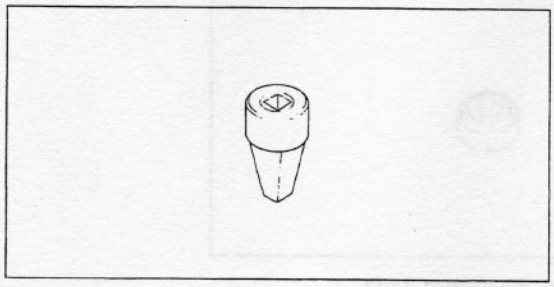
Gear Holder: 57001-1015



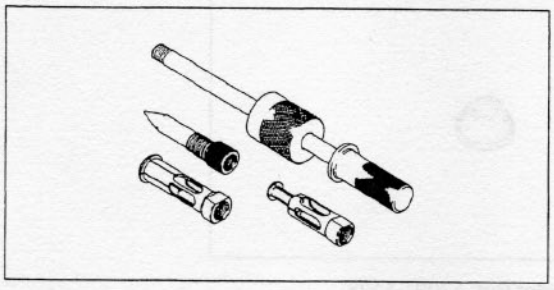
Fuel Level Gauge: 57001-1017



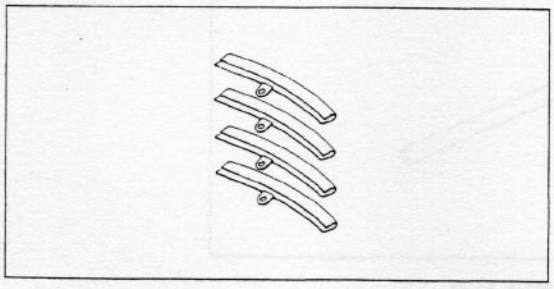
Fork Cylinder Holder Adapter: 57001-1057



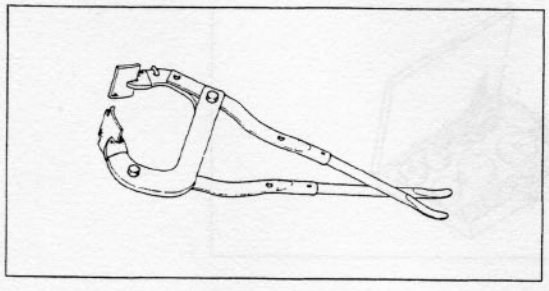
Oil Seal & Bearing Remover: 57001-1058



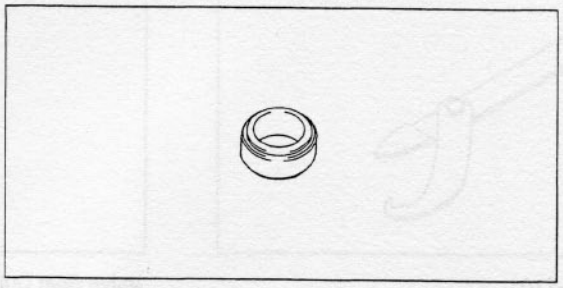
Rim Protector: 57001-1063



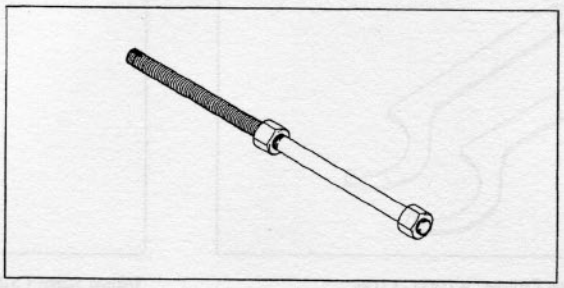
Bead Breaker Set: 57001-1072



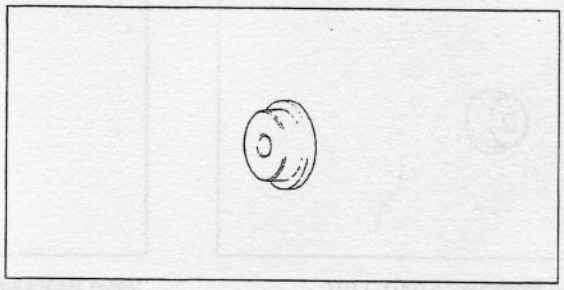
Steering Stem Bearing Driver Adapter: 57001-1074



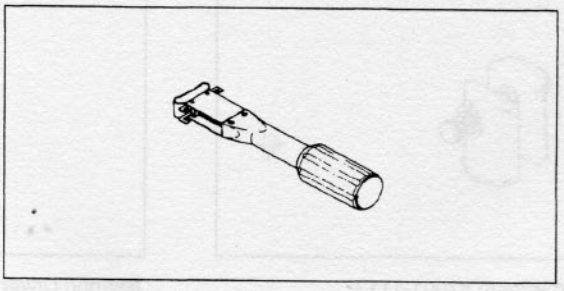
Head Pipe Outer Race Press Shaft: 57001-1075



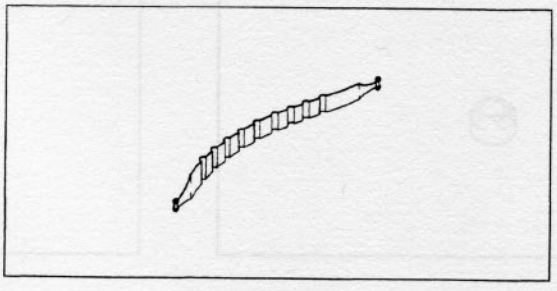
Head Pipe outer Race Driver: 57001-1076



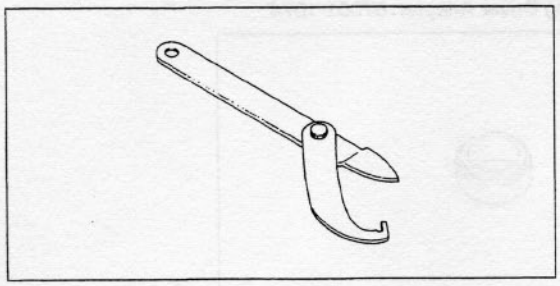
Piston Ring Compressor Grip: 57001-1095



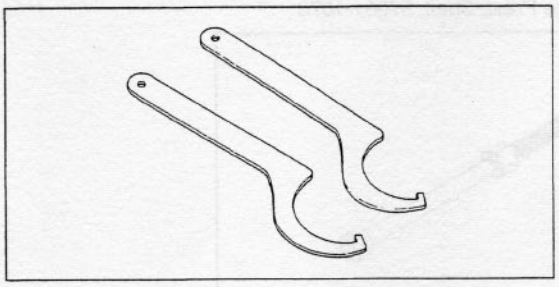
Piston Ring Compressor Belt, ø67 to ø79: 57001-1097



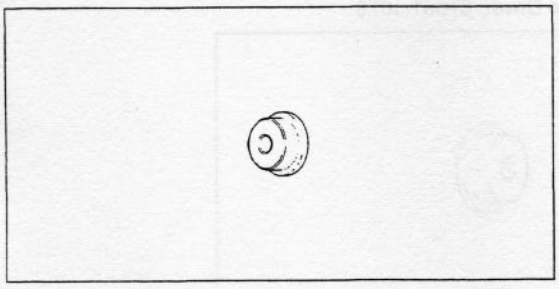
Steering Stem Nut Wrench: 57001-1100



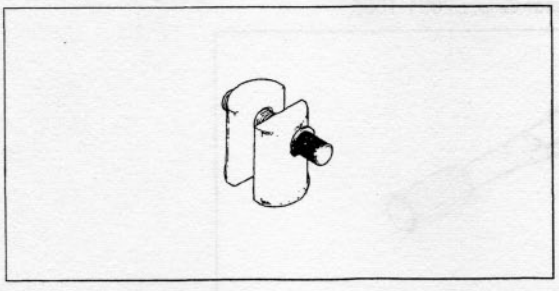
Hook Wrench: 57001-1101



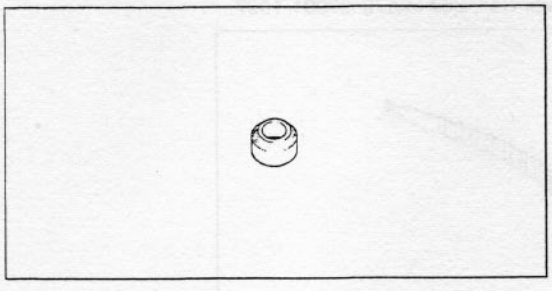
Head Pipe Outer Race Driver: 57001-1106



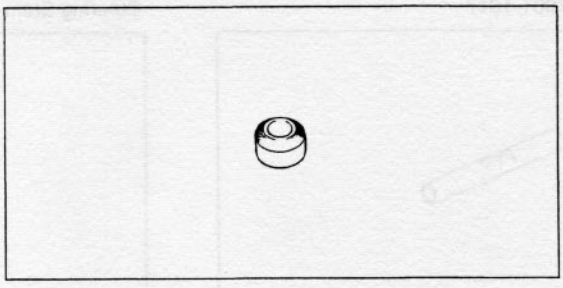
Head Pipe Outer Race Remover: 57001-1107



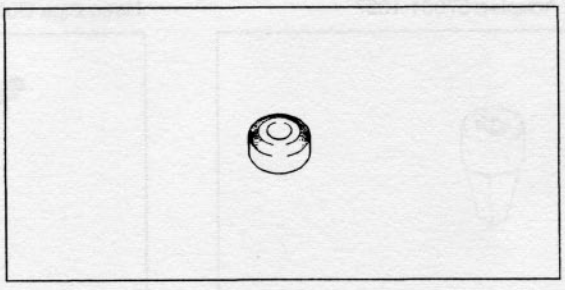
Valve Seat Cutter, 45° -ø24.5: 57001-1113



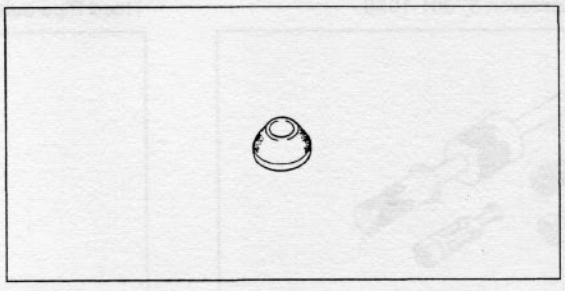
Valve Seat Cutter, 32° -ø25: 57001-1118



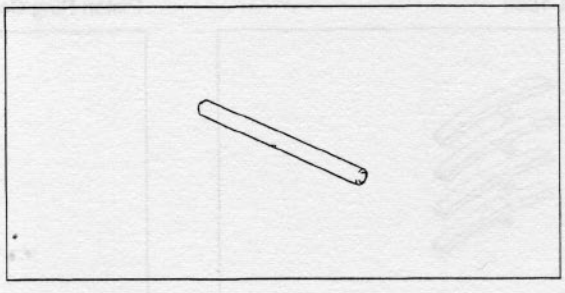
Valve Seat Cutter, 32° -ø30: 57001-1120



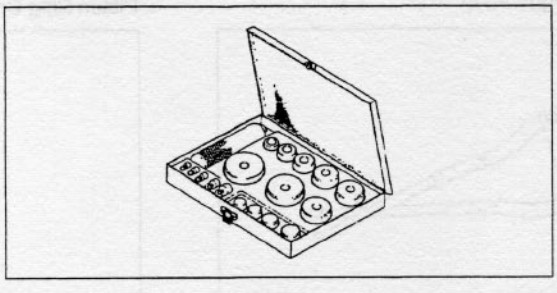
Valve Seat Cutter, 60° -ø30: 57001-1123



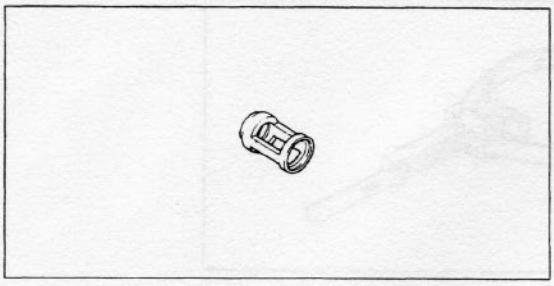
Valve Seat Cutter Holder Bar: 57001-1128



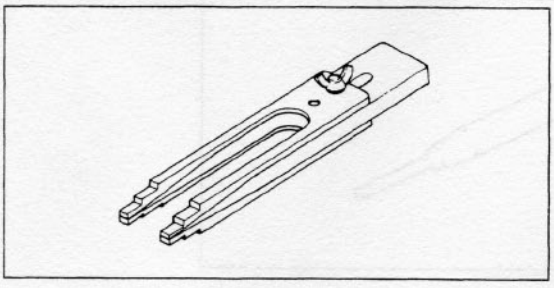
Bearing Driver Set: 57001-1129



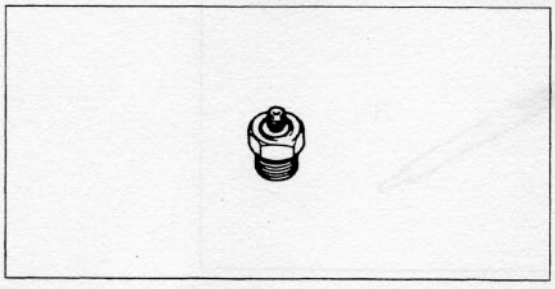
Valve Spring Compressor Adapter, ø20: 57001-1154



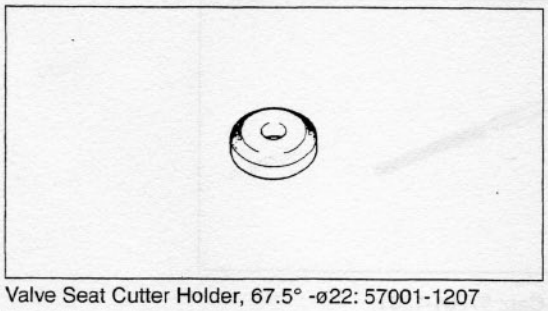
Crankshaft Jig: 57001-1174



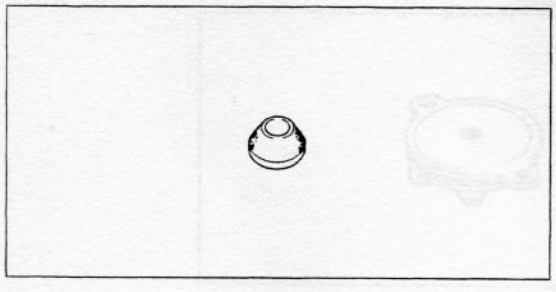
Oil Pressure Gauge Adapter, M10 × 1.25: 57001-1182



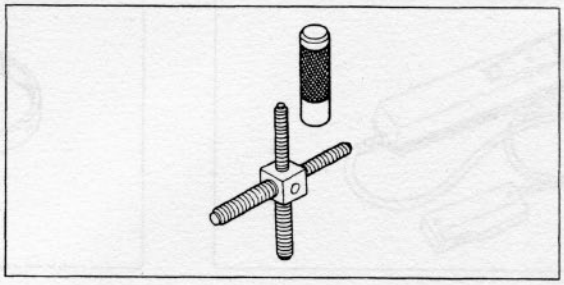
Valve Seat Cutter, 45° -ø30: 57001-1187



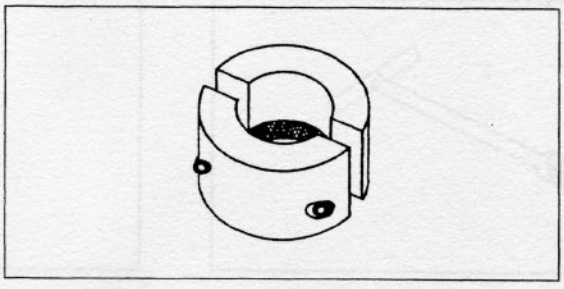
Valve Seat Cutter Holder, 67.5° -ø22: 57001-1207



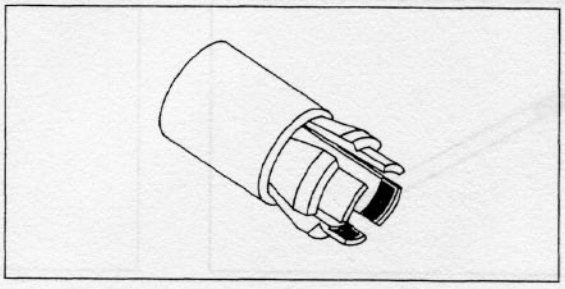
Rotor Puller, M16/M18/M20/M22 × 1.5: 57001-1216



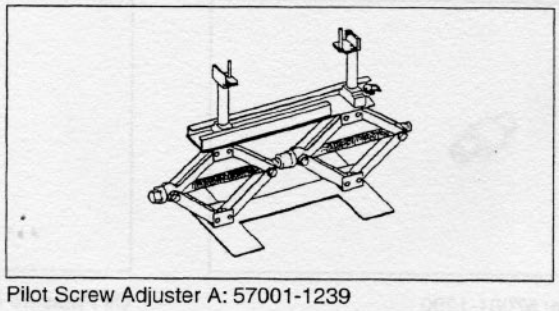
Fork Outer Tube Weight: 57001-1218



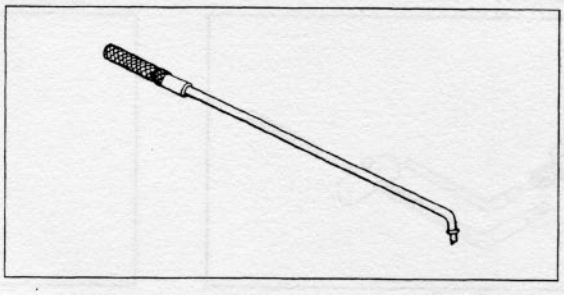
Fork Oil Seal Driver: 57001-1219



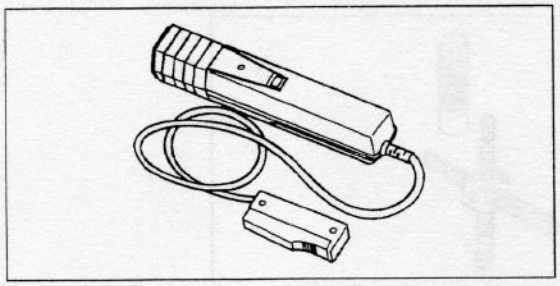
Jack: 57001-1238



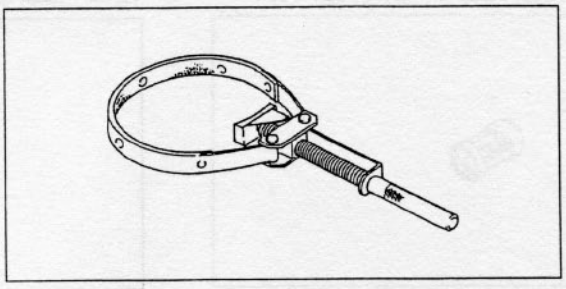
Pilot Screw Adjuster A: 57001-1239



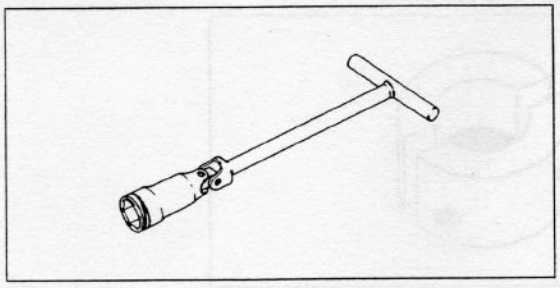
Timing Light: 57001-1241



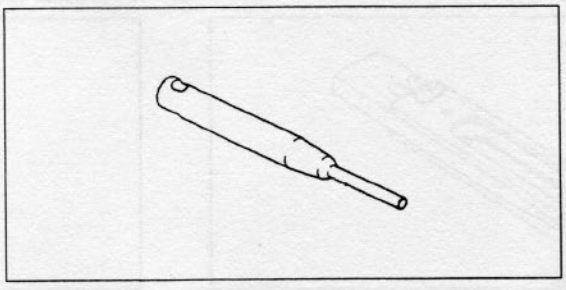
Flywheel Holder: 57001-1313



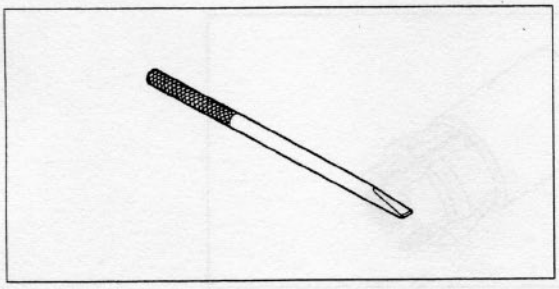
Spark Plug Wrench, Hex 16: 57001-1262



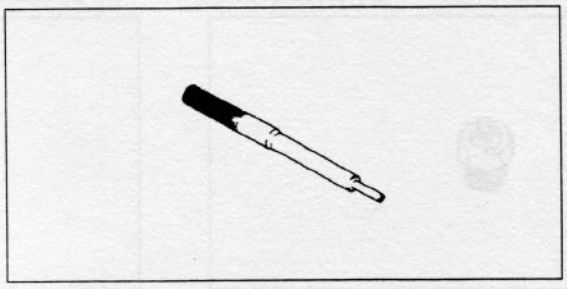
Valve Seat Cutter Holder, ø4.5: 57001-1330



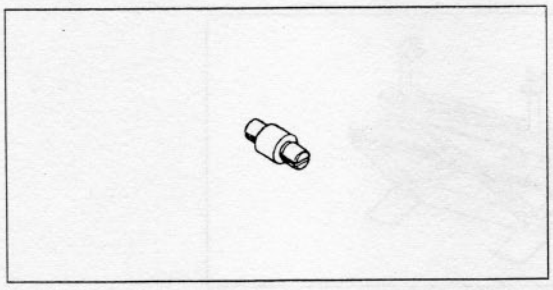
Bearing Remover Shaft, ø9: 57001-1265



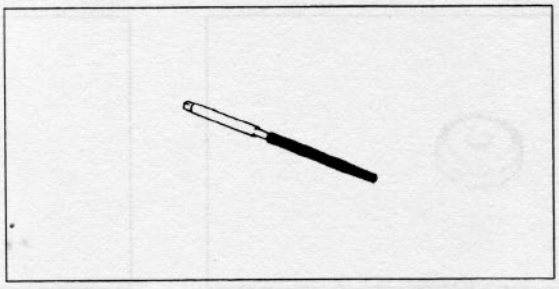
Valve Guide Arbor, ø4.5: 57001-1331



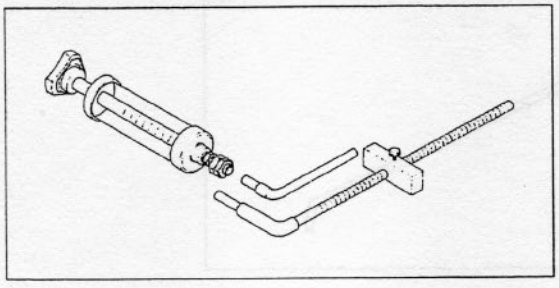
Bearing Remover Head, ø15 × ø17: 57001-1267



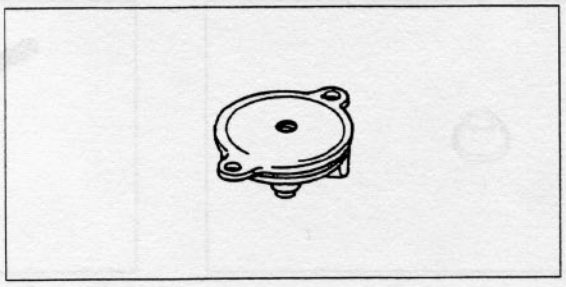
Valve Guide Reamer, ø4.5: 57001-1333



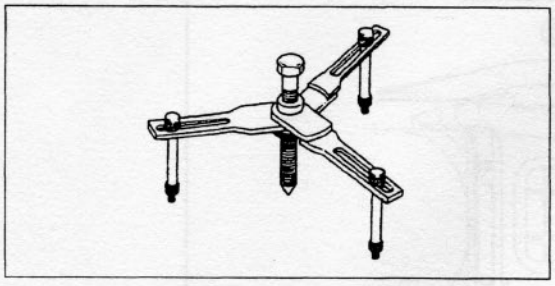
Fork Oil Level Gauge: 57001-1290



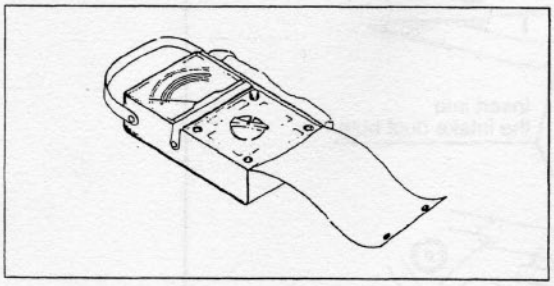
Oil Pressure Gauge Cap: 57001-1361



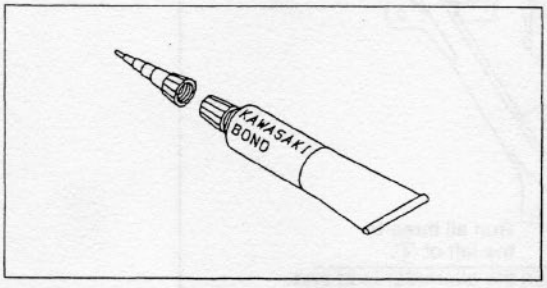
Crankcase Splitting Tool Assembly: 57001-1362



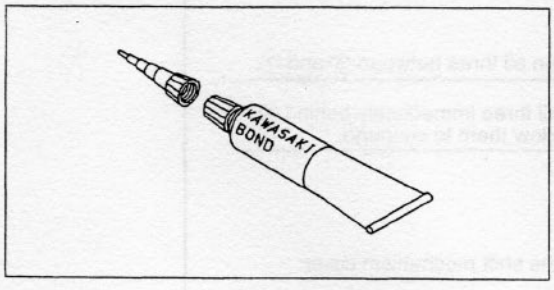
Hand Tester: 57001-1394



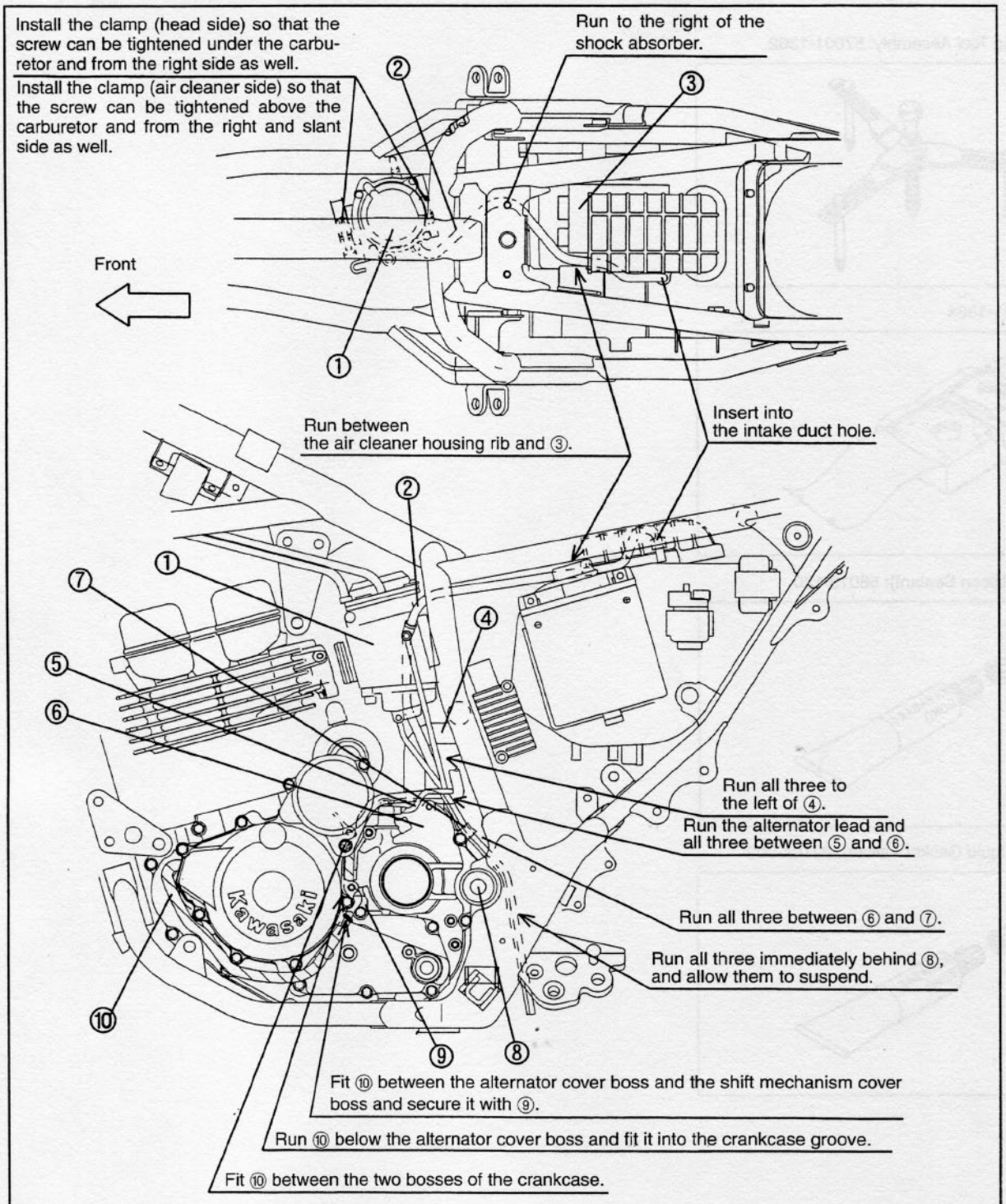
Kawasaki Bond (Silicon Sealant): 56019-120



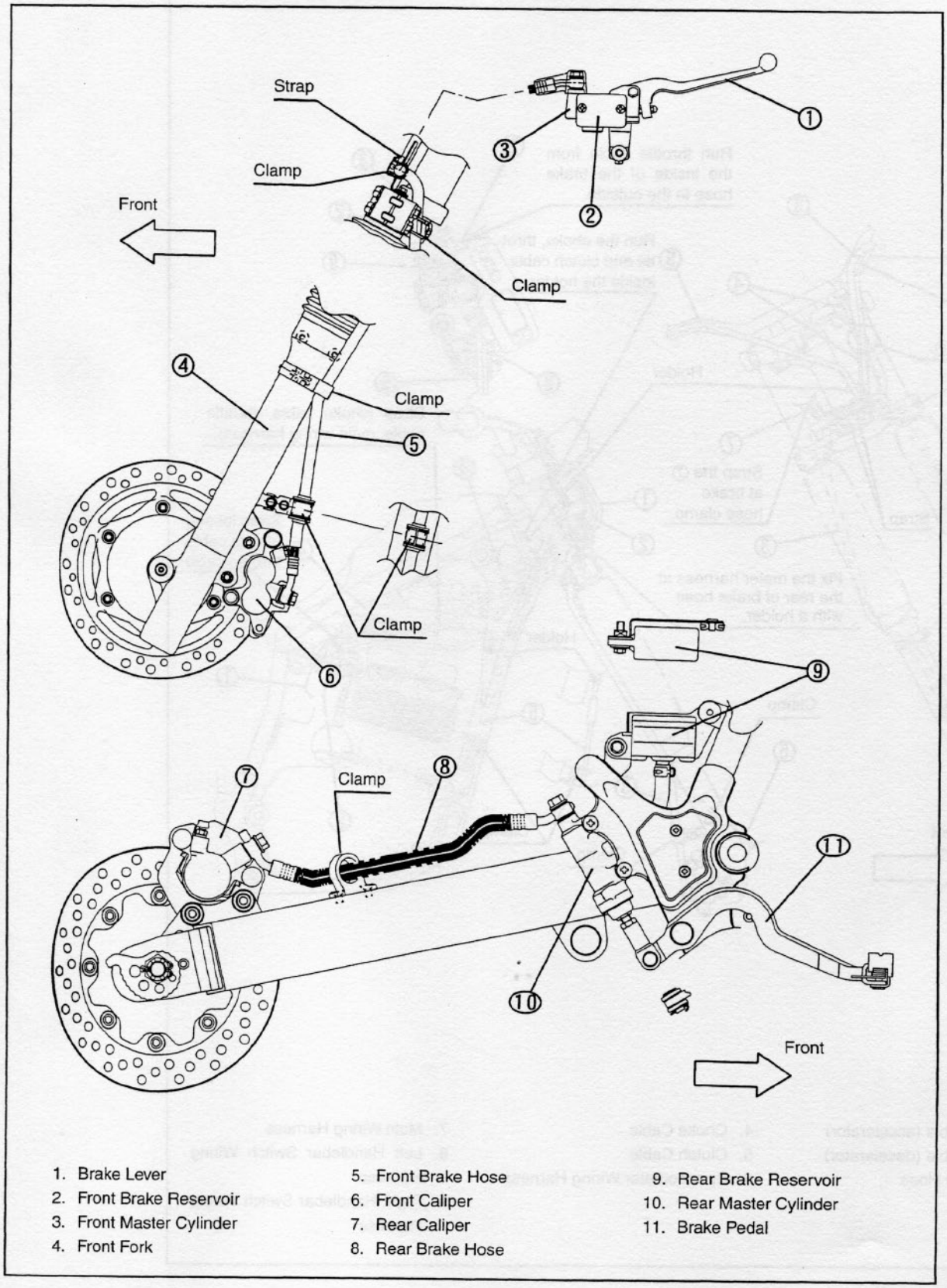
Kawasaki Bond (Liquid Gasket - silver): 92104-002



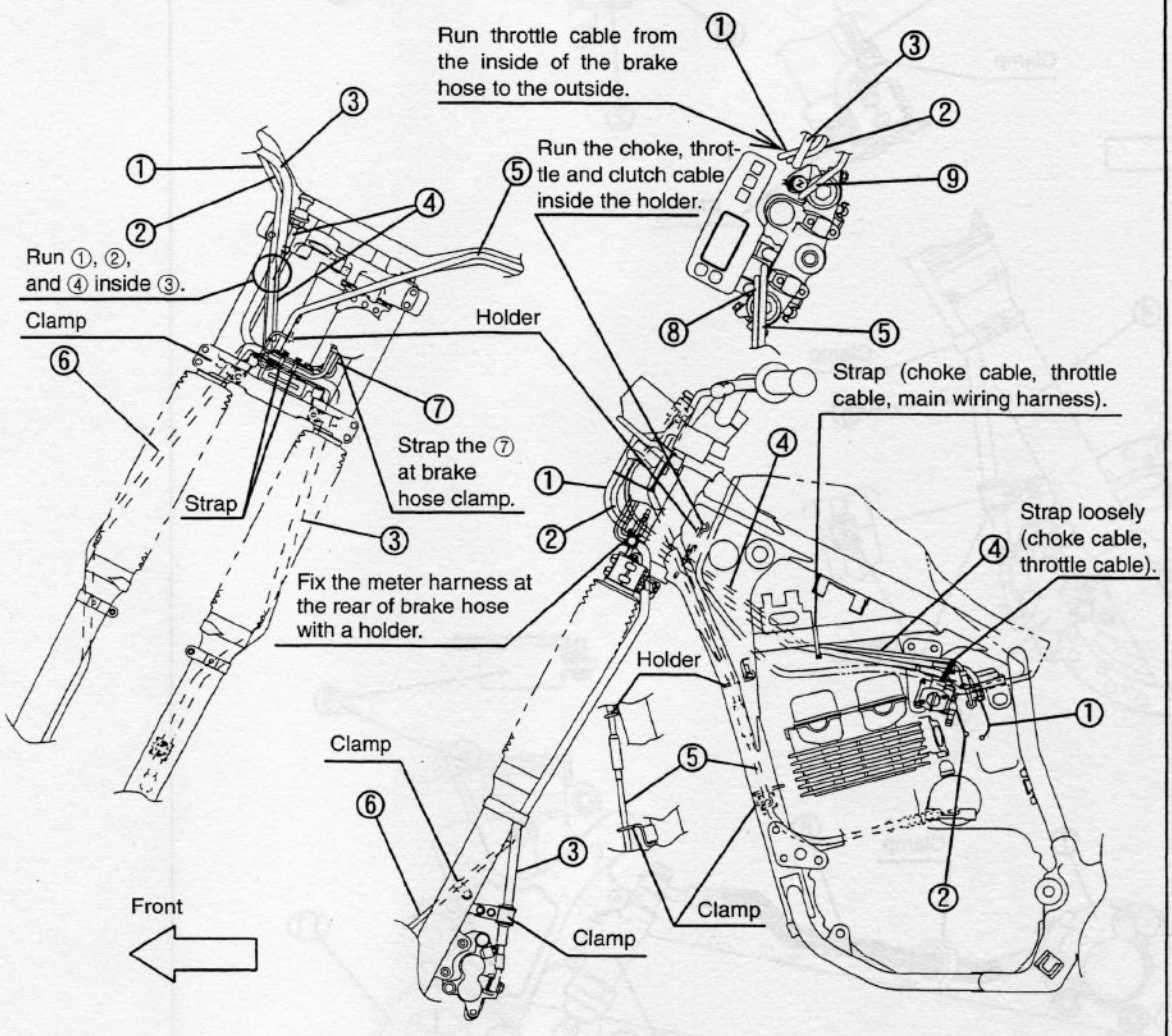
Cable, Wire and Hose Routing



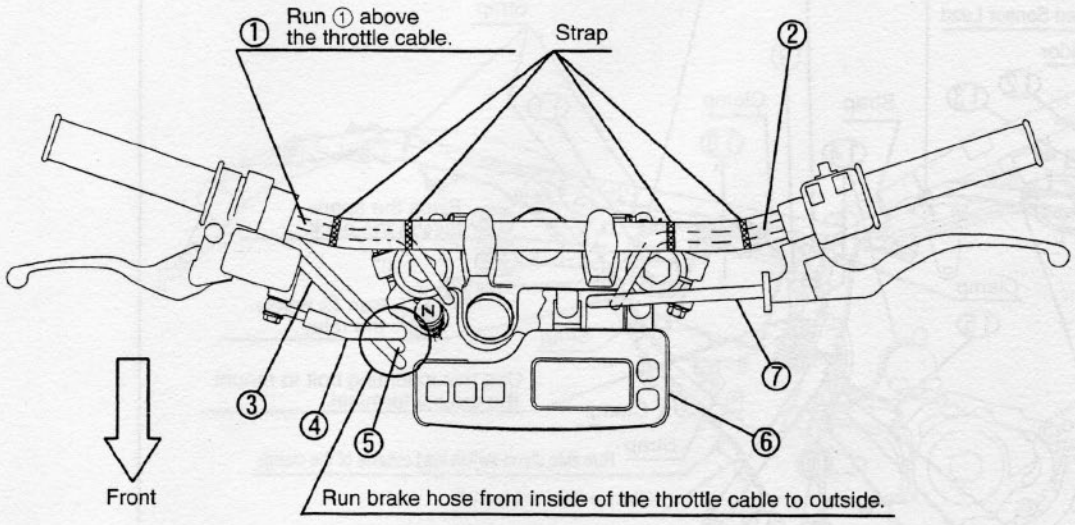
1. Carburetor
2. Carburetor Vent Hose
3. CDI Unit
4. Crankcase Breather Hose
5. Oil Pipe
6. Crankcase
7. Clamp
8. Swing Arm Pivot
9. Holder
10. Alternator Lead and Pick up Coil Lead

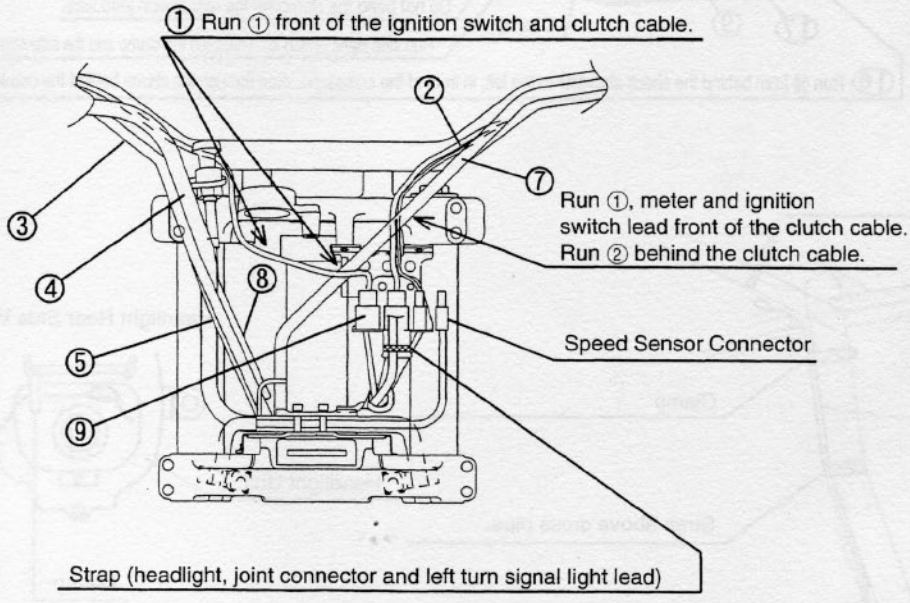


1. Brake Lever
2. Front Brake Reservoir
3. Front Master Cylinder
4. Front Fork
5. Front Brake Hose
6. Front Caliper
7. Rear Caliper
8. Rear Brake Hose
9. Rear Brake Reservoir
10. Rear Master Cylinder
11. Brake Pedal

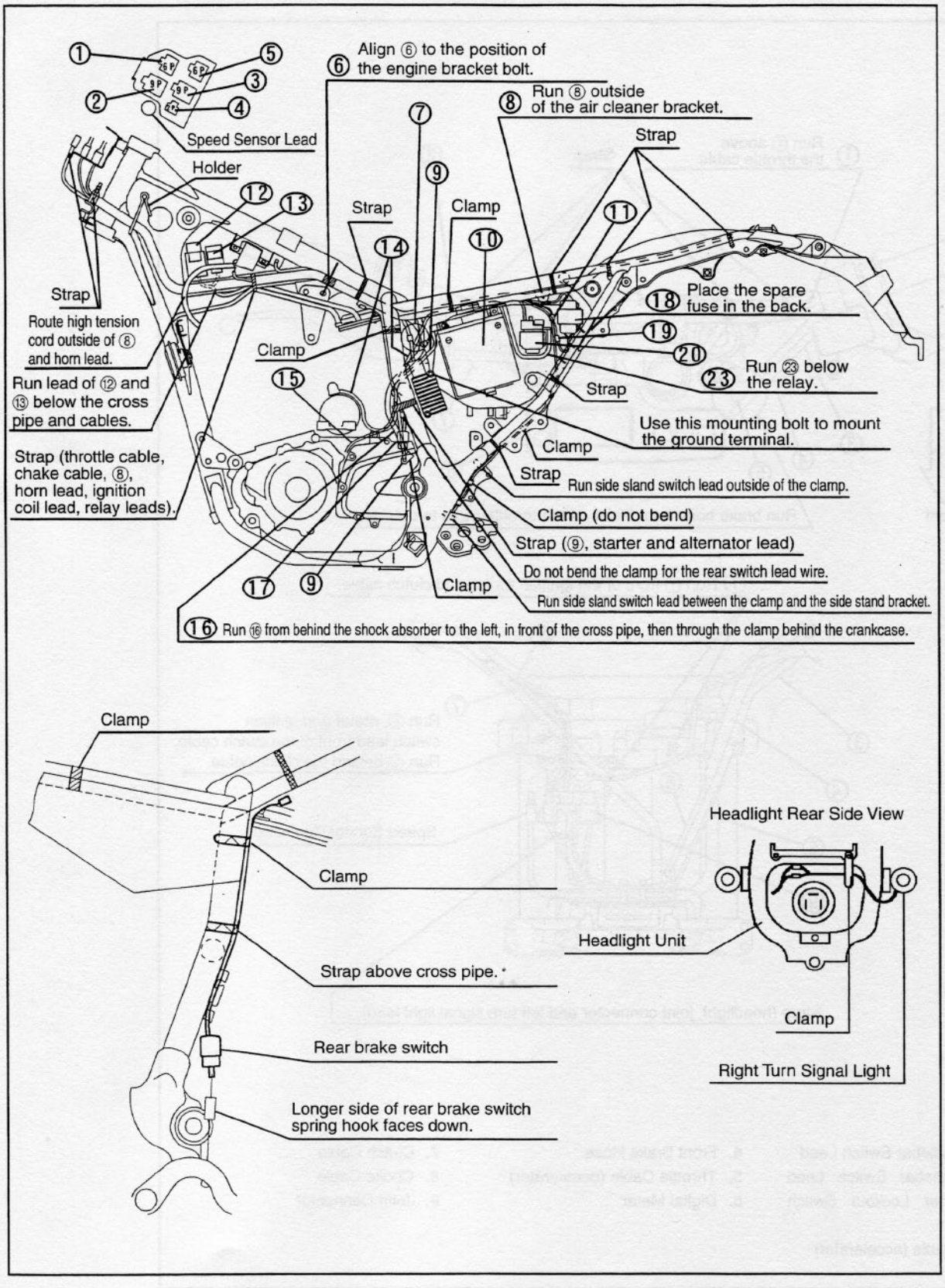


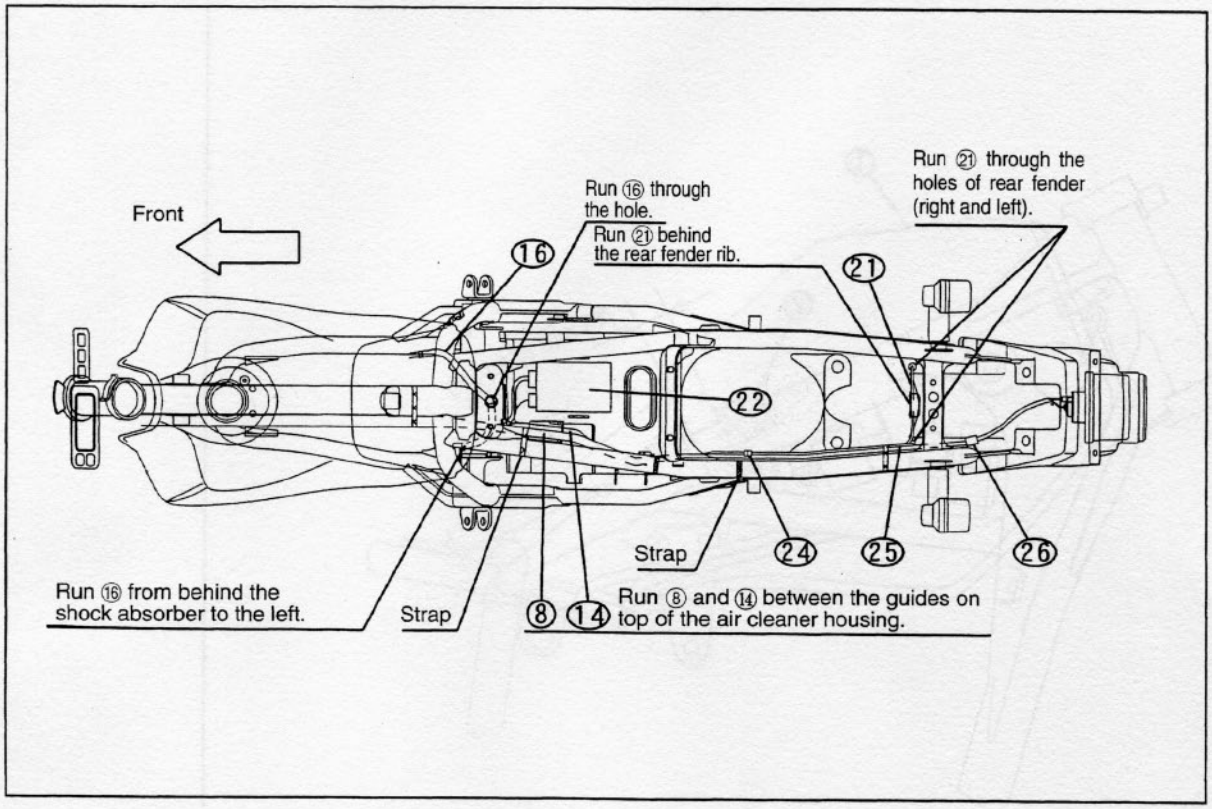
1. Throttle Cable (accelerator)
2. Throttle Cable (decelerator)
3. Front Brake Hose
4. Choke Cable
5. Clutch Cable
6. Speedometer Wiring Harness
7. Main Wiring Harness
8. Left Handlebar Switch Wiring Harness
9. Right Handlebar Switch Wiring Harness



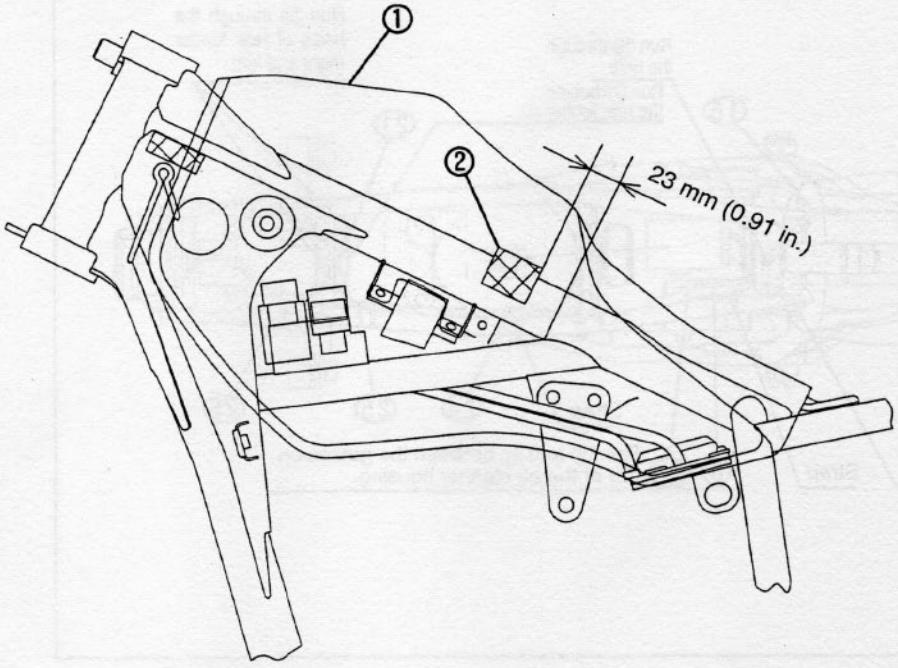


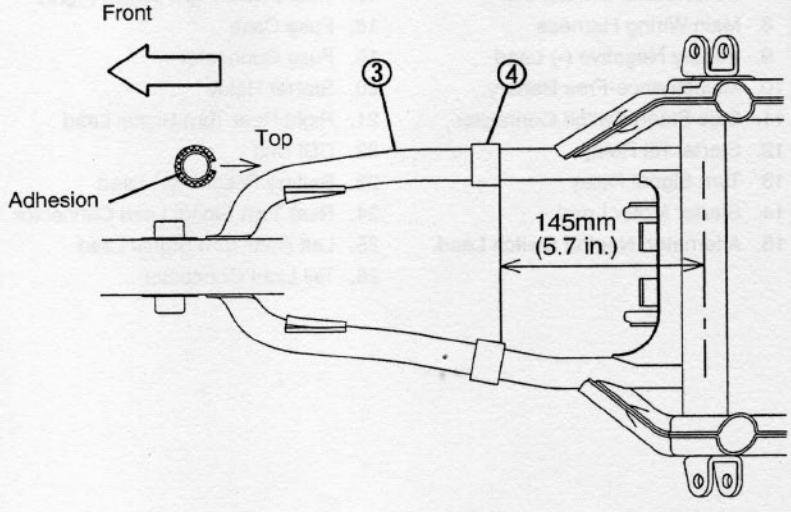
1. Right Handlebar Switch Lead
2. Left Handlebar Switch Lead and Starter Lockout Switch Lead
3. Throttle Cable (accelerator)
4. Front Brake Hose
5. Throttle Cable (decelerator)
6. Digital Meter
7. Clutch Cable
8. Choke Cable
9. Joint Connector


Speed Sensor Lead
Holder
Strap
Route high tension cord outside of ⑧ and horn lead.
Run lead of ⑫ and ⑬ below the cross pipe and cables.
Strap (throttle cable, chake cable, ⑧, horn lead, ignition coil lead, relay leads).
Align ⑥ to the position of the engine bracket bolt.
Run ⑧ outside of the air cleaner bracket.
Strap
Clamp
Clamp
Strap
Place the spare fuse in the back.
Run ㉓ below the relay.
Strap
Use this mounting bolt to mount the ground terminal.
Clamp
Strap
Run side sland switch lead outside of the clamp.
Clamp (do not bend)
Strap (⑨, starter and alternator lead)
Do not bend the clamp for the rear switch lead wire.
Clamp
Run side sland switch lead between the clamp and the side stand bracket.
⑯ Run ⑯ from behind the shock absorber to the left, in front of the cross pipe, then through the clamp behind the crankcase.
Clamp
Clamp
Strap above cross pipe.
Rear brake switch
Longer side of rear brake switch spring hook faces down.
Headlight Rear Side View
Headlight Unit
Clamp
Right Turn Signal Light

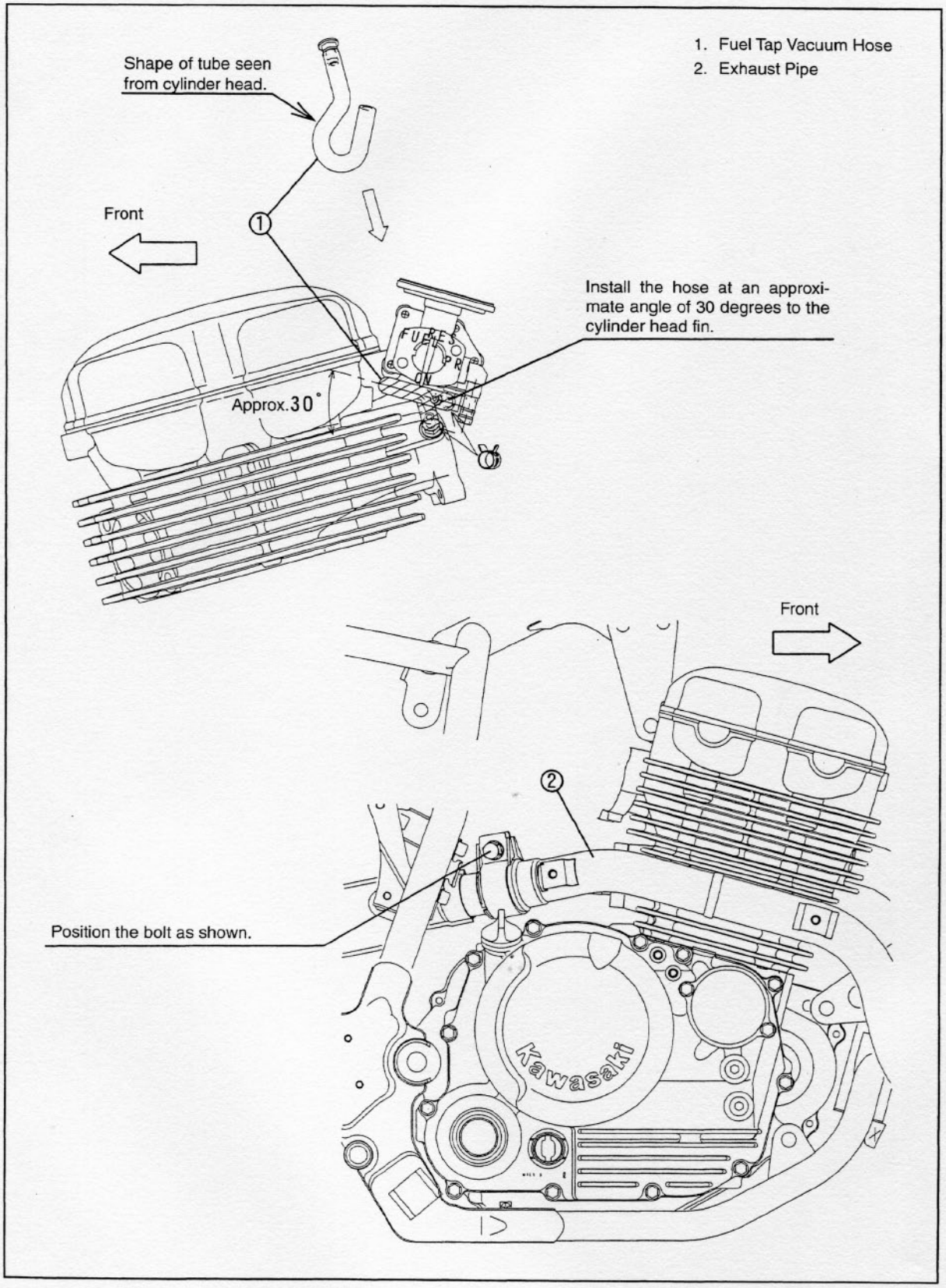


1. 6-Pin Ignition Switch Connector
2. 9-Pin Digital Meter Connector
3. 9-Pin Left Handlebar Switch Connector
4. 2-Pin Start Lockout Switch Connector
5. 6-Pin Right Handlebar Switch connector
6. White Tape (for matching mark)
7. Connectors for Regulator, Pickup Coil, Neutral Switch, etc.
8. Main Wiring Harness
9. Battery Negative (-) Lead
10. Maintenance-Free Battery
11. Side Stand Switch Connector
12. Starter Kit Relay
13. Turn Signal Relay
14. Starter Motor Lead
15. Alternator, Neutral Switch Lead
16. Fuel Tank Drain Hose
17. Rear Brake Light Switch (right)
18. Fuse Case
19. Fuse Connector
20. Starter Relay
21. Right Rear Turn Signal Lead
22. CDI Unit
23. Battery Positive (+) Lead
24. Rear Turn Signal Lead Connector
25. Left Rear Turn Signal Lead
26. Tail Light Connector





1. Fuel Tank
2. Fuel Tank Damper
3. Engine Guard (below engine)
4. Engine Guard Damper

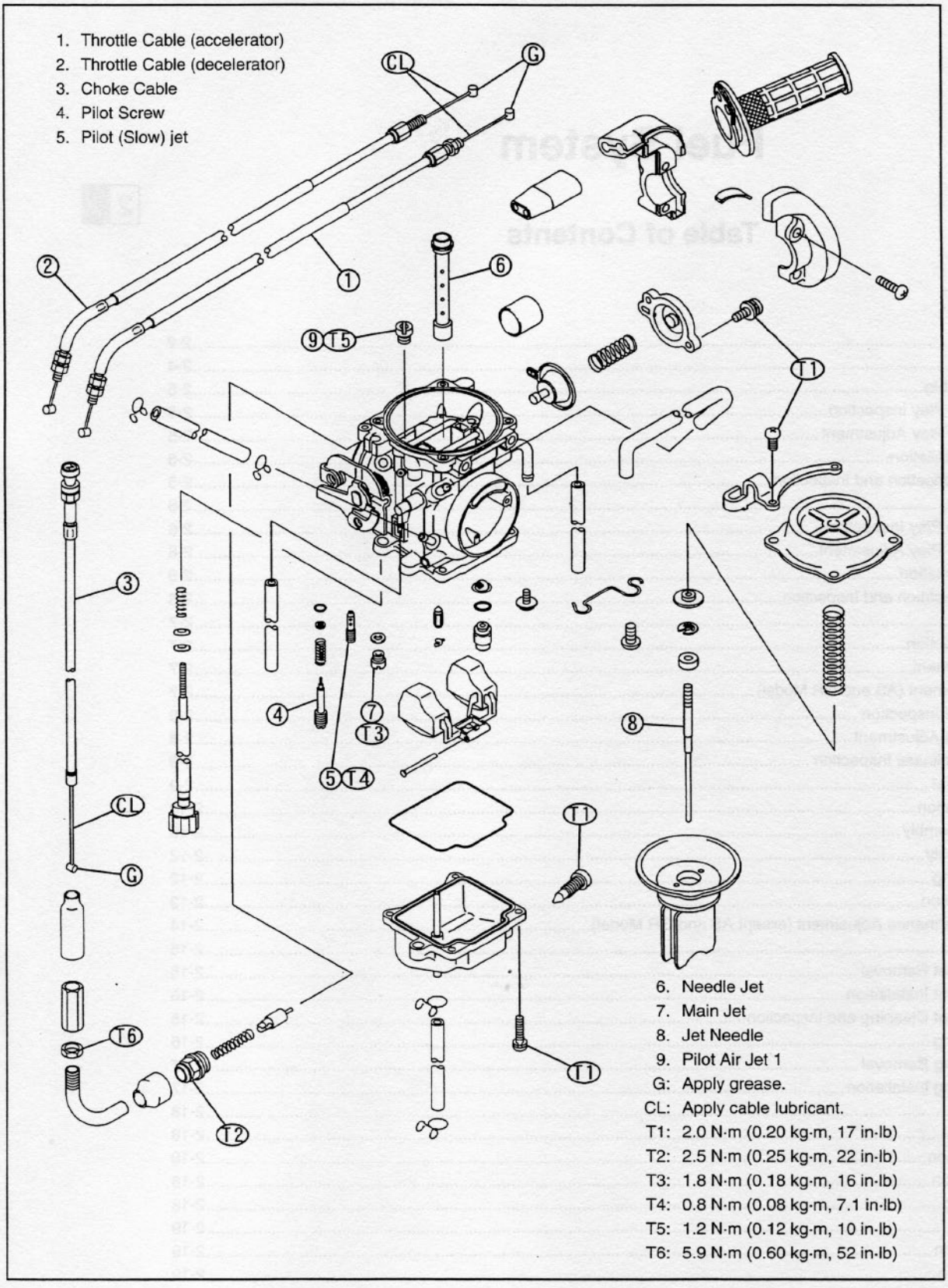

1. Fuel Tap Vacuum Hose
2. Exhaust Pipe
Shape of tube seen from cylinder head.
Front
1
Install the hose at an approximate angle of 30 degrees to the cylinder head fin.
FUEL
PRI
ON
Approx.30°
Front
2
Position the bolt as shown.
Kawasaki

Fuel System

2

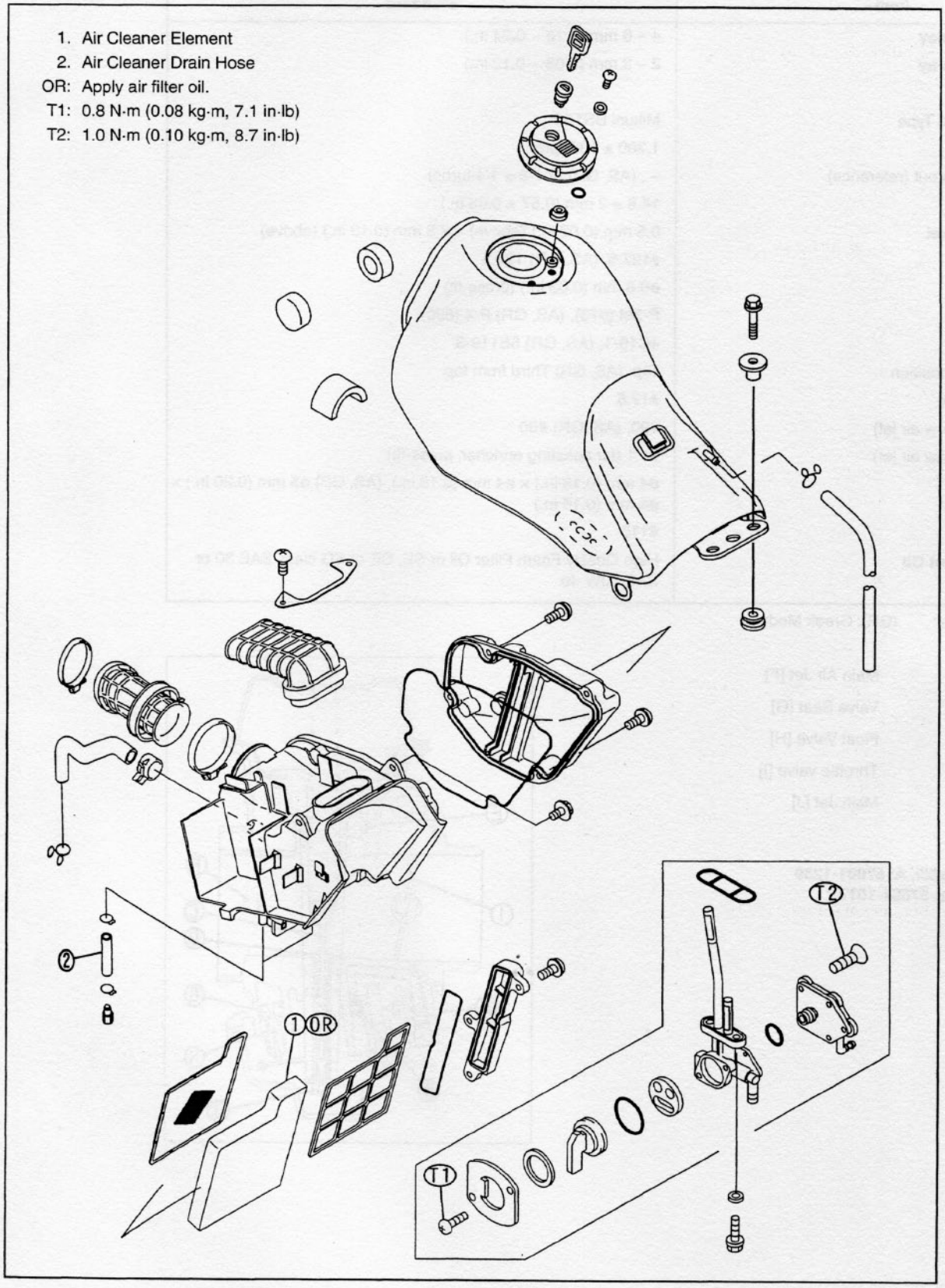
Table of Contents

Exploded View



1. Air Cleaner Element
2. Air Cleaner Drain Hose

OR: Apply air filter oil.
T1: 0.8 N·m (0.08 kg·m, 7.1 in·lb)
T2: 1.0 N·m (0.10 kg·m, 8.7 in·lb)

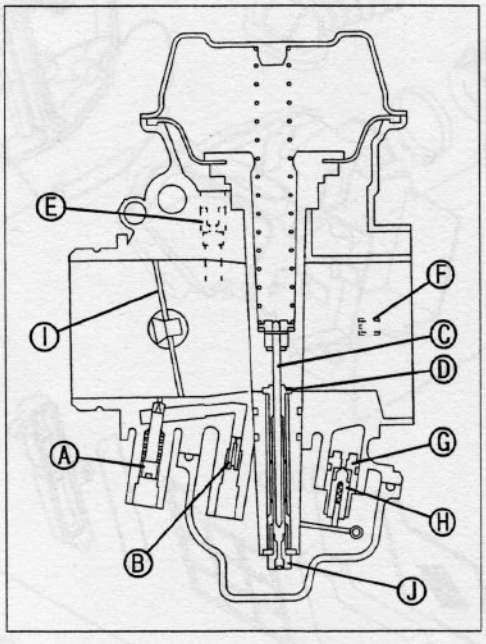


Specifications

Item	Standard
Throttle grip free play	4 ~ 6 mm (0.16 ~ 0.24 in.)
Choke cable free play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Carburetor	
Manufacturer and Type	Mikuni BST34
Idle speed	1,300 ± 100 rpm
Pilot Screw turns out (reference)	– , (AS, GR) (2 7/8 ± 1/4 turns)
Float Height	14.6 ± 2 mm (0.57 ± 0.08 in.)
Service Fluid Level	0.5 mm (0.02 in.) (above) ~ 2.5 mm (0.10 in.) (above)
Main Jet	#127.5, (AS, GR) 122.5
Main Air Jet	ø0.8 mm (0.03 in.) (press-fit)
Needle Jet	P-3M (873), (AS, GR) P-4 (820)
Jet Needle	4C16-1, (AS, GR) 5E119-3
Jet Needle Clip position	Top, (AS, GR) Third from top
Pilot Jet (slow jet)	#17.5
Pilot Air Jet 1 (slow air jet)	#90, (AS, GR) #80
Pilot Air Jet 2 (slow air jet)	#1.1 (for coasting enricher, press-fit)
Starter Jet	ø4 mm (0.16 in.) × ø4 mm (0.16 in.), (AS, GR) ø5 mm (0.20 in.) × ø4 mm (0.16 in.)
Throttle Valve	#115
Air Cleaner Element Oil	High Quality Foam Filter Oil or SE, SF, or SG class SAE 30 or SAE 10W 40

(AS): Australian Model (GR): Greek Model

Pilot Screw [A]
Pilot Jet [B]
Jet Needle [C]
Needle Jet [D]
Pilot Air Jet [E]
Main Air Jet [F]
Valve Seat [G]
Float Valve [H]
Throttle valve [I]
Main Jet [J]



Special Tools:
Pilot Screw Adjuster, A: 57001-1239
Fuel Level Gauge: 57001-1017

Throttle Grip and Cable

Throttle Grip Free Play Inspection

- Check the throttle grip free play [A].

[Throttle Grip Free Play]

Standard: 4 ~ 6 mm (0.16 ~ 0.24 in.)

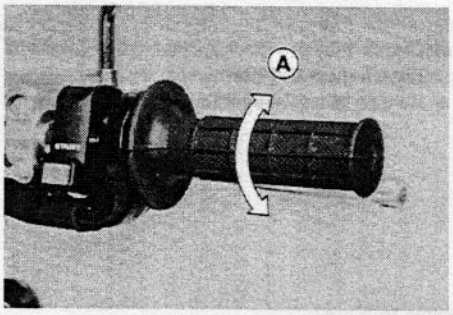
★If the throttle grip free play is improper, adjust the throttle cable.

- Check that the throttle grip moves smoothly from full open to close, and the throttle closes quickly and completely in all steering positions by the return spring.

★If the throttle grip does not return properly, check the throttle cable routing, grip free play, and cable damage. Then lubricate the throttle cable.

- Run the engine at the idle speed, and turn the handlebar all the way to the right and left to ensure that the idle speed does not change.

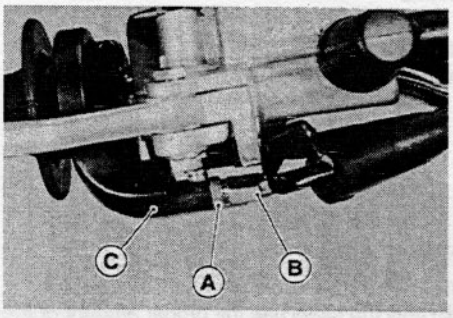
★If the idle speed increase, check the throttle cable free play and the cable routing.



Throttle Grip Free Play Adjustment

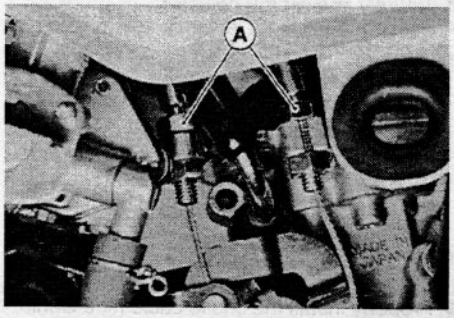
- Loosen the locknut [A].
- Turn the adjuster [B] until the proper amount of throttle grip free play is obtained.
- Tighten the locknut securely against the case [C].

★ If the throttle grip free play cannot be adjusted with the adjuster at the throttle grip, use the throttle grip adjusting nut at the carburetor.

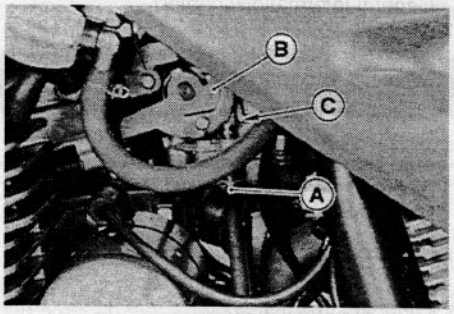


- Loosen the locknut at the throttle grip and turn the adjuster all the way in.
- Tighten the locknut securely against the case.
- Remove the fuel tank.
- Loosen the adjusting nut at the carburetor.
- Adjust either lower nuts [A] of the accelerator cable or the decelerator cable until the correct throttle grip free play is obtained.
- Tighten the adjusting nut.

★ If the throttle grip free play cannot be adjusted with the adjusting nut at the carburetor, use the adjuster at the throttle grip again.



- Make sure that the idle adjusting screw [A] of the carburetor and the throttle pulley [B] are making contact [C].



Throttle Cable Installation

- Properly install the throttle cables (see Cable, Wire and Hose Routing section in the General Information chapter).
- Install the upper ends of the throttle cable in the grip; then, install the lower ends of the throttle cables in the cable bracket on the carburetors.
- After installation, adjust each cable properly.

⚠WARNING

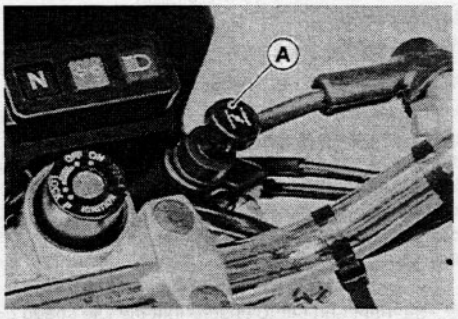
Operation with incorrectly routed or improperly adjusted cables could result in an unsafe riding condition.

Throttle Cable Lubrication and Inspection

- Lubricate and inspect the cables during a periodic inspection or whenever the cables are removed (see Appendix chapter).

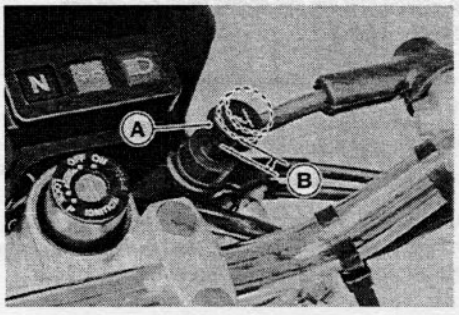
Choke Cable

Choke Cable Free Play Inspection



- Check that the choke inner cable slides smoothly by moving the choke knob [A] up and down.

★ If there is any irregularity, check the choke cable free play.



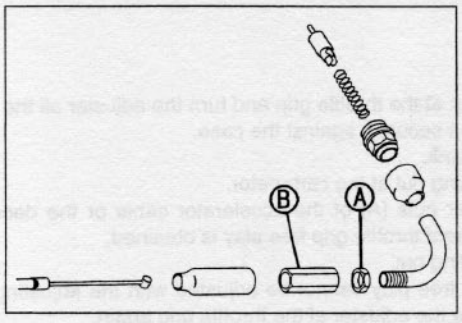
- Inspect the choke cable free play.

○ Lightly pull on the choke knob [A]. The amount of choke knob travel is the amount of choke cable free play [B].

★ Adjust if out of standard.

[Choke cable free play]
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)

Choke Cable Free Play Adjustment



- Loosen the locknut [A] where the cable enters the carburetor.
- Turn the adjuster [B] until the cable has the proper amount of free play.
- Tighten the locknut securely against the adjuster.

Torque - Choke Cable Locknut : 5.9 N·m (0.60 kg·m, 52 in·lb)

Choke Cable Installation

- Properly install the choke cable (see Cable, Wire and Hose Routing in the General Information chapter).
- After installation, adjust the cable properly.

⚠WARNING

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

Choke Cable Lubrication and Inspection

- Lubricate and inspect the cable during a periodic inspection or whenever the cable is removed (see Appendix chapter).

Carburetors

Idling Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides to check for any changes in the idle speed.

★ If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed, or damaged. Be sure to correct any of these conditions before riding (see Cable, Wire and Hose Routing section in the General Information chapter).

⚠WARNING

Operation with Improperly adjusted, incorrectly routed, or damaged cables could result in an unsafe riding condition.

- Check idle speed.

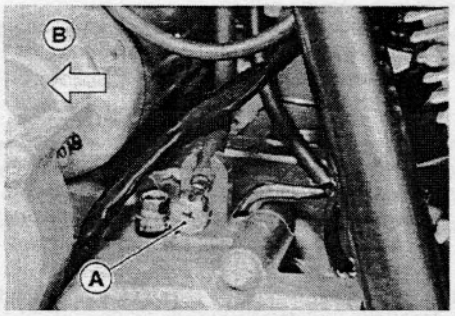
★ If the idle speed is out of the specified range, adjust it.

[Idle Speed]
Standard: 1,300 ± 100 rpm

Idle Speed Adjustment

- Start the engine and warm it up thoroughly.
- Turn the adjusting screw [A] until the idle speed is correct.

○ Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.
Front [B]



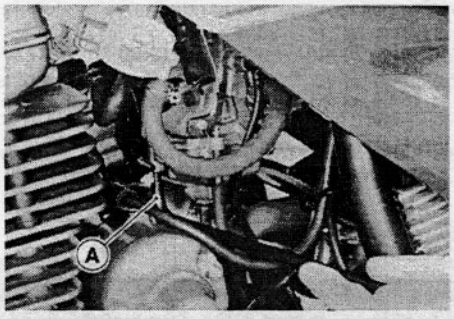
Pilot Screw Adjustment (AS and GR Model)

★ If the engine idle is still not stable, adjust the pilot screw to obtain the proper idle speed using the pilot screw adjuster [A].

Special Tool - Pilot Screw Adjuster, A: 57001 -1239

○ Turn in the pilot screw fully but not tightly, and then back it out the specified turns. to set the screw to its original position.

Pilot Screw Setting: 2 7/8 ± 1/4 turns



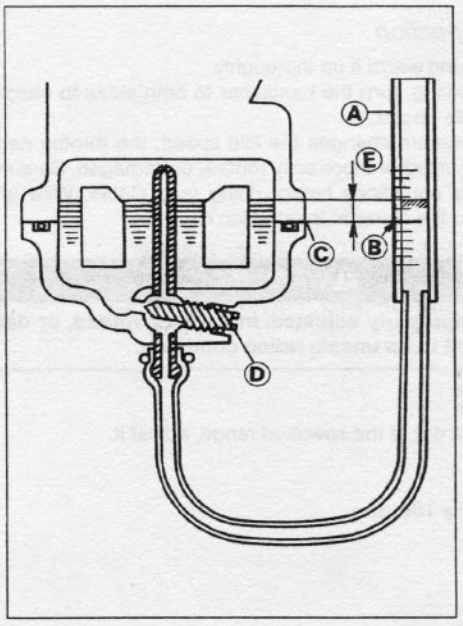
NOTE

○ *The standard number of turns the pilot screw must be backed out varies by carburetor. The values given in the specifications should be used only when the number of the original back out turns is unavailable.*
(AS): Australian Model (GR): Greek Model

Service 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 free from any source of flame or sparks; this includes any appliance with a pilot light.



- Remove the carburetor, and hold it upright on a stand (see Carburetor Removal).
- Prepare an auxiliary fuel tank and connect the fuel hose to the carburetor.
- Prepare a fuel hose (6 mm (0.24 in.) in outer diameter and about 300 mm (11.81 in.) long).
- Connect the fuel level gauge [A] to the carburetor float bowl with the fuel hose.

Special Tool - Fuel Level Gauge: 57001-1017

- Hold the gauge vertically against the side of the carburetor body so that the middle line [B] is several millimeters higher than the lower edge [C] of the float bowl skirt.
- Turn the fuel tap to feed fuel to the carburetor and gauge, then turn the carburetor drain plug [D] out a few turns.

- Wait until the fuel level in the gauge settles.
- Keeping the gauge vertical, slowly lower the gauge until the middle line is even with the lower edge of the float bowl.

NOTE

○ *Do not lower the middle line below the lower edge of the float bowl skirt. If the gauge is lowered and then raised again, the fuel level measured shows somewhat higher than the actual fuel level. If the gauge is lowered too far, dump the fuel out of it into a suitable container and start the procedure over again.*

- Read the fuel level [E] in the gauge and compare to the specification.
- Tighten the drain plug and remove the fuel level gauge.

Torque - Drain Plug: 2.0 N·m (0.20 kg·m, 17 in·lb)

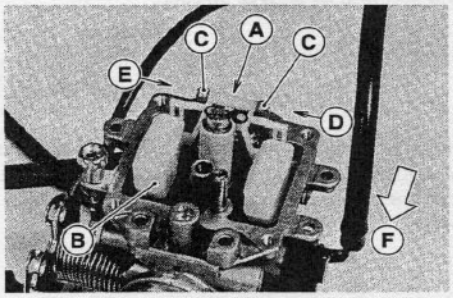
★ If the fuel level is incorrect, adjust it (see Service Fuel Level Adjustment).

[Service Fuel Level]
Standard: 0.5 mm (0.02 in.) below ~ 2.5 mm (0.10 in.) above the lower edge of the float bowl skirt.

Service Fuel Level Adjustment

⚠ WARNING

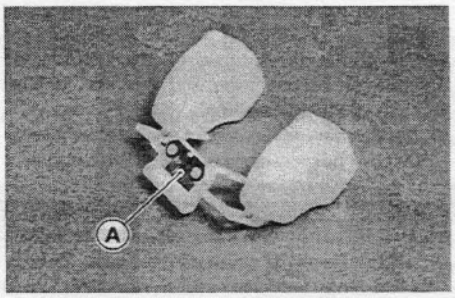
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot tight.



- Remove the carburetor, and drain the fuel into a suitable container.
- Remove the float bowl by taking out the screws.
- Slide out the pivot pin [A] and remove the floats [B].
- When removing and installing the pivot pin, note the followings.

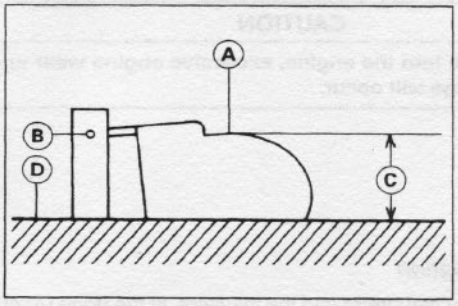
○ Be careful not to snap the pin holder leg [C].
○ When removing it, tap [D] the left end of the pin.

○ When installing it, press [E] the right end of the pin.
Front [F]
● Bend the tang [A] on the float arm very slightly to change the float height in order to adjust the fuel level.



[Float height]
Standard: 14.6 ± 2 mm (0.57 ± 0.08 in.)

● Drive in the pivot pin [B] to install the float [A].
● Remove the float chamber gasket.
● Measure the float height [C] from the float bowl mating surface [D] with the carburetor upside down.
○ Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.
● Assemble the carburetor and recheck the fuel level.
★ If the fuel level cannot be adjusted by this method, the float or the float valve is damaged.

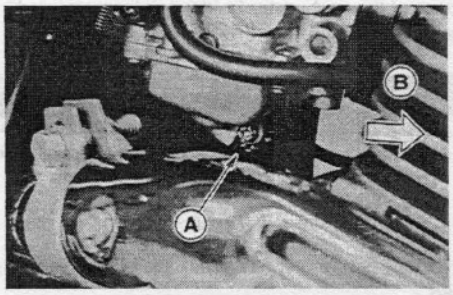


Fuel System Cleanliness Inspection

⚠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 free from any source of flame or sparks; this includes any appliance with a pilot light.

● Connect a suitable hose to the fitting at the bottom of the carburetor float bowl.
● Run the lower end of the carburetor drain hose into a suitable container.
● Turn the fuel tap to the PRI position.
● Turn out the carburetor drain plug [A] a few turns and drain the float bowl.
Front [B]
● Tighten the drain plug and turn the fuel tap to the ON position.
★ If any water or dirt appears during the above inspection, clean the carburetor and the fuel tank (see Carbretor Cleaning and Fuel Tank Cleaning).



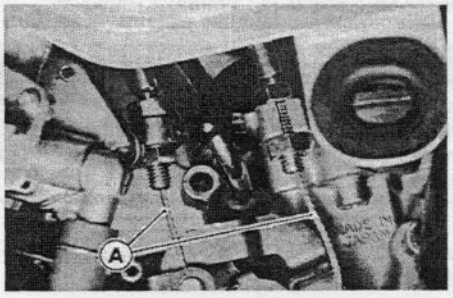
Torque - Drain Screw: 2.0 N·m (0.20 kg·m, 17 in·lb)

Carburetor Removal

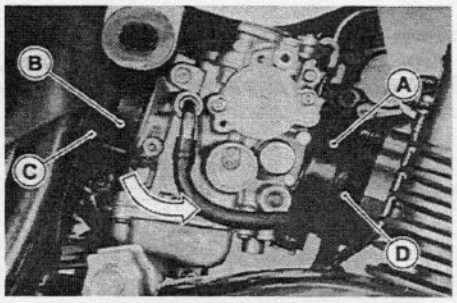
⚠WARNING

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 free from any source of flame or sparks; this includes any appliance with a pilot light.

● Remove the fuel tank (see Fuel Tank Removal).
● Increase the throttle cable free play.
● Remove the lower end [A] of the throttle cable.



- Loosen the carburetor holder clamp [A] and the air cleaner duct clamp [B].
- Pull the carburetor out of the air cleaner duct end [C], and then pull it out of the carburetor holder [D] from the vehicle's right side.
- Take out the carburetor.
- Stuff pieces of lint-free, clean clothe into the carburetor holder and the air cleaner duct to keep dirt out of the engine and air cleaner.



⚠ WARNING

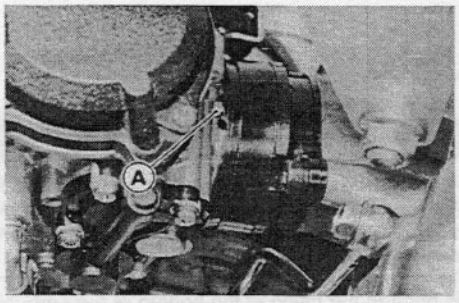
If dirt or dust is allowed to pass through into the carburetor, the throttle may become stuck, possibly causing an accident.

CAUTION

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

Carburetor Installation

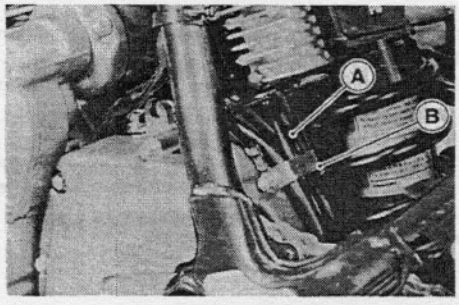
- When installing the carburetor into the insulator, fit the ridge [A] of the carburetor into the recess of the carburetor holder.
- Check fuel leakage from the carburetor.



⚠ WARNING

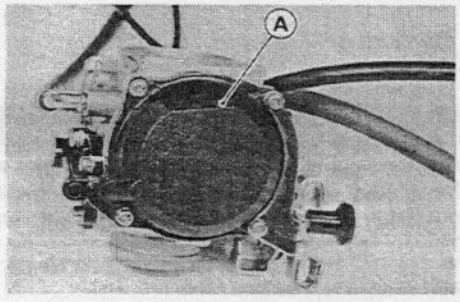
Fuel spilled from the carburetor is hazardous.

- Run the carburetor drain hose and vent hose [A] through the clamp [B].
- Adjust the idle speed.
- Adjust the throttle cable (see Throttle Cable).



Carburetor Disassembly

- Remove the carburetor assembly (see Carburetor Removal).



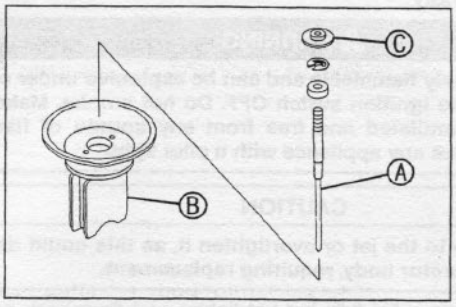
⚠ WARNING

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 free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove:
  Upper chamber cover [A]
  Vacuum piston and diaphragm

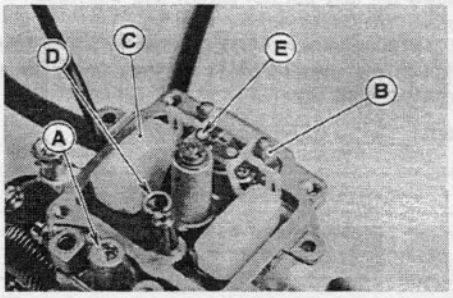
CAUTION

During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp edge to remove the diaphragm.

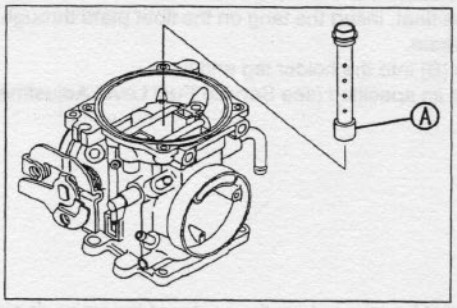


● Remove the jet needle [A] from the vacuum piston [B] along with the spring seat [C].

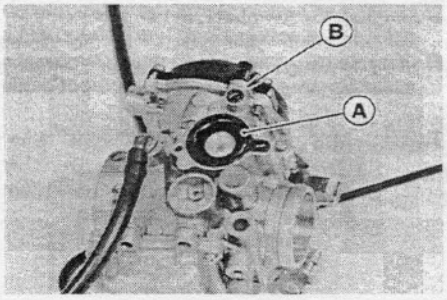
● Remove the lower end of the carburetor as follows:
○ Remove the screw from the float bowl to remove the float bowl and the O-ring.
○ Punch a hole in the plug and pry there with an awl or other suitable tool (except (AS) and (GR) Model).
○ Turn in the pilot screw [A] and count the number of turns until it seats fully but not tightly, and then remove the pilot screw. This is to set the pilot screw to its original position when assembling.
○ Slide out the float pivot pin [B] and remove the floats [C]. The float needle valve will come out together (see Service Fuel Level Adjustment).
○ Remove the pilot jet [D].
○ Remove the main jet [E].
(AS): Australian Model (GR): Greek Model



○ Push the needle jet [A] out from the inside of the carburetor bore with your finger.



● Remove the coasting enricher cover.
● Remove the diaphragm [A] and the O-ring [B].



Carburetor Assembly

⚠WARNING

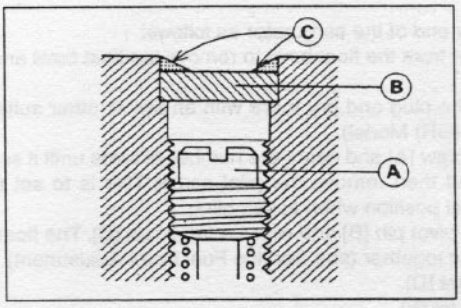
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

CAUTION

Do not apply force to the jet or overtighten it, as this could damage the jet or the carburetor body, requiring replacement.

- Turn in the pilot screw [A] fully but not tightly, and then back it out the same number of turns counted during disassembly.
- Install a new plug [B] in the pilot screw hole, and apply a small amount of a bonding agent [C] to the circumference of the plug to fix the plug (except (AS) and (GR) Model).

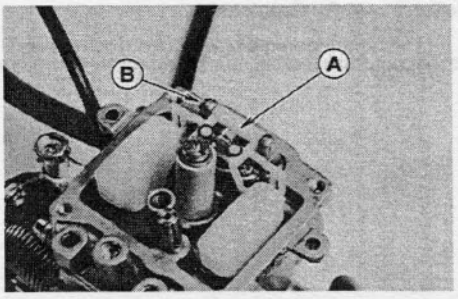
(AS): Australian Model (GR): Greek Model



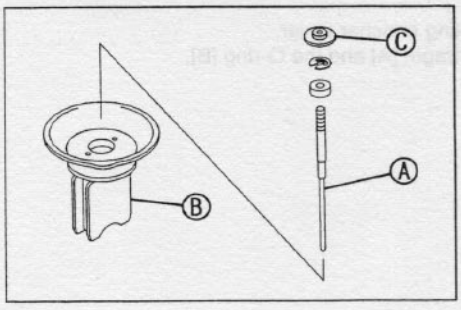
CAUTION

Do not apply too much bonding agent to the plug or the pilot screw itself may become fixed.

- Put the float valve needle into the valve seat.
- Before installing the float, insert the tang on the float plate through the clip [A] on the valve needle.
- Press the pivot pin [B] into the holder leg and float.
- Set the float height as specified (see Service Fuel Level Adjustment).



- Slip the jet needle [A] into the hole in the center of the vacuum piston [B], and put the spring seat [C] on the top of the needle.
- After installing the upper chamber cover, check that the vacuum piston slides up and down smoothly without binding in the carburetor bore.



Torque - Main Jet: 1.8 N·m (0.18 kg·m, 16 in·lb)
Pilot Jet: 0.8 N·m (0.08 kg·m, 7.1 in·lb)
Upper Chamber Cover, Float Bowl Cover Screw: 2.0 N·m (0.20 kg·m, 17 in·lb)

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; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the carburetors.

CAUTION

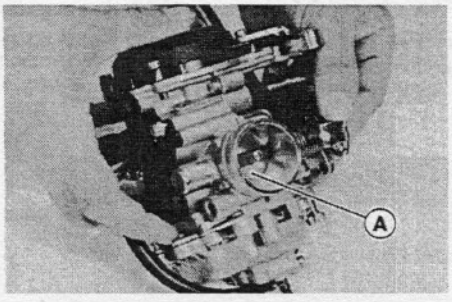
Do not use compressed air on an assembled carburetor, or the floats may be crushed by the pressure, and the vacuum piston diaphragms may be damaged. Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage 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; instead, use a mild high flash-point cleaning solution safe for 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 (see Carburetor Disassembly).
- Clean all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- Dry them with compressed air.
- Blow through the air and fuel passages with compressed.
- Assemble the carburetor (see Carburetor Assembly).

Carburetor 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 free from any source of flame or sparks; this includes any appliance with a pilot light.



- Remove the carburetors (see Carburetor Removal).
- Before disassembling the carburetor body, check the service fuel level (see Service Fuel Level Inspection).
- Move the starter plunger lever upward to downward to check that the starter plunger moves smoothly.

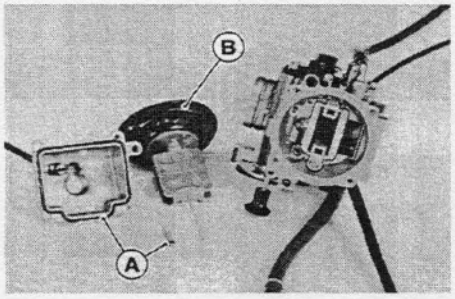
★ If the starter plunger does not work properly, replace the plunger or the carburetors.

- Turn the throttle cable pulley to check that the throttle valve [A] moves smoothly and return by spring force.

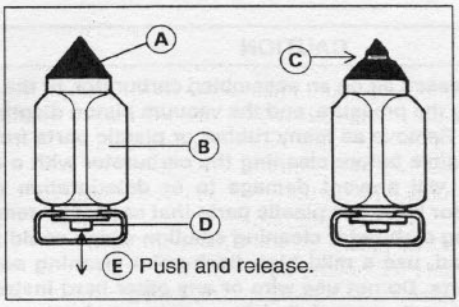
★ If the throttle valve does not move smoothly, replace the carburetors.

- Disassemble the carburetors (see Carburetor Disassembly).
- Clean the carburetors (see Carburetor Cleaning).
- Check that the O-ring [A] of the carburetor and the diaphragm [B] on the vacuum piston are in good condition.

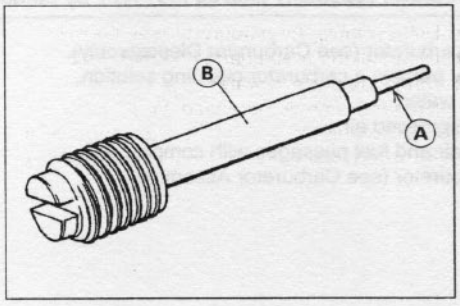
★ If the O-ring or the diaphragm is not in good condition, replace it.



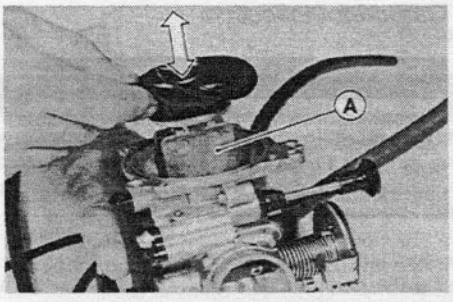
● Check the plastic tip [A] of the float valve needle [B]. It should be smooth, without any grooves, scratches, or tears.
★ If the plastic tip is damaged [C], replace the needle.
● Push the rod [D] into the valve needle with your finger, and then release it [E].
★ If the rod does not spring out, replace the valve needle.



● Check the tapered portion [A] of the pilot screw [B] for wear or damage.
★ Replace the pilot screw if it is worn or damaged on the tapered portion, or it will prevent the engine from idling smoothly.



● Check that the vacuum piston [A] operates smoothly in the carburetor body.
★ If the vacuum piston does not operate smoothly, or if loosened in the carburetor body, replace the piston or the carburetor.



High Altitude Performance Adjustment (except AS and GR Model)

○ To improve the EMISSION CONTROL PERFORMANCE of vehicle operated above **4000 feet**, Kawasaki recommends the following Environmental Protection Agency (EPA) approved modification.
● Change the main jet and pilot jet for high altitude use.

High Altitude Carburetor Specifications

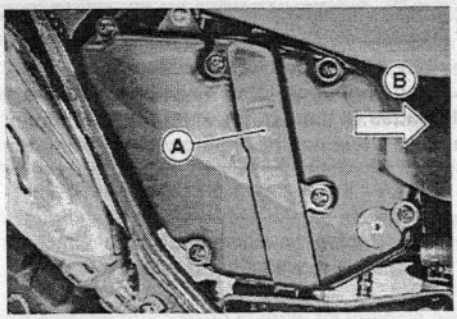
Pilot Jet:	**#15(92064-1018)**
Main Jet:	**#125(92063-1102)**

(AS): Australian Model (GR): Greek Model

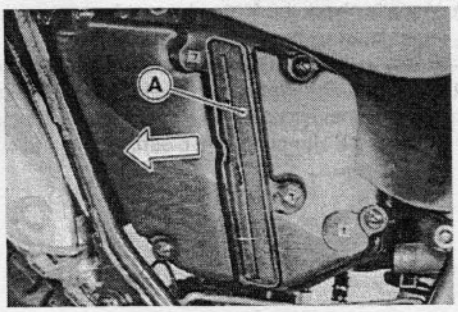
Air Cleaner

Air Cleaner Element Removal

- Remove the right side cover (see Frame chapter).
- Remove the element cover [A].
  Front [B]



- Pull out the element [A] together with its frame.
- ○ Push a clean, lint-free towel into the opening to keep dirt or other foreign material from entering.



⚠WARNING

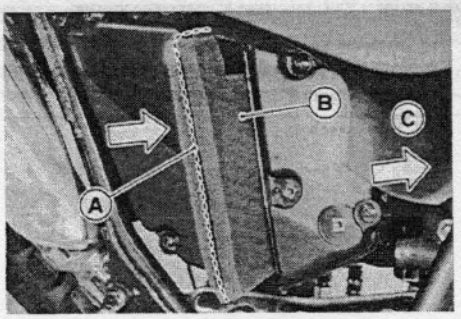
If dirt or dust is allowed to past the air cleaner into the carburetor, the throttle valve may become stuck, possibly causing an accident.

CAUTION

If dirt gets through the carburetor into the engine, excessive engine wear and possibly engine damage will occur.

Air Cleaner Element Installation

- To ensure proper sealing, apply grease around the side [A] of the element.
- Install the element so that the side with the smaller mesh [B] faces the carburetor [C].



Air Cleaner Element Cleaning and Inspection

NOTE

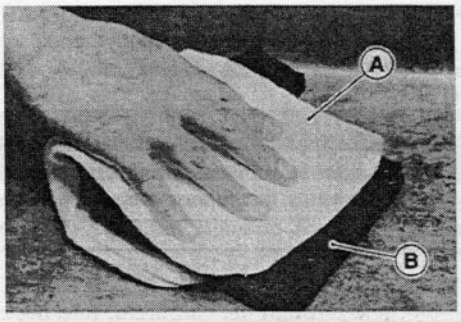
- ○ *In dustry areas, the element should be cleaned more frequently than the recommended interval.*
- ○ *After riding through rain or on muddy roads, the element should be cleaned immediately.*
- ○ *Since repeated cleaning opens the pores of the foam element, replace it with a new one in accordance with the Periodic Maintenance Chart. Also, if there is a break in the element material or any other damage to the element, replace the element with a new one.*

⚠WARNING

Clean the element in a well-ventilated area, and make sure that there are no sparks or flame 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.

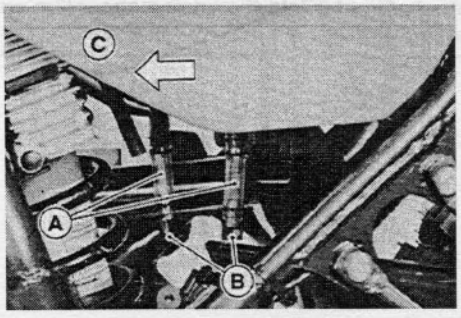
- Remove the element and separate the sponge foam element and the frame.
- Clean the foam element in a bath of high flash-point solvent, and then dry it with compressed air or by shaking it.

- Visually check the foam element for tears or breaks and replace the damaged foam element with a new one.
- ○ Replace the foam element after cleaning it five times.
- After cleaning, saturate the element with high quality foam filter oil and squeeze out excess oil.
- Wrap the element [B] in a clean rag [A] and squeeze it as dry as possible.



Air Cleaner Draining

A plastic tube is provided beneath the air cleaner housing, and catches the water or oil from the bottom of the housing. Usually water or oil does not collect at the bottom of the housing. In the event that rain water is drawn in through the air cleaner, or if engine oil is blown back, drain the housing.



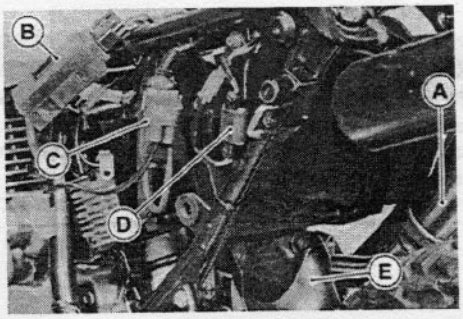
- Inspect the air cleaner plastic tube [A] periodically.
- Remove the tube plug [B] to drain the water or breather oil.
  Front [C]
- Replace the plug to its original position.

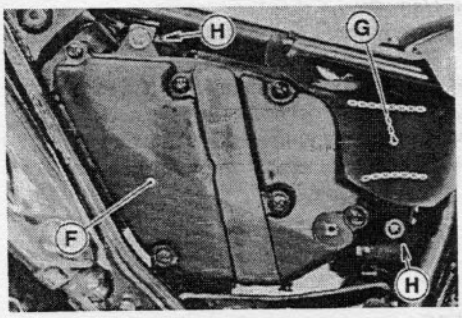
⚠WARNING

Be sure to reinstall the plug in the drain hose after draining. Oil on tires will make them slippery and can cause an accident and injury.

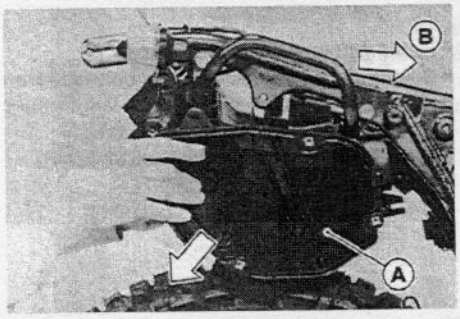
Air Cleaner Housing Removal

- Using a jack, raise the rear wheel (see Wheels/Tires chapter).
- Remove:
  Side covers and Seat (see Frame chapter)
  Muffler (see Engine Top End chapter) [A]
  Battery (see Electrical System chapter)
  CDI Unit (with connector attached) [B]
  Starter Relay [C]
  Fuse Case [D]
  Rear Fender (see Frame chapter)
  Rear Flap [E]
  Air Cleaner Cover [F]
  Intake Duct
  Air Cleaner Duct [G]
  Mounting Bolt [H]



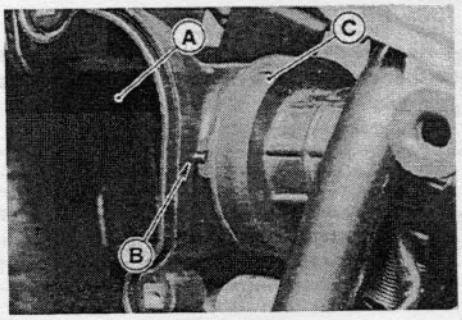


- Remove the air cleaner housing [A].
  Front [B]



Air Cleaner Housing Installation

- Fit the ridge [B] of the housing [A] into the recess of the air cleaner duct [C].
- Attach the engine breather hose and the drain hose securely to the air cleaner housing.



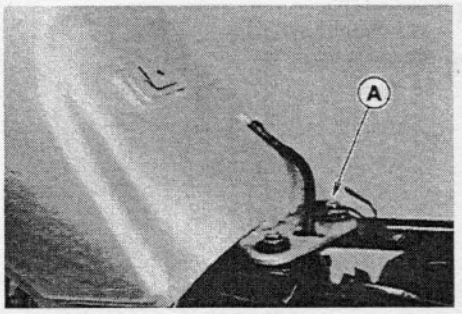
Fuel Tank

Fuel Tank Removal

⚠ WARNING

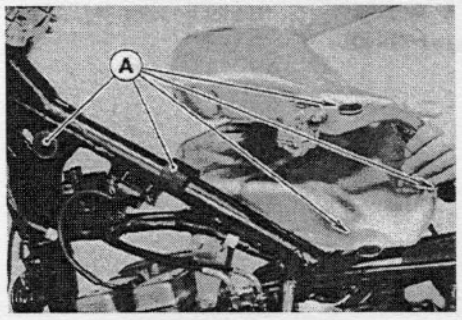
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks, this includes any appliance with a pilot light.

- Remove:
  Side covers and Seat (see Frame chapter)
  Fuel Tank Mounting Bolt [A]
- Turn the fuel tap to the ON or RES position.
- Detach the fuel hose and the vacuum hose.
- Remove the fuel tank.
- Turn the fuel tap to the PRI position, and drain the gasoline into an appropriate container.



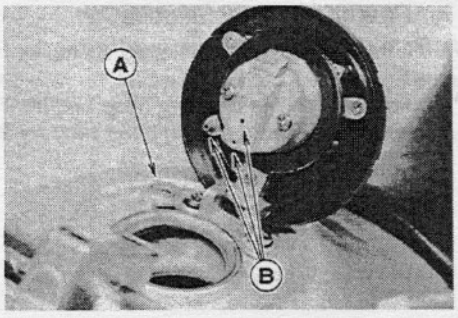
Fuel Tank Installation

- Read the above WARNING.
- Check the rubber dampers [A] on the frame top-tube.
- ★ If the dampers are damaged or deteriorated, replace them.
- Route the hoses and leads correctly.
- Be sure the hoses are clamped securely.



Fuel Tank Inspection

- Remove the hoses from the fuel tank, and open the tank cap.
- Check to see if the water drain pipe [A] in the tank are not clogged.
- ★ If pipe is clogged, remove the tank and drain it, and then blow pipe free with compressed air.



CAUTION

Do not apply compressed air to the air vent holes [B] in the tank cap. This could cause damage and clogging of the labyrinth in the cap.

Fuel Tank Cleaning

⚠ WARNING

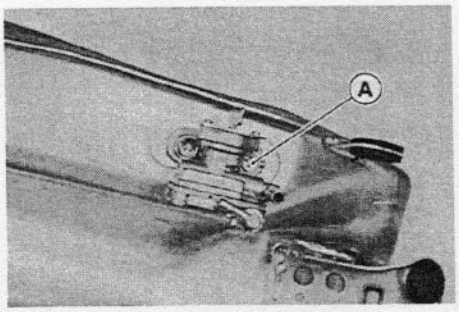
Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the tank.

- Remove the fuel tank and drain it.
- Pour some high-flash point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Pour the solvent 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 solvent.
- Pour high-flash point solvent through the tap in all lever positions.
- Dry the tank and the fuel tap with compressed air.
- Install the tap in the tank.

Fuel Tap 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 free from any source of flame or sparks; this includes any appliance with a pilot light.



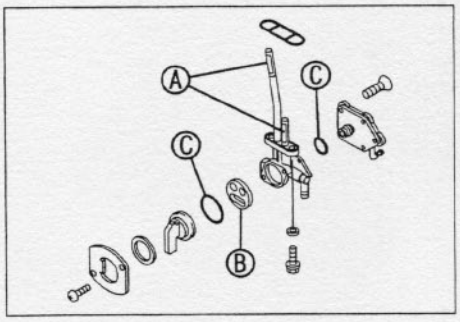
- Remove the fuel tank and drain the gasoline into a suitable container (see Fuel Tank Removal).
- Remove the fuel tap bolt [A] together with the nylon washer to remove the fuel tap.

Fuel Tap Installation

- Read the above WARNING.
- Check the O-ring for damage.
- Place the fuel hose over the fuel tap and securely clamp it in place.
- Check the nylon washer for damage.
- ○ Do not use steel washers in place of the nylon washers, because they will not seal the bolts properly and fuel will leak.

Fuel Tap Inspection

- Remove the fuel tap (see Fuel Tap Removal).
- Check the fuel tap filter screen [A] for any breaks or deterioration.
- ★ If the fuel tap screens have any breaks or are deteriorated, they may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap.
- ★ If the fuel tap leaks, or allows fuel to flow when it is at ON or RES position without engine running, replace the damaged gasket [B] or O-ring [C].



Fuel Tap Plate Screw: 0.8 N·m (0.08 kg·m, 7.1 in·lb)
Fuel Tap Diaphragm Cover Screw: 1.0 N·m (0.10 kg·m, 8.7 in·lb)

Engine Top End

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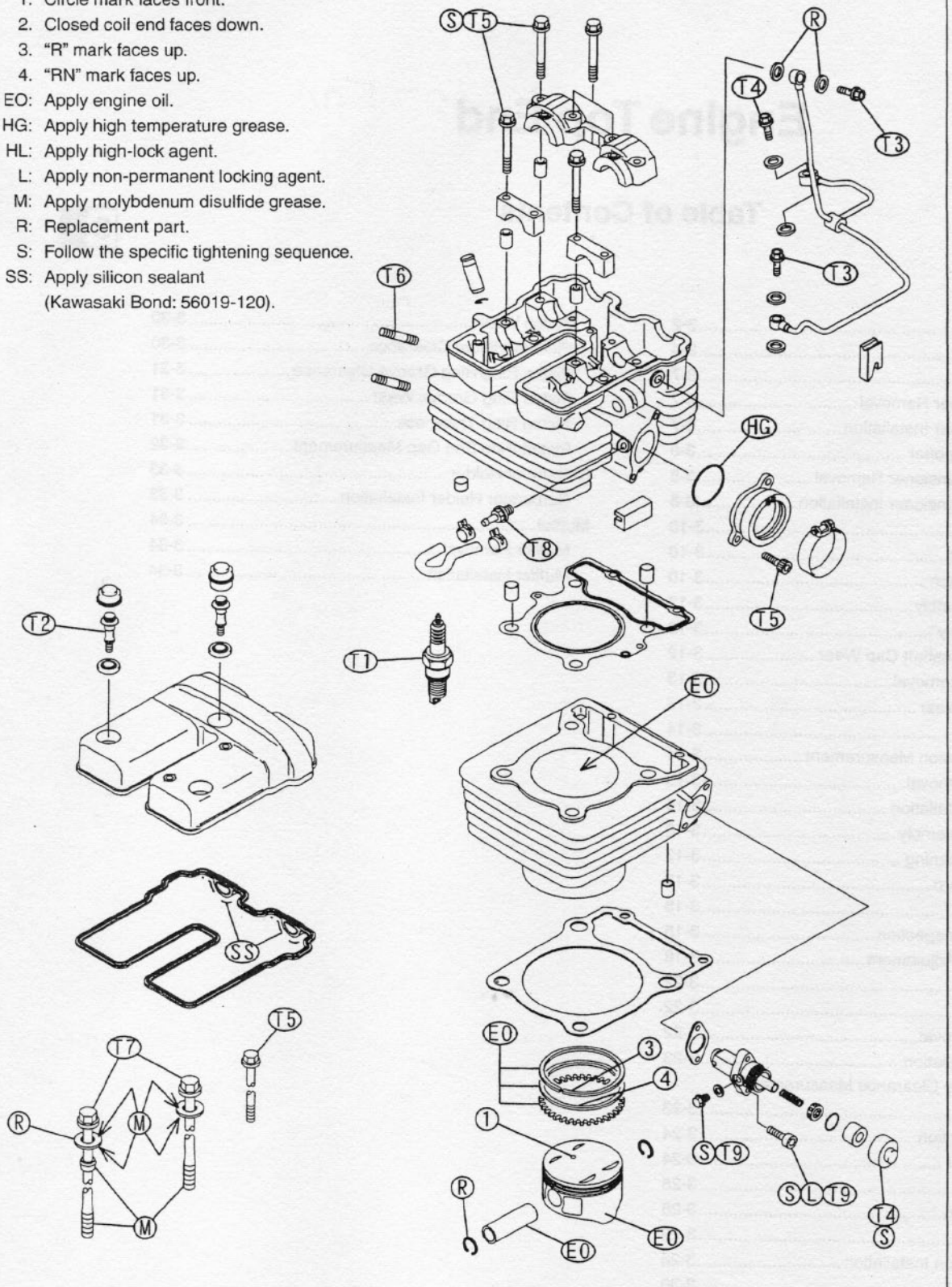
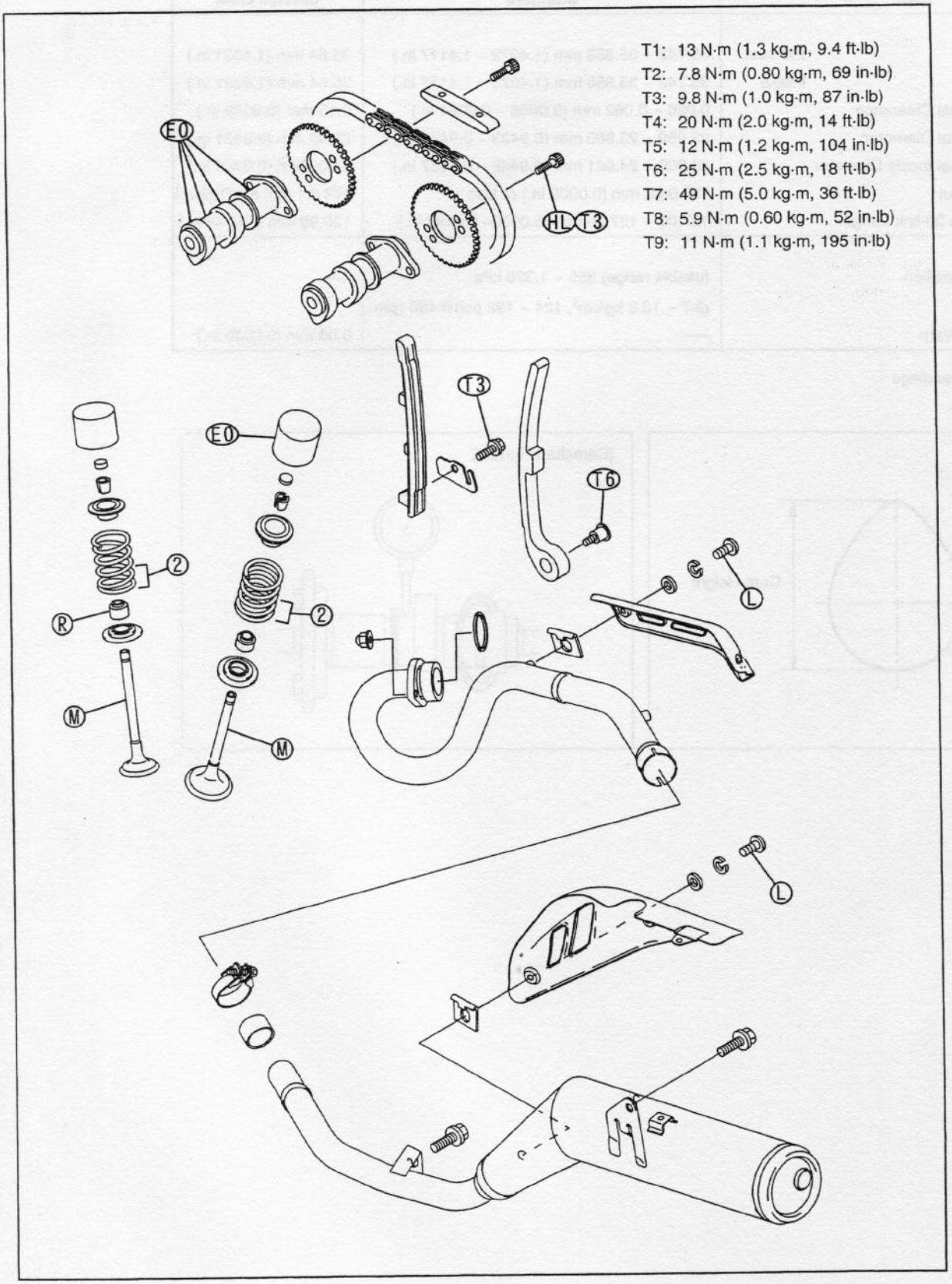
3

Exploded View

1. Circle mark faces front.
2. Closed coil end faces down.
3. "R" mark faces up.
4. "RN" mark faces up.

EO: Apply engine oil.
HG: Apply high temperature grease.
HL: Apply high-lock agent.
L: Apply non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement part.
S: Follow the specific tightening sequence.
SS: Apply silicon sealant (Kawasaki Bond: 56019-120).



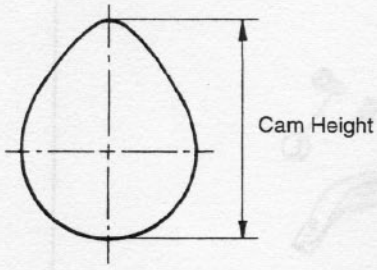

T1: 13 N·m (1.3 kg·m, 9.4 ft·lb)
T2: 7.8 N·m (0.80 kg·m, 69 in·lb)
T3: 9.8 N·m (1.0 kg·m, 87 in·lb)
T4: 20 N·m (2.0 kg·m, 14 ft·lb)
T5: 12 N·m (1.2 kg·m, 104 in·lb)
T6: 25 N·m (2.5 kg·m, 18 ft·lb)
T7: 49 N·m (5.0 kg·m, 36 ft·lb)
T8: 5.9 N·m (0.60 kg·m, 52 in·lb)
T9: 11 N·m (1.1 kg·m, 195 in·lb)
EO
HL
T3
T6
L
R
M
2

Specifications

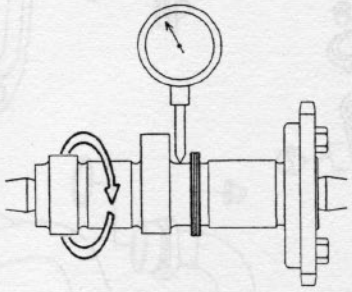
Item		Standard	Service Limit
Camshaft			
Cam height:	Exhaust	35.742 ~ 35.858 mm (1.4072 ~ 1.4117 in.)	35.64 mm (1.4031 in.)
	Intake	35.742 ~ 35.858 mm (1.4072 ~ 1.4117 in.)	35.64 mm (1.4031 in.)
Camshaft Journal Clearance		0.020 ~ 0.062 mm (0.0008 ~ 0.0024 in.)	0.15 mm (0.0059 in.)
Camshaft Journal Diameter		23.959 ~ 23.980 mm (0.9433 ~ 0.9441 in.)	23.93 mm (0.9421 in.)
Camshaft Journal Inside Diameter		24.000 ~ 24.021 mm (0.9449 ~ 0.9457 in.)	24.08 mm (0.9480 in.)
Camshaft Runout		TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.0039 in.)
Camshaft Chain 20-link Length		127.00 ~ 127.36 mm (5.0000~ 5.0142 in.)	128.90 mm (5.0748 in.)
Cylinder Head:			
Cylinder Compression		(usable range) 855 ~ 1,320 kPa (8.7 ~ 13.5 kg/cm^2, 124 ~ 192 psi)@450 rpm	—
Cylinder Head Warp		—	0.05 mm (0.0020 in.)

TIR: Total Indicator Readings

[Cam Height]

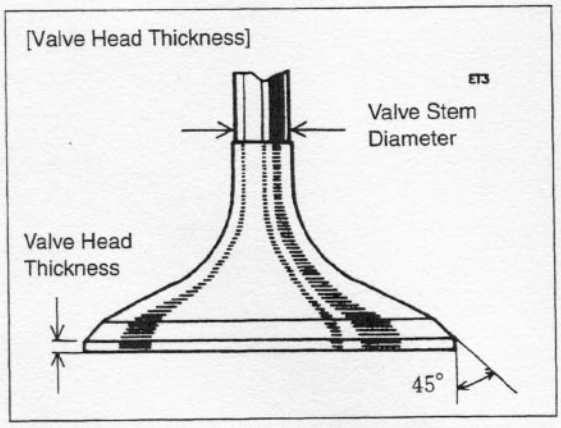


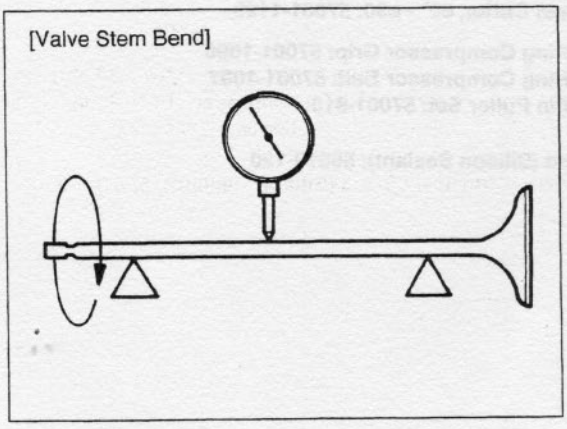
[Camshaft Runout]



Item		Standard	Service Limit
Valve			
Valve Clearance:	Exhaust	0.14 ~ 0.23 mm (0.0055 ~ 0.0091 in.)	—
	Intake	0.10 ~ 0.19 mm (0.0039 ~ 0.0075 in.)	—
Valve Head Thickness:	Exhaust	0.8 mm (0.0315 in.)	0.7 mm (0.0276 in.)
	Intake	0.5 mm (0.0197 in.)	0.25 mm (0.0098 in.)
Valve Stem Bend		TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.0020 in.)
Valve Stem Diameter:	Exhaust	4.455 ~ 4.470 mm (0.1754 ~ 0.1760 in.)	4.44 mm (0.1748 in.)
	Intake	4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in.)	4.46 mm (0.1756 in.)
Valve Guide Inside Diameter:	Exhaust	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.57 mm (0.1779 in.)
	Intake	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.57 mm (0.1799 in.)
Valve/valve Guide Clearance (wobble method):	Exhaust	0.08 ~ 0.16 mm (0.0031 ~ 0.0063 in.)	0.33 mm (0.0130 in.)
	Intake	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)	0.27 mm (0.0106 in.)
Valve Seat Cutting Angle		45°, 32°, 60°, 67.5°	—
Valve Seat Surface Outside Diameter:			
	Exhaust	23.4 ~ 23.6 mm (0.9213 ~ 0.9291 in.)	—
	Intake	27.9 ~ 28.1 mm (1.0984 ~ 1.1063 in.)	—
Valve Seat Surface Width:	Exhaust	0.8 ~ 1.2 mm (0.0315 ~ 0.0472 in.)	—
	Intake	0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)	—
Valve Spring Free Length:	Intake, Exhaust	38.95 mm (1.5335 in.)	38.5 mm (1.5157 in.)

TIR: Total Indicator Readings





Item		Standard	Service Limit
Cylinder and Pistons			
Cylinder Inside Diameter		72.000 ~ 72.012 mm (2.8346~ 2.8351 in.)	72.06 mm (2.8370 in.)
Piston Diameter		71.965 ~ 71.980 mm (2.8333 ~ 2.8339 in.)	71.82 mm (2.8276 in.)
Piston/Cylinder Clearance		0.020 ~ 0.047 mm (0.0008 ~ 0.0019 in.)	—
Piston Ring/Ring Groove Clearance:	Top	0.05 ~ 0.09 mm (0.0020 ~ 0.0035 in.)	0.19 mm (0.0075 in.)
	Second	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Piston Ring Groove Width:	Top	0.84 ~ 0.86 mm (0.0331 ~ 0.0339 in.)	0.94 mm (0.0370 in.)
	Second	0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)	0.92 mm (0.0362 in.)
Piston Ring Thickness:	Top	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.0276 in.)
	Second	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.0276 in.)
Piston Ring End Gap:	Top	0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)	0.65 mm (0.0256 in.)
	Second	0.35 ~ 0.50 mm (0.0138 ~ 0.0197 in.)	0.80 mm (0.0315 in.)
	Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	1.0 mm (0.0394 in.)

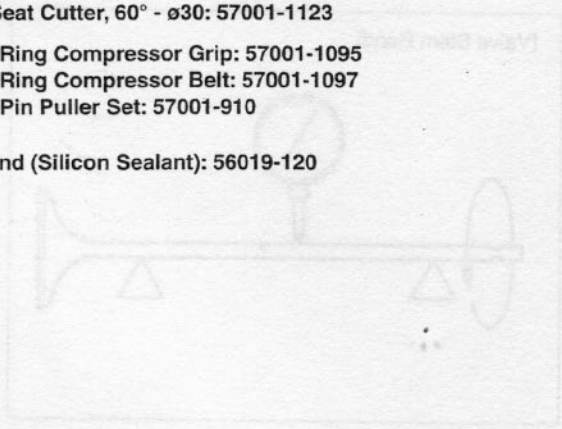
Special Tools - Spark Plug Wrench, Hex 16: 92110-1172 (Owner's Tool)
Valve Spring Compressor Assembly: 57001-241
Valve Spring Compressor Adapter, ø20: 57001-1154

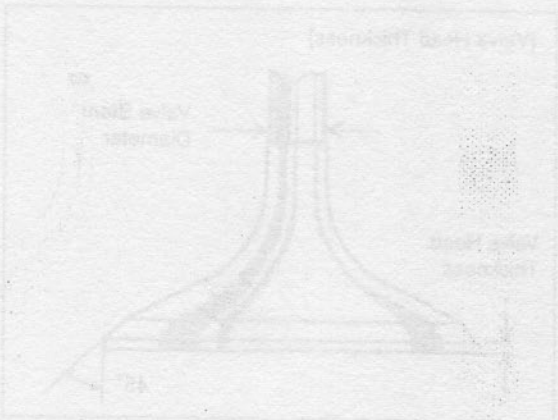
Valve Guide Arbor, ø4.5: 57001-1331
Valve Guide Reamer, ø4.5: 57001-1333

Valve Seat Cutter Holder, ø4.5: 57001-1330
Valve Seat Cutter Holder Bar: 57001-1128
Valve Seat Cutter, 45° - ø24.5: 57001-1113
(or Valve Seat Cutter, 45° - ø27.5: 57001-1114)
Valve Seat Cutter, 32° - ø25: 57001-1118
(or Valve Seat Cutter, 32° - ø28: 57001-1119
Valve Seat Cutter, 67.5° - ø22: 57001-1207
Valve Seat Cutter, 45° - ø30: 57001-1187
Valve Seat Cutter, 32° - ø38.5: 57001-1120
Valve Seat Cutter, 60° - ø30: 57001-1123

Piston Ring Compressor Grip: 57001-1095
Piston Ring Compressor Belt: 57001-1097
Piston Pin Puller Set: 57001-910

Sealant - Kawasaki Bond (Silicon Sealant): 56019-120

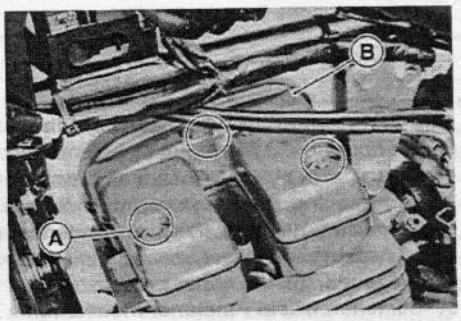




Cylinder Head Cover

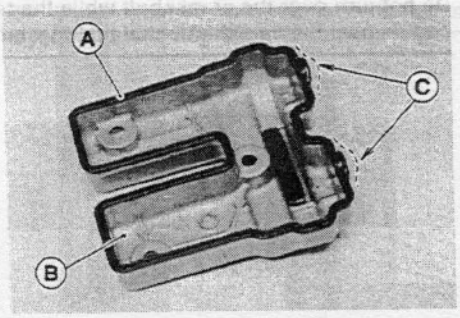
Cylinder Head Cover Removal

- Remove:
  Fuel Tank (see Fuel System chapter)
  Spark Plug Cap
- Remove the cylinder head cover bolt [A] and remove the head cover [B].



Cylinder Head Cover Installation

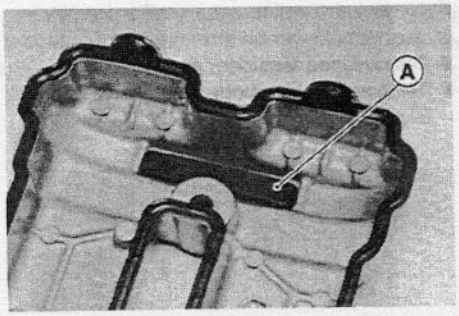
- Check the head cover gasket [A]; replace it if it is damaged.
- Install the head cover gasket on the head cover [B].
- Apply silicon sealant [C] to the locations shown.



- Make sure that the upper chain guide [A] is bottomed.

CAUTION

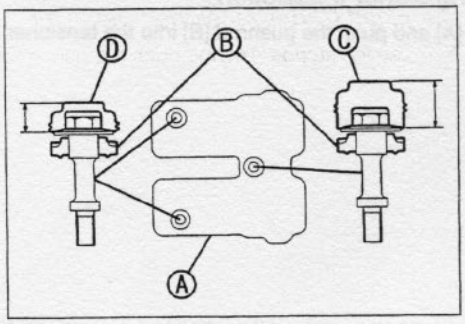
Unless the upper chain guide is bottomed, the camshaft chain could push the cylinder head cover upward, leading to an oil leak.



- Install the head cover [A].
- Install the head cover bolt washer [B], head cover bolt, caps [C] and [D]. Install them carefully, making sure of their orientation as shown.

Torque - Cylinder Head Cover Bolt:7.8 N·m (0.80 kg·m, 69 in·lb)

- Install the spark plug cap.



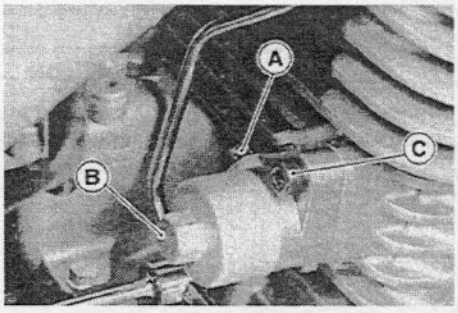
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

CAUTION

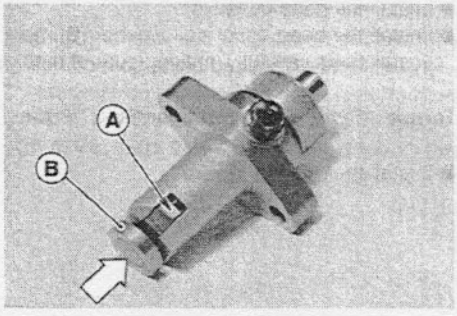
This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below:
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation."
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove the muffler (see Muffler Removal).
- Insert a box wrench from the left, and loosen the lock bolt [A].
- Remove the tensioner cap [B].
- Remove the tensioner installation bolt [C], and remove the chain tensioner.

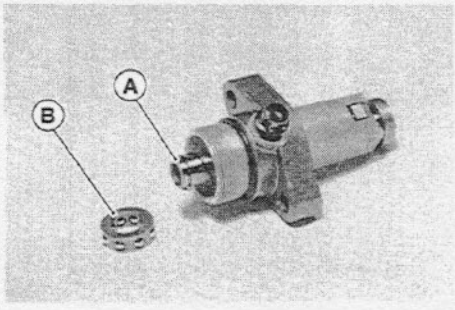


Camshaft Chain Tensioner Installation

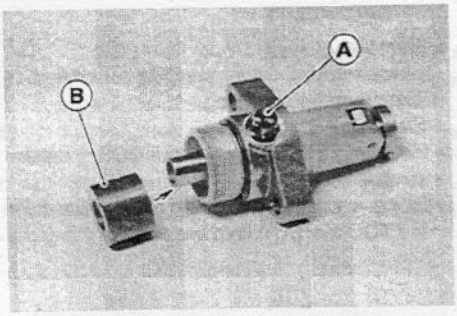
- Press the stopper [A] and push the pushrod [B] into the tensioner body.



- Install the (large) spring [A]; then, install the ball bearing assembly [B].
- Install the ball bearing assembly to the tensioner body. Use a regular tip screwdriver to push the bearing until it bottoms.

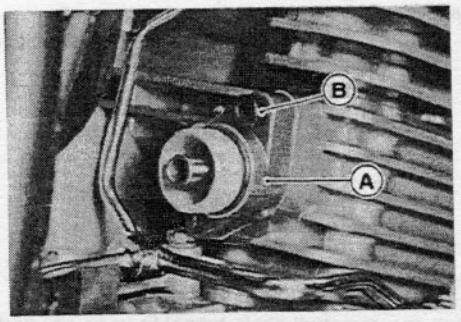


- Tighten the lockbolt [A] with your fingers to secure the ball bearing assembly in place.
- Install the retainer [B].



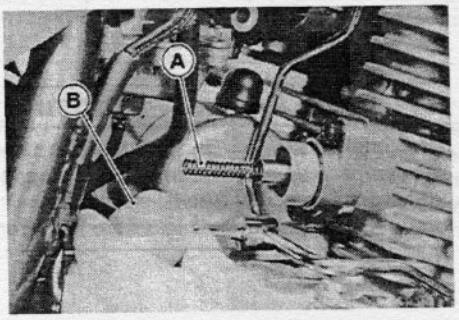
- Install the tensioner body [A].
- Apply locking agent to the threads and tighten the mounting bolt [B] to the specified torque.

Torque - Chain Tensioner Mounting Bolt: 11 N·m (1.1 kg·m, 95 in·lb)



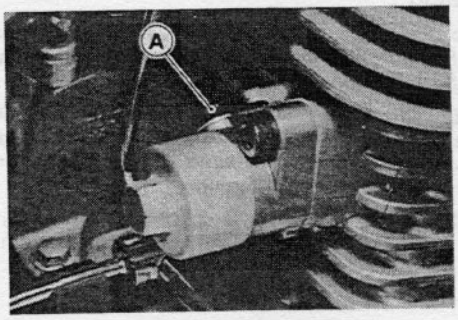
- Insert the small spring [A]; then, install the tensioner cap [B].
- Tighten the tensioner cap to the specified torque.

Torque - Chain Tensioner Cap: 20 N·m (2.0 kg·m, 14 ft·lb)



- Loosen the lock bolt [A]. After a click is heard, tighten the lock bolt.

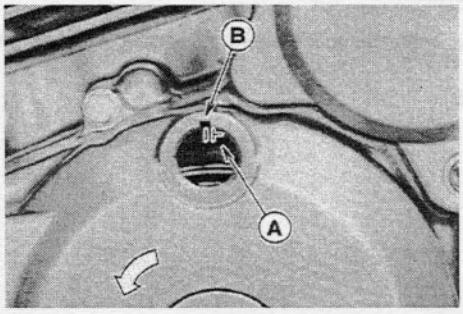
Torque - Tensioner Lock Bolt: 11 N·m (1.1 kg·m, 95 in·lb)



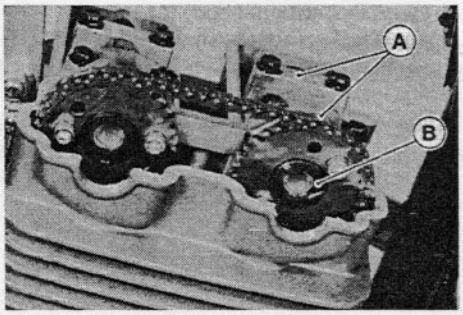
Camshaft

Camshaft Removal

- Remove:
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Timing Inspection Plug
  Rotor Bolt Plug
- First, bring the piston to the TDC (of either the compression or exhaust stroke).
- ○ Place a wrench over the rotor bolt and turn it counterclockwise to align the TDC mark [A] with the center of the groove [B] of the inspection hole.



- Remove:
  Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal).
  Camshaft Cap [A]
  Camshaft [B]



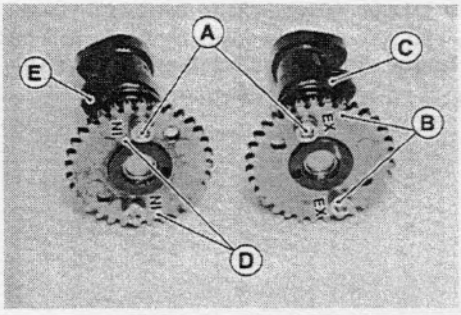
- Stuff a clean cloth into the camshaft chain tunnel to keep any parts from dropping into the crankcase.

CAUTION

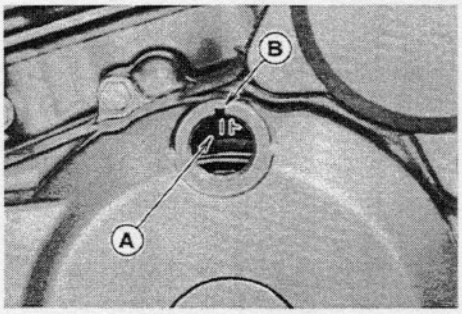
The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

Camshaft Installation

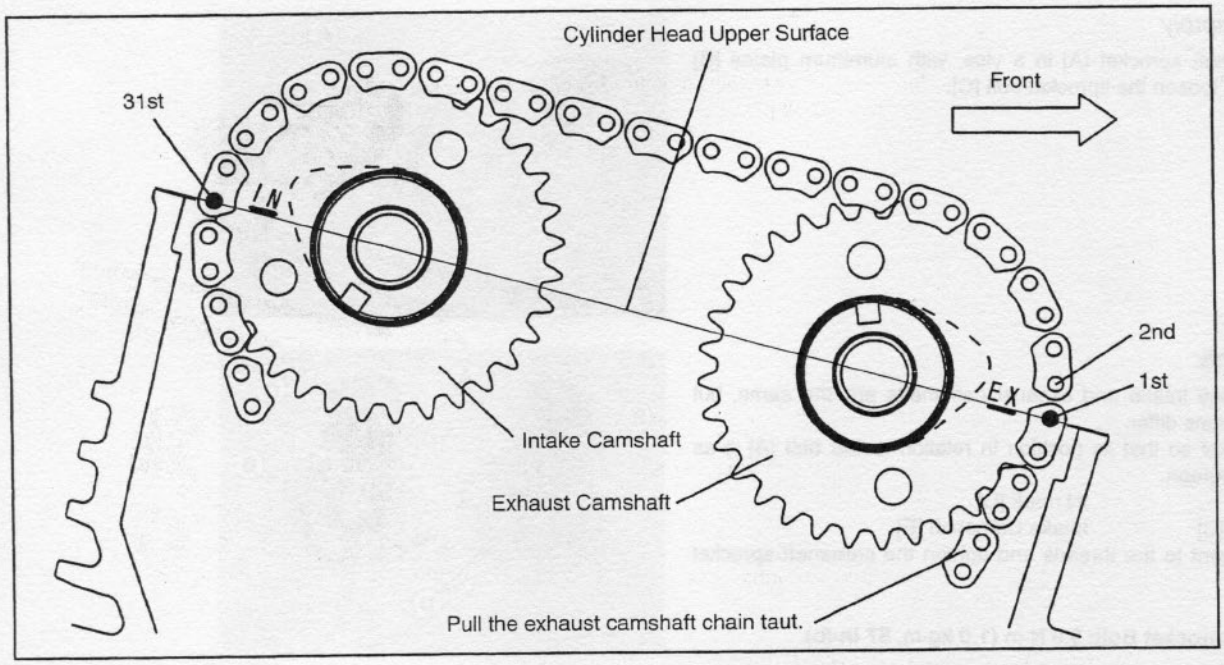
- Apply engine oil to all the cam and journal surfaces of the camshaft.
- If the camshaft is replaced with a new part, apply a thin coat of molybdenum disulfide grease to the cam and journal surfaces.
- ○ Do not interchange the intake and exhaust camshafts. Although their sprockets are the same, the positions of the bolt [A] are different, as shown in the photographs.
  EX mark [B] IN mark [D]
  Exhaust Camshaft [C] Intake Camshaft [E]



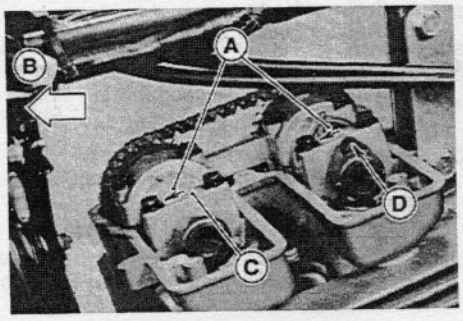
- First, bring the crankshaft to the TDC (of either the compression or exhaust stroke).
- ○ Place a wrench over the rotor bolt and turn it counterclockwise to align the TDC mark [A] with the center of the groove [B] of the inspection hole.



● Engage the camshaft chain with the camshaft sprockets.
○ Pull the tension side (exhaust side) of the chain taut to install the chain.
○ The timing marks on the exhaust sprocket must be aligned with the cylinder head upper surface and pointed toward the front
● Pull the chain taut and fit it onto the camshaft sprocket.
● Starting with the timing mark on the front of the exhaust sprocket, count to the 31st pin. Feed the exhaust camshaft through the chain and align the 31st pin with the timing mark on the inlet camshaft sprocket.



● Install the camshaft caps in their original positions by facing their arrows [A] forward [B] as shown in the photograph.
EX mark [C] IN mark [D]



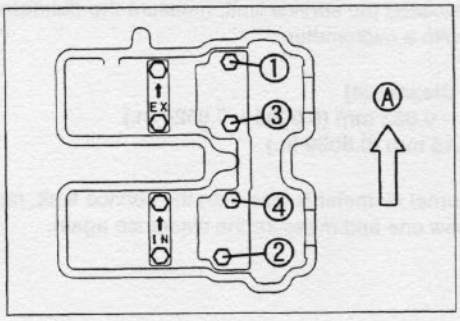
CAUTION

The camshaft caps are machined with the cylinder head, and the camshaft may seize if the caps are installed in a wrong position.

● Uniformly tighten bolts **1** and **2**, and after the camshaft has settled, uniformly tighten all the bolts.
○ Bolts **3** and **4** are short.
Front [A]

Torque - Camshaft Cap Bolt: 12 N·m (1.2 kg·m, 104 in·lb)

● Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation); then, check the camshaft chain timing.



CAUTION

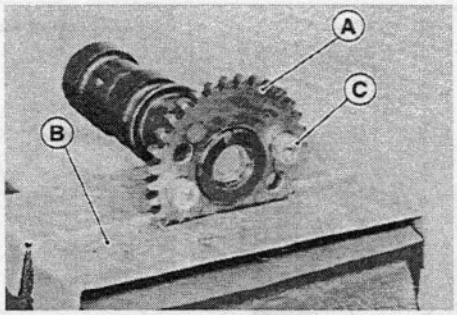
After this procedure, if any resistance is felt while turning over the crankshaft, stop immediately, and check the camshaft chain timing. Valves will be bent if the timing is not properly set.

● Install the cylinder head cover (see Cylinder Head Cover Installation), timing inspection plug, and the rotor bolt plug.

Torque - Timing Inspection Plug, Rotor Bolt Plug: 2.5 N·m (0.25 kg·m, 22 in·lb)

Camshaft Disassembly

● Holding the camshaft sprocket [A] in a vise, with aluminum plates [B] placed in between, loosen the sprocket bolt [C].

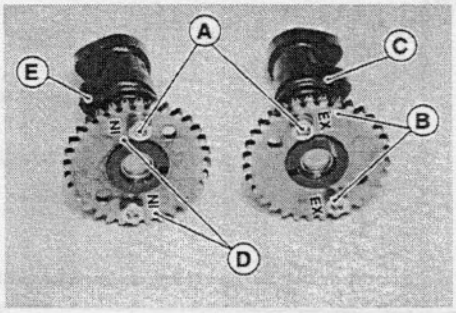


Camshaft Assembly

● The sprockets of the intake and exhaust camshafts are the same, but their installed positions differ.
● Install each sprocket so that its position in relation to the bolt [A] is as shown in the photograph.

EX mark [B] IN mark [D]
Exhaust Camshaft [C] Intake Camshaft [E]

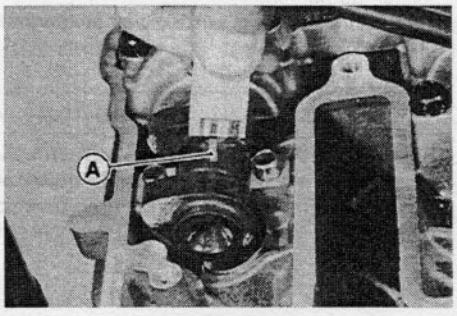
● Apply high-lock agent to the threads and tighten the camshaft sprocket bolt.



Torque - Camshaft Sprocket Bolt: 9.8 N·m (1.0 kg·m, 87 in·lb)

Camshaft and Camshaft Cap Wear

● Measure each clearance between the camshaft journal and camshaft cap using plastigage (press gauge) [A].
○ Tighten the camshaft cap bolts.



Torque - Camshaft Cap Bolts: 12 N·m (1.2 kg·m, 104 in·lb)

NOTE

○ *Do not turn the camshaft when the plastigauge is between the journal and camshaft cap.*

★ If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

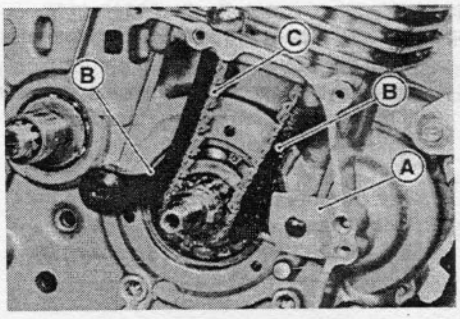
[Camshaft Bearing Clearance]
Standard: 0.020 ~ 0.062 mm (0.0008 ~ 0.0024 in.)
Service Limit: 0.15 mm (0.0059 in.)

★ If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.

[Camshaft Bearing Diameter]
Standard: 23.959 ~ 23.980 mm (0.9433 ~ 0.9441 in.)
Service Limit: 23.93 mm (0.9421 in.)

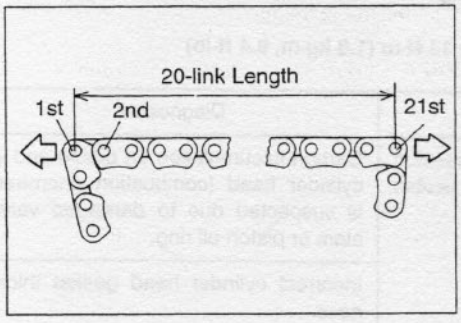
★ If the clearance still remains out of the service limit, replace the cylinder head unit.

Camshaft Chain Removal



- Remove:
  Camshaft (see Camshaft Removal)
  Cylinder Head (see Cylinder Head Removal)
  Clutch (see Clutch chapter)
  Primary Gear (see Clutch chapter)
  Chain Guide Plate [A]
  Chain Guide [B]
- Remove the camshaft chain [C] from the crankshaft sprocket.

Camshaft Chain Wear



- Hold the chain taut with a force of approximately 49 N·m (5 kg·m, 36 ft·lb), and measure a 20-link length. Since the chain may wear unevenly, take measurements at several places.

★ If any measurement exceeds the service limit, replace the camshaft chain. Also, replace the camshaft sprocket and the crankshaft when the chain is replaced.

[Camshaft Chain - 20-link length]
Standard: 127.00 ~ 127.36 mm (5.0000 ~ 5.0142 in.)
Service Limit: 128.90 mm (5.0748 in.)

Cylinder Head

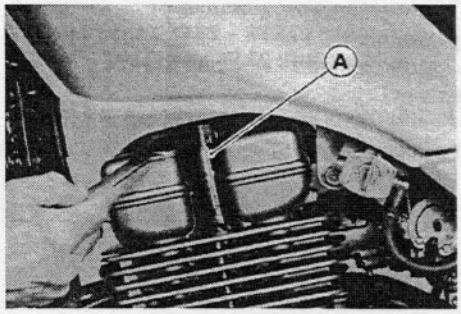
Cylinder Compression Measurement

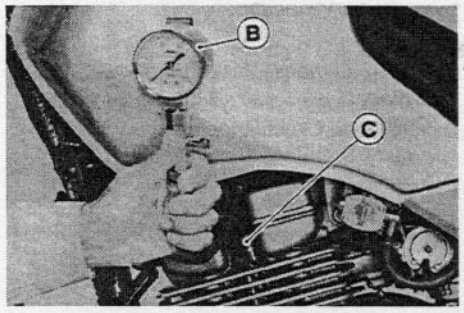
NOTE

○ *Use a battery that is fully charged.*

● Thoroughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running.

● Stop the engine, remove the spark plug with spark plug wrench (owner's tool) [A], and attach the commercially available compression gauge [B] and the adapter hose [C] firmly into the spark plug hole.





Special Tool - Spark Plug Wrench (Owner's Tool) : 92110-1172

● Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

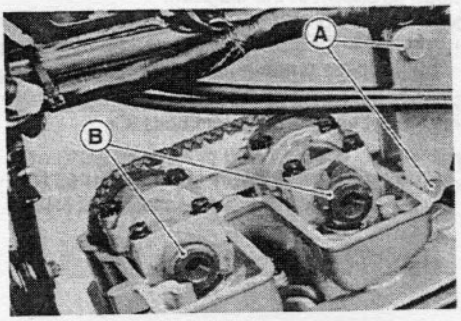
[Cylinder Compression]
Service Range:
855 ~ 1,320 kPa (8.7 ~ 13.5 kg/cm^2, 124 ~ 192 psi)/450 rpm

● Install the spark plug.

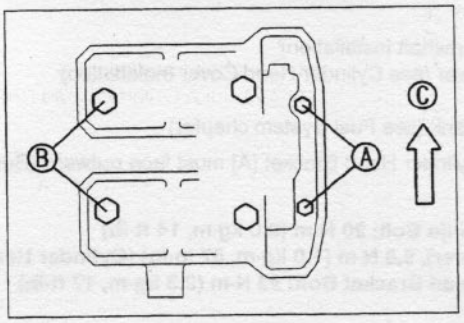
Torque - Spark Plug: 13 N·m (1.3 kg·m, 9.4 ft·lb)

Problem	Diagnosis	Remedy (Action)
The cylinder compression is higher than the usable range.	Carbon accumulation on piston and in cylinder head (combustion chamber) is suspected due to damaged valve stem or piston oil ring.	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness.	Replace the gasket with a standard one.
Cylinder compression is lower than usable range.	Exhaust gas leakage around cylinder head.	Replace the damaged gasket and check cylinder head warp.
	Incorrect seating surface of valve.	Repair seating surface if possible.
	Valve clearance is too narrow.	Adjust the valve clearance.
	Piston/cylinder clearance is too wide.	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and piston; repair or replace them as necessary.
	Incorrect condition of piston ring and/or piston ring grooves.	Replace the piston and/or the piston rings.

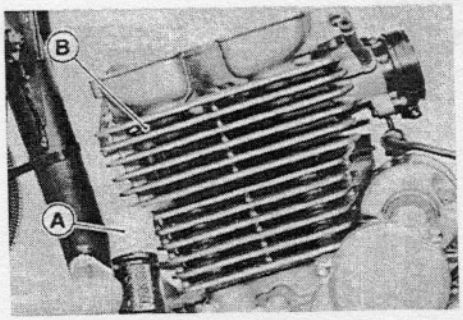
Cylinder Head Removal



- Remove:
  Fuel Tank, Carburetor (see Fuel System chapter)
  Muffler (see Muffler Removal)
  Cylinder Head Bracket Bolt [A]
  Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Oil Pipe (see Engine Lubrication System chapter)
  Camshaft (see Camshaft Removal) [B]
  Front Chain Guide

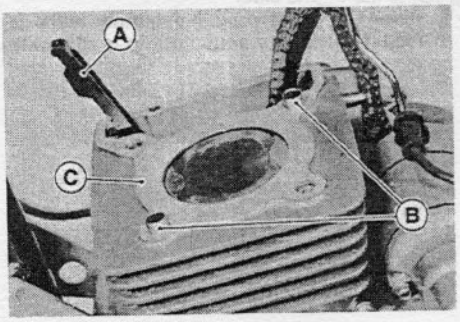


- Remove the 6 mm cylinder head bolts [A] first, then remove the 10 mm cylinder head bolts [B]. This prevents the 6 mm bolts from becoming damaged.
  Front [C]

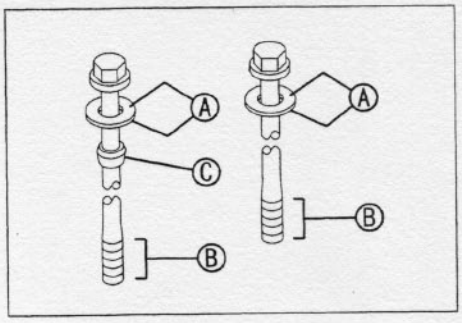


- Tap lightly up with a plastic mallet [A] to separate the cylinder head [B] from the cylinder.
- Remove the cylinder head gasket.

Cylinder Head Installation

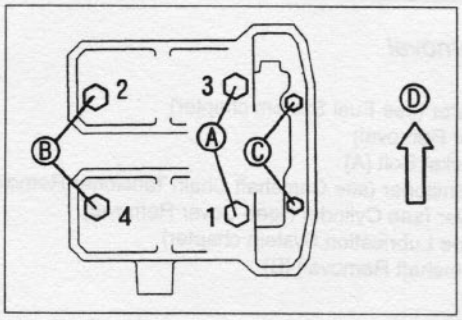


- Install:
  Front Chain Guide [A]
  Dowel Pins [B]
  New Cylinder Head Gasket [C]
- ○ The camshaft caps are machined with the cylinder head; therefore, if a new cylinder head is installed, use the caps that are supplied with the new head.
- Install the cylinder head.



- To ensure proper oil seal and uniform tightening torque, replace all the 10 mm cylinder head bolt washers with new ones.
- ○ The 10 mm cylinder head bolt washers are copper-plated, and they could leak oil if reused.
- Apply molybdenum disulfide grease to the following areas:
  10 mm Cylinder Head Bolt Washer, both sides [A]
  10 mm Cylinder Head Bolt, threaded portion [B]
  10 mm Cylinder Head Bolt, rubber portion [C]

● Install the cylinder head as shown in the diagram.
● Install the 10 mm cylinder head bolts (with rubber material) [A] and (without rubber material) [B] in the numbered sequence. First tighten them to **15 N·m (1.5 kg·m, 11 ft·lb)**; then, tighten them to the specified torque.
● Lastly, tighten the 6 mm bolts [C].

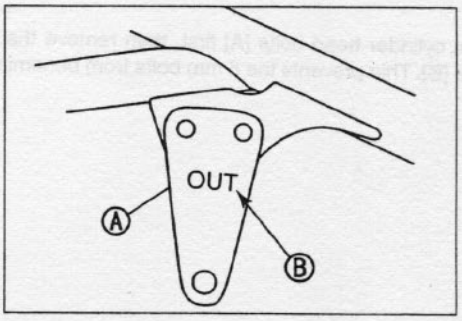


Torque - 10 mm Cylinder Head Bolt: 49 N·m (5.0 kg·m, 36 ft·lb)
6 mm Cylinder Head Bolt: 12 N·m (1.2 kg·m, 104 in·lb)

Front [D]

● Install:
Front Chain guide
Camshaft (see Camshaft Installation)
Cylinder Head Cover (see Cylinder Head Cover Installation)
Muffler
Carburetor, Fuel Tank (see Fuel System chapter)

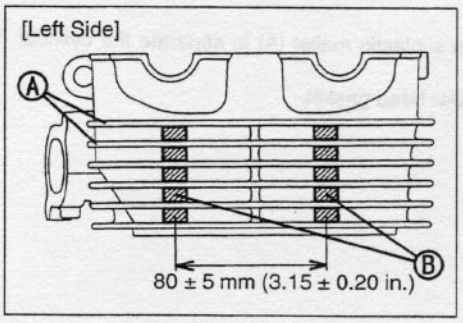
○ Out mark [B] of Cylinder Head Bracket [A] must face outward (Burrs face inward).



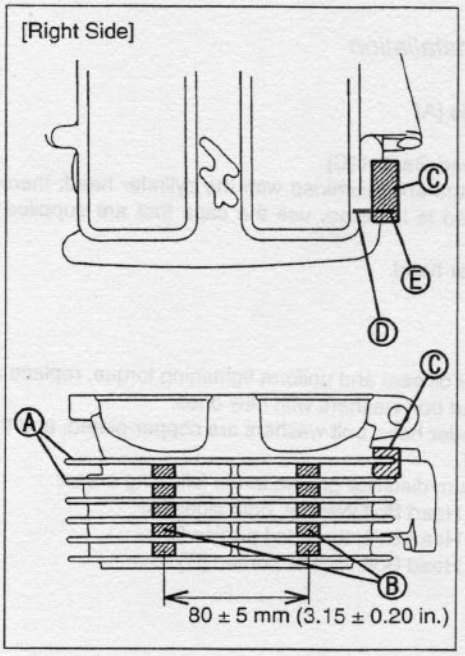
Torque - Oil Pipe Banjo Bolt: 20 N·m (2.0 kg·m, 14 ft·lb)
(Clutch Cover), 9.8 N·m (1.0 kg·m, 87 in·lb) (Cylinder Head)
Cylinder Head Bracket Bolt: 23 N·m (2.3 kg·m, 17 ft·lb)

Cylinder Head Assembly

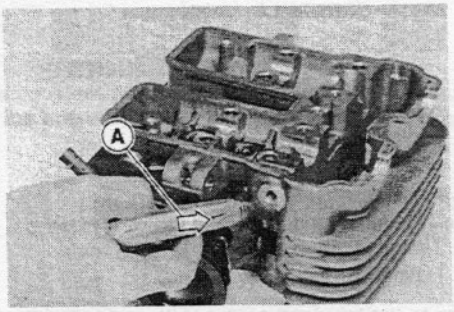
● Attach the 20 dampers [B] between the cylinder head fins [A] as shown in the diagram.



● Attach the damper [C] to the intake side.
○ Align the cylinder head parting line [D] with the damper mark [E].

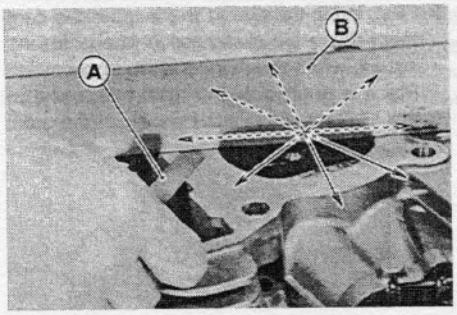


Cylinder Head Cleaning



- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valves (see Valve Removal).
- Scrape the carbon out of the combustion chamber and exhaust port with a scraper or a suitable tool.
- Clean the cylinder head, using high-flash point solvent.
- Blow out [A] any particles which may obstruct the oil passage in the cylinder head using compressed air.
- Install the valves (see Valve Installation).

Cylinder Head Warp



- Clean the cylinder head (see Cylinder Head Cleaning).
- Lay a straightedge across the mating surface of the cylinder head at the positions shown.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the cylinder head.

[Cylinder Head Warp]
Standard: ---
Service Limit: 0.05 mm (0.0020 in.)

★ If the cylinder head is warped more than the service limit, replace it.
★ If the cylinder head is warped less than the service limit, repair the head by sanding the mating surface (first No. 200, then No. 400).

Valve

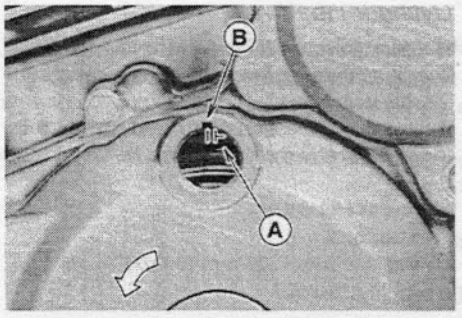
Valve Clearance Inspection

NOTE

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

● Remove:
Cylinder Head Cover (see Cylinder Head Cover Removal)
Timing Inspection Plug
Rotor Bolt Plug

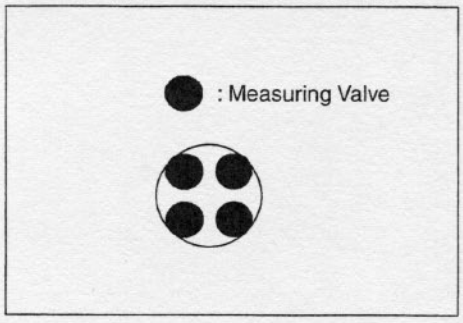
● First, bring the piston to the top-dead-center of its compression stroke to inspect the valve clearance (the position at the end of the compression stroke, when the cam lobe faces opposite of the rocker arm).
○ Place a wrench over the rotor bolt and turn it counterclockwise to align the TDC mark [A] with the center of the groove [B] of the inspection hole.



● Using a thickness gauge [A], measure the clearance between each cam lob and valve lifter, for all four valves.
○ For the purpose of adjusting the valve clearances, record the measured values.

[Valve clearance: between cam and valve lifter]
Standard:
Exhaust: 0.14 ~ 0.23 mm (0.0055 ~ 0.0091 in.)
Intake: 0.10 ~ 0.19 mm (0.0039 ~ 0.0075 in.)

★ If the valve clearance is not within the specified range, adjust it.



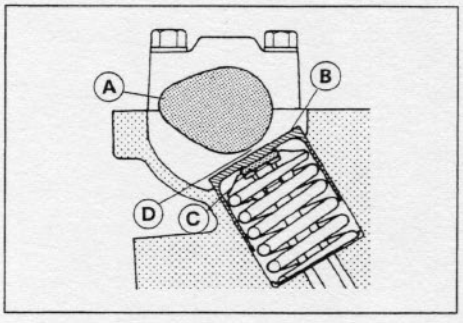
Valve Clearance Adjustment

● Remove the camshaft [A] (see Camshaft Removal).
● Remove the valve lifter [B] of the applicable valve.
● Remove the shim [C] from the top of the spring retainer.

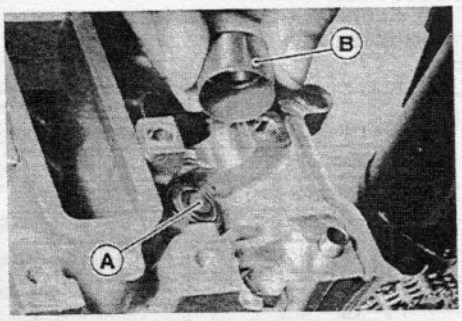
NOTE

○ *Mark and record the locations of the valve lifters and shims so that they can be reinstalled in their original positions.*

● Measure the thickness of the removed shim. Select a new shim based on the previously measured valve clearance [D] and the Valve Clearance Adjustment Chart.



- When installing the shim, face the marked side [A] toward the valve lifter [B]. At this time, apply high temperature grease to the shim or the valve lifter [B] to keep the shim in place during camshaft installation.



CAUTION

Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.
Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

- Apply engine oil to the valve lifter surface and install the lifter.
- Install the camshaft (see Camshaft Installation).
- Recheck the valve clearance and readjust if necessary.
- Install the cylinder head cover (see Cylinder Head Cover Installation), timing inspection plug, and the rotor bolt plug.

Torque - Timing Inspection Plug, Rotor Bolt Plug:
2.5 N·m (0.25 kg·m, 22 in·lb)

VALVE CLEARANCE ADJUSTMENT CHART
EXHAUST VALVE

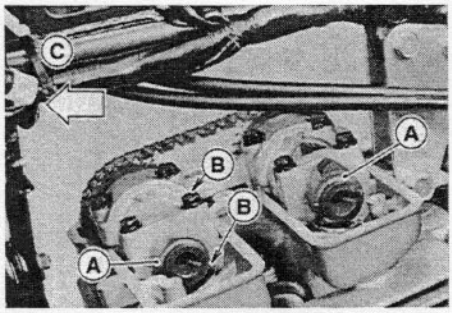
	Present shim									Example											
Part No. (92180 -)	1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054
Mark	50	55	60	65	70	75	80	85	90	95	00	5	10	15	20	25	30	35	40	45	50
Thickness (mm)	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50

Valve clearance measurement mm																					
0.00 ~ 0.01	–	–	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30
0.02 ~ 0.06	–	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.07 ~ 0.11	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.12 ~ 0.13	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.14 ~ 0.23	Specified Valve Clearance/No change required																				
0.24 ~ 0.26	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
0.27 ~ 0.31	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
0.32 ~ 0.36	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
0.37 ~ 0.41	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
0.42 ~ 0.46	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
0.47 ~ 0.51	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
0.52 ~ 0.56	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
0.57 ~ 0.61	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
0.62 ~ 0.66	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
0.67 ~ 0.71	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
0.72 ~ 0.76	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
0.77 ~ 0.81	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
0.82 ~ 0.86	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
0.87 ~ 0.91	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
0.92 ~ 0.96	3.25	3.30	3.35	3.40	3.45	3.50															
0.97 ~ 1.01	3.30	3.35	3.40	3.45	3.50																
1.02 ~ 1.06	3.35	3.40	3.45	3.50																	
1.07 ~ 1.11	3.40	3.45	3.50																		
1.12 ~ 1.16	3.45	3.50																			
1.17 ~ 1.21	3.50																				

Example

Install the shim of this thickness.

1. Measure the valve clearance (with engine cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. Install the shim specified by the lines that intersect. This shim will give the proper clearance.
   Example: Present shim is 2.95 mm.
   Measured clearance is 0.42 mm.
   Replace with the shim where the lines intersect, which is the 3.15 mm shim.
5. Remeasure the valve clearance and readjust if necessary.



Cam [A] Front [C]
Valve Clearance [B]

CAUTION

Be sure to remeasure the clearance after selecting a shim according to the table. The clearance can be out of the specified range because of the shim tolerance.

○ If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

VALVE CLEARANCE ADJUSTMENT CHART
INTAKE VALVE

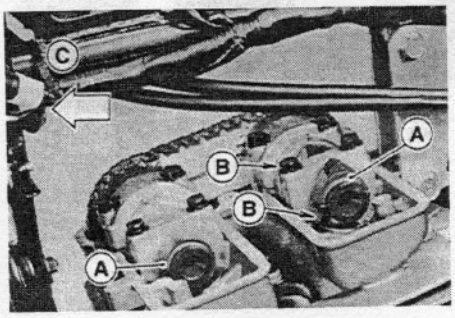
	Present shim ← Example																				
Part No. (92180 -)	1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054
Mark	50	55	60	65	70	75	80	85	90	95	00	5	10	15	20	25	30	35	40	45	50
Thickness (mm)	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50

Valve clearance measurement mm																					
0.00 ~ 0.02	–	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.03 ~ 0.07	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.08 ~ 0.09	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.10 ~ 0.19	Specified Valve Clearance/No change required																				
0.20 ~ 0.22	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
0.23 ~ 0.27	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
0.28 ~ 0.32	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
0.33 ~ 0.37	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
0.38 ~ 0.42	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
0.43 ~ 0.47	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
0.48 ~ 0.52	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
0.53 ~ 0.57	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
0.58 ~ 0.62	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
0.63 ~ 0.67	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
0.68 ~ 0.72	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
0.73 ~ 0.77	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
0.78 ~ 0.82	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
0.83 ~ 0.87	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
0.88 ~ 0.92	3.25	3.30	3.35	3.40	3.45	3.50															
0.93 ~ 0.97	3.30	3.35	3.40	3.45	3.50																
0.98 ~ 1.02	3.35	3.40	3.45	3.50																	
1.03 ~ 1.07	3.40	3.45	3.50																		
1.08 ~ 1.12	3.45	3.50																			
1.13 ~ 1.17	3.50																				

Example

Install the shim of this thickness.

1. Measure the valve clearance (with engine cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. Install the shim specified by the lines that intersect. This shim will give the proper clearance.
   Example: Present shim is 2.95 mm.
   Measured clearance is 0.42 mm.
   Replace with the shim where the lines intersect, which is the 3.20 mm shim.
5. Remeasure the valve clearance and readjust if necessary.



Cam [A]
Valve Clearance [B]
Front [C]

CAUTION

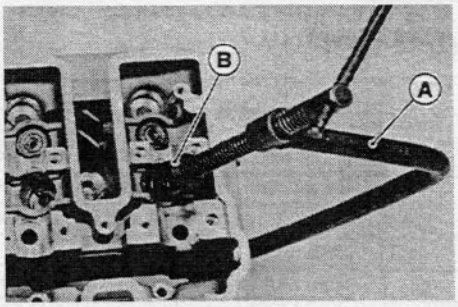
Be sure to remeasure the clearance after selecting a shim according to the table. The clearance can be out of the specified range because of the shim tolerance.

○ If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

Valve Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valve lifter and the shim from the valve.
- Use the valve spring compressor assembly and the adapter to press down the valve spring retainer.

Special Tools - Valve Spring Compressor Set: 57001-241 [A]
Valve Spring Compressor Adapter, ø20: 57001-1154 [B]

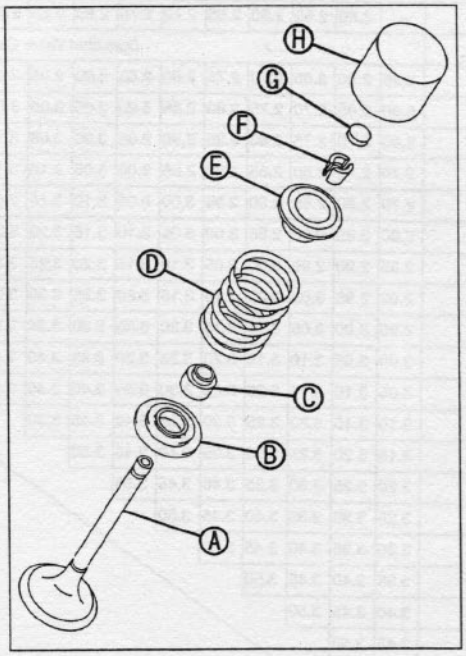


Valve Installation

- Replace the oil seal [C] with a new part.
- Apply a thin coat molybdenum disulfide grease to the valve stem [A] before installing the valve.
- Check to make sure that the valve moves up and down smoothly.
- Check to make sure that the valve and the valve seat are making proper contact.
- Install the valve spring so that the closed coil end [D] faces the spring seat [B].
- Compress the valve spring to install the split keepers [F] in order to secure the spring retainer [E] in place.

Special Tools - Valve Spring Compressor Set: 57001-241
Valve Spring Compressor Adapter, ø20: 57001-1154

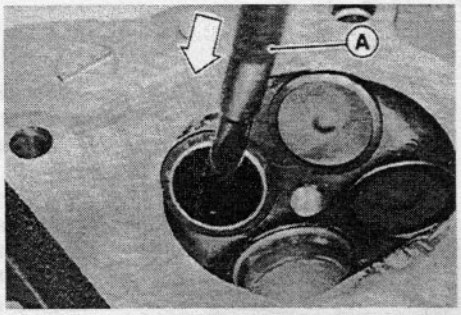
- The shim [G] must be installed with its thickness indication facing up towards the retainer.
- ○ Apply high temperature grease to the shim or to the retainer to prevent the shim from falling off when the camshaft is being installed.
- Apply engine oil to the valve lifter [H] surface; then install the lifter.



Valve Guide Removal

- Remove:
  Valve (see Valve Removal)
  Oil Seal
  Spring Seat
- Heat the area around the valve guide up to 120 ~ 150°C (248 ~ 302°F).

CAUTION
Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head and heat the oil.



- Hammer lightly on the valve guide arbor [A] to remove the guide.

Special Tool - Valve Guide Arbor, ø4.5: 57001-1331

Valve Guide Installation

- Apply a thin coat of oil to the outer surface of the valve guide.
- Heat the area around the valve guide up to 120 ~ 150°C (248 ~ 302°F).

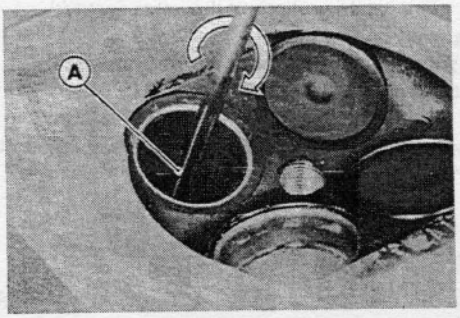
CAUTION
Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head and heat the oil.

- Using the valve guide arbor, press and insert the valve guide in until its snap ring touches the head surface.

Special Tool - Valve Guide Arbor, ø4.5: 57001-1331

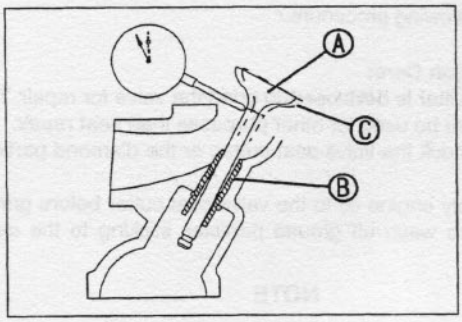
- Ream the valve guide with valve guide reamer [A], even if the old guide is reused.

Special Tool - Valve Guide Reamer, ø4.5: 57001-1333



Valve/Valve Guide Clearance Measurement (Wobble Method)

- ○ If a small bore gauge is not available, inspect the valve guide wear by measuring the valve/valve guide clearance with the wobble method as indicated below.
- Insert 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 cylinder head mating surface.
- Move the stem back and forth [C] to measure the valve wobble.
- Repeat the measurement in a direction at a 90° angle to the first measurement.
- ★ If the reading exceeds the service limit, replace the guide.



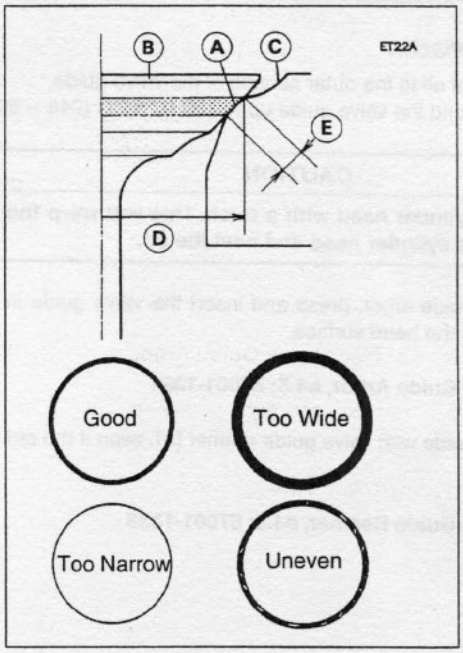
NOTE

- ○ *The reading is greater than the actual valve/valve guide clearance because the measurement is taken outside of the guide.*

[Valve/Valve Guide Clearance Measurement - Wobble Method]

	Standard	Service Limit
Exhaust:	**0.08 ~ 0.16 mm (0.0031 ~ 0.0063 in.)**	**0.33 mm (0.0130 in.)**
Intake:	**0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)**	**0.27 mm (0.0106 in.)**

Valve Seat Inspection



- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].
- Measure the outside diameter [D] of the seating pattern on the valve seat.

★ If the outside diameter is too large or too small, repair the seat.(see Seat Repair)

[Valve Seating Surface Outside Diameter]
Exhaust: 23.4 ~ 23.6 mm (0.9213 ~ 0.9291 in.)
Intake: 27.9 ~ 28.1 mm (1.0984 ~ 1.1063 in.)

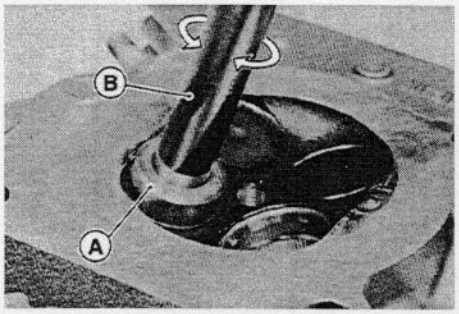
- Check the seating surface width of the valve seat.

○ Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.

[Valve Seating Surface Width Standard]
Exhaust: 0.8 ~ 1.2 mm (0.0315 ~ 0.0472 in.)
Intake: 0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)

★ If the seating surface width of the valve seat is not within the standard, repair the seat.

Valve Seat Repair



- For the instructions on how to use the valve seat cutter [A], follow the operation manual provided by the tool manufacturer.

Special Tools - Valve Seat Cutter Holder, ø4.5: 57001-1330 [B]
Valve Seat Cutter Holder Bar: 57001-1128
Exhaust: Valve Seat Cutter, 45° - ø24.5: 57001-1113 (or 1114)
Valve Seat Cutter, 32° - ø25: 57001-1118 (or 1119)
Valve Seat Cutter, 67.5° - ø22: 57001-1207
Intake: Valve Seat Cutter, 45° - ø30: 57001-1187
Valve Seat Cutter, 32° - ø38.5: 57001-1120
Valve Seat Cutter, 60° - ø30: 57001-1123

★ If the tool manufacturer's instructions are not available, operate in accordance with the following procedure.

Seat Cutter Operation Care:

○ This valve seat cutter is developed to grind the valve for repair. Therefore the cutter must not be used for other purposes than seat repair.

○ Do not drop or shock the valve seat cutter, or the diamond particles may fall off.

○ Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTE

○ *Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

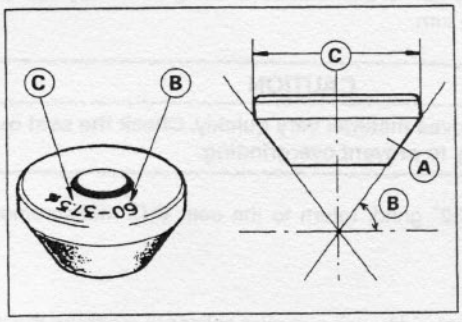
○ Setting the valve seat cutter holder in position, operate the cutter in one hand. Do not apply too much force to the diamond portion.

NOTE

○ *Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

○ After use, wash it with washing oil and apply thin layer of engine oil before storing.

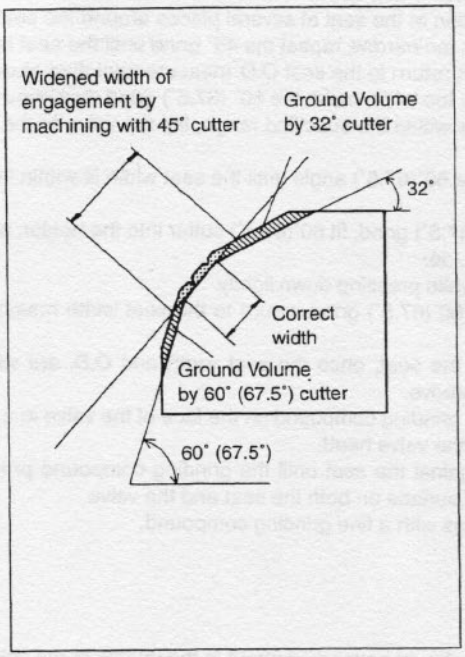
[Marks Stamped on the Cutter]
The marks stamped on the back of the cutter [A] represent the following:
60°... Cutter Angle [B]
37.5ø... Cutter Outer Diameter [C]



[Repair Operation Procedure]
- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

CAUTION

Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into 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.

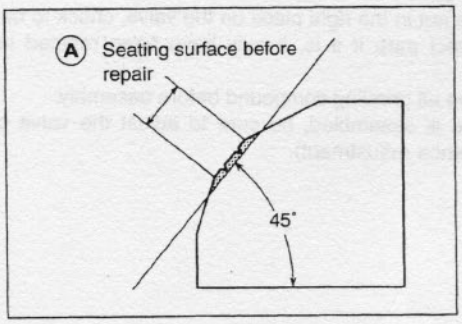


- Measure the outside diameter (O.D.) of the seating surface with a vernier caliper.

★ If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.

NOTE

○ *If the 45° seat surface has cuts or pin holes, it must be ground until it is smooth.*
After grinding, apply machinist's dye on the 45° seat surface. This will clearly show the 45° pattern line when the 32° and 60° (67.5°) surfaces are ground later.
If the valve guide is replaced, make sure to grind first with a 45° cutter to ensure the concentricity of the seating surface and sealing performance.

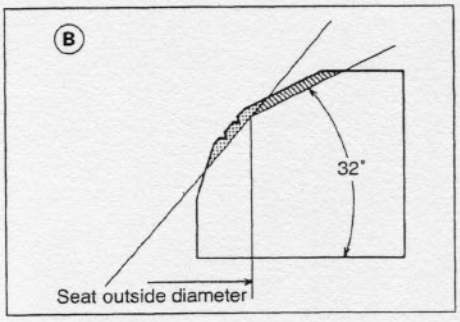


★ If the outside diameter of the seating surface is too large, make the 32° grind described below.

★ If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.

● Grind the seat at a 32° angle until the seat O.D. is within the specified range [B].

○ To make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.



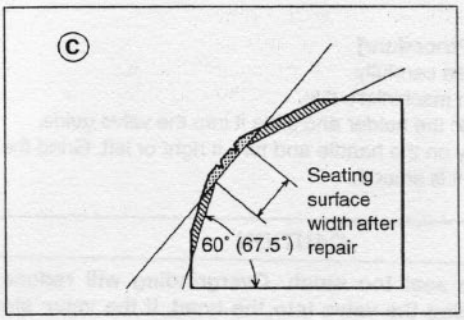
○ Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

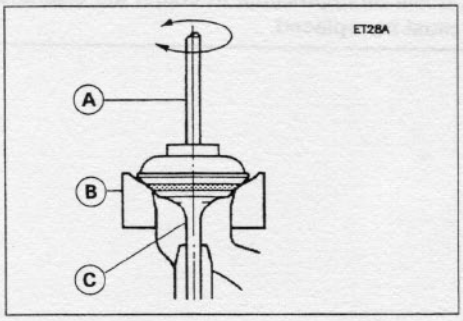
CAUTION

The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

○ After making the 32° grind, return to the seat O.D. measurement step above.

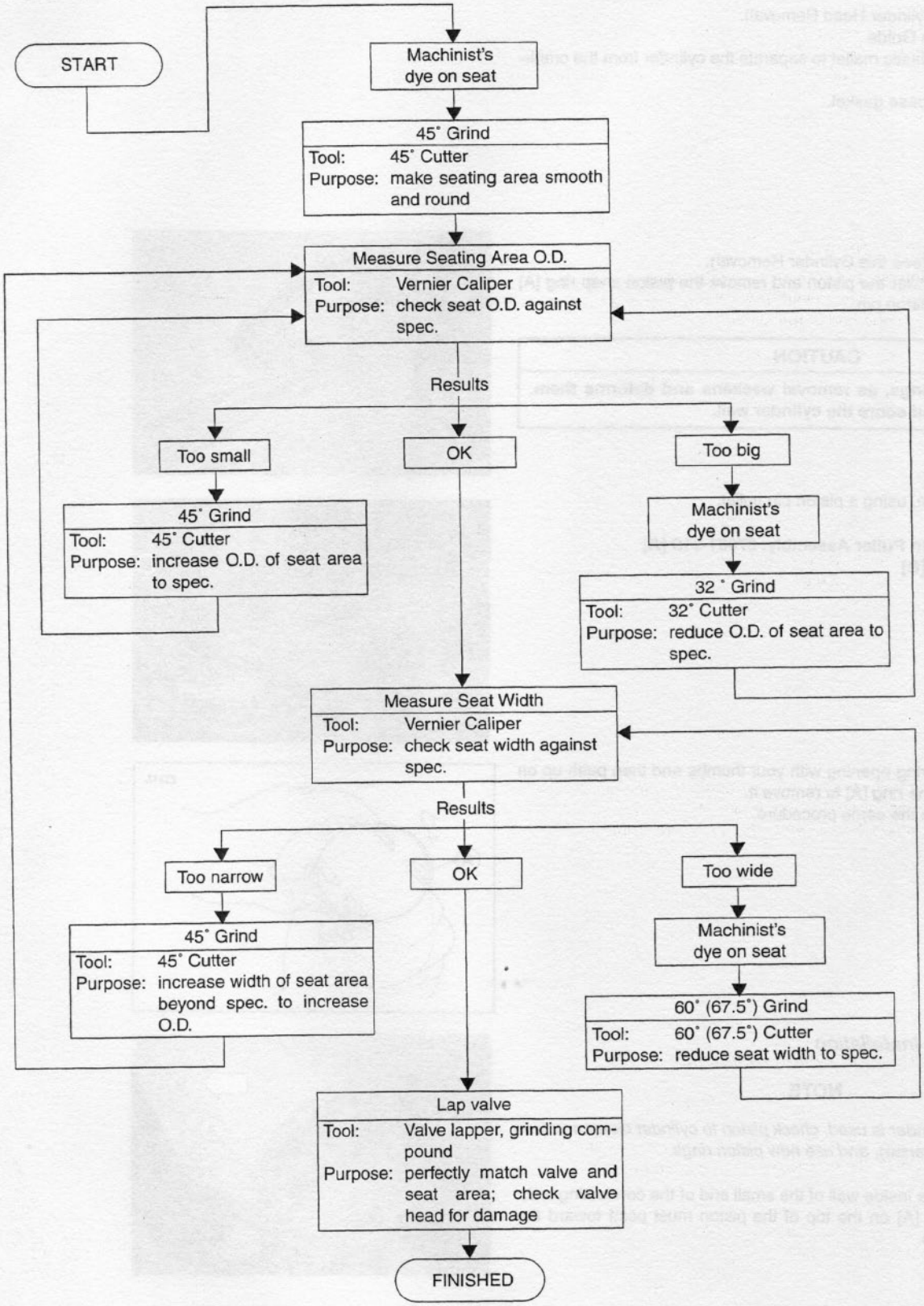
● To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
★ If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.
★ If the seat width is too wide, make the 60° (67.5°) grind described below.
★ If the seat width is within the specified range, lap the valve to the seat as described below.
● Grind the seat at a 60°(67.5°) angle until the seat width is within the specified range [C].
○ To make the 60°(67.5°) grind, fit 60°(67.5°) cutter into the holder, and slide it into the valve guide.
○ Turn the holder, while pressing down lightly.
○ After making the 60°(67.5°) grind, return to the seat width measurement step above.
● Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.
○ Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○ Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○ Repeat the process with a fine grinding compound.
[A] Lapper
[B] Valve Seat
[C] Valve





● The seating area should be marked about in the middle of the valve face.
★ If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
● Be sure to remove all grinding compound before assembly.
● When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Adjustment).

[Valve Seat Repair]



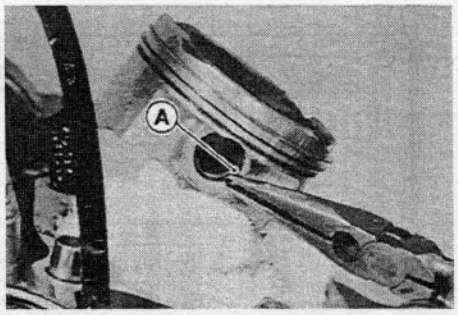
Cylinder and Piston

Cylinder Removal

- Remove:
  Cylinder Head (see Cylinder Head Removal).
  Front Camshaft Chain Guide
- Tap lightly up with a plastic mallet to separate the cylinder from the crankcase.
- Remove the cylinder base gasket.

Piston Removal

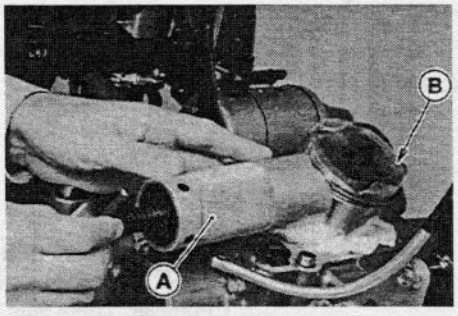
- Remove the cylinder (see this Cylinder Removal).
- Place a clean cloth under the piston and remove the piston snap ring [A] from one end of the piston pin.



CAUTION
Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

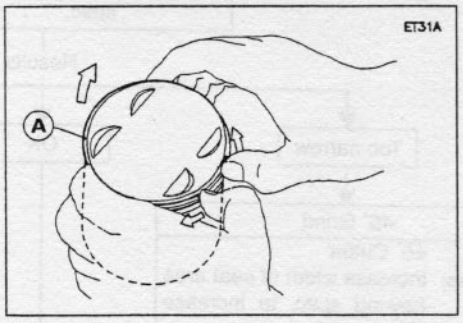
- Remove the piston pin, using a piston pin puller.

Special Tool - Piston Pin Puller Assembly: 57001-910 [A]
Adapter [B]



- Remove the piston.

- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the oil ring in the same procedure.

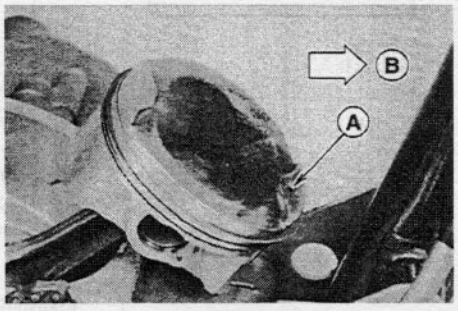


Cylinder and Piston Installation

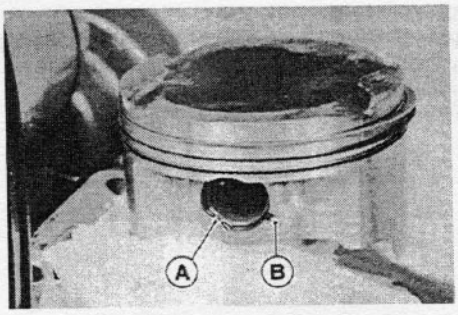
NOTE

○ *If a new piston or cylinder is used, check piston to cylinder clearance (see Piston/Cylinder Clearance), and use new piston rings.*

- Apply engine oil to the inside wall of the small end of the connecting rod.
- Face the circle mark [A] on the top of the piston must point toward the front [B] of the engine.



● Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.
○ When installing the piston pin snap ring, compress it only enough to install it and no more.



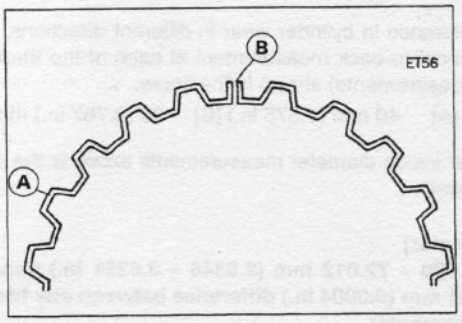
CAUTION

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

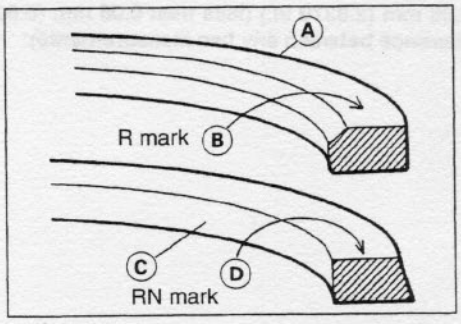
NOTE

○ *The oil ring rails have no "top" or "bottom".*

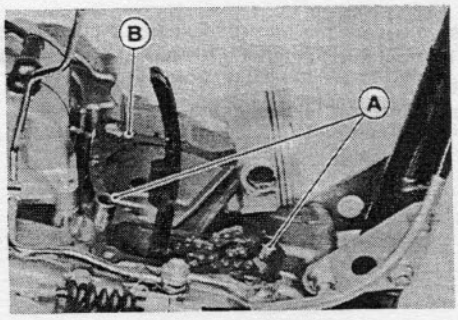
● Install the oil ring expander [A] in the bottom piston ring groove so the ends [B] butt together.
● Install the oil ring steel rails, one above the expander and one below it.
○ Spread the rail with your thumbs, but only enough to fit the rail over the piston.
○ Release the rail into the bottom piston ring groove.



● Do not mix up the top and second ring.
○ Install the top ring [A] so that the "R" mark [B] face up.
○ Install the second ring [C] so that the "RN" mark [D] faces up.
○ Install the oil ring, second ring, and the top ring according to the due order.



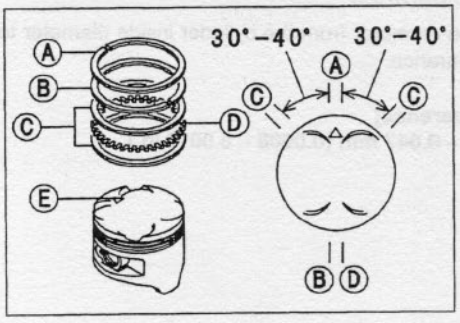
● Install:
Dowel Pins [A]
New Cylinder Base Gasket [B]



● The piston ring openings must be positioned as shown in the figure. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.

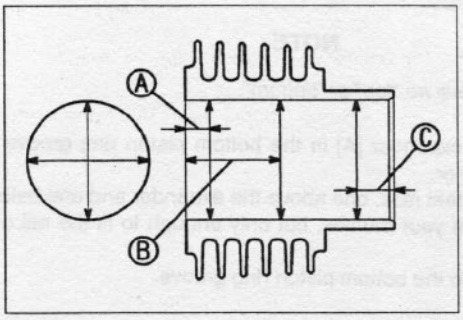
Top Ring [A]
Second Ring [B]
Oil Ring Steel Rails [C]
Oil Ring Expander [D]
Round mark [E]

● Install the piston with its marking hollow facing forward.



- Apply engine oil to the cylinder bore.
- Determine the position of the piston ring ends.
- Install the cylinder while compressing the piston rings with your fingers.
- Drive the front chain guide in.
- Install the removed parts.

Cylinder Wear



- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the three locations (total of six measurements) shown in the figure.

  10 mm (0.394 in.) [A] 40 mm (1.575 in.) [B] 20 (0.787 in.) mm [C]

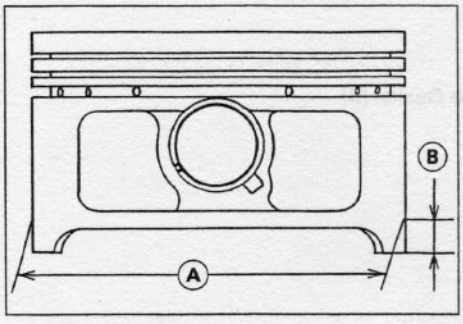
★ If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

[Cylinder Inside Diameter]

Standard: 72.000 ~ 72.012 mm (2.8346 ~ 2.8351 in.) (less than 0.01 mm (0.0004 in.) difference between any two measurements)

Service Limit: 72.06 mm (2.8370 in.) (less than 0.05 mm (0.0020 in.) difference between any two measurements)

Piston Wear



- Using a micrometer, measure the outside diameter [A] of each piston 5 mm (0.197 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

★ If the piston's outside diameter is smaller than the service limit, replace the piston.

[Piston Diameter]

Standard: 71.965 ~ 71.980 mm (2.8333 ~ 2.8339 in.)

Service Limit: 71.82 mm (2.8276 in.)

Piston/Cylinder Clearance

- Subtract the piston diameter from the cylinder inside diameter to get the piston/cylinder clearance.

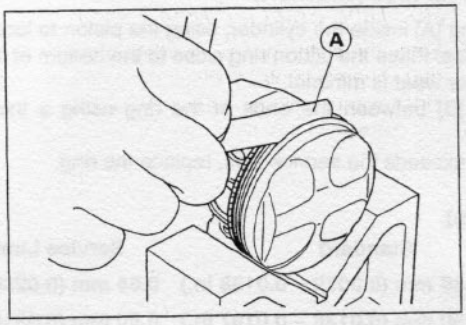
[Piston/Cylinder Clearance]

Standard: 0.020 ~ 0.047 mm (0.0008 ~ 0.0019 in.)

★ If the piston/cylinder clearance is less than the specified range, use a smaller piston or increase the cylinder inside diameter by honing.
★ If the piston/cylinder clearance is greater than the specified range, use a larger piston.
★ If only a piston is replaced, the clearance may exceed the standard slightly. But it must not be less than the minimum limit in order to prevent piston seizure.

Piston Ring/Ring Groove Clearance

● Check for uneven groove wear by inspecting the ring seating.
★ The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.
● With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.



[Piston Ring/Ring Groove Clearance]

	Standard	Service Limit
Top:	**0.05 ~ 0.09 mm (0.0020 ~ 0.0035 in.)**	**0.19 mm (0.0075 in.)**
Second:	**0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)**	**0.17 mm (0.0067 in.)**

★ If the piston ring groove clearance is greater than the service limit, measure the ring thickness and groove width as follows to decide whether to replace the rings, the piston or both.

Piston Ring Groove Wear

● Measure the groove width at several points around the piston with a vernier caliper.

[Piston Ring Groove Width]

	Standard	Service Limit
Top:	**0.84 ~ 0.86 mm (0.0331 ~ 0.0339 in.)**	**0.94 mm (0.0370 in.)**
Second:	**0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)**	**0.92 mm (0.0362 in.)**

★ If any of the groove widths exceeds the service limit, replace the piston.

Piston Ring Thickness

● Measure the thickness at several points around ring with a micrometer.

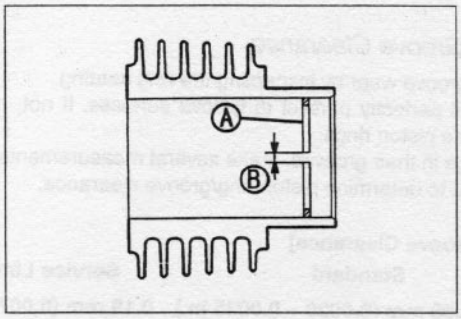
[Piston Ring Thickness - Top, Second]
Standard: 0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)
Service Limit: 0.70 mm (0.0276 in.)

★ If any of the measurements is less than the service limit on either of the rings, replace the rings as a set.

NOTE

○ *When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

Piston Ring End Gap Measurement



- Place the piston ring [A] inside the cylinder, using the piston to locate the ring squarely in place. Place the piston ring close to the bottom of the cylinder, where cylinder wear is minimal.
- Measure the gap [B] between the ends of the ring using a thickness gauge.

★ If the ring end gap exceeds the service limit, replace the ring.

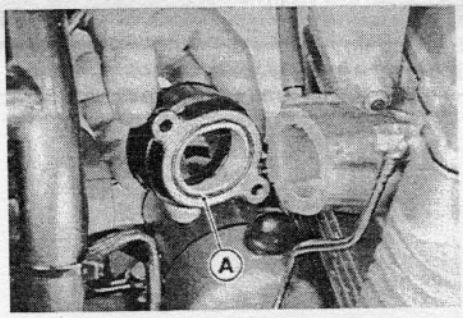
[Piston Ring End Gap]

	Standard	Service Limit
Top:	**0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)**	**0.65 mm (0.0256 in.)**
Second:	**0.35 ~ 0.50 mm (0.0138 ~ 0.0197 in.)**	**0.80 mm (0.0315 in.)**
Oil:	**0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)**	**1.0 mm (0.0394 in.)**

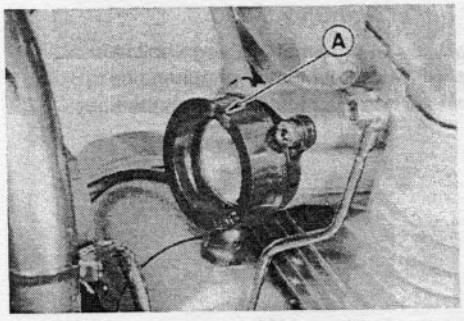
Carburetor Holder

Carburetor Holder Installation

- Apply high temperature grease to the O-ring [A] and install it without pinching the O-ring.



- Install the holder with its recess aligns [A] facing up.



Torque - Carburetor Holder Bolt: 12 N·m (1.2 kg·m, 104 in·lb)

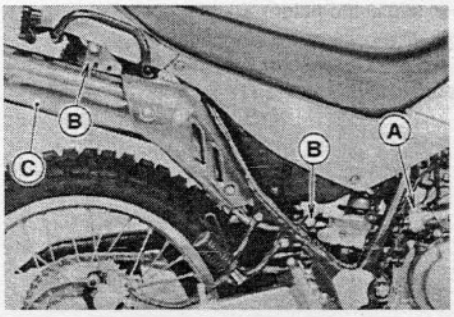
Muffler

⚠WARNING

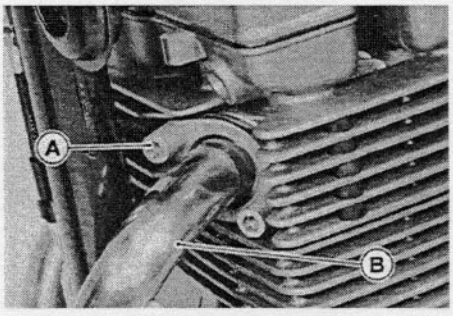
To avoid a serious burn, do not remove the muffler when the engine is still hot. Wait until the muffler cools down.

Muffler Removal

- Loosen the muffler clamp bolt [A].
- Remove the muffler mounting bolt [B].
- Remove the muffler [C] from the back.

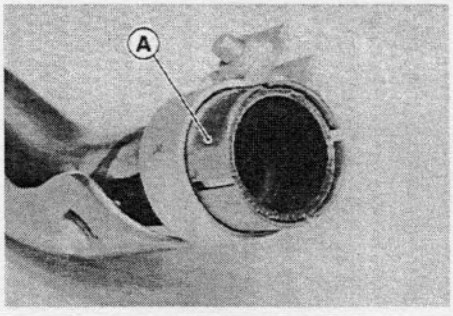


- Remove the exhaust pipe holder nut [A].
- Remove the exhaust pipe [B].



Muffler Installation

- Check the exhaust pipe holder gasket and replace it if it is damaged.
- Check the gasket [A] at the clamp and replace it if it is damaged. Make sure that the gasket is placed securely inside the exhaust pipe.



- First tighten all the bolts and nuts to a snug fit.
- Next tighten the exhaust pipe holder nuts evenly to avoid exhaust leaks.
- Lastly, tighten the rest of the bolts and clamp bolt securely.
- Thoroughly warm up the engine, wait until the engine cools down, and then retighten the exhaust pipe holder nuts, and the clamp bolt securely.

Clutch

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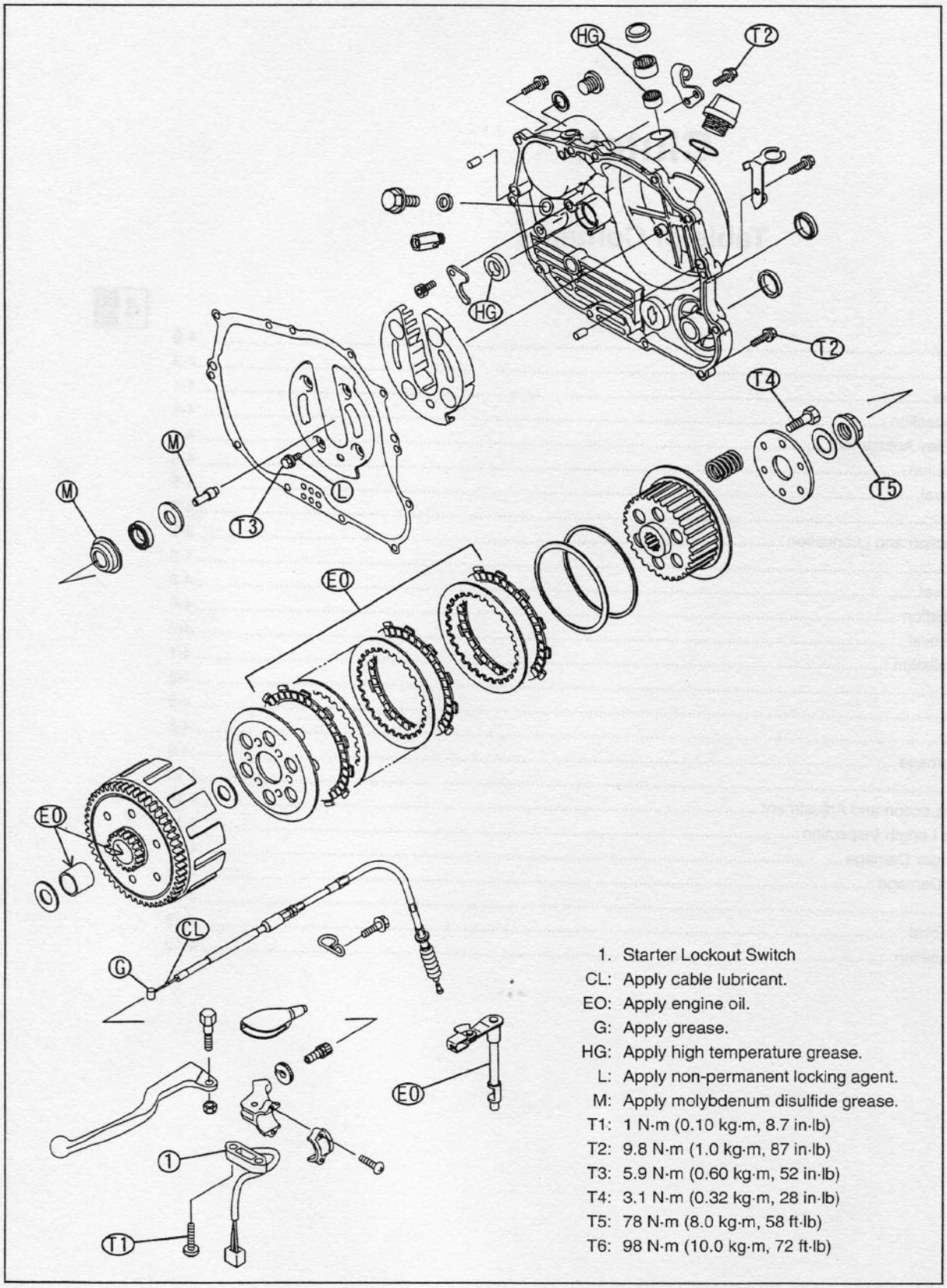
Exploded View



1. Starter Lockout Switch
CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
HG: Apply high temperature grease.
L: Apply non-permanent locking agent.
M: Apply molybdenum disulfide grease.
T1: 1 N·m (0.10 kg·m, 8.7 in·lb)
T2: 9.8 N·m (1.0 kg·m, 87 in·lb)
T3: 5.9 N·m (0.60 kg·m, 52 in·lb)
T4: 3.1 N·m (0.32 kg·m, 28 in·lb)
T5: 78 N·m (8.0 kg·m, 58 ft·lb)
T6: 98 N·m (10.0 kg·m, 72 ft·lb)

Specifications

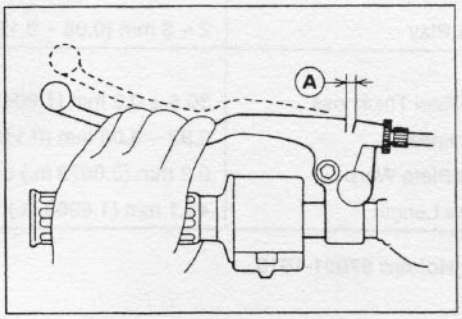
Item	Standard	Service Limit
Clutch Lever		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	—
Clutch		
Clutch Assembly Total Thickness	30.6 ± 0.3 mm (1.2047 ± 0.0118 in.)	29.8 ~ 30.9 mm (1.1732 ~ 1.2165 in.)
Friction Plate Thickness	2.92 ~ 3.08 mm (0.1150 ~ 0.1213 in.)	2.62 mm (0.1031 in.)
Friction and Steel Plate Warp	0.2 mm (0.0079 in.) or less	0.3 mm (0.0118 in.)
Clutch Spring Free Length	43.1 mm (1.6968 in.)	40.9 mm (1.6102 in.)

Special Tools - Gear Holder: 57001-1015

Clutch Lever and Cable

Due to friction plate wear and clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart.

Lever Free Play Inspection



- Pull the clutch lever just enough to take up the free play [A].
- Measure the gap between the lever and the lever holder.

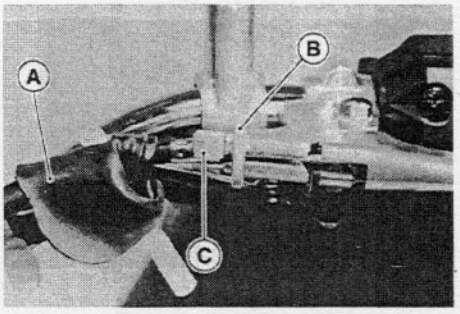
★ If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust it.

Clutch Lever Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)

Clutch Lever Free Play Adjustment

⚠WARNING

To avoid a serious burn, never touch the engine or exhaust pipe during clutch adjustment.



- Slide the dust cover [A] from the clutch lever area, and loosen the knurled locknut [B].
- Turn the adjuster [C] until the lever free play is between 2 ~ 3 mm (0.08 ~ 0.12 in.).
- Check to make sure that the upper end of the cable is correctly fitted in the adjuster.

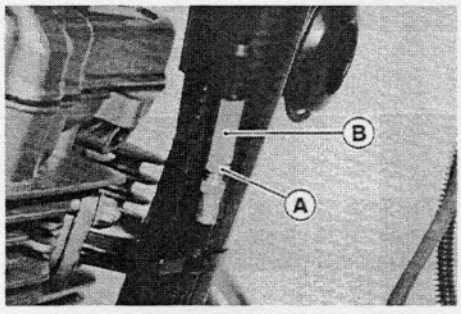
⚠WARNING

Be sure that the outer cable end at the clutch lever is fully seated in the adjuster at the clutch lever, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

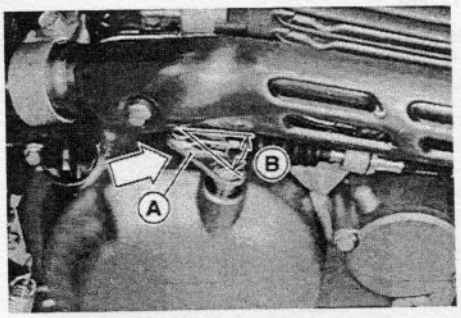
- Tighten the knurled locknut.
- Return the dust cover back to its original position.

★ If proper adjustment cannot be achieved at the adjuster of the clutch lever, adjust the adjusting nut at the center of the clutch cable.

- Loosen the knurled locknut at the clutch lever, screw in the adjuster entirely, and tighten the knurled locknut.
- Loosen the locknut [A] at the center of the clutch cable, and turn the adjusting nut [B] to create a clutch lever free play of 2 ~ 3 mm (0.08 ~ 0.12 in.).
- Tighten the locknut.

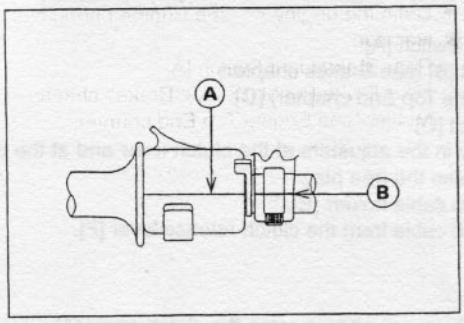


- Turn the release lever [A] clockwise until it becomes hard to turn, then inspect the angle [B] of the release lever is set within 40° ~ 50° range.
★ If any angle is except 40° ~ 50° range, inspect the parts of the clutch.
- After the adjustment is made, start the engine and check that the clutch does not slip and that it releases properly.



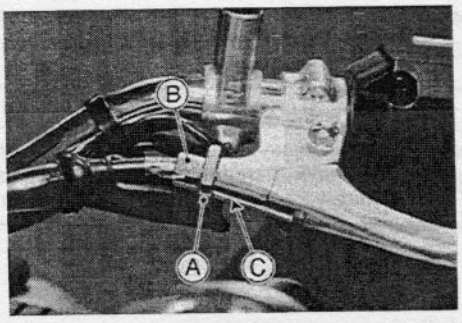
Clutch Lever Installation

- Install the clutch lever so that the mating surface [A] of the switch housing is aligned with the mating surface [B] of the clutch lever clamp.



Clutch Cable Removal

- Loosen the knurled locknut [A] at the clutch lever, and screw in the adjuster [B].
- Line up the slots [C] in the clutch lever, knurled locknut, and adjuster and then free the cable from the lever.
- Free the clutch inner cable tip from the clutch release lever.
- Push the release lever toward the front of the motorcycle and tape the release lever to the clutch cover to prevent the release shaft from falling out.
- Pull the clutch cable out of the frame.



Cable Installation

- Run the clutch cable correctly (see General Information chapter).
- Adjust the clutch cable (see Clutch Lever Free Play Adjustment).

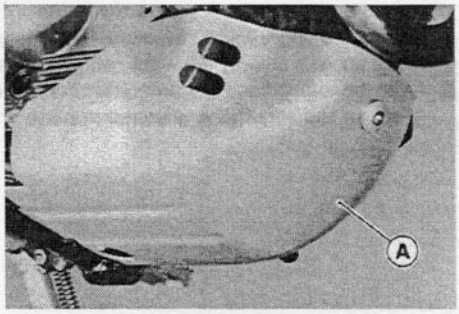
Clutch Cable Inspection and Lubrication

- During a periodic inspection or when the cable has been removed, inspect and lubricate the cable (see Appendix).

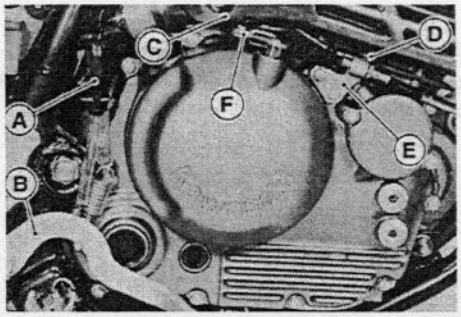
Clutch Cover

Clutch Cover Removal

- Remove the engine guard [A].



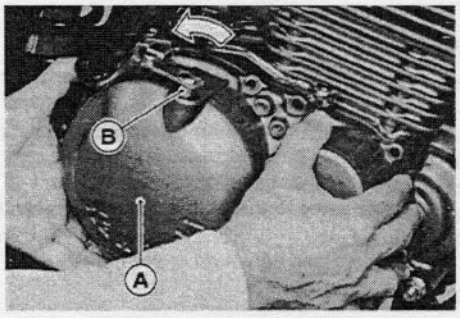
- Drain the engine oil (see Engine Lubrication System chapter).
- Remove:
  Rear Brake Light Switch [A]
  Rear Brake Pedal [B] (see Brakes chapter)
  Muffler (see Engine Top End chapter) [C]
  Oil Pipe Banjo Bolt [D]
- Completely screw in the adjusters at the clutch lever and at the center of the cable to increase the free play.
- Remove the clutch cable holder [E].
- Remove the clutch cable from the clutch release lever [F].



- Remove the clutch cover bolt to remove the clutch cover [A].
- ○ Turn the clutch release lever [B] rearward to free the release shaft from the clutch spring plate pusher.

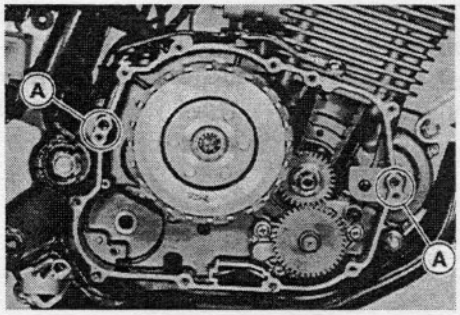
CAUTION

Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.

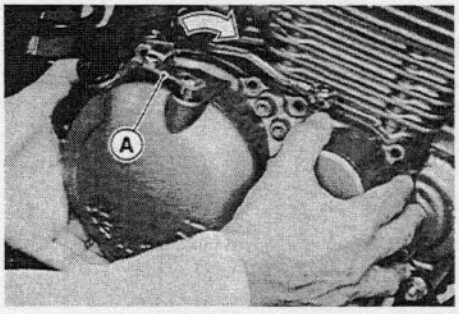


Clutch Cover Installation

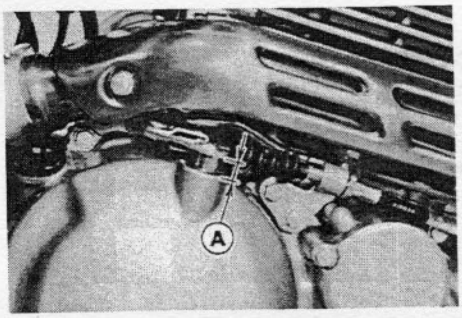
- Two dowel pins [A] are installed at the mating surface between the crankcase and the clutch cover.
- Replace the clutch cover gasket with a new part.



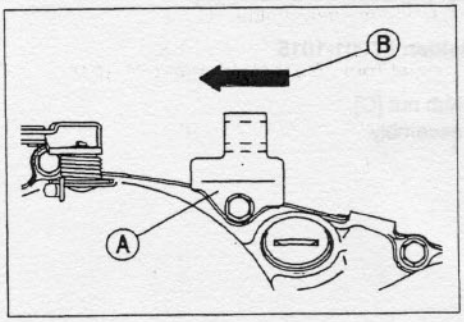
- Engage the clutch release shaft with the clutch spring plate pusher by turning the clutch release lever [A] toward the front.



● With the shaft pulled a little out of the cover, turn the lever until it becomes hard to turn.
○ The release lever should have about 8.5 mm (0.335 in.) [A] clearance between the lever and the boss of clutch cover.



● Tighten the cover bolts and clutch cable holder bolts.
○ While pushing [B] the clutch cable holder [A] rearward until the holder touches the clutch cover, tighten the clutch cable holder bolt.
● Replace the washer with a new part and tighten the oil pipe banjo bolt.



Torque - Clutch Cover Bolt: 9.8 N·m (1.0 kg·m, 87 in·lb)
Clutch Cable Holder Bolt: 9.8 N·m (1.0 kg·m, 87 in·lb)
Oil Pipe Banjo Bolt: 20 N·m (2.0 kg·m, 14 ft·lb)

● Apply grease to the brake pedal shaft and install the brake pedal.
● Install a new cotter pin in the hole of the brake pedal shaft and bend the pin.
● Pour in the specified type and amount of oil (see Engine Lubrication System chapter).
● Adjust the clutch lever free play (see Clutch Lever Free Play Adjustment).
● Check the rear brake (see Brakes chapter).
● Check the engagement timing of the rear brake light switch (see Electrical System chapter).

Release Shaft Removal

CAUTION
Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.

● Remove the clutch cover (see Clutch Cover Removal).
● Pull the lever and shaft assembly out of the clutch cover.

Release Shaft Installation

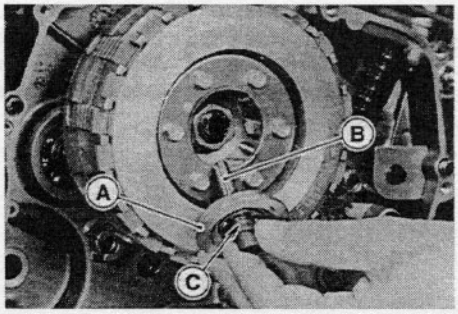
● Apply high-temperature grease to the oil seal lips on the upper ridge of the clutch cover.
● Apply engine oil to the bearing in the hole of the clutch cover.
● Insert the release shaft straight into the upper hole of the clutch cover.

CAUTION
When inserting the release shaft, be careful not to remove the spring of the oil seal.

Clutch

Clutch Removal

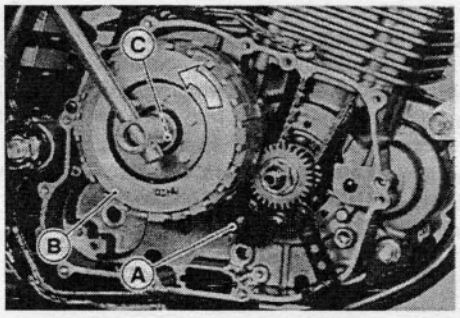
- Remove:
  Clutch Cover (see Clutch Cover Removal).
  Spring Plate Pusher [A]
  Clutch Pusher [B]
  Thrust Washer [C]
  Oilpump (see Engine Lubrication System chapter)



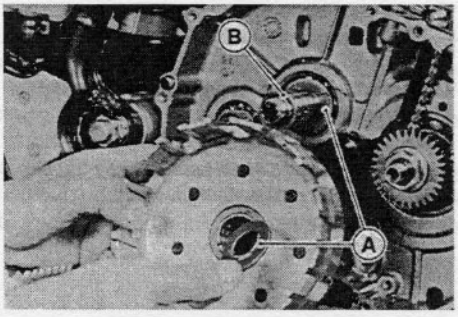
- Using the gear holder [A], secure the clutch [B].

Special Tool - Gear Holder: 57001-1015

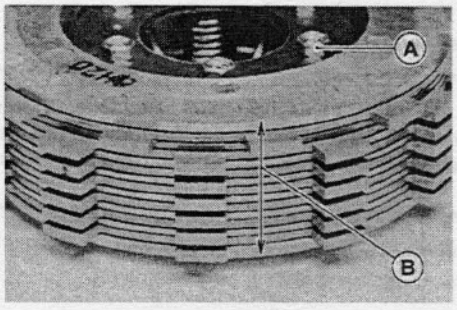
- Remove the clutch hub nut [C].
- Remove the clutch assembly.



- Remove:
  Thrust Washer [A]
  Sleeve [B]



- By temporarily installing them in the clutch housing, remove the spring bolts [A], and disassemble the plate assembly [B].
- ○ The spring plate, springs, clutch hub, clutch wheel, friction plates, and steel plates will then come apart.

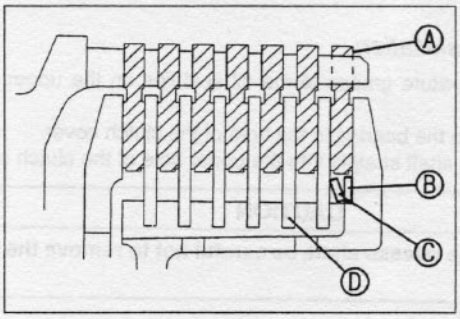


Clutch Installation

- Apply engine oil to the clutch housing bearing hole and sleeve.
- Install the clutch housing.
- Install the spring seat [B] and the spring [C] on the inner bore side of the outer friction plate [A].

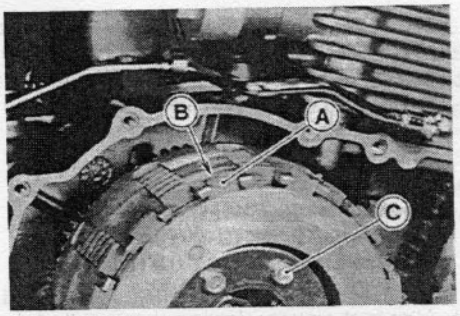
CAUTION
Do not install dry friction and steel plates, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

- Install the plates alternately: first the friction plate, then the steel plate [D], and so on.

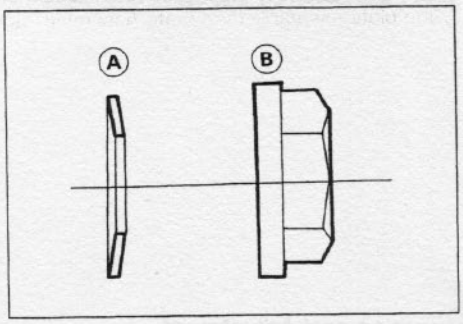


● Install the outer friction plate [A] by aligning its protrusions with the shallow grooves [B].
● Tighten the clutch spring bolts [C].

Torque - Clutch Spring Bolt: 3.1 N·m (0.32 kg·m, 28 in·lb)

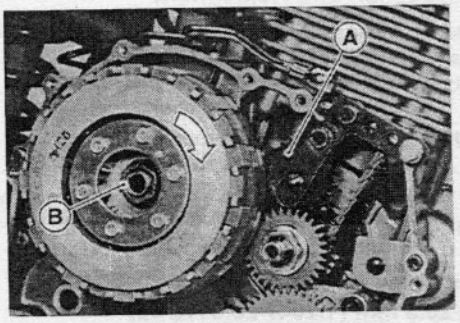


● Install the spring washer [A] with its concave side facing inward.
○ Install the clutch hub nut [B].



● Using the gear holder [A], prevent the clutch hub from turning.

Special Tool - Gear Holder: 57001-1015
Torque - Clutch Hub Nut [B]: 78 N·m (8.0 kg·m, 58 ft·lb)

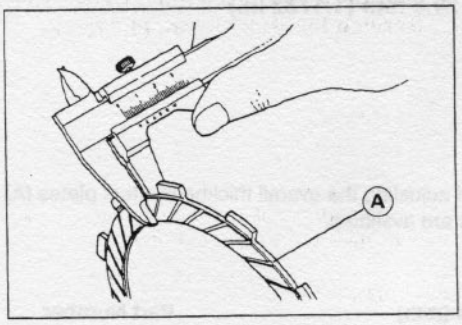


● Apply molybdenum disulfide grease to the clutch pusher and install it together with the thrust washer.
● Install the removed parts.

Plate Wear and Damage

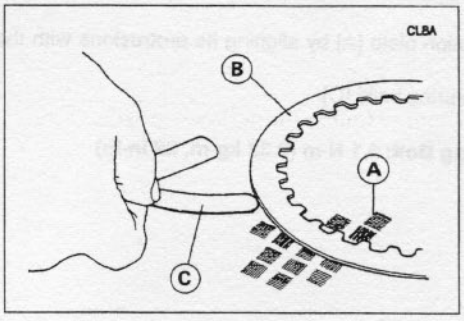
● Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
● Measure the thickness of the friction plates [A] at several points.
★ If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

[Friction Plate Thickness]
Standard: 2.92 ~ 3.08 mm (0.1150 ~ 0.1213 in.)
Service Limit: 2.62 mm (0.1031 in.)



★ After replacing the friction plates or the steel plates, inspect and adjust the plate assembly (see Plate Assembly Inspection and Adjustment).

Plate Warp



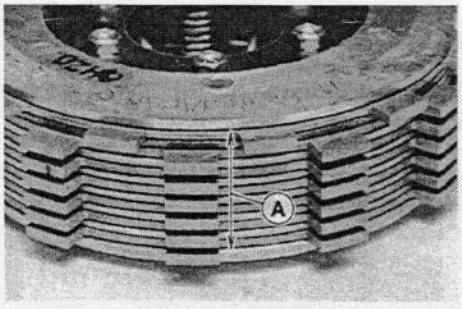
● Place friction plate or steel plate [B] on a surface plate, and measure the gap between the surface plate [A] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.

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

[Friction Plate and Steel Plate Warp]
Standard: 0.2 mm (0.0079 in.) or less
Service Limit: 0.3 mm (0.0118 in.)

★ After replacing the friction plates or the steel plates, inspect and adjust the plate assembly (see Plate Assembly Inspection and Adjustment).

Plate Assembly Inspection and Adjustment



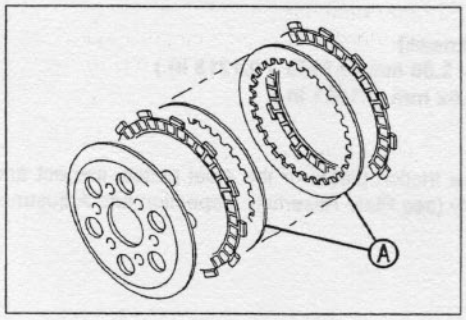
● Measure the overall thickness of the plate assembly (the total thickness of the friction plates and steel plates) [A].

○ The clutch spring bolts must be tightened to the specified torque.

Torque - Clutch Spring Bolt: 3.1 N·m (0.32 kg·m, 27 in·lb)

★ If the measured value exceeds the service limit, replace the steel plate(s) to adjust the overall thickness.

[Overall Thickness of the Plate Assembly]
Standard: 30.6 ±0.3 mm (1.2047 ±0.0118 in.)
Service Limit: 29.8 mm (1.1732 in.)



○ For the purpose of adjusting the overall thickness, steel plates [A] with different thicknesses are available.

[Steel Plates]

Thickness (mm)	Part Number
1.2	13089-1117
2.0	13089-1116

★ After replacing the steel plates or the friction plates, make sure to measure the overall thickness of the plate assembly and adjust if necessary.

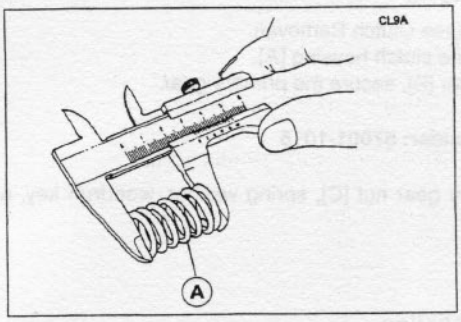
NOTE

○ *Do not use the steel plate of 1.2 mm and 2.0 mm thickness at the same time.*

Clutch Spring Free Length Inspection

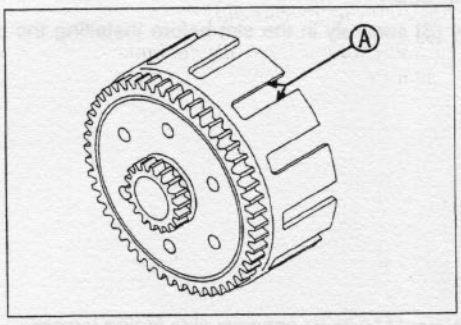
● Measure the free length [A] of the clutch springs.
★ If any clutch spring is shorter than the service limit, it must be replaced.

[Clutch Spring Free Length]
Standard: 43.1 mm (1.6968 in.)
Service Limit: 40.9 mm (1.6102 in.)



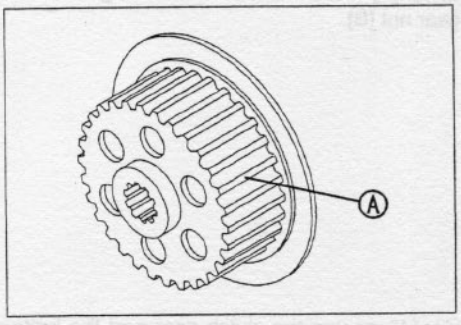
Clutch Housing Finger Damage

● Visually inspect the clutch housing fingers [A] that come in contact with the friction plate tangs.
★ If they are damaged or if there are groove cuts in the areas that come in contact with the tangs, replace the housing. Replace the friction plates if their tangs are damaged as well.



Clutch Hub Spline Damage

● Visually inspect the areas of the clutch hub splines that come in contact with the teeth of the steel plates.
★ If there are notches worn into the clutch hub splines [A], replace the clutch hub. Replace the steel plates if their teeth are damaged as well.

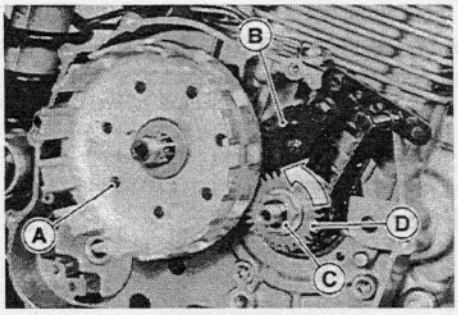


Primary Gear

Primary Gear Removal

- Remove the clutch (see Clutch Removal).
- Temporarily install the clutch housing [A].
- Using the gear holder [B], secure the primary gear.

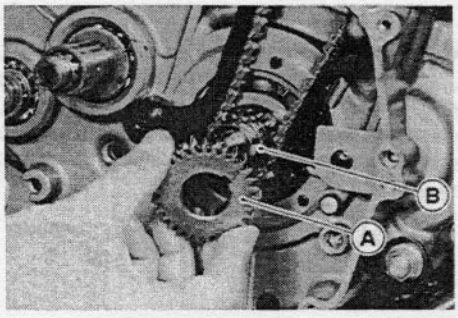
Special Tool - Gear Holder: 57001-1015



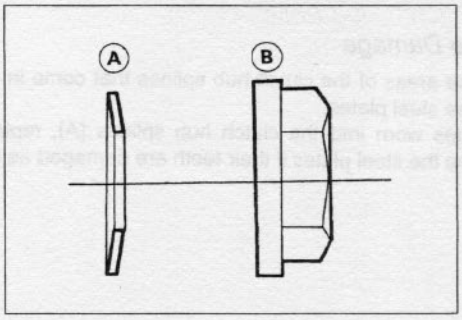
- Remove the primary gear nut [C], spring washer, woodruff key, and the primary gear [D].

Primary Gear Installation

- Fit the woodruff key [B] securely in the slot before installing the primary gear [A].

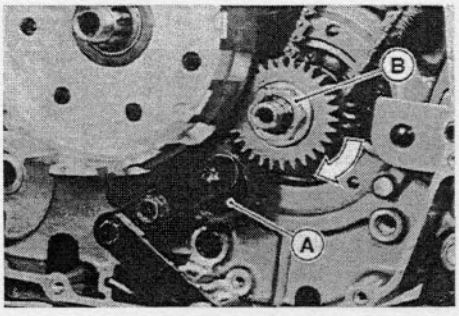


- Install the spring washer [A] with its concave side facing inward.
- Install the primary gear nut [B].



- Using the gear holder [A], secure the clutch gear and the bottom of the primary gear; then, tighten the primary gear nut [B].

Torque - Primary Gear Nut: 98 N·m (10.0 kg·m, 72 ft·lb)
Special Tool - Gear Holder: 57001-1015



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

Engine Lubrication System

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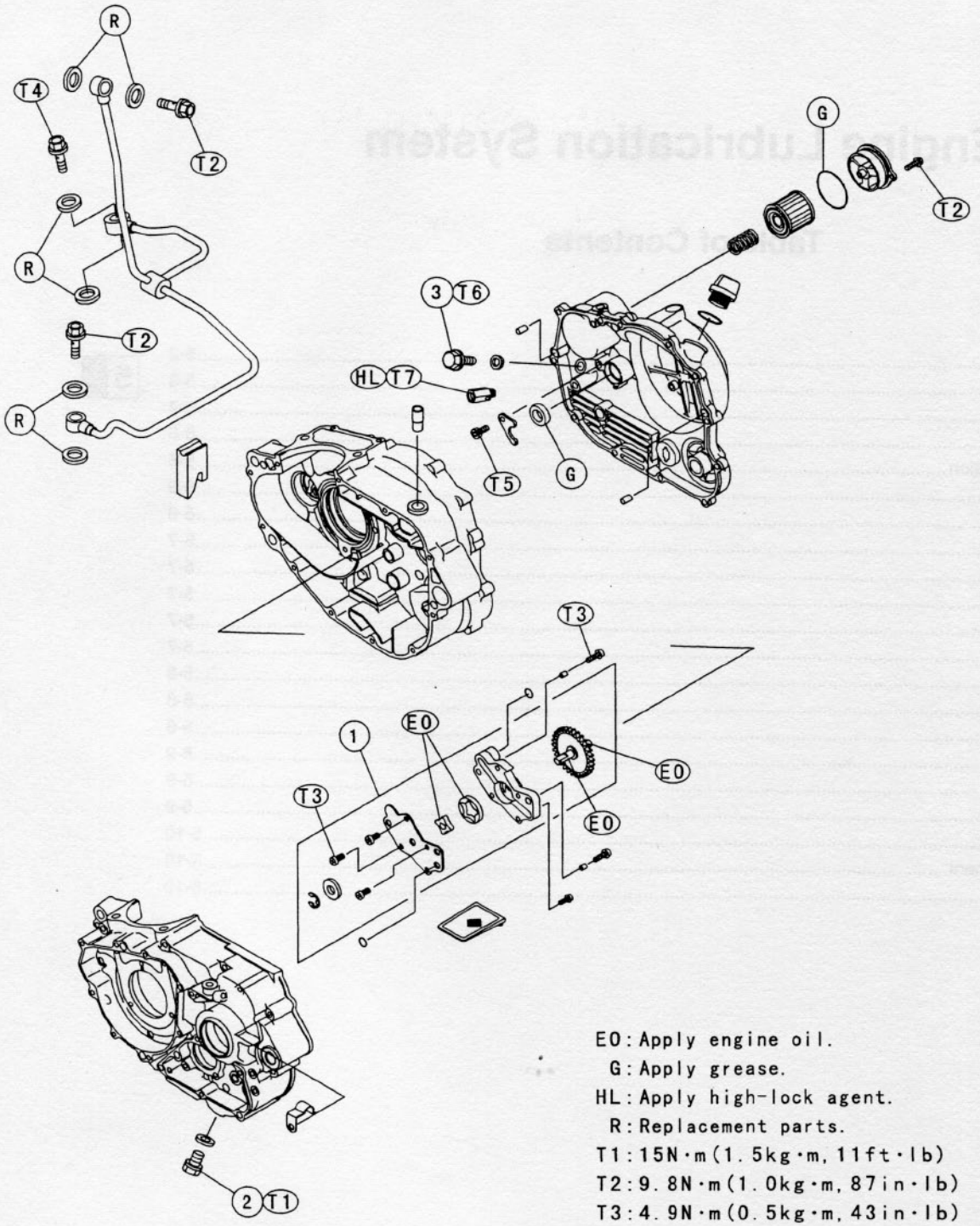
Exploded View

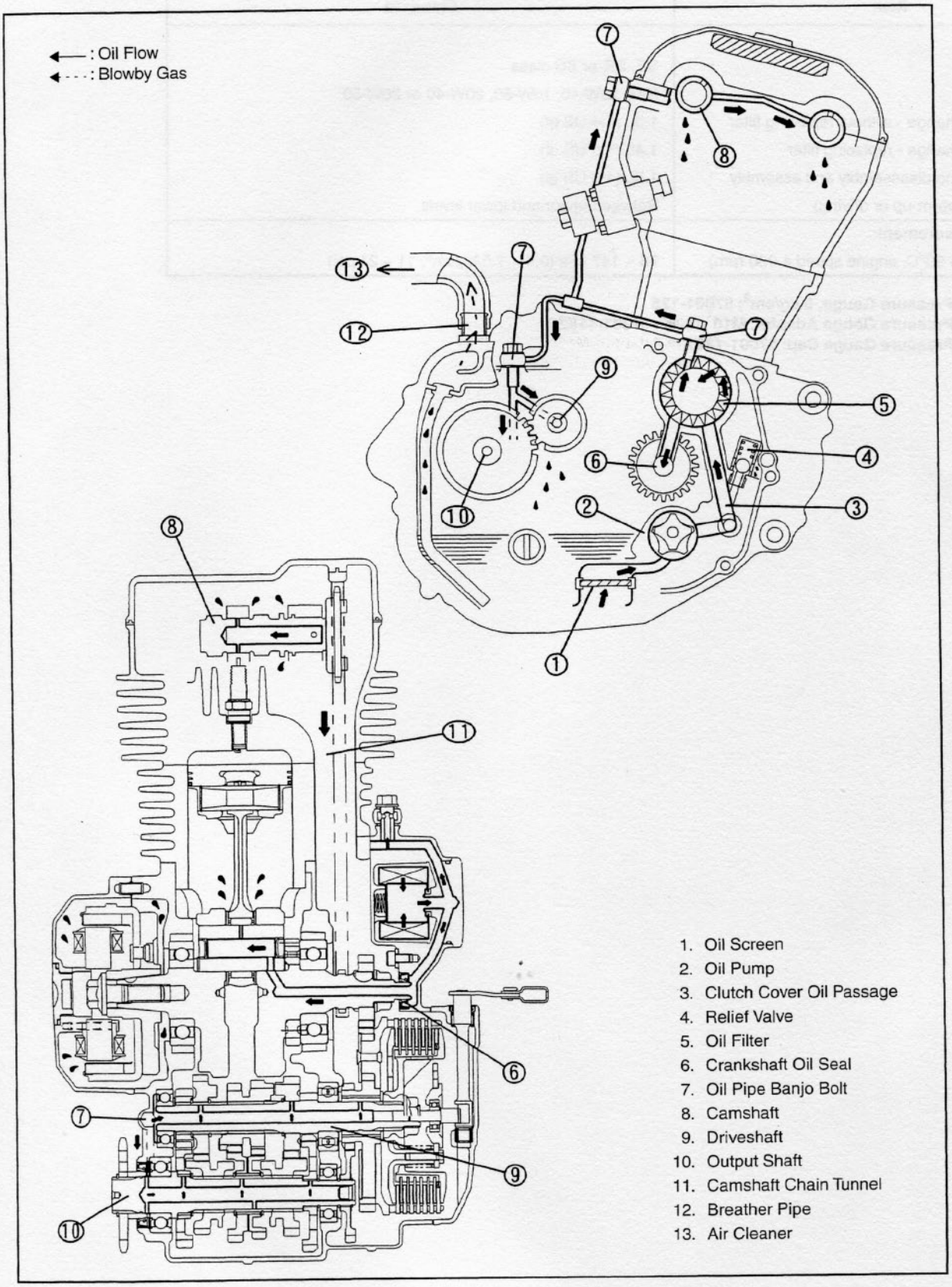


1. Oil Pump
2. Engine Oil Drain Plug
3. Oil Passage Blind Plug

EO: Apply engine oil.
G: Apply grease.
HL: Apply high-lock agent.
R: Replacement parts.
T1: 15N·m (1.5kg·m, 11ft·lb)
T2: 9.8N·m (1.0kg·m, 87in·lb)
T3: 4.9N·m (0.5kg·m, 43in·lb)
T4: 20N·m (2.0kg·m, 14ft·lb)
T5: 12N·m (1.2kg·m, 104in·lb)
T6: 18N·m (1.8kg·m, 13ft·lb)
T7: 15N·m (1.5kg·m, 11ft·lb)

GG02076BW5 C

Lubrication System Chart



Specifications

Item	Standard
Engine Oil:	
Grade	SE, SF, or SG class
Viscosity	SAE 10W-40, 10W-50, 20W-40 or 20W-50
Capacity: Oil change - without replacing filter	1.3L (1.4 US qt)
Oil change - replacing filter	1.4L (1.5 US qt)
Engine disassembly and assembly	1.5L (1.6 US qt)
Oil level (after warm-up or driving)	Between upper and lower levels
Oil pressure Measurement:	
(oil temperature 90°C, engine speed 4,000 rpm)	78 ~ 147 kPa (0.8 ~ 1.5 kg/cm^2, 11 ~ 21 psi)

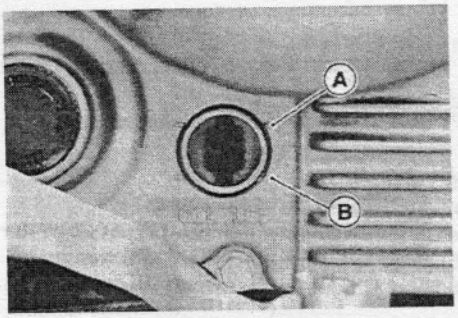
Special Tools - Oil Pressure Gauge, 5 kg/cm^2: 57001-125
Oil Pressure Gauge Adapter, M10 x 1.25: 57001-1182
Oil Pressure Gauge Cap: 57001-1361

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.

Engine Oil Level Inspection



- Situate the motorcycle so that it is vertical.
- Check that the engine oil level is between the upper [A] and lower [B] levels in the gauge.

NOTE

○ *Situate the motorcycle so that it is perpendicular to the ground.*
○ *If the motorcycle has just been used, wait several minutes for all the oil to drain down.*
○ *If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.*

⚠WARNING

Racing the engine before the oil reaches every part can cause engine seizure. If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise 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.

CAUTION

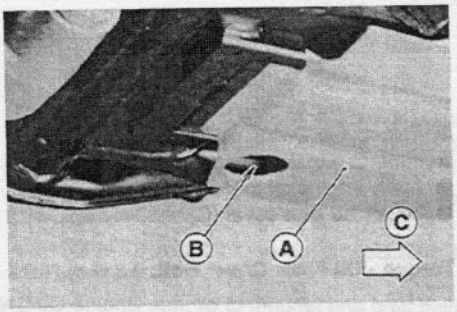
Racing the engine before the oil reaches every part can cause engine seizure.

★ If the oil level is too high, remove the excess oil through the filler opening, using a syringe or some other suitable device.
★ If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

○ *If the engine oil type and make are unknown, use any brand of the specified oil to top off the level rather than running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*

Engine Oil Change



⚠WARNING

To avoid a serious burn, never touch the exhaust pipe during oil change.

- Warm up the engine sufficiently with the motorcycle standing on its side stand, and stop the engine.
- Remove the engine guard [A].
- Place an oil pan under the engine and remove the drain plug [B] to drain the oil.
  Front [C]
- Replace the drain plug gasket with a new one if it is damaged.

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

● After draining the oil, tighten the drain plug.

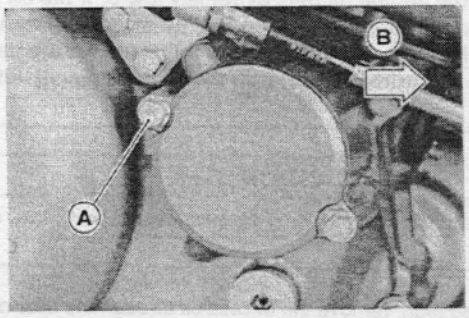
Torque - Drain Plug: 15 N·m (1.5 kg·m, 11 ft·lb)

● Pour in the specified type and amount of oil.

[Engine Oil]
Grade: SE, SF or SG class
Viscosity: SAE 10W-40, 10W-50, 20W-40 or 20W-50
Capacity: 1.3L (1.4 US qt) Oil change - without replacing filter
1.4L (1.5 US qt) Oil change - replacing filter
1.5L (1.6 US qt) Engine disassembly and assembly

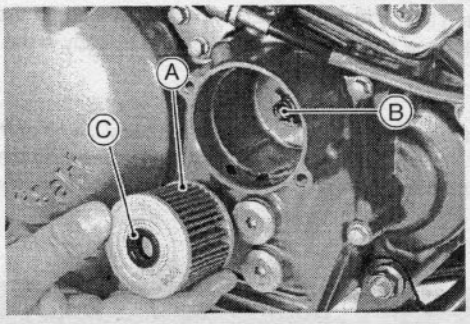
Oil Filter Change

● Drain the engine oil (see Engines Oil Change).
● Remove the filter cover bolt [A], and remove the filter assembly.
Front [B]



● Replace the filter [A] with a new one.
● Install the spring [B].
● Be sure to install the filter with the rubber grommet [C] facing out as shown.

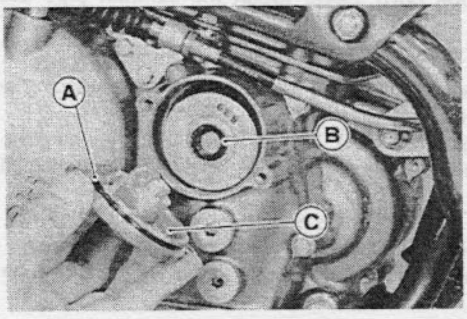
CAUTION
Inside-out installation stop oil flow, causing engine seizure.



● Inspect the O-ring [A] for damage.
★ If the O-ring is damaged, replace it with a new one.
● Apply engine oil to the O-ring and the grommet [B].
● Install the filter cover [C].

Torque - Oil Filter Cover Bolt: 9.8 N·m (1.0 kg·m, 87 in·lb)

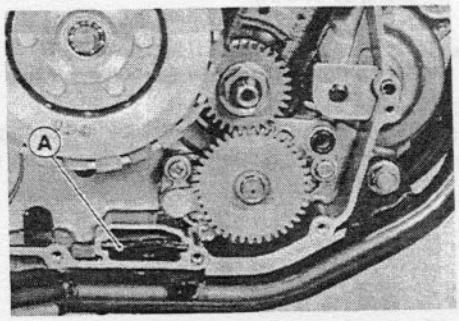
● Pour in the specified type and amount of oil (see Engine Oil Change).



Oil Pump

Oil Screen Removal

- Remove the clutch cover (see Clutch chapter).
- Remove the oil screen [A] from the crankcase.

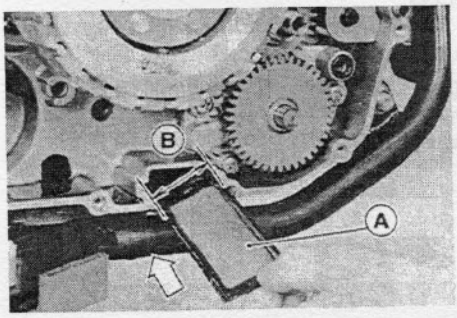


Oil Screen Installation

- Clean the oil screen [A] thoroughly whenever it is removed for any reason.
- Clean the oil screen with a high-flash point solvent and remove any particles stuck to it.

⚠WARNING

Clean the screen in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvents.



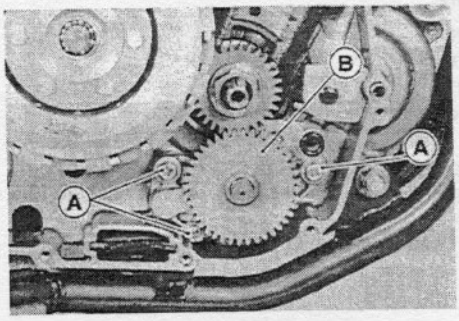
NOTE

○ *While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

- Check the screen carefully for any damage, holes, broken wires, gasket pulling off.
- ★ If the screen is damaged, replace it.
- Insert the oil screen with the narrow side [B] of the screen going first.

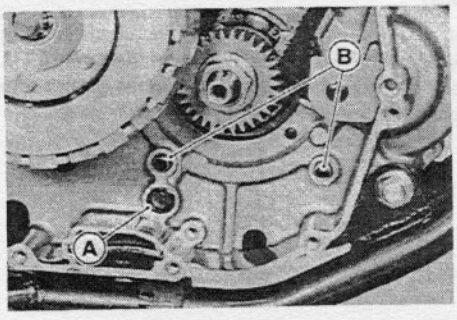
Oil Pump Removal

- Remove the clutch cover (see Clutch chapter).
- Remove the mounting screws [A] and remove the oil pump assembly [B].



Oil Pump Installation

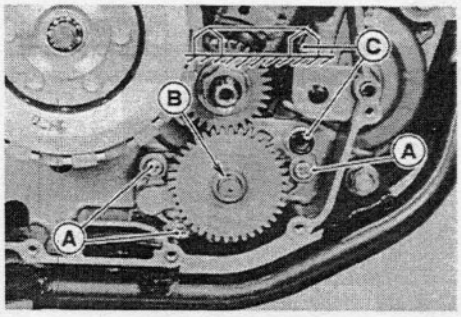
- Install the O-ring [A] (round cross section).
- Install the dowel pins [B].



● Tighten the oil pump mounting screws [A].

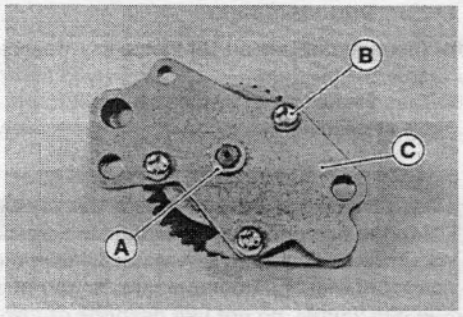
Torque - Oil Pump Mounting Screw: 4.9 N·m (0.5 kg·m, 43 in·lb)

● Apply engine oil to the shaft sliding surface [B].
● Install the O-ring (pentagon cross section) [C] with its pentagon side facing outward.

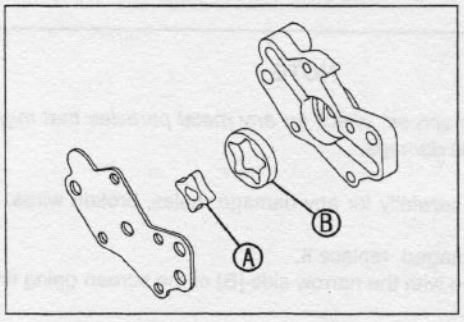


Oil Pump Disassembly

● Remove:
Oil Pump (see Oil Pump Removal)
E-Clip and Washer [A]
Oil Pump Cover Screw [B]
● Remove the oil pump cover [C].



● Remove:
Inner Rotor [A]
Outer Rotor [B]

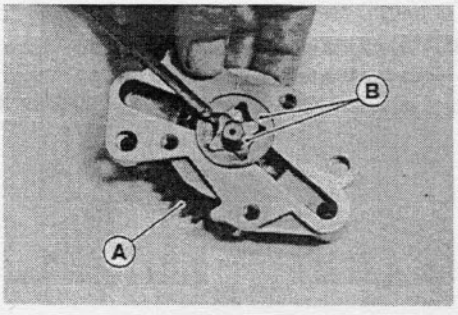


Oil Pump Assembly

● Install the pump gear [A].
● Pour oil in the rotors [B].
● Install the dowel pins.
● Install the cover and tighten the oil pump cover screws.

Torque - Oil Pump Cover Screw: 4.9 N·m (0.5 kg·m, 43 in·lb)

● Make sure that the pump gear moves smoothly.

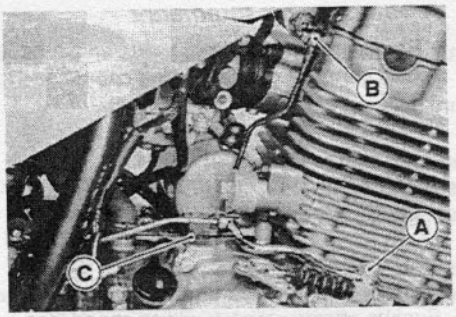


Oil Pump Inspection

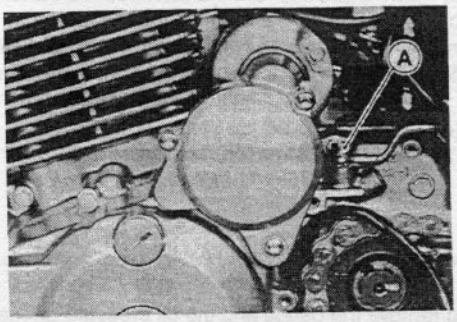
● Disassemble the oil pump assembly (see Oil Pump Disassembly).
● Visually inspect the oil pump body, outer rotor and the inner rotor.
★ If the oil pump is any damage or uneven wear, replace the rotors, cover, or body, or the oil pump assembly.

Oil Pipe

Oil Pipe Removal



- Remove:
  Muffler (see Engine Top End chapter)
  Oil Pipe Banjo Bolt (Clutch Cover) [A]
  Oil Pipe Banjo Bolt (Cylinder Head) [B]
  Damper [C]



- Remove:
  Engine Sprocket Cover
  Oil Pipe Banjo Bolt (Left Crankcase) [A]
- Remove the oil pipe from the right side of the engine.

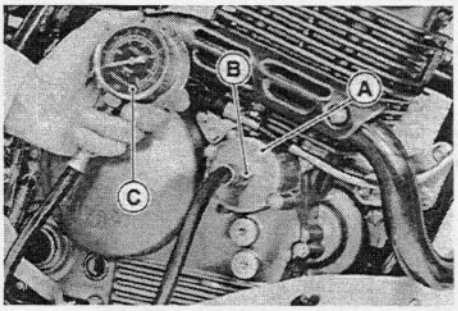
Oil Pipe Installation

- Replace the washers on both sides of the oil pipe banjo bolt with new ones.
- Tighten the following banjo bolts in the order listed to prevent pipe warp.

Torque - Oil Pipe Banjo Bolt
Clutch Cover side: 20 N·m (2.0 kg·m, 14 ft·lb)
Cylinder Head side: 9.8 N·m (1.0 kg·m, 87 in·lb)
Left Crankcase side: 9.8 N·m (1.0 kg·m, 87 in·lb)

Oil Pressure

Oil Pressure Measurement



- Remove the oil filter cap.
- Attach the oil pressure gauge cap [A] and the oil pressure gauge adapter [B].
- Attach the oil pressure gauge [C].

Special Tools - Oil Pressure Gauge Cap: 57001-1361
Oil Pressure Gauge Adapter: 57001-1182
Oil Pressure Gauge: 57001-1182

- Start the engine and warm up the engine thoroughly.
- Run the engine at the specified speed, and read the oil pressure gauge.

★ If the oil pressure is much lower than the standard, check the oil pump, crankshaft oil seal of the clutch cover, and oil pump relief valve.

★ If the reading is much higher than the standard, check the oil pump screen and the oil filter first, and oil passages for dirt or clogging.

[Oil Pump Pressure (oil temperature 90 °C, @4,000 rpm)]
Standard: 78 ~ 147 kPa (0.8 ~ 1.5 kg/cm², 11 ~ 21 psi)

NOTE

○ *Warm up the engine thoroughly before measuring the oil pressure.*

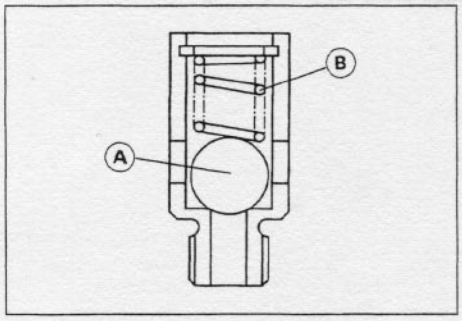
- Stop the engine and remove the gauge and the oil pressure gauge cap.

⚠WARNING

Take care against burns from hot engine oil that will drain through the oil passage when the oil pressure gauge adapter is removed.

- Install the oil filter cap (see Oil Filter Change).

Relief Valve Inspection



- Remove the oil pressure relief valve from the clutch cover.
- Check to see if the valve slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring pressure.

NOTE

○ *Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.*

★ If any rough spots are found during above inspection, wash the valve clean with a high-flash point solvent and blow out any foreign particles that may be in the valve with compressed air.

Valve [A] Spring [B]

⚠WARNING

Clean the relief valve in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvent.

★ If cleaning does not solve the problem, replace the relief valve as an assembly. The relief valve is precision made with no allowance for replacement of individual parts.

Engine Removal/Installation

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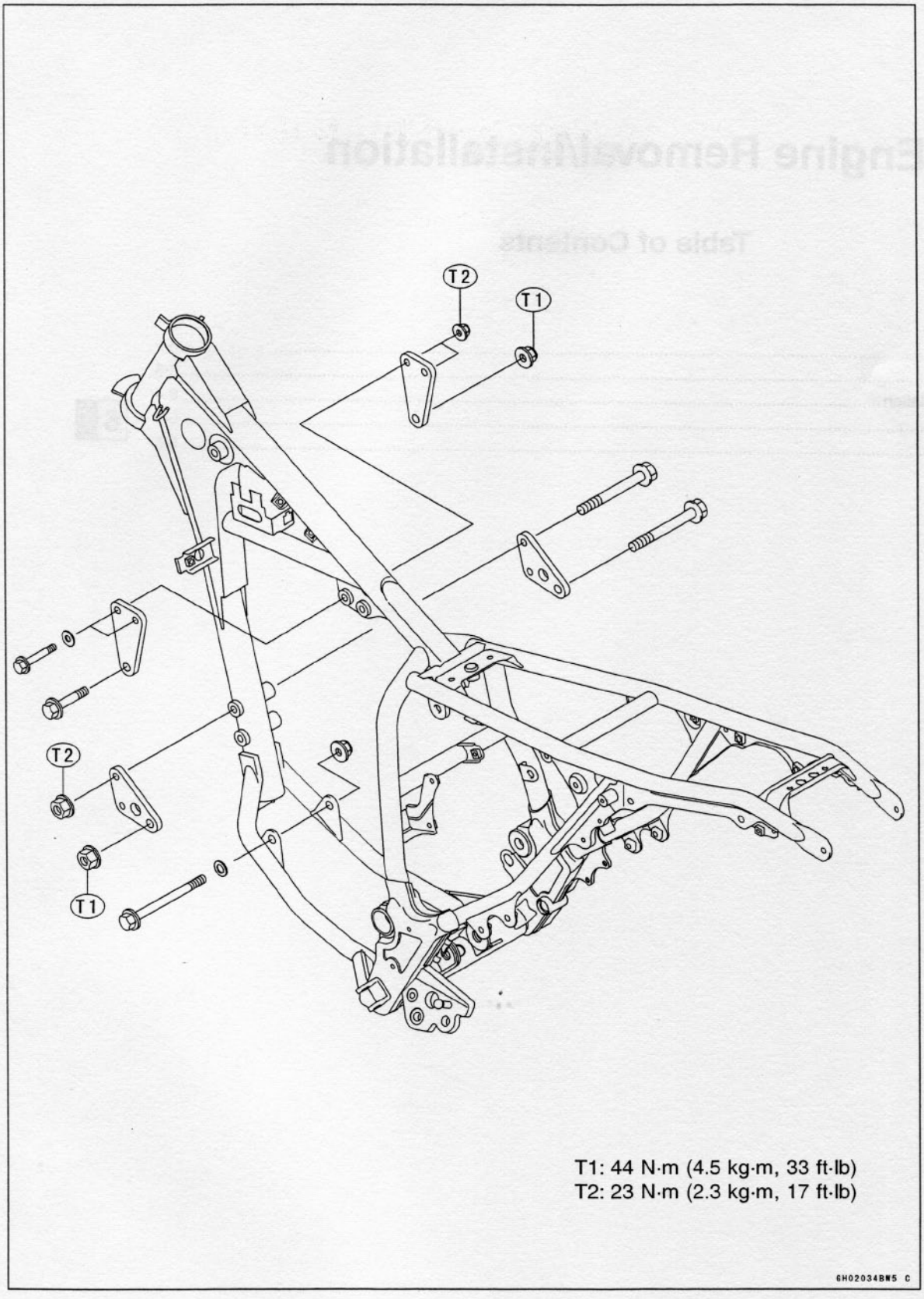
6

Exploded View



Specifications

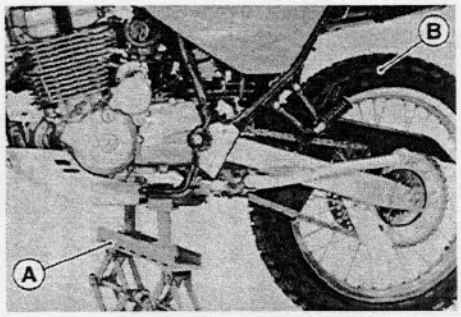
Special Tool - Jack: 57001-1238

Engine Removal/Installation

Engine Removal

● Place the jack [A] under the frame to lift the rear wheel [B] off the ground.

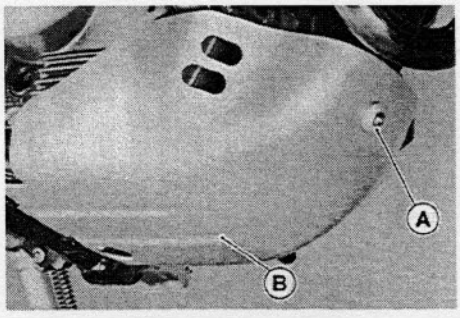
Special Tool - Jack: 57001-1238



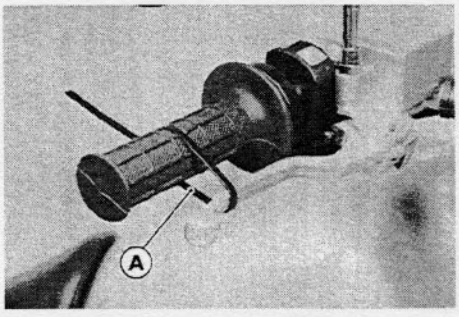
⚠WARNING

For engine removal, the swing arm pivot shaft must be pulled out, causing the swing arm and rear wheel assembly to become detached. To prevent the motorcycle from falling, make sure to support the frame with a jack.

● Remove the mounting bolt [A] and remove the engine guard [B].



● Squeeze the brake lever slowly and hold it with a band [A].



⚠WARNING

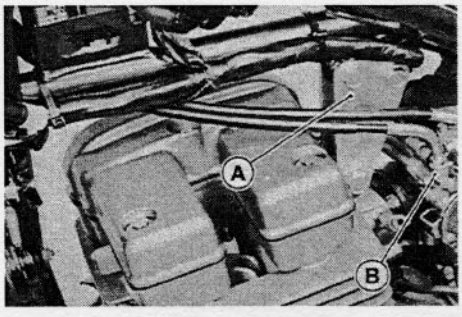
Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. It could cause an accident and injury.

CAUTION

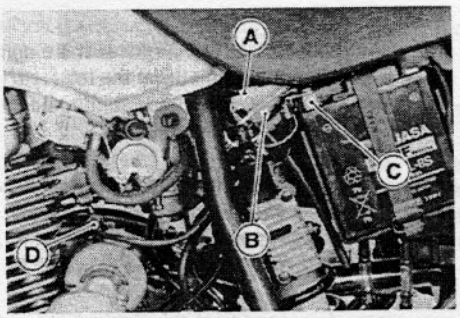
Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

● Drain the engine oil (see Engine Lubrication System chapter).

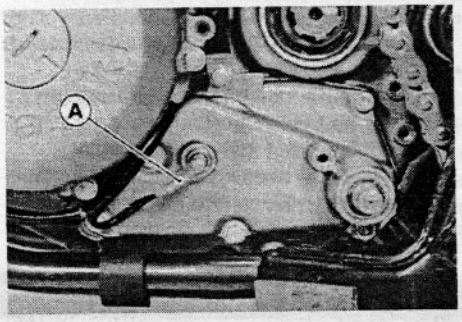
● Remove:
Side Cover, Seat (see Frame chapter)
Fuel Tank (see Fuel System chapter)
Clutch Cable Lower End (see Clutch chapter)
Cylinder Head Bracket [A]
Muffler, Exhaust Pipe (see Engine Top End chapter)
Carburetor (see Fuel System chapter) [B]
Engine Sprocket (see Final Drive chapter)
Shift Pedal (see Crankshaft/Transmission chapter)



● Disconnect the cables and wiring leads from the engine.
Pickup Coil Lead Connector [A]
Alternator Lead Connector [B]
Battery (–) Lead [C]
Starter Motor Cable Terminal [D]
Spark Plug Cap

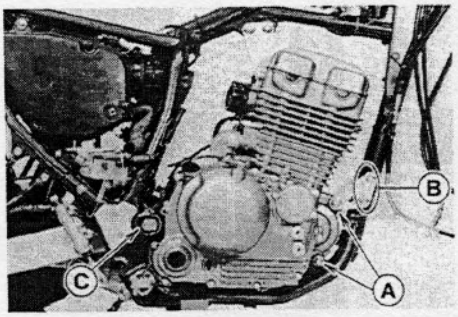


● Remove:
Neutral Switch Terminal [A]

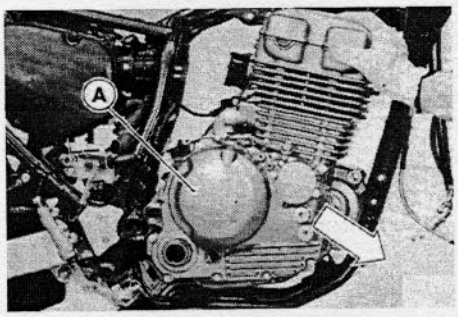


● Remove:
Rear Brake Light Switch
Rear Brake Pedal (see Brakes chapter)
○ The following parts may be removed with the engine mounted on the frame:
Clutch (see Clutch chapter)
Starter Motor (see Electrical System chapter)
Alternator Rotor (see Electrical System chapter)

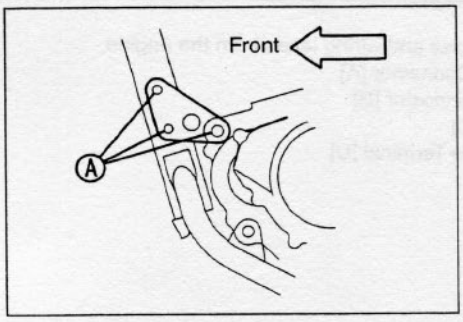
● Remove:
Engine Mounting Bolts [A]
Engine Mounting Bracket Bolts [B]
○ Pull out the bolts while raising the engine.
○ Pull out the swing arm pivot shaft [C] half way to free the engine.



● Pull the engine towards the right.
● Remove the engine [A] from the vehicle right side.



Engine Installation



- For the three locations [A] shown in the diagram, insert the bolts from the right and attach the nuts from the left.
- For other locations, insert the engine mounting bolts from the left.
- Tighten the engine mounting bolts.

Torque - Engine Mounting Bolt: 44 N·m (4.5 kg·m, 33 ft·lb)
Engine Mounting Bracket Bolt: 23 N·m (2.3 kg·m, 17 ft·lb)
Cylinder Head Bracket Bolt: 23 N·m (2.3 kg·m, 17 ft·lb)
Swing Arm Pivot Nut: 88 N·m (9.0 kg·m, 65 ft·lb)

- Install the chain and the engine sprocket (see Final Drive chapter).
- Run the cables, hoses, and leads according to the Cable, Wire and Hose Routing section of the General Information chapter.
- Adjust:
  Throttle Cable (see Fuel System chapter)
  Clutch Cable (see Clutch chapter)
  Drive Chain (see Final Drive chapter)
- Fill Engine Oil (see Engine Lubrication System chapter).
- Adjust the idling (see Fuel System chapter).
- Check the operation of the clutch lever (see Clutch chapter).
- Check the brake effectiveness.

⚠ WARNING

Do not attempt to drive the motorcycle until you pump 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.

⚠ WARNING

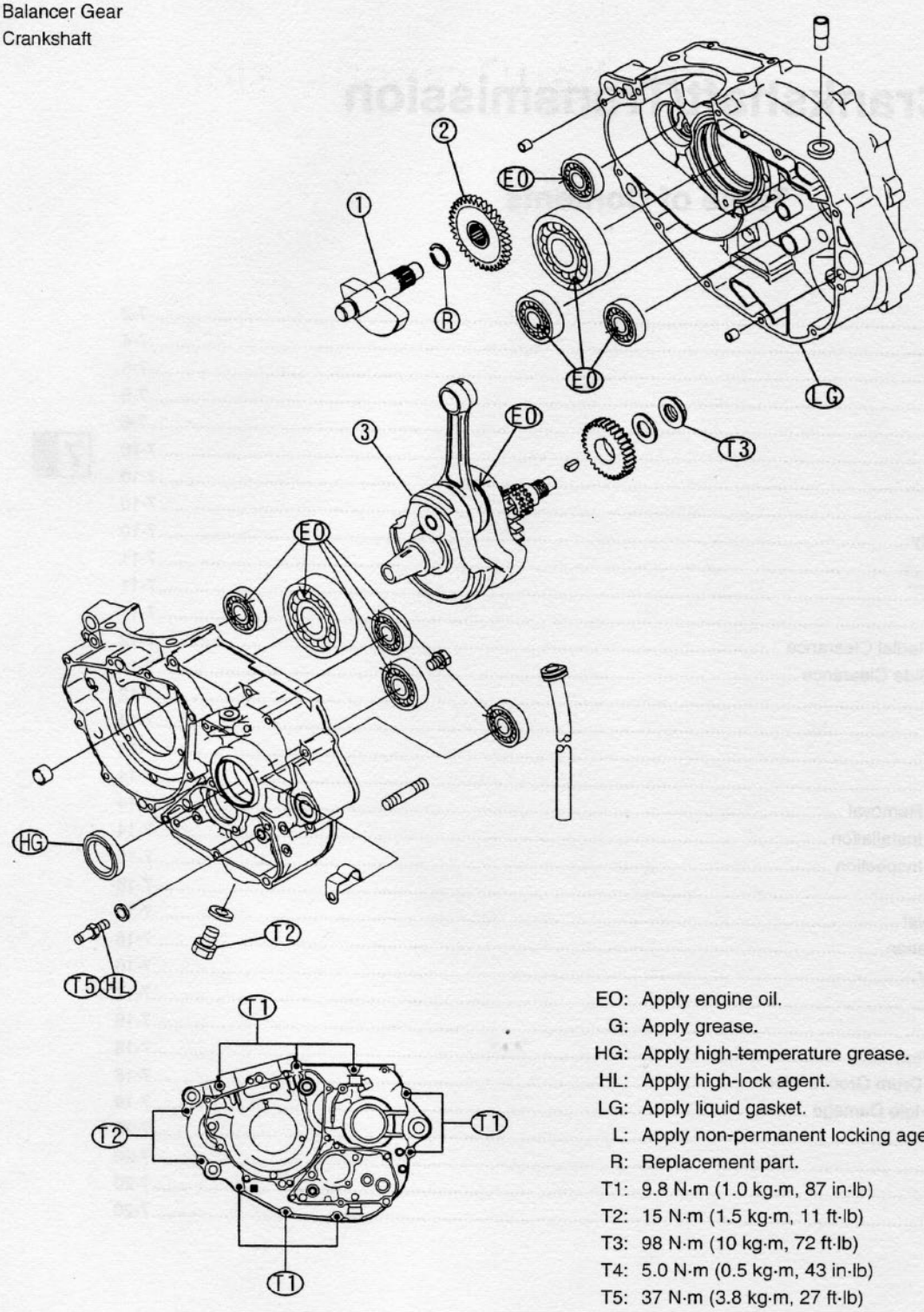
If the brake lever does not have a firm stop before the lever hits the grip, disassemble and inspect the brake parts. Worn parts can cause lock of the brake or loss of braking.

Crankshaft/Transmission

Table of Contents

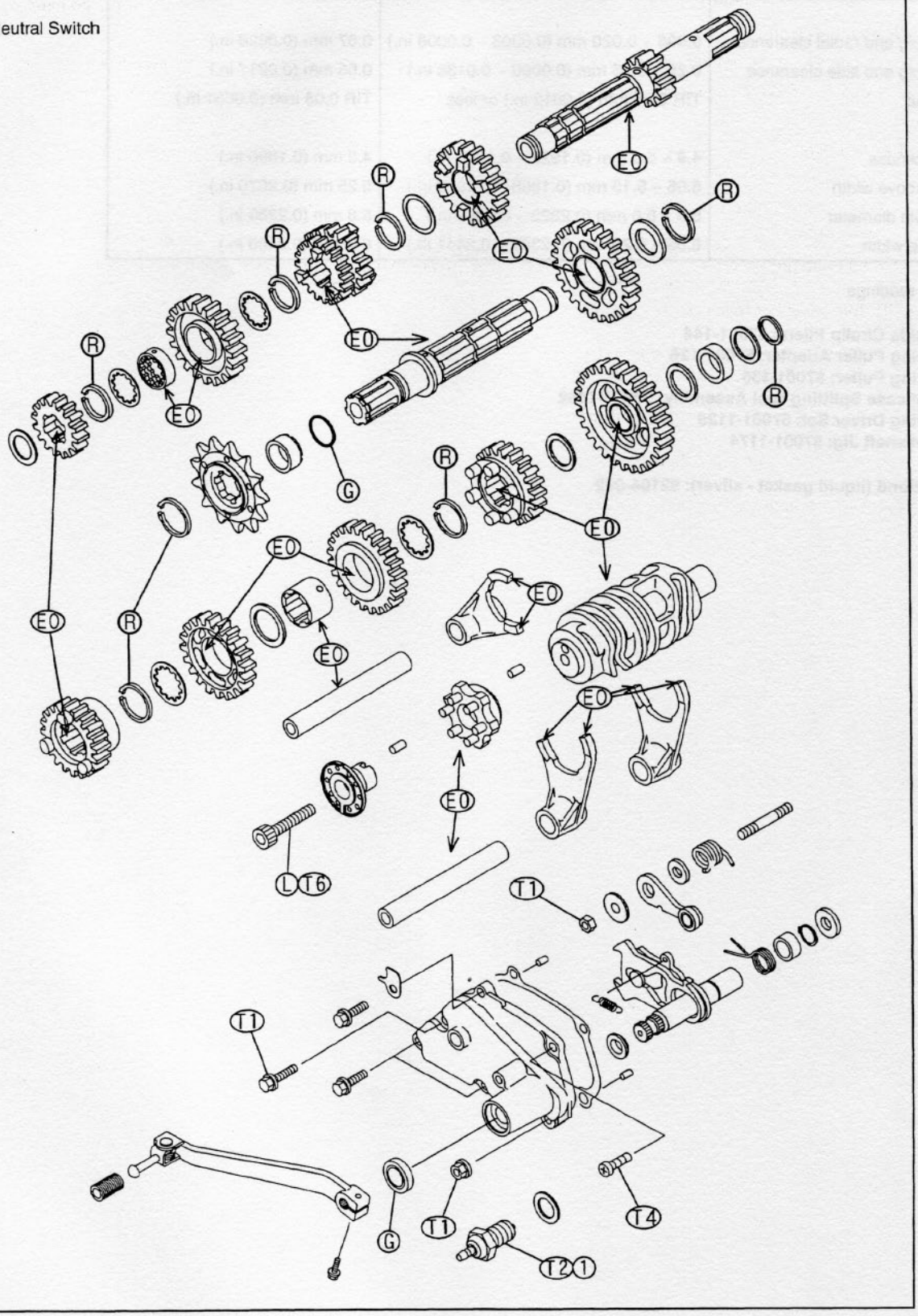
Exploded View

1. Balancer
2. Balancer Gear
3. Crankshaft



EO: Apply engine oil.
G: Apply grease.
HG: Apply high-temperature grease.
HL: Apply high-lock agent.
LG: Apply liquid gasket.
L: Apply non-permanent locking agent.
R: Replacement part.
T1: 9.8 N·m (1.0 kg·m, 87 in·lb)
T2: 15 N·m (1.5 kg·m, 11 ft·lb)
T3: 98 N·m (10 kg·m, 72 ft·lb)
T4: 5.0 N·m (0.5 kg·m, 43 in·lb)
T5: 37 N·m (3.8 kg·m, 27 ft·lb)
T6: 12 N·m (1.20 kg·m, 104 in·lb)

1. Neutral Switch



Specifications

Item	Standard	Service Limit
Connecting Rod		
Connecting rod big end radial clearance	0.008 ~ 0.020 mm (0.0003 ~ 0.0008 in.)	0.07 mm (0.0028 in.)
Connecting rod big end side clearance	0.25 ~ 0.35 mm (0.0098 ~ 0.0138 in.)	0.55 mm (0.0217 in.)
Crankshaft runout	TIR 0.03 mm (0.0012 in.) or less	TIR 0.08 mm (0.0031 in.)
Transmission		
Shift fork ear thickness	4.9 ~ 5.0 mm (0.1929 ~ 0.1969 in.)	4.8 mm (0.1890 in.)
Gear shift fork groove width	5.05 ~ 5.15 mm (0.1988 ~ 0.2028 in.)	5.25 mm (0.2070 in.)
Shift fork guide pin diameter	5.9 ~ 6.0 mm (0.2323 ~ 0.2362 in.)	5.8 mm (0.2283 in.)
Shift drum groove width	6.05 ~ 6.20 mm (0.2382 ~ 0.2441 in.)	6.3 mm (0.2480 in.)

TIR: Total Indicator readings

Special Tools - Outside Circlip Pliers: 57001-144
Bearing Puller Adapter: 57001-136
Bearing Puller: 57001-135
Crankcase Splitting Tool Assembly: 57001-1362
Bearing Driver Set: 57001-1129
Crankshaft Jig: 57001-1174

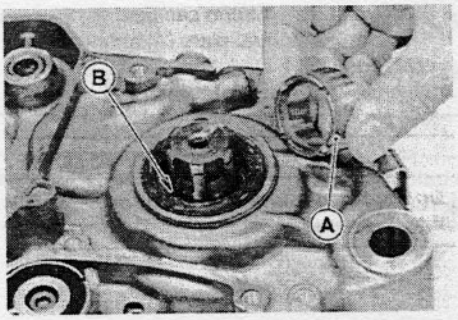
Sealant - Kawasaki Bond (liquid gasket - silver): 92104-002

Crankcase

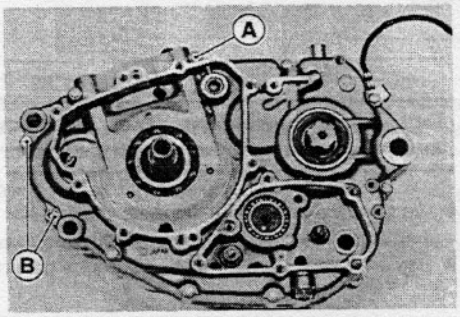
Crankcase Disassembly

- Remove the engine from the frame (see Engine Removal/Installation chapter).
- Remove:
  Shift Mechanism Cover
  Shift Arm
  Alternator Cover
  Alternator Rotor (see Electrical System chapter)
  Clutch Cover (see Clutch chapter)
  Clutch (see Clutch chapter)
  Primary Gear (see Clutch chapter)
  Oil Pump
  Cylinder Head Cover
  Camshaft Chain Tensioner (see Engine Top End chapter)
  Camshaft
  Camshaft Chain Guide
  Camshaft Chain
  Cylinder Head (see Engine Top End chapter)
  Cylinder
  Piston

- Remove the output shaft sleeve [A] and the O-ring [B].
  ○ Do not reuse the O-ring.

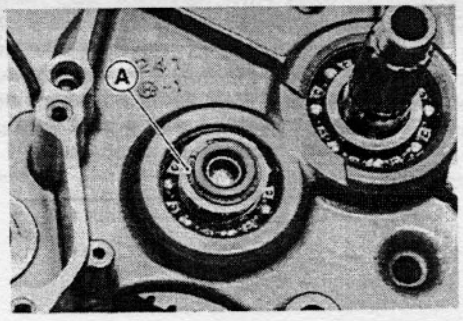


- Remove the crankcase bolt [A], and the crankcase Allen bolts [B].



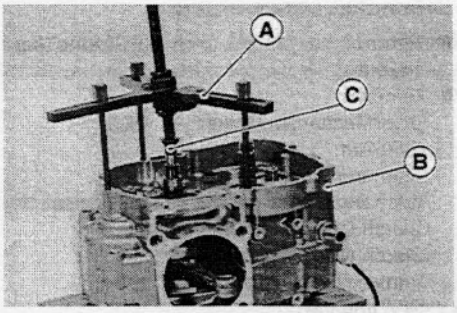
- Remove the circlip [A] from the output shaft end.

Special Tool - Outside Circlip Pliers: 57001-144

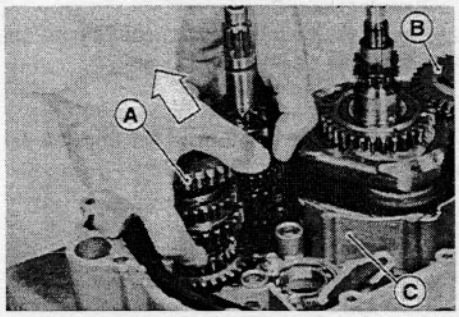


● Attach the crankcase splitting tool [A] to the right crankcase [B]. Be certain to screw the adapters in all the way.

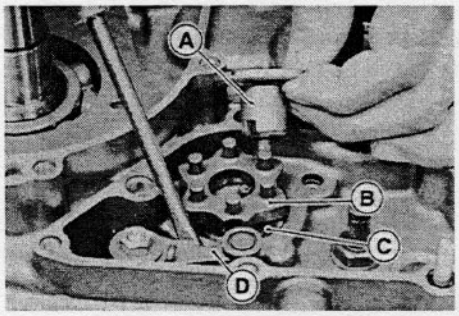
Special Tools - Crankcase Splitting Tool Assembly: 57001-1362
Bearing Puller Adapter: 57001-136 [C]



● Tighten the center bolt of the crankcase splitting tool to split the crankcase halves.
○ Remove the right crankcase half.
● Remove the transmission [A] and the balancer [B] from the left crankcase half [C].
● Remove the crankshaft (see Crankshaft Removal).



● Remove the shift drum cam bolt.
● Remove the neutral plate [A] and the shift drum cam [B], and remove the shift drum [C].
● Remove the gear set lever [D].



CAUTION

Do not remove the ball bearings and oil seals unless it is necessary. If they are removed, replace them with new ones.

Crankcase Assembly

CAUTION

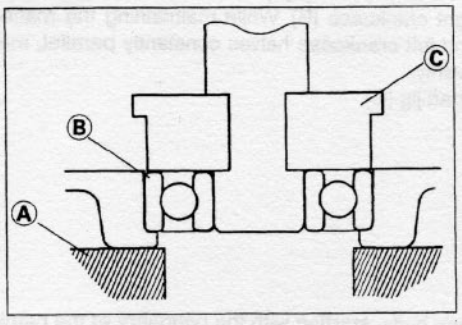
Right and left crankcase halves are machined at the factory in the assembled state, so if replaced, they must be replaced as a set.

● Remove the old gasket from the mating surfaces of the crankcase halves and clean them off with a high-flash point solvent.
● Using compressed air, blow out the oil passages in the crankcase halves.

⚠ WARNING

Clean the engine parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low-flash point solvent to clean parts. A fire or explosions could result.

- Support the crankcase bearing boss with a suitable retainer [A].
- Using a press and the bearing driver set [C], install a new bearing [B] until it bottoms out.

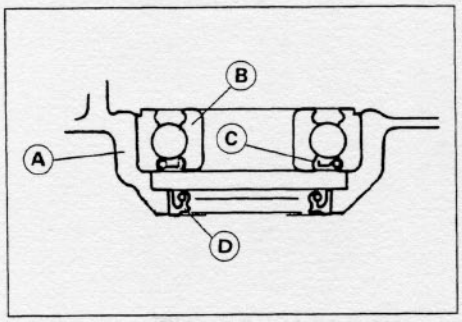


Special Tool - Bearing Driver Set: 57001-1129

CAUTION
Support the crankcase bearing boss when the bearings are pressed, or the crankcase could be damaged.

○ If the crankshaft has been removed from the crankcase, install the jig between the crankshaft flywheels before pressing the crankshaft into the left crankshaft half.

- Press the output shaft bearing [B] in the left crankcase half [A] so that the sealed side [C] faces to the engine sprocket.

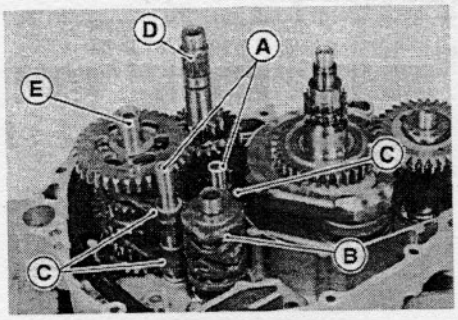


Special Tool - Bearing Driver Set: 57001-1129

- Put the output shaft oil seal [D] in, being careful of the proper direction as shown.
- Apply high-temperature grease to the oil seal lip.

- With the connecting rod positioned at the bottom-dead-center, install the crankshaft jig [A].

★ In case the crankshaft was removed, install the crankshaft jig before driving the crankshaft into the left crankcase half.



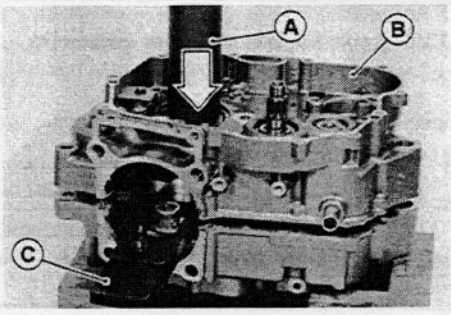
Special Tool - Crankshaft Jig: 57001-1174

- Apply engine oil to the transmission gears, bearings, shift forks, shift drum and crankshaft bearing.
- Install:
  - Shift Rod [A]
  - Shift Drum [B]
  - Shift Forks [C]
  - Transmission Shafts [D] and [E]
  - Balancer Shaft (Be careful of its direction)
- Check to see that the dowel pins are in place in the mating surfaces of the crankcase halves. If either has been removed, replace it with a new one.
- Apply gasket to the mating surface of the left crankshaft half.

Sealant - Kawasaki Bond (Liquid Gasket - Silver): 92104-002

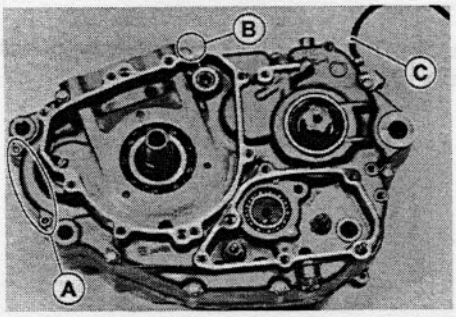
CAUTION
Do not apply liquid gasket around the crankshaft main bearing inserts, and oil passage holes.

- Using a press and a suitable tool [A], press the area around the crankshaft hole of the right crankcase [B]. While maintaining the mating surfaces of the right and left crankcase halves constantly parallel, mate the crankcase halves evenly.
- Remove the crankshaft jig [C].



- Tighten the crankcase bolts, starting with the periphery of the crankshaft, then outward.

Torque - Crankcase Allen Bolt [A]: 15 N·m (1.5 kg·m, 11 ft·lb)
Crankcase Bolt [B]: 9.8 N·m (1.0 kg·m, 87 in·lb)
Battery Ground Lead [C]

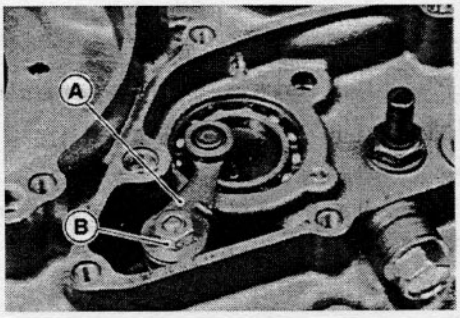


- Make sure that the crankshaft, driveshaft, output shaft, and the balancer shaft rotate smoothly.

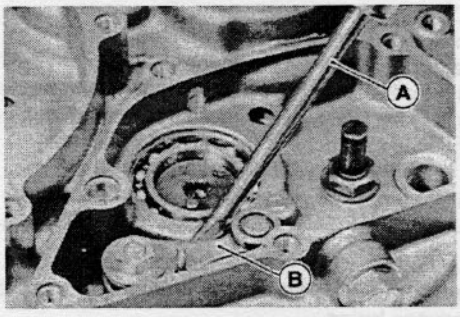
★ If the crankshaft will not turn, probably the crankshaft is not centered; tap the appropriate end of the crankshaft with a mallet to reposition it.

- Install the gear set lever [A] and tighten the nut [B].

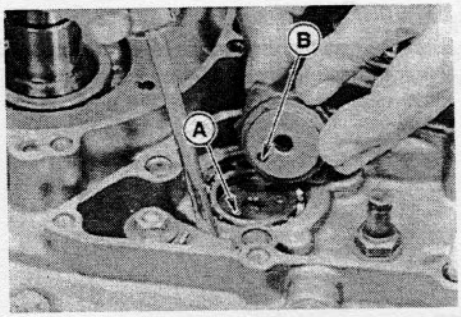
Torque - Gear Set Lever Nut: 9.8 N·m (1.0 kg·m, 87 in·lb)



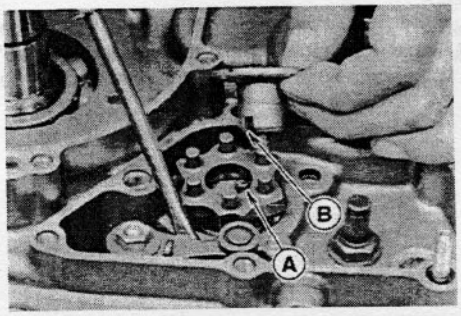
- To install the shift drum cam, use the driver [A] to bring the gear set lever [B] to the bottom of the crankcase.



● Mate the shift drum pin [A] into the shift drum cam hole [B].



● Install the pin [A] in the shift drum cam, and install the neutral plate by aligning its groove [B] with the pin.
● Apply non-permanent locking agent to the shift drum cam bolts and tighten them.
○ While installing the neutral plate, turn the plate clockwise until it comes to a stop; then, tighten the bolts.



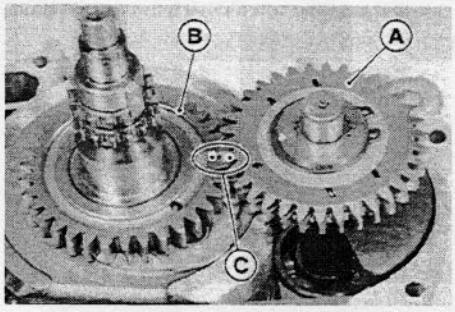
Torque - Shift Drum Cam Bolt: 12 N·m (1.2 kg·m, 104 in·lb)

● Check to see that gears shift smoothly from 1st to 5th gear, and 5th to 1st while spinning the output shaft.
● Set the shift drum in the neutral position.
● Replace the O-ring on the output shaft with a new one.
● Apply grease to the inside of the output shaft collar.
● Insert the collar with the oil groove end facing in.

Balancer

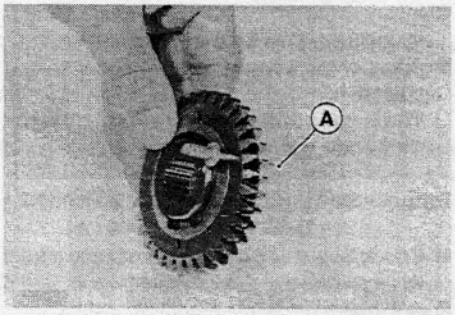
Balancer Removal

- Disassemble the crankcase (see Crankcase Disassembly).
- Align the timing marks [C] of the balancer gear [A] and the crankshaft drive gear [B]. Then, remove the balancer assembly from the left crankcase.

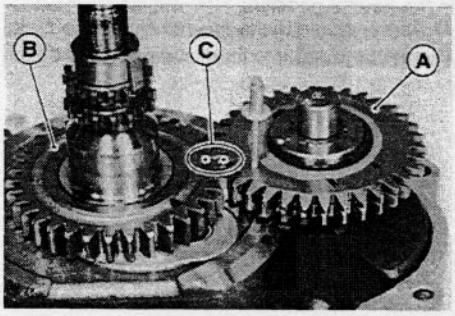


Balancer Installation

- Insert a suitable pin [A] through the holes of the right and left balancer gears to align the teeth of the right and left balancer gears.



- Align the timing mark [C] on the balancer gear [A] and the timing mark [C] on the drive gear [B] of the crankshaft and install the balancer gear in the crankcase.



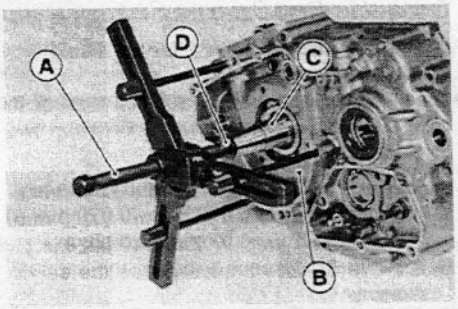
Balancer Gear Disassembly

○ The parts of the balancer gear are not sold individually. Therefore, do not disassemble the balancer gear.

Crankshaft

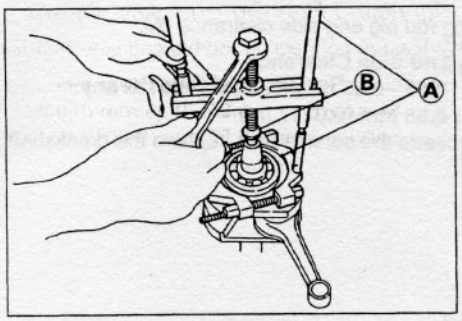
Crankshaft Removal

- Disassemble the crankcase (see Crankcase Disassembly).
- Remove the transmission shaft (see this chapter).
- Remove the balancer assembly (see Balancer Removal).
- Using the crankcase splitting tool [A], remove the crankshaft [C] from the left crankcase [B].



Special Tools - Crankcase Splitting Tool Assembly: 57001-1362
Bearing Puller Adapter: 57001-136 [D]

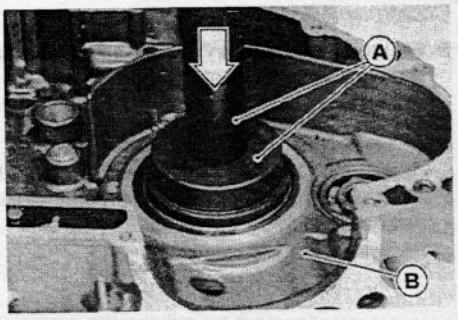
★ If the bearings stay on the crankshaft when splitting the crankcase or removing the crankshaft from the left crankcase, remove the bearings from the crankshaft with a bearing puller.



Special Tools - Bearing Puller [A]: 57001-135
Bearing Puller Adapter [B]: 57001-136

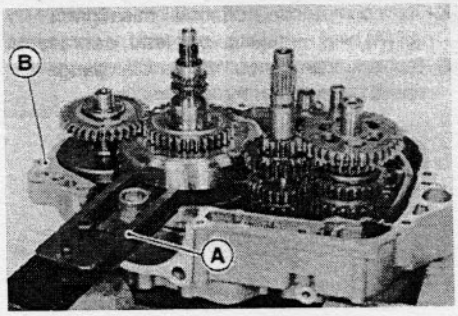
Crankshaft Installation

- Apply high-temperature grease to the outer side of the crankshaft bearings and use the bearing driver set [A] and a press to drive the bearing to the bottom of the crankcase [B]. While driving the bearing in, make sure to use a holder to support the boss area.



Special Tool - Bearing Driver Set: 57001-1129

- Insert the crankshaft jig [A] between the crankshaft flywheels opposite the connecting rod big end to protect flywheel alignment as shown, and press the crankshaft into the left crankcase [B].
- When pressing, position the jig in the crankcase opening so the jig does not hit the crankcase.



Special Tool - Crankshaft Jig: 57001-1174 [A]

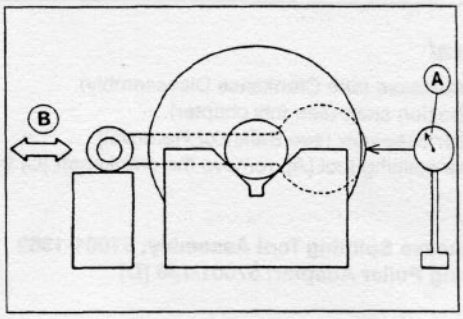
- Apply engine oil to the connecting rod big end bearing.

Connecting Rod Big End Radial Clearance

- Set the crankshaft on V blocks, and place a dial gauge [A] against the connecting rod big end.
- Push [B] the connecting rod first towards the gauge and then in the opposite direction. The difference between two gauge readings is the radial clearance.

Connecting Rod Big End Radial Clearance
Standard: 0.008 mm - 0.020 mm (0.0003 ~ 0.0008 in.)
Service Limit: 0.07 mm (0.0028 in.)

- If the radial clearance exceeds the service limit, replace the crankshaft assembly.

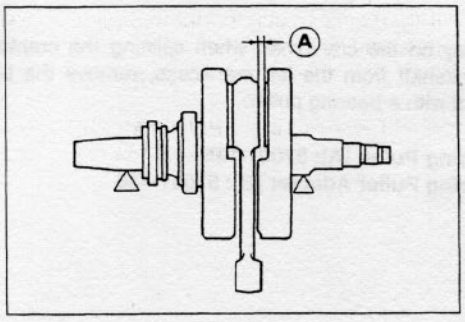


Connecting Rod Big End Side Clearance

- Measure connecting rod big end side clearance [A].

Connecting Rod Big End Side Clearance
Standard: 0.25 - 0.35 mm (0.0098 ~ 0.0138 in.)
Service Limit: 0.55 mm (0.0217 in.)

★ If the clearance exceeds the service limit, replace the crankshaft assembly.

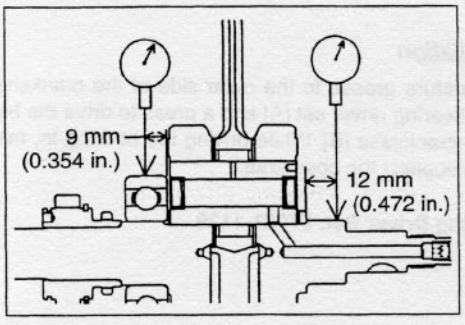


Crankshaft Runout

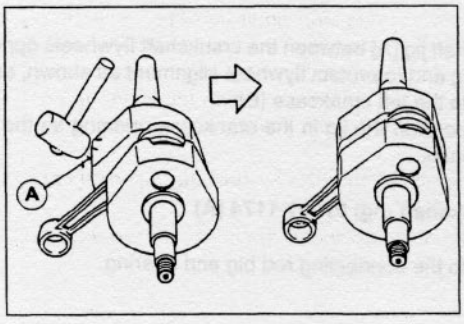
- With the crankshaft on V blocks, place a dial gauge as shown and turn the crankshaft slowly. The maximum difference in gauge reading is the crankshaft runout.

Standard: TIR 0.03 mm (0.0012 in.) or less
Service Limit: TIR 0.08 mm (0.0031 in.)

★ If the runout at either point exceeds the service limit, replace the crankshaft assembly with a new one or align the crankshaft so that the runout falls within the service limit.

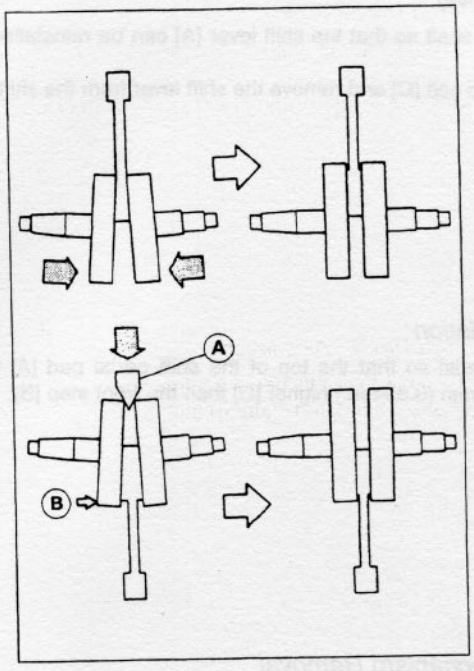


- First correct the horizontal misalignment by striking the projecting crank half [A] with a plastic, soft lead, or brass hammer as shown.
- Recheck the runout with a dial gauge and repeat the process until the runout falls within the service limit.



● Next, correct the vertical misalignment by either driving a wedge [A] in between the crank halves or by squeezing them in a vice, depending on the nature of the misalignment.

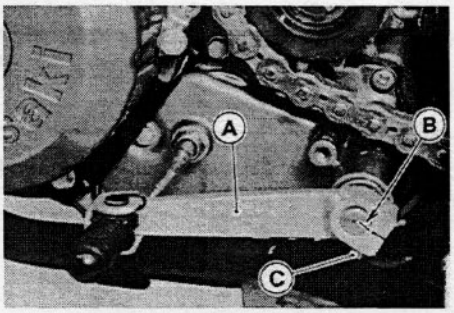
CAUTION
Do not hammer the crank half at the point [B].



External Shift Mechanism

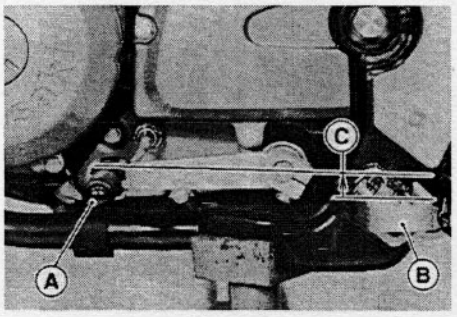
Shift Pedal Removal

- Mark [B] the shift shaft so that the shift lever [A] can be reinstalled in its original position.
- Remove the clamp bolt [C] and remove the shift lever from the shift shaft.



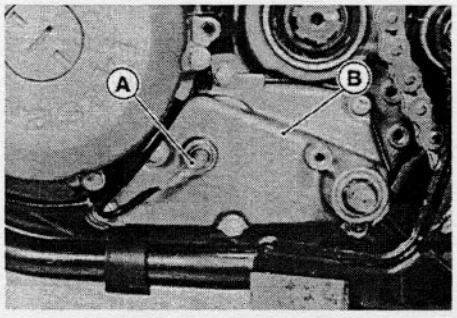
Shift Pedal Installation

- Install the shift pedal so that the top of the shift pedal pad [A] will be approximately 10 mm (0.394 in.) higher [C] than the front step [B].

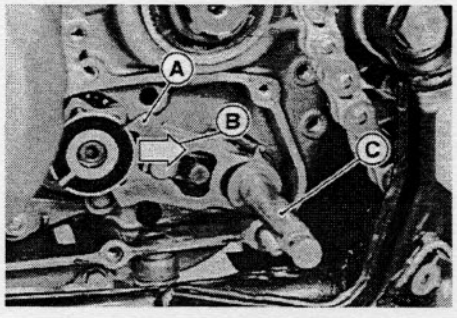


External Shift Mechanism Removal

- Drain the engine oil (see Engine Lubrication System chapter).
- Remove:
  Shift Pedal (see Shift Pedal Removal)
  Engine Sprocket Cover
  Engine Sprocket (see Final Drive chapter)
  Neutral Switch Terminal [A]
  Shift Mechanism Cover [B]

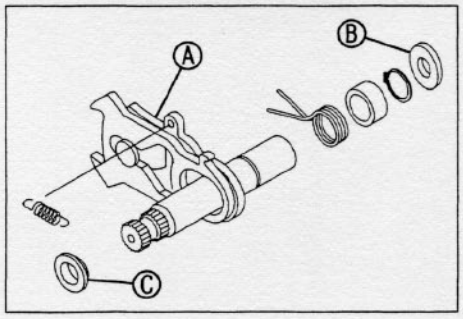


- Remove the shift shaft [C] while pushing [B] the shift mechanism arm [A] toward the shaft.



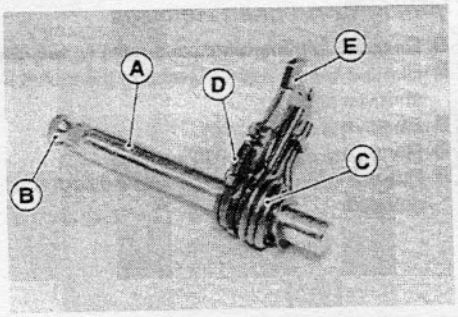
External Shift Mechanism Installation

- Install the flat washer [B] behind the shift arm [A], and the collar [C] in front.
- Install the shift arm in the left crankcase.



External Shift Mechanism Inspection

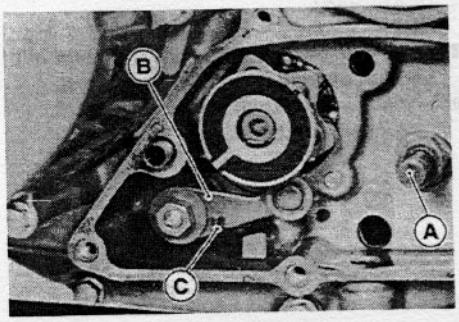
- Inspect the shift shaft [A] for any damage.
- ★ If the shaft is bent, repair or replace it.
- ★ If the splines [B] is damaged, replace the shaft.
- ★ If the spring [C] or [D] is damaged, replace the spring.
- ★ If the shift mechanism arm [E] is damaged, replace the assembly.



- Check the return spring pin [A] is not loose.
- ★ If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

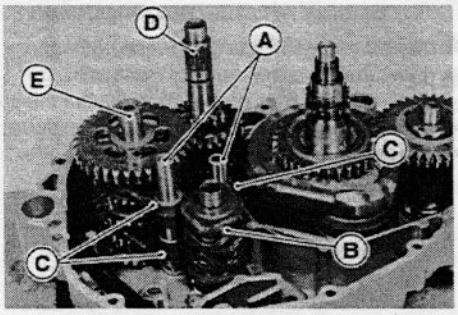
Torque - Return Spring Pin: 37 N·m (3.8 kg·m, 27 ft·lb)

- Check the gear set lever [B], and their springs [C] for breaks or distortion.
- ★ If the lever or springs are damaged in any way, replace them.
- Inspect the shift drum cam and the neutral plate.
- ★ Replace it if it is seriously worn or damaged.



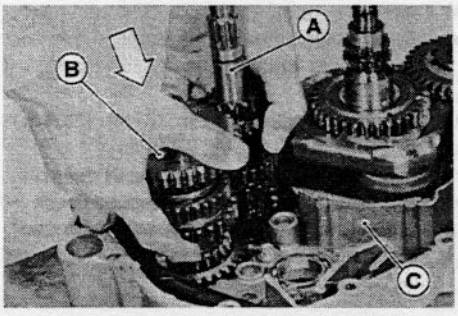
Transmission

Transmission Shaft Removal

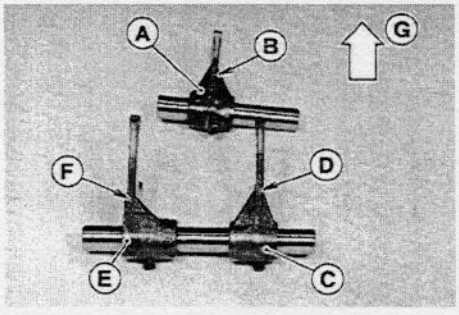


- Disassemble the crankcase halves (see Crankcase Disassembly).
- Pull out the shift rod [A] allowing the shift fork guide pins to free from the shift drum [B].
- Remove the shift drum.
- Remove the shift fork [C].
- Pull out the drive shaft [D] and output shaft [E] together with their gears meshed.

Transmission Shaft Installation



- Apply engine oil to the sliding portion of the transmission shaft, gears, and ball bearings.
- Install the drive shaft [A] and output shaft [B] in the left crankcase [C] with their gears meshed.



- Apply a small amount of engine oil to the shift fork fingers and fit each shift fork into the groove of the proper gear.
- The shift forks can be identified by their shape or number. Install them noting the direction shown.
  - The drive shaft fork [A] is the shortest, and install it with its number "216" [B] facing the engine right side.
  - Install the right output shaft fork [C] with its number "218" [D] facing the engine right side.
  - Install the left output shaft fork [E] with its number "217" [F] facing the engine left side.

  Front [G]
- Fit each shift fork guide pin into the corresponding groove in the shift drum.
- Apply a small amount of engine oil to the shift rods and slide them into the shift forks.

Transmission Disassembly

- Remove the transmission shafts.
- Remove the circlips, washers, then gears.

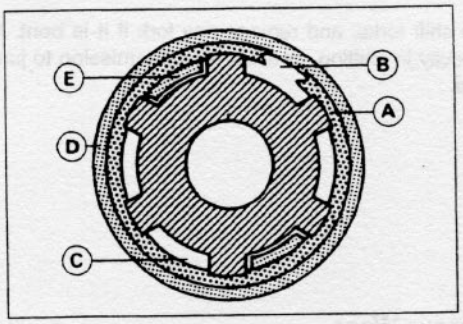
Special Tool - Outside Circlip Pliers: 57001-144 [A]

- Do not reuse the removed circlips.

Transmission Assembly

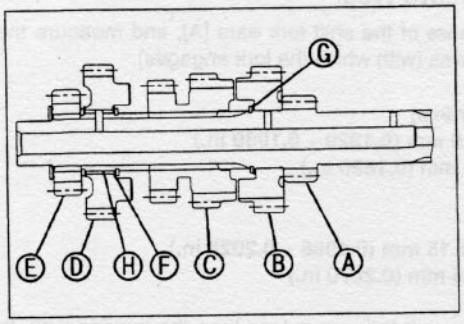
- Apply engine oil liberally to the transmission shaft, gears and bearings.
- Replace any circlips that were removed with new ones.
- Always install circlips [A] so that the opening [B] is aligned with a spline groove [C], and install toothed washers [D] so that the teeth [E] are not aligned with the circlip opening [B]. To install a circlip without damage, first fit the circlip onto the shaft expanding it just enough to install it, and then use a suitable gear to push the circlip into place.

Special Tool - Outside Circlip Pliers: 57001-144

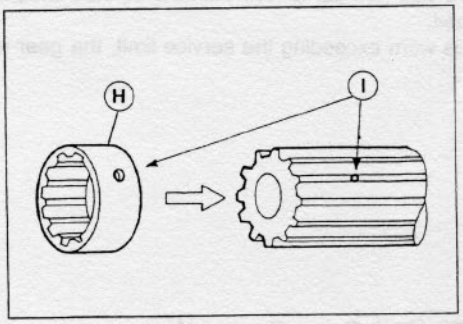


- The drive shaft gears can be identified by size. the smallest diameter gear is 1st gear, and the largest is 6th. Be sure that all parts are put back in the correct sequence, facing the proper direction, and that all circlips and the washers are properly in place.

1. 1st gear (11T; part of drive shaft) [A]
2. 5th gear (26T; gear dogs left) [B]
3. 3rd/4th gear (18T/27T; larger gear faces right) [C]
4. 6th gear (27T; gear dogs right) [D]
5. 2nd gear (16T; front / back symmetrical) [E]
6. Toothed Washer [F] Plane Washer [G]

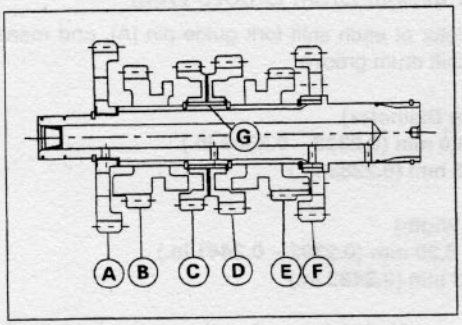


○ Install the 6th gear bushings [H] on the shaft with their oil holes [I] aligned with the shaft oil holes.

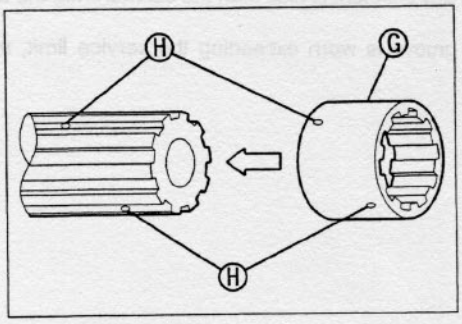


- The output shaft gears can be identified by size; the largest diameter gear is 1st gear, and the smallest is 6th. Be sure that all parts are put back in the correct sequence, facing the proper direction, and that all circlips and washers are properly in place.

1. 2nd gear (34T; plain side faces left) [A]
2. 6th gear (23T; fork groove goes to the right side of the gear teeth) [B]
3. 3rd gear (27T; dog recesses face left) [C]
4. 4th gear (31T; dog recesses face right) [D]
5. 5th gear (25T; fork groove goes to the left side of the gear teeth) [E]
6. 1st gear (23T; plain side faces right) [F]

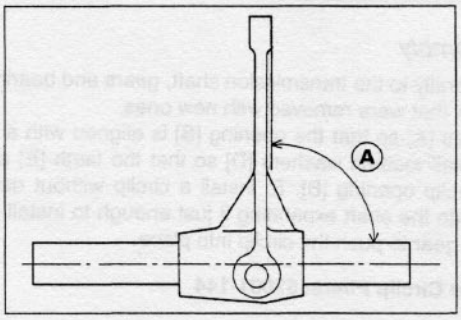


○ Install the 3rd/4th gear bushing [G] on the output shaft and align the oil holes [H].
○ Install the toothed washers for both ends of the 3rd gear bushing.



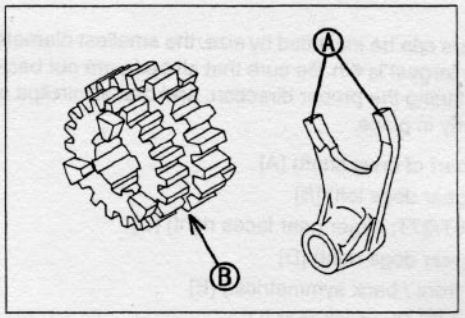
- Check each gear spins or slides freely on the transmission shaft without binding after assembly.

Shift Fork Bend



● Visually inspect the shift forks, and replace any fork if it is bent. A bent fork may cause difficulty in shifting, or allow the transmission to jump out of gear when loaded.
90° [A]

Shift Fork/Gear Groove Wear



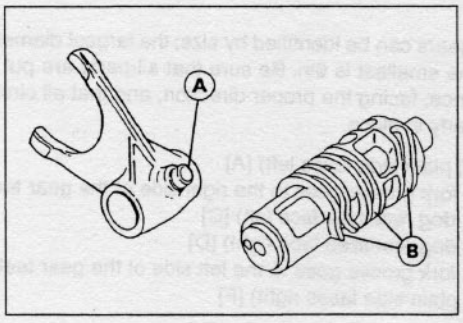
● Measure the thickness of the shift fork ears [A], and measure the width [B] of the gear grooves (with which the fork engages).

[Shift Fork Ear Thickness]
Standard: 4.9 ~ 5.0 mm (0.1929 ~ 0.1969 in.)
Service Limit: 4.8 mm (0.1890 in.)

[Gear Groove Width]
Standard: 5.05 ~ 5.15 mm (0.1988 ~ 0.2028 in.)
Service Limit: 5.25 mm (0.2070 in.)

★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.
★ If the gear groove is worn exceeding the service limit, the gear must be replaced.

Shift Fork Guide Pin/Shift Drum Groove Wear



● Measure the diameter of each shift fork guide pin [A], and measure the width [B] of each shift drum groove.

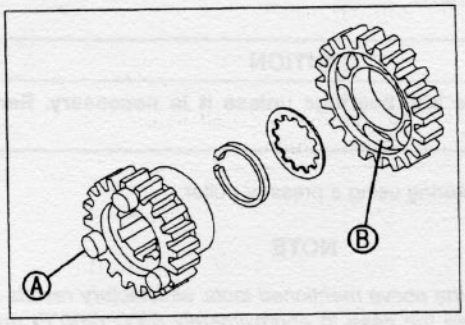
[Shift Fork Guide Pin Diameter]
Standard: 5.9 ~ 6.0 mm (0.2323 ~ 0.2362 in.)
Service Limit: 5.8 mm (0.2283 in.)

[Shift Drum Groove Width]
Standard: 6.05 ~ 6.20 mm (0.2382 ~ 0.2441 in.)
Service Limit: 6.3 mm (0.2480 in.)

★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.
★ If any shift drum groove is worn exceeding the service limit, the drum must be replaced.

Gear Dog and Gear Dog Hole Damage

- Visually inspect the gear dogs [A] and gear dog holes [B].
- ★ Replace any damaged gear or gears with excessively worn dogs or dog holes.



Bearing/Oil Seal

Bearing Replacement

CAUTION
Do not remove the ball bearings unless it is necessary. Removal may damage them.

● Remove the ball bearing using a press or puller.

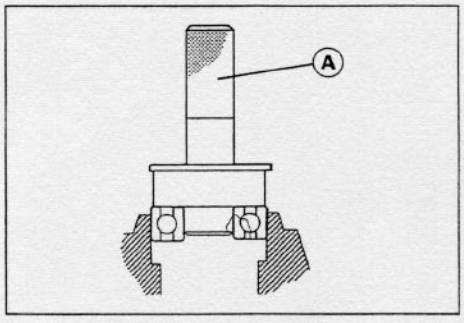
NOTE

○ *In the absence of the above mentioned tools. satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max, and tapping the bearing in or out.*

CAUTION
Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.

● Install the bearing until its outer race stops at the bottom of the case using a press and the bearing driver set.

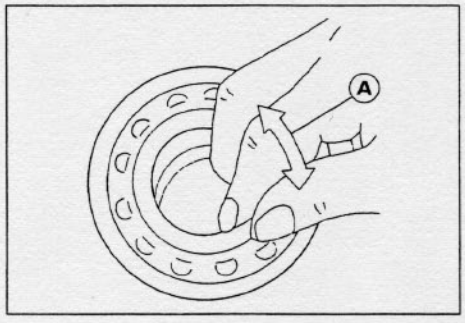
Special Tool - Bearing Driver Set: 57001-1129 [A]



Bearing Inspection

CAUTION
Do not remove the bearings for inspection. Removal may damage them.

● Inspect the ball bearings.
○ Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in high-flash point solvent, dry it (do not spin the bearing while it is dry), and apply engine oil to it.
○ Spin [A] the bearing by hand to check its condition.
★ If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.



Oil Seal Inspection

★ Replace the oil seal if the lips are deformed, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

Wheels/Tires

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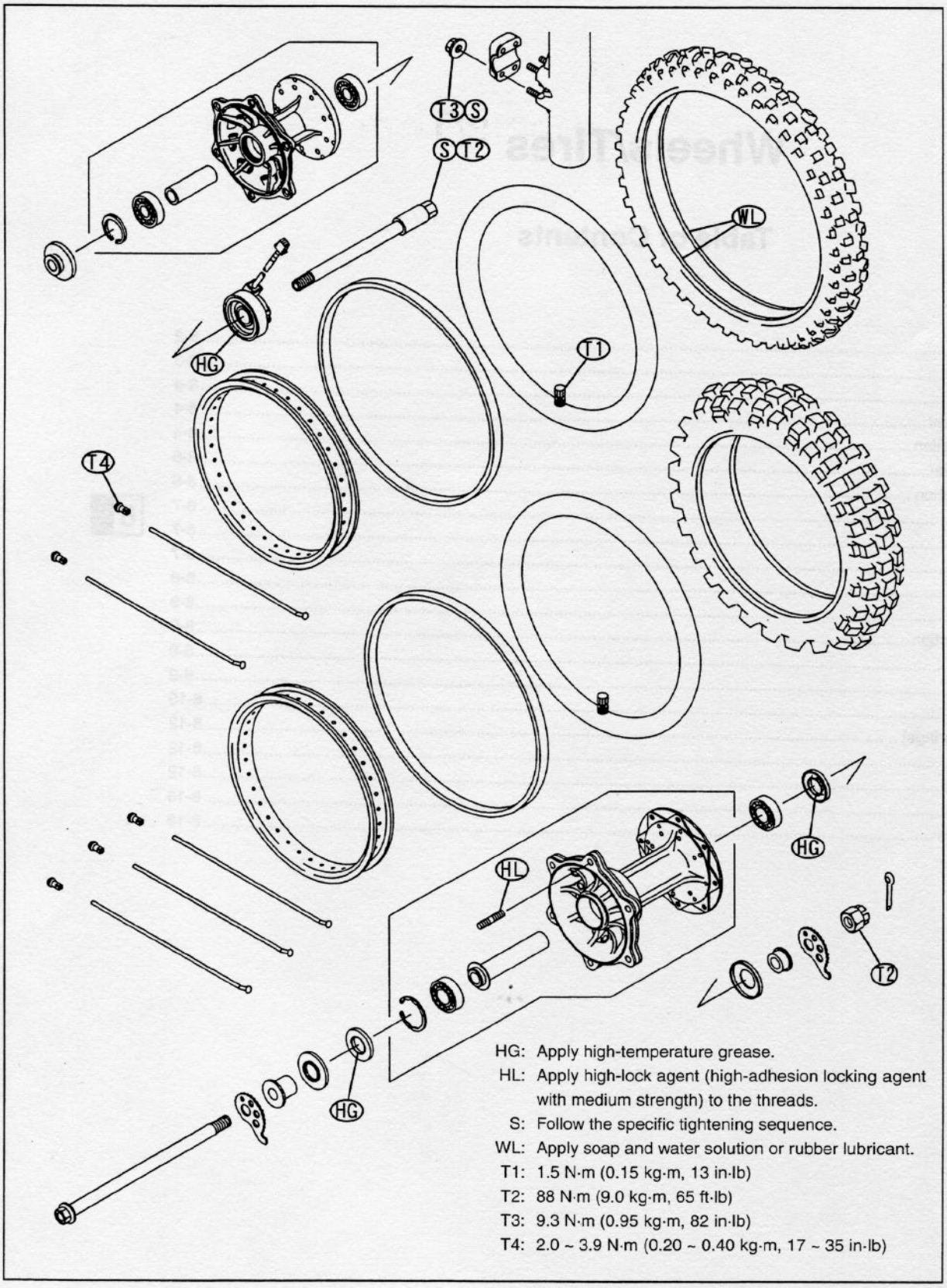
Exploded View



HG: Apply high-temperature grease.
HL: Apply high-lock agent (high-adhesion locking agent with medium strength) to the threads.
S: Follow the specific tightening sequence.
WL: Apply soap and water solution or rubber lubricant.
T1: 1.5 N·m (0.15 kg·m, 13 in·lb)
T2: 88 N·m (9.0 kg·m, 65 ft·lb)
T3: 9.3 N·m (0.95 kg·m, 82 in·lb)
T4: 2.0 ~ 3.9 N·m (0.20 ~ 0.40 kg·m, 17 ~ 35 in·lb)

Specifications

Item		Standard	Service Limit
Wheels (rims)			
Rim runout (with tire installed):	Axial	TIR 0.8 mm (0.0315 in.) or less	TIR 2.0 mm (0.0787 in.)
	Radial	TIR 1.0 mm (0.0394 in.) or less	TIR 2.0 mm (0.0787 in.)
Axle runout/100 mm (3.94 in.)		TIR 0.1 mm (0.0040 in.) or less	TIR 0.2 mm (0.0079 in.)
Wheel balance		10g (0.35 oz) or less	—
Tires			
Tread depth:	Front	7.0 mm (0.28 in.) (Bridgestone)	2 mm (0.08 in.)
		7.4 mm (0.29 in.) (Dunlop)	
	Rear	10.5 mm (0.41 in.) (Bridgestone)	2 mm (0.08 in.)
		11.3 mm (0.44 in.) (Dunlop)	
Air pressure (when cold)			
1 occupant:	Front	150 kPa (1.50 kg/cm², 21psi)	—
		150 kPa (1.50 kg/cm², 21psi)	
2 occupants:	Rear	150 kPa (1.50 kg/cm², 21psi)	—
		175 kPa (1.75 kg/cm², 25psi)	
Standard tire:		Manufacture, type	Size
	Front	Bridgestone Trail Wing 301, tube type	2.75-21 45 P
		Dunlop D605FG, Tube type	
	Rear	Bridgestone Trail Wing 302, tube type	4.10-18 59 P
		Dunlop D605, Tube type	

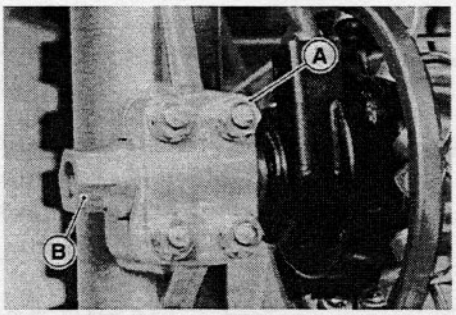
TIR: Total Indicator Readings

Special Tools - Jack: 57001-1238
Bead Breaker Set: 57001-1072
Rim Protector: 57001-1063
Inside Circlip Pliers: 57001-143
Bearing Driver Set: 57001-1129
Bearing Remover Shaft: 57001-1265
Bearing Remover Head, ø15 × ø17: 57001-1267

Wheels

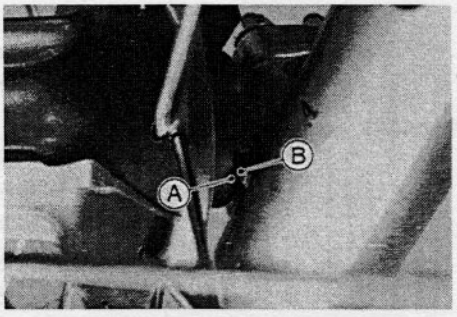
Front Wheel Removal

- Loosen:
  Axle Clamp Nut [A]
  Axle [B]

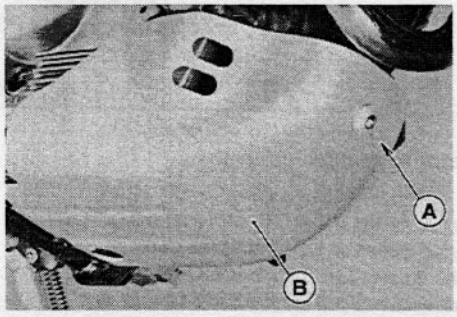


CAUTION

Slide the wheel toward the front fork (right).
Loosen the axle nut with the stopper [B] of front fork remaining stayed in the groove [A] of the speedometer gear housing.
The speed sensor projections may break if excuted above.

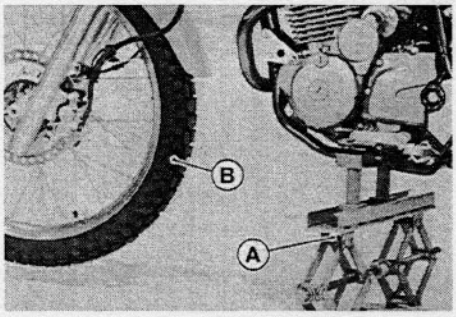


- Remove the mounting bolt [A] and take out the engine guard [B].



- Raise the front wheel [B] off the ground using the jack [A].

Special Tool - Jack: 57001-1238



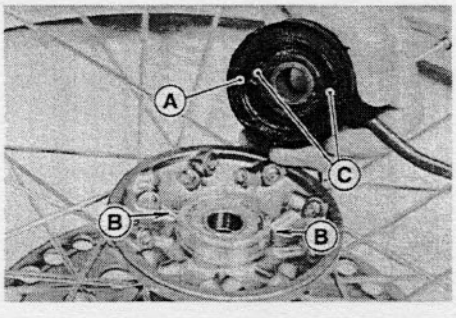
- Pull out the axle and drop the front wheel [A] out of the forks.
- Insert a wooden plate between the pads in the caliper to prevent the caliper piston from jumping out.

CAUTION

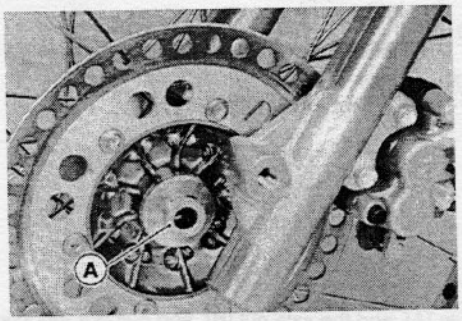
Do not lay the wheel down on the disc. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation

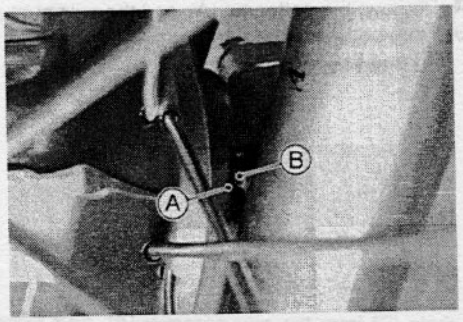
- Apply high-temperature grease to the seal lip [A] of the speedometer gear.
- Install the speedometer gear housing so that the speed sensor projections [C] fit in the drive notches [B].



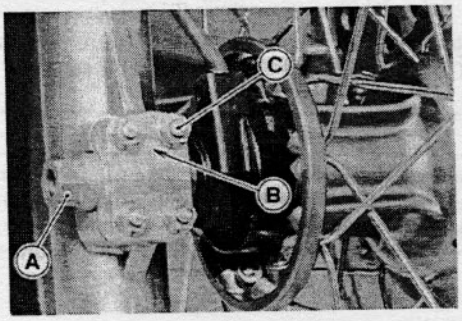
● Fit the collar [A] to the left side of the hub.



● Align the groove [A] of speedometer gear housing with the stopper [B] of fork (right) to install the wheel assembly.



● Insert the axle [A] into the wheel assembly from the right, then temporalily tighten the axle clamp nut [C] pulling the wheel toward the front fork (right) remaining stayed in the groove of speedometer gear housing.
○ Install the axle clamp with its arrow mark [B] facing upward.



● Tighten the axle securely pulling the wheel assembly toward the front fork (right).

Torque - Front Axle: 88 N·m (9.0 kgf·m, 65 ft·lb)

CAUTION

Prevent the groove in the speedometer gear housing from coming off the stopper on the right front fork, otherwise the speedometer gear housing will turn when the axle is tightened, which would damage the projection in speedometer gear housing.

● Securely tighten the upper axle clamp nut first, then the lower one.

Torque - Front Axle Clamp Nut: 9.3 N·m (0.95 kg·m, 82 in·lb)

● Check the front brake effectiveness.

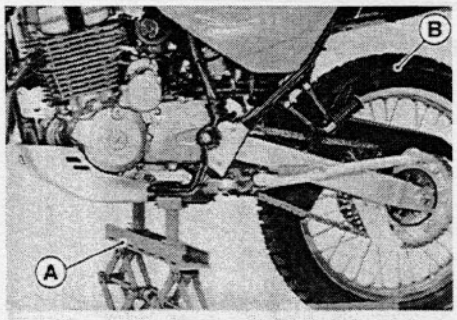
⚠WARNING

Do not attempt to drive the motorcycle until you pump 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.

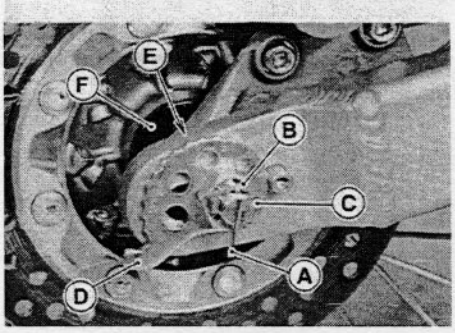
Rear Wheel Removal

- Raise the rear wheel [B] off the ground using the jack [A].

Special Tool - Jack: 57001-1238

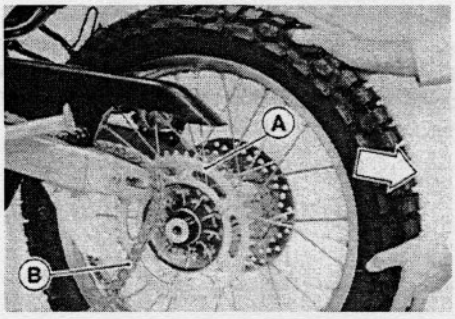


- Remove the cotter pin [A], and the axle nut [B], and pull out the axle [C].
- From both sides of the rear hub, remove the chain adjuster [D], the collar [E] and the cap [F].



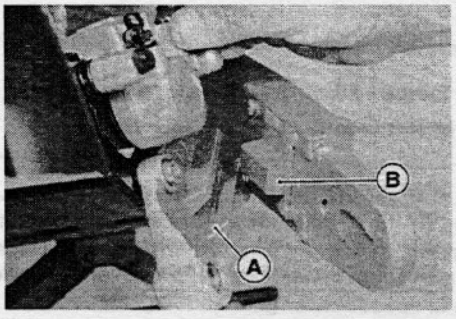
- Remove the drive chain [B] from the rear sprocket [A], and remove the rear wheel.
- Insert a wooden plate between the pads in the rear caliper to prevent the caliper piston from jumping out.

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

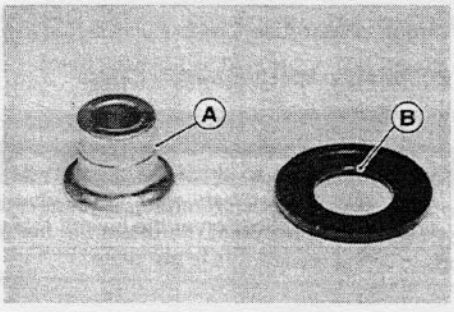


Rear Wheel Installation

- Fit the swing arm stop [B] to the caliper holder groove [A].



- Apply high-temperature grease to the seal lip.
- Install the collars and the caps to both sides of the rear hub. Fit the cap lip [B] to the collar groove [A].
- Insert the axle from the left side of the wheel, and tighten the axle nut.



● Adjust the drive chain slack after installation (see Final Drive chapter).

Torque - Rear Axle Nut: 88 N·m (9.0 kg·m, 65 ft·lb)

● Check the rear brake effectiveness.

⚠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

● Raise the wheel and turn the wheel by hand to make sure that it rotates smoothly without noise.

★ If any abnormal condition is found, replace the bearings (see Bearing Removal and Installation).

Spoke Inspection

● Check that all the spokes are tightened evenly.

★ If spoke tightness is uneven or loose, tighten the spoke nipples evenly.

Torque - Spoke Nipples: 2.0 ~ 3.9 N·m (0.20 ~ 0.40 kg·m, 17 ~ 35 in·lb)

● Check the rim runout.

⚠WARNING

If any spoke breaks, it should be replaced immediately. A missing spoke places an additional load on the other spoke, which will eventually cause other spokes to break.

Rim Inspection

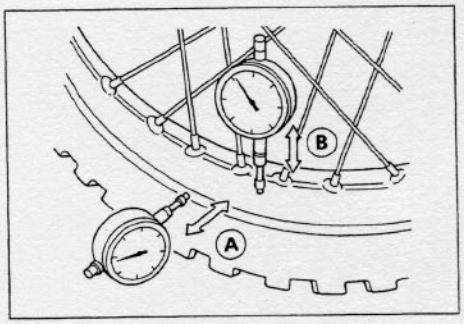
● Inspect the rim for small cracks, dents, bending, or warping.

★ If there is any damage to the rim, it must be replaced.

● Set a dial gauge against the side of the rim, and rotate rim to measure the axial runout [A]. The difference between the highest and lowest dial readings is the amount of runout

● Set a dial gauge against the outer circumference of the rim, and rotate the rim to measure radial runout [B]. The difference between the highest and lowest dial readings is the amount of runout.

★ If rim runout exceeds the service limit, check the hub bearings first. Replace them if they are damaged. If the problem is not due to the bearings, correct the rim warp (runout). A certain amount of rim warp can be corrected by recentering the rim. Loosen some spokes and tighten others within the standard torque to change the position of different parts of the rim. If the rim is badly bent, however, it must be replaced.



[Rim Runout]

	Standard	Service Limit
Axial Runout	TIR 0.8 mm (0.0315 in.) or less	TIR 2.0 mm (0.0787 in.)
Radial Runout	TIR 1.0 mm (0.0394 in.) or less	TIR 2.0 mm (0.0787 in.)

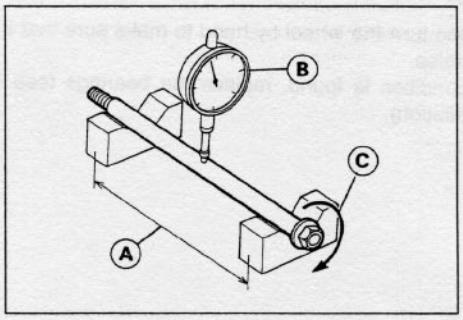
TIR: Total Indicator Readings

⚠WARNING

Repairing and reusing the damaged wheel parts are dangerous. If wheel parts are damaged, replace them with new ones.

Axle Inspection

- Visually inspect the front and rear axles for damage.
- ★ If the axle is damaged or bent, replace it.
- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.
- ★ If axle runout exceeds the service limit, replace the axle.

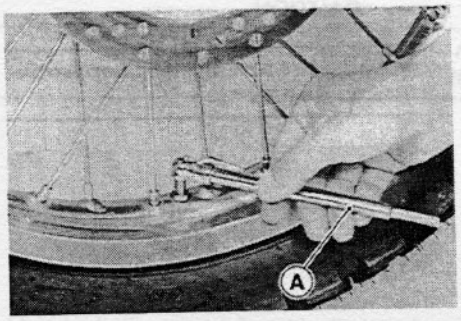


[Axle Runout/100 mm]
Standard: TIR 0.1 mm (0.0040 in.) or less
Service limit: TIR 0.2 mm (0.0079 in.)

TIR: Total Indicator Readings

Tires

Air Pressure Inspection



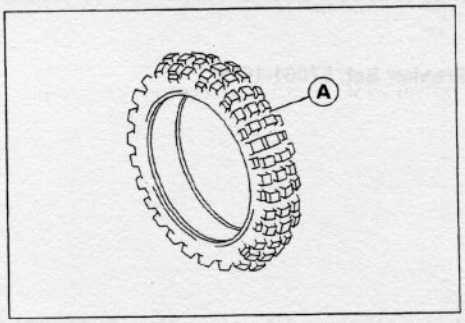
- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).

★ Adjust the tire air pressure according to the specifications if necessary.

[Air Pressure - when cold] **Unit: kPa (kg/cm², psi)**

Operating Conditions	Front	Rear
1 person	150 (1.5, 21)	150 (1.5, 21)
2 persons	150 (1.5, 21)	175 (1.75, 25)

Tire Inspection



As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90 % of all tire failures occur during the last 10 % of tread life (90 % worn). So it is false economy and unsafe to use the tires until they are bald.

- Remove any imbedded stones or other foreign particles from the tread.
- Visually inspect the tire for cracks and cuts, replacing the tire in case of damage. Swelling or high spots indicate internal damage, requiring tire replacement.
- Measure the tread depth [A] with a depth gauge. Since the tire may wear unevenly, take measurement at several places.

★ If any measurement is less than the service limit, replace the tire.

[Tread depth:]

	Standard	Service Limit
Front	7.0 mm (0.28 in.) (B), 7.4 mm (0.29 in.) (D)	2 mm (0.08 in.)
Rear	10.5 mm (0.41 in.) (B), 11.3 mm (0.44 in.) (D)	2 mm (0.08 in.)

(B): Bridgestone; (D): Dunlop

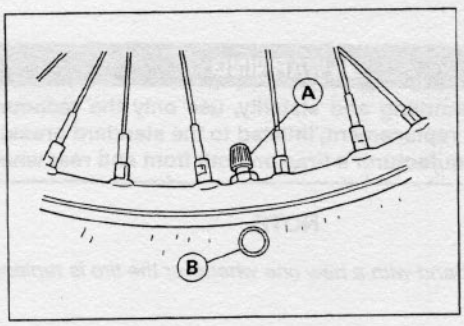
NOTE

○ *Most countries may have their own regulations requiring a minimum tire tread depth; be sure to follow them.*

⚠ WARNING

To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure. Use the same manufacturer's tires on both front and rear wheels.

Tire Removal



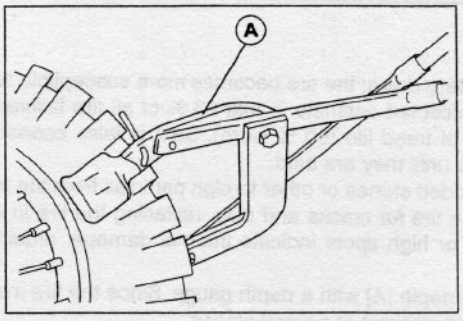
- Remove:
  Wheel (see Front or Rear Wheel Removal)
  Brake Disc
  Valve Core (let out the air)
- To maintain wheel balance, mark [B] the valve stem [A] position on the tire with chalk so that the tire can be reinstalled in the same position.
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

CAUTION

Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.

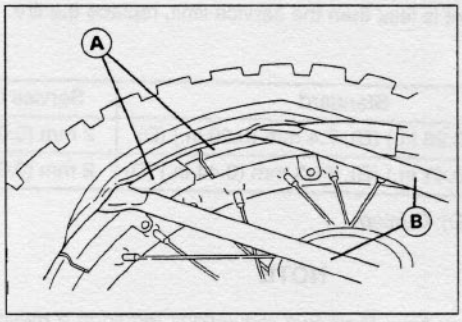
- Break the beads away from both sides of the rim with the bead breaker [A].

Special Tool - Bead Breaker Set: 57001-1072



- Install the rim protector [A] around the valve stem to prevent the rim flange from damage. Lubricate the tire irons [B] and rim protectors with soap and water solution, or rubber lubricant.
- Pry the tire off the rim so that the operation can be started near the valve stem with the tire iron portion of the bead breaker [B] protecting the rim with rim protectors [A].

Special Tools - Rim Protector : 57001-1063
Bead Breaker Assembly : 57001-1072



- Do the same for the other side of the tire, then remove the rim from the tire.
- Remove the protectors.

Tire Installation

⚠WARNING

To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure. Use the same manufacturer's tires on both front and rear wheels.

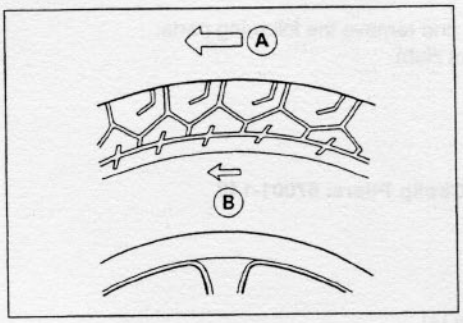
NOTE

○ *Replace the rim band with a new one whenever the tire is replaced.*

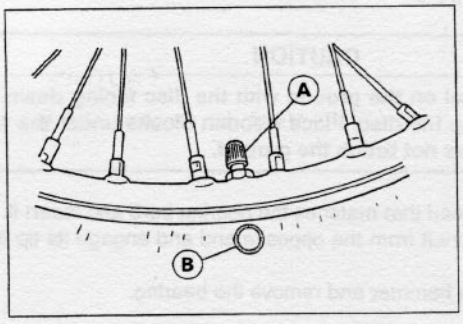
● Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.

NOTE

○ *The direction of the tire rotation [A] is shown by an arrow [B] on the tire sidewall.*



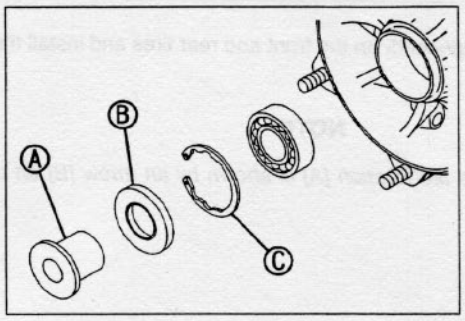
● Position the tire on the rim so that the valve stem [A] is at the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).
● Adjust the air pressure to the specified pressure.
● Install the brake disc(s) so that the disk rotation mark aligns with the tire rotation.
● Adjust the wheel balance.



Torque - Tire Air Valve Nut: 1.5 N·m (0.15 kg·m, 13 in·lb)
Front Disc Bolt: 23 N·m (2.3 kg·m, 17 ft·lb)
Rear Disc Bolt: 15 N·m (1.5 kg·m, 11 ft·lb)

Bearings (Wheel Bearings)

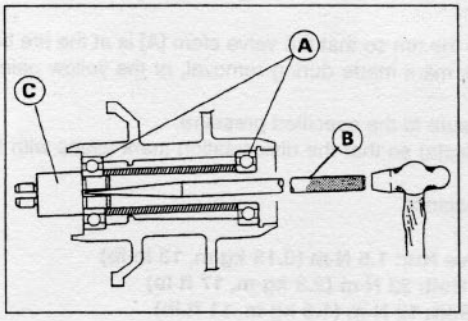
Bearing Removal



- Remove the wheel, and remove the following parts:
  Speed Sensor (Front Hub)
  Collar [A]
  Grease Seal [B]
  Circlip [C]

Special Tool - Inside Circlip Pliers: 57001-143

- Remove the bearing [A].



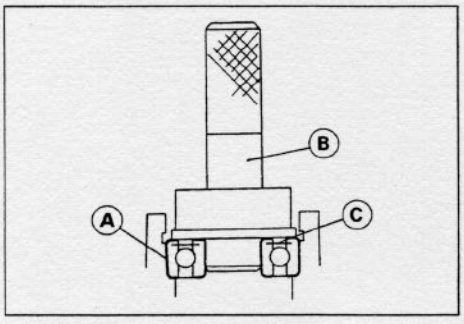
CAUTION

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

- ○ Select a remover head that matches the bearing bore and insert it.
- ○ Pass the remover shaft from the opposite end and engage its tip into the groove of the head.
- ○ Tap the shaft with a hammer and remove the bearing.

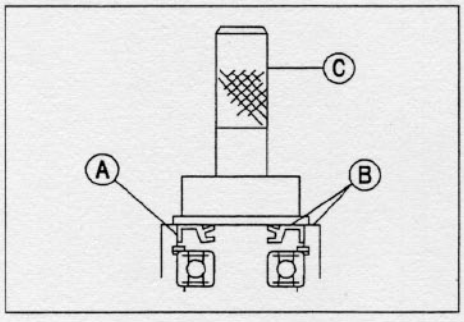
Special Tools - Bearing Remover Shaft: 57001-1265 [B]
Bearing Remover Head, ø15 × ø17: 57001-1267 [C]

Bearing Installation



- Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- ○ Install the bearings so that the marked side or the seal side [C] faces out.
- ○ Press in left bearings [A] on both front and rear wheel until it bottoms out.

Special Tool - Bearing Driver Set: 57001-1129 [B]



- Replace the circlip with a new one.

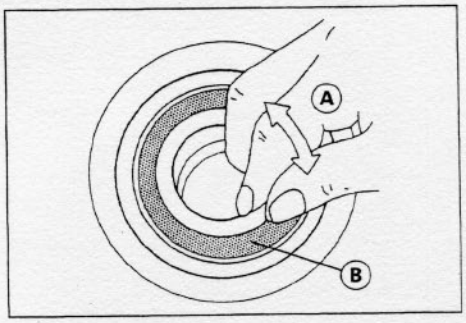
Special Tool - Inside Circlip Pliers: 57001-143

- Replace the rear hub grease seal [A] with a new one and press it in so that the seal surface is flush [B] with the end of the hub.
- ○ Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001-1129 [C]

Bearing Wear

○ Since the hub bearings are made to extremely close tolerances, the clearance cannot normally be measured.



NOTE

○ *Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*

● Spin [A] the bearing 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 hub bearing seal [B] for tears or leakage.
★ If the seal is torn or is leaking, replace the bearing.

Bearing Lubrication

NOTE

○ *The bearing is the single-side seal type that cannot be re-lubricated once it is installed in place.*

CAUTION
Do not remove any bearings for lubrication. If any bearings are removed, they will need to be replaced with new ones.

Final Drive

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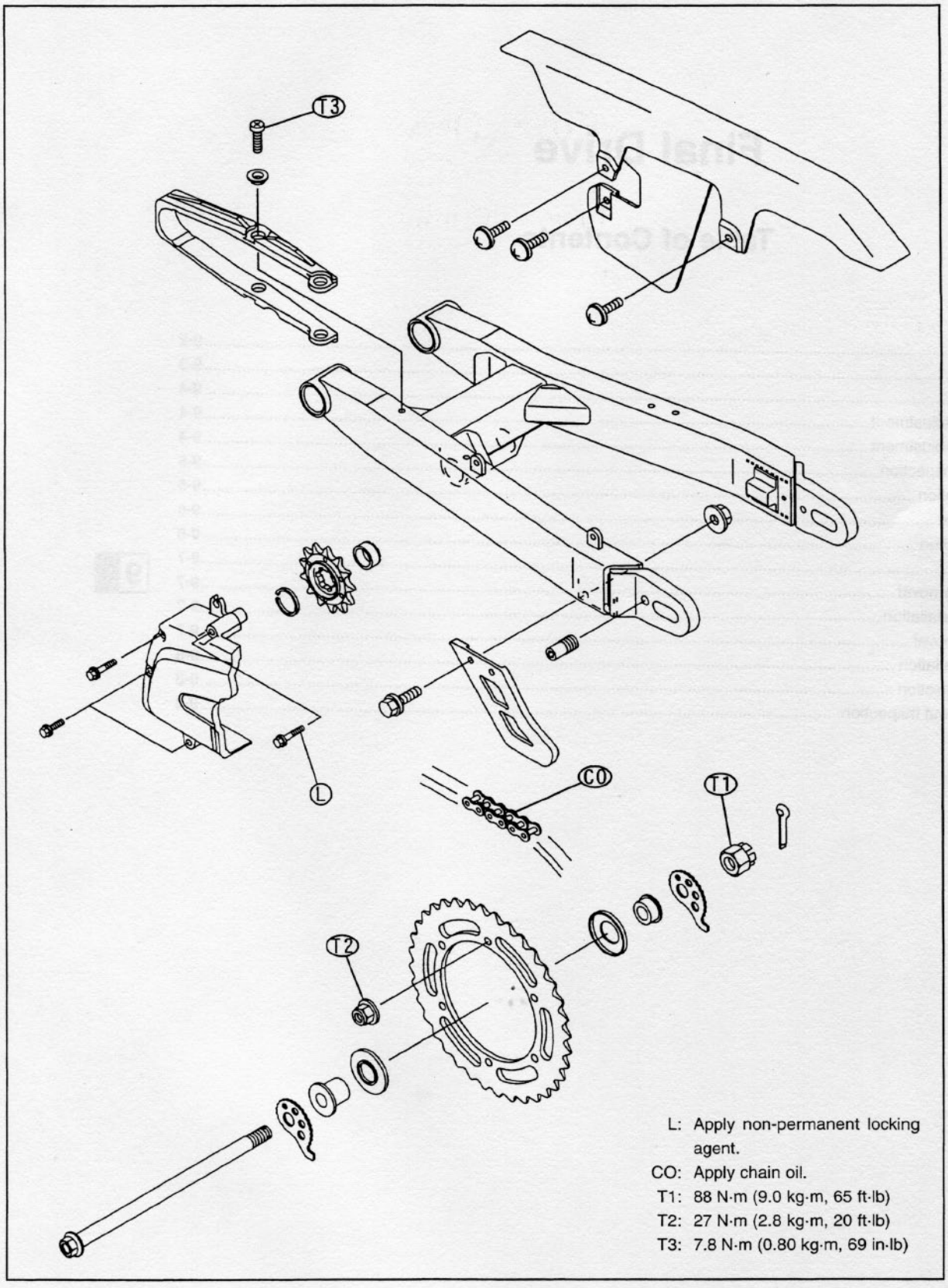
Exploded View

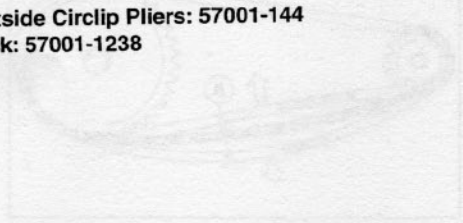


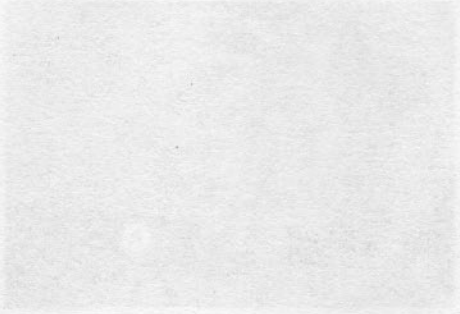
Specifications

Item	Standard	Service Limit
Drive		
Make	Enuma Chain	—
Type	EK520LV-0, Endless	—
	102 links	
Slack	35 ~ 55 mm (1.38 ~ 2.17 in.)	—
20 links length	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.72 in.)
Sprocket		
Rear sprocket warp	TIR 0.4 mm (0.0157 in.) or less	TIR 0.5 mm (0.0197 in.)

TIR: Total Indicator Readings

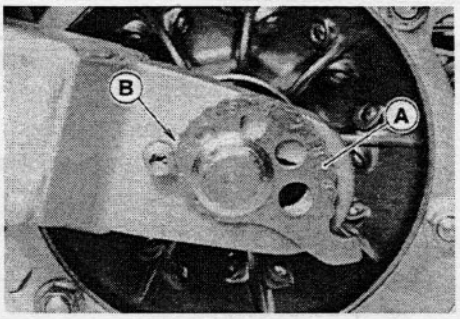
Special Tools - Outside Circlip Pliers: 57001-144
Jack: 57001-1238





Drive Chain

Drive Chain Slack Adjustment



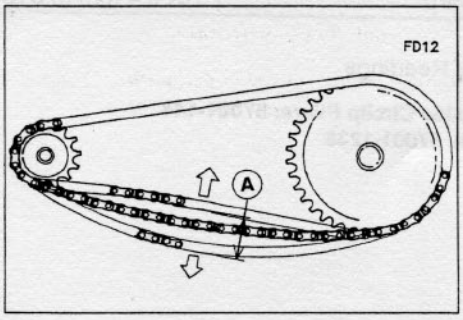
● Check to see that the alignment indicators [B] of the chain adjuster [A] on both sides are in the same relative position. If they are not, adjust the chain slack and align them.

⚠WARNING

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

NOTE

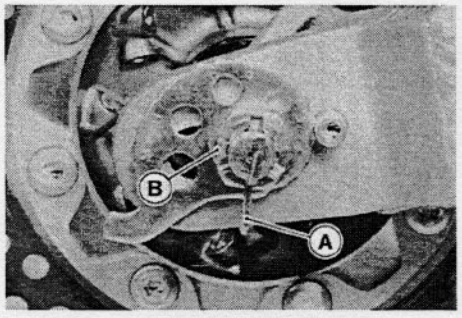
○ *Clean the drive chain if it is dirty, and lubricate it if it appears dry.*



● Set the motorcycle up on its side stand.
○ Rotate the rear wheel to find the position where the chain is tightest.
○ Measure the vertical movement (chain slack) [A] midway between the sprockets.
★ If the chain slack exceeds the standard, adjust it.

[Chain Slack]
Standard: 35 ~ 55 mm (1.38 ~ 2.17 in.)

Drive Chain Slack Adjustment



● Remove the cotter pin [A].
● Loosen the rear axle nut [B].
● Turn both adjusting nuts evenly until the drive chain has the standard amount of slack.
● Check to see that the adjusters on both sides are in the same relative position.

⚠WARNING

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

● While keeping the top of the chain taut, tighten the rear axle nut and the torque link nut.

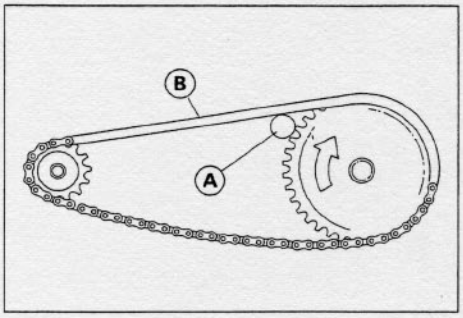
⚠WARNING

If the axle nut is not securely tightened, an unsafe riding condition may result.

Torque - Rear Axle Nut: 88 N·m (9.0 kg·m, 65 ft·lb)

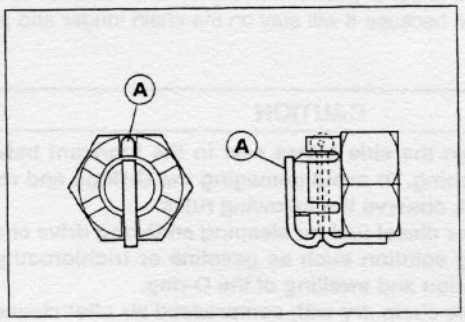
NOTE

○ *Insert a suitable stick or cloth [A] between the chain and sprocket and turn the wheel clockwise to stretch the upper chain [B] taut. This helps reduce the change in chain slack during the axle tightening.*



● Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

● Insert a new cotter pin [A] and bend it over the nut as shown.
● Check the rear brake effectiveness.



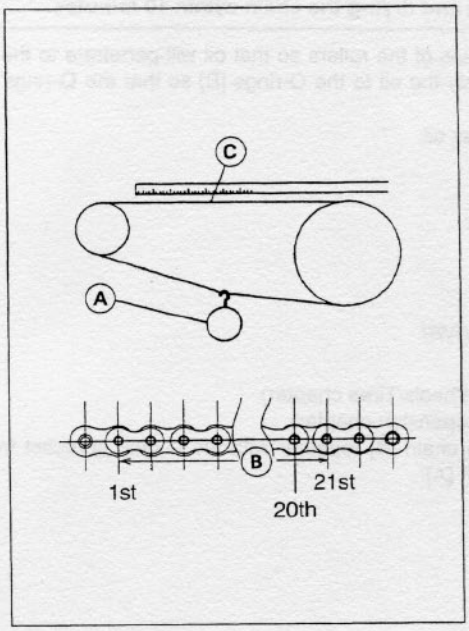
⚠WARNING

If you do not pump fully, disassemble and inspect the brake parts. Worn parts cause lock of the brake or loss of braking.

● Tighten the chain adjuster locknuts.

Drive Chain Wear Inspection

● Remove the chain cover.
● Turn the rear wheel to inspect the drive chain for damaged rollers, links, and loose pins.
★ If there is any irregularity, replace the drive chain.
★ Lubricate the drive chain if it appears dry.
● Stretch the chain taut by hanging a 10 kg (22 lb) weight [A] on the 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 any measurements exceed the service limit, make sure to replace the chain. Also replace the front and rear sprockets when the drive chain is replaced.



[Drive Chain - 20 link Length]
Standard: 317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)
Service Limit: 323 mm (12.72 in.)

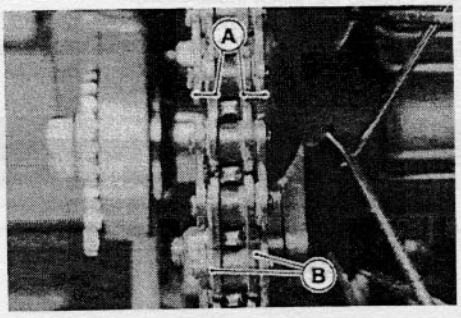
⚠WARNING

If the drive chain wear exceeds the service limit, replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could snag on the engine sprocket 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.

[Standard Chain]
Make: Enuma Chain
Type: Endless EK520LV-0
Links: 102 links

Drive Chain Lubrication

○ The chain should be lubricated with a lubricant which will both prevent the exterior from rusting and also absorb shock and reduce friction in the interior of the chain.
★ If the chain is especially dirty, it should be washed in diesel oil or kerosene, and afterward soaked in a heavy oil. Shake the chain while it is in the oil so that oil will penetrate to the inside of each roller.
● An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication.



★ If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication

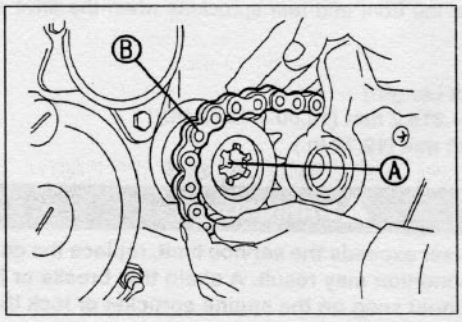
CAUTION

The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.
Use only kerosene or diesel fuel for cleaning an O-ring drive chain. Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-ring.
Immediately blow the chain dry with compressed air after cleaning.
Complete cleaning and drying the chain within 10 minutes.

- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings [B] so that the O-rings will be coated with oil [A].
- Wipe off any excess oil.

Drive Chain Removal

- Remove:
  Rear Wheel (see Wheels/Tires chapter)
  Swingarm (see Suspension chapter)
- Take out the drive chain [B] together with the engine sprocket from the engine output shaft [A].



Drive Chain Installation

⚠WARNING

For safety, use only the standard chain. The endless chain must not be cut for installation.

- Place the chain over the swingarm so that the swingarm enter in the chain.
- Install:
  Swingarm (see Suspension chapter)
  Rear Wheel (see Wheels/Tires chapter)
  Engine Sprocket (see Engine Sprocket Installation)
- Adjust the drive chain slack (see Drive Chain Slack Adjustment).
- Check the brake for good braking power, and no brake drag (see Brakes chapter).

⚠WARNING

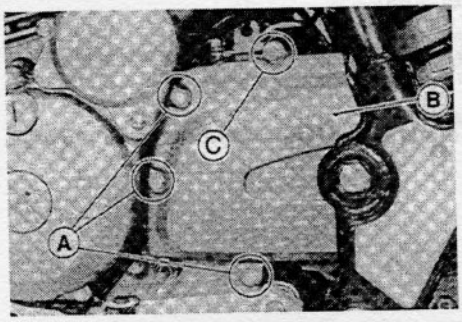
If you do not pump fully, disassemble and inspect the brake parts. Worn parts cause lock of the brake or loss of braking.

Sprocket

Engine Sprocket Removal

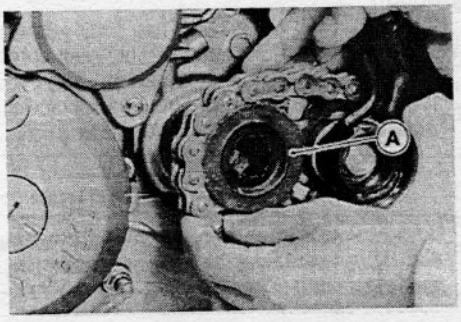
- Remove the bolts [A] and remove the engine sprocket cover [B].

  Engine Sprocket Top Bolt [C] : with non-permanent locking agent.



- Remove the circlip and remove the engine sprocket [A] together with the chain.

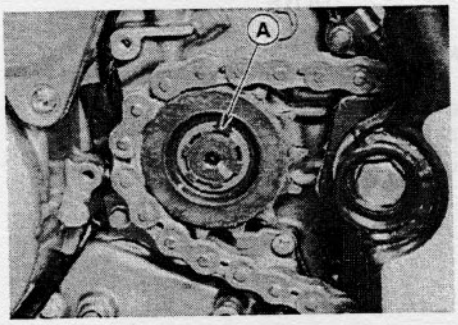
Special Tool - Outside Circlip Pliers: 57001-144



Engine Sprocket Installation

- Replace the circlip with a new one.
- Align the circlip opening with the spline groove [A].
- Apply non-permanent locking agent on engine sprocket top bolt.

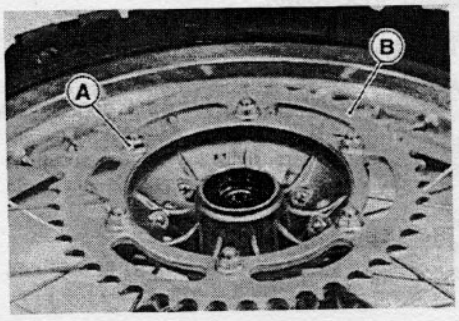
Special Tool - Outside Circlip Pliers: 57001-144



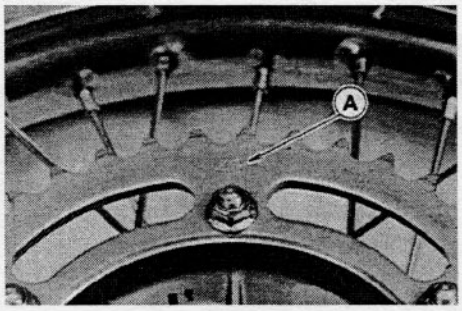
Rear Sprocket Removal

- Remove the rear wheel (see Wheels/Tires chapter).
- Remove the sprocket nut [A] and remove the rear sprocket [B].

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



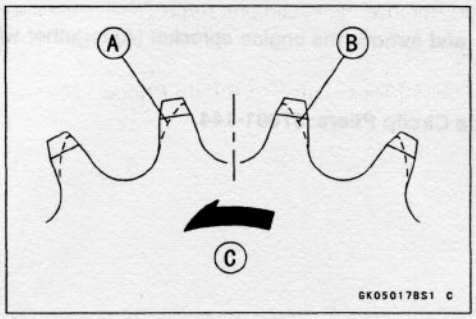
Rear Sprocket Installation



- Install the sprocket with the tooth number marking [A] outward.
- Tighten the rear sprocket.

Torque - Rear Sprocket Nut: 27 N·m (2.8 kg·m, 20 ft·lb)

Sprocket Wear Inspection



- Visually inspect the engine and rear sprocket teeth for uneven wear, abnormal wear, or damaged teeth.
- ★ If the teeth are worn or damaged, replace the sprockets, and inspect the drive chain (see Drive Chain Wear Inspection).

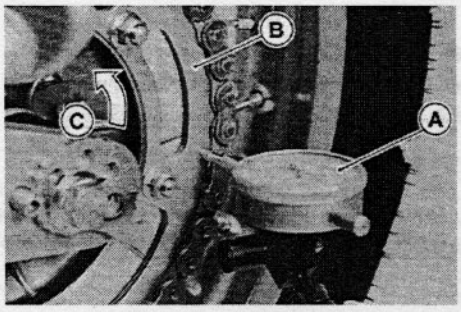
CAUTION
If a sprocket requires replacement, the drive chain is probably worn also. Upon replacing the rear sprocket, inspect the chain and engine sprocket.

NOTE

○ *Sprocket wear is exaggerated for illustration.*

Worn Tooth (engine sprocket) [A]
Worn Tooth (rear sprocket) [B]
Rotation Direction [C]

Rear Sprocket Runout Inspection



- Raise the rear wheel off the ground with a jack (see Wheels/Tires chapter).
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown.
- Turn [C] the rear wheel. The difference between the highest and lowest dial gauge readings is the amount of runout (warp).
- ★ If the runout exceeds the service limit, replace the rear sprocket.

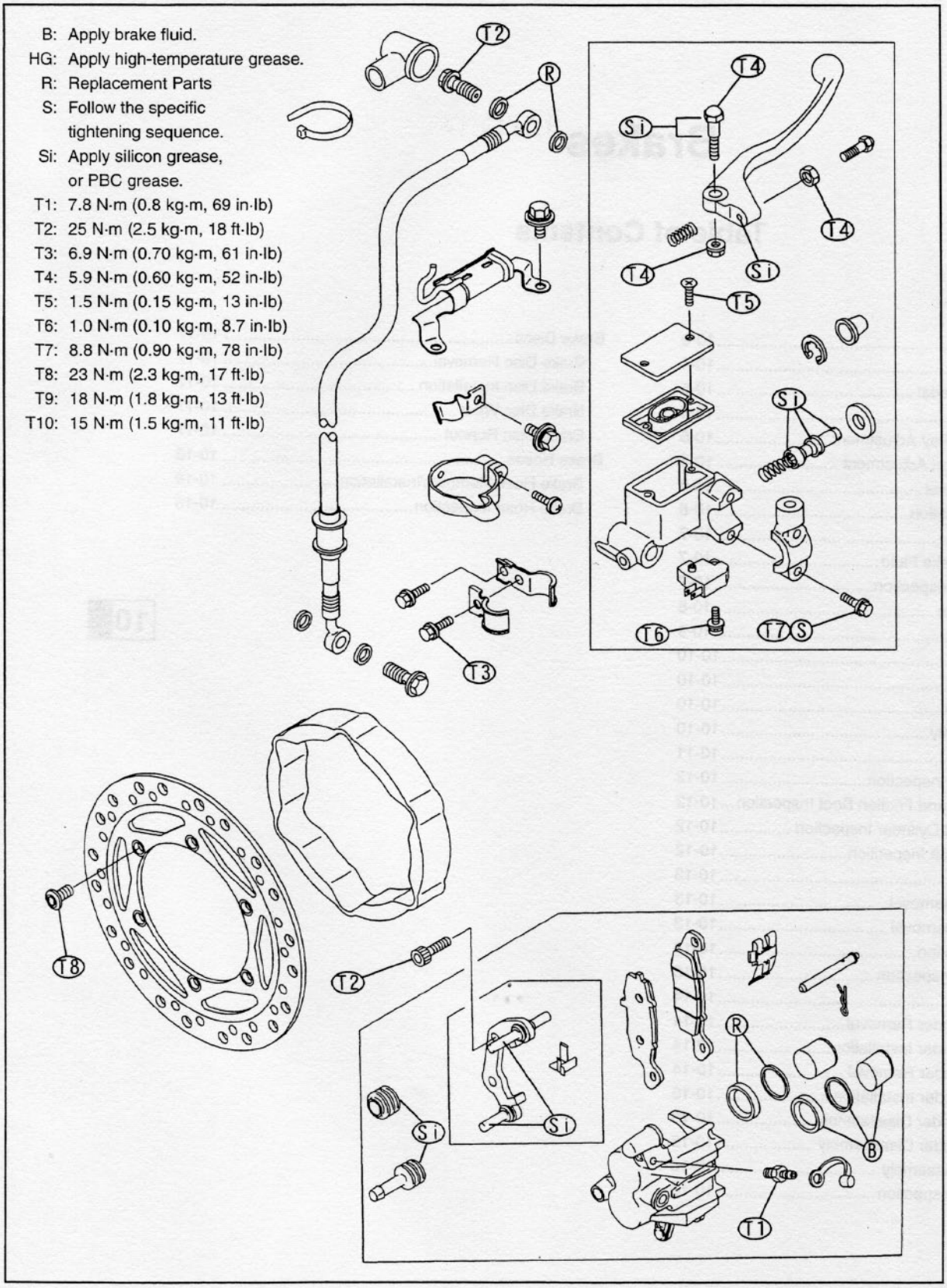
[Rear Sprocket Runout]
Standard: TIR 0.4 mm (0.0157 in.) or less
Service limit: TIR 0.5 mm (0.0197 in.)

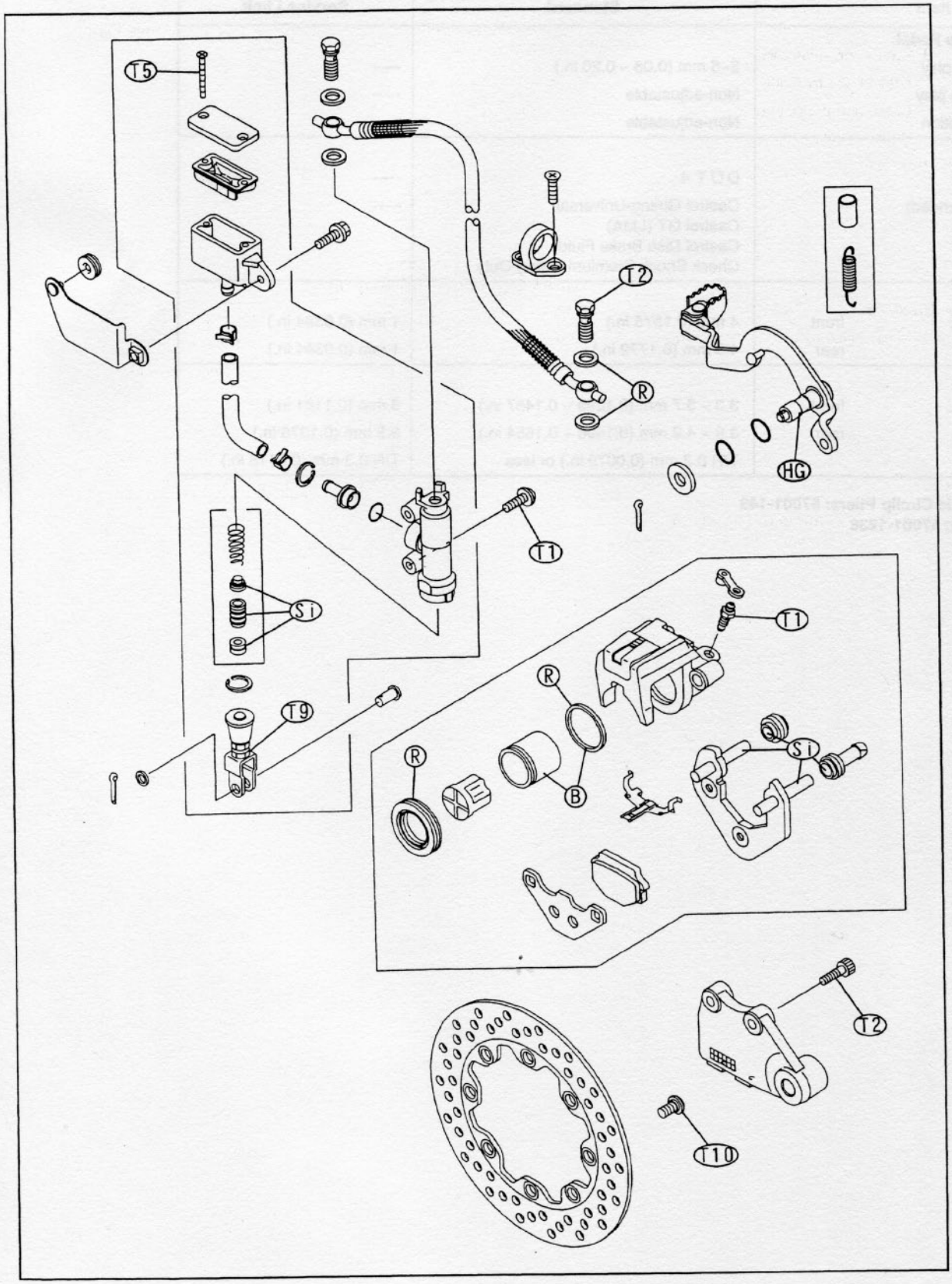
Brakes

Table of Contents

Exploded View

B: Apply brake fluid.
HG: Apply high-temperature grease.
R: Replacement Parts
S: Follow the specific tightening sequence.
Si: Apply silicon grease, or PBC grease.
T1: 7.8 N·m (0.8 kg·m, 69 in·lb)
T2: 25 N·m (2.5 kg·m, 18 ft·lb)
T3: 6.9 N·m (0.70 kg·m, 61 in·lb)
T4: 5.9 N·m (0.60 kg·m, 52 in·lb)
T5: 1.5 N·m (0.15 kg·m, 13 in·lb)
T6: 1.0 N·m (0.10 kg·m, 8.7 in·lb)
T7: 8.8 N·m (0.90 kg·m, 78 in·lb)
T8: 23 N·m (2.3 kg·m, 17 ft·lb)
T9: 18 N·m (1.8 kg·m, 13 ft·lb)
T10: 15 N·m (1.5 kg·m, 11 ft·lb)




T5
T2
R
HG
T1
Si
T9
T1
R
R
B
Si
T2
T10

Specifications

Item		Standard	Service Limit
Brake Lever, Brake Pedal:			
Brake lever free play		2~5 mm (0.08 ~ 0.20 in.)	—
Brake pedal free play		Non-adjustable	—
Brake pedal position		Non-adjustable	—
Brake Fluid:			
Type		DOT 4	—
Brand (recommended)		Castrol Girling-Universal Castrol GT (LMA) Castrol Disc Brake Fluid Check Shock Premium Heavy Duty	—
Brake Pads:			
Lining thickness:	front	4 mm (0.1575 in.)	1 mm (0.0394 in.)
	rear	4.5 mm (0.1772 in.)	1 mm (0.0394 in.)
Brake Discs:			
Disc thickness:	front	3.3 ~ 3.7 mm (0.1299 ~ 0.1457 in.)	3 mm (0.1181 in.)
	rear	3.8 ~ 4.2 mm (0.1496 ~ 0.1654 in.)	3.5 mm (0.1378 in.)
Disc runout		TIR 0.2 mm (0.0079 in.) or less	TIR 0.3 mm (0.0118 in.)

Special Tools - Inside Circlip Pliers: 57001-143
Jack: 57001-1238

Brake Lever, Brake Pedal

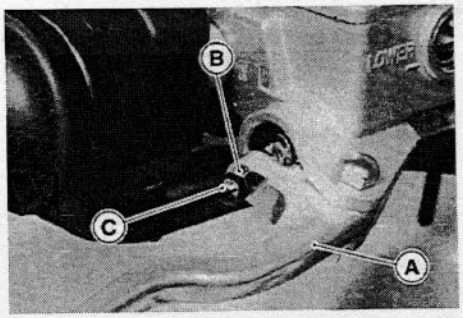
Brake Adjustment

○ It is unnecessary to perform adjustments other than the brake lever free play and the brake pedal position because when the disc and disc pads wear, the clearance between them is adjusted automatically.

⚠WARNING

If the front brake feels soft or spongy upon application, bleed the brake line (see Brake Bleeding).

Brake Lever Free Play Adjustment



● Adjust the brake lever [A] free play within specified range according to the rider's preference.
○ Loosen the lock nut [B] and turn the adjuster [C] to either side.
○ After the adjustment, tighten the lock nut against the lever.

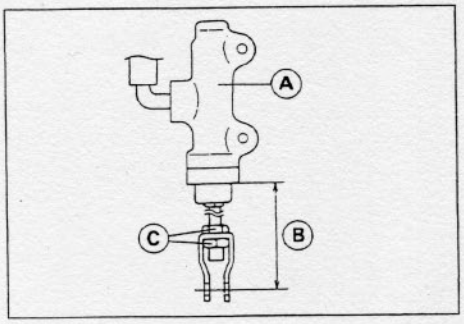
Lever Free Play Standard : 2~5 mm (0.08 ~ 0.20 in.)

Torque - Brake Lever Adjuster Lock Nut: 5.9 N·m (0.60 kg·m, 52 in·lb)

⚠WARNING

Be sure to adjust the lever free play to an appropriate amount. If it is improperly adjusted, it could cause the brake to drag and overheat, and may result in an unsafe riding condition.

Brake Pedal Position Adjustment



The brake pedal position and pedal play should not be adjusted. There is no pedal position adjustment device installed.

NOTE

○ *Usually it is not necessary to adjust the push rod length, but adjust it when the rear master cylinder [A] is disassembled.*

● When the brake pedal is in its rest position, measure the length [B] indicated in the figure.

Length Standard: 52 mm (2.05 in.)

★ If the length [B] is not within the specified length, loosen the locknuts [C], and adjust the length.
● Tighten the locknuts.

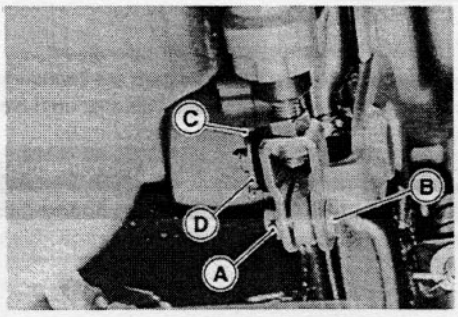
Torque - Rear Brake Push Rod Locknut: 18 N·m (1.8 kg·m, 13 ft·lb)

NOTE

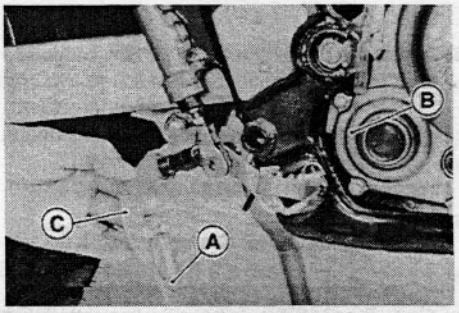
○ *If the pedal position cannot be adjusted, the brake pedal might be deformed or it is improperly installed.*

Brake Pedal Removal

- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Pedal Shaft Cotter Pin [C]
  Washer [D]



- Remove the top of the return spring [A] and the bottom of the rear brake light switch spring [B] to remove the brake pedal [C].



Brake Pedal Installation

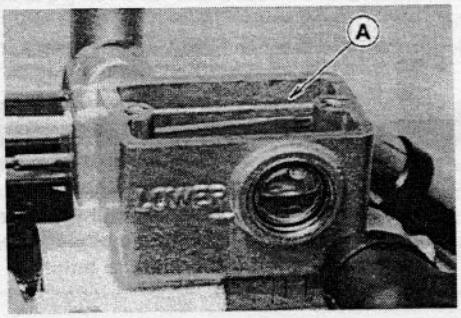
- Apply high-temperature grease to the pedal shaft, make sure that the O-rings are installed on both sides, and install the pedal.
- Hook the bottom of the rear brake light switch spring and of the return spring to the pedal.
- Insert a new cotter pin into the joint pin and bend the end of the cotter pin.
- Check brake pedal position (see Pedal Position Adjustment).
- Check rear brake light switch ON timing (see Electrical System chapter).

Brake Fluid

⚠WARNING

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

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



Recommended Brake Fluid

The recommended brake fluid (for factory use and for replenishment) is indicated below. If a brake fluid other than the recommended fluid must be used, use only the type that complies with the DOT-4 standard.

[Brake Fluid]

Recommended Brake Fluid: Castrol Girling-Universal
Castrol GT (LMA)
Castrol Disc Brake Fluid
Check Shock Premium Heavy Duty

Type: DOT-4

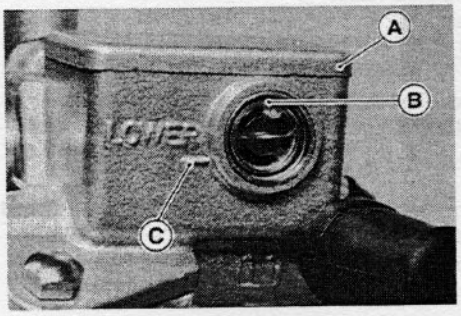
Brake Fluid Level Inspection

● Cheek that the brake fluid level in the front brake reservoir [A] is between the upper [B] and the lower [C] level lines.

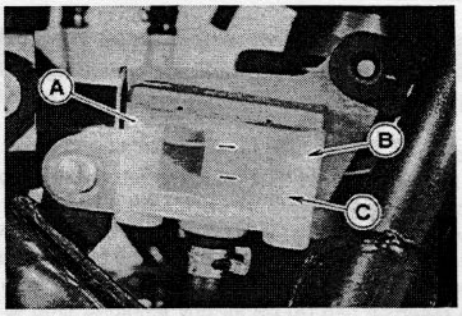
NOTE

○ *Hold the reservoir parallel to the ground by turning the handlebar when checking brake fluid level.*

★ If the fluid level is lower than the lower level line, fill the reservoir to the upper level line.



● Check that the brake fluid level in the rear brake reservoir [A] is between the upper [B] and the lower [C] level lines.
★ If the fluid level is lower than the lower level line, fill the reservoir to the upper level line.



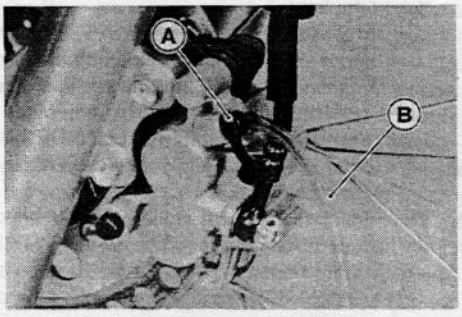
⚠WARNING

Do not mix two brands of fluid. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter.

Brake Fluid Change

NOTE

○ *Although the instructions given below are for the front brake, the same procedure applies also to the rear brake.*

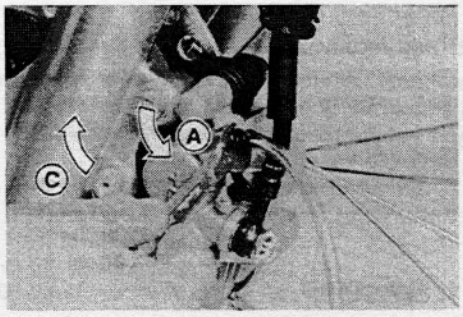


● Level the brake fluid reservoir.
● Remove the reservoir cap.
● Remove the rubber cap from the bleed valve [A] on the caliper.
● Attach a clear plastic hose [B] to the bleed valve of the caliper, and run the other end of the hose into a suitable container.
● Fill the reservoir with fresh brake fluid.

NOTE

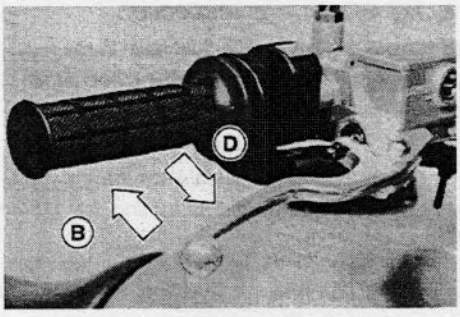
○ *The fluid level must be checked often during the changing operation and replenished with specified brake fluid to the upper level line. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.*

● Repeat the operation described below until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.
○ Open the bleed valve [A].
○ Pump the brake lever several times and hold it [B].
○ Close the bleed valve [C] while holding the brake lever.
○ Release the brake lever [D].



● Remove the clear plastic hose.
● Install the reservoir cap.
● Tighten the bleed valve, and install the rubber cap.

Torque - Caliper Bleed Valve: 7.8 N·m (0.80 kg·m, 69 in·lb)
Front and Rear Brake Reservoir Cap Screws: 1.5 N·m (0.15 kg·m, 13 in·lb)



● After changing the fluid, check the brake for fluid level, good braking power, no brake drag, and no fluid leakage.
★ Bleed the air from the lines, if necessary.

Brake Bleeding

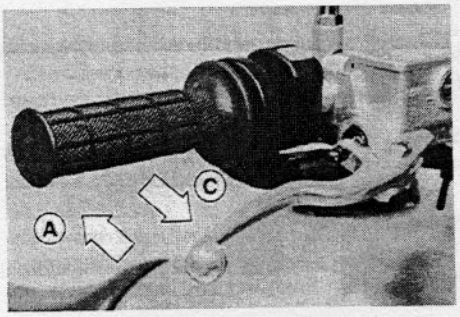
NOTE

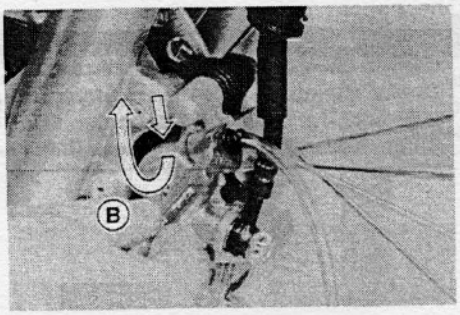
○ *Although the instructions given below are for the front brake, the same procedure applies also to the rear brake.*

⚠WARNING

Be sure to bleed the air from the brake line whenever brake lever 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.

- Remove the reservoir cap, and fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- With the reservoir cap off, slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.
- ○ Bleed the air completely from the master cylinder by this operation.
- Install the reservoir cap.
- Remove the rubber cap from the bleed valve on the caliper.
- Attach a clear plastic hose to the caliper bleed valve, and run the other end of the hose into a suitable container.
- Repeat this operation described below until no more air can be seen coming out into the plastic hose.
- ○ Pump the brake lever until it becomes hard, and pull the brake lever and hold it [A].
- ○ Quickly open and close [B] the bleed valve while holding the brake lever.
- ○ Release the brake lever [C].





NOTE

○ *The fluid level must be checked often during the bleeding operation and replenished with specified brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

○ *Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*

- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.
- Install the reservoir cap.

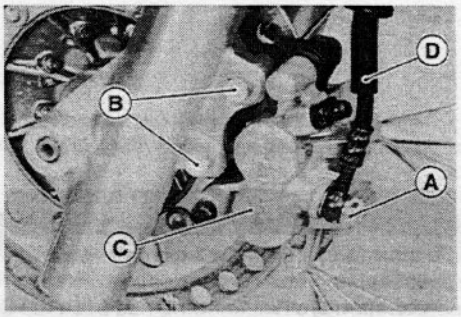
Torque - Caliper Bleed Valve: 7.8 N·m (0.8 kg·m, 69 in·lb)
Front and Rear Brake Reservoir Cap Screws: 1.5 N·m (0.15 kg·m, 13 in·lb)

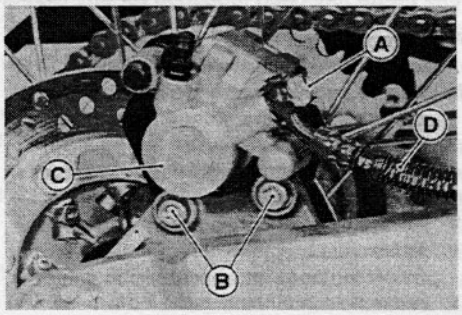
- After bleeding is done, check the brake for fluid level, good braking power, no brake drag, and no fluid leakage.

Calipers

Caliper Removal

- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper (see Brake Hose Removal/Installation).





CAUTION

Brake fluid quickly ruins painted or plastic surfaces, any spilled fluid should be completely wiped up immediately with wet cloth.

NOTE

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

Caliper Installation

- Install the caliper and brake hose lower end.
- ○ Replace the washers that are on each side of hose fitting with new ones.
- Tighten the caliper mounting bolts and banjo bolt.

Torque - Caliper Mounting Bolts: 25 N·m (2.5 kg·m, 18.0 ft·lb)
Brake Hose Banjo Bolt: 25 N·m (2.5 kg·m, 18 ft·lb)

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

⚠ WARNING

Do not attempt to drive the motorcycle until you pump 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.

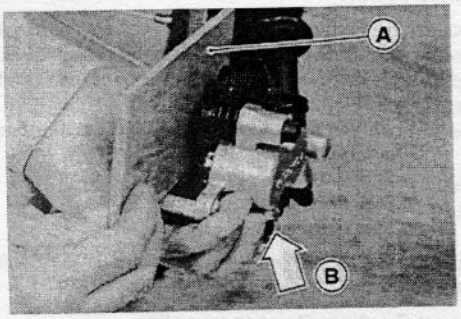
Caliper Disassembly

- Remove:
  Caliper (see Caliper Removal)
  Pad and spring (see Front or Rear Brake Pad Removal)
- Using compressed air, remove the pistons.

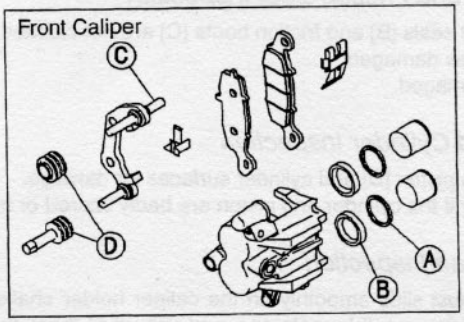
⚠ WARNING

To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

○ Insert a wooden board [A] 5 mm (0.20 in.) thick inside the caliper opening.
○ Apply compressed air [B] into the banjo bolt hole to allow the piston to protrude and stop at the wooden board.
○ Remove the wooden board and pull out the piston by hand.
★ If compressed air is unavailable, while the brake hose is still attached, apply the brake lever (or pedal) to remove the piston. The remaining operation is the same as above.



● Remove:
Dust Seal [A]
Fluid Seal (piston seal) [B]
Caliper Holder [C]
Friction Boot [D]
Bleed Valve



CAUTION
Immediately wash away any brake fluid that spills.

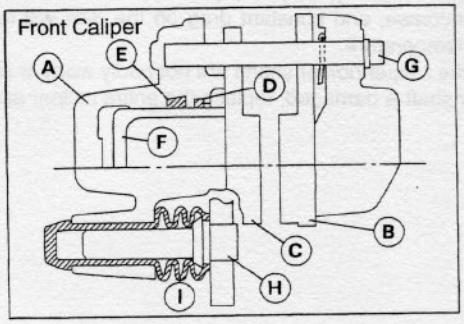
Caliper Assembly

● Clean the caliper parts except for the pads [B, C].

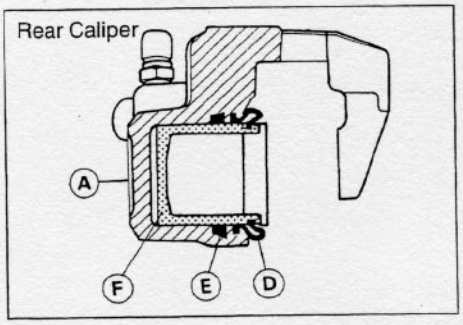
CAUTION
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

● Install the bleed valve and the rubber cap.

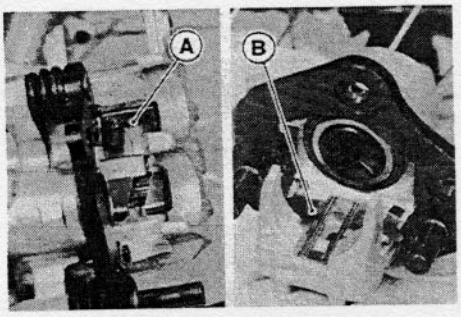
Torque - Caliper Bleed Valve: 7.8 N·m (0.80 kg·m, 69 in·lb)



● Replace the fluid seal [E] with a new one.
○ Apply brake fluid to the fluid seal, and install it into the caliper [A] by hand.
● Replace the dust seal [D] with a new one if it is damaged.
● Apply brake fluid to the dust seal, and install it into the caliper [A] by hand.
● Apply brake fluid to the inside of the cylinder and outside of the piston, and push the piston [F] into the cylinder by hand.
● Replace the caliper holder shaft rubber friction boots [I] if they are damaged.
● Apply a thin coat of silicone grease to the caliper holder shafts [H] and holder holes (Silicone grease is a special high temperature, water-resistance grease).
Pad Mounting Bolts [G]



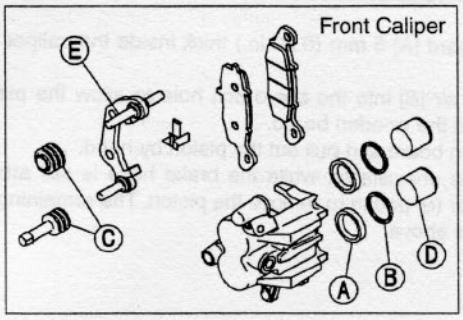
● Install the anti-rattle pad spring.
Front Caliper Anti-Rattle Pad Spring [A]
Rear Caliper Anti-Rattle Pad Spring [B]
● Install the pads (see Brake Pad Installation).
● Wipe up any spilled brake fluid on the caliper with wet cloth.



Caliper Fluid Seal Inspection

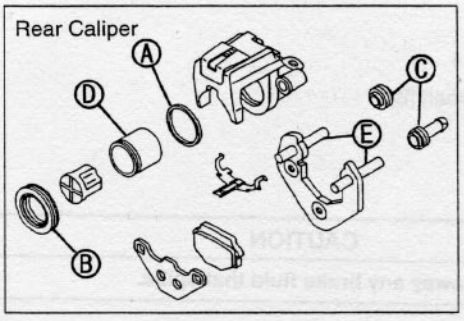
The fluid seal [A] around the piston should maintain the proper pad/disc clearance. If the seal is not satisfactory, pad wear will increase, brake fluid will leak around the pad as well, and constant pad drag on the disc will raise both temperatures of brakes and brake fluid.

● Replace the fluid seal if it exhibits any of the conditions listed below.
○ Fluid seal damaged.
○ Fluid seal deteriorated.
○ Fluid seal deformed.
○ Fluid seal worm.
★ If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are replaced.



Caliper Dust Seal and Friction Boot Inspection

● Check that the dust seals [B] and friction boots [C] are not cracked, worn, swollen, or otherwise damaged.
● Replace them if damaged.



Caliper Piston and Cylinder Inspection

● Visually inspect the piston [D] and cylinder surfaces for damage.
★ Replace the caliper if the cylinder and piston are badly scored or rusty.

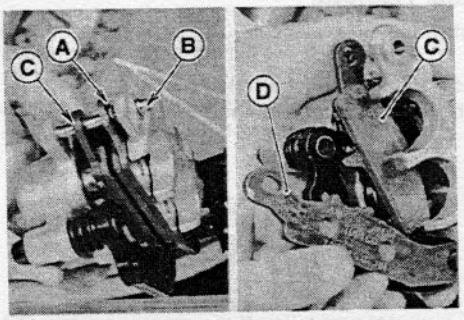
Caliper Holder Shaft Inspection

The caliper body must slide smoothly on the caliper holder shafts [E]. If the body does not slide smoothly, only one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise the brake and brake fluid temperature.

● Check to see that the caliper holder shafts are not badly worn or stepped.
★ If the caliper holder shaft is damaged, replace the entire caliper assembly.

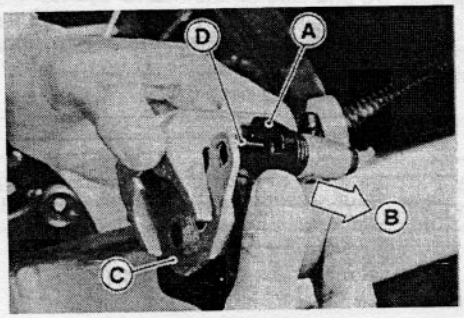
Brake Pad

Front Brake Pad Removal



- Remove the caliper with the hose attached (see Caliper Removal).
- Remove:
  Clip [A]
  Pad Pin [B]
  Piston Side Pad [C]
- Remove the pad [D] from the opposite side.

Rear Brake Pad Removal



- Remove the caliper with the hose attached (see Caliper Removal).
- Remove the piston side pad from the caliper holder.
- Push [B] the caliper holder [A] towards the piston, and remove the pad [C] from the caliper holder shaft [D].

Brake Pad Installation

- Before installation, clean the pads with a high-flash point solvent.
- Push the caliper pistons in by hand as far as they will go.
- Be sure to install the pad pin clip in the front caliper.

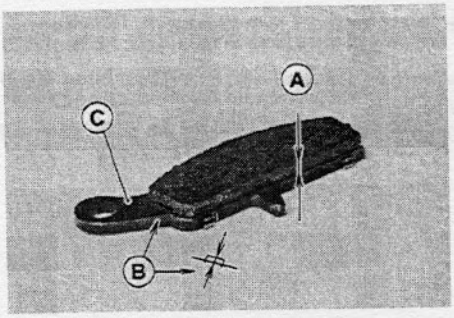
⚠ WARNING

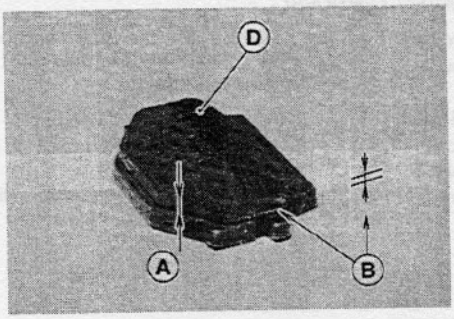
Do not attempt to drive the motorcycle until you pump the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

Brake Pad Wear Inspection

In accordance with the Periodic Maintenance Chart, inspect the brake pads for wear.

- Remove the pads.
- 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.
  Front Brake Pad [C]
  Rear Brake Pad [D]



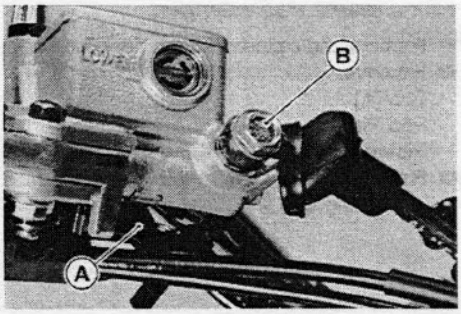


[Brake Pad Thickness]
Standard: Front: 4 mm (0.1575 in.)
Rear: 4.5 mm (0.1772 in.)
Service Limit: 1 mm (0.0394 in.)

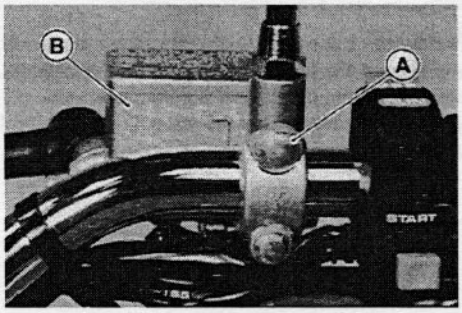
Master Cylinder

Front Master Cylinder Removal

- Remove the brake fluid from the reservoir with a syringe or other suitable device.
- Disconnect the front brake light switch connectors [A].
- Remove the banjo bolt [B] to disconnect the brake hose from the master cylinder.



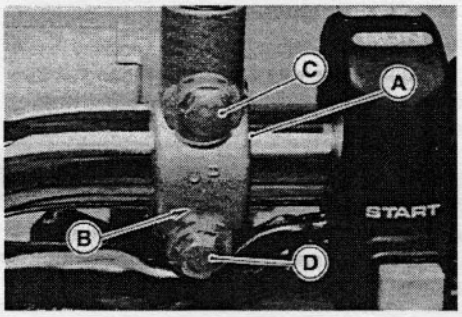
- Unscrew the clamp bolts [A] and take off the master cylinder [B] as an assembly with the reservoir, brake lever, and brake switch installed.
- ○ When removing the master cylinder take care not to spill the brake fluid on the painted or plastic parts.



CAUTION
Brake fluid quickly ruins painted or plastic surfaces; any spilled fluid should be completely wiped up immediately with wet cloth.

Front Master Cylinder Installation

- Set the master cylinder to match its mating face to the punch mark [A] of the handlebar.
- The master cylinder clamp must be installed with the arrow mark [B] faced upward.
- Tighten the upper clamp bolt first [C], and then the lower clamp bolt [D]. There will be a gap at the lower part of the clamp after tightening.



Torque - Front Master Cylinder Clamp Bolt: 8.8 N·m (0.9 kg·m, 78 in·lb)

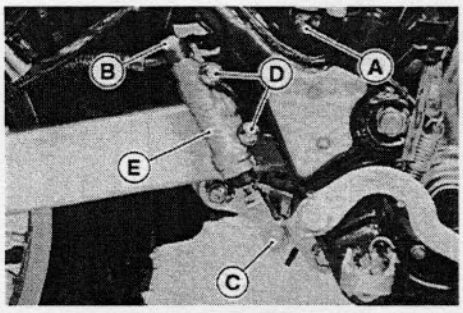
- Use a new flat washer on each side of the brake hose fitting.
- Tighten the brake hose banjo bolt.

Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kg·m, 18 ft·lb)

- Fill the reservoir with fresh specified brake fluid and bleed the brake line (see Brake Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Rear Master Cylinder Removal

- Remove the brake fluid from the reservoir and the reservoir hose with a syringe or other suitable device.
- Remove:
  Reservoir Hose Bottom [A]
  Brake Hose Banjo Bolt [B]
  Cotter Pin and Joint Pin [C]
- Remove the mounting bolts [D], and remove the rear master cylinder [E].



Rear Master Cylinder Installation

- Replace the cotter pin and the flat washers on each side of the brake hose fitting with new ones.
- Tighten the brake hose banjo bolt and rear master cylinder mounting screw.

Torque - Rear Master Cylinder Mounting Screw:
7.8 N·m (0.8 kg·m, 69 in·lb)
Brake Hose Banjo Bolt: 25 N·m (2.5 kg·m, 18 ft·lb)

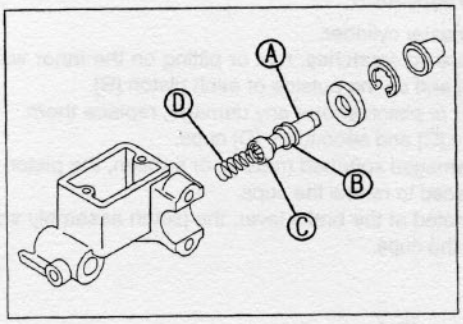
- Fill the reservoir with fresh specified brake fluid and bleed the brake line (see Brake Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Front Master Cylinder Disassembly

- Remove the master cylinder.
- Remove the reservoir cap and diaphragm.
- Unscrew the locknut and pivot bolt, and remove the brake lever.
- Pull the dust cover out of place, and remove the circlip.

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the piston [A], secondary cup [B], primary cup [C], and the return spring [D].



CAUTION

Do not remove the primary or the secondary cup from the piston since removal will damage it.

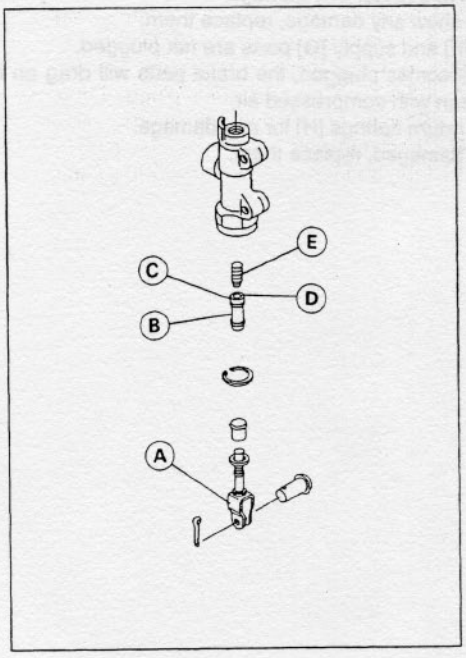
Rear Master Cylinder Disassembly

NOTE

○ *The rear master cylinder can be disassembled without removing the push rod bracket [A] at the bottom.*

- Remove the rear master cylinder.
- Slide out the dust cover and remove the circlip.
- Pull the push rod out with the piston [B].
- Take the secondary cup [C], primary cup [D] and return spring [E].

Special Tool - Inside Circlip Pliers: 57001-143



CAUTION

Do not remove the primary or the secondary cup from the piston since removal will damage it.

Master Cylinder Assembly

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

CAUTION

Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

- 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.
- Apply a little silicone grease to the following points.

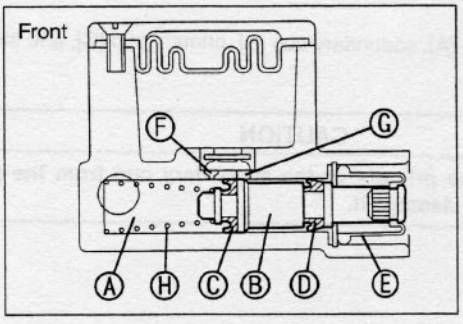
Silicone Grease - Brake Lever Pivot Bolt
Brake Lever Pivot Contact
Push Rod Contact
Dust Cover

- Tighten the brake lever pivot and the locknut.

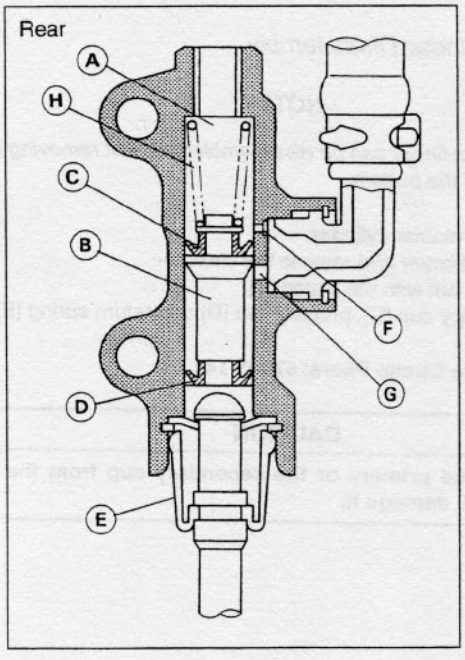
Torque - Brake Lever Pivot Bolt: 5.9 N·m (0.60 kg·m, 52 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kg·m, 52 in·lb)

Master Cylinder Inspection

- Disassemble the master cylinder.
- Check that there are no scratches, rust or pitting on the inner wall of the 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 softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.
- ★ If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.



- Check the dust covers [E] for any damage.
- ★ If the dust covers show any damage, replace them.
- Check that relief [F] and supply [G] ports are not plugged.
- ★ If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.
- Check the piston return springs [H] for any damage.
- ★ If the springs are damaged, replace them.



Brake Discs

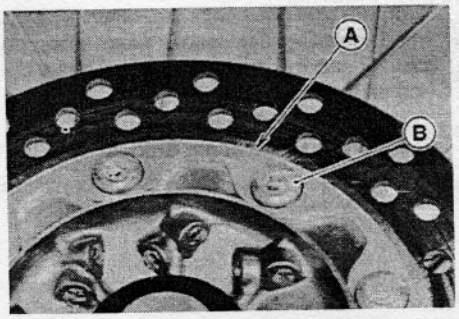
Brake Disc Removal

- Remove the wheel (see Wheels/Tires chapter).
- Unscrew the disc bolts, and take off the disc.

Brake Disc Installation

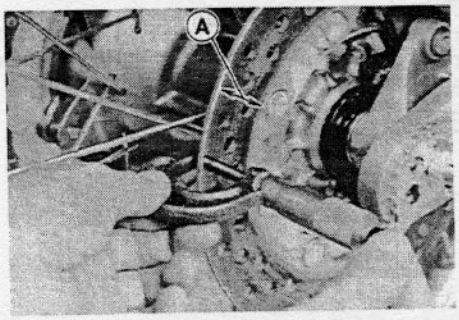
- Install the brake disc on the wheel so that the side with the wear thickness limit mark [A] faces outward.
- Tighten the disc bolts [B].

Torque - Front Disc Bolt: 23 N·m (2.3 kg·m, 17 ft·lb)
Rear Disc Bolt: 15 N·m (1.5 kg·m, 11 ft·lb)



Brake Disc Wear

- Visually inspect the disc.
- ★ Replace the disc if it shows any damage or crack.
- Measure the thickness of the disc sliding surface [A].
- ★ Replace the disc if the sliding surface has worn exceeding the service limit.



[Brake Disc Thickness]

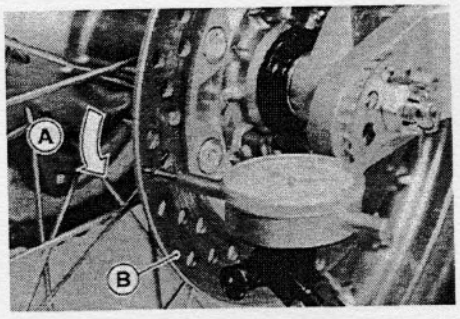
	Front	Rear
Standard:	**3.3 ~ 3.7 mm (0.1299 ~ 0.1457 in.)**	**3.8 ~ 4.2 mm (0.1496 ~ 0.1654 in.)**
Service Limit:	**3 mm (0.1181 in.)**	**3.5 mm (0.1378 in.)**

Brake Disc Runout

- Raise the wheel (see Wheels/Tires chapter).
- ○ To check the front disc, raise the front wheel and turn the handlebar fully to either right or left.

Special Tool - Jack: 57001-1238

- Set up a dial gauge perpendicular to the disc surface.
- Slowly turn [A] the wheel by hand and measure the disc [B] runout. The measurement should be taken 5 mm inside from the outer perimeter.
- ★ Replace the disc if it has worn exceeding the service limit.

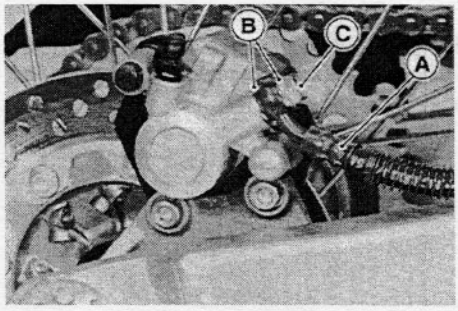


[Brake Disc Runout]
Standard: TIR 0.2 mm (0.0079 in.) or less
Service Limit: TIR 0.3 mm (0.0118 in.)

TIR: Total Indicator Readings

Brake Hoses

Brake Hose Removal/Installation



CAUTION
Brake fluid quickly ruins painted or plastic surfaces; any spilled fluid should be completely wiped up immediately with wet cloth.

- When removing the brake hose, take care not to spill the brake fluid on the painted or plastic parts.
- When removing the brake hose [A], temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
- There are washers [B] on each side of the brake hose fitting. Replace them with new ones when installing.
- When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses properly (see General Information chapter).
- Tighten the banjo bolt [C].

Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kg·m, 18 ft·lb)

- Bleed the brake line after installing the brake hose (see Brake Bleeding).

Brake Hose Inspection

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★ Replace it if any cracks or bulges are noticed.

Suspension

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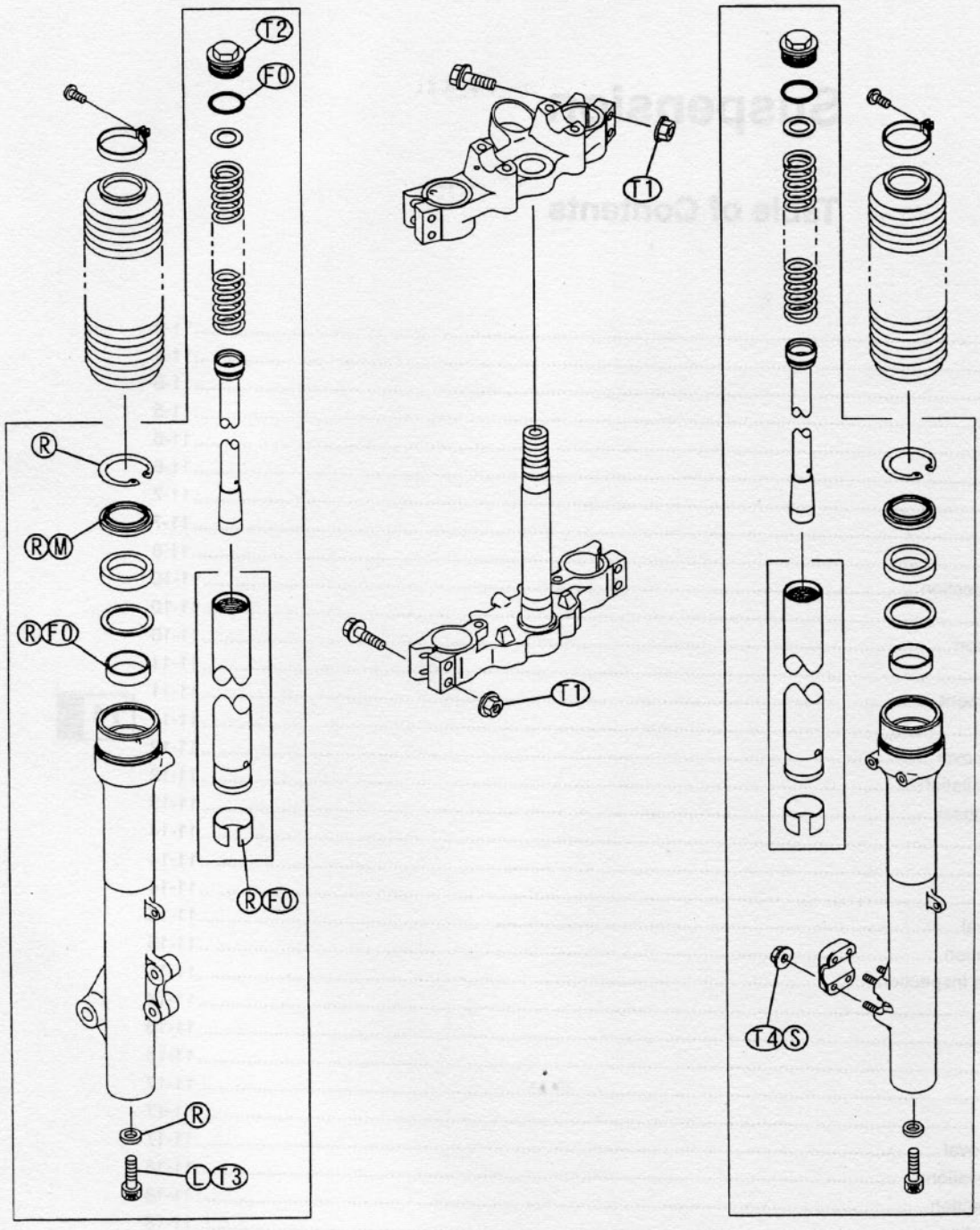
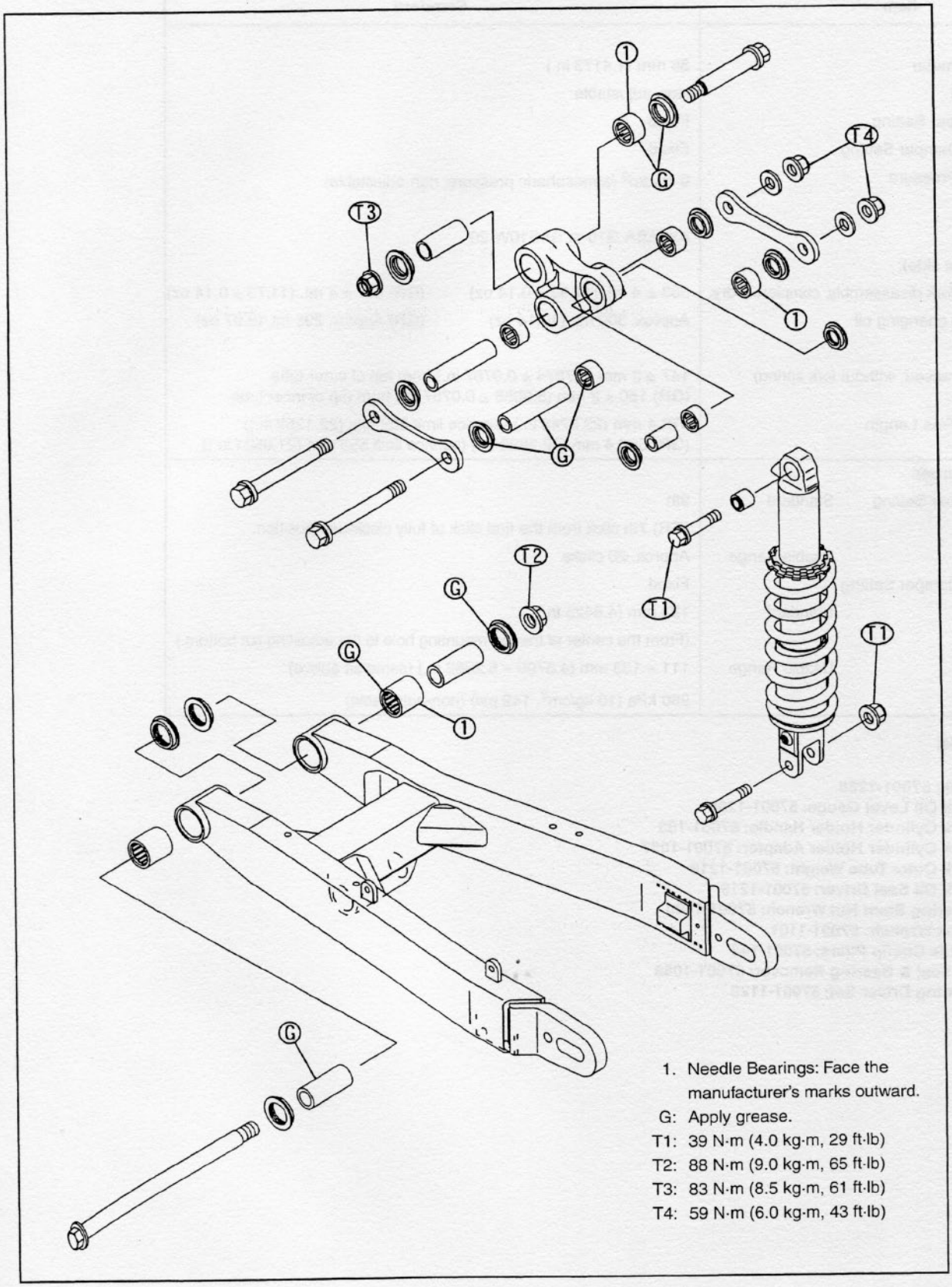
Exploded View



FO: Apply fork oil.
L: Apply non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement parts
S: Follow the specific tightening sequence.

T1: 21 N·m (2.1 kg·m, 15 ft·lb)
T2: 22 N·m (2.2 kg·m, 16 ft·lb)
T3: 30 N·m (3.0 kg·m, 22 ft·lb)
T4: 9.3 N·m (0.95 kg·m, 82 in·lb)



1. Needle Bearings: Face the manufacturer's marks outward.

G: Apply grease.

T1: 39 N·m (4.0 kg·m, 29 ft·lb)

T2: 88 N·m (9.0 kg·m, 65 ft·lb)

T3: 83 N·m (8.5 kg·m, 61 ft·lb)

T4: 59 N·m (6.0 kg·m, 43 ft·lb)

Specifications

Item		Standard	
Front Fork			
Inner Tube Diameter		36 mm (1.4173 in.)	
Spring Preload		Non-adjustable	
Rebound Damper Setting		Fixed	
Compression Damper Setting		Fixed	
Front Fork Air Pressure		0 kg/cm^2 (atmospheric pressure; non-adjustable)	
Front Fork Oil:			
Viscosity		KAYABA G10 or SAE10W-20	
Capacity (one side):			
After fork disassembly, completely dry		353 ± 4 mL (11.93 ± 0.14 oz)	(GR) 347 ± 4 mL (11.73 ± 0.14 oz)
When changing oil		Approx. 300 mL (10.14 oz)	(GR) Approx. 295 mL (9.97 oz)
Oil Level			
(fully compressed, without fork spring)		147 ± 2 mm (5.7874 ± 0.0787 in.) from top of inner tube (GR) 150 ± 2 mm (5.9055 ± 0.0787 in.) from top of inner tube	
Fork Spring Free Length		573.4 mm (22.5748 in.) (service limit 562 mm (22.1259 in.)) (GR) 566.4 mm (22.2992 in.) (service limit 555 mm (21.8504 in.))	
Rear Shock Absorber			
Rebound Damper Setting	Standard	9th (GR) 7th click from the first click of fully clockwise position.	
	Usable Range	Approx. 20 clicks	
Compression Damper Setting		Fixed	
Spring Preload	Standard	123 mm (4.8425 in.) (From the center of the top mounting hole to the adjusting nut bottom.)	
	Usable Range	111 ~ 133 mm (4.3700 ~ 5.2362 in.) (same as above)	
Gas Pressure		980 kPa (10 kg/cm^2, 142 psi) (non-adjustable)	

(GR) : Greek Model

Special Tools - Jack: 57001-1238
Fork Oil Level Gauge: 57001-1290
Fork Cylinder Holder Handle: 57001-183
Fork Cylinder Holder Adapter: 57001-1057
Fork Outer Tube Weight: 57001-1218
Fork Oil Seal Driver: 57001-1219
Steering Stem Nut Wrench: 57001-1100
Hook Wrench: 57001-1101
Inside Circlip Pliers: 57001-143
Oil Seal & Bearing Remover: 57001-1058
Bearing Driver Set: 57001-1129

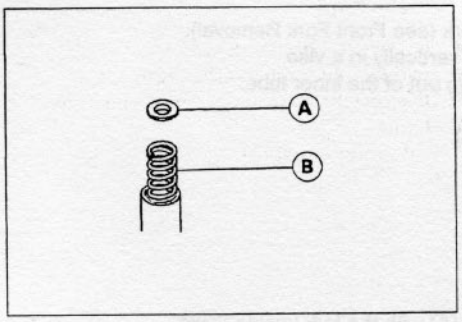
Front Fork

Oil Level Adjustment

- Using a jack (special tool), raise the front wheel (see Tires/Wheels chapter).
- Remove the handlebar (see Steering chapter).
- Loosen the upper fork clamp bolt and remove the top plug.

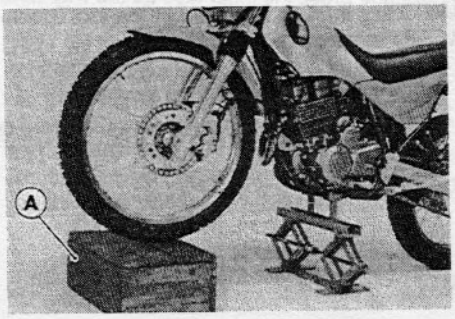
⚠WARNING

The top plugs are under extreme spring pressure. Take care when removing the top bolts. Wear eye and face protection.



- Remove:
  Fork Spring Seat [A]
  Fork Spring [B]

- Using a suitable base [A], raise the front wheel to fully compress the fork.
- Wait until the oil level settles.

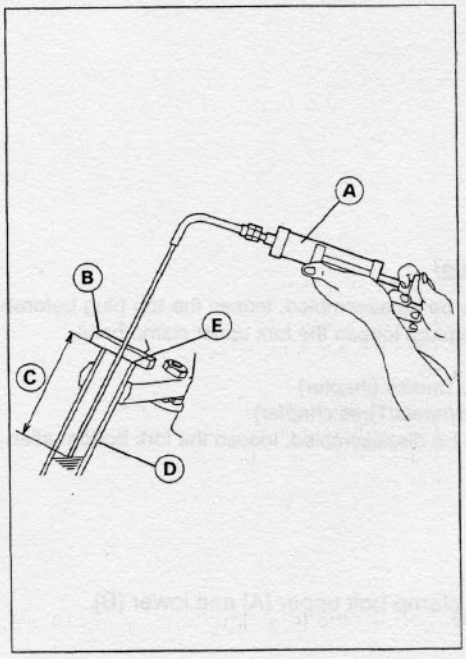


- Use the fork oil level gauge [A] and measure the distance between the top of the inner tube to the oil surface.

Special Tool - Fork Oil Level Gauge: 57001-1290

○ Set the oil level gauge stopper [B] so that the distance from the bottom of the stopper to the lower end of the pipe is the specified oil level distance [C].
○ An accurate measurement cannot be obtained unless the pipe of the level gauge is placed in the center of the inner tube.

[Oil Level - Fully compressed, without fork spring]
Standard: 147 ± 2 mm (5.7874 ± 0.0787 in.)
(GR) 150 ± 2 mm (5.9055 ± 0.0787 in.)
(GR) : Greek Model



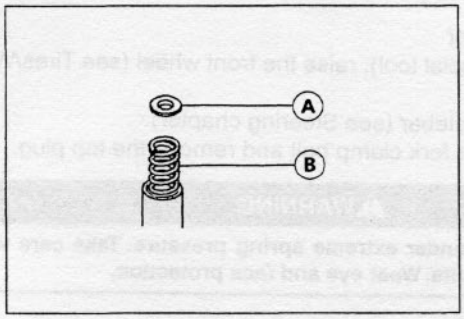
○ Place the stopper of the level gauge at the top [E] of the inner tube [D], and pull the handle slowly to pump out the excess oil into the gauge, thus attaining the standard level.
○ If no oil is drawn into the gauge, there is not enough oil in the fork. Pour in some more oil, then draw out the excess before measuring again.

Fork Oil: KAYABA G10 or SAE 10W-20

- Repeat the same procedure for adjusting the other fork.
- Install the fork spring seat and the fork spring.
- Check the top plug O-ring and replace it with a new one if it is damaged.

Fork Oil Change

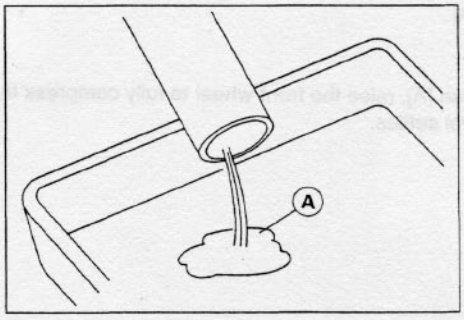
- Remove the front fork (see Front Fork Removal).
- Hold the outer tube vertically in a vise.
- Unscrew the top plug out of the inner tube.
- Remove:
  Fork Spring Seat [A]
  Fork Spring [B]



- Pour out the fork oil [A] with the fork upside down.
- ○ Pump the outer tube up and down to expel the oil from the fork.
- Holding the fork tube upright, press the inner tube all the way down.
- Fill the front fork with the specified oil.

Fork Oil: **KAYABA G10 or SAE 10W-20**
Capacity (per one unit): approx. 300 mL (10.14 oz),
(GR) 295 mL (9.97 oz) (when changing oil)

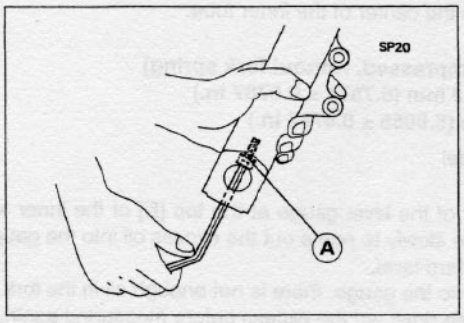
(GR) : Greek Model



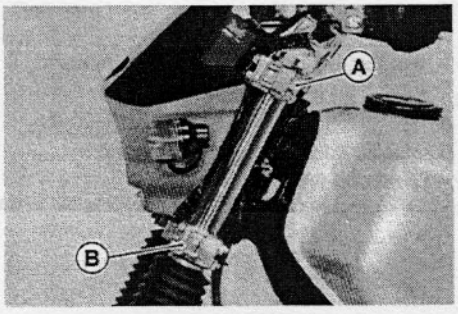
- Measure the oil level for verification (see Oil Level Adjustment).

Front Fork Removal

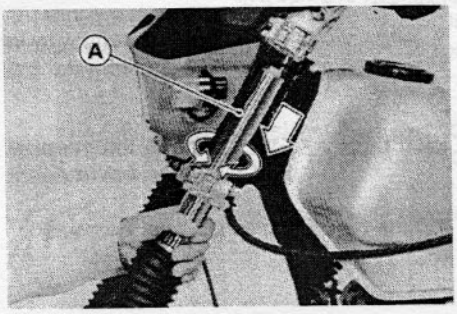
- ○ If the fork leg is to be disassembled, loosen the top plug beforehand. To loosen the fork top plug, loosen the fork upper clamp bolts.
- Remove:
  Brake Caliper (see Brakes chapter)
  Front Wheel (see Wheels/Tires chapter)
- ○ If the fork leg is to be disassembled, loosen the fork bottom allen bolt [A] beforehand.



- Loosen the fork clamp bolt upper [A] and lower [B].

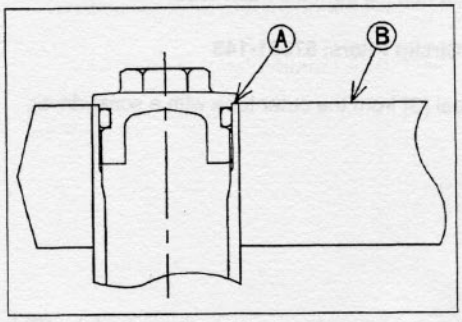


● With a twisting motion of the inner tube [A], work the fork leg down and out.



Front Fork Installation

● Install the fork so that the top end [A] of the inner tube is flush with the upper surface of the steering stem head [B].
● Run the cables, wires and hoses as shown in the Cable, Wire and Hose Routing section of the General Information chapter.



Torque – Front Fork Clamp Bolt (upper, lower): 21 N·m (2.1 kgf·m, 15 ft·lb)
Front Fork Top Plug: 22 N·m (2.2 kgf·m, 16 ft·lb)

NOTE

○ *Tighten the two clamp bolts alternately two times to ensure even tightening torque.*

⚠WARNING

Run the cable, wiring harnesses, and hoses properly so as not to obstruct the movement of the handlebar.

● Install the front wheel (see Wheels/Tires chapter).
● Check the effectiveness of the front brake.

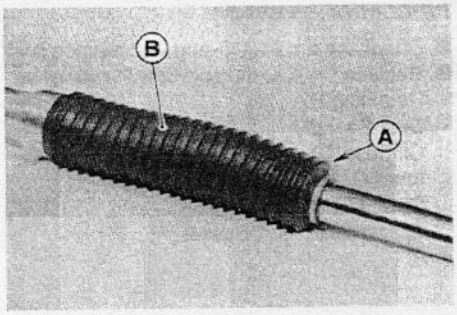
⚠WARNING

Do not attempt to ride the motorcycle until a full brake lever is obtained 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.

Front Fork Disassembly

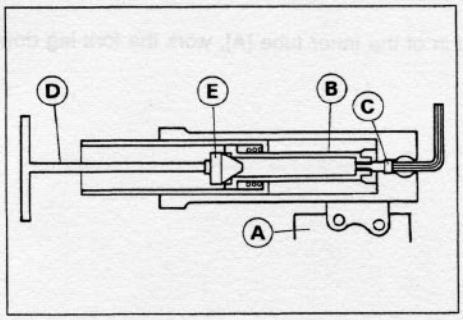
● Remove the front fork (see Front Fork Removal).
● Drain the fork oil (see Fork Oil Change).
○ The following parts are removed when draining the fork oil:
Top plug
Fork Spring Seat
Fork Spring

● Loosen the screw [A] and remove the boot [B].



- Hold the front fork horizontally in a vise [A].
- Stop the cylinder unit [B] from turning by using the special tools.
- Unscrew the allen bolt [C], and take the gasket out of the bottom of the outer tube.

Special Tools - Fork Cylinder Holder Handle: 57001-183 [D]
Fork Cylinder Holder Adapter: 57001-1057 [E]

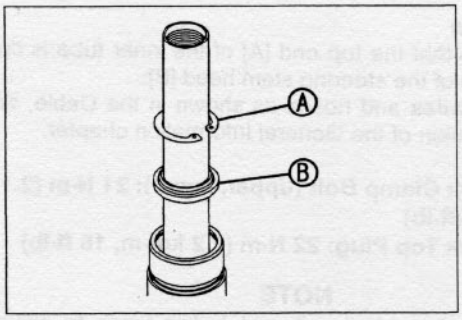


- Take the cylinder unit out of the inner tube.

- Remove the retaining ring [A] from the outer tube.

Special Tool - Inside Circlip Pliers: 57001-143

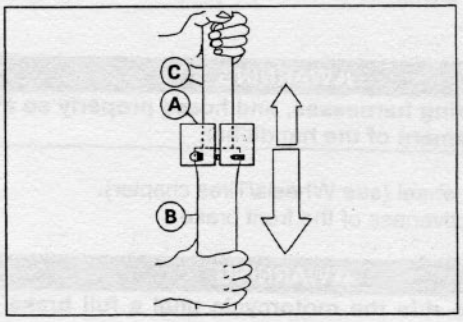
- Remove the dust seal [B] from the outer tube with a screwdriver.



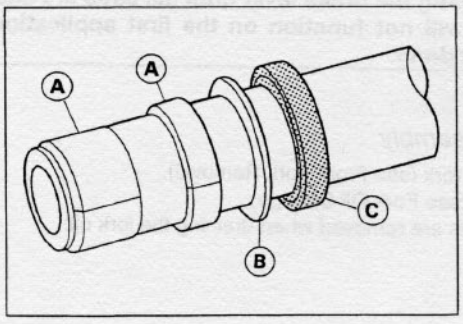
- Use the fork outer tube weight [A] to separate the outer tube [B] from the inner tube [C]. Holding the inner tube by hand, pull the outer tube several times to pull out the inner tube.

Special Tool - Outer Tube Weight: 57001-1218

- Take out the cylinder base from the outer tube bottom.

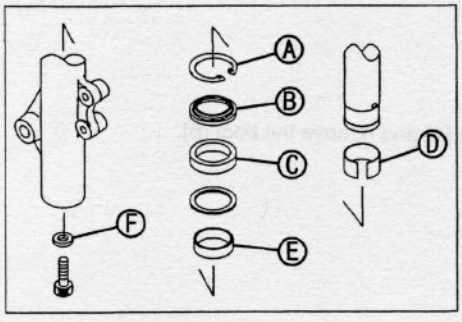


- Remove the guide bushings [A], washer [B] and oil seal [C] from the inner tube.

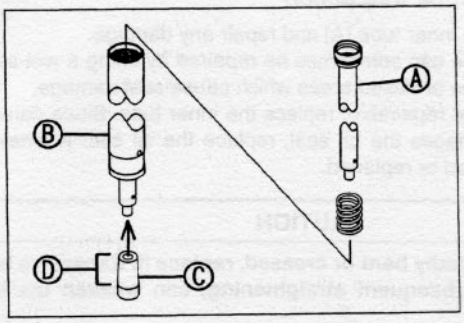


Front Fork Assembly

- Check the top plug O-ring and replace it with a new one if it is damaged.
- Replace the following parts with new ones:
  Retaining Ring [A]
  Dust Seal [B]
  Oil Seal [C]
  Inner Guide Bushing [D]
  Outer Guide Bushing [E]
  Bottom Allen Bolt Gasket [F]

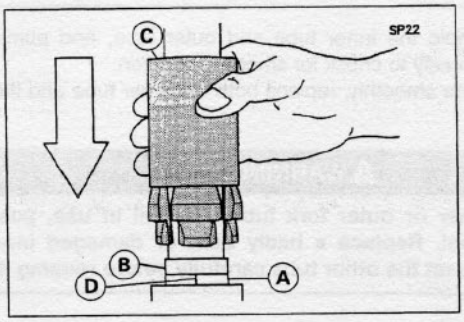


- Put the cylinder unit [A] with the spring into the inner tube [B] protruding from the inner tube, and install the cylinder base [C] onto the bottom end of the cylinder unit.
- ○ Install the cylinder base with the tapered end [D] facing upward.
- Install the inner tube, cylinder unit, and cylinder base as a set into the outer tube.



- Install the new guide bushing [A] with a used one [B] on it by tapping the used one with the fork oil seal driver [C].
- ○ The split [D] of the bushing should face toward the side of the vehicle.

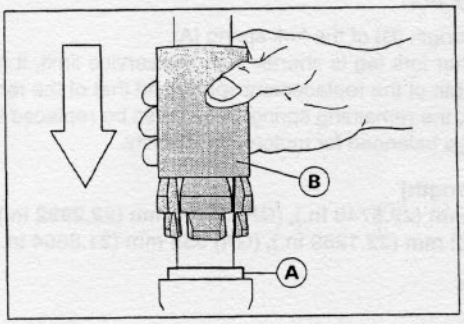
Special Tool - Front Fork Oil Seal Driver: 57001-1219



- Apply molybdenum disulfide grease to the oil seal lips and install the washer and the oil seal [A] into the outer tube.

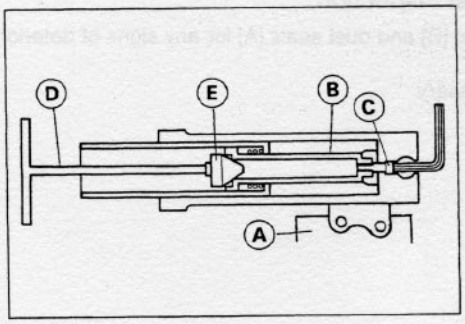
Special Tool - Front Fork Oil Seal Driver: 57001-1219 [B]

- Drive the dust seal into the outer tube in the same way as the oil seal.
- Install the retaining ring on the outer tube.



- Install a new bottom allen bolt gasket.
- Apply non-permanent locking agent to the threads of the bottom allen bolt and screw the allen bolt into the bottom of the outer tube.
- Hold the outer tube in a vise [A], hold the cylinder unit [B] with the special tools, then tighten the allen bolt [C].

Special Tools - Fork Cylinder Holder Handle: 57001-183 [D]
Fork Cylinder Holder Adapter: 57001-1057 [E]
Torque - Bottom Allen Bolt: 30 N·m (3.0 kg·m, 22 ft·lb)

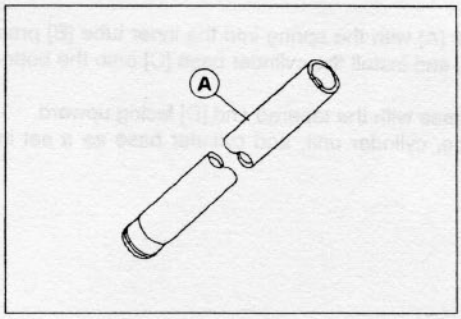


- Fill with the specified type of oil and install the parts removed (see Oil Change).
- Install the boots.

Fork Oil: KAYABA G10 or SAE 10W-20
Capacity (per one unit):
353 ± 4 mL (11.93 ± 0.14 oz),
(GR) 347 ± 4 mL (11.73 ± 0.14 oz), (after fork disassembly, completely dry)

(GR) : Greek Model

Inner Tube/Outer Tube Inspection



- Visually inspect the inner tube [A] and repair any damage.
- Nick or rust damage can sometimes be repaired by using a wet-stone to remove sharp edges or raised 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, replace the oil seal whenever the inner tube is repaired or replaced.

CAUTION

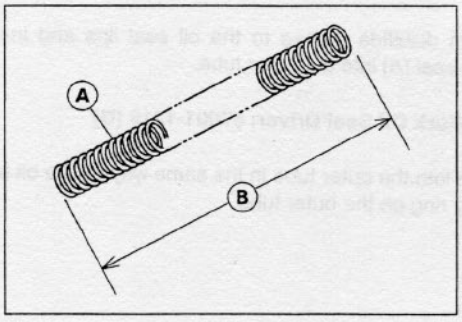
If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

- Temporarily assemble the inner tube and outer tube, and pump them back and forth manually to check for smooth operation.
- ★ If it does not operate smoothly, replace both the inner tube and the outer tube.

⚠WARNING

A straightened inner or outer fork tube may fail in use, possibly causing an accident. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Fork Spring Inspection

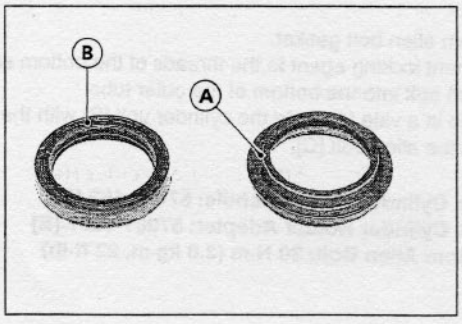


- Measure the free length [B] of the fork spring [A].
- ★ If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of the replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

[Fork Spring Free Length]
Standard: 573.4 mm (22.5748 in.), (GR) 566.4 mm (22.2992 in.)
Service Limit: 562 mm (22.1259 in.), (GR) 555 mm (21.8504 in.)

(GR) : Greek Model

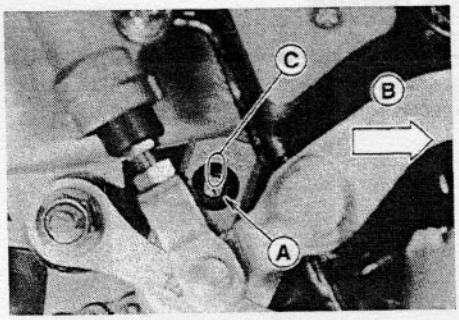
Oil Seal Dust Seal Inspection



- Inspect the oil seal [B] and dust seals [A] for any signs of deterioration or damage.
- Replace it if necessary.

Rear Shock Absorber

Rebound Damping Adjustment

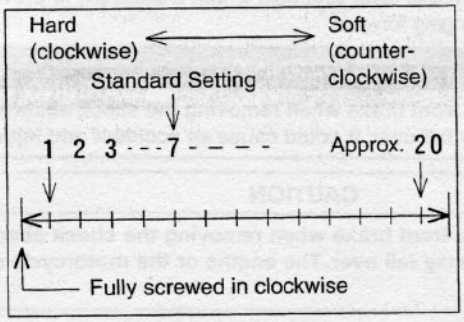


● Turn the damper adjuster [A] to adjust the rebound damping (elongation damping force).
Front [B]

○ The standard adjuster setting for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is the **9th**, (GR) **7th click** from the 1st click of the fully clockwise position. The punch mark [C] lines up in the standard setting.

(GR) : Greek Model

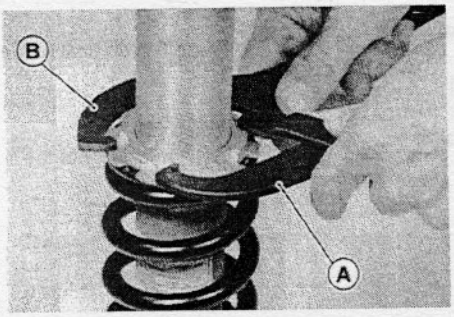
★ If the dampening force is not suited to the driving condition, refer to the table below to adjust it to the proper position.



[Rebound Damping Adjustment]

Adjustment Position	Damping Force	Setting	Load	Road	Speed
Approx. 20 ⇕ 1	Weak ⇕ Strong	Soft ⇕ Hard	Light ⇕ Heavy	Good ⇕ Bad	Low ⇕ High

Spring Preload Adjustment



★ If the spring preload is not suited to the driving condition, refer to the table below to adjust the adjusting nut to the proper position.

● Remove the rear shock absorber (see Rear Shock Absorber Removal).

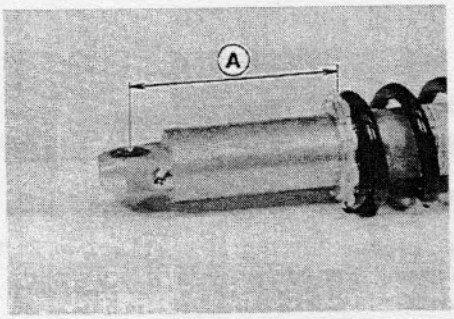
● Using the stem nut wrench [A] and the hook wrench [B], turn the adjusting nut as needed.

○ The standard adjusting nut setting for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is 123 mm.

Special Tools - Steering Stem Nut Wrench: 57001-1100
Hook Wrench: 57001-1101

[Spring Preload Adjustment]

Adjuster Position	Damping Force	Setting	Load	Road	Speed
111 ⇕ 133	Weak ⇕ Strong	Soft ⇕ Hard	Light ⇕ Heavy	Good ⇕ Bad	Low ⇕ High



○ Measure the distance between the center of the top mounting hole to the bottom of the adjusting nut in order to set the nut in place.

[Spring Preload]
Standard Position: **123mm (4.8425 in.) [A]**
Usable Range: **111 ~ 133 mm (4.3700 ~ 5.2362 in.) [A]**
Standard Spring Preload: **1030 N (105 kg, 232 lb),**
(GR) 965 N (98 kg, 216 lb)
Change in preload for each turn of the nut:
110 N (11.25 kg, 25 lb),
(GR) 103 N (10.5 kg, 23 lb)

(GR) : Greek Model

● Tighten the locknut.

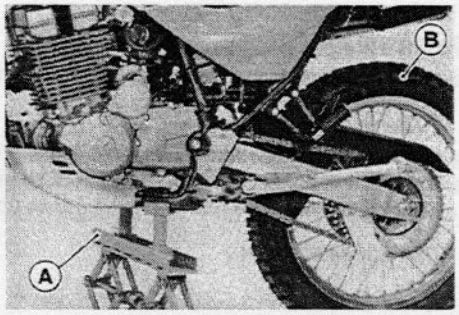
● Move the spring up and down to make sure it is not loose.

● Install the rear shock absorber (see Rear Shock Absorber Installation).

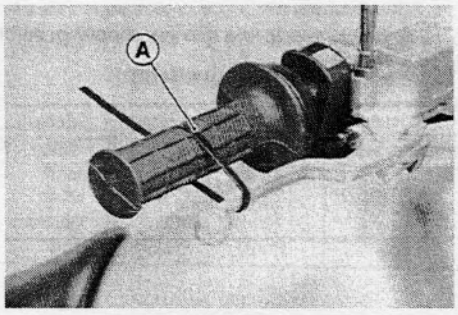
Rear Shock Absorber Removal

- Using the jack [A], raise the rear wheel [B].

Special Tool - Jack: 57001-1238



- Squeeze the front brake lever and hold it with a band [A] to prevent the motorcycle from lunging forward.



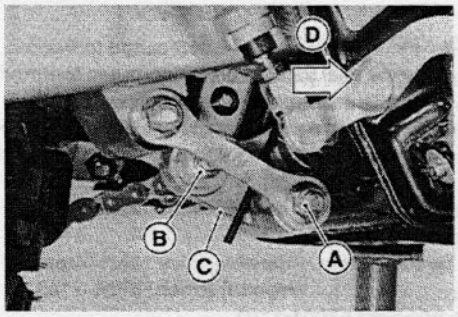
⚠WARNING

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

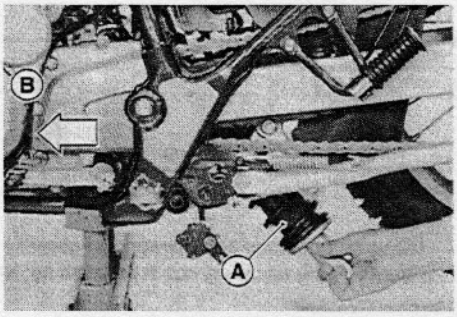
CAUTION

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

- Remove:
  Side Covers and Seat (see Frame chapter)
  Side Stand Switch
  Front Tie-Rod Bolt [A]
  Lower Shock Absorber Bolt [B]
- Support the locker arm [C] and pull out the bolt.
  Front [D]



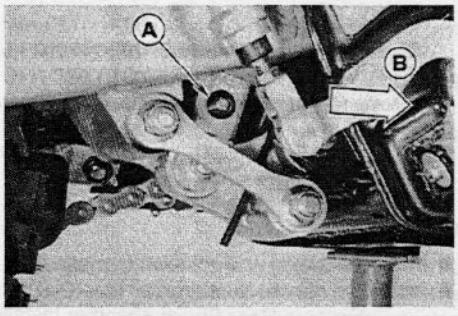
- Remove the shock absorber upper bolt and take out the shock absorber [A] from underneath.
  Front [B]



Rear Shock Absorber Installation

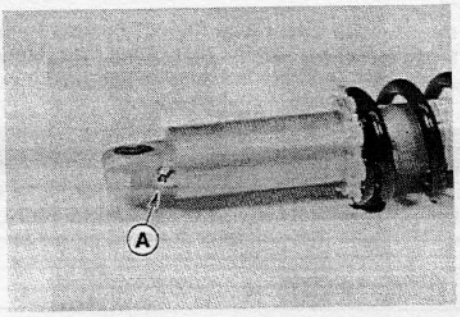
- Install the shock absorber with its damper adjuster [A] facing right.
  Front [B]
- Apply threadlock agent to the side stand switch bolt.

Torque - Rear Shock Absorber Bolt, Nut: 39 N·m (4.0 kg·m, 29 ft·lb)
Side Stand Switch Bolt: 6.9 N·m (0.70 kg·m, 61 in·lb)
Tie-Rod Nut: 59 N·m (6.0 kg·m, 43 in·lb)



Rear Shock Absorber Disposal

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Remove the valve cap and push the valve [A] to completely remove the nitrogen gas.



⚠WARNING

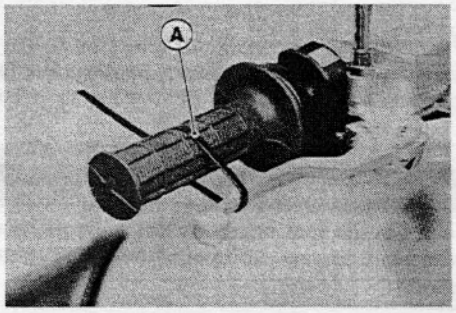
Since the reservoir tank of the rear shock absorber contains nitrogen gas, do not incinerate the reservoir tank without first releasing the gas or it may explode.

⚠WARNING

Since the high pressure gas is dangerous, do not point the valve toward your face or body.

Swingarm

Swingarm Removal



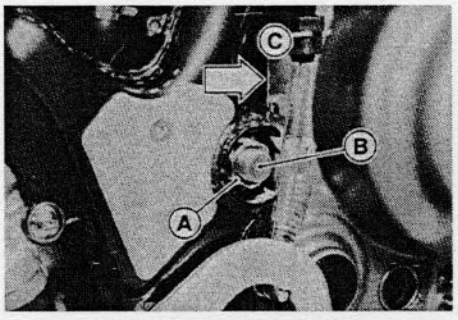
- Using a jack, raise the rear wheel (see Rear Shock Absorber Removal).
- Squeeze the front brake lever and hold it with a band [A] to prevent the motorcycle from lunging forward.

⚠ WARNING

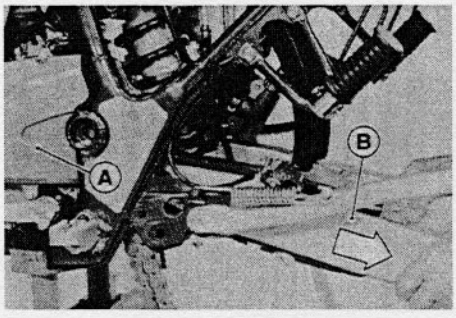
Be sure to hold the front brake when removing the swingarm, or the motorcycle may fall over. It could cause an accident and injury.

CAUTION

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



- Remove:
  Rear Wheel (see Wheels/Tires chapter)
  Brake Hose Clamp
  Rear Shock Absorber Lower Bolt (see Rear Shock Absorber Removal)
- Remove the swingarm pivot nut [A], and pull out the swingarm pivot shaft [B].
  Front [C]



- Remove
  Chain Cover [A]
  Drive Chain (from the swingarm)
  Swingarm [B]

Swingarm Installation

- Apply grease to the needle bearing and the grease seal.
- Install the chain cover.
- From the left, install the swingarm pivot shaft.
- Tighten the nuts.

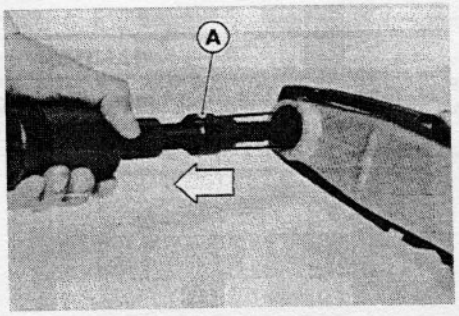
Torque - Swingarm Pivot Nut: 88 N·m (9.0 kg·m, 65 ft·lb)
Tie-Rod Nut: 59 N·m (6.0 kg·m, 43 ft·lb)

- Install:
  Rear wheel (see Wheels/Tires chapter).
  Drive Chain (see Final Drive chapter).
- Check the brake effectiveness.

⚠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 this is not done.

Swingarm Bearing Removal

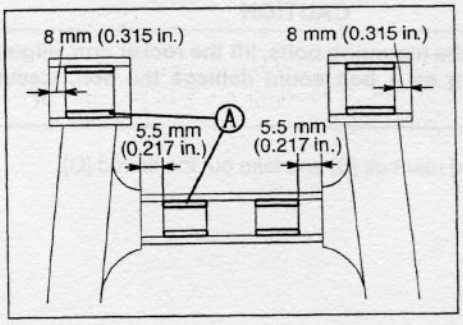


- Remove:
  Swingarm (see Swingarm Removal).
  Grease Seal, Sleeve
  Needle Bearing

Special Tool - Oil Seal & Bearing Remover: 57001-1058 [A]

- Replace the bearing and the sleeve with new parts.

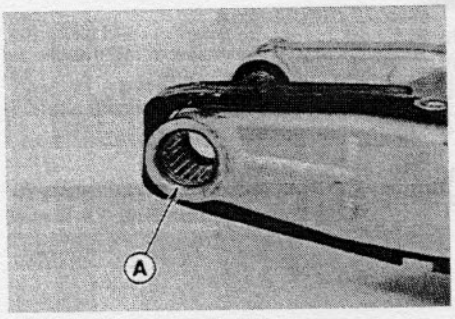
Swingarm Bearing Installation



- Apply grease to the following:
  Needle Bearing and Sleeve
  Grease Seal Lip
- Drive the bearings [A] to the respective positions as shown.
- ○ Be sure to install the bearings so that the manufacturer's marks face out. This prevents bearing damage.

Special Tool - Bearing Driver Set: 57001-1129

Swingarm Bearing, Sleeve Inspection



CAUTION

Do not remove the bearings for inspection. Removal may damage them.

- Inspect the needle bearings [A] and tie rod needle bearings installed in the swingarm.
- ○ The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing in the swingarm for abrasion, discoloration, or other damage.
- ★ If the needle bearing and the sleeve show any signs of abnormal wear, discoloration, or damage, replace them as a set.

Tie-Rod, Rocker Arm

Tie-Rod Removal

- Using a jack, raise the rear wheel (see Rear Shock Absorber Removal).
- Squeeze the brake lever and hold it with a band to prevent the motorcycle from lunging forward (see Rear Shock Absorber Removal).
- Remove:
  Side Stand Switch
  Tie-Rod Front Bolt [A]

⚠ WARNING

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

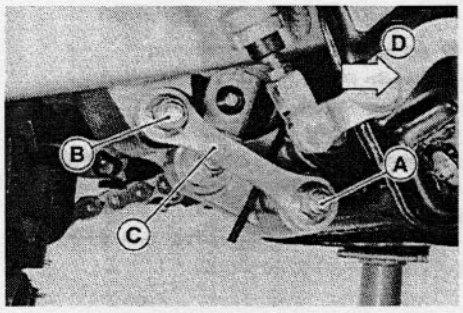
CAUTION

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

CAUTION

When pulling out the mounting bolts, lift the rocker arm, slightly. Forcing or tapping on a bolt could damage the bolt, sleeve, and bearing.

- Remove the tie-rod rear bolt [B] and take out the tie-rod [C].
  Front [D]

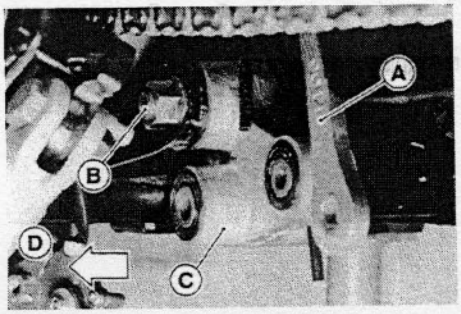


Tie-Rod Installation

- Apply grease to the inside of the needle bearings and oil seals.
- Insert the bolt from the left.
- Apply threadlock agent on the side stand switch bolt.
- Tighten the nut and bolt.

Torque - Tie-Rod Nut: 59 N·m (6.0 kg·m, 43 ft·lb)
Side Stand Switch Bolt: 6.9 N·m (0.70 kg·m, 61 in·lb)

Rocker Arm Removal



- Remove:
  Rear Shock Absorber
  Swingarm (see Swingarm Removal)
  Tie-Rod [A] (see Tie-Rod Removal)
- Remove the rocker arm bolt [B] and take out the rocker arm [C].
  Front [D]

⚠WARNING

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

CAUTION

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

CAUTION

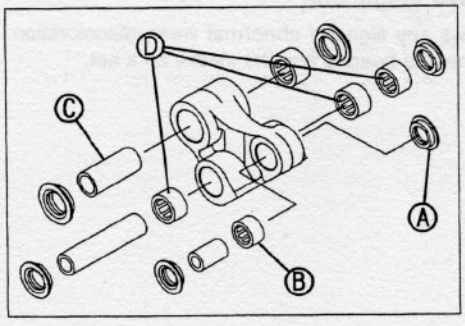
When pulling out the mounting bolts, lift the rocker arm slightly. Forcing or tapping on a bolt could damage the bolt, sleeve, and bearing.

Rocker Arm Installation

- Apply grease to the inside of the needle bearings and oil seal lips.
- Insert the rocker arm bolt from the right, and tighten the nut.

Torque - Rocker Arm nut: 83 N·m (8.5 kg·m, 61 ft·lb)
Rear Shock Absorber Bolt, Nut: 39 N·m (4.0 kg·m, 29 ft·lb)
Tie-Rod Nut: 59 N·m (6.0 kg·m, 43 ft·lb)
Swingarm Pivot Nut: 88 N·m (9.0 kg·m, 65 ft·lb)

Rocker Arm Bearing Removal



- Remove the rocker arm (see Rocker Arm Removal), take out the sleeves, and remove the rocker arm bearings.
- ○ Because the needle bearings [D] of tie-rod is the all-roller type, 31 rollers come out from each bearing when the sleeve is taken out.

⚠WARNING

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

CAUTION

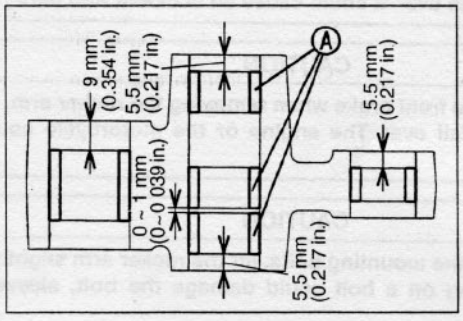
Be sure to hold the front brake when removing the rocker arm, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

- Remove:
  Grease Seal [A]
  Needle Bearing [B]
  Sleeve [C]
  Roller [D]

Special Tool - Bearing Driver Set: 57001-1129

● Replace the bearings and the sleeves with new parts.

Rocker Arm Bearing Installation



● Apply grease to the bearings, sleeves, and the grease seals.
● Be sure to install the bearings so that the manufacturer's marks face out. This prevents bearing damage.
○ Drive the bearings to the position shown.
○ Install 31 rollers in each of the bearing cages [A], and insert the sleeves and the grease seals.

Special Tool - Bearing Driver Set: 57001-1129

Rocker Arm Bearing Inspection

○ The rollers in needle bearings normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing in the rocker arm for abrasion, discoloration, or other damage.
★ If the needle bearing shows any signs of abnormal wear, discoloration, or damage, replace the needle bearing and the sleeve as a set.

Rocker Arm Sleeve Inspection

★ If the sleeve shows any signs of abnormal wear, discoloration, or damage, replace the needle bearing and the sleeve as a set.

Steering

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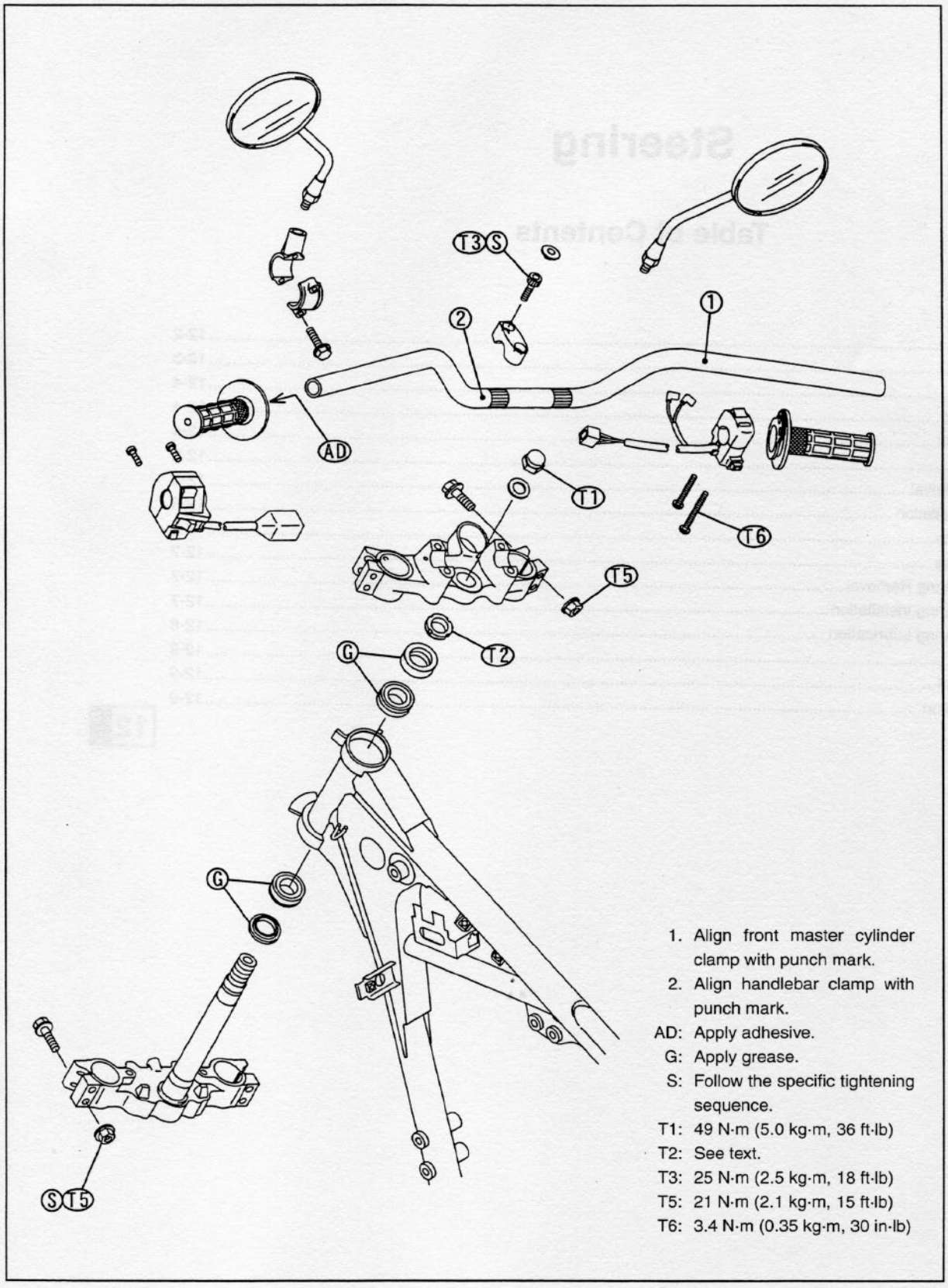
Exploded View



1. Align front master cylinder clamp with punch mark.
2. Align handlebar clamp with punch mark.

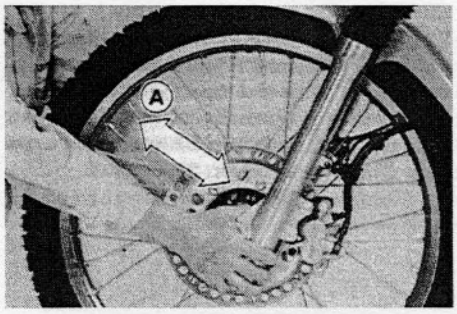
AD: Apply adhesive.
G: Apply grease.
S: Follow the specific tightening sequence.
T1: 49 N·m (5.0 kg·m, 36 ft·lb)
T2: See text.
T3: 25 N·m (2.5 kg·m, 18 ft·lb)
T5: 21 N·m (2.1 kg·m, 15 ft·lb)
T6: 3.4 N·m (0.35 kg·m, 30 in·lb)

Specifications

Special Tools - Jack: 57001-1238
Steering Stem Nut Wrench: 57001-1100
Head Pipe Outer Race Remover: 57001-1107
Head Pipe Outer Race Press Shaft: 57001-1075
Head Pipe Outer Race Driver: 57001-1076
Head Pipe Outer Race Driver: 57001-1106
Steering Stem Bearing Driver: 57001-137
Steering Bearing Driver Adapter: 57001-1074

Steering

Steering Inspection



● Check the steering.
○ Lift the front wheel off the ground using the jack (see Wheels/Tires chapter).

Special Tool - Jack: 57001-1238

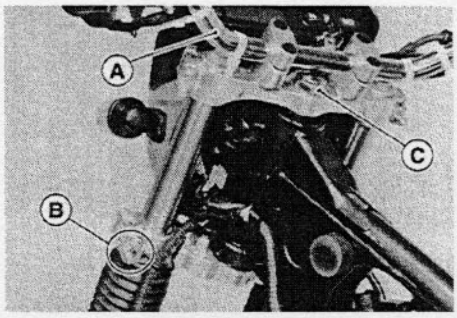
○ With the front wheel pointing straight ahead, alternately tap each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.
★ If the wheel binds or catches before the stop, the steering is too tight.

○ Feel for steering looseness by pushing and pulling [A] the forks.
★ If you feel looseness, the steering is too loose.

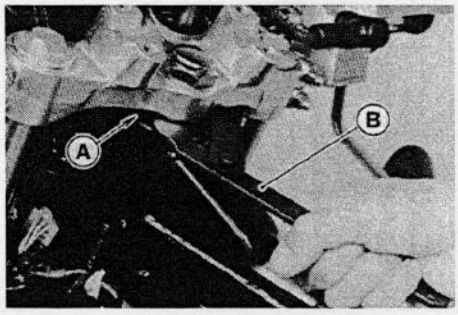
NOTE

○ *The cables and wiring will have some effect on the motion of the fork which must be taken into account.*
Be sure the wires and cables are properly routed.
○ *The bearings must be in good condition and properly lubricated in order for any test to be valid.*

Steering Adjustment



★ Adjust the steering if it feels tight or loose.
● Remove:
Fuel Tank (see Fuel System chapter)
Handlebar [A]
● Loosen:
Lower Fork Clamp Bolts (both sides) [B]
Stem Head Nut [C]

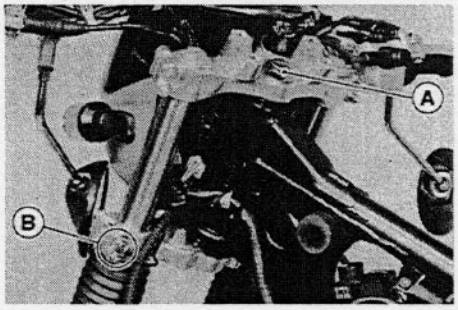


● Lift the front wheel oft the ground using the jack.
★ If the steering is too tight, loosen the stem nut [A] a fraction of a turn.
★ If the steering is too loose, tighten the stem nut a fraction of a turn.

NOTE

○ *Turn the stem nut 1/8 turn at a time maximum.*

Special Tools - Jack: 57001-1238
Steering Stem Nut Wrench: 57001-1100 [B]
Torque - Steering Stem Nut: 4.9 N·m (0.5 kg·m, 43 in·lb) (for reference)



● Tighten the steering stem head bolt [A] and then lower front fork clamp bolts [B].

Torque - Steering Stem Head Nut: 49 N·m (5.0 kg·m, 36 ft·lb)
Front Fork Lower Clamp Bolt: 21 N·m (2.1 kg·m, 15 ft·lb)

NOTE

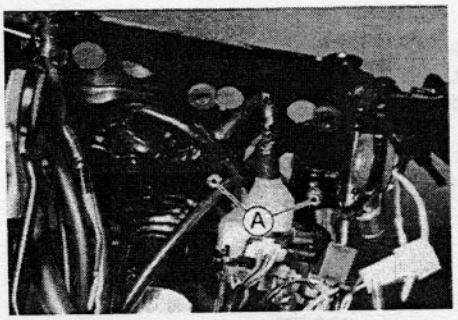
○ *Tighten the two clamp bolts alternately two times to ensure even tightening torque.*

● Check the steering again.
★ If the steering is still too tight or too loose, inspect the steering parts.
● Install the removed parts.
● Adjust the headlight beam vertically (see Electrical System chapter).

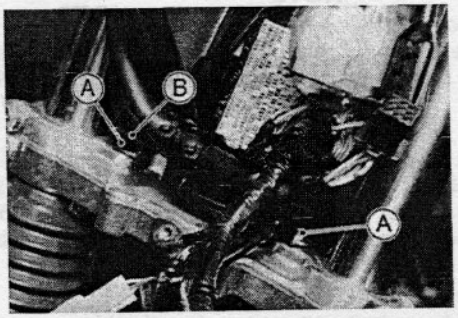
Steering Stem

Steering Stem Removal

- Remove the handlebar (see Handlebar Removal) and loosen the stem head nut.
- Remove:
  Headlight and Meter Unit (see Electrical System chapter)
- Remove the connector of the turn signal light.
- Remove mouting bolts [A] and take the bracket of the speedometer/the headlight.
- Remove:
  Front Wheel (see Wheels/Tires chapter)
  Front Fork (see Suspension chapter)

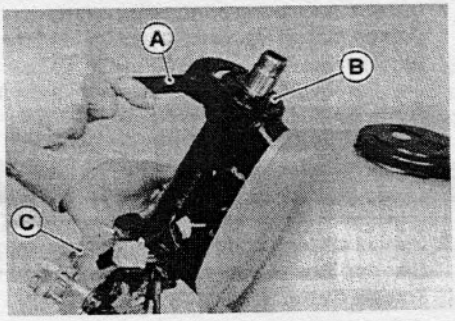


- Remove the bolts [A] and take out the brake hose clamp [B].
- Remove the front master cylinder (see Brakes chapter).



- Remove:
  Stem Head Nut
  Steering Stem Head

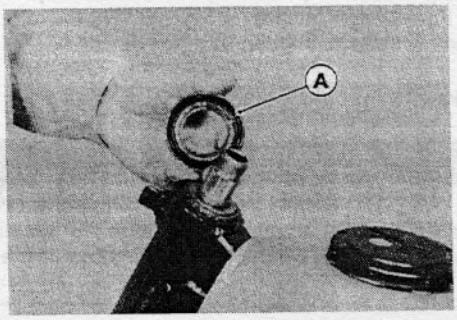
- While holding the stem base and remove the stem nut [B] with the stem nut wrench [A].
- Remove the steering stem base [C].



Special Tool - Steering Stem Nut Wrench: 57001-1100

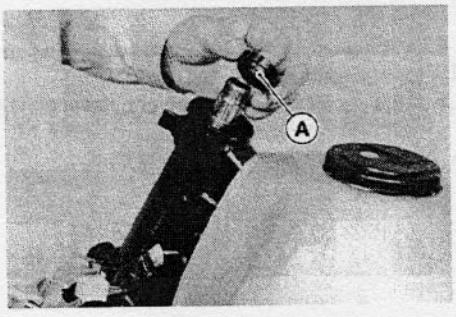
Steering Stem Installation

- Run the cables, wiring harnesses, and hoses as specified to prevent them from obstructing the movement of the handlebar (see General Information chapter).
- Apply grease to the lower and the upper bearing inner race and lower seal lip.
- Insert the stem base through the head pipe and the upper bearing inner race.
- Apply grease to the upper seal lip of the stem cap [A], install it, and hand-tighten the stem nut.



NOTE

○ *Install the stem nut so that the stepped side [A] faces down into the recess of the stem cap.*



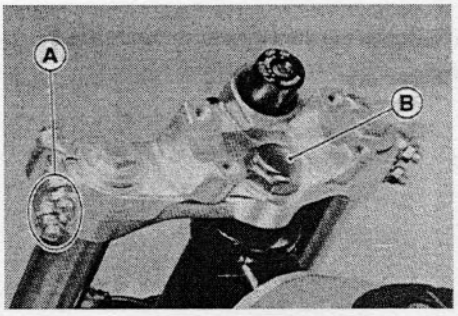
- Install and hand-tighten the stem nut.

Torque - Steering Stem Nut: 4.9 N·m (0.5 kg·m, 43 in·lb) (for reference)

- Install:
  Stem Head
  Handlebar (see Handlebar Installation)
  Headlight and Meter Unit (see Electrical System chapter)
- Install the washer and lightly tighten the stem head nut.
- Install:
  Front Master Cylinder (see Brakes chapter)
  Front Fork (see Suspension chapter)

NOTE

○ *Align the top end of the inner tubes and upper surface of the steering stem head, and tighten the fork upper clamp bolts [A]. Then, tighten the stem head nut [B], and finally the fork lower clamp bolts[C].*

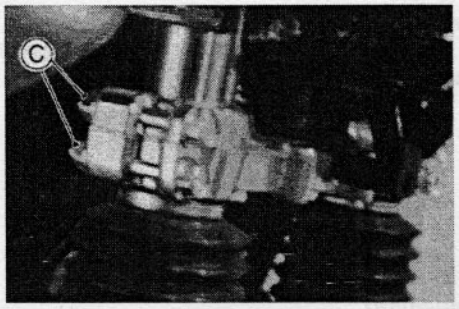


Torque - Front Fork Upper Clamp Bolt: 21 N·m (2.1 kg·m, 15 ft·lb)
Steering Stem Head Nut: 49 N·m (5.0 kg·m, 36 ft·lb)
Front Fork Lower Clamp Bolt: 21 N·m (2.1 kg·m, 15 ft·lb)
Brake Hose Clamp Bolt: 6.9 N·m (0.70 kg·m, 61 ft·lb)

NOTE

○ *Tighten the two clamp bolts alternately two times to ensure even tightening torque.*

- Install the following parts:
  Cables, Wiring Harnesses, and Hoses (see General Information chapter)
  Front Wheel (see Wheels/Tires chapter)



⚠WARNING

Do not impede the handlebar turning by routing the cables, harnesses and hoses improperly (see General Information chapter).

- Inspect and adjust the following items:
  Steering (see Steering Adjustment)
  Throttle Cable (see Fuel System chapter)
  Headlight (see Electrical System chapter)
  Rearview Mirrors
- Check the front brake effectiveness.

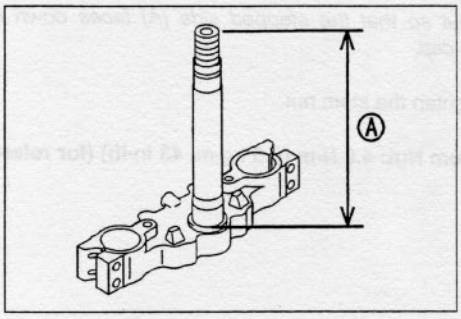
⚠WARNING

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

Steering Stem Warp

- Whenever the steering movement is not smooth, check the steering stem for straightness.

★ If the steering stem [A] is bent, replace the steering stem.

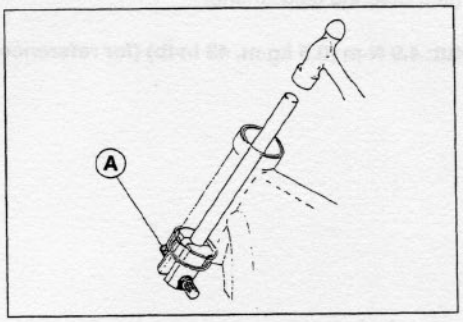


Steering Stem Bearing

Steering Stem Bearing Removal

- Remove the steering stem (see this chapter).
- Remove the upper tapered roller bearing.
- Remove the upper and lower outer races, using the outer race remover (special tool) [A].

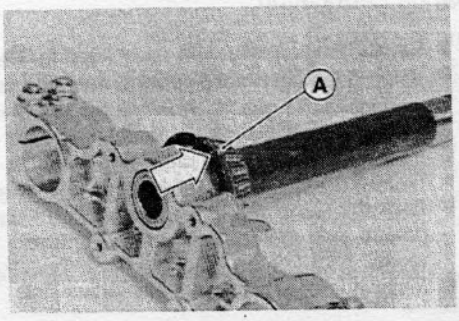
Special Tool - Head Pipe Outer Race Remover: 57001-1107



NOTE

○ *If either steering stem bearing is damaged, it is recommended that both the upper and lower bearing (including outer races) should be replaced with new ones.*

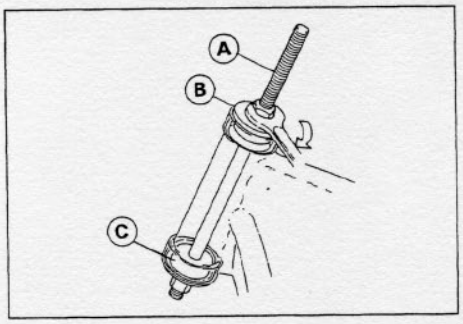
- Using a chisel, strike at the base [A] of the lower inner race to drive the race out from the stem, together with the grease seal. Replace the removed bearing and grease seal.



Steering Stem Bearing Installation

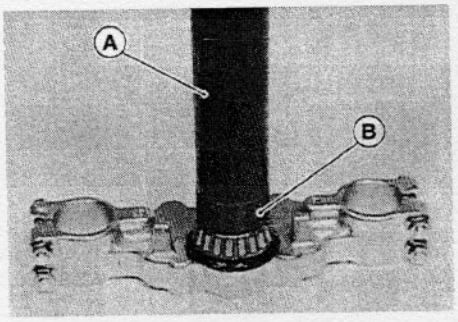
- Replace the bearing outer race with a new one and apply grease to it.
- Using the driver and the driver press shaft (both special tools), drive both upper and lower outer races into the head pipe.

Special Tools - Head Pipe Outer Race Press Shaft: 57001-1075 [A]
Head Pipe Outer Race Driver: 57001-1076 [B]
Head Pipe Outer Race Driver: 57001-1106 [C]



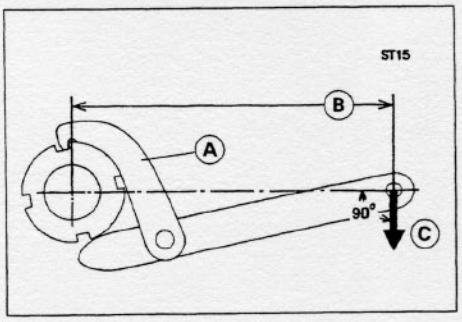
- Replace the stem bearing inner race with a new one.
- Apply grease to the lower inner race, and using the stem bearing driver and adapter (special tools), drive the race over the stem.

Special Tools - Steering Stem Bearing Driver: 57001-137 [A]
Steering Stem Bearing Driver Adapter: 57001-1074 [B]



- Install the steering stem (see Steering Stem Installation).
- Have the steering stem a snug fit so that it does not have the looseness when driving with its nut temporalily tightened.
- ○ Torque the stem nut to 39 N·m (4.0 kg·m, 29 ft·lb) as shown in the drawing.

Special Tool - Stem Nut Wrench: 57001-1100 [A]
180mm (7.0866 in.) [B] Load 200 N (22.2 kg, 49 lb) [C]



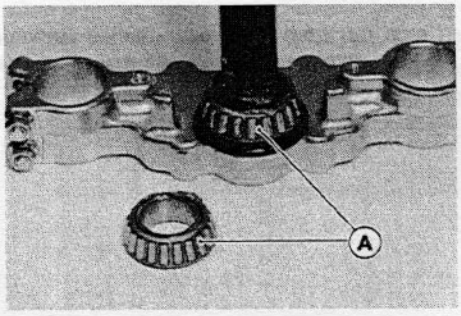
- ○ Check whether the stem turns smoothly, without free play. If it feels too tight or has free play, the bearing could be damaged.
- ○ Gradually loosen the stem nut until the stem turns smoothly.

○ Adjust the steering (see Steering adjustment).

Torque - Stem Lock Nut: 4.9 N·m (0.5 kg·m, 43 in·lb) (for reference)

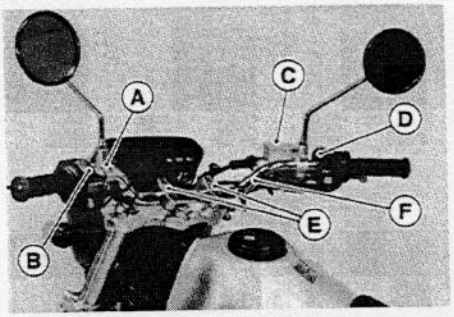
Steering Stem Bearing Lubrication

- Remove the steering stem (see Steering Stem Removal).
- Using a high flash-point solvent, wash the upper and lower tapered roller bearings in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and the rollers.
- ★ Replace the bearing assemblies if they show wear or damage.
- Pack the upper and lower tapered roller bearings [A] in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem and adjust the steering (see Steering Stem Installation and Steering Adjustment).



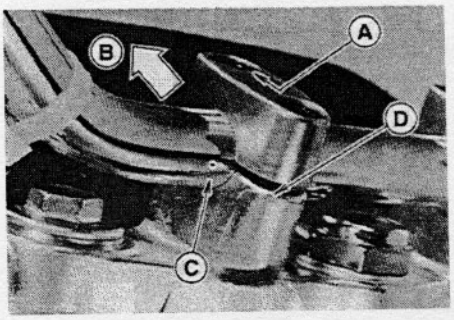
Handlebar

Handlebar Removal

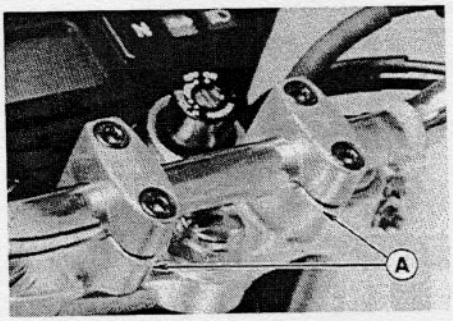


- Remove:
  Clutch Lever [A]
  Left Handlebar Switch Housing [B]
  Front Brake Master Cylinder [C] (see Brakes chapter)
  Right Handlebar Switch Housing [D]
  Throttle Case and Throttle Grip
  Handlebar Clamp Bolt [E]
- Remove the handlebar [F] from the stem head.

Handlebar Installation

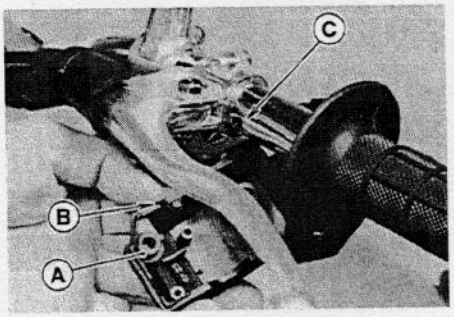


- Face the arrow [A] of the handlebar clamp forward [B] to install the handlebar.
- Install the handlebar by aligning the punch mark [C] on the handlebar with the bottom of the back of the clamp [D].



- First tighten the front clamp bolt, then the rear clamp bolt. After tightening them, there will be a gap [A] at the back of the clamp.

Torque - Handlebar Clamp Bolt: 25 N·m (2.5 kg·m, 18 ft·lb)



- The front half of the right and left switch housings [A] has a small projection [B]. Fit the protrusion into the hole [C] in the handlebar.
- Install the handlebar switch housing.

Torque - Handlebar Switch Housing Screw: 3.4 N·m (0.35 kg·m, 30 in·lb)

- Install the following:
  Clutch Lever
  Front Master Cylinder (see Brakes chapter)
  ○ Install the clutch lever by aligning the punch mark on handlebar with the matching surface of the clutch lever holder.

Frame

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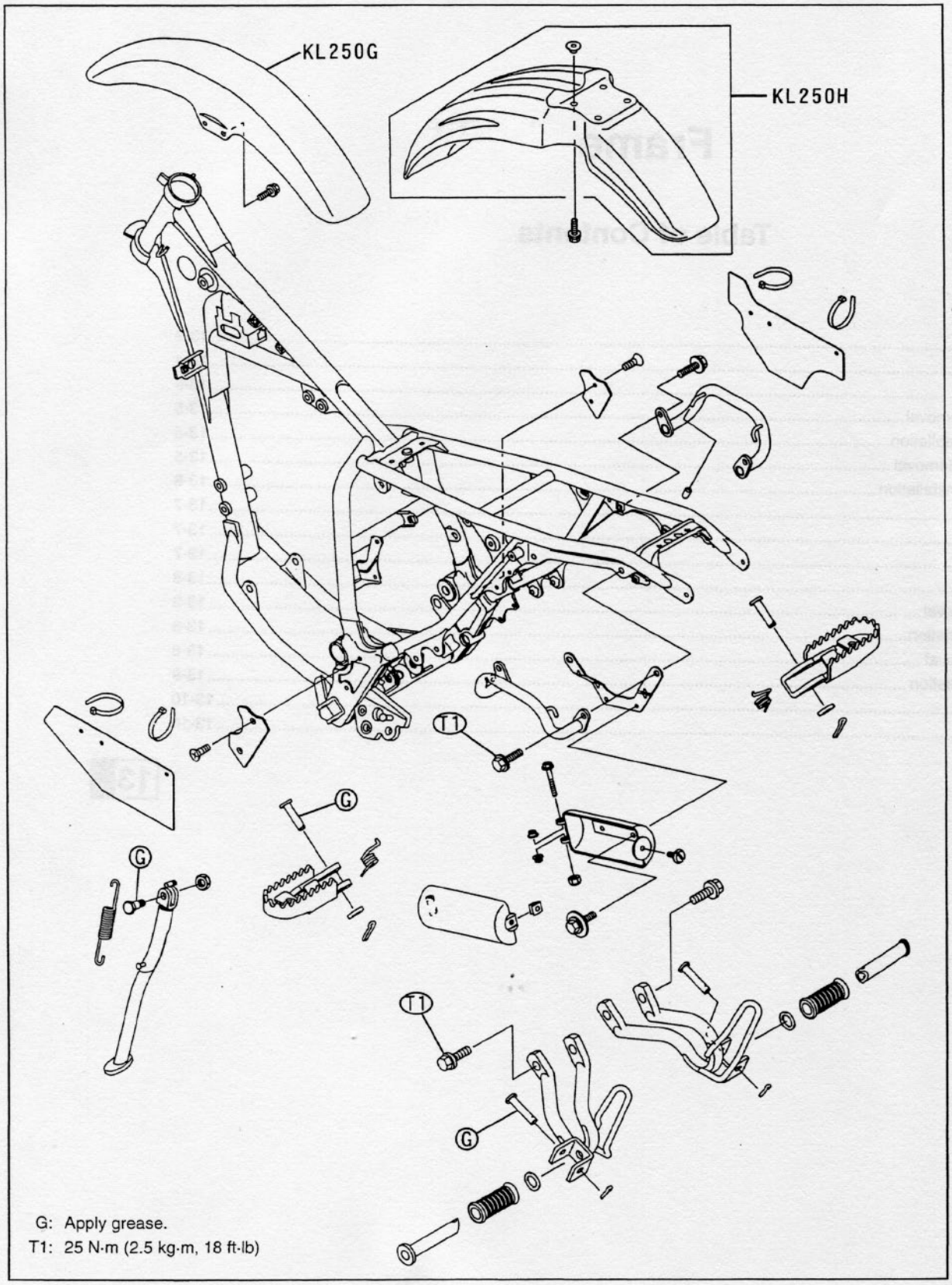
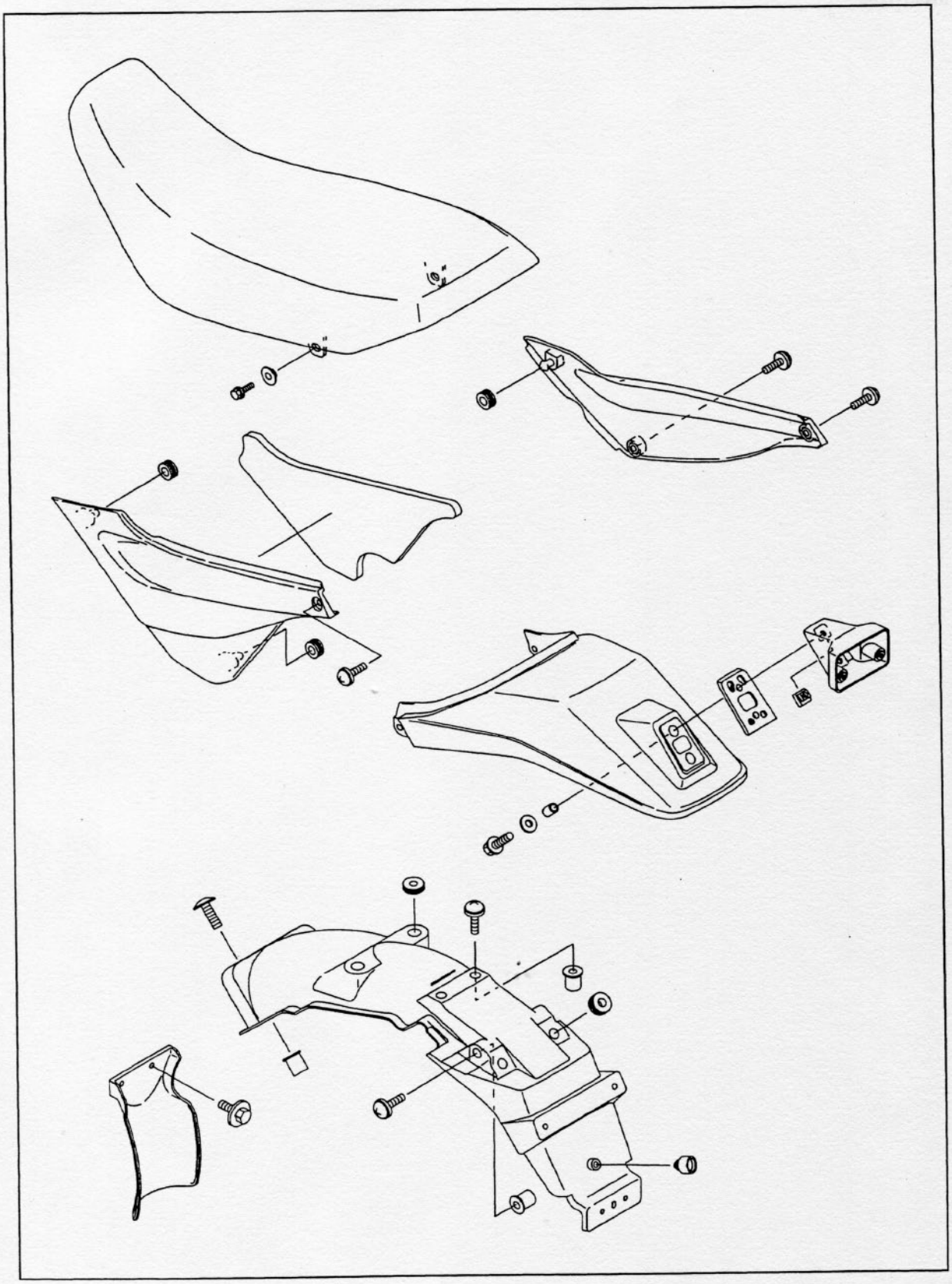
Exploded View

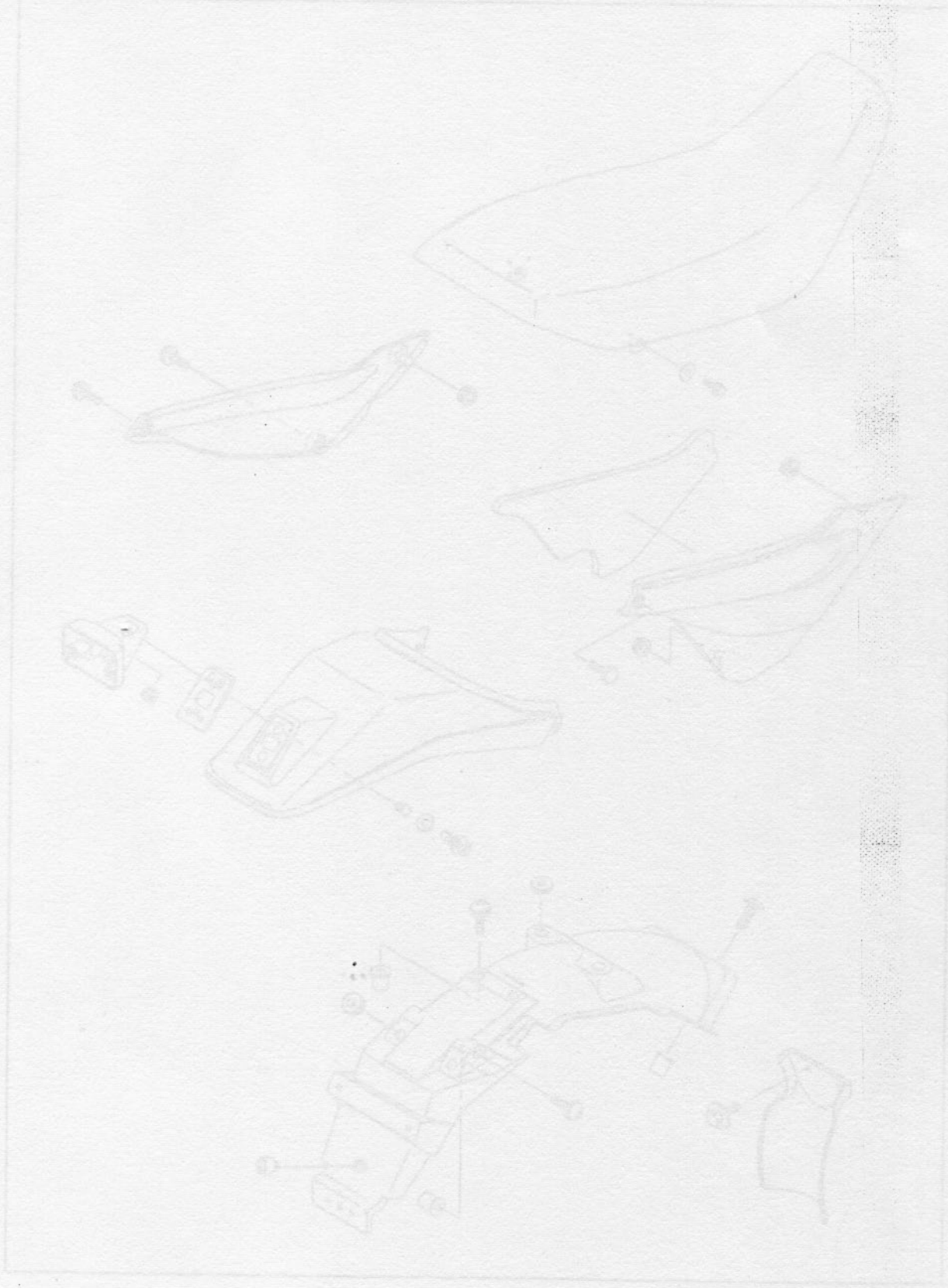


G: Apply grease.
T1: 25 N·m (2.5 kg·m, 18 ft·lb)



Specifications

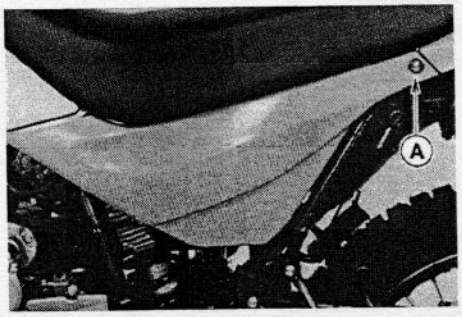
Special Tool - Jack: 57001-1238



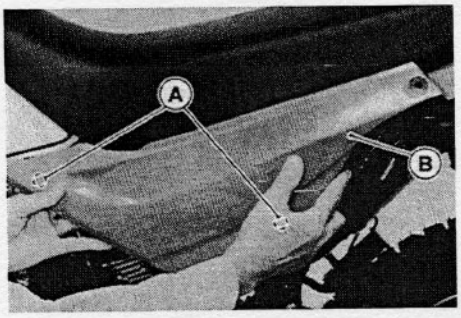
Side Covers

Left Side Cover Removal

- Remove the cover screw [A].



- Pull out the cover evenly to disengage the stoppers [A] in order to remove the left side cover [B].

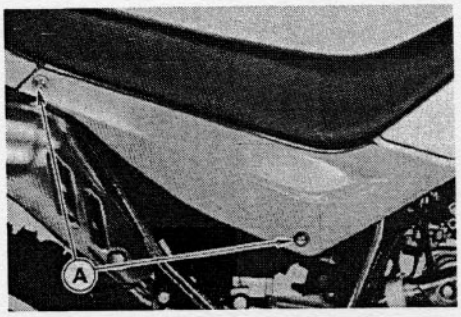


Left Side Cover Installation

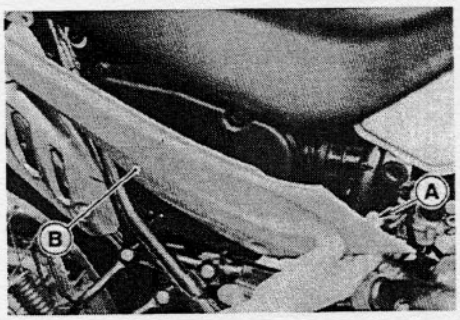
- Installation is the reverse of removal.

Right Side Cover Removal

- Remove the cover screw [A].



- Pull out the cover evenly to disengage the stoppers [A] in order to remove the right side cover [B].



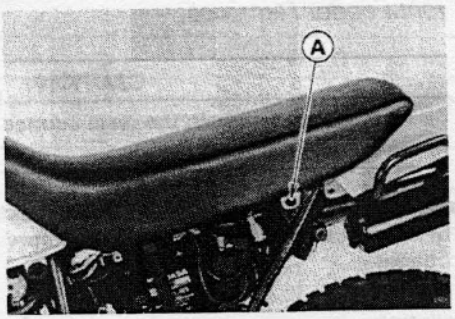
Right Side Cover Installation

● Installation is the reverse of removal.

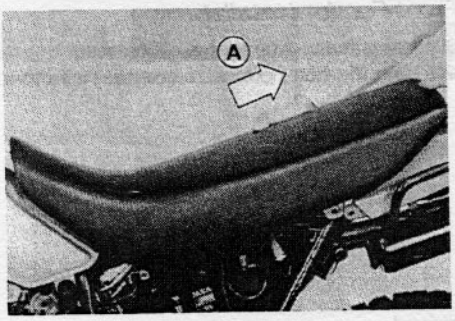
Seat

Seat Removal

- Remove the right and left side covers (see Right/Left Side Cover Removal).
- Remove the seat screw and collar [A] from the right and left sides.

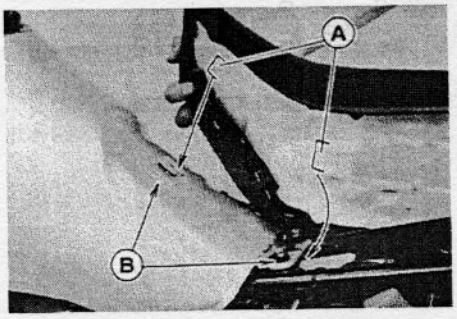


- Pull the seat backward [A] to remove.



Seat Installation

- Insert the hooks [A] of the seat into the respective brackets [B] of the fuel tank.
- Install the right and left side covers (see Right/Left Side Cover Installation).

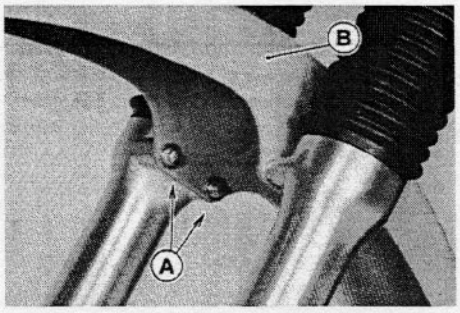


Fender

Front Fender Removal

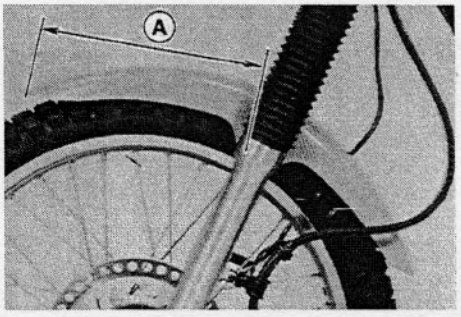
CAUTION
Be careful not to scratch the resin surface during removal or installation.

- Remove the front wheel (see Wheels/Tires chapter).
- Remove the mounting bolts [A] and remove the front fender [B] from the back.



Front Fender Installation

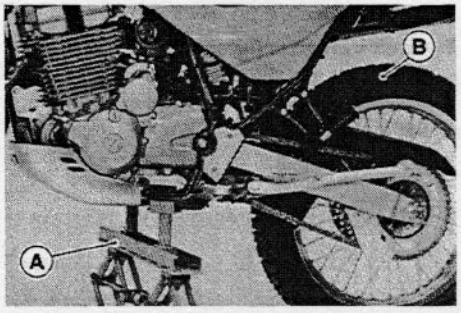
- Installation is the reverse of removal.
- Using the bolt hole as reference, face the long end [A] of the fender forward.



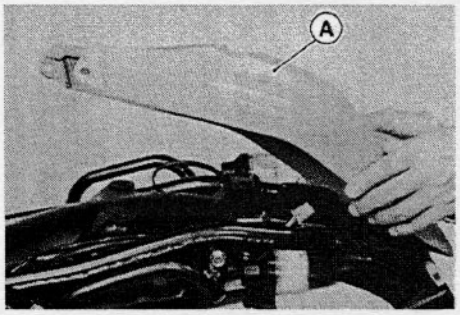
Rear Fender Removal

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

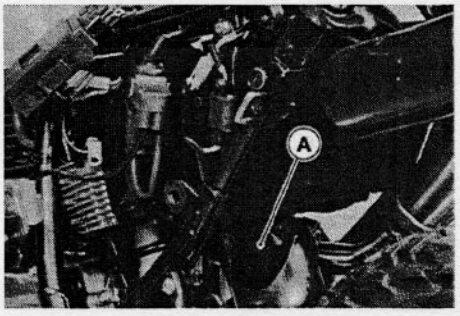
Special Tool - Jack: 57001-1238



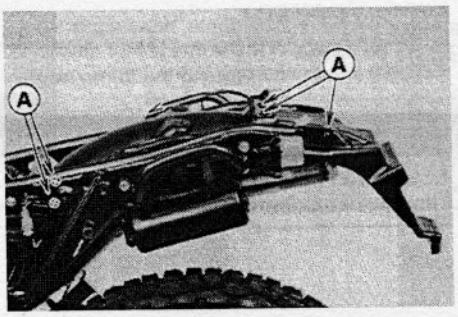
- Remove:
  Side Covers (see Right/Left Side Cover Removal)
  Seat (see Seat Removal)
- Pull out the seat cover [A].
- Pull out the taillight connector.



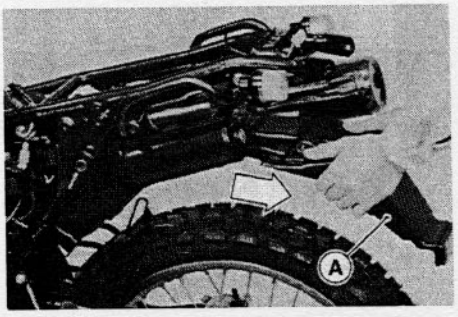
- Remove the flap [A].



● Remove the rear fender screw [A].

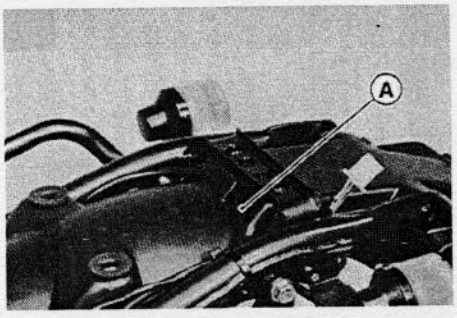


● Remove the rear fender [A].



Rear Fender Installation

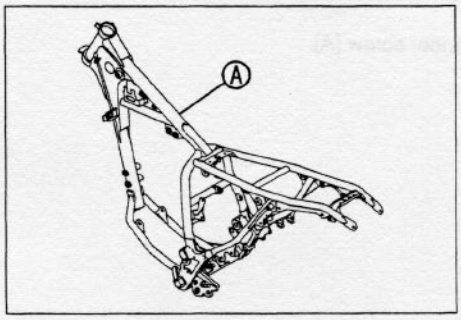
● Installation is the reverse of removal.
● Run the rear turn signal light lead [A] as shown.



Frame

Frame Inspection

● Visually inspect the frame [A] for cracks, dents, bending, or warp.
★ If there is any damage to the frame, replace it.



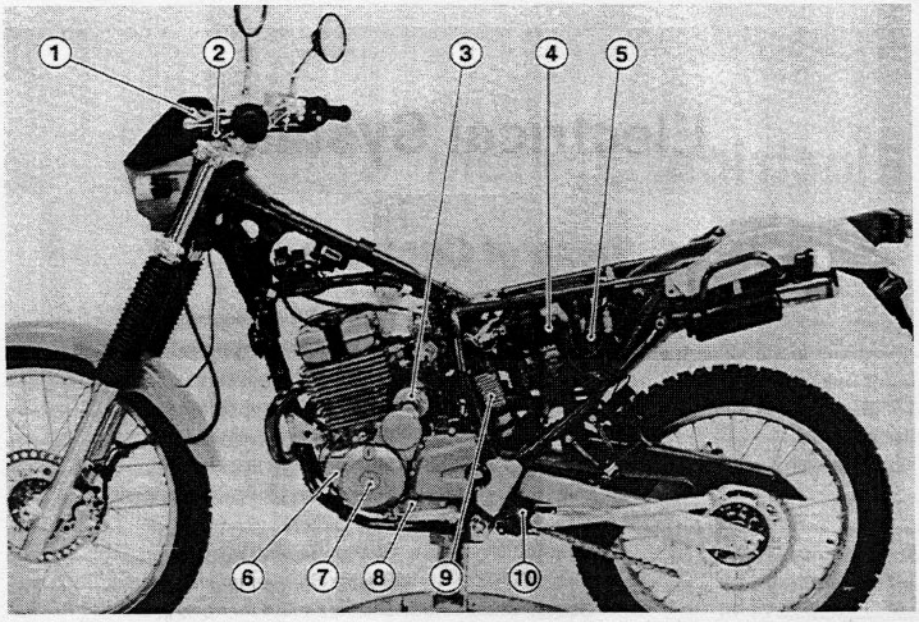
⚠WARNING

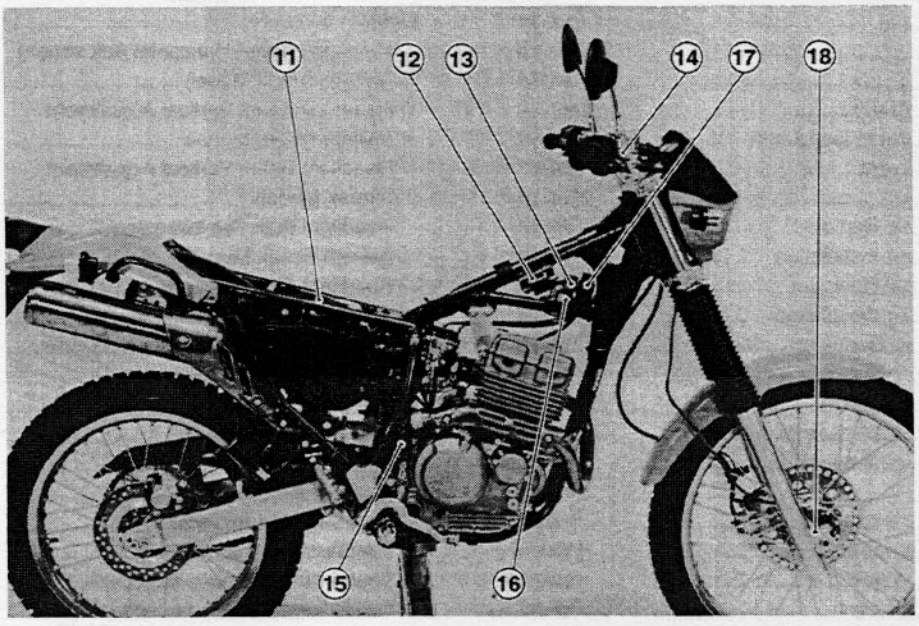
A repaired frame may fail in use, possibly causing an accident. If the frame is bent, dented, cracked, or warped, replace it.

Electrical System

Table of Contents

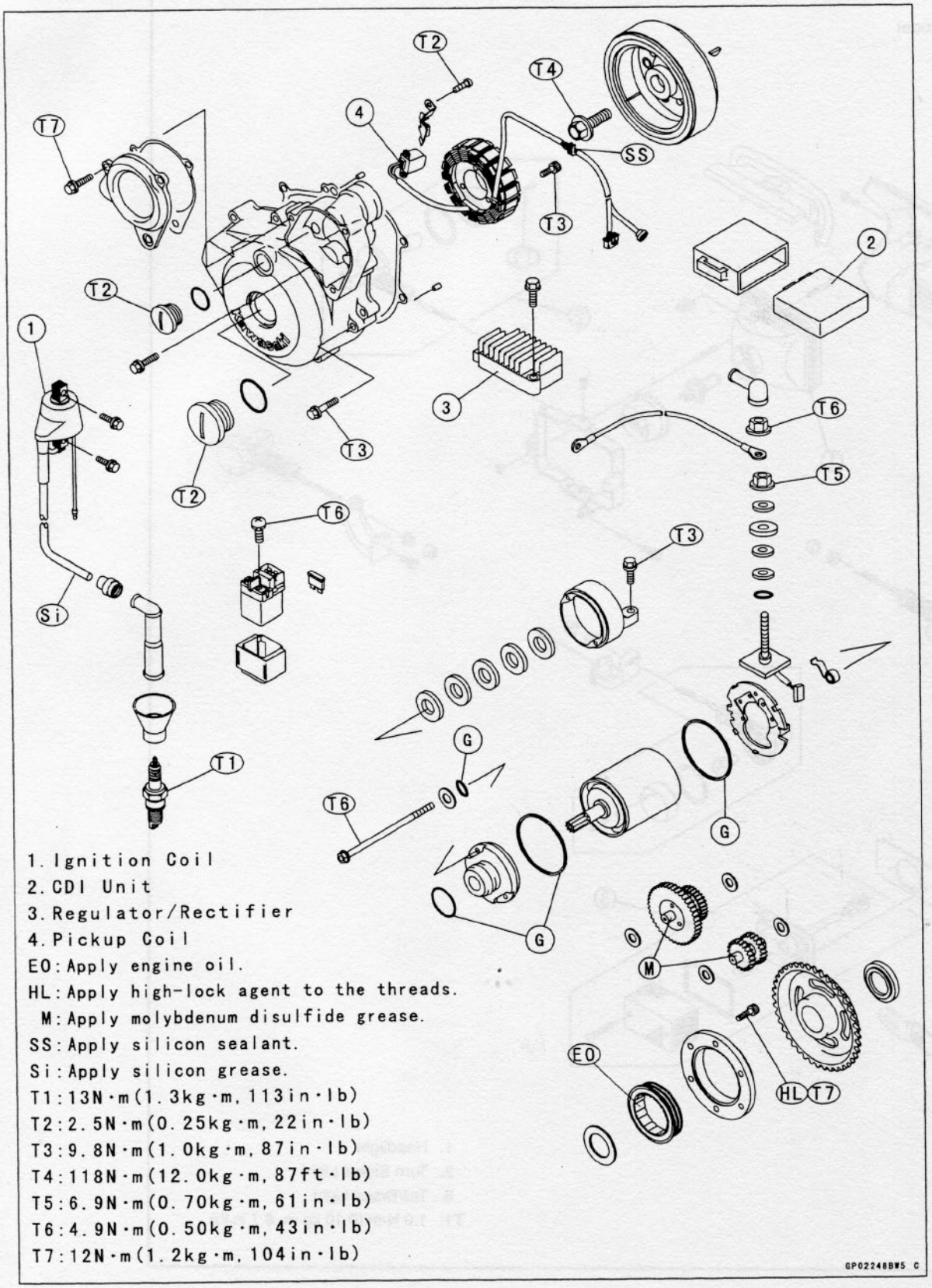
Parts Location





1. Digital Meter
2. Starter Lockout Switch
3. Starter Motor
4. Maintenance-Free Battery
5. Starter Relay
6. Pickup Coil
7. Alternator
8. Neutral Switch
9. Regulator/Rectifier
10. Side Stand Switch
11. CDI Unit
12. Ignition Coil
13. Turn Signal Relay
14. Front Brake Light Switch
15. Rear Brake Light Switch
16. Interlock Diode
17. Starter Circuit Relay
18. Speed Sensor

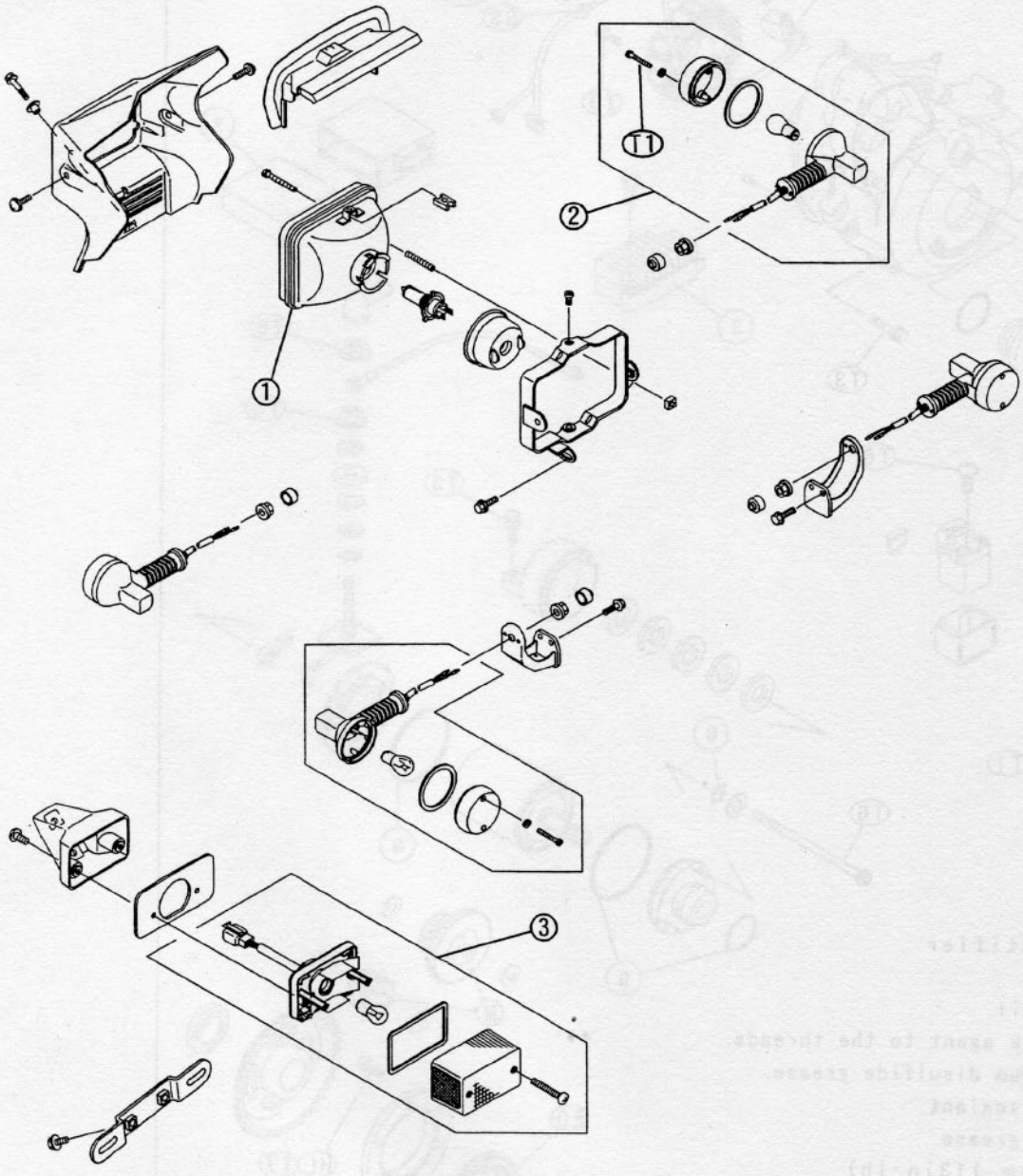
Exploded View



1. Ignition Coil
2. CDI Unit
3. Regulator/Rectifier
4. Pickup Coil

EO: Apply engine oil.
HL: Apply high-lock agent to the threads.
M: Apply molybdenum disulfide grease.
SS: Apply silicon sealant.
Si: Apply silicon grease.
T1: 13N·m (1.3kg·m, 113in·lb)
T2: 2.5N·m (0.25kg·m, 22in·lb)
T3: 9.8N·m (1.0kg·m, 87in·lb)
T4: 118N·m (12.0kg·m, 87ft·lb)
T5: 6.9N·m (0.70kg·m, 61in·lb)
T6: 4.9N·m (0.50kg·m, 43in·lb)
T7: 12N·m (1.2kg·m, 104in·lb)

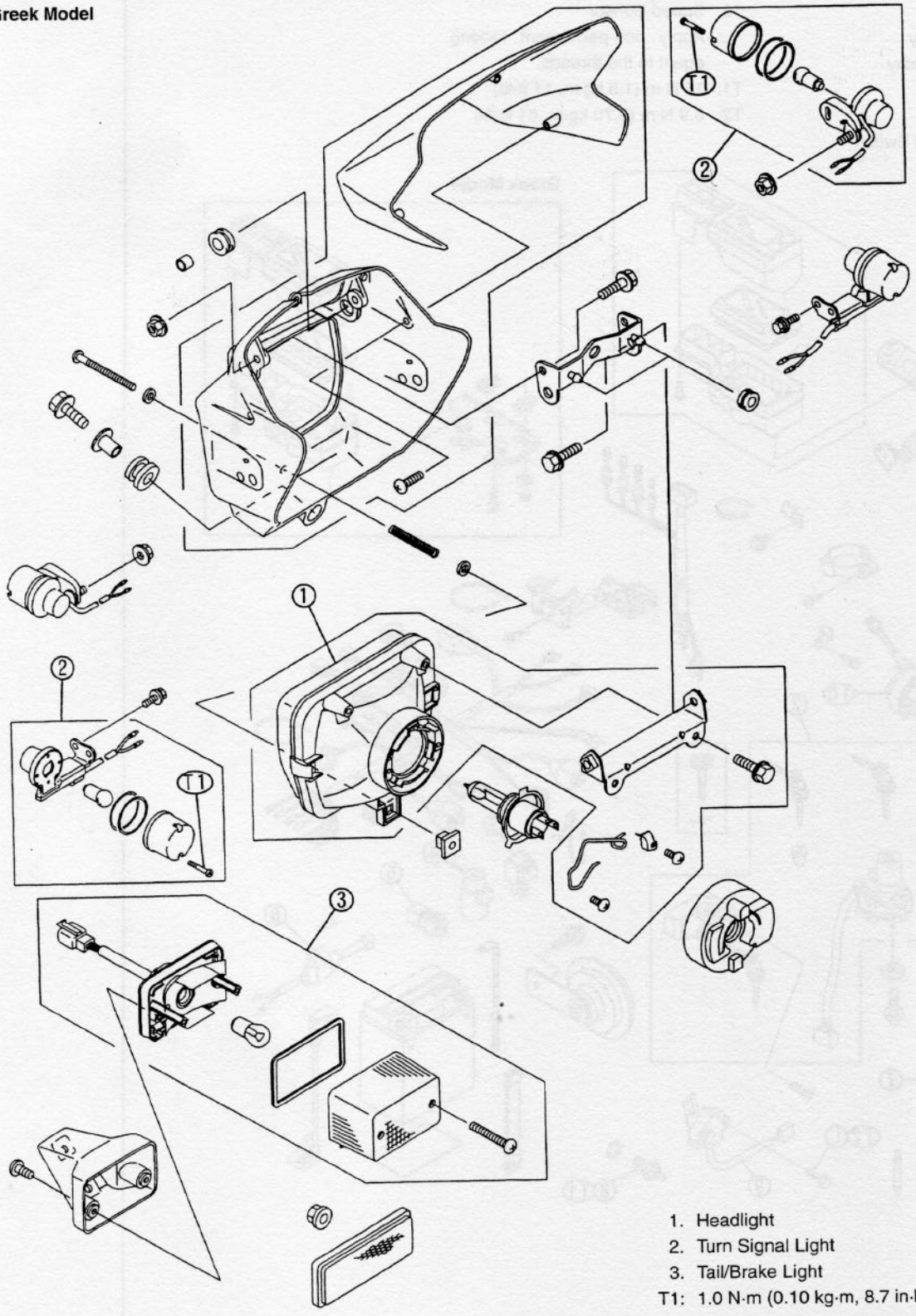
Except Greek Model



1. Headlight
2. Turn Signal Light
3. Tail/Brake Light

T1: 1.0 N·m (0.10 kg·m, 8.7 in·lb)

Greek Model

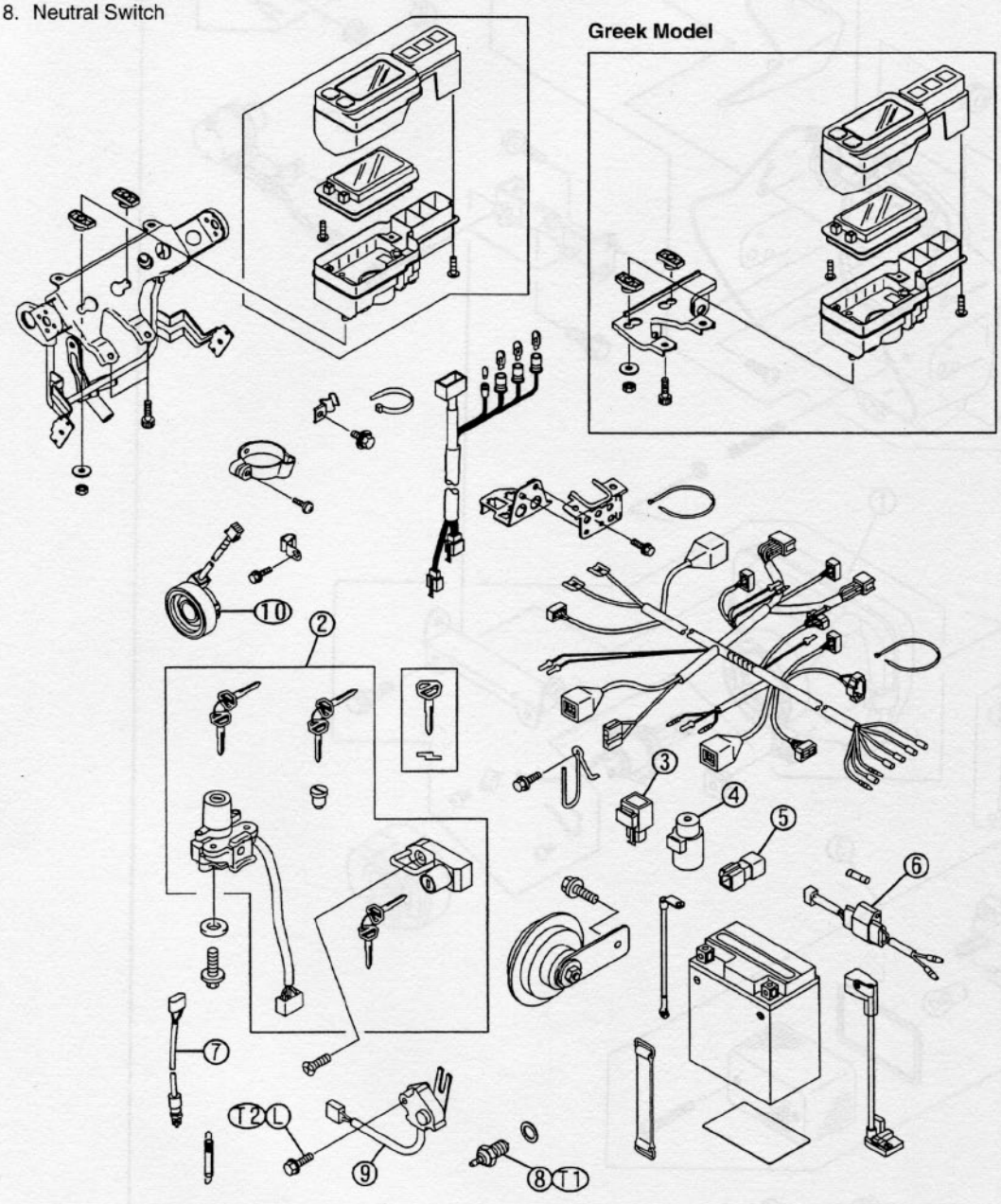


1. Headlight
2. Turn Signal Light
3. Tail/Brake Light

T1: 1.0 N·m (0.10 kg·m, 8.7 in·lb)

1. Digital Meter
2. Ignition Switch
3. Turn Signal Relay
4. Starter Circuit Relay
5. Interlock Diode
6. Fuse Case
7. Rear Brake Light Switch
8. Neutral Switch
9. Side Stand Switch
10. Speed Sensor

L: Apply non-permanent locking agent to the threads.
T1: 15 N·m (1.5 kg·m, 11 ft·lb)
T2: 6.9 N·m (0.70 kg·m, 61 in·lb)

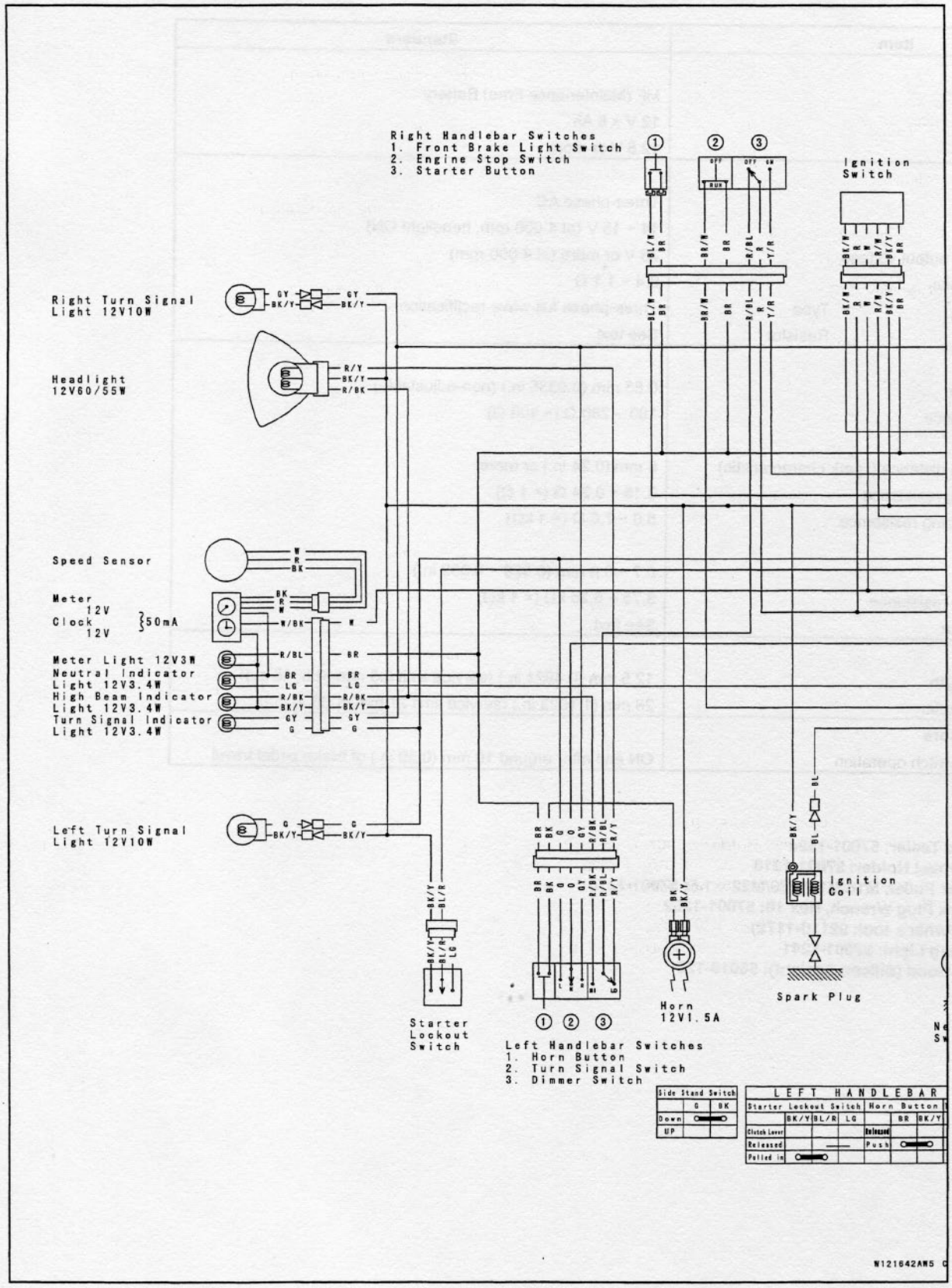


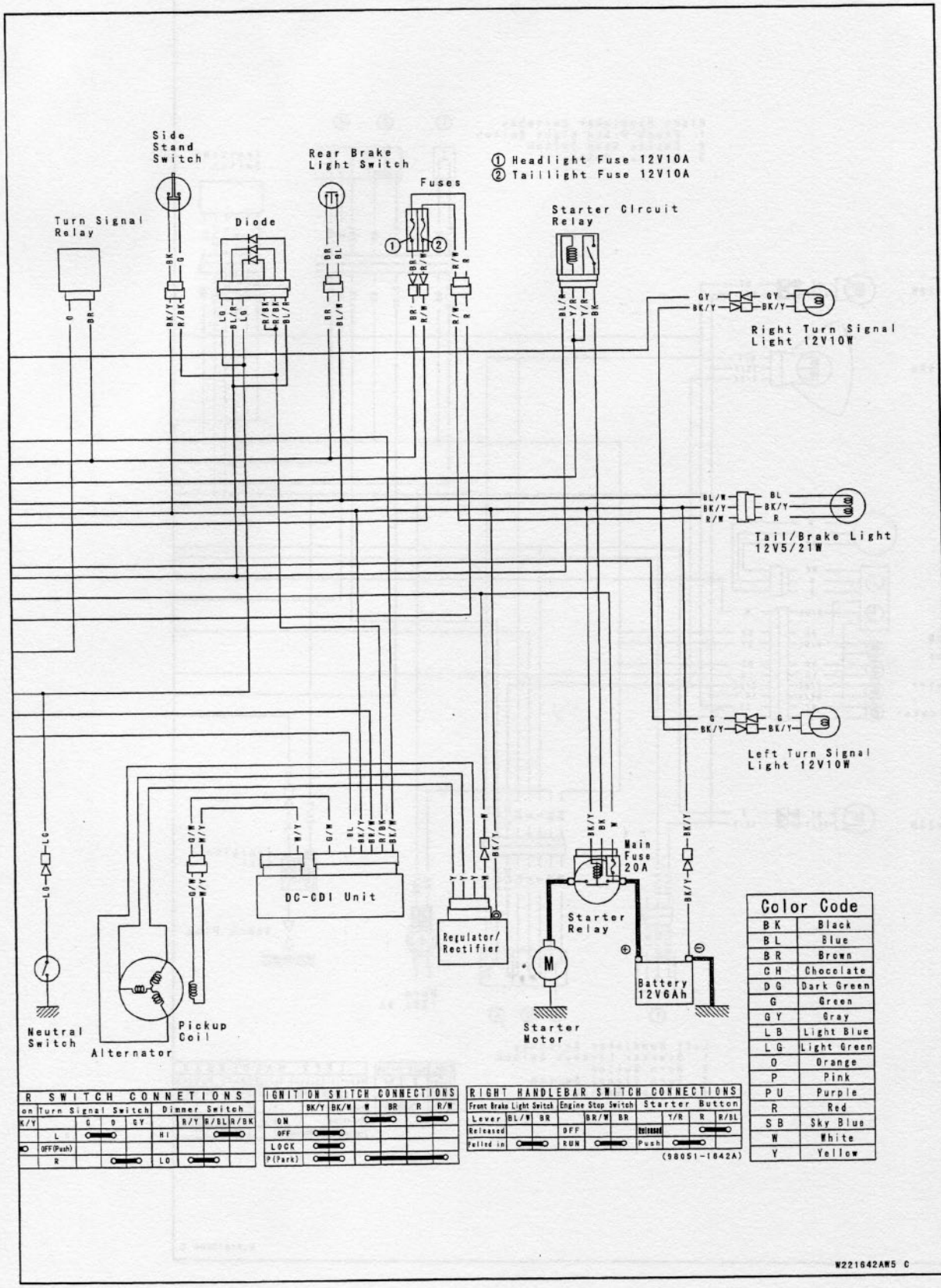
Specifications

Item		Standard
Battery:		
Type		MF (Maintenance Free) Battery
Capacity		12 V × 6 Ah
Voltage		12.8 V or more
Charging System:		
Alternator type		Three-phase AC
Charging voltage		14 ~ 15 V (at 4 000 rpm, headlight ON)
Alternator no-load output voltage		38 V or more (at 4 000 rpm)
Stator coil resistance		0.4 ~ 1.1 Ω
Regulator/rectifier	Type	Three-phase full-wave rectification
	Resistor	See text.
Ignition System:		
Pickup coil air gap		0.85 mm (0.0335 in.) (non-adjustable)
Pickup coil resistance		180 ~ 280 Ω (× 100 Ω)
Ignition coil:		
3 needle arcing distance (spark characteristic)		6 mm (0.24 in.) or more
Primary winding resistance		0.16 ~ 0.24 Ω (× 1 Ω)
Secondary winding resistance		5.0 ~ 7.6 Ω (× 1 kΩ)
Spark plug:		
Spark plug gap		0.7 ~ 0.8 mm (0.028 ~ 0.032 in.)
Spark plug gap resistance		3.75 ~ 6.25 kΩ (× 1 kΩ)
CDI unit resistance		See text.
Starter Motor:		
Carbon brush length		12.5 mm (0.4921 in.) (service limit 8.5 mm (0.3346 in.))
Commutator diameter		28 mm (1.1023 in.) (service limit 27 mm (1.0630 in.))
Switches and Sensors		
Rear brake light switch operation		ON and after around 10 mm (0.39 in.) of brake pedal travel

Special Tools - Hand Tester: 57001-1394
Flywheel Holder: 57001-1313
Rotor Puller, M16/M18/M20/M22 × 1.5: 57001-1216
Spark Plug Wrench, Hex 16: 57001-1262
(or owner's tool: 92110-1172)
Timing Light: 57001-1241
Sealant - Kawasaki Bond (Silicon Sealant): 56019-120

KL250-H Wiring Diagram (Greek Model)





R SWITCH CONNETIONS							
on	Turn Signal Switch				Dimmer Switch		
K/Y		G	O	GY		R/Y	R/BL	R/BK
	L				HI			
	OFF(Push)							
	R				LO			

IGNITION SWITCH CONNECTIONS						
	BK/Y	BK/W	W	BR	R	R/W
ON						
OFF						
LOCK						
P(Park)						

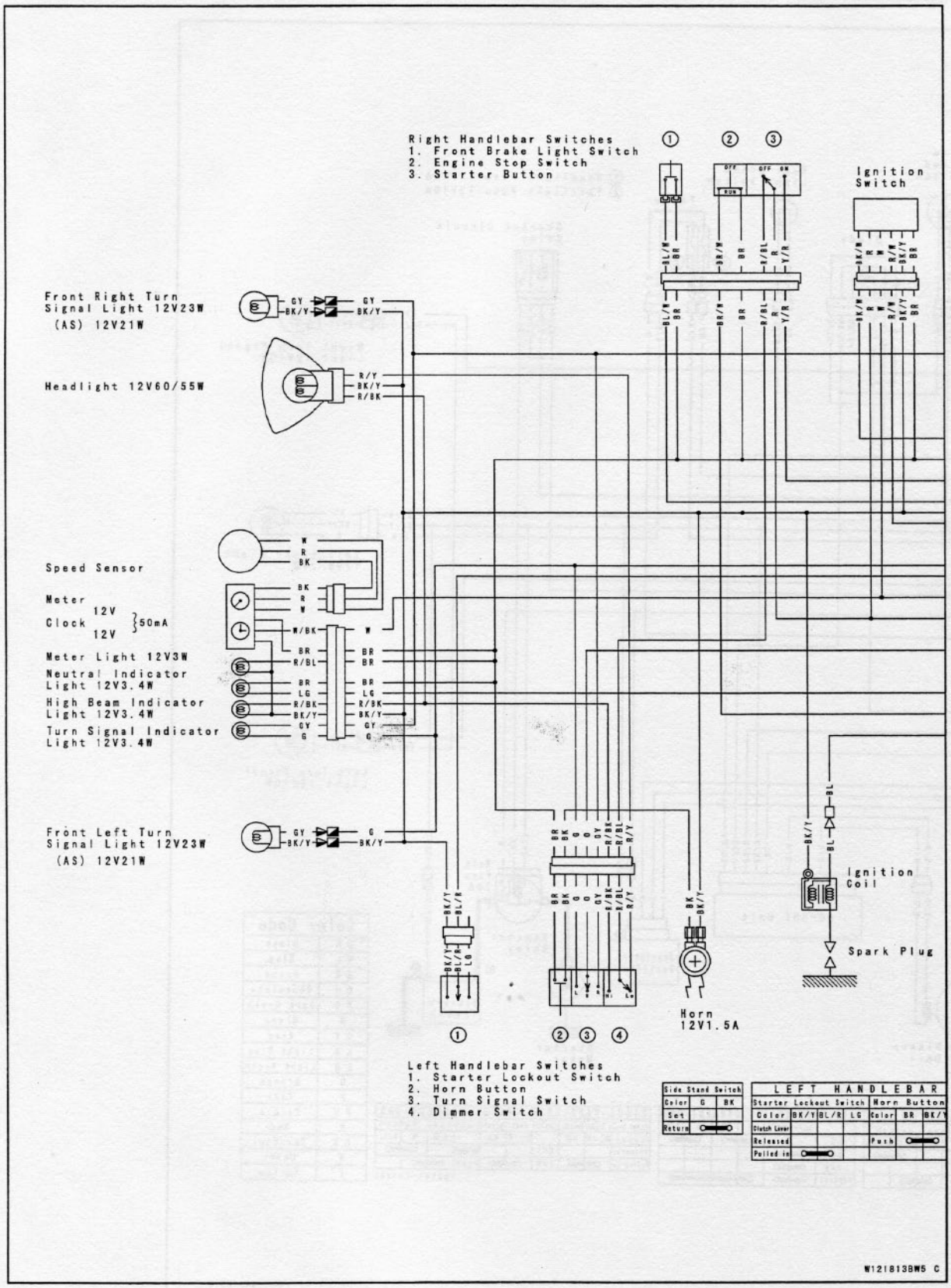
RIGHT HANDLEBAR SWITCH CONNECTIONS									
Front Brake Light Switch			Engine Stop Switch			Starter Button			
Lever	BL/W	BR		BR/W	BR		Y/R	R	R/BL
Released			OFF			Released			
Pulled in			RUN			Push			

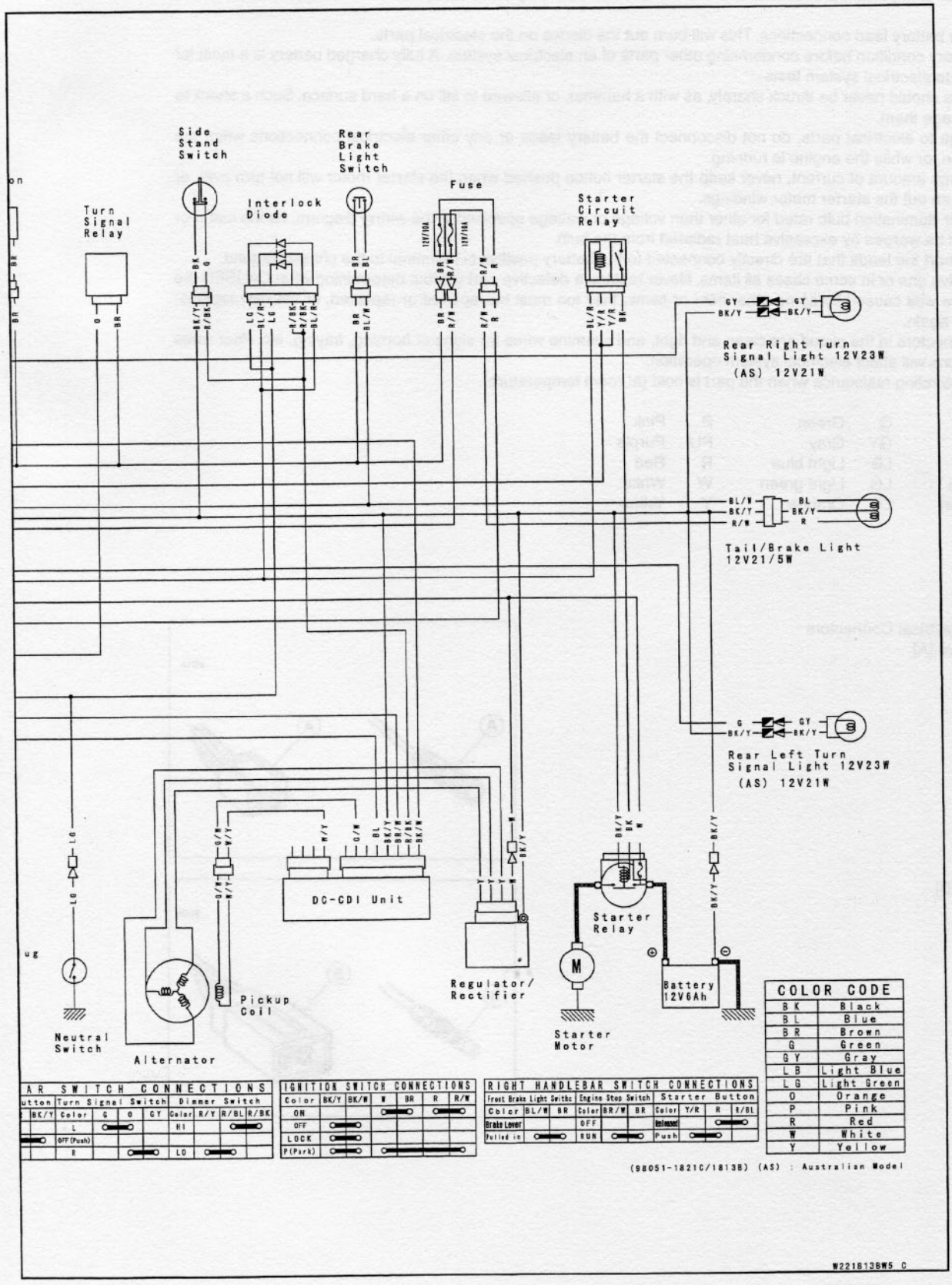
(98051-1842A)

Color Code	
BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark Green
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
SB	Sky Blue
W	White
Y	Yellow

W221642AN5 C

KL250-G/H Wiring Diagram (U.S. and Canadian Model)




Side Stand Switch
Rear Brake Light Switch
Fuse
Turn Signal Relay
Interlock Diode
Starter Circuit Relay
Rear Right Turn Signal Light 12V23W (AS) 12V21W
Tail/Brake Light 12V21/5W
Rear Left Turn Signal Light 12V23W (AS) 12V21W
DC-CDI Unit
Starter Relay
Regulator/ Rectifier
Battery 12V6Ah
Neutral Switch
Alternator
Pickup Coil
Starter Motor
COLOR CODE
BK Black
BL Blue
BR Brown
G Green
GY Gray
LB Light Blue
LG Light Green
O Orange
P Pink
R Red
W White
Y Yellow
(98051-1821C/1813B) (AS) : Australian Model
W2218136W5 C

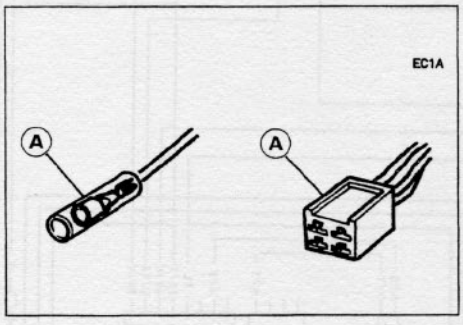
Precautions

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

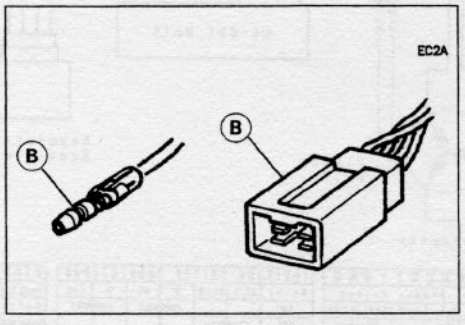
- ○ Do not reverse the battery lead connections. This will burn out the diodes on the electrical parts.
- ○ Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- ○ The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- ○ To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- ○ Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- ○ Do not use a meter illumination bulb rated for other than voltage or wattage specified in the wiring diagram, as the meter or gauge panel could be warped by excessive heat radiated from the bulb.
- ○ Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- ○ Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- ○ Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- ○ Measure coil and winding resistance when the part is cold (at room temperature).
- ○ Color Codes:

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

- ○ Identification of Electrical Connectors
  Female Connectors [A]

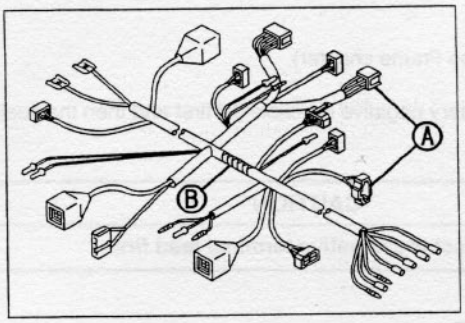


Male Connectors [B]



Electrical Wiring

Wiring Inspection



- ● Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- ● Pull each connector [A] apart and inspect it for corrosion, dirt, damage, and looseness.
- ★ If the connector is corroded or dirty, clean it carefully. If damaged, replace it with a new one. Make sure to connect it securely to prevent improper connection.
- ● Check the wiring for continuity.
- ○ Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- ○ Connect the hand tester between the ends of the leads.

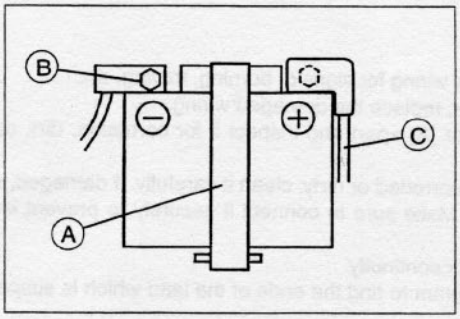
Special Tool - Hand Tester: 57001-1394

- ○ 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 [B] if necessary.

MF (Maintenance-Free) Battery

Battery Removal

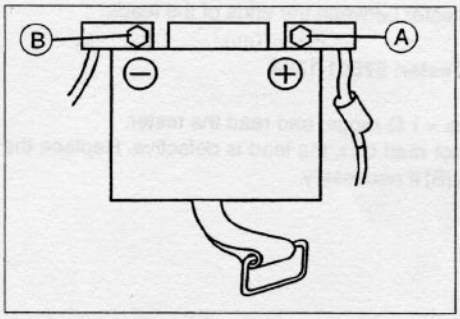
- Remove:
  Left Side Cover (see Frame chapter).
  Battery Band [A]
- Disconnect the battery negative (–) cable [B] first and then the positive (+) cable [C].



CAUTION
Be sure to disconnect the negative terminal lead first.

Battery Installation

- When installing the battery, connect the positive (+) cable [A] first and then the negative cable [B].
- Battery cables are installed for on it and nor front.

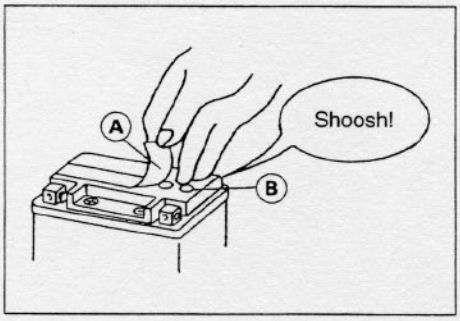


CAUTION
If the battery cable is not correctly disconnected or connected, sparks can arise at electrical connections, causing damage to electrical parts.

Electrolyte Filling

CAUTION
Do not remove the aluminum seat sheet sealing the filler ports until just before use. **Be sure to use the dedicated electrolyte container for correct electrolyte volume.**

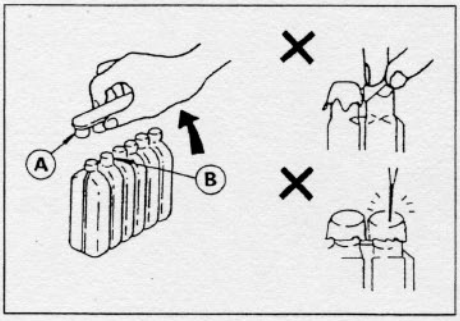
- Check to see that there is no peeling, tears or holes in the sealing sheet.
- Place the battery on a level surface.
- Remove the sealing sheet [A].
- ○ When removing, check to hear an air-sucking sound "Shoosh!" from filler ports [B].



NOTE

- ○ *A Battery whose sealing sheet has any peeling, tears, holes, or from which the air-sucking sound was not heard requires a refreshing charge (initial charge).*

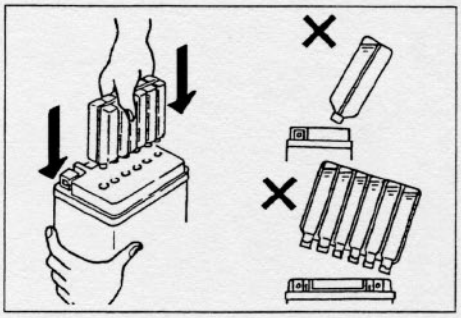
- Take the electrolyte container out of the vinyl bag.
- Detach the strip of caps [A] from the container.



NOTE

- ○ *Do not discard the strip of caps because it is used as the battery plugs later.*
- ○ *Do not peel back or pierce the sealed areas [B].*

- Place the electrolyte container upside down with the six sealed areas in line with the six battery filler ports. Push the container down strongly enough to break the seals. Now the electrolyte should start to flow into the battery and bubbles will appear from six locations.



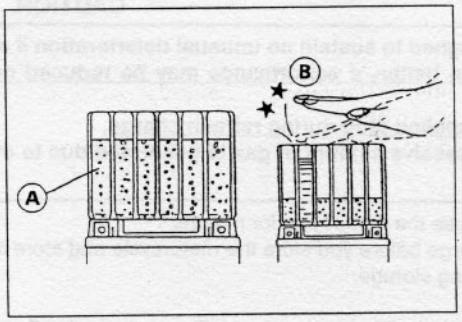
NOTE

- ○ *Do not tilt the container as the electrolyte flow may be interrupted.*

- Make sure air bubbles [A] are coming up from all six filler ports. Leave the container this way for 5 minutes or longer.

NOTE

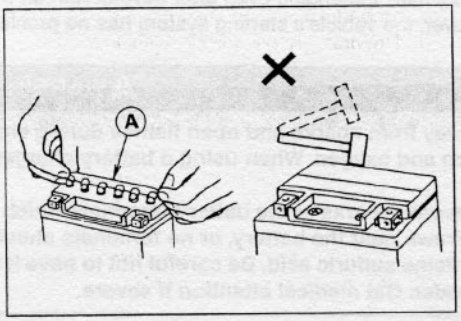
○ *If no air bubbles are coming up from a filler port, tap [B] the bottom of the bottle two or three times. Do not remove the container from the battery.*



CAUTION

Fill until the container is completely emptied.

- Be certain that all the electrolyte has flowed out.
- Tap the bottom the same way as above if there is any electrolyte left in the container.
- Now pull the container gently out of the battery.
- Let the battery sit for **20** minutes. During this time, the electrolyte permeates the special separators and the gas generated by chemical reaction is released.
- Fit the strip of caps [A] tightly into the filler ports until the strip is at the same level as the top of the battery.



NOTE

○ *Do not hammer. Press down evenly with both hands.*

⚠WARNING

Once you install the strip of caps after filling the battery, never remove it, nor add any water or electrolyte.

Initial Charge

While a maintenance free battery can be used after only filling with electrolyte, a battery may not be able to sufficiently move a starter motor to start an engine in the cases shown in the table below, where an initial charge is required before use. However, if a battery shows a terminal voltage of higher than 12.8 V after 10 minutes* of filling, no initial charge is necessary.

Condition requiring initial charge	Charging method
At low temperatures (lower than 0 °C)	0.7 A × 2 ~ 3 hours
Battery has been stored in high temperature and humidity.	0.7 A × 15 ~ 20 hours
Seal has been removed, or broken - peeling, tear or hole. (If you did not hear the air-sucking sound "Shoosh!" as you removed the seal.)	
Battery as old as 2 years or more after manufactured. Battery manufacturing date is printed on battery top. Example: 12 (Day) 3 (Month) 99 (Year) T1 (Mfg. location)	

* Terminal voltage: To measure the terminal voltage, use a digital voltmeter which can be read to one decimal place voltage.

Precautions

1) No need topping-up
   No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the sealing plug to add water is very dangerous. Never do that.
2) Refreshing charge
   If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the Refreshing Charge section.
   When a quick charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

CAUTION

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However the battery's performance may be reduced noticeably if charged under conditions other than given above.
Never remove the sealing plug during refresh charge.
If by chance an excessive amount of gas is generated due to overcharging, the safety valve operates to keep the battery safe.

3) When you do not use the motorcycle for months
Give a refresh charge before you store the motorcycle and store it with the negative lead removed. Give a refresh charge once a month during storage.
4) Battery life
If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it. (Provided, however, the vehicle's starting system has no problem.)

⚠WARNING

Keep the battery away from sparks and open flames during charging, since the battery gives on an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger.
This procedure prevents sparks at the battery terminals which could ignite any battery gases.
No fire should be drawn near the battery, or no terminals should have the tightening loosened.
The eleotrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water. Get medical attention if severe.

Interchangeability

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 had an ordinary battery as original equipment, the maintenance free battery's life will be shortened.

Charging Condition Inspection

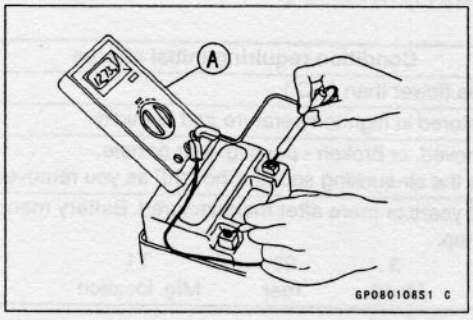
○ Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].

● Remove:
Seats (see Frame chapter)
Battery Cover

● Disconnect the battery terminals.

CAUTION

Be sure to disconnect the negative (−) cable first.



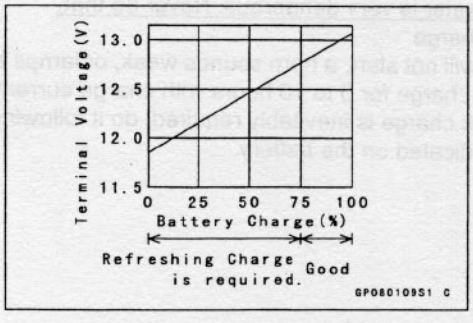
● Measure the battery terminal voltage.

NOTE

○ *Measure with a digital voltmeter which can be read one decimal place voltage.*

★ If the reading is 12.8 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

[Battery Terminal Voltage]
Standard: 12.8 V or more

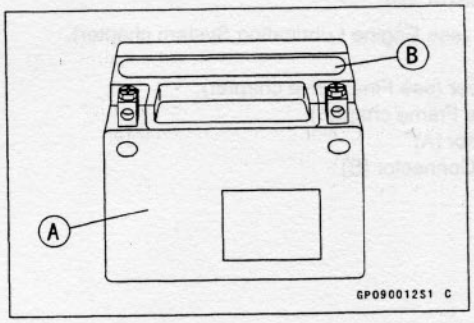


Refreshing Charge

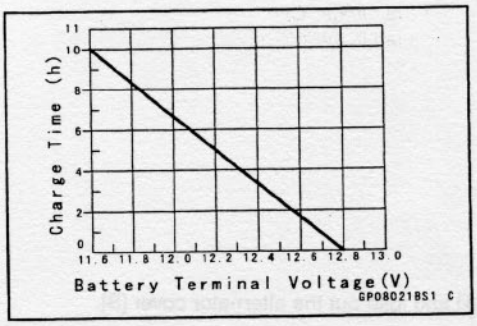
- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠WARNING

This battery is a sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



[Terminal Voltage: 11.5 ~ less than 12.8 V]
Standard Charge: 0.7 A × 5 ~ 10 h (see following chart)
Quick Charge: 3 A × 1 h



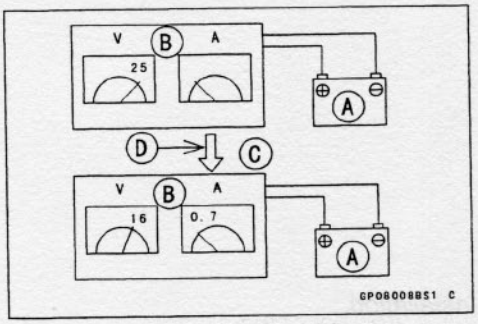
CAUTION

If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

[Terminal Voltage: less than 11.5 V]
Charging Method: 0.7 A × 20 h

NOTE

○ *Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.*



Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]

- Determine the battery condition after refresh charge.

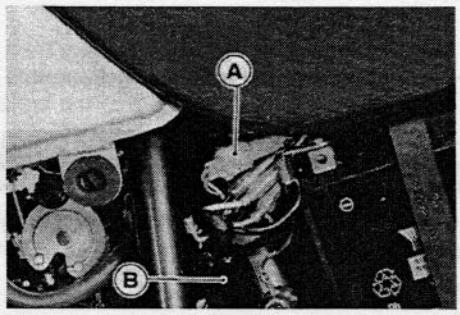
○ Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Criteria	Judgment
12.8 V or higher	Good
12.0 ~ lower than 12.8 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

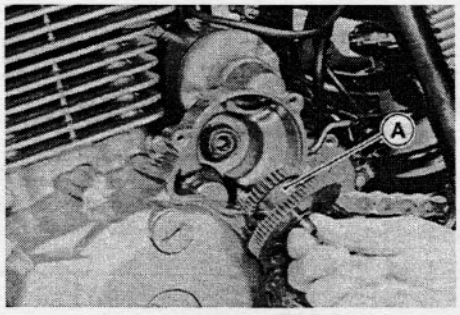
Charging System

Alternator Cover Removal

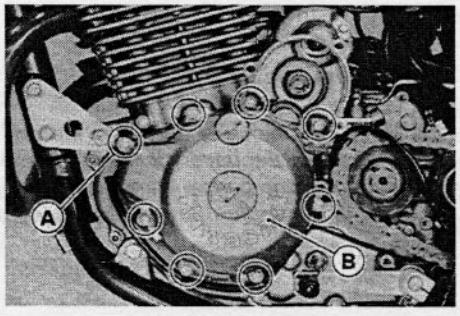
- Drain the engine oil (see Engine Lubrication System chapter).
- Remove:
  Engine sprocket cover (see Final Drive chapter).
  Left Side Cover (see Frame chapter).
  Pickup Coil Connector [A]
  Regulator/Rectifier Connector [B]



- Remove:
  Torque Limiter Cap
  Torque Limiter [A]

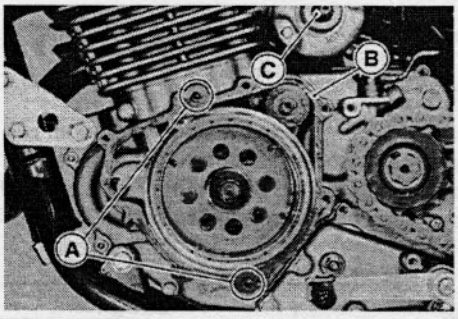


- Remove the bolts [A] and take out the alternator cover [B].



Alternator Cover Installation

- Install the dowel pins [A] and a new gasket [B].
- Apply silicone sealant to the alternator lead grommet and crankcase halves mating surface.
- Apply molybdenum disulfide grease to the starter pinion gear [C] and the torque limiter shaft.
- Run the lead wires as specified in the General Information chapter.

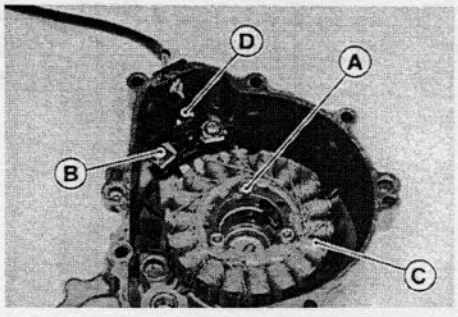


Torque - Alternator Cover Bolt: 9.8 N·m (1.0 kg·m, 87 in·lb)
Torque Limiter Cap Bolt: 12 N·m (1.2 kg·m, 104 in·lb)

- Fill the engine with oil (see Engine Lubrication System chapter).

Alternator Stator Removal

- Remove the alternator cover (see Alternator Cover Removal).
- Remove the allen bolt [A], screw [B], and take out the stator [C] and the pickup coil [D] from the cover.



Alternator Stator Installation

● Tighten the following parts:

Torque - Alternator Stator Bolt: 9.8 N·m (1.0 kg·m, 87 in·lb)
Pickup Coil Screw: 2.5 N·m (0.25 kg·m, 22 in·lb)

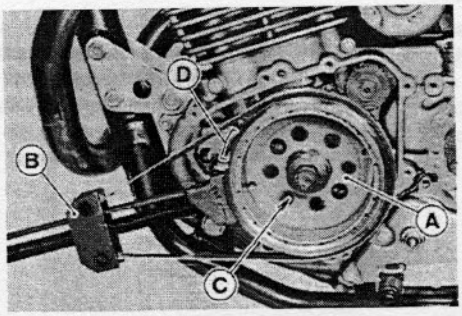
● Apply silicone sealant to the circumference of the alternator lead grommet [C], and fit the grommet into the notch of the cover securely.

Sealant - Kawasaki Bond (Silicon Sealant): 56019-120

Alternator Rotor Removal

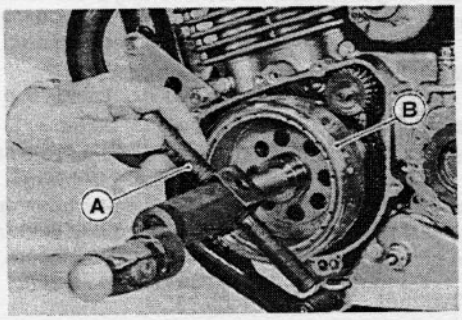
● Remove the alternator cover (see Alternator Cover Removal).
● Hold the alternator rotor [A] steady with the flywheel holder [B], and remove the rotor bolt [C].

Special Tool - Flywheel Holder: 57001-1313



CAUTION
Do not hold the timing plate [D] of the alternator rotor. This can damage the timing plate.

● Using the rotor puller [A], remove the rotor [B] from the crankshaft.
○ Screw in the puller while tapping the head of the puller with a hammer.



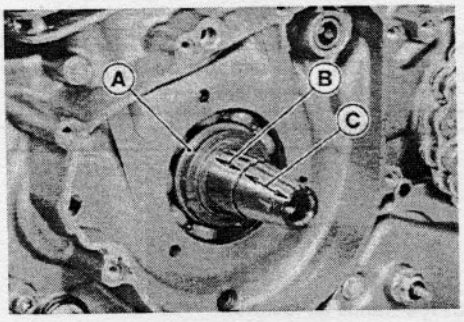
CAUTION
Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Special Tool - Rotor Puller: 57001-1216

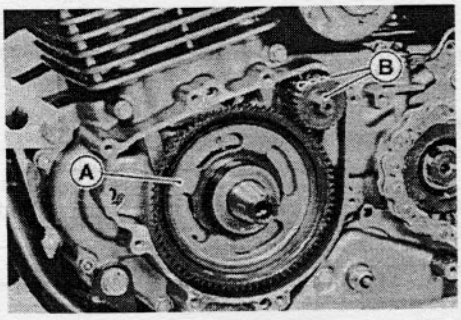
● Remove the starter idler gear and the starter gear.

Alternator Rotor Installation

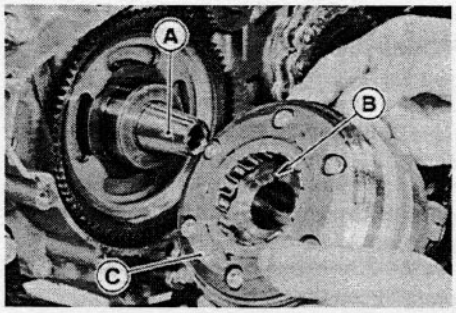
● Install the collar [A].
● Apply a thin coat of molybdenum disulfide grease to the crankshaft journal [B].
● Using high-flash point solvent, clean the tapered portion [C] of the crankshaft.
● Also clean the opposing tapered portion of the alternator rotor with high-flash point solvent.



● Install the starter gear [A].
● Apply molybdenum disulfide grease to the journals [B] at the front and back of the idler gear, and install the gear.



- Fit the woodruff key [A] securely in the slot in the crankshaft before installing the alternator rotor.
- Install the alternator rotor [C] so that the woodruff key fits in the groove [B] of the rotor.
- Tighten the alternator rotor bolt.



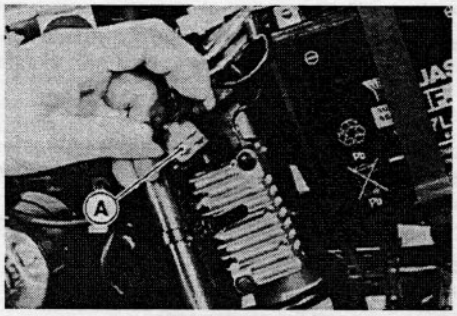
Torque - Alternator Rotor Bolt: 120 N·m (12.0 kg·m, 87 ft·lb)
Special Tool - Flywheel Holder; 57001-1313

- Install the alternator cover (see Alternator Cover Installation).

Alternator Inspection

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

- To check the alternator output voltage, do the following procedures.
- ○ Disconnect the regulator/rectifier connector [A] from behind the left side cover.
- ○ Connect the hand tester as indicated in the table below.
- ○ Start the engine.
- ○ Set the engine speed to the rpm indicated in the table below.
- ○ Read the tester's measurements (a total of 3 times for the combination of the lead wires).
- ★ If the output voltage shows the value in the table, the alternator operates properly and the regulator/rectifier is damaged. A much lower reading than the value in the table indicates that the alternator is defective.



[Alternator No-Load Voltage]

Tester range	Connection		Measurement value 4,000 rpm
	Tester positive (+) terminal	Tester negative (–) terminal	
250 V AC	Yellow lead	Another yellow lead	38 V or above

- Check the stator coil resistance as follows:
- ○ Stop the engine.
- ○ Connect the hand tester as described in the table below.
- ○ Read the tester's measurements (a total of 3 times for the combination of the lead wires).

[Stator Coil Resistance]

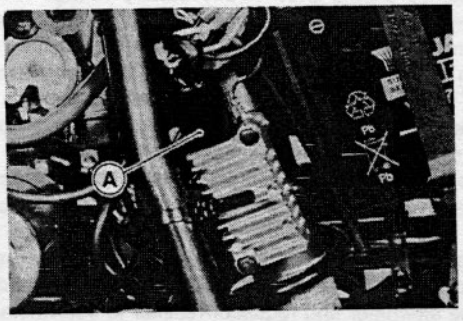
Tester range	Connection		Measurement value
	Tester positive (+) terminal	Tester negative (–) terminal	
× 1 Ω	Yellow lead	Another yellow lead	0.4 ~ 1.1 Ω

★ If there is more resistance than shown in the table, or no hand tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
● Using the highest resistance range of the hand tester, measure the resistance between each of the Yellow leads and chassis ground.
★ Any hand tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
★ If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

Special Tool - Hand Tester: 57001-1394

Regulator/Rectifier Inspection

● Remove the left side cover (see Frame chapter).
● Disconnect the connector [A] from the regulator/rectifier.
● Set the hand tester (special tool) to the x 1 kΩ range and make the measurements shown in the table.
★ If the reading is out of standard, replace the regulator/rectifier.



Special Tool - Hand Tester: 57001-1394

CAUTION

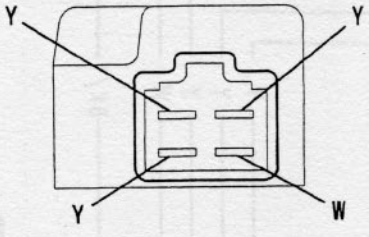
Use only Hand Tester 57001-1394 for this test. A tester other than the Kawasaki Hand Tester may show different readings. If a megger or a meter with a large-capacity battery is used, the regulator/rectifier will be damaged.

[Regulator/Rectifier Internal Resistance] **Unit (KΩ)**

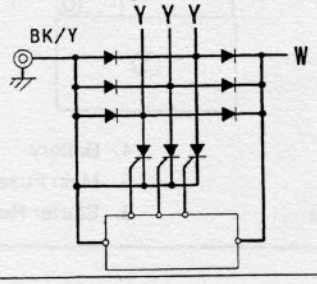
		Tester positive (+) terminal				
	Green	W	Y	Y	Y	BK/Y
Tester negative (-) terminal	W	–	∞	∞	∞	∞
	Y	0.5 ~ 10	–	∞	∞	∞
	Y	0.5 ~ 10	∞	–	∞	∞
	Y	0.5 ~ 10	∞	∞	–	∞
	BK/Y	0.5 ~ 20	0.5 ~ 10	0.5 ~ 10	0.5 ~ 10	–

BK/Y: Body Ground

[Terminals on Regulator/Rectifier]



[Internal Circuit Diagram]



Charging Voltage Inspection

- Check the battery condition.
- Warm up the engine to obtain actual alternator operating conditions.
- Check that the ignition switch is turned off, and connect the hand tester as shown in the table.

Regulator/Rectifier Output Voltage

Tester range	Connection terminal		Standard
	Tester (+) to	Tester (–) to	
DC 25 V	Battery (+)	Battery (–)	14 ~ 15 V

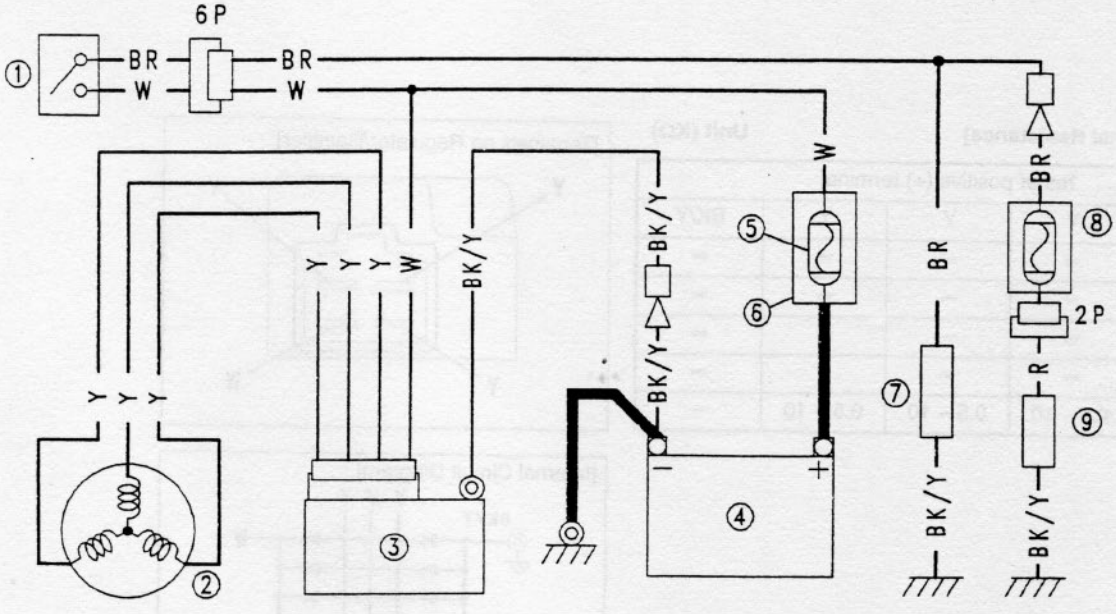
- Turn on the ignition switch and start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. The readings should show nearly battery voltage when the engine speed is low, and as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.
- Turn off the ignition switch to stop the engine, and disconnect the hand tester.

★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

★ If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★ If the battery voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

[Charging System Circuit]



1. Ignition Switch
2. Alternator
3. Regulator/Rectifier
4. Battery
5. Main Fuse 20 A
6. Starter Relay
7. Load (Brake Light, Horn)
8. Fuse 10 A
9. Load (Headlight)

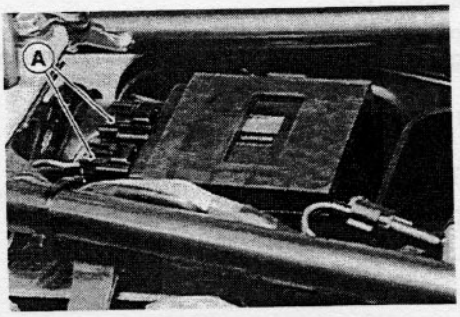
Ignition System

⚠ WARNING

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

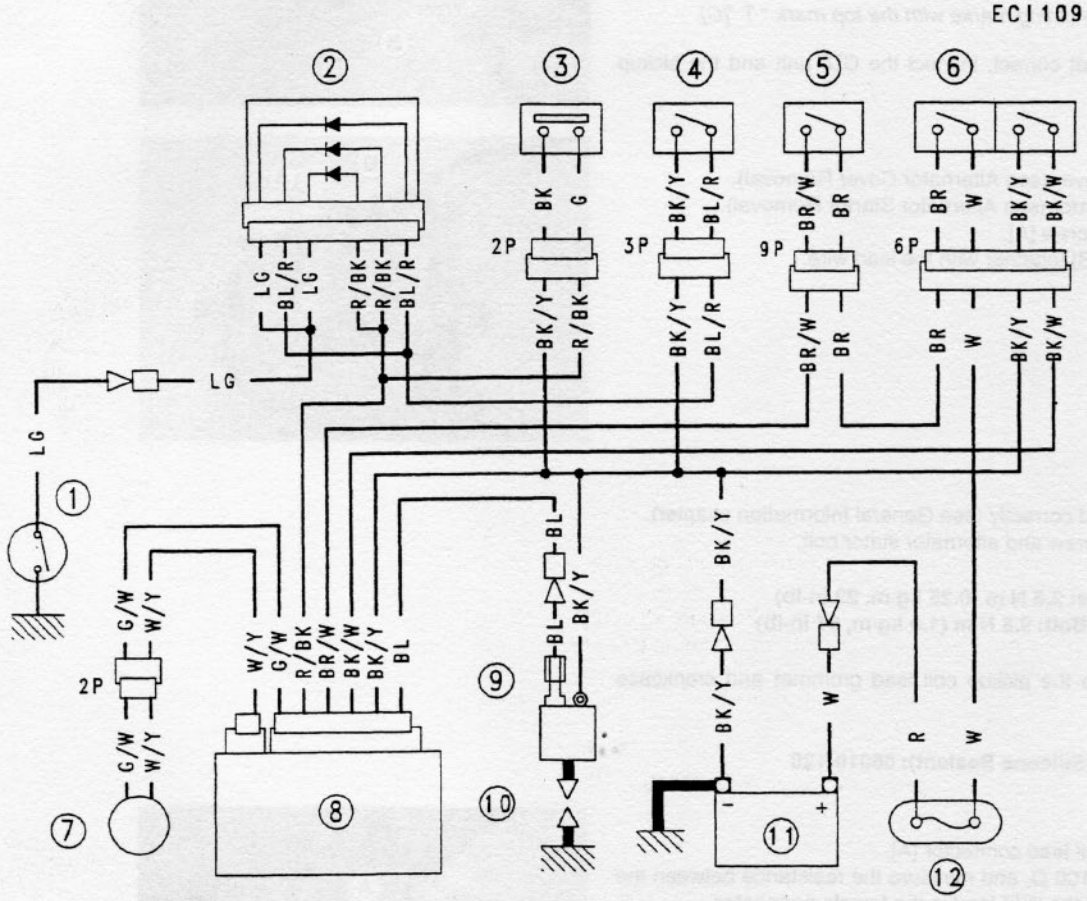
CAUTION

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



CDI Unit Connectors [A]

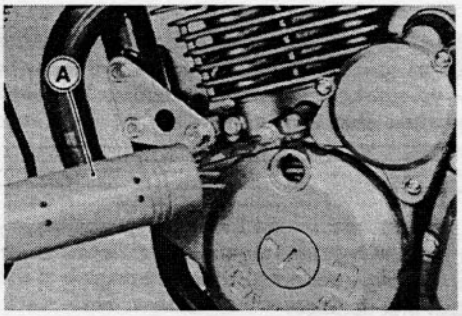
[Ignition system Circuit]



1. Neutral Switch
2. Interlock Diode
3. Side Stand Switch
4. Starter Lockout Switch
5. Engine Stop Switch
6. Ignition Switch
7. Pickup Coil
8. CDI Unit
9. Ignition Coil
10. Spark Plug
11. Battery
12. Main Fuse 20 A

Ignition Timing Inspection

- Remove the ignition timing inspection plug.
- Attach the timing light [A] in the manner prescribed by the manufacturer.

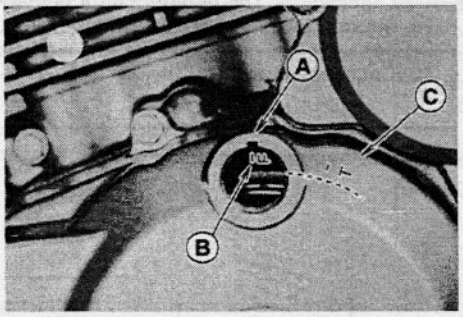


Special Tool - Timing Light: 57001-1241

- Start the engine and aim the timing light to the alternator rotor.
- Run the engine at the speeds specified in the table and note the alignment of the ignition timing marks.

[Ignition Timing]

Engine speed (rpm)	Mark that aligns with groove [A]
2,500 rpm and below	F mark [B] on alternator rotor



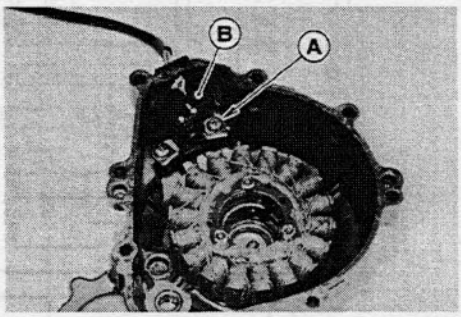
NOTE

○ *Do not mix up the ignition timing marks with the top mark " T "[C].*

★ If the ignition timing is not correct, inspect the CDI unit and the pickup coil.

Pickup Coil Removal

- Remove the alternator cover (see Alternator Cover Removal).
- Remove the alternator stator (see Alternator Startor Removal).
- Remove the pickup coil screw [A].
- Remove the pickup coil [B] together with the lead wire.



Pickup Coil Installation

- Route the pickup coil lead correctly (see General Information chapter).
- Tighten the pickup coil screw and alternator stator bolt.

Torque - Pickup Coil Screw: 2.5 N·m (0.25 kg·m, 22 in·lb)
Alternator Stator Bolt: 9.8 N·m (1.0 kg·m, 87 in·lb)

- Apply silicone sealant to the pickup coil lead grommet and crankcase halves mating surface.

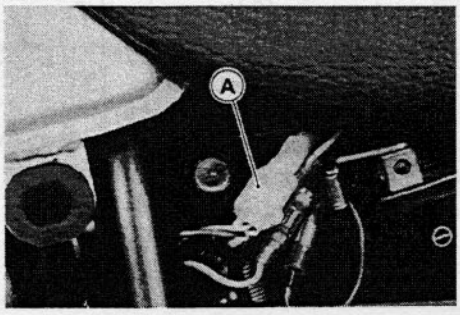
Sealant - Kawasaki Bond (Silicone Sealant): 56019-120

Pickup Coil Inspection

- Disconnect the pickup coil lead connector [A].
- Set the hand tester to × 100 Ω, and measure the resistance between the terminals of the G/W and the W/Y lead in the female connector.

★ If the tester does not read as specified, replace the pickup coil.

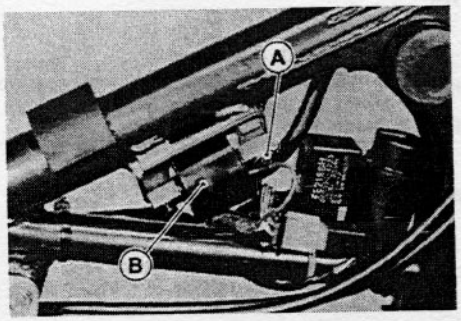
[Pickup Coil Resistance]
Standard: 180 ~ 280 Ω (× 100 Ω)



● Using the highest resistance range of the tester, measure the resistance between the terminal of the G/W and/or W/Y lead in the female connector and chassis ground.
★ Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the pickup coil.

Ignition Coil Removal

● Remove the fuel tank (see Fuel System chapter).
● Disconnect the primary winding lead from the ignition coil.
● Remove the mounting bolt [A], and take out the ignition coil [B].



Ignition Coil Inspection

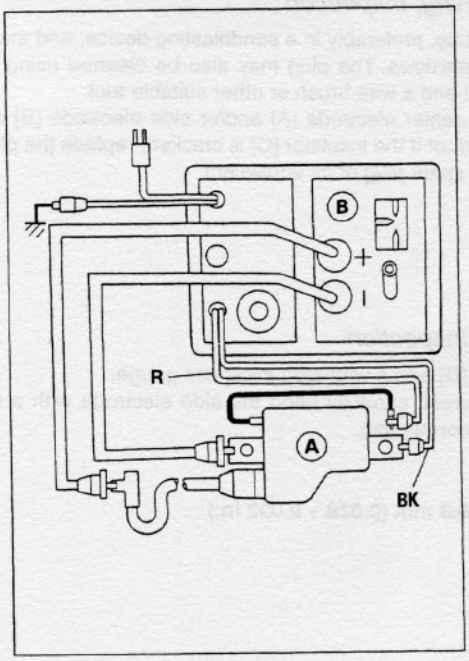
● Remove the ignition coils (see Ignition Coil Removal).
● Measure the arcing distance with the suitable commercially available coil tester [B] to check the condition of the ignition coil [A].
● Connect the ignition coil (with the spark plug cap left attached at the end of the spark plug lead) to the tester in the manner prescribed by the manufacturer and measure the arcing distance.

⚠WARNING

To avoid extremely high voltage shocks, do not touch the coil body or leads.

★ If the distance reading is less than the specified value, the ignition coil or spark plug caps are defective.

[Ignition Coil Arcing Distance]
Standard: 6 mm (0.24 in.) or more

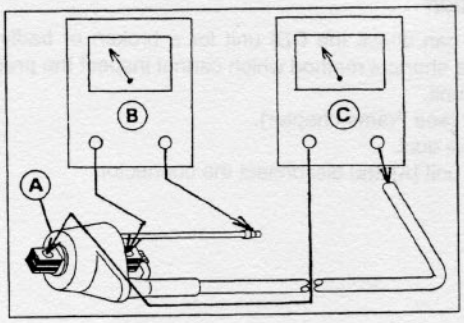


● To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil. Remove the cap by turning it counterclockwise.
★ If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug cap.

★ If the coil tester is not available, the coil [A] can be checked for a broken or badly shorted winding with the hand tester (special tool).

NOTE

○ *The hand tester cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.*



● Measure the primary winding resistance [B] as follows.
○ Connect the hand tester between the coil terminal and primary winding lead.

● Measure the secondary winding resistance [C] as follows.
○ Remove the plug cap by turning it counterclockwise.
○ Connect the tester between the spark plug lead and the coil terminal.
★ If the tester does not read as specified, replace the coil.

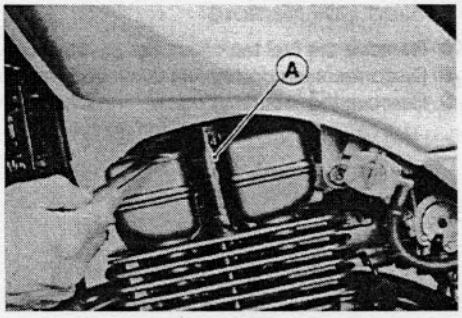
[Ignition Coil Resistance]
Standard: Primary windings 0.16 ~ 0.24 Ω (× 1 Ω)
Secondary windings 5.0 ~ 7.6 kΩ (× 1 kΩ)

● Visually inspect the secondary winding lead.
★ If it is damaged, replace the ignition coil.

Spark Plug Removal

● Remove:
Spark Plug Cap
● Using the spark plug wrench (owner's tool) [A], remove the spark plug.

Special Tool - Spark Plug Wrench, Hex 16: 92110-1172



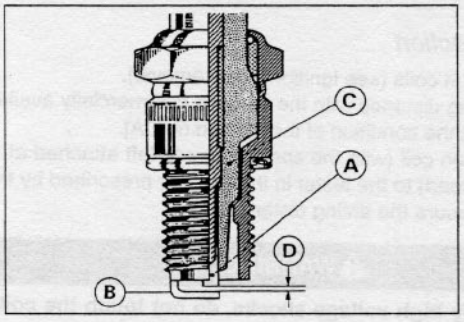
Spark Plug Installation

● Tighten the plug.

Torque - Spark Plugs: 13 N·m (1.3 kg·m, 9.4 ft·lb)

Spark Plug Cleaning, Inspection

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



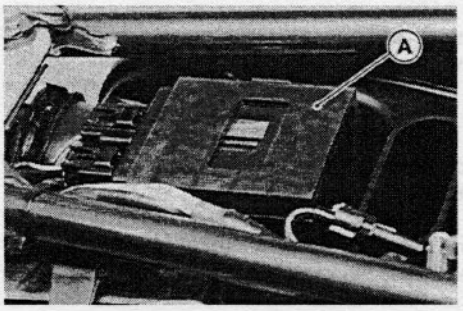
Spark Plug Gap Inspection

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

[Spark Plug Gap]
Standard: 0.7 ~ 0.8 mm (0.028 ~ 0.032 in.)

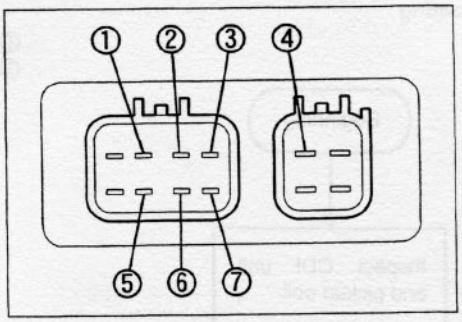
CDI Unit Inspection

○ The hand tester can check the CDI unit for a broken or badly shorted winding, but it is a shortcut method which cannot inspect the precise condition of the CDI unit.
● Remove the seat (see Frame chapter).
● Remove the intake duct.
● Remove the CDI unit [A] and disconnect the connector.



● Set the hand tester (special tool) to the x 1 kΩ range and make the measurements shown in the table.
★ If the tester readings are not as specified, replace the CDI unit.

Special Tool - Hand Tester: 57001-1394



CAUTION

Use only Hand Tester 57001-1394 for this test. A tester other than the Kawasaki Hand Tester may show different readings.
If a megger or a meter with a large-capacity battery is used, the CDI unit will be damaged.

[CDI Unit Internal Resistance]

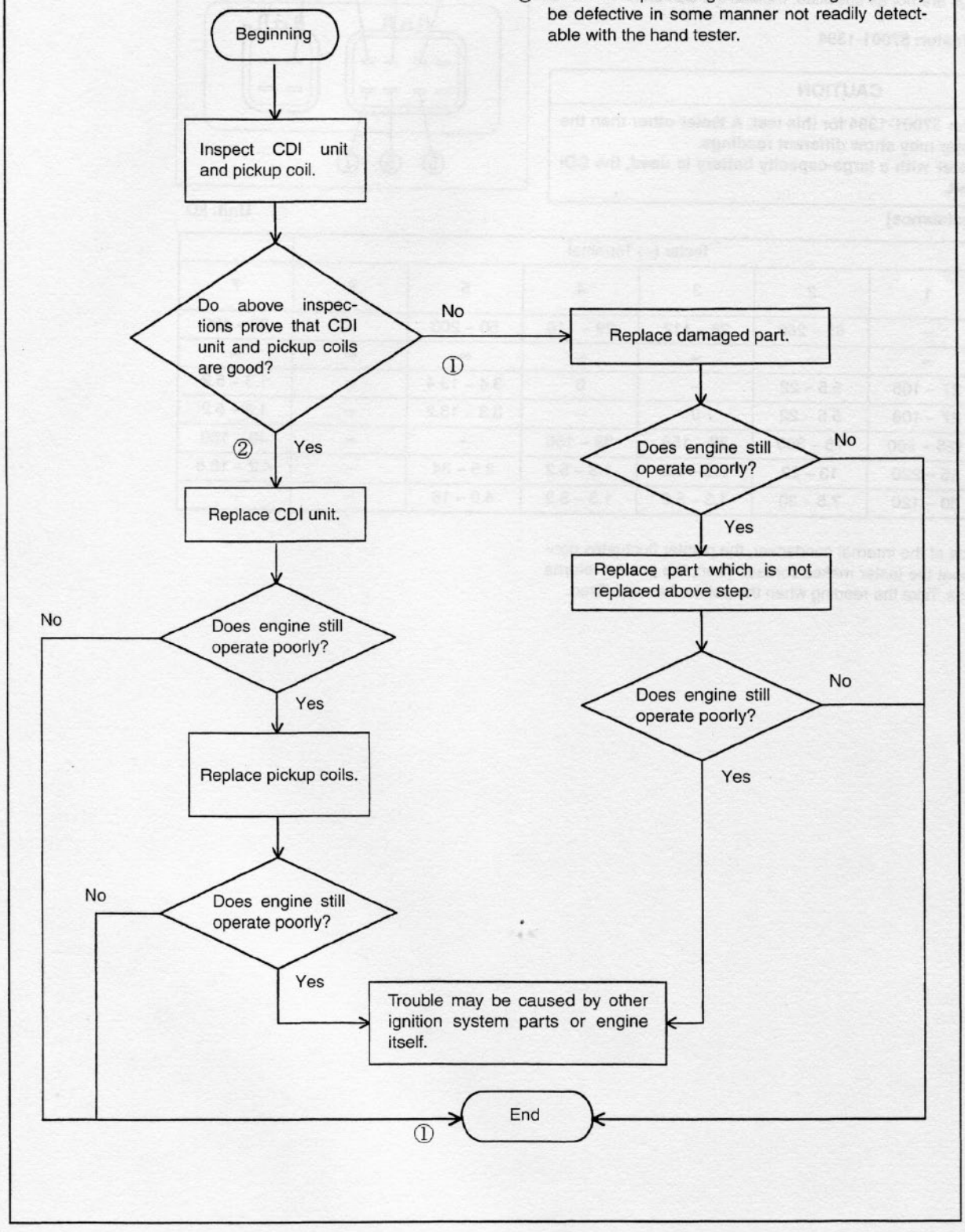
Unit: kΩ

		Tester (+) Terminal						
	Terminal number	1	2	3	4	5	6	7
Tester (-) Terminal	1	–	65 ~ 260	28 ~ 112	29 ~ 116	50 ~ 200	∞	30 ~ 120
	2	∞	–	∞	∞	∞	∞	∞
	3	27 ~ 108	5.5 ~ 22	–	0	3.4 ~ 13.4	∞	1.3 ~ 5.2
	4	27 ~ 108	5.5 ~ 22	0	–	3.3 ~ 13.2	∞	1.3 ~ 5.2
	5	125 ~ 500	75 ~ 300	38 ~ 156	38 ~ 156	–	∞	40 ~ 160
	6	55 ~ 220	13 ~ 22	2.3 ~ 9.2	1.3 ~ 5.2	8.5 ~ 34	–	4.2 ~ 16.8
	7	30 ~ 120	7.5 ~ 30	1.3 ~ 5.2	1.3 ~ 5.2	4.0 ~ 16	∞	–

○ Due to the influence of the internal condenser, the pointer fluctuates considerably the moment the tester makes contact. Then, the pointer returns slowly and stabilizes. Take the reading when the pointer has stabilized.

CDI Unit Troubleshooting

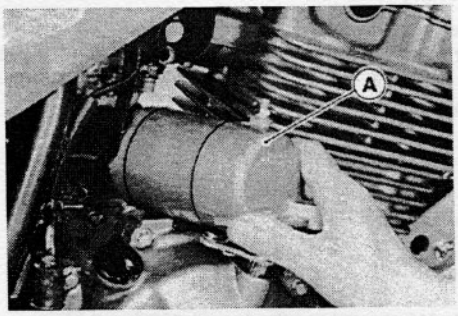
① CDI Unit or pickup coil damaged.
② Even if the preceding checks show good, it may be defective in some manner not readily detectable with the hand tester.



Starter System

Starter Motor Removal

- Remove:
  Oil Pipe (see Engine Lubrication System chapter).
  Camshaft Chain Tensioner (see Engine Top End chapter).
  Starter Motor Terminal Nut
  Starter Motor Mounting Bolt
- Pull out the starter motor [A].

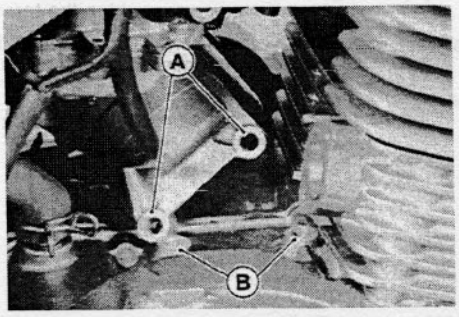


Starter Motor Installation

CAUTION

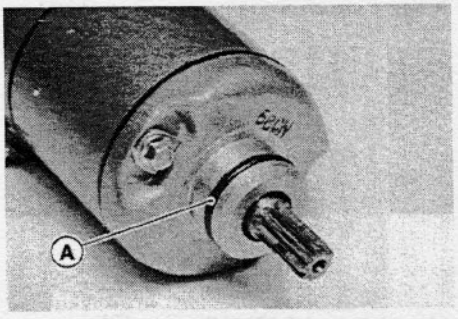
Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Clean the starter motor mounting surface [A] and the crankcase surface [B] (ground surface).



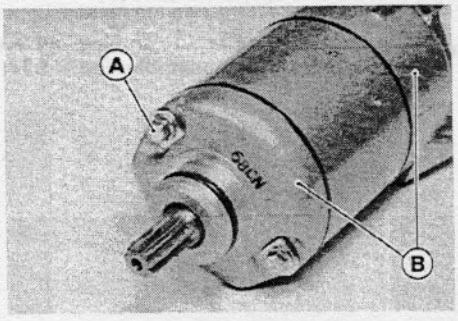
- Replace the O-ring [A] with a new one.
- Apply engine oil to the O-ring.

Torque - Starter Motor Mounting Bolts: 9.8 N·m (1.0 kg·m, 87 in·lb)
Starter Motor Terminal Nut: 4.9 N·m (0.50 kg·m, 43 in·lb)

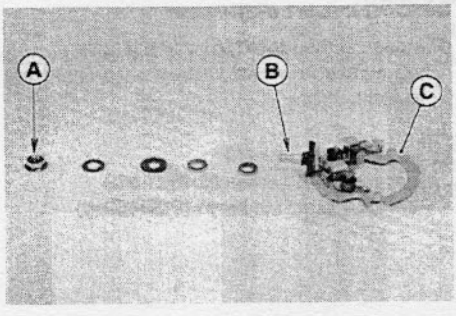


Starter Motor Disassembly

- Remove the starter motor (see Starter Motor Removal).
- Remove the starter motor assembly bolts [A], remove both end covers [B], and pull the armature out of the yoke.

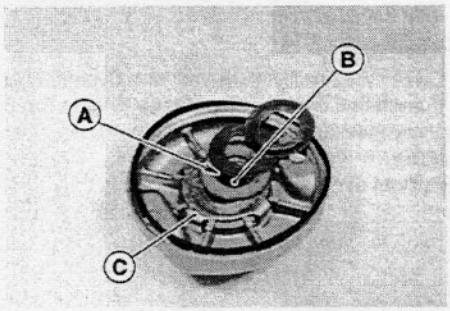


- Remove the terminal locknut [A] and terminal bolt [B], and then remove the brush with the brush plate [C] from the yoke.



Starter Motor Assembly

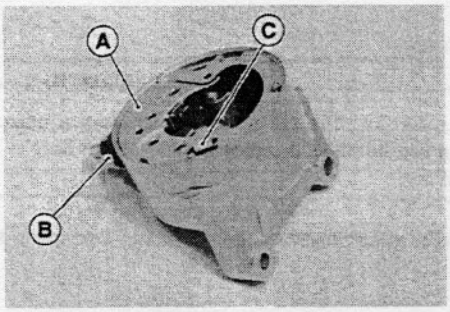
- Replace the O-ring with a new one.
- Apply a thin coat of high-temperature grease to the oil seal [A] and the needle bearing [B].
- Fit the toothed washer [C] into the end cover.



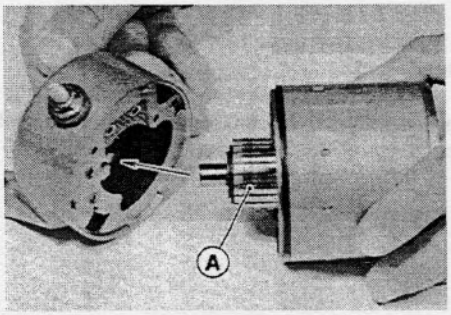
- Install the brush plate [A] and tighten the terminal lock nut [B].

Torque - Starter Motor Terminal Lock Nut: 6.9 N·m (0.70 kg·m, 61 in·lb)

- Fit the tongue [C] on the brush plate into the end cover groove.

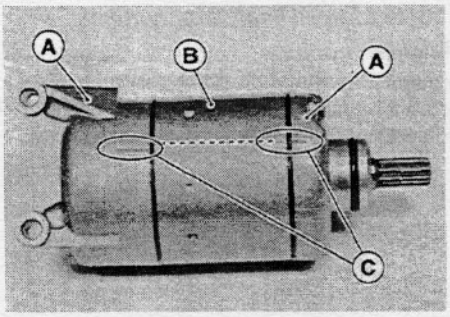


- Insert the armature [A] between the brushes.



- Align the end cover [A] with the mark [C] of the yoke [B].

Torque - Starter Motor Assembly Bolt: 4.9 N·m (0.50 kg·m, 43 in·lb)

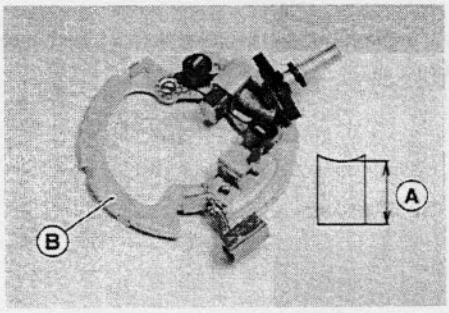


Carbon Brush Inspection

- Measure the length [A] of each brush.

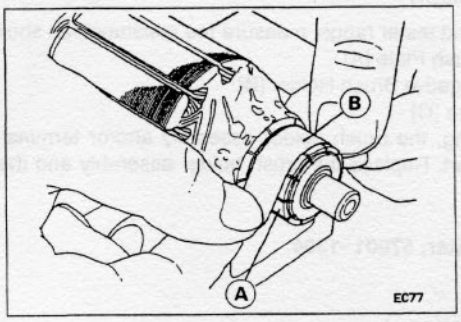
★ If any is worn down to the service limit, replace the carbon brush holder assembly [B].

[Carbon Brush Length]
Standard: 12.5 mm (0.4921 in.)
Service Limit: 8.5 mm (0.3346 in.)



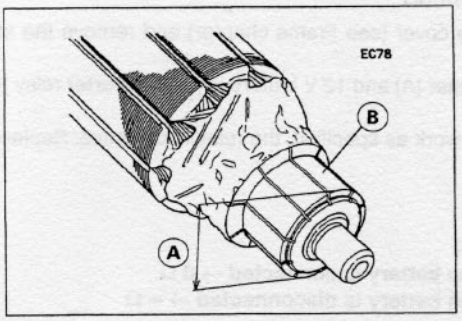
Commutator Inspection, Cleaning

- Smooth the communicator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.



- Measure the outer diameter [A] of the commutator [B].
- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.

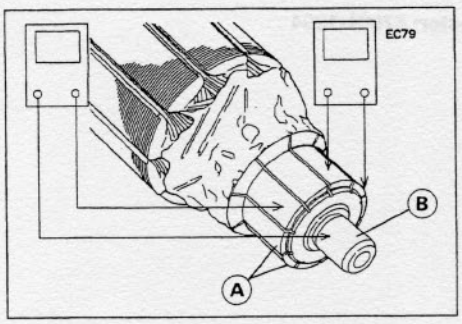
[Commutator Diameter]
Standard: 28 mm (1.1023 in.)
Service Limit: 27 mm (1.0630 in.)



Armature Inspection

- Using the x 1 Ω hand tester range, measure the resistance between any two communicator segments [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 hand tester range, measure the resistance between the segments and the shaft [B].
- ★ If there is any reading at all, the armature has a short and the starter motor must be replaced.

Special Tool - Hand Tester 57001-1394



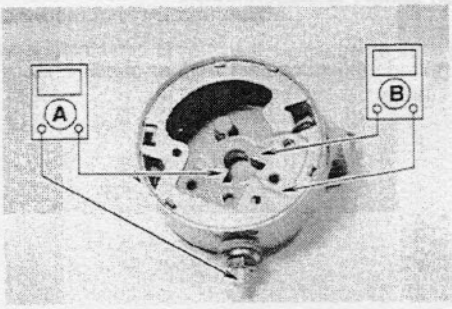
NOTE

○ *Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

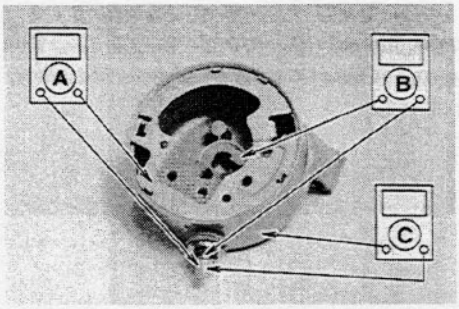
Brush Lead Inspection

- Using the x 1 Ω hand tester range, measure the continuity between the following:
  Terminal Bolt and Positive (+) Brush [A]
  Brush Plate and Negative (–) Brush [B]
- ★ If there is not close to zero ohms, the brush lead has an open. Replace the terminal bolt assembly and/or the brush holder assembly.

Special Tool - Hand Tester: 57001-1394



Terminal Bolt Inspection

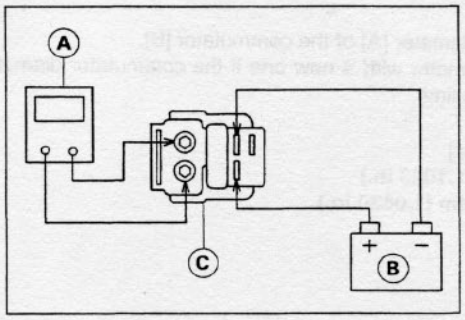


- Using the highest hand tester range, measure the resistance as shown.
  Terminal Bolt and Brush Plate [A]
  Terminal Bolt and Negative Brush Holder [B]
  Terminal Bolt and Yoke [C]

★ 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.

Special Tool - Hand Tester: 57001 -1394

Starter Relay Inspection



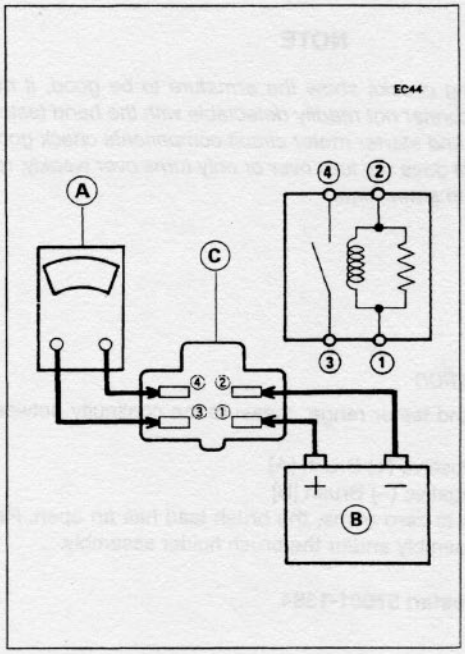
- Remove the left side cover (see Frame chapter) and remove the starter relay.
- Connect the hand tester [A] and 12 V battery [B] to the starter relay [C] as shown.

★ If the relay does not work as specified, the relay is defective. Replace the relay.

[Testing Relay]
Tester range: × 1 Ω
Standard: **When battery is connected → 0 Ω**
When battery is disconnected → ∞ Ω

Special Tool - Hand Tester: 57001-1394

Starter Circuit Relay Inspection



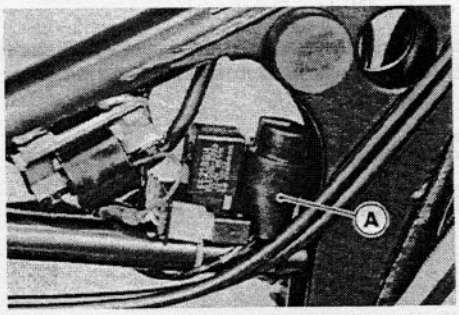
- Remove the fuel tank (see Fuel System chapter), and remove the starter circuit relay [C].
- Connect the hand tester [A] to the 12 V battery [B] as shown.
  Relay coil terminals [1] and [2]
  Relay switch terminals [3] and [4]

Special Tool - Hand Tester: 57001-1394

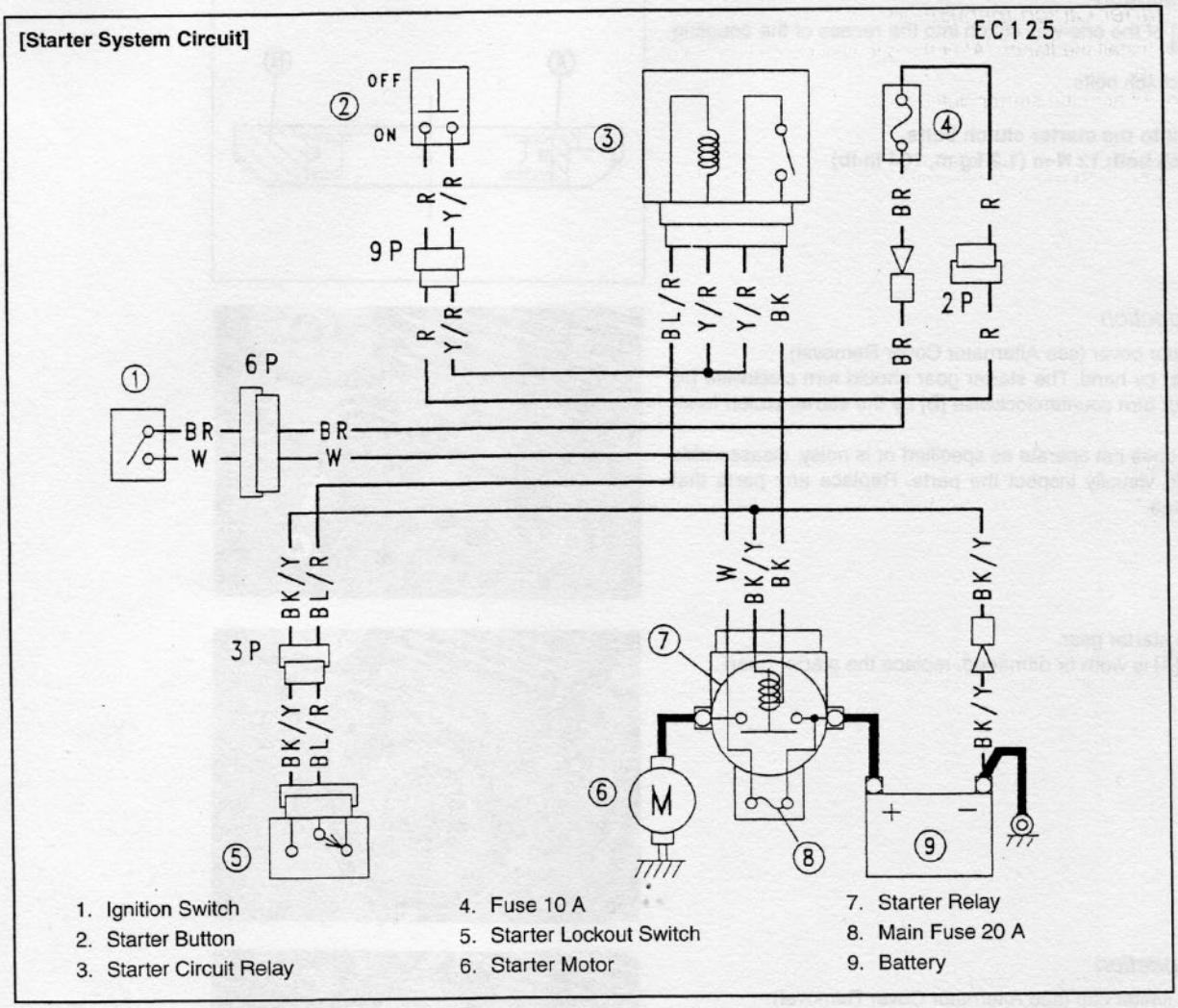
[Relay Test]
Tester range: × 1 Ω
Standard: **When battery is connected → 0 Ω**
When battery is disconnected → ∞ Ω

★ If the relay does not work as specified, the relay is defective. Replace the relay.

Starter Circuit Relay [A]



[Starter System Circuit]



1. Ignition Switch
2. Starter Button
3. Starter Circuit Relay
4. Fuse 10 A
5. Starter Lockout Switch
6. Starter Motor
7. Starter Relay
8. Main Fuse 20 A
9. Battery

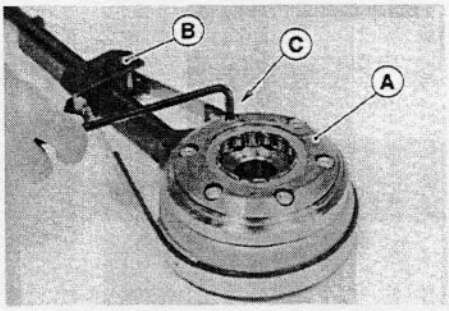
Starter Clutch

Starter Clutch Removal

- Remove the alternator rotor (see Alternator Rotor Removal).
- Hold the alternator rotor with the flywheel holder [B] and remove starter clutch bolts [C].

Special Tool - Flywheel Holder: 57001-1313

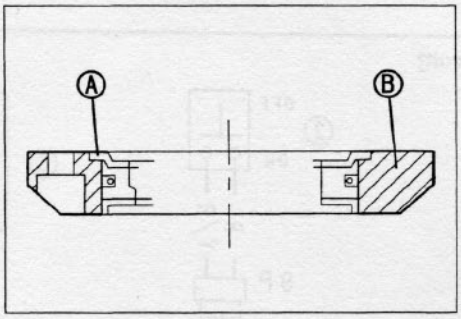
- Remove the starter clutch [A].



Starter Clutch Installation

- Install the flange [A] of the one-way clutch into the recess of the coupling [B].
- Tighten the starter clutch bolts.

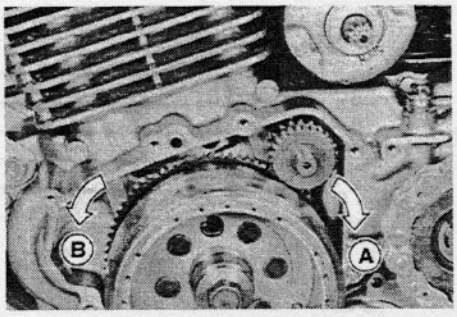
Apply high-lock agent to the starter clutch bolts.
Torque - Starter Clutch bolt: 12 N·m (1.2 kg·m, 104 in·lb)



Starter Clutch Inspection

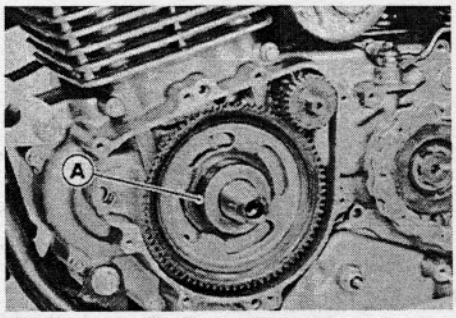
- Remove the alternator cover (see Alternator Cover Removal).
- Turn the starter gear by hand. The starter gear should turn clockwise [A] freely, but should not turn counterclockwise [B] by the starter clutch function.

★ If the starter clutch does not operate as specified or is noisy, disassemble the starter clutch to visually inspect the parts. Replace any parts that show wear or damage.



- Visually inspect the starter gear.

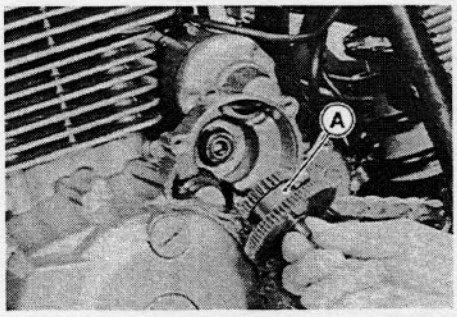
★ If the slide surface [A] is worn or damaged, replace the starter gear.



Torque Limiter Inspection

- Remove the torque limiter cap (see Alternator Cover Removal).
- Remove and visually inspect the torque limiter [A].

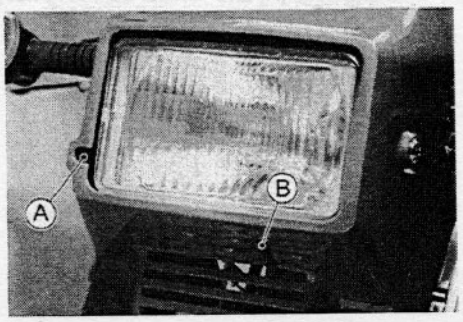
★ If the limiter has any wear, discoloration, or other damage, replace it as a unit.



Lighting System

Headlight Beam Horizontal Adjustment (except Greek Model)

- Turn the horizontal adjuster [A] on the headlight with a phillips head screwdriver in or out until the beam points straight ahead.
- Turn the horizontal adjuster clockwise to face the headlight right.

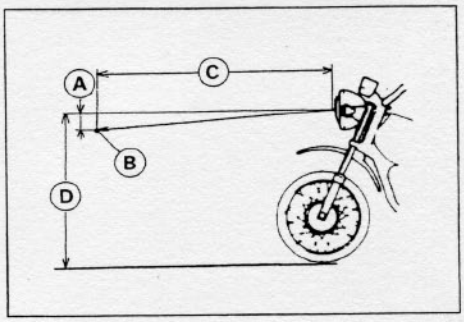


Headlight Beam Vertical Adjustment (except Greek Model)

- Loosen the vertical adjusting nut [B], and push the headlight body upward or downward to adjust the headlight vertically. Then tighten the vertical adjusting nut.

NOTE

- *On high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight(s) to the proper angle according to local regulations.*
- *For US model, the proper angle is 0.4 degrees below horizontal. This is 50 mm (2 in.) drop at 7.6 m (25 ft) measured from the center of the headlights with the motorcycle on its wheels and the rider seated.*



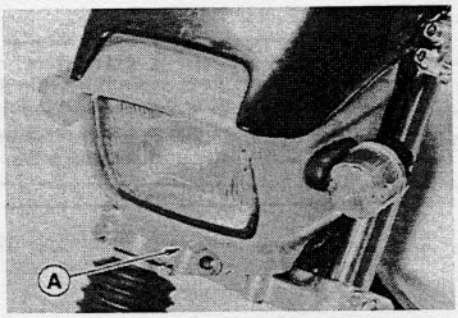
50 mm (2 in.) [A]
Center of Brightest Spot [B]
7.6 m (25 ft) [C]
Height of Headlight Center [D]

Headlight Beam Vertical Adjustment (Greek Model)

- Turn the adjuster screw [A] on the headlight in or out to adjust the beam slightly lower than horizontal.
- Turn the screw clockwise to turn the headlight upward.

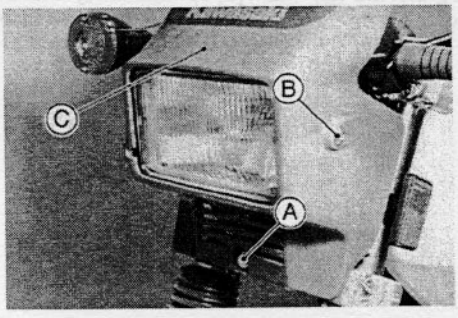
NOTE

- *On high beam the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.*

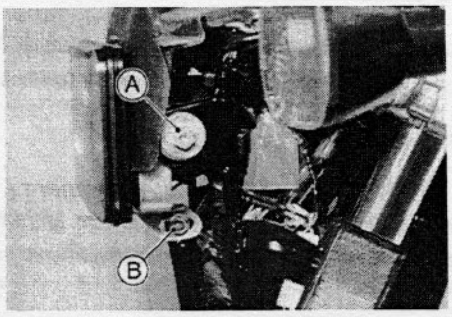


Headlight Bulb Replacement (except Greek Model)

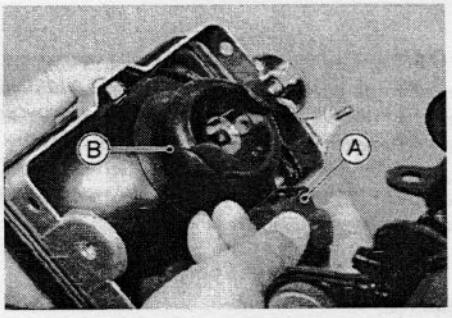
- Remove the headlight cover mounting bolt [A] and headlight cover mounting screw [B], and take off the headlight cover [C].



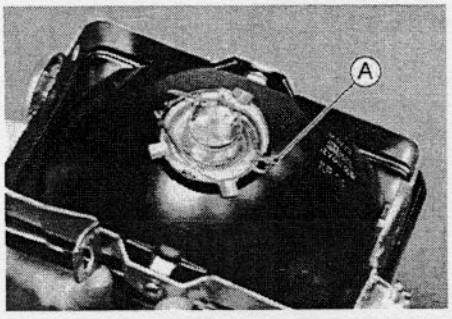
● Remove the headlight mounting bolts [A] and vertical adjusting nut [B].



● Remove:
Bulb Socket [A]
Dust Cover [B]



● Remove the hook [A].



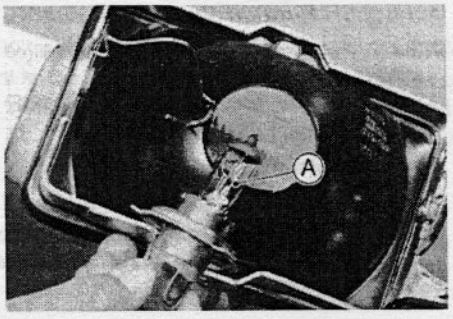
● Replace the bulb [A].

CAUTION

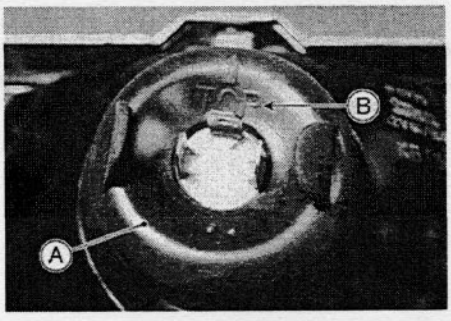
When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

NOTE

○ *Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.*

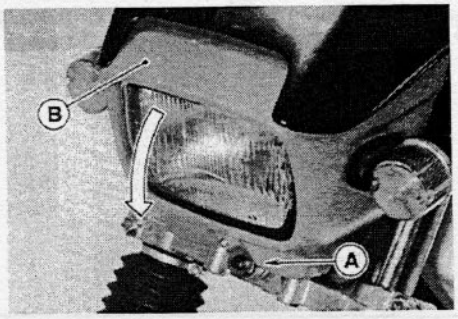


● Fit the dust cover [A] with the TOP mark [B] upward, firmly onto the bulb.
● Adjust the headlight beam (see Headlight Beam Horizontal/Vertical Adjustment).

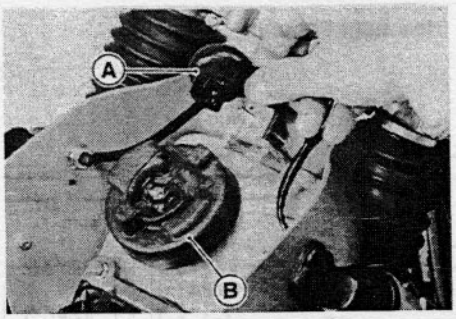


Headlight Bulb Replacement (Greek Model)

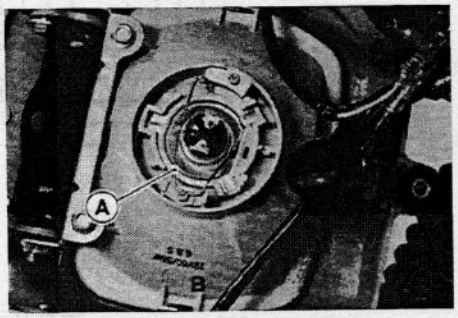
● Remove the mounting bolt [A] and tilt the headlight unit [B] forward.



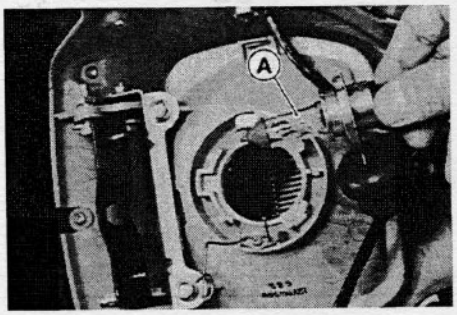
● Remove:
Bulb Socket [A]
Dust Cover [B]



● Remove the hook [A].



● Replace the bulb [A].



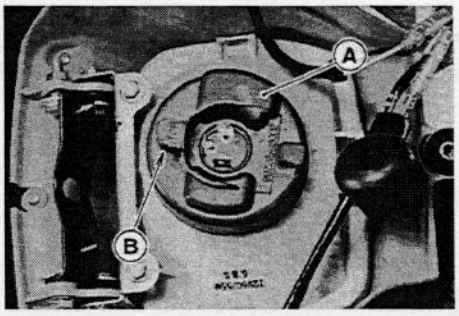
CAUTION

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 can reduce bulb life or cause the bulb to explode.

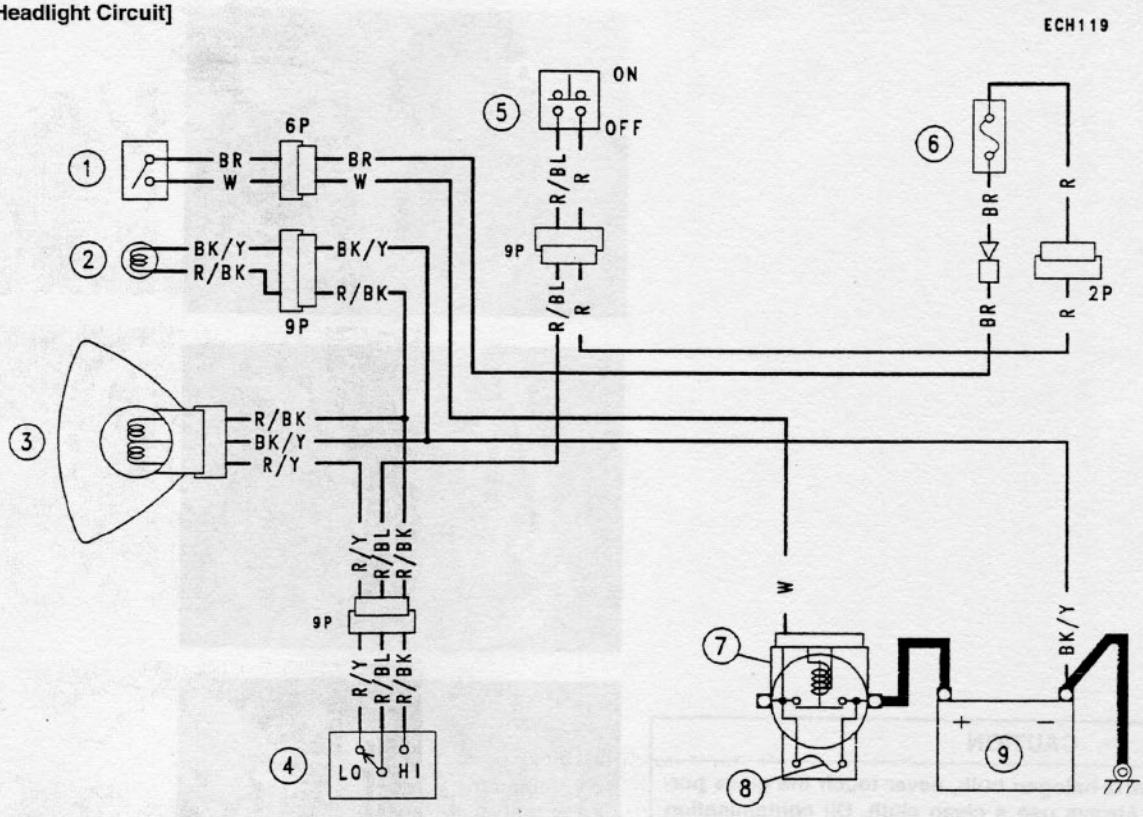
NOTE

○ *Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.*

- Fit the dust cover [A] with the TOP mark [B] upward, firmly onto the bulb.
- Adjust the headlight beam (see Headlight Beam Horizontal/Vertical Adjustment).



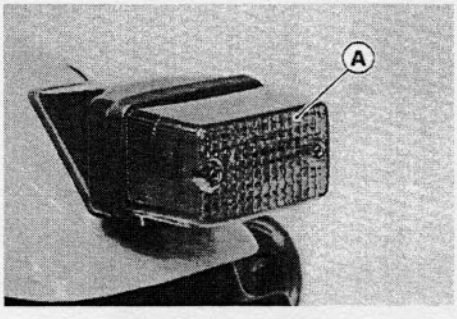
[Headlight Circuit]



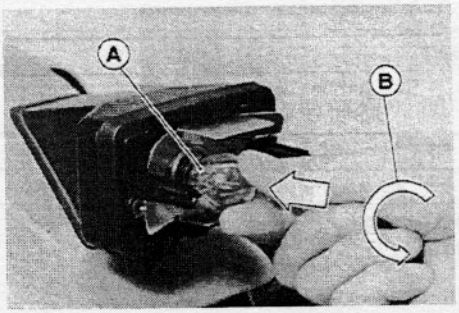
1. Ignition Switch
2. High Beam Indicator Light
3. Headlight
4. Dimmer Switch
5. Starter Button
6. 10 A Fuse
7. Starter Relay
8. Main Fuse 20 A
9. Battery

Tail/Brake Light Bulb Replacement

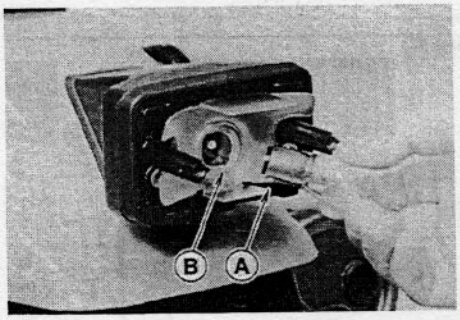
- Remove the tail/brake light lens [A].



● Push the bulb [A] in the socket, turn it counterclockwise [B], and pull it out.

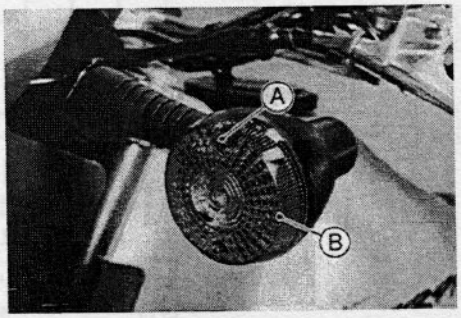


● With the front pin [A] down, insert the new bulb by aligning the front pin with the groove [B] in the walls of the socket.
● Push the bulb in, turn it clockwise, and replace it. It should lock in position.
● Tighten the lens screws. Be careful not to overtighten them.



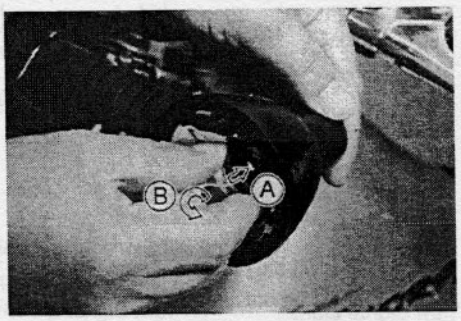
Turn Signal Light Bulb Replacement

● Remove the turn signal light screws [A] and remove the lens [B].



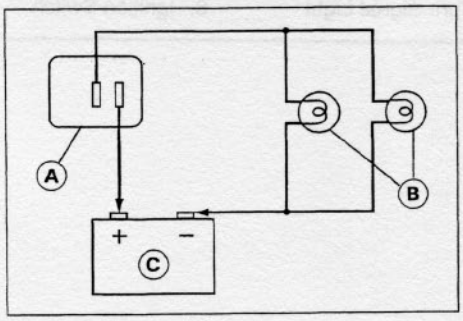
● Push the bulb [A] in the socket, turn it counterclockwise [B], and pull it out.
● Replace the bulb.

Torque - Turn Signal Light Screw: 1 N·m (0.10 kg·m, 8.7 in·lb)



Turn Signal Relay Inspection

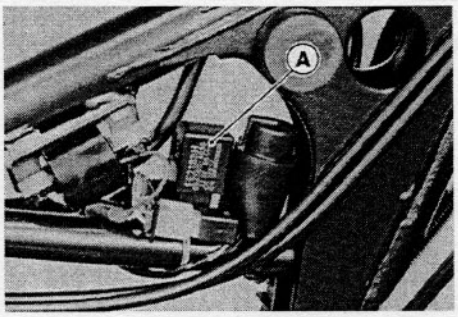
● Remove the left side cover (see Frame chapter).
● Connect one 12 V battery and turn signal lights as indicated in the figure, and count how many times the lights flash for one minute.
Turn Signal Relay [A]
Turn Signal Light [B]
12 V Battery [C]
★ If the light do not flash as specified, replace the turn signal relay.



[Turn Signal Relay Inspection]

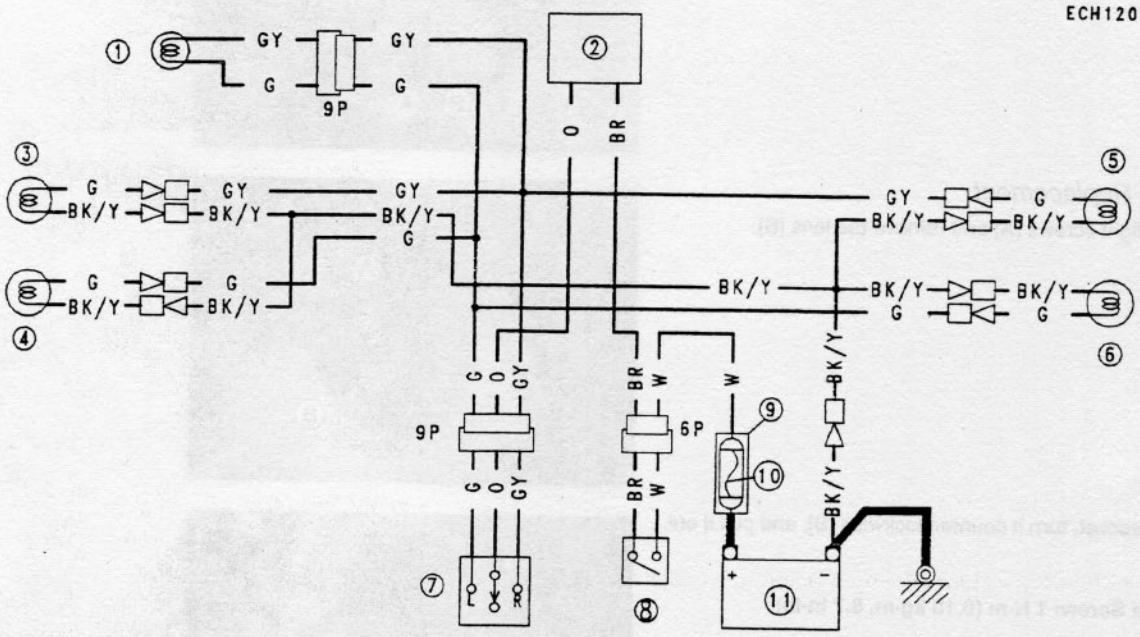
Load		Flashing times (c/m**)
The Number of Turn Signal Lights	Wattage (W)	
1*	21 ~ 23 (GR), 10	140 ~ 250
2	42 ~ 46 (GR), 20	75 ~ 95

(*): Corresponds to "light burned out" (GR): Greek Model
(**): Cycle(s) per minute



Turn Signal Relay [A]

[Turn Signal Light Circuit]

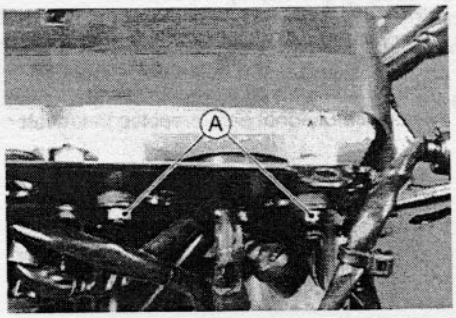


1. Turn Signal Indicator Light
2. Turn Signal Relay
3. Front Right Turn Signal Light
4. Front Left Turn Signal Light
5. Rear Right Turn Signal Light
6. Rear Left Turn Signal Light
7. Turn Signal Switch
8. Ignition Switch
9. Starter Relay
10. Main Fuse 30 A
11. Battery

Digital Meter

Digital Meter Removal

- Remove the headlight unit (see Headlight Bulb Replacement).
- Remove the digital meter nuts [A].
- Disconnect the lead connector and remove the meter unit.

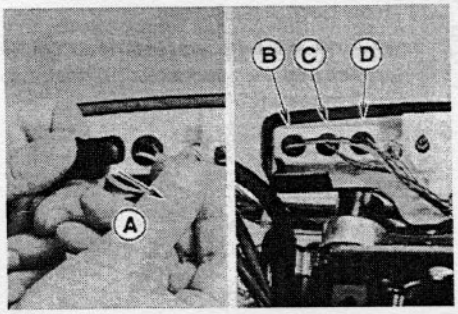


Bulb Replacement

- Pull the plate type bulb straight to remove [A].
  R/BK, BK/Y [B]
  GY, G [C]
  BR, LG [D]

CAUTION

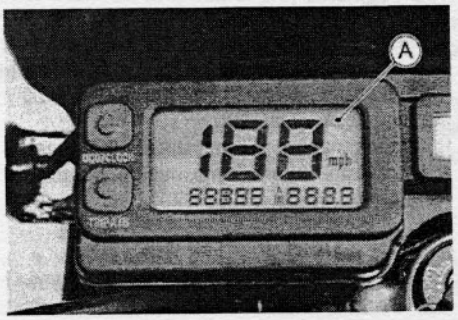
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb.
Do not use bulb rated for greater wattage than the specified value.



Switch Inspection

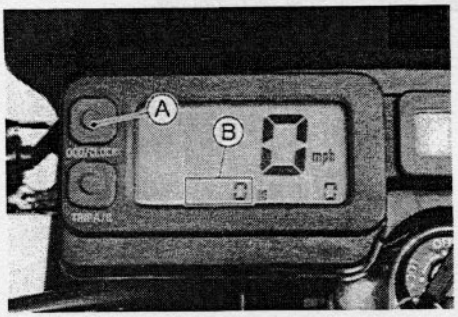
- Turning the ignition switch ON causes all the LCD segments (the letters and numbers of the liquid crystal display) [A] illuminate for 3 seconds.

★ If they do not illuminate, check the LCD segments (see LCD Segment Inspection).



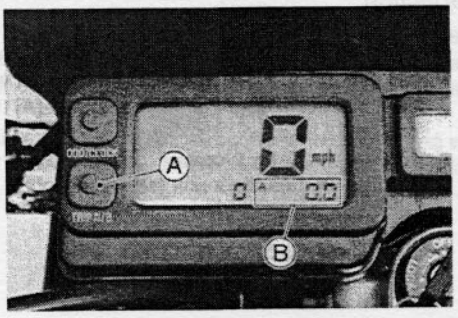
- Check that the display [B] shifts between ODO and CLOCK each time the ODO/CLOCK button [A] is pushed.

★ If the display does not shift, replace the meter unit.



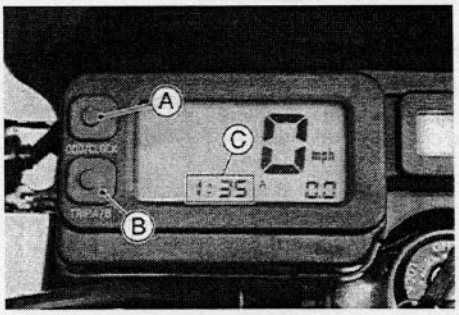
- Check that the display [B] shifts between TRIP-A and TRIP-B each time the TRIP A/B button [A] is pushed.

★ If the display does not shift, replace the meter unit.



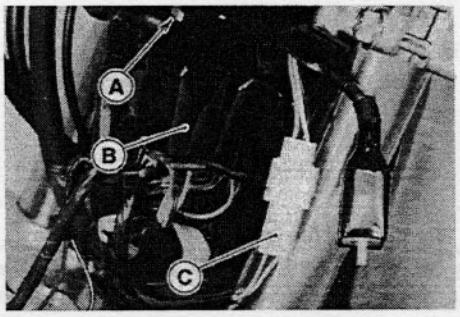
- Push the ODO/CLOCK button [A] to display the clock.
- Keeping the ODO/CLOCK button pushed, turning ON the TRIP A/B button [B] enables the hours and the minutes of the clock to be set [C]. Verify that the time can be set here (see General Information chapter).

★ If the time cannot be set, replace the meter unit.



LCD Segment Inspection

- Remove the headlight unit (see Headlight Bulb Replacement).
- Disconnect the black connector [B] from the meter [A].
  White Connector [C]



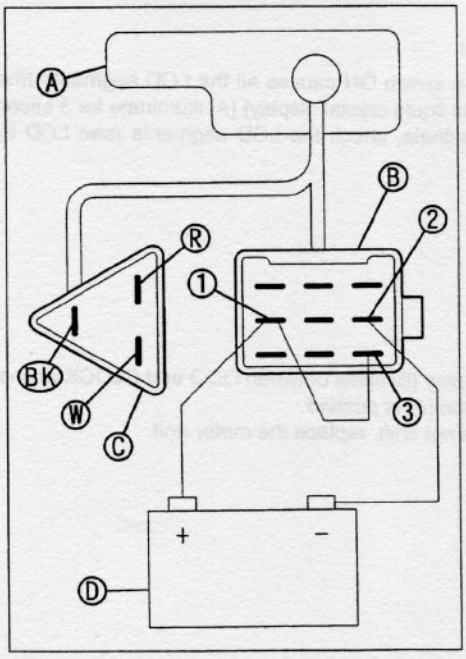
- Check that all the LCD segments (the letters and numbers of the liquid crystal display) illuminate for 3 seconds after connecting pins [1] and [2] of the black connector [B] to the battery [D], then connecting pins [1] and [3] together. Next, check that all the LCD segments become unlit when pin [3] is disconnected.

★ If there is any problem, replace the meter unit [A].

★ If there are no problems, inspect the power wiring.

NOTE

○ *In case that the Liquid Crystal Display (LCD) malfunctions, e.g., display freezing, wait for 30 seconds or more after disconnecting it from the battery.*
The LCD will function normally after reconnected.

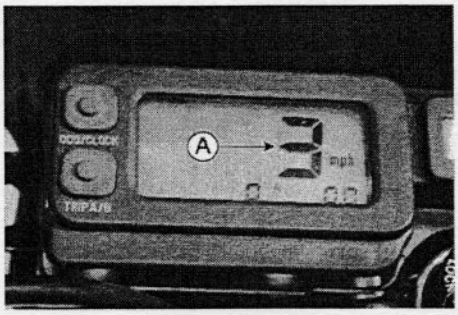


Speedometer Inspection

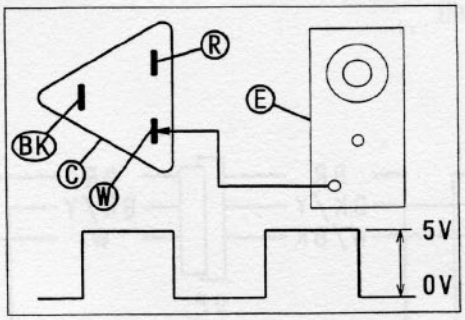
- Using a jack, raise the front wheel (see Wheels/Tires chapter).
- Turn the ignition switch ON. Turn the front wheel by hand, and see if the speedometer shows the vehicle speed [A] that corresponds to the wheel rotation.

★ If it does not show properly, inspect the power to the speed sensor.

- Remove the headlight unit (see Headlight Bulb Replacement).

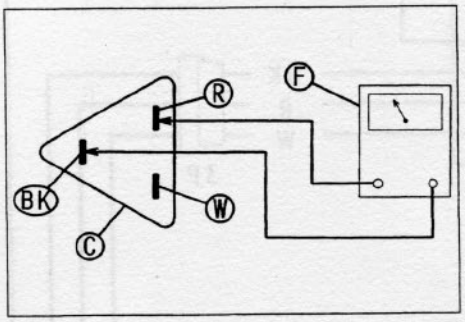


★ If an oscillator is available, check the speedometer by the following points.
● Disconnect the white connector [C], and connect the oscillator [E] to the pin [W] of the connector on the meter. The vehicle speed that corresponds to the input frequency will be displayed when a short waveform such as the one shown in the diagram is input.
Example: An input frequency of 60Hz will display 60 km/h.



Speed Sensor Power Inspection

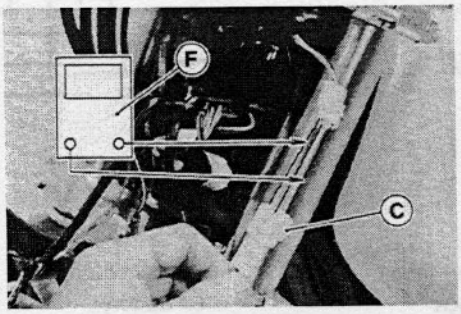
● Disconnect the white connector [C] and turn the ignition switch ON.
● Using the tester [F] at volt range, make sure that a minimum voltage of 7V is available between pins [R] and [BK] on the meter.
★ If the voltage is low or "0", inspect the battery and the power wiring.
★ If the voltage is normal, inspect the speedometer pulse.



CAUTION
Do not short pins [R] and [BK], and pins [R] and [W].

Speedometer Pulse Inspection

● Disconnect the white connector [C], and use auxiliary leads to connect as original.
● Turn the ignition switch ON.
● Connect the tester's [F] at V range positive [+] terminal to the white [W] lead, and negative [–] terminal to the black [BK] lead.
● Turn the front wheel slowly to see that the tester's pointer fluctuates by repeatedly reading ON (8 V) and OFF (0 V). Repeat this process 8 times for each rotation.
★ If the speedometer does not show any indication even if the tester's pointer fluctuates, replace the meter unit.
★ If the tester's pointer does not fluctuate, replace the speed sensor.



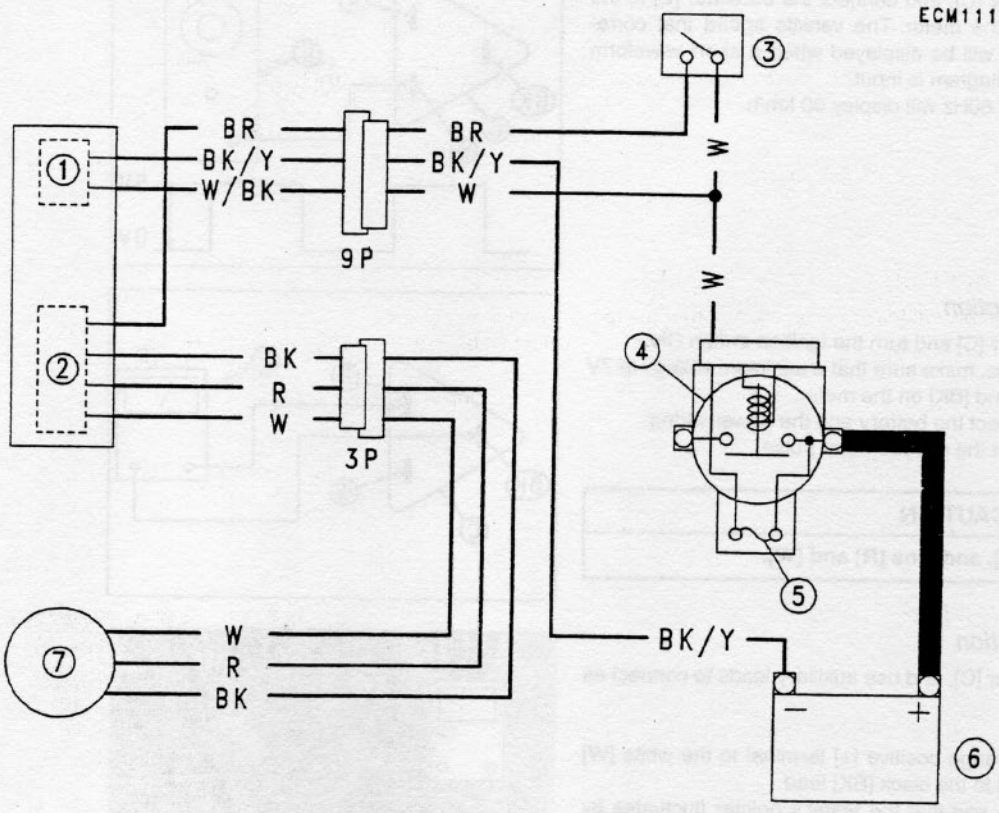
ODO Meter Inspection

● During the speedometer inspection, check that the odometer reading increases.
★ If it does not increase, replace the meter unit.

TRIP A/B Meter Check

● During the speedometer inspection, check that the tripometer reading increases.
● Turn ON the TRIP A/B switch 2 seconds or longer, and check that the tripometer reading turns back to 0 the moment the switch is released.
★ If there is any problem, replace the meter unit.

[Digital Meter Circuit]



1. Digital Clock
2. Speedometer
3. Ignition Switch
4. Starter Relay
5. Main Fuse 20 A
6. Battery
7. Speed Sensor

Switches

Front Brake Light Switch Inspection

- Turn the ignition switch on.
- The brake light should go on when the front brake lever is applied.

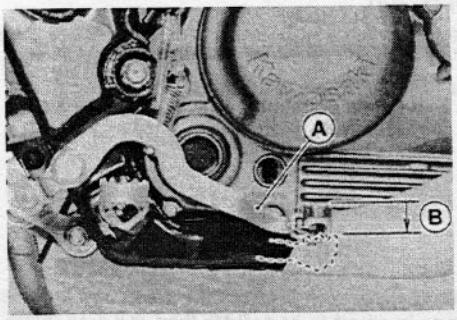
★ If it does not, replace the switch.

Rear Brake Light Timing Inspection

- Turn the ignition switch on.
- Check the operation of the rear brake light switch by depressing the brake pedal [A].

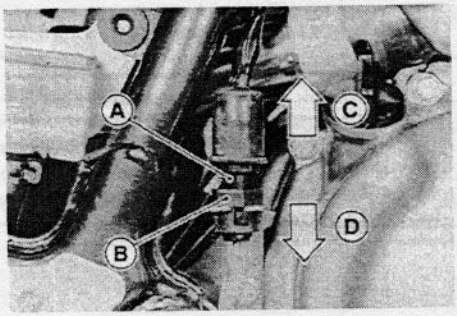
★ If it does not as specified, adjust the brake light timing.

[Brake Light Timing]
Standard: On after about 10 mm (0.39 in.) of pedal travel [B]



Rear Brake Light Timing Adjustment

- While holding the switch body [A], turn the adjusting nut [B] to adjust the switch.
  Lights sooner as the switch rises [C]
  Lights later as the switch lowers [D]

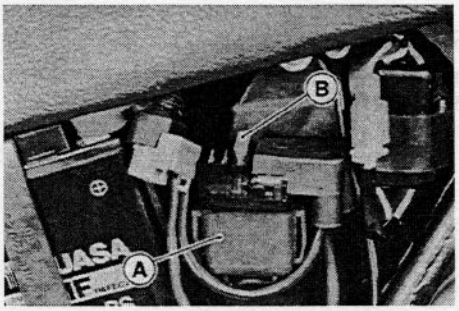


CAUTION
To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

Fuses

Main Fuse 20A Removal

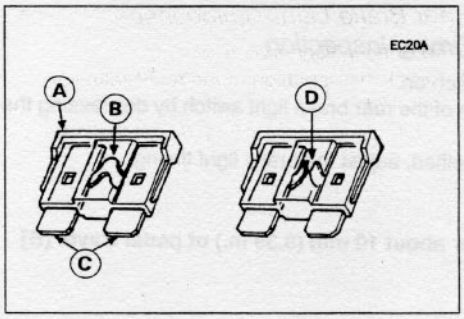
- Remove the left side cover (see Frame chapter).
- Disconnect the starter relay connector.
- Remove the main fuse [B] from the starter relay [A].



Main Fuse 20A Inspection

- Remove the fuse (see Main Fuse 20A Removal) and inspect the fuse element.

★ If the fuse element is blown, replace the fuse.
Housing [A]
Fuse Element [B]
Terminal [C]
Blown Element [D]



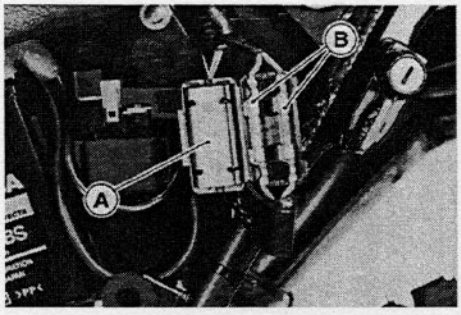
NOTE

○ *Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.*

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

Fuse 10A Removal

- Remove the left side cover (see Frame chapter).
- Open the fuse case [A] and remove the fuses [B].



Fuse 10A Installation

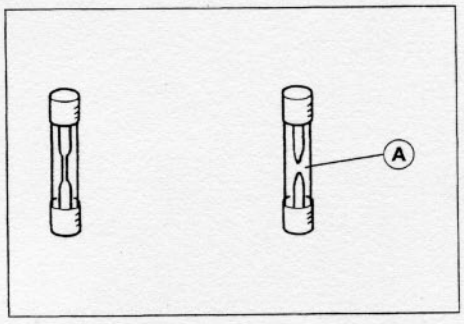
★ If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.

CAUTION
The fuse case has 10A fuses only. Do not use the fuse other than 10A fuse.

Fuse Inspection

● Inspect the fuse element.

★ If the fuse element is blown [A], replace the fuse.



Appendix

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Additional Considerations for Racing

This motorcycle has been manufactured for use in a reasonable and prudent manner and as a vehicle only. However, some may wish to subject this motorcycle to abnormal operation, such as would be experienced under racing conditions. KAWASAKI STRONGLY RECOMMENDS THAT ALL RIDERS RIDE SAFELY AND OBEY ALL LAWS AND REGULATIONS CONCERNING THEIR MOTORCYCLE AND ITS OPERATION.

Racing should be done under supervised conditions, and recognized sanctioning bodies should be contacted for further details. For those who desire to participate in competitive racing or related use, the following technical information may prove useful. However, please note the following important notes.

- You are entirely responsible for the use of your motorcycle under abnormal conditions such as racing, and Kawasaki shall not be liable for any damages which might arise from such use.
- Kawasaki's Limited Motorcycle Warranty and Limited Emission Control Systems Warranty specifically exclude motorcycles which are used in competition or related uses. Please read the warranty carefully.
- Motorcycle racing is a very sophisticated sport, subject to many variables. The following information is theoretical only, and Kawasaki shall not be liable for any damages which might arise from alterations utilizing this information.
- When the motorcycle is operated on public roads, it **must** be in its original state in order to ensure safety and compliance with applicable regulations.

Carburetor:

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

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

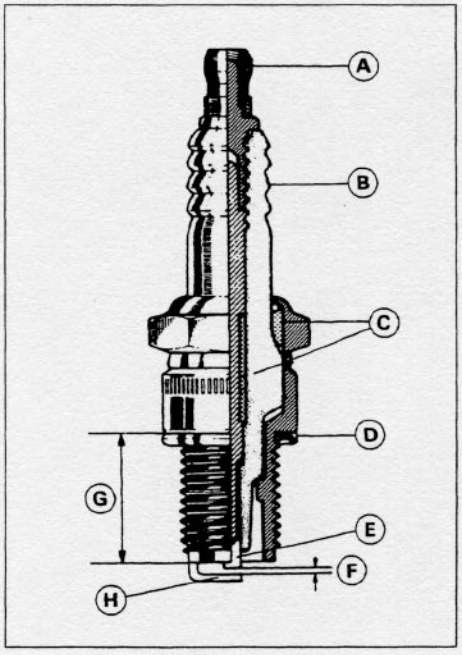
Spark Plug:

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

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

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

A. Terminal
B. Insulator
C. Cement
D. Gasket
E. Center Electrode
F. Gap (0.7 - 0.8 mm (0.028 ~ 0.032 in.))
G. Reach
H. Side Electrode



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

A spark plug for higher operating temperatures is used for racing. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a "colder" plug. If a spark plug with too cool a heat range is used - that is, a "cold" plug that cools itself too well - the plug will stay too cool to burn oft the carbon, and the carbon will collect on the electrodes and the ceramic insulator.

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

Spark Plug Inspection

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

CAUTION

If the spark plug is replaced with a type other than the standard plug, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same insulator type (regular type or projected type) as the standard plug.
If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and 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 Threads
Diameter: 10 mm
Pitch: 1.0 mm
Reach: 19 mm

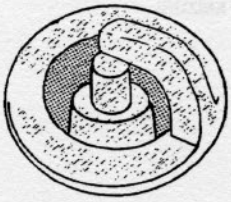
NOTE

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

Spark Plug Condition

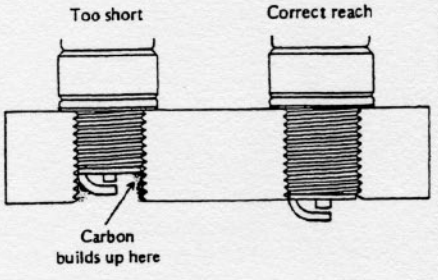
Carbon Fouling

Oil Fouling



Normal Operation

Overheating



Troubleshooting

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

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Starter lockout switch or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay, starter circuit relay not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:
- Starter motor clutch trouble
- Torque limiter trouble

Engine won't turn over:
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end, big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idler gear seizure
- Balancer bearing seizure

No fuel flow:
- No fuel in tank
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel tap valve trouble
- Fuel tap vacuum hose clogged
- Fuel line clogged
- Carburetor float valve clogged
- Starting technique faulty (to start the motorcycle after it has not been operated for 2 days or longer, turn the fuel tap to PRI, wait 10 seconds, and start).

Engine flooded:
- Fuel level in carburetor float bowl too high
- Float valve worn or jammed with foreign matter
- Starting technique faulty (When flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.

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

No spark; spark weak:
- Ignition switch, engine stop switch OFF
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect heat value
- Faulty CDI unit
- Pickup coil trouble
- Ignition coil trouble
- Ignition switch, engine stop switch shorted
- Neutral, starter lockout, or side stand switch trouble.
- Wiring shorted or open
- Fuse blown

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

Poor Running at Low Speed

Spark weak:
- Battery voltage low
- Spark plug dirty, broken, or gap maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect heat value
- Faulty CDI unit
- Pickup coil trouble
- Ignition coil trouble

Fuel/air mixture incorrect:
- Pilot screw maladjusted
- Pilot jet, or air passage clogged
- Needle jet, or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Choke plunger stuck open
- Carburetor starter system trouble
- Fuel level in carburetor float bowl too high or too low
- Fuel tank cap air vent obstructed
- Fuel tap clogged
- Carburetor holder loose
- Air cleaner duct loose
- Air cleaner O-ring damaged

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

Other:
- Faulty CDI unit
- Carburetor vacuum piston doesn't slide smoothly
- Carburetor vacuum piston diaphragm damage
- Coasting enricher trouble
- Engine oil level too high
- Engine oil viscosity too high
- Brake dragging
- Drive train trouble
- Engine overheating
- Clutch slipping

Poor Running or No Power at High Speed

Firing incorrect:
- Spark plug dirty, broken, or gap maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect heat value
- Faulty CDI unit
- Pickup coil trouble
- Ignition coil trouble

Fuel/air mixture incorrect:
- Choke plunger stuck open
- Carburetor starter system trouble
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Air jet clogged
- Fuel level in carburetor float bowl too high or too low
- Needle jet, or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner duct loose
- Air Cleaner O-ring damaged
- Water or foreign matter in fuel
- Carburetor holder loose
- Fuel tank cap air vent obstructed
- Fuel tap clogged
- Fuel line clogged

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

Knocking:
- Carbon build up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect heat value
- Faulty CDI unit

Other:
- Throttle valve won't fully open
- Carburetor vacuum piston doesn't slide smoothly
- Carburetor vacuum piston diaphragm damaged
- Brake dragging
- Clutch slipping
- Overheating

- Engine oil level too high
- Engine oil viscosity too high
- Drive train trouble
- Balancer mechanism malfunctioning
- Coasting enricher trouble

Engine Overheating:

Firing incorrect:
- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- Faulty CDI unit

Fuel/air mixture incorrect:
- Main jet clogged or wrong size
- Fuel level in carburetor float bowl too low
- Carburetor holder loose
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner duct loose
- Air cleaner O-ring damaged

Compression high:
- Carbon build up in combustion chamber

Engine load faulty:
- Clutch slipping
- Engine oil level too high
- Engine oil viscosity too high
- Brake dragging
- Drive train trouble

Lubrication inadequate:
- Engine oil level too low
- Engine oil poor quality or incorrect

Clutch Operation Faulty

Clutch slipping:
- Clutch cable maladjusted
- Clutch inner cable sticking
- Friction plate worn or warped
- Steel plate worn or warped
- Clutch spring broken or weak
- Clutch release function trouble
- Clutch hub or housing unevenly worn

Clutch not disengaging properly:
- Clutch lever play excessive
- Clutch spring compression uneven
- Engine oil deteriorated
- Engine oil viscosity too high
- Engine oil level too high
- Clutch housing seized
- Clutch release function trouble
- Clutch hub nut loose
- Clutch plate warped or rough
- Clutch hub spline damaged

Gear Shifting Faulty

Doesn't go into gear; shift pedal doesn't return:
- Clutch not disengaging
- Shift fork bent, worn, or seized
- Shift return spring pin loose
- Shift return spring weak or broken
- Shift mechanism arm broken
- Shift mechanism arm spring broken
- Shift pawl broken
- Gear seized
- Gear set lever operation trouble
- Shift drum broken

Jumps out of gear:
- Shift fork ear worn, bent
- Gear groove worn
- Gear dogs and/or dog holes worn
- Shift drum groove worn
- Gear set lever spring weak or broken
- Shift fork guide pin worn
- Drive shaft, output shaft, and/or gear splines worn

Overshifts:
- Gear set lever spring weak or broken
- Shift mechanism arm spring broken

Abnormal Engine Noise

Knocking:
- Faulty CDI unit
- Carbon build up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect heat value
- Overheating

Piston slap:
- Cylinder/piston clearance excessive
- Cylinder, piston worn
- Connecting rod bent
- Piston pin, piston pin hole worn

Valve noise:
- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearing or cam face worn
- Valve lifter worn

Other noise:
- Connecting rod big end, small end clearance excessive
- Piston ring worn, broken, or stuck
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive
- Engine mounts loose
- Crankshaft bearing worn
- Camshaft chain tensioner trouble
- Camshaft chain, sprocket, chain guide worn
- Primary gear worn or damaged
- Balancer gear worn or damaged
- Balancer gear improperly assembled
- Balancer bearing worn
- Alternator rotor loose

Abnormal Drive Train Noise

Clutch noise:
- Clutch housing finger and friction plate tang worn
- Clutch rubber damper weak or damaged
- Clutch housing gear worn
- Outside friction plate groove incorrect installation
- Metal chips jammed in clutch housing gear teeth

Transmission noise:
- Bearing worn
- Transmission gear worn or damaged
- Metal chips jammed in gear teeth
- Engine oil insufficient, low viscosity

Drive chain noise:
- Drive chain maladjusted
- Drive chain worn
- Rear and/or engine sprocket worn
- Drive chain lubrication insufficient
- Rear wheel misaligned

Abnormal Frame Noise

Front fork noise:
- Oil insufficient or too thin
- Spring weak or broken

Rear shock absorber noise:
- Shock absorber trouble
- Spring weak or broken

Disc brake noise:
- Pad surface glazed
- Disc warped
- Caliper trouble
- Pad installed incorrectly
- Master cylinder damaged

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

Abnormal Exhaust Color

White smoke:
- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

Black smoke:
- Air cleaner element clogged
- Main jet too large or fallen off
- Starter plunger stuck open
- Fuel level in carburetor float bowl too high

Brown smoke:
- Main jet too small
- Fuel level in carburetor float bowl too low
- Air cleaner duct loose
- Air cleaner O-ring damaged
- Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory

Handlebar hard to turn:
- Cable, hose, wire routing incorrect
- Steering stem nut too tight
- Steering stem bearing damaged
- Steering stem bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

Handlebar shakes or excessively vibrates:
- Tires worn
- Swingarm pivot bearings worn
- Rim warped, or not balanced
- Spoke looseness
- Wheel bearing worn
- Handlebar clamp bolt loose
- Steering stem head bolt loose
- Front, rear axle runout excessive

Handlebar pulls to one side:
- Frame bent
- Rear wheel misaligned
- Swingarm bent or twisted
- Swingarm pivot shaft bent
- Steering maladjusted
- Front fork bent
- Right and left front fork oil level uneven

Suspension operation trouble:
(Too hard)
- Tire air pressure too high
- Front fork oil excessive
- Front fork oil viscosity too high
- Rear shock absorber adjustment too hard
- Front fork bent

(Too soft)
- Front fork oil insufficient or leaking
- Front fork oil viscosity too low
- Rear shock absorber adjusted too soft
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking
- Tire air pressure too low

Brake Doesn't Hold

- Air in brake system
- Pads, disc worn
- Brake fluid leaking
- Contaminated pad
- Brake fluid deteriorated
- Brake master cylinder cups damaged
- Master cylinder scratched inside
- Disc warped

Battery Trouble

Battery discharged:
- Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte insufficient)
- Battery leads making poor contact
- Load excessive (e.g., bulb of excessive wattage)
- Ignition switch trouble
- Alternator trouble
- Regulator/rectifier trouble
- Wiring faulty

Battery overcharged:
- Battery faulty (temperature rise, safety valve open, low terminal voltage)
- Alternator trouble
- Regulator/rectifier trouble

General Lubrication (Periodic Maintenance)

Lubrication (Periodic Maintenance)

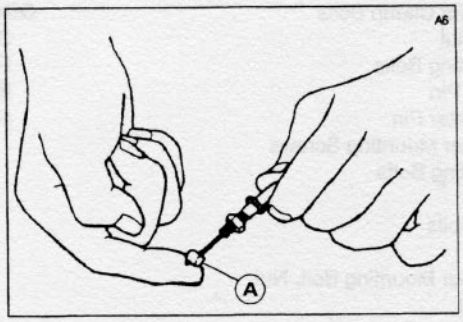
- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

NOTE

○ *Perform the general lubrication in accordance with the Periodic Maintenance Chart or whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray.*

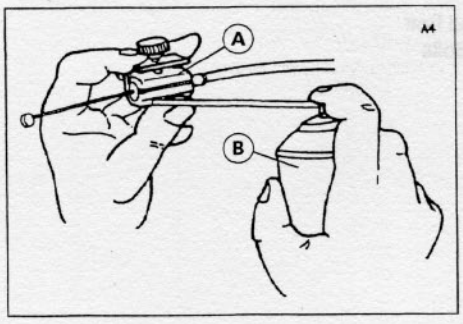
[Pivots : Lubricate with Motor Oil]
Footpegs
Side Stand
Rear Brake Joint Pin
Drive Chain with SAE 90 oil or chain oil

[Lubricate with grease]
Throttle Inner Cable Upper End [A]
Clutch Cable Upper End [A]
Brake Pedal
Clutch Lever
Brake Lever (silicon grease)



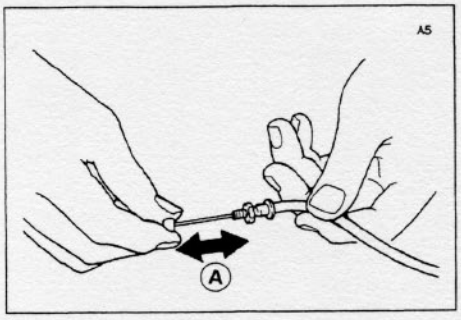
[Lubricate with cable lubricant]
Throttle Cable
Clutch Cable

- Lubricate the cables by seeping the oil between the inner cable and the cable housing. The cable may be lubricated by using a pressure cable luber [A] with an aerosol cable lubricant [B].



- With the cable disconnected at the both ends, the inner cable should move freely [A] within the cable housing.

★ If the cable movement is not free after lubricating, the cable is frayed or the cable housing is kinked. Replace the cable.



Nut, Bolt and Fastener Tightness

Tightness Inspection (Periodic Inspection)

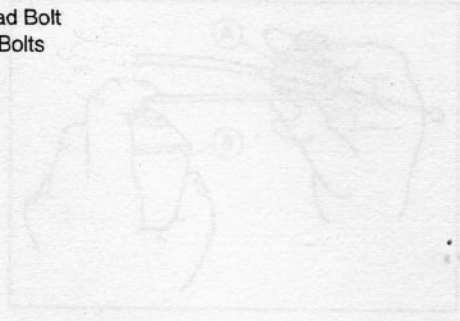
● Check the tightness of the bolts and nuts listed here in accordance with the Periodic Maintenance Chart. Also, check to see that each cotter pin is in place and in good condition.

NOTE

○ *For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

★ If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the Torque and Locking Agent section of the General Information chapter for torque specifications. For each fastener, first loosen it by 1/2 turn, then tighten it.
★ If cotter pins are damaged, replace them with new ones.

[Nut, Bolt, and Fastener to be checked]
Wheels:
Front Axle Nut
Front Axle Clamp Nut
Rear Axle Nut Cotter Pin
Rear Axle Nut
Final Drive:
Rear Sprocket Nuts
Brakes:
Front Master Cylinder Clamp Bolts
Brake Lever Pivot Nut
Front Caliper Mounting Bolts
Brake Pedal Cotter Pin
Brake Rod Joint Cotter Pin
Rear Master Cylinder Mounting Screws
Rear Caliper Mounting Bolts
Suspension:
Front Fork Clamp Bolts
Front Fender Bolts
Rear Shock Absorber Mounting Bolt, Nut
Swingarm Pivot Nut
Steering:
Steering Stem Head Bolt
Handlebar Clamp Bolts
Engine:
Throttle Cable Adjuster Lock Nuts
Engine Mounting Bolts, Nuts
Shift Pedal Bolt
Muffler Mounting Bolts
Exhaust Pipe Holder Nuts
Muffler Clamp Bolt
Clutch Cable Adjuster Lock Nuts
Clutch Lever Pivot Nut
Others:
Side Stand Bolt, Nut
Front Footpeg Cotter Pins
Rear Footpeg Holder Bolts
Rear Footpeg Cotter Pins



Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	×1 000 000
kilo	k	×1 000
centi	c	×0.01
milli	m	×0.001
micro	μ	×0. 000001

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

L	×	0.2642	=	gal (US)
L	×	0.2200	=	gal (imp)
L	×	1.057	=	qt (US)
L	×	0.8799	=	qt (imp)
L	×	2.113	=	pint (US)
L	×	1.816	=	pint (imp)
mL	×	0.03381	=	oz (US)
mL	×	0.02816	=	oz (imp)
mL	×	0.06102	=	cu in

Units of Force:

N	×	0.1020	=	kg
N	×	0.2248	=	lb
kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length:

km	×	0.6214	=	mile
m	×	3.281	=	ft
mm	×	0.03937	=	in

Units of Torque:

N·m	×	0.1020	=	kg·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb
kg·m	×	9.807	=	N·m
kg·m	×	7.233	=	ft·lb
kg·m	×	86.80	=	in·lb

Units of Pressure:

kPa	×	0.01020	=	kg/cm^2
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cm Hg
kg/cm^2	×	98.07	=	kPa
kg/cm^2	×	14.22	=	psi
cm Hg	×	1.333	=	kPa

Units of Speed:

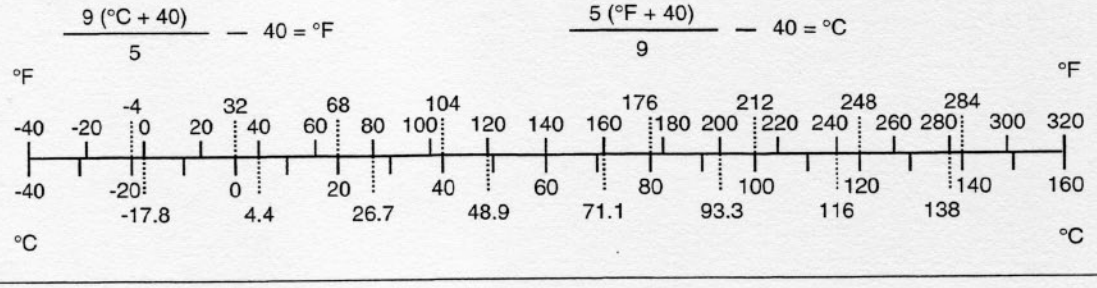
km/h	×	0.6214	=	mph

Units of Power:

kW	×	1.360	=	PS
kW	×	1.341	=	HP
PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

Units of Temperature:

$$\frac{9\,(°C + 40)}{5} - 40 = °F \qquad \frac{5\,(°F + 40)}{9} - 40 = °C$$



Supplement - 2001 ~ 2009 Models

Table of Contents

Foreword

How to Use this Manual

This "Supplement-2001 ~ 2009 Models" designed to be used in conjunction with the front part of this manual (up to 15-11). The specifications and maintenance procedures described in this chapter are only those that are unique to the KL250-G5 ~ G8, G9F, H5 ~ H9, H6F ~ models.

Complete and proper servicing of the KL250-G5 ~ G8, G9F, H5 ~ H9, H6F ~ models therefore requires mechanics to read both this chapter and the front of this manual.

General Information

General Specifications

Items	KL250-G5 ~ G8	KL250-H5 ~ H9 KL250-H5 ~ H6 (GR)
Dimensions and Weight		
Overall Length	2 080 mm (81.89 in.)	← (GR) 2 060 mm (81.10 in.)
Overall Width	780 mm (30.71 in.)	←
Overall Height	1 190 mm (46.85 in.)	← (GR) 1 130 mm (44.49 in.)
Wheelbase	1 375 mm (54.13 in.)	← (GR) 1 360 mm (53.54 in.)
Road Clearance	270 mm (10.63 in.)	← (GR) 265 mm (10.43 in.)
Seat Height	830 mm (32.68 in.)	← (GR) 810 mm (31.89 in.)
Dry Weight (mass)	113 kg (249 lb)	← (GR) 107 kg (236 lb)
Curb Weight (mass)	128 kg (282 lb)	← (GR) 122 kg (269 lb)
Fuel Tank Capacity	9 L (2.4 US gal)	←
Performance		
Minimum Turning Radius	1.8 mm (5.9 ft)	←
Engine		
Type	4-stroke, single cylinder, DOHC, 4 valves	←
Cooling System	Air-cooled	←
Bore and Stroke	72.0 × 61.2 mm (2.83 × 2.41 in.)	←
Displacement	249 cm^3 (15.19 cu in.)	←
Compression Ratio	9.3 : 1	←
Maximum Horsepower	(US) (CA) – – –	(AU) 15 kW (20.4 PS) @8 000 r/min (rpm) (GR) 19.1 kW (26 PS) @8 000 r/min (rpm)
Maximum Torque	(US) (CA) – – –	(AU) 20.6 N·m (2.1 kgf·m, 15.2 ft·b) @6 000 r/min (rpm) (GR) 25.5 N·m (2.6 kgf·m, 18.8 ft·b) @6 500 r/min (rpm)
Fuel System	Carburetor, Mikuni BST 34	←
Starting System	Electric starter	←
Ignition System	DC-CDI	←
Timing Advance System	Electronically advanced (digital)	←
Ignition Timing	BTDC 10° @1 300 r/min (rpm) ~ BTDC 30° @5 750 r/min (rpm)	(AU) (GR) BTDC 10° @2 500 r/min (rpm) ~ BTDC 30° @5 750 r/min (rpm)
Spark Plugs	NGK CR8E or ND U24ESR-N	←
Valve Timing:		
Intake Open	BTDC 31°	←
Intake Close	ABDC 61°	←
Intake Duration	272°	←
Exhaust Open	BBDC 61°	←
Exhaust Close	ATDC 31°	←
Exhaust Duration	272°	←
Lubrication System	Forced lubrication (wet sump)	←

General Information

Items	KL250-G5 ~ G8	KL250-H5 ~ H9 KL250-H5 ~ H6 (GR)
Engine Oil		
Type	API SE, SF or SG API SH, SJ, SL or SM with JASO MA, MA1 or MA2	←
Viscosity	SAE 10W-40	←
Capacity	1.5 L (1.6 US qt)	
Drive Train		
Primary Reduction System:		
Type	Gear drive	←
Reduction Ratio	2.800 (84/30)	←
Clutch Type	Wet multi disc	←
Transmission:		←
Type	6-speed, constant mesh, return shift	←
Gear Ratios:		
1st	3.090 (34/11)	←
2nd	2.125 (34/16)	←
3rd	1.500 (27/18)	←
4th	1.148 (31/27)	←
5th	0.961 (25/26)	←
6th	0.851 (23/27)	←
Final System:		
Type	Chain drive	←
Reduction Ratio	3.071 (43/14)	←
Overall Drive Ratio	7.325 @top gear	←
Frame		
Type	Tubular, semi-double cradle	←
Caster	28°	←
Trail	107 mm (4.21 in.)	←
Rim Size:		
Front	21 × 1.60	←
Rear	18 × 2.15	←
Front Tire:		
Type	Tube type	←
Size	2.75-21 45P	←
Rear Tire:		
Type	Tube type	←
Size	4.10-18 59P	←
Front Suspension:		
Type	Telescopic fork	←
Wheel Travel	230 mm (9.06 in.)	← (GR) 220 mm (8.66 in.)
Rear Suspension		
Type	Swingarm (uni-trak)	←
Wheel Travel	186 mm (7.32 in.)	← (GR) 170 mm (6.69 in.)

General Information

Items	KL250-G5 ~ G8	KL250-H5 ~ H9 KL250-H5 ~ H6 (GR)
Brake Type:		
Front	Single disc brake	←
Rear	Single disc brake	←
Electrical System		
Battery	12 V 6 Ah (sealed battery)	←
Headlight:		
Type	Semi-sealed beam	←
Bulb	12 V 60/55 W (quartz-halogen)	←
Tail/Brake Light	12 V 5/21 W	←
Alternator:		
Type	Three-phase AC	←
Output	15 A-14 V/@7 000 r/min (rpm)	←

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

(AU): Australia Model
(GR): Greece Model
(US): United States Model
(CA): Canada Model

General Information

Items	KL250G9F	KL250H6F ~ H7F
Dimensions and Weight		
Overall Length	2 080 mm (81.89 in.)	←
Overall Width	780 mm (30.71 in.)	←
Overall Height	1 190 mm (46.85 in.)	←
Wheelbase	1 375 mm (54.13 in.)	←
Road Clearance	270 mm (10.63 in.)	←
Seat Height	830 mm (32.68 in.)	←
Dry Weight (mass)	113 kg (249 lb)	←
Curb Weight (mass)	128 kg (282 lb)	←
Fuel Tank Capacity	9 L (2.4 US gal)	←
Performance		
Minimum Turning Radius	1.8 mm (5.9 ft)	←
Engine		
Type	4-stroke, single cylinder, DOHC, 4 valves	←
Cooling System	Air-cooled	←
Bore and Stroke	72.0 × 61.2 mm (2.83 × 2.41 in.)	←
Displacement	249 cm^3 (15.19 cu in.)	←
Compression Ratio	9.3 : 1	←
Maximum Horsepower	(US) (CA) – – –	13.4 kW (18.2 PS) @7 700 r/min (rpm), (CA) – – –
Maximum Torque	(US) (CA) – – –	19.2 N·m (2.0 kgf·m, 14.2 ft·b) @6 000 r/min (rpm), (CA) – – –
Fuel System	Carburetor, Mikuni BST 34	←
Starting System	Electric starter	←
Ignition System	DC-CDI	←
Timing Advance System	Electronically advanced (digital)	←
Ignition Timing	BTDC 10° @1 300 r/min (rpm) ~ BTDC 30° @5 750 r/min (rpm)	BTDC 10° @1 300 r/min (rpm) ~ BTDC 30° @5 750 r/min (rpm) (AU) BTDC 10° @2 500 r/min (rpm) ~ BTDC 30° @5 750 r/min (rpm)
Spark Plugs	NGK CR8E or ND U24ESR-N	←
Valve Timing:		
Intake Open	BTDC 31°	←
Intake Close	ABDC 61°	←
Intake Duration	272°	←
Exhaust Open	BBDC 61°	←
Exhaust Close	ATDC 31°	←
Exhaust Duration	272°	←
Lubrication System	Forced lubrication (wet sump)	←

General Information

Items	KL250G9F	KL250H6F ~ H7F
Engine Oil		
Type	API SE, SF or SG API SH, SJ, SL or SM with JASO MA, MA1 or MA2	←
Viscosity	SAE 10W-40	←
Capacity	1.5 L (1.6 US qt)	
Drive Train		
Primary Reduction System:		
Type	Gear drive	←
Reduction Ratio	2.800 (84/30)	←
Clutch Type	Wet multi disc	←
Transmission:		←
Type	6-speed, constant mesh, return shift	←
Gear Ratios:		
1st	3.090 (34/11)	←
2nd	2.125 (34/16)	←
3rd	1.500 (27/18)	←
4th	1.148 (31/27)	←
5th	0.962 (25/26)	←
6th	0.852 (23/27)	←
Final System:		
Type	Chain drive	←
Reduction Ratio	3.071 (43/14)	←
Overall Drive Ratio	7.326 @top gear	←
Frame		
Type	Tubular, semi-double cradle	←
Caster	28°	←
Trail	107 mm (4.21 in.)	←
Rim Size:		
Front	21 × 1.60	←
Rear	18 × 2.15	←
Front Tire:		
Type	Tube type	←
Size	2.75-21 45P	←
Rear Tire:		
Type	Tube type	←
Size	4.10-18 59P	←
Front Suspension:		
Type	Telescopic fork	←
Wheel Travel	230 mm (9.06 in.)	←
Rear Suspension		
Type	Swingarm (uni-trak)	←
Wheel Travel	186 mm (7.32 in.)	←

General Information

Items	KL250G9F	KL250H6F ~ H7F
Brake Type:		
Front	Single disc brake	←
Rear	Single disc brake	←
Electrical System		
Battery	12 V 6 Ah (sealed battery)	←
Headlight:		
Type	Semi-sealed beam	←
Bulb	12 V 60/55 W (quartz-halogen)	←
Tail/Brake Light	12 V 5/21 W	←
Alternator:		
Type	Three-phase AC	←
Output	15 A-14 V/@7 000 r/min (rpm)	←

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

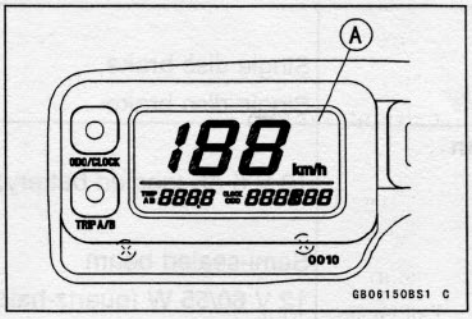
(AU): Australia Model
(US): United States Model
(CA): Canada Model

Technical Information-Digital Mater (KL250G9F Canada model/KL250-H9, H6F ~)

○The meter displays and button positions are as follows:

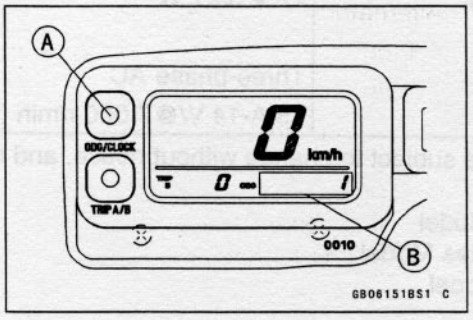
Speedometer
Display Range: 0 to 150 km/h

○Displays speed [A] constantly with the ignition switch turned ON. Displays "188 km/h" (all segments) for a few seconds immediately after the ignition switch has been turned ON, in order to check the operation of the display panel.



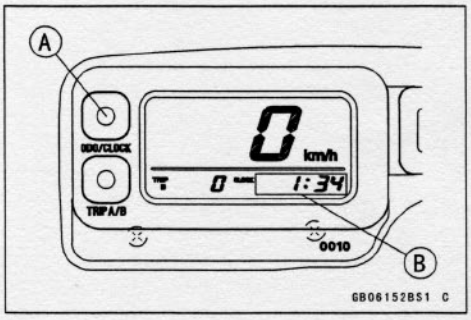
Odometer [B]
Display Range: 0 to 999999 km

○This display is shared with the clock function. An ODO/CLOCK button [A] is provided to toggle between the two displays. It displays the clock [B] immediately after the battery has been connected.



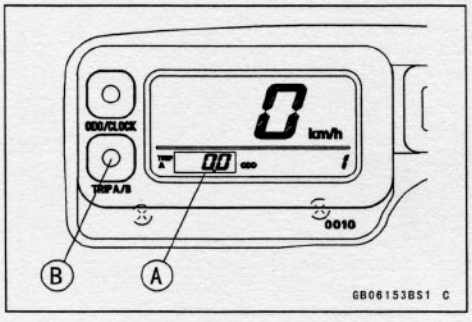
Clock
Display Range: **1:00 to 12:59; 12-hour display without AM/PM distinction.**
(hours):(miniutes)
Minimum display unit: **1 minute**

○This display is shared with the odometer function An ODO/CLOCK button [A] is provided to toggle between the functions. Immediately after the ignition switch has been turned ON, it displays the clock [B] with its center segment flashing.



Tripmeter [A]
Displays: **Two displays are provided, Trip A and Trip B. A TRIP A/B [B] button is provided to toggle between the two displays.**
Displays Range:
Trip A: 0.0 to 999.9 km
Trip B: 0 to 9999 km

○Immediately after the ignition switch has been turned ON, the Trip A display shows "0.0", and starts counting the driven distance.



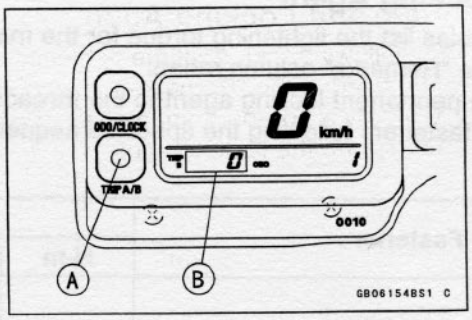
ODO/CLOCK Button
○Toggles between the odometer and clock displays.

General Information

TRIP A/B Button

○To toggle [B] between the Trip A and Trip B displays, press the TRIP A/B button [A] less than 2 seconds and release it.

● Pressing the switch longer than 2 seconds resets the trip-meter display to "0".



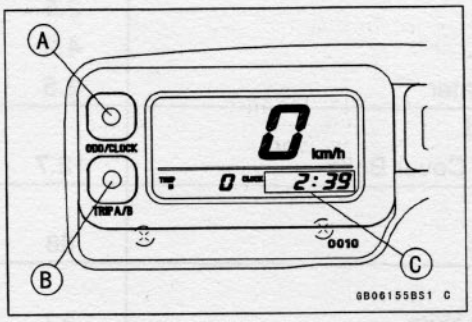
Clock Setting

● Press the ODO/CLOCK button [A] to show the clock in the odometer display.

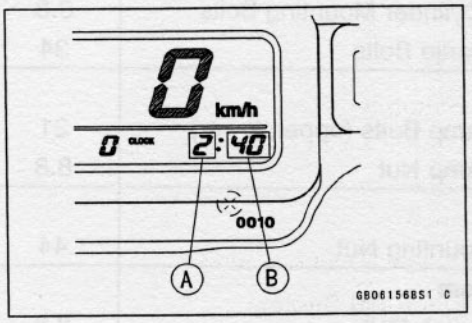
● Keep the ODO/CLOCK button pressed and turn the TRIP A/B button [B] ON to enable the display to assume the Hour/Minute setting mode [C] in which the numbers flash, thus enabling you to set the time on the clock.

○Starting with the Hour/Minute setting mode, each pressing of the ODO/CLOCK button changes the setting modes as follows:

Hour/Minute Setting Mode → Hour Setting Mode → Minute Setting Mode



○In the Hour/Minute setting mode, the numbers that represent the hours and the minutes flash. In the Hour setting mode, the numbers [A] that represent the hours flash. And in the Minute setting mode, the numbers [B] that represent the minutes flash.



● In the Hour setting mode and the Minute setting mode, set the time by pressing the TRIP A/B button to increase the number of Hours and Minutes.

● Then, change to the Hour/Minute setting mode and press the TRIP A/B button to complete the time setting process.

General Information

Torque and Locking Agent

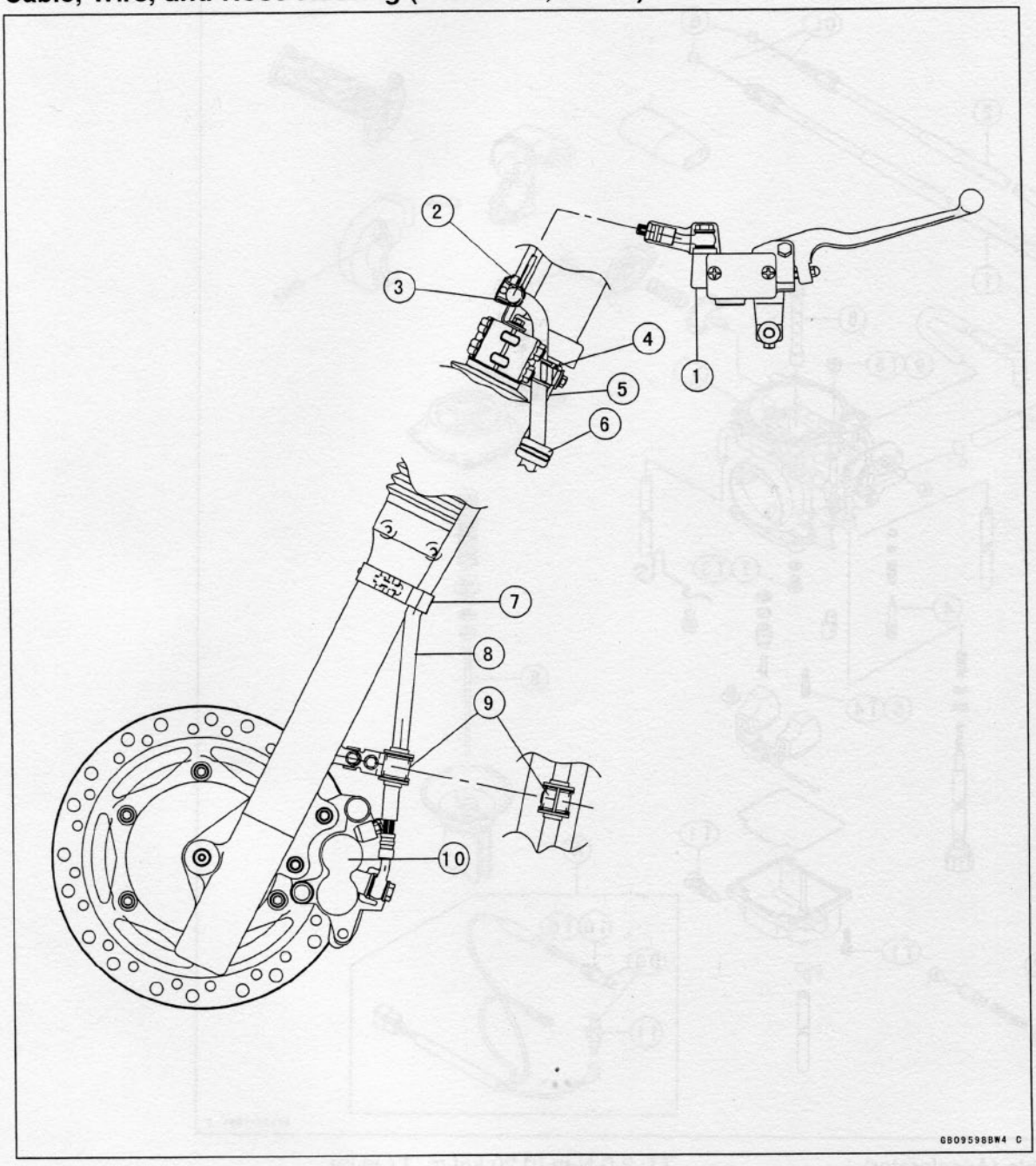
The following tables list the tightening torque for the major fasteners.
Letters used in the "Remarks" column mean:

L: Apply a non-permanent locking agent to the threads.
S: Tighten the fasteners following the specified sequence.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System				
Fuel Tap Bolts	2.5	0.25	22 in·lb	with white washer
	4.9	0.50	43 in·lb	with black washer
Carburetor Heater	2.5	0.25	22 in·lb	
Engine Top End				
Cylinder Head Cover Bolts	12.7	1.3	112 in·lb	
Wheels/Tires				
Front Axle Nut	88	9.0	65	
Final Drive				
Rear Sprocket Nuts	32	3.3	24	
Brakes				
Rear Master Cylinder Mounting Bolts	8.8	0.9	78 in·lb	
Brake Hose Banjo Bolts	34	3.5	25	
Suspension				
Front Fork Clamp Bolts (upper, lower)	21	2.1	15	S
Front Axle Clamp Nut	8.8	0.9	78 in·lb	S
Frame				
Side Stand Mounting Nut	44	4.5	32	
Electrical System				
Side Stand Switch Bolt	8.8	0.9	78 in·lb	L
Torque Limiter Cap Bolts	12	1.2	104 in·lb	
Carburetor Heater	2.5	0.25	22 in·lb	

General Information

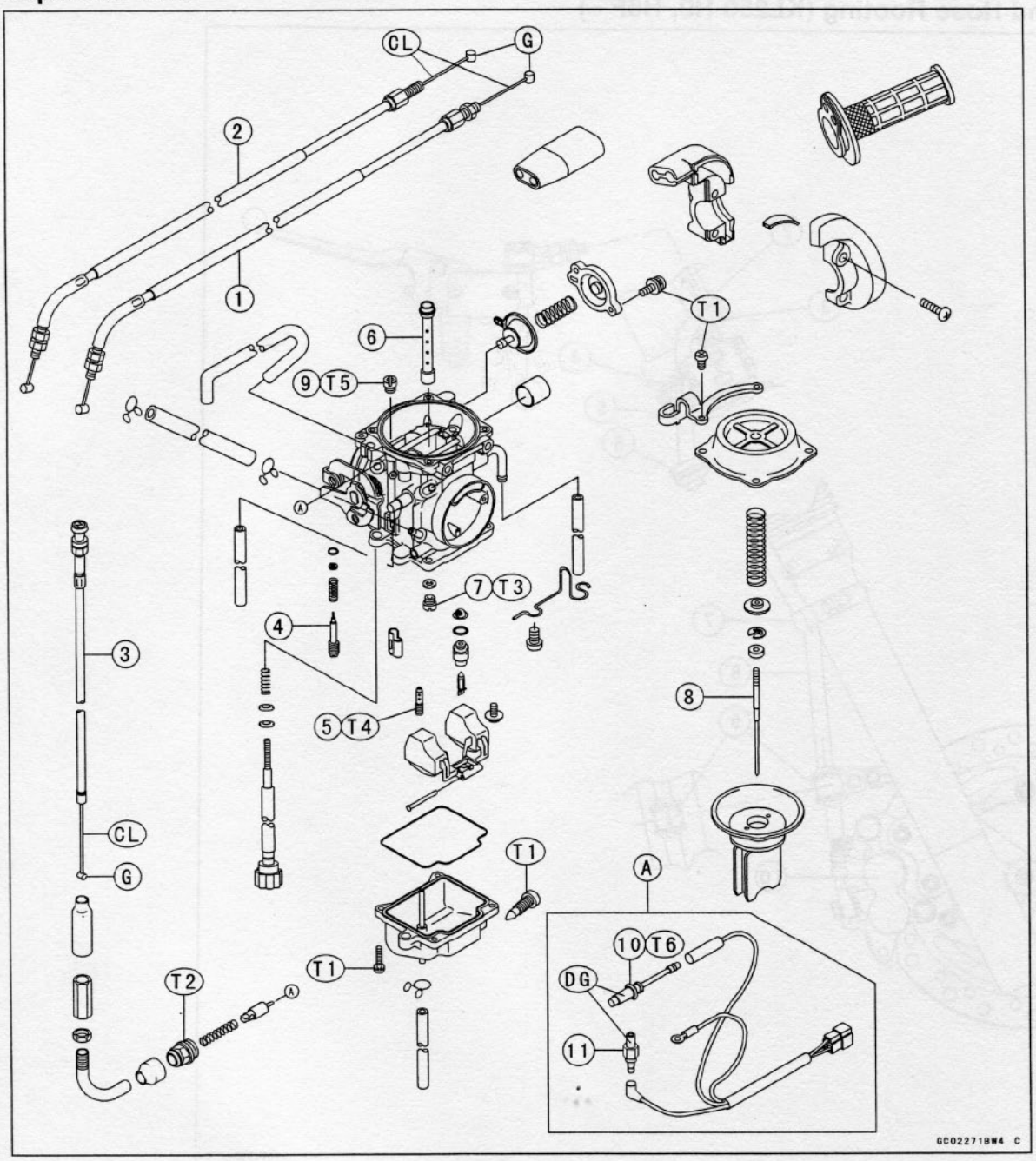
Cable, Wire, and Hose Rooting (KL250-H9, H6F ~)



1. Front Master Cylinder
2. Strap
3. Clamp
4. Clamp
5. Clamp
6. Grommet
7. Clamp
8. Front Brake Hose
9. Clamp
10. Front Caliper

Fuel System

Exploded View

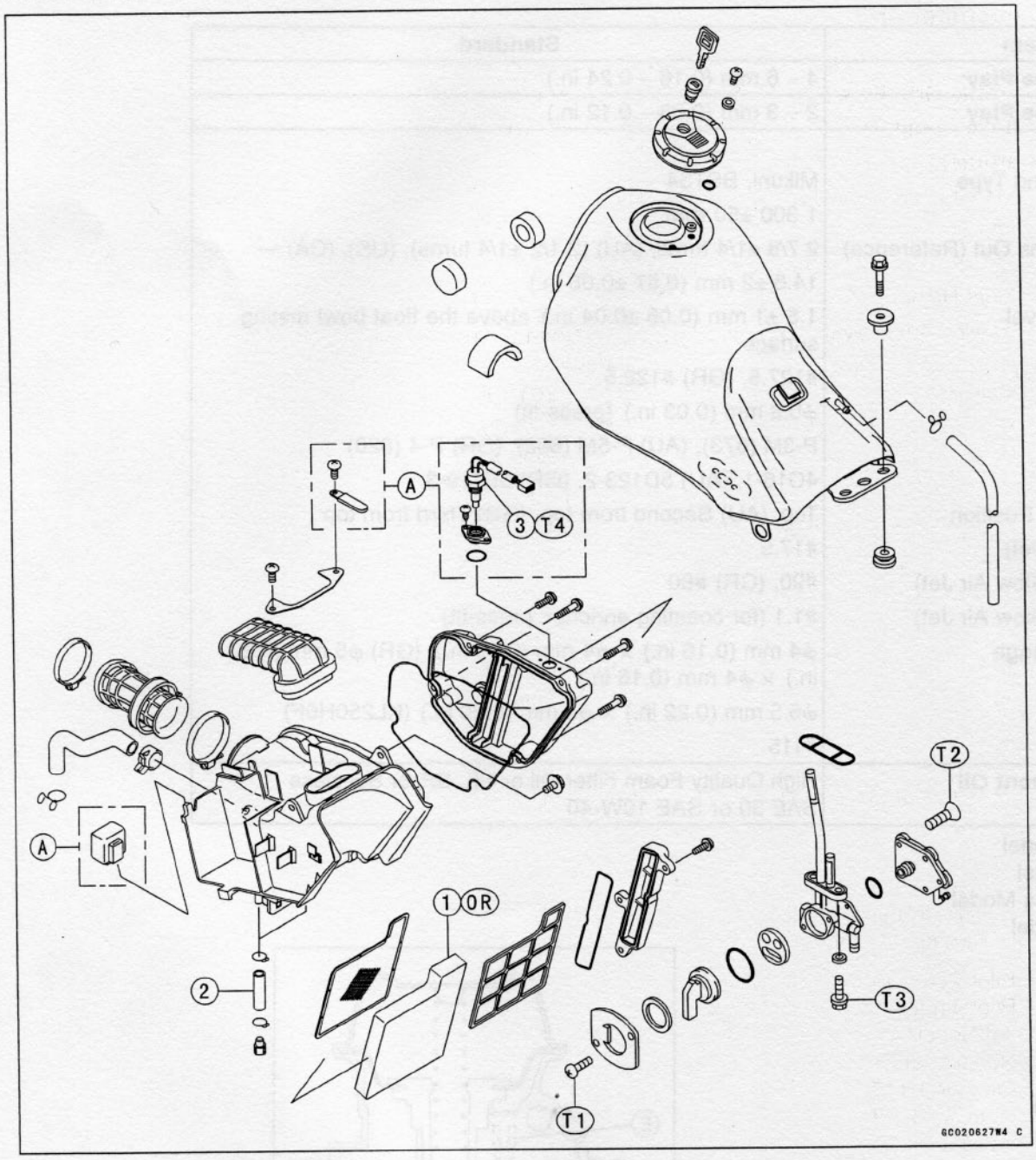


1. Throttle Cable (Accelerator)
2. Throttle Cable (Decelerator)
3. Choke Cable
4. Pilot Screw
5. Pilot (Slow) Jet
6. Needle Jet
7. Main Jet
8. Jet Needle
9. Pilot Air Jet 1
10. Carburetor Heater
11. Carburetor Temperature Sensor

T1: 2.0 N·m (0.20 kgf·m, 17 in·lb)
T2: 2.5 N·m (0.25 kgf·m, 22 in·lb)
T3: 1.8 N·m (0.18 kgf·m, 16 in·lb)
T4: 0.8 N·m (0.08 kgf·m, 7.1 in·lb)
T5: 1.2 N·m (0.12 kgf·m, 10 in·lb)
T6: 2.5 N·m (25 kgf·m, 22 in·lb)
CL: Apply cable lubricant.
DG: Apply heat transfer grease.
G: Apply grease.

A: Australia Model

Fuel System



1. Air Cleaner Element
2. Air Cleaner Drain Hose
3. Atmospheric Temperature Sensor

T1: 0.8 N·m (0.08 kgf·m, 7.1 in·lb)
T2: 1.0 N·m (0.10 kgf·m, 8.7 in·lb)
T3: 2.5 N·m (0.25 kgf·m, 22 in·lb)
T4: 15 N·m (1.5 kgf·m, 11 ft·lb)
OR: Apply Air Filter Oil.

A: Australia Model

Fuel System

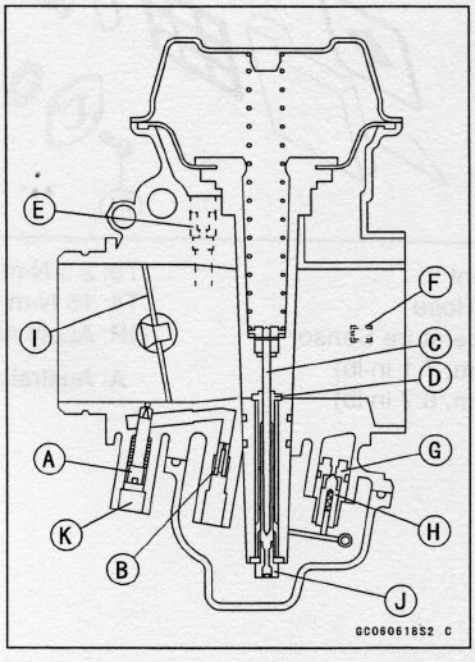
Specifications

Item	Standard
Throttle Grip Free Play	4 ~ 6 mm (0.16 ~ 0.24 in.)
Choke Cable Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Carburetor	
Manufacturer And Type	Mikuni, BST34
Idle Speed	1 300 ±50 rpm
Pilot Screw Turns Out (Reference)	2 7/8 ±1/4 turns, (AU) (2 1/2 ±1/4 turns), (US), (CA) —
Float Height	14.6 ±2 mm (0.57 ±0.08 in.)
Service Fuel Level	1.5 ±1 mm (0.06 ±0.04 in.) above the float bowl mating surface
Main Jet	#127.5, (GR) #122.5
Main Air Jet	ϕ0.8 mm (0.03 in.) (press-fit)
Needle jet	P-3M (873), (AU) P-5M (888), (GR) P-4 (820)
Jet Needle	4C16-1, (AU) 5D123-2, (GR) 5E119-3
Jet Needle Clip Position	Top, (AU) Second from top, (GR) Third from top
Pilot Jet (Slow Jet)	#17.5
Pilot Air Jet 1 (Slow Air Jet)	#90, (GR) #80
Pilot Air Jet 2 (Slow Air Jet)	#1.1 (for coasting enricher, press-fit)
Starter Jet Passage	ϕ4 mm (0.16 in.) × ϕ4 mm (0.16 in.), (GR) ϕ5 mm (0.20 in.) × ϕ4 mm (0.16 in.)
	ϕ5.5 mm (0.22 in.) × ϕ5 mm (0.20 in.) (KL250H6F)
Throttle Valve	#115
Air Cleaner Element Oil	High Quality Foam Filter Oil or SE, SF, or SG class SAE 30 or SAE 10W-40

(AU): Australia Model
(GR): Greece Model
(US): United States Model
(CA): Canada Model

Pilot Screw [A]
Pilot Jet [B]
Jet Needle [C]
Needle Jet [D]
Pilot air Jet [E]
Main Air Jet [F]
Valve Seat [G]
Float Valve [H]
Throttle Valve [I]
Main Jet [J]
Plug [K] (United States and Canada Models)

Special Tools - Pilot Screw Adjuster, A: 57001 -1239
Fuel Level Gauge: 57001-1017



Engine Top End

Exhaust System (KL250H6F, Australia Model)

The catalyst is adopted for exhaust system and included into the muffler body as follows.

Muffler Body	Specification	ORG Product
Pipe Type Catalyst P/No: 18091-0269A Mark: KHI K497	Australia	KL250H6F

Engine Lubrication System

Specifications

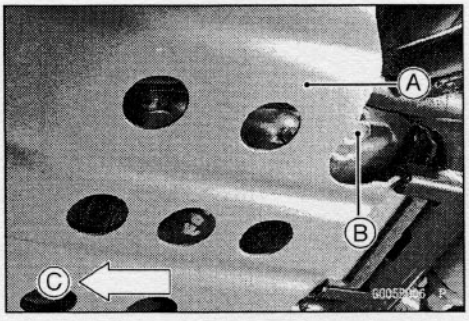
Item	Standard
Engine Oil	
Type:	API SE, SF or SG API SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity:	
Oil Change-Without Replacing Filter	1.3 L (1.4 US qt)
Oil Change-Replacing Filter	1.4 L (1.5 US qt)
Engine Disassembly And Assembly	1.5 L (1.6 US qt)
Oil Level (After Warm-Up Or Driving)	Between upper and lower levels
Oil Pressure Measurement	
(Oil Temperature 90°C, Engine Speed 4 000 rpm)	78 ~ 147 kPa (0.8 ~ 1.5 kgf/cm², 11 ~ 21 psi)

Engine Oil and Oil Filter

Engine Oil Change

⚠ WARNING

To avoid a serious burn, never touch the exhaust pipe during oil change.



- Warm up the engine sufficiently with the motorcycle standing on its side stand, and stop the engine.
- Remove the engine guard [A].
- Place an oil pan under the engine and remove the drain plug [B] to drain the oil.
  Front [C]
- Replace the drain plug gasket with a new one if it is damaged.

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

- After draining the oil, tighten the drain plug.

Torque - Drain Plug: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Pour in the specified type and amount of oil.

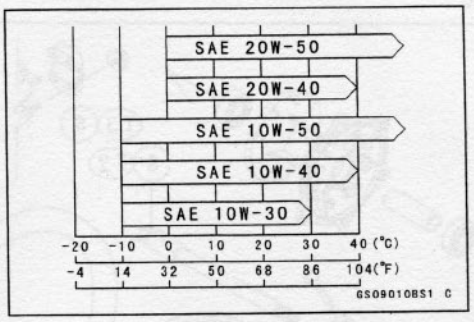
Recommended Engine Oil

Type:	**API SE, SF or SG**
	API SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity:	**SAE 10W - 40**
Capacity:	**1.3 L (1.4 US qt) Oil change without replacing filter**
	1.4 L (1.5 US qt) Oil change with replacing filter
	1.5 L (1.6 US qt) Engine disassembly and assembly

Engine Lubrication System

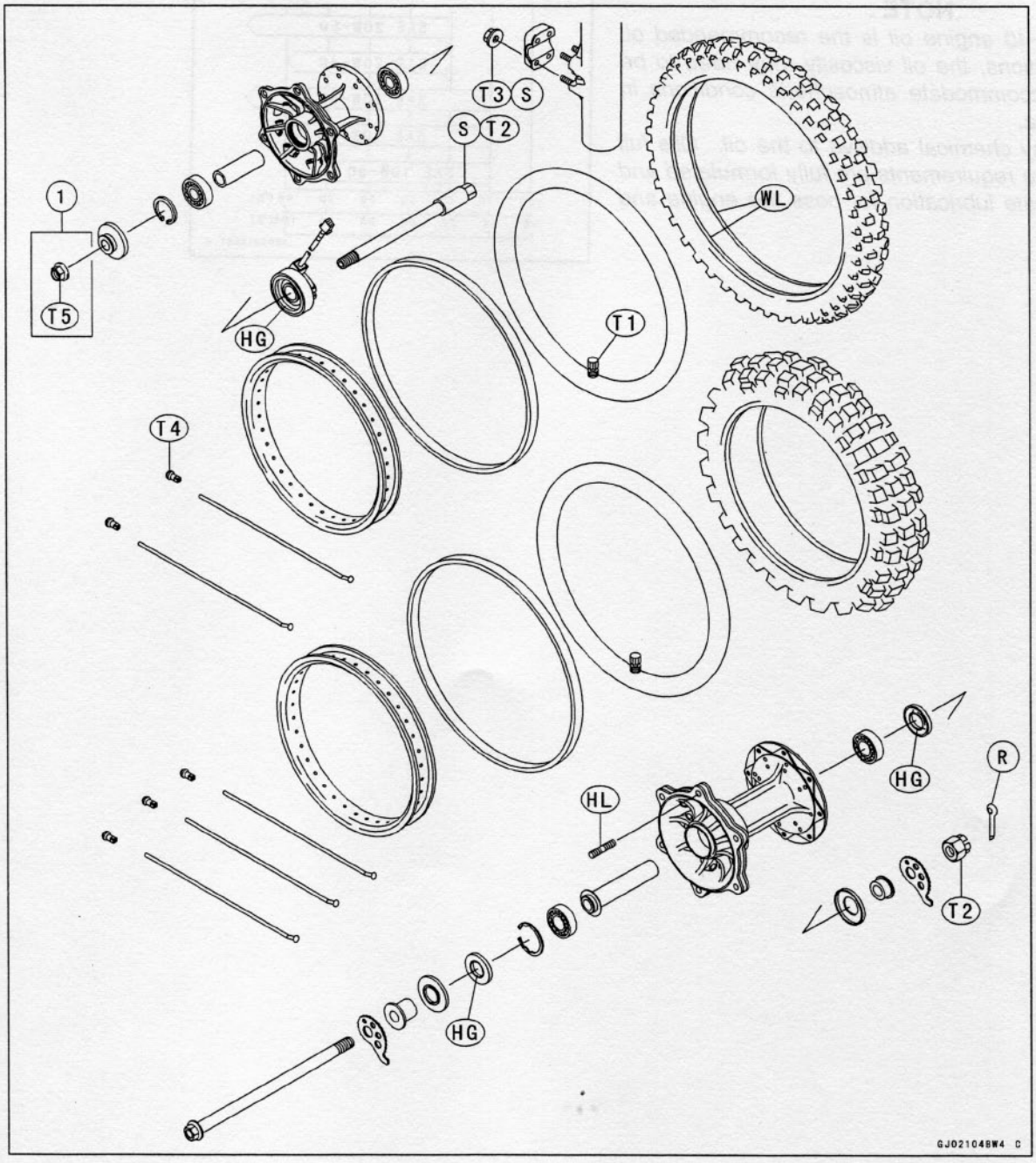
NOTE

- *Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.*
- *Do not add any chemical additive to the oil. Oils full filling the above requirements are fully formulated and provide adequate lubrication for boss the engine and the clutch.*



Wheels/Tires

Exploded View



1. KL250G9F/H7F
T1: 1.5 N·m (0.15 kgf·m, 13 in·lb)
T2: 88 N·m (9.0 kgf·m, 65 ft·lb)
T3: 8.8 N·m (0.9 kgf·m, 78 in·lb)
T4: 2.0 ~ 3.9 N·m (0.20 ~ 0.40 kgf·m, 17 ~ 35 in·lb)
T5: 88 N·m (9.0 kgf·m, 65 ft·lb)
HG: Apply high-temperature grease.
HL: Apply high-lock agent (high-adhesion locking agent with medium strength) to the threads.
R: Replacement Parts
S: Follow the specific tightening sequence.
WL: Apply soap and water solution or rubber lubricant.

Wheels/Tires

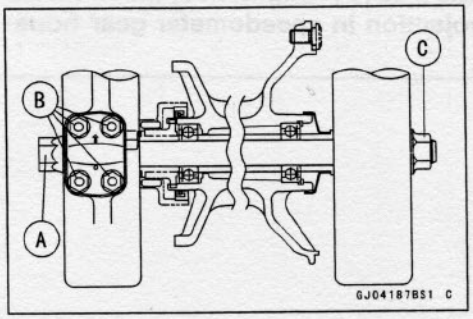
Wheels

Specifications

Item	Standard	Service Limit
Wheels		
Rim Size:		
Front	21 × 1.60	—
Rear	18 × 2.15	—

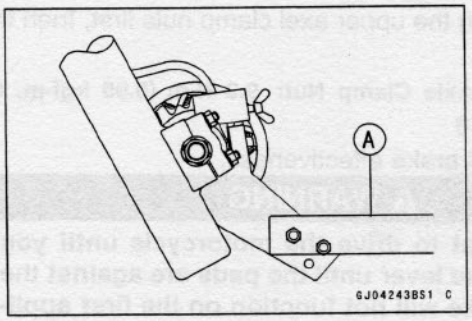
Front Wheel Removal (KL250G9F/H7F)

● Loosen:
Axle [A]
Axle Clamp Nut [B]
Nut [C]



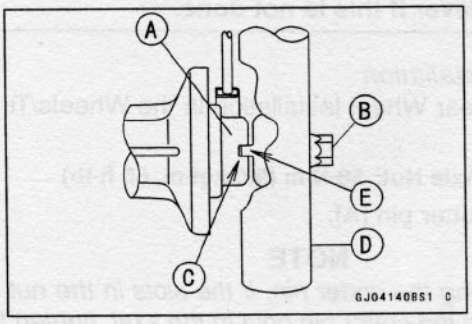
○Loosen the front axle nut while holding the speedometer gear housing steady with the sensor housing holder [A].

Special Tool - Sensor Housing Holder 57001-1652



CAUTION

Prevent the groove [C] in the speed gear housing [A] from coming off the stopper [E] on the right front fork [D], otherwise the speedometer gear housing will turn when the axle [B] is tightened, which would damage the projection in speedometer gear housing.



● Refer to the front Wheel Removal in the Wheels/Tires chapter.

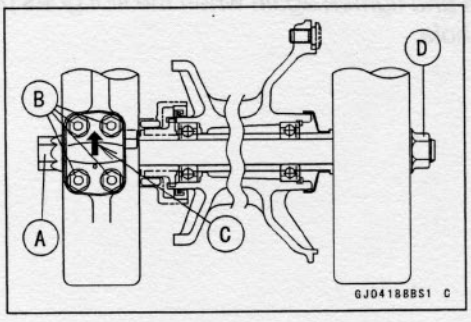
Front Wheel Installation (KL250G9F/H7F)

● Refer to the front Wheel Installation in the Wheels/Tires chapter.

● Insert the axle [A] into the wheel assembly from the right, then temporarily tighten the axle clamp nuts [B] pulling the wheel toward the front fork (right) remaining the stopper of the fork stayed in the groove of speedometer gear housing.

○Install the axle clamp with its arrow mark [C] facing upward.

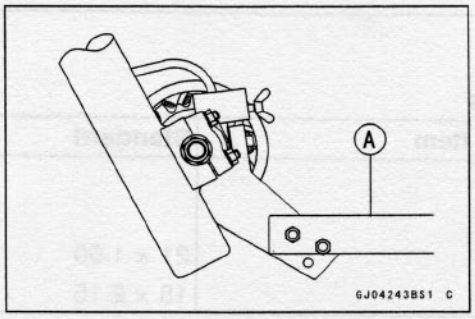
● Install the axle nut [D].



○Tighten the front axle nut while holding the speedometer gear housing steady with the sensor housing holder [A].

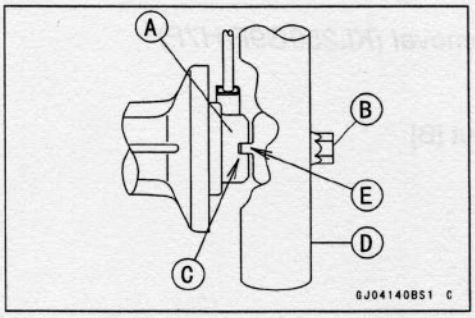
Special Tool - Sensor Housing Holder 57001-1652

Torque - Front Axle Nut: 88 N·m (9.0 kgf·m, 65 ft·lb)



CAUTION

Prevent the groove [C] in the speed gear housing [A] from coming off the stopper [E] on the right front fork [D], otherwise the speedometer gear housing will turn when the axle [B] is tightened, which would damage the projection in speedometer gear housing.



- Securely tighten the upper axel clamp nuts first, then the lower ones.

Torque - Front Axle Clamp Nut: 9.3 N·m (0.95 kgf·m, 82 in·lb)

- Check the front brake effectiveness.

⚠ WARNING

Do not attempt to drive the motorcycle until you pump 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 Wheel Installation

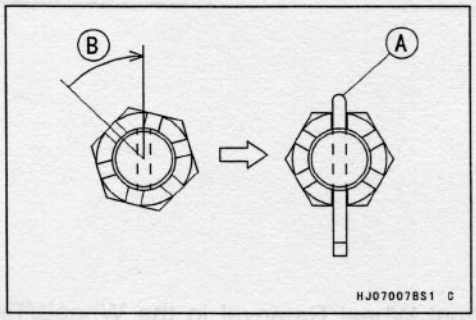
- Refer to the Rear Wheel Installation in the Wheels/Tires chapter.

Torque - Rear Axle Nut: 88 N·m (9.0 kgf·m, 65 ft·lb)

- Insert a new cotter pin [A].

NOTE

○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axel, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degree.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*

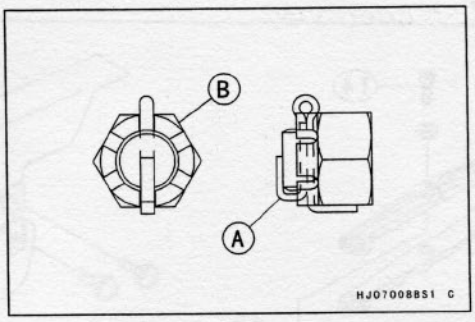


Wheels/Tires

- Bend the cotter pin [A] over the nut [B].
- Check the rear brake.

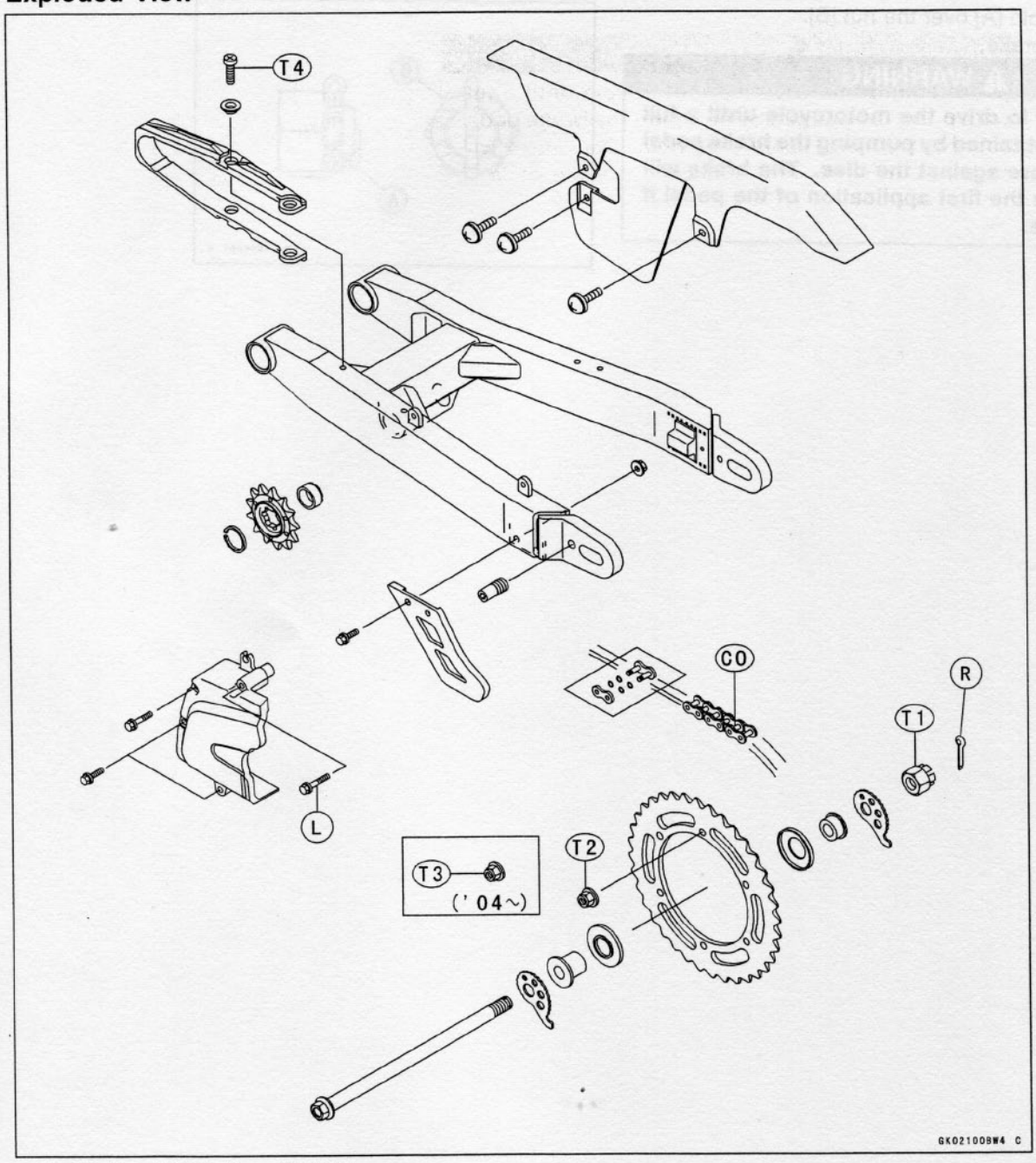
⚠ WARNING

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.



Final Drive

Exploded View



T1: 88 N·m (9.0 kgf·m, 65 ft·lb)
T2: 27 N·m (2.8 kgf·m, 20 ft·lb)
T3: 32 N·m (3.3 kgf·m, 24 ft·lb)
T4: 7.8 N·m (0.80 kgf·m, 69 in·lb)
CO: Apply chain oil.
L: Apply non-permanent locking agent.
R: Replacement Parts

Final Drive

Drive Chain

Drive Chain Slack Adjustment

● Refer to the Drive Chain Slack Adjustment in the Final Drive chapter to Drive Chain.

Torque - Rear Axle Nut: 88 N·m (9.0 kgf·m, 65 ft·lb)

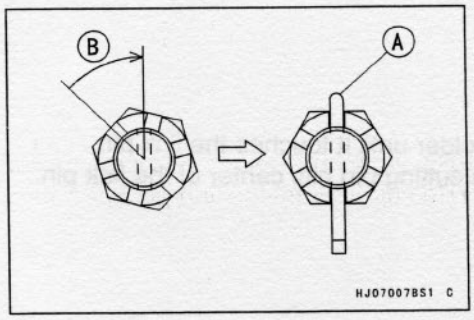
● Insert a new cotter pin [A].

NOTE

○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axel, tighten the nut clockwise [B] up to next alignment.*

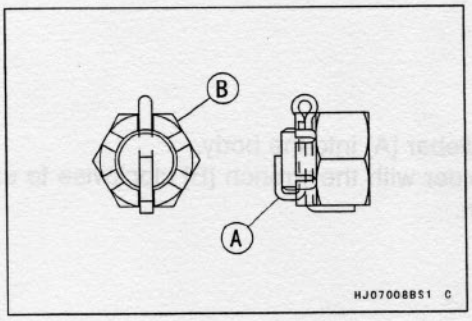
○*It should be within 30 degree.*

○*Loosen once and tighten again when the slot goes past the nearest hole.*



● Bend the cotter pin [A] over the nut [B].

● Check the rear brake.



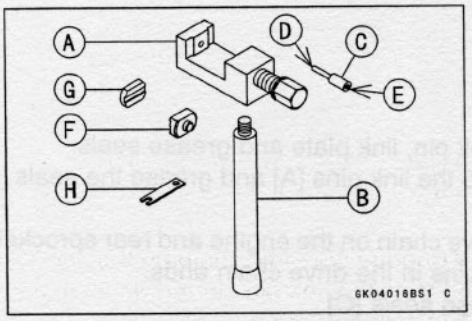
Drive Chain Replacement

CAUTION

For safety, if the drive chain shall be replaced, replace it using a recommended tool.

Standard Chain - Type: EK 520LV-0, Joint
Link: 102

Recommended Tool - Type: EK JOINT Tool #50
Brand: ENUMA

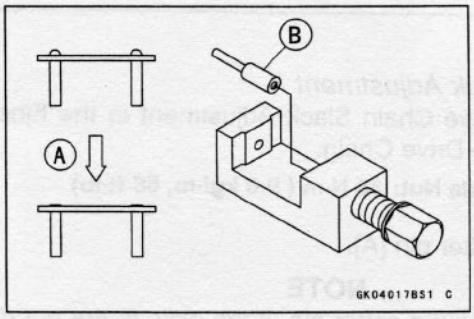


Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
For Rivetting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]

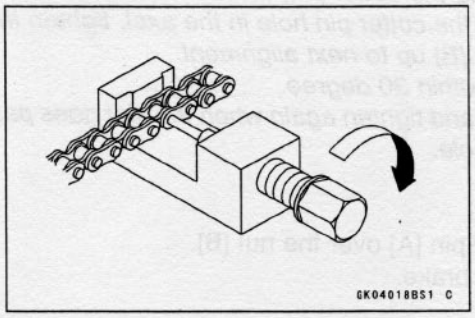
● Remove:
Chain Cover (see Drive Chain Removal)
Engine Sprocket Cover (see Engine Sprocket Removal)

Final Drive

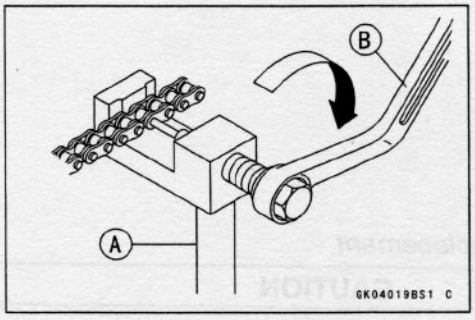
- Grind [A] the pin head to make it flat.
- Set the cutting and rivetting pin [B] as shown.



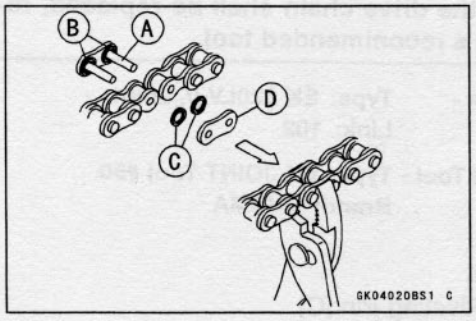
- Screw the pin holder until it touches the link pin.
- Be sure that the cutting pin hits center of the link pin.



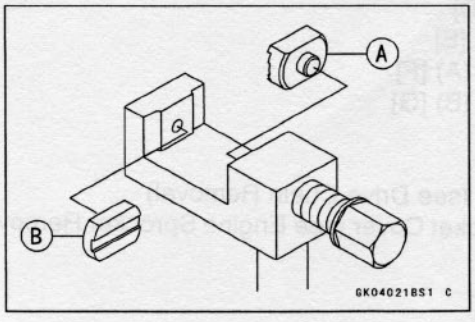
- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the link pin.



- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease the seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals [C].
- Install the link plate [D] so that the mark faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.

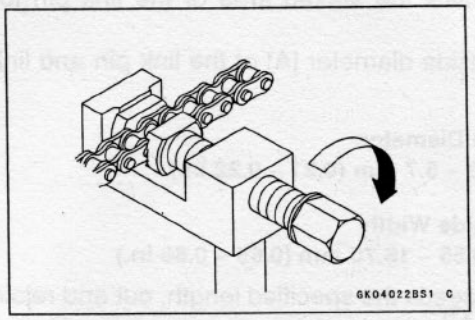


- Set the plate holder (A) [A] and plate holder (B) [B] on the body.

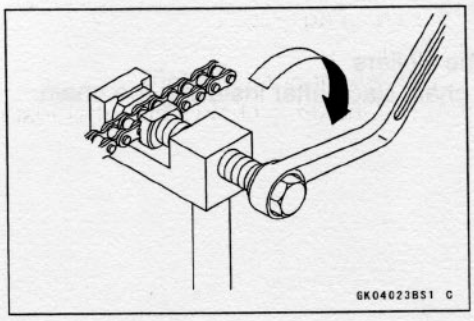


Final Drive

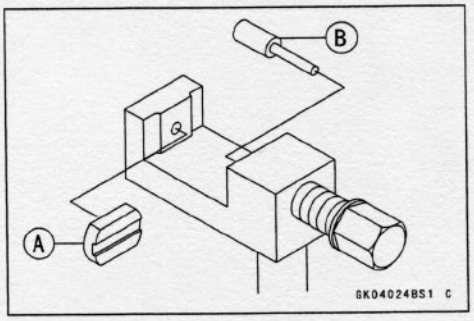
- Fit the plate holder (A) to the link plate.
- Turn the pin holder by hand until the plate holder (B) touches the other link plate.



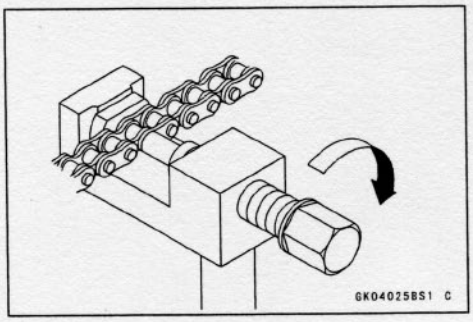
- Turn the pin holder by a wrench clockwise until two pins of link come into groove of the plate holder (A).
- Take off the plate holder.



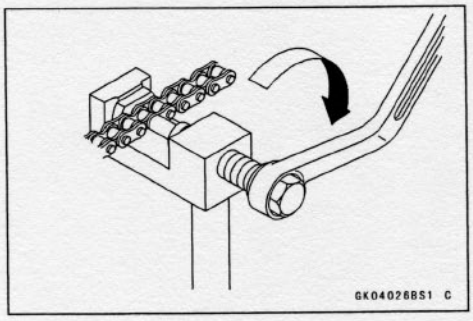
- Set the plate holder (B) [A] and the cutting and rivetting pin [B] as shown.



- Turn the pin holder until the rivetting pin touches the link pin.



- Turn the wrench clockwise until the tip of rivetting pin contact with the link pin.
- Rivet it.
- Repeat the same procedure for the other link pin.

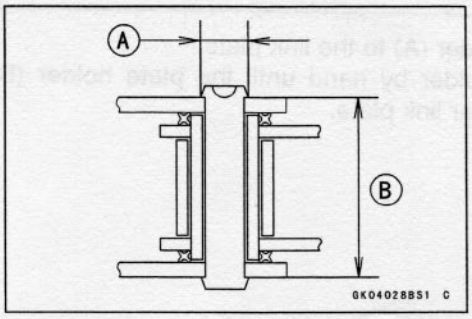


Final Drive

- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

Link Pin Outside Diameter
Standard: 5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)

Link Plates Outside Width
Standard: 16.55 ~ 16.70 mm (0.65 ~ 0.66 in.)

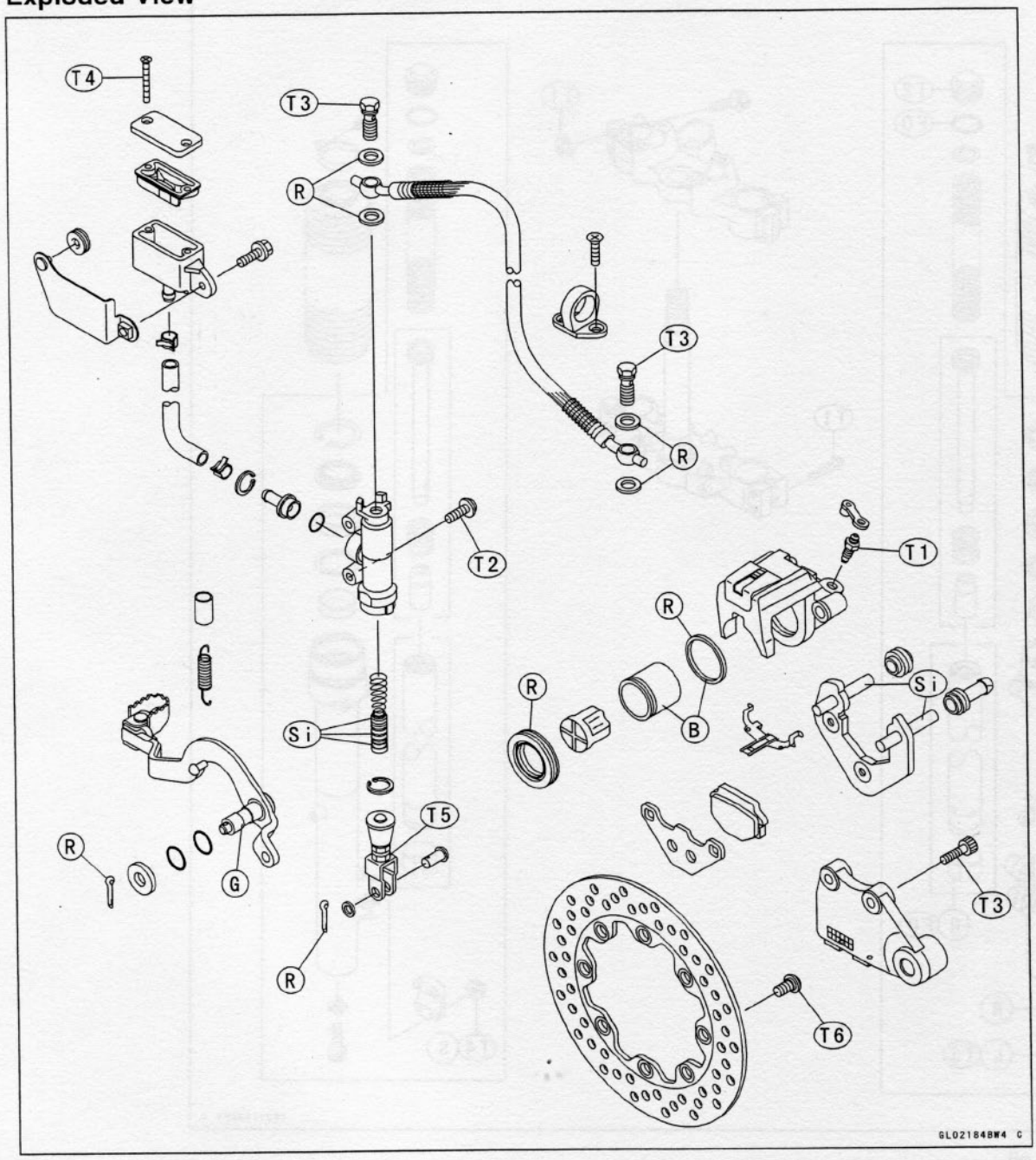


★If the reading exceeds the specified length, cut and rejoin the chain again.

- Check:
  Movement of the Rollers
- Adjust the drive chain slack after installing the chain.

Brakes

Exploded View

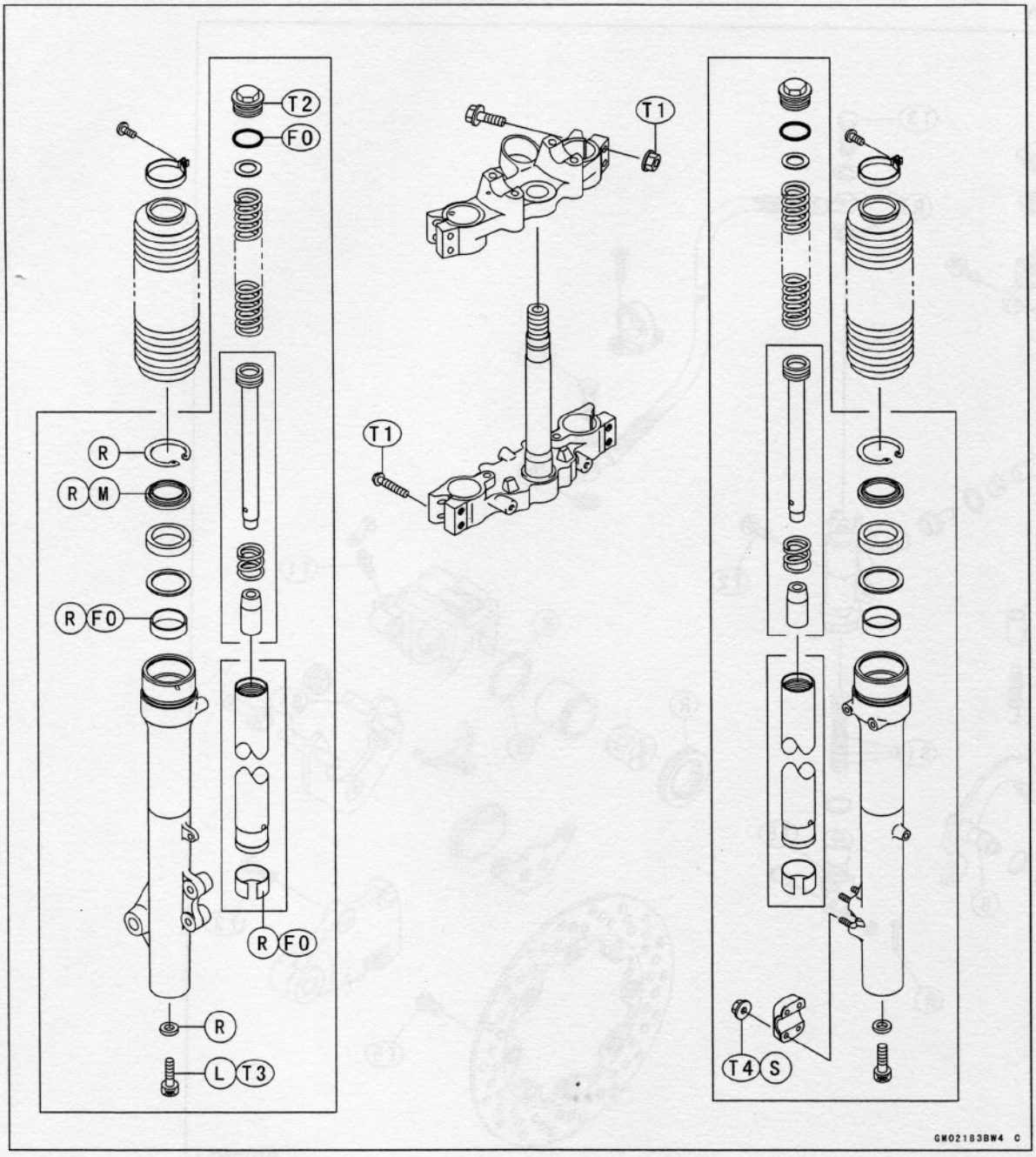


T1: 7.8 N·m (0.8 kgf·m, 69 in·lb)
T2: 8.8 N·m (0.90 kgf·m, 78 in·lb)
T3: 34 N·m (3.5 kgf·m, 25 ft·lb)
T4: 1.5 N·m (0.15 kgf·m, 13 in·lb)
T5: 18 N·m (1.8 kgf·m, 13 ft·lb)
T6: 15 N·m (1.5 kgf·m, 11 ft·lb)

B: Apply brake fluid.
G: Apply grease.
R: Replacement parts
Si: Apply silicone grease, or PBC grease.

Suspension

Exploded View (KL250G9F/H7F)



FO: Apply fork oil.
L: Apply non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement parts
S: Follow the specific tightening sequence.
T1: 21 N·m (2.1 kgf·m, 15 ft·lb)
T2: 22 N·m (2.2 kgf·m, 16 ft·lb)
T3: 30 N·m (3.0 kgf·m, 22 ft·lb)
T4: 9.3 N·m (0.95 kgf·m, 82 in·lb)
T5: 6.9 N·m (0.70 kgf·m, 61 ft·lb)

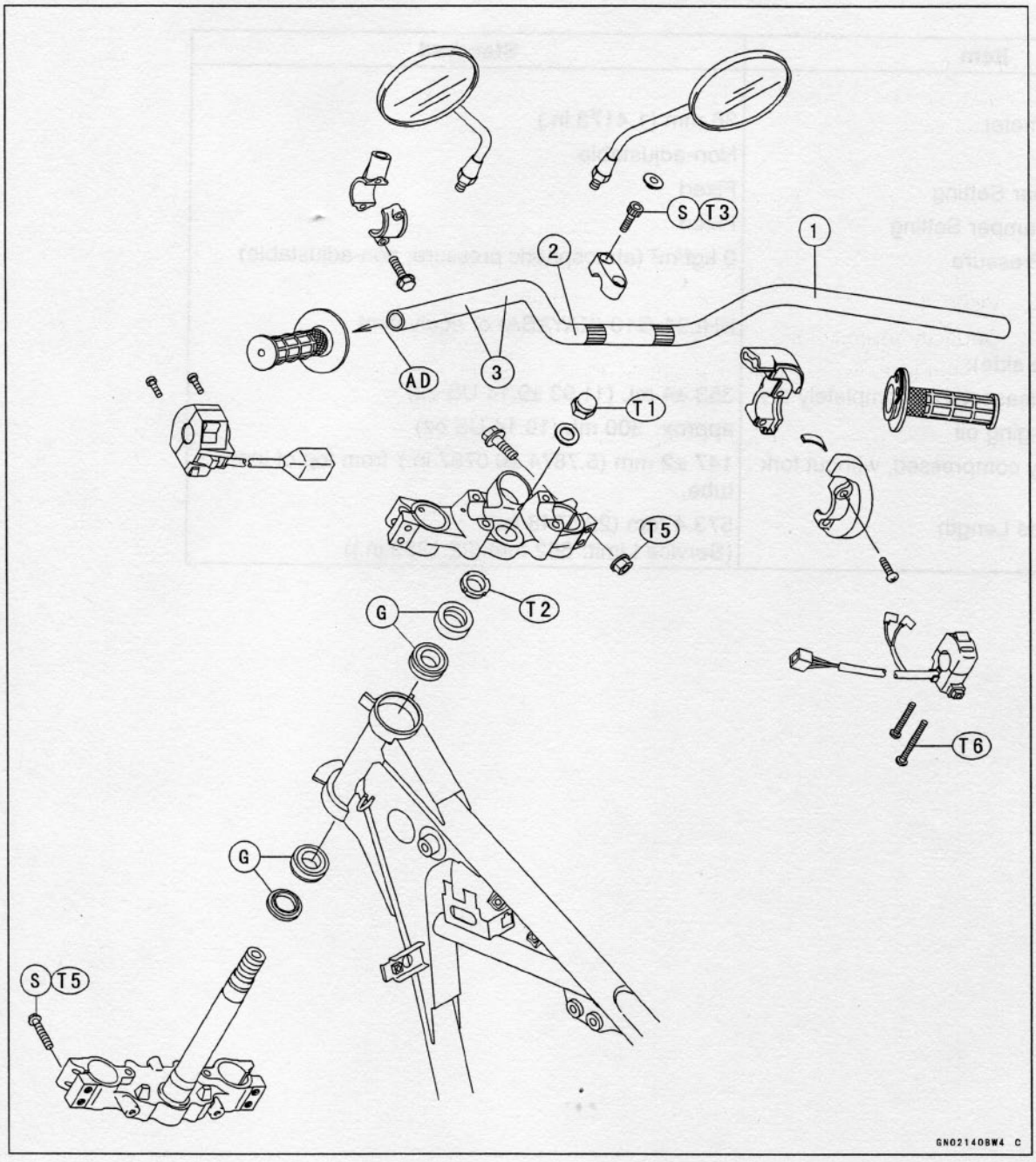
Suspension

Specifications

Item	Standard
Front Fork	
Inner Tube Diameter	36 mm (1.4173 in.)
Spring Preload	Non-adjustable
Rebound Damper Setting	Fixed
Compression Damper Setting	Fixed
Front Fork Air Pressure	0 kgf/m² (atmospheric pressure, non-adjustable)
Front Fork Oil:	
Viscosity	KHL34-G10 (KAYABA) or equivalent
Capacity (one side):	
After fork disassembly, completely dry	353 ±4 mL (11.93 ±0.14 US oz)
When changing oil	approx. 300 mL (10.14 US oz)
Oil Level (fully compressed, without fork spring)	147 ±2 mm (5.7874 ±0.0787 in.) from top of inner tube.
Fork Spring Free Length	573.4 mm (22.5748 in.) (Service Limit: 562 mm (22.1259 in.))

Steering

Exploded View (KL250G9F/H7F)

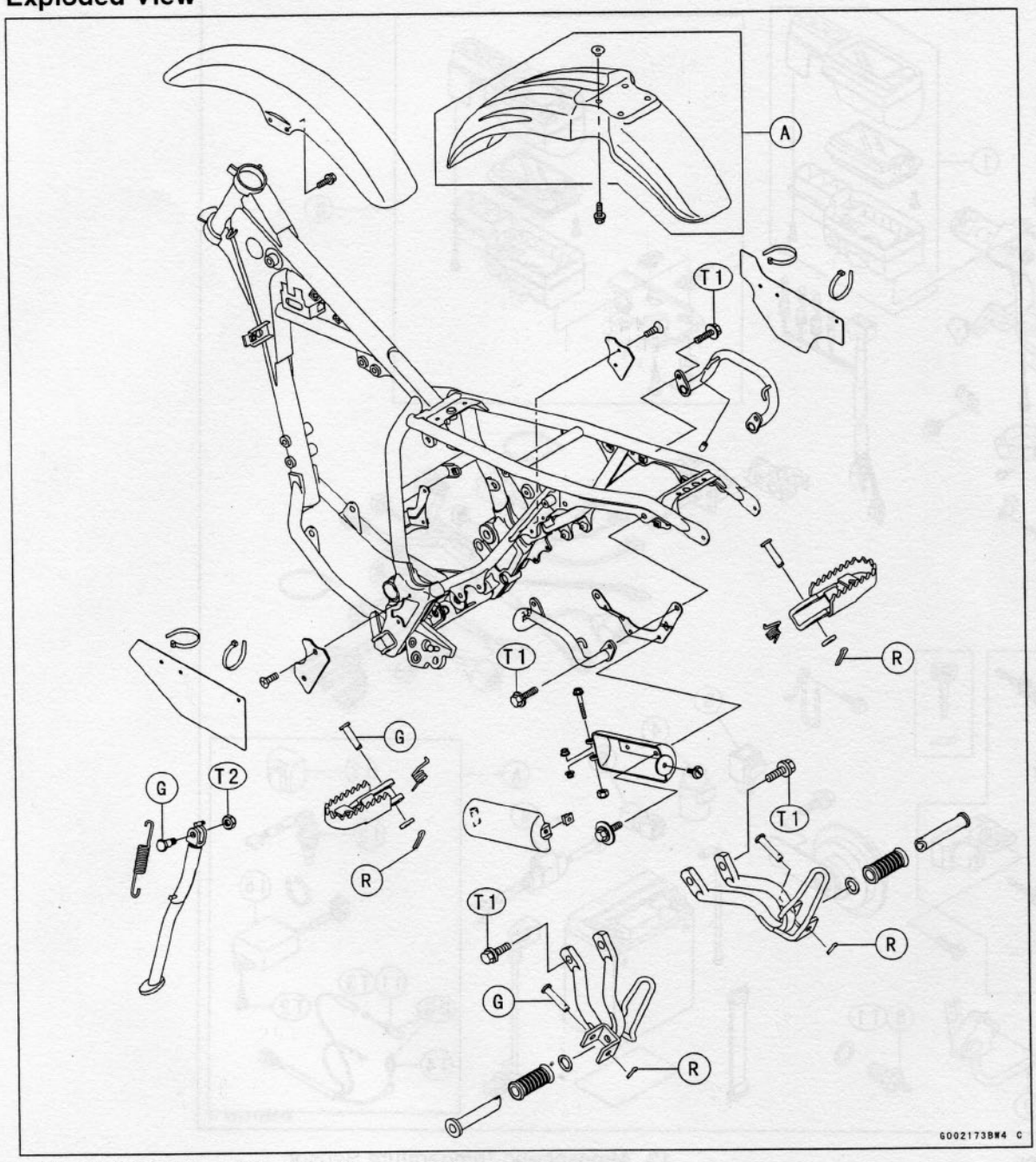


1. Align front master cylinder clamp with punch mark.
2. Align handlebar clamp with punch mark.
3. Align clutch lever clamp with punch mark (KL250G9F model).

AD: Apply adhesive.
G: Apply grease.
S: Follow the specific tightening sequence.
T1: 49 N·m (5.0 kgf·m, 36 ft·lb)
T2: See text.
T3: 25 N·m (2.5 kgf·m, 18 ft·lb)
T5: 21 N·m (2.1 kgf·m, 15 ft·lb)
T6: 3.4 N·m (0.35 kgf·m, 30 in·lb)

Frame

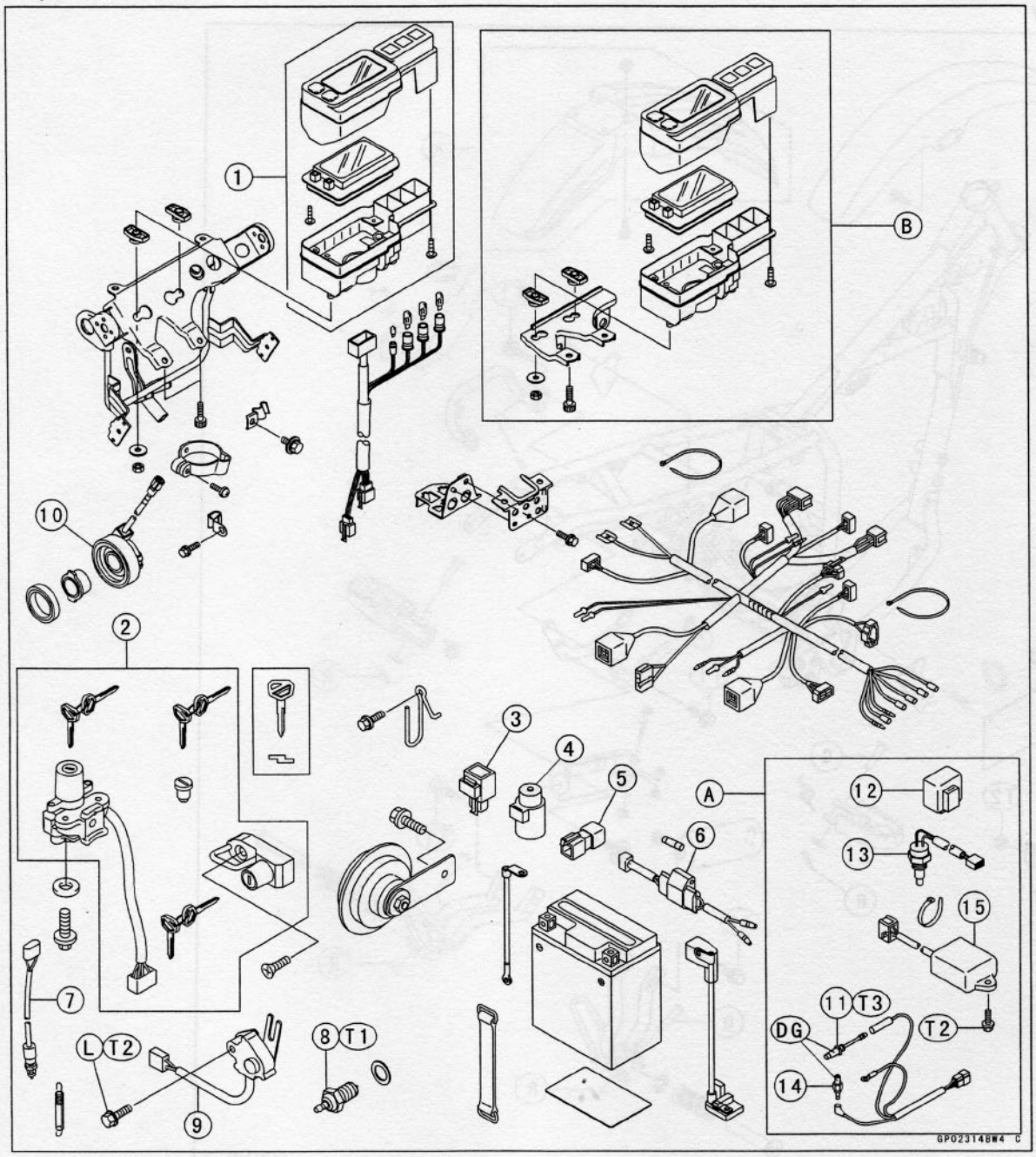
Exploded View



T1: 25 N·m (2.5 kgf·m, 18 ft·lb)
T2: 44 N·m (4.5 kgf·m, 32 ft·lb)
A: KL250H model
G: Apply grease.
R: Replacement parts

Electrical System

Exploded View



1. Digital Meter
2. Ignition Switch
3. Turn Signal Relay
4. Starter Circuit Relay
5. Interlock Diode
6. Fuse Case
7. Rear Brake Light Switch
8. Neutral Switch
9. Side Stand Switch
10. Speed Sensor
11. Carburetor Heater
12. Relay
13. Atmospheric Temperature Sensor
14. Carburetor Temperature Sensor
15. Carburetor Heater Controller

T1: 15 N·m (1.5 kgf·m, 11 ft·lb)
T2: 8.8 N·m (0.9 kgf·m, 78 in·lb)
T3: 2.5 N·m (0.25 kgf·m, 22 in·lb)
DG: Apply heat transfer grease.
L: Apply a non-permanent locking agent to the threads.

A: Australia Model
B: Greece Model

Electrical System

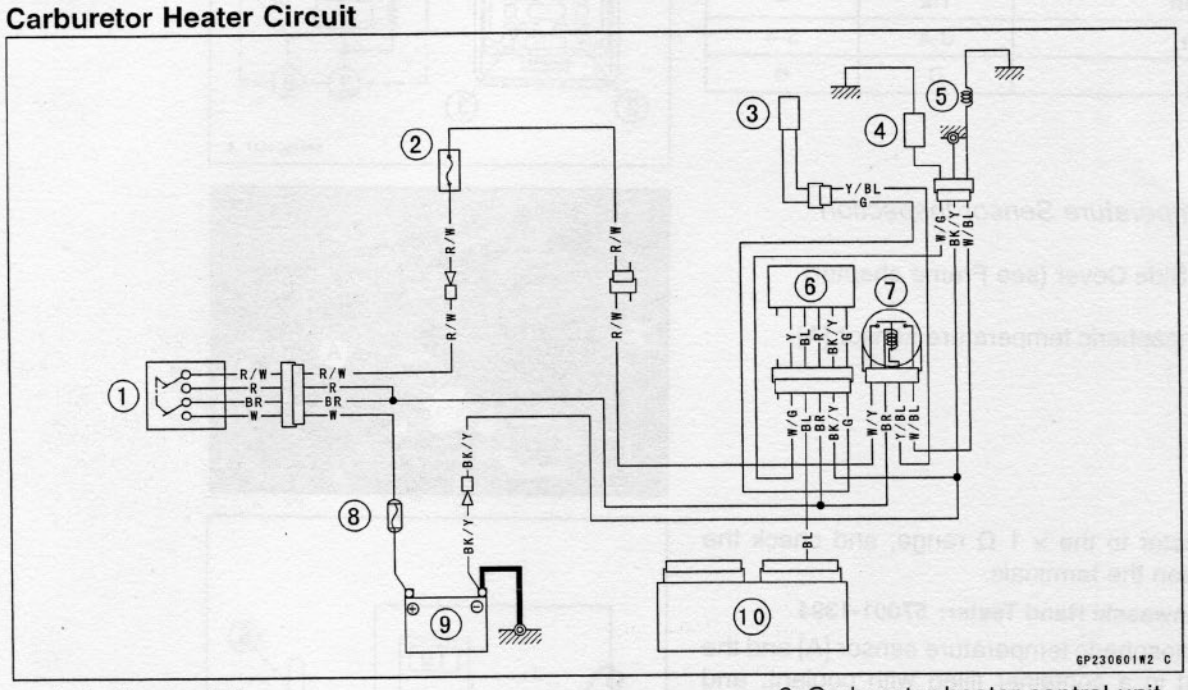
Carburetor Heater (Australia Model)

At times, the temperature of the carburetors could be too low for efficient atomization of fuel, such as immediately after the engine has been started or when the ambient temperature is low. Under these conditions, the electric carburetor heaters electrically heats the carburetors to prevent the engine from stalling.

Outline

To activate the carburetor heaters, the (stopped) engine must first be started. Then, the PTC (Positive Temperature Coefficient) sensor detects the temperature of one carburetor body, and this signal is sent to the control unit. When the atmospheric temperature sensor is ON, the control unit turns the carburetor heater relay ON or OFF in accordance with the signals sent by the igniter and the PTC sensor. As a result, the carburetor heater operates or stops operating depending on whether the relay is turned ON or OFF.

Carburetor Heater Circuit

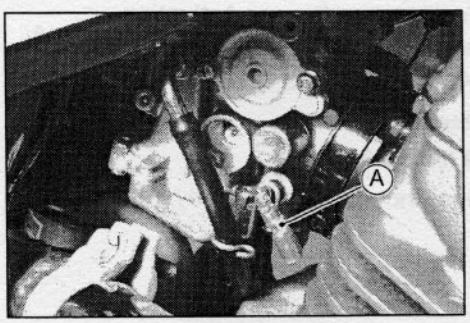


1. Ignition switch
2. Accessory fuse 10 A
3. Atmospheric temperature sensor
4. PTC sensor
   (Carburetor temperature sensor)
5. Carburetor heaters
6. Carburetor heater control unit
7. Normal open type relay
8. Main fuse 20 A
9. Battery
10. IC igniter

Carburetor Heater Inspection

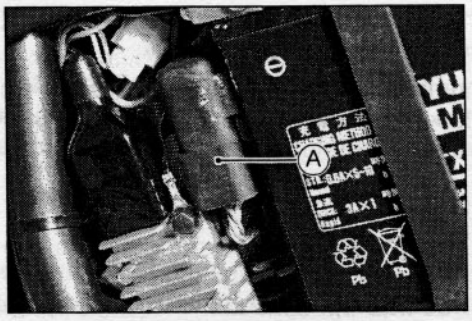
- Disconnect the connector [A] from the carburetor heater lead.
- Set the hand tester to the × 1 Ω range, and measure the resistance between the carburetor heater terminal and the carburetor body.

Carburetor Heater Resistance
Standard: 6 ~ 10 Ω



Normal Open Type Relay Inspection

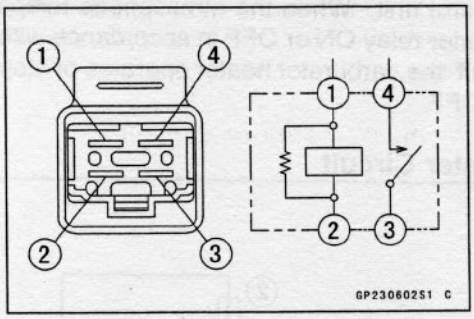
- Remove:
  Left Side Cover (see Frame chapter)
- Remove the relay [A] from the air cleaner housing.



- Connect the 12 V battery as indicated in the table, and check the continuity between the terminals.

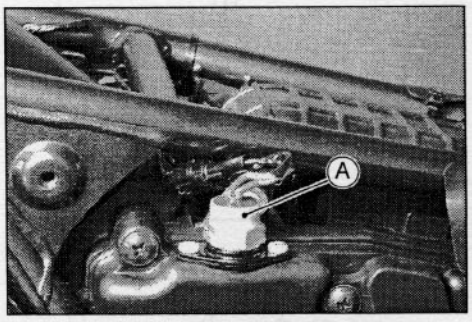
Table 1: Relay Circuit Inspection

Battery Connection	1-2	–
Tester Connection	3-4	3-4
Measurement (Ω)	0	∞



Atmospheric Temperature Sensor Inspection

- Remove:
  Left and Right Side Cover (see Frame chapter)
  Seat
- Remove the atmospheric temperature sensor [A].



- Set the hand tester to the × 1 Ω range, and check the continuity between the terminals.

Special Tool - Kawasaki Hand Tester: 57001-1394

- Immerse the atmospheric temperature sensor [A] and the thermometer [B] in a container filled with coolant, and gradually increase the temperature of the coolant.

NOTE

○*Do not allow the atmospheric temperature sensor or the thermometer to come in contact with the container.*

Atmospheric Temperature Sensor Activation

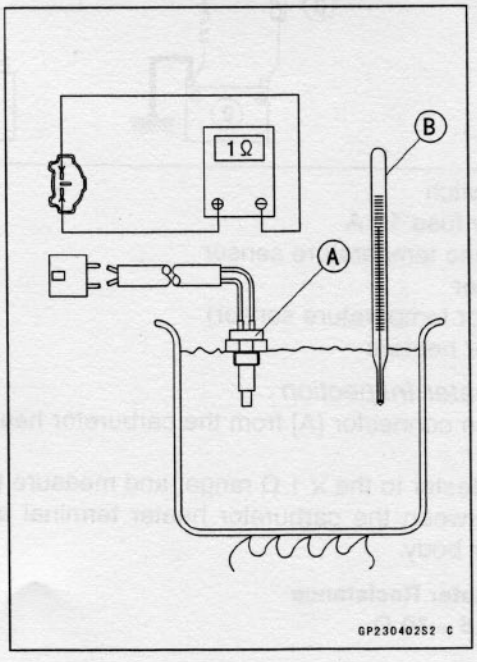
Increasing temperature:

ON → OFF between 7 ~ 13°C

Decreasing temperature:

OFF → ON before 3°C

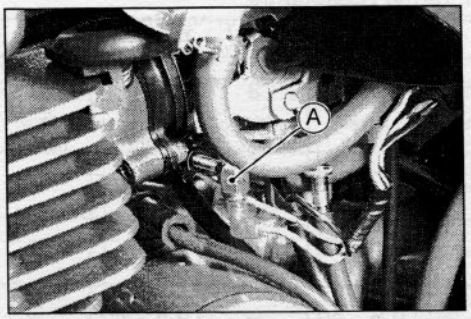
★If the sensor does not operate properly, replace it.



Electrical System

PTC Sensor (Carburetor Temperature Sensor) Inspection

● Remove the PTC sensor [A].



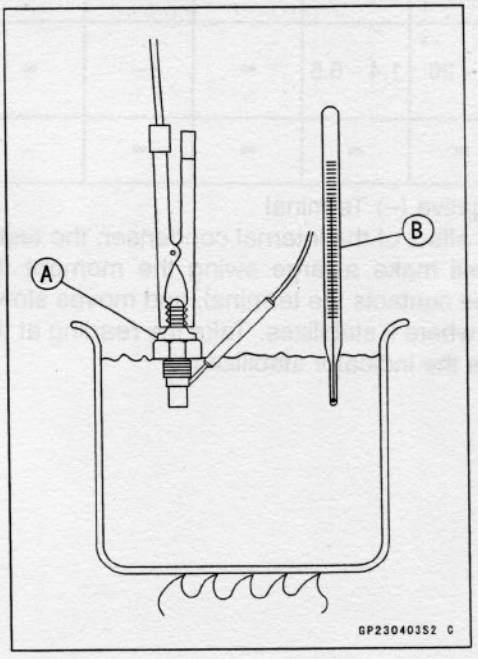
● Set the hand tester to the × 1 kΩ and measure the resistance between the terminals.

Special Tool - Kawasaki Hand Tester: 57001-1394

Immerse the PTC sensor [A] and the thermometer [B] in a container filled with water, and gradually increase the water temperature.

NOTE

○*Do not allow the PTC sensor or the thermometer to come in contact with the container.*



Temperature (°C)	Sensor Resistance (kΩ)
8	2.5
9	2.9
10	3.4
11	4.0
12	4.6
13	5.4
14	6.5
15	7.7

★If the measurements are out of standard, replace the PTC sensor.

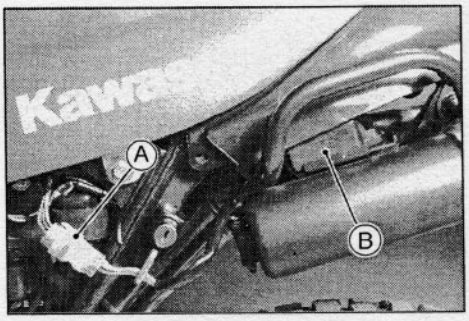
Carburetor Heater Controller Inspection

● Remove:
Left Side Cover (see Frame chapter)
Carburetor Heater Controller Connector [A]

● Set the hand tester to the × 1 kΩ range, and measure the internal resistance of the controller [B].

Special Tool - Kawasaki Hand Tester: 57001-1394

★If the measurement is out of standard, replace the controller.

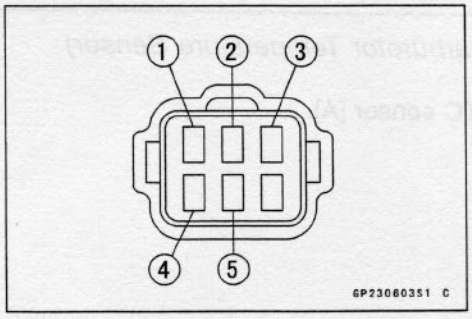


CAUTION

Using a tester other than the Kawasaki Hand Tester may show different readings. The use of a megger or a tester with high-voltage battery could damage the unit.

Heater Controller internal Resistance

		Tester Positive (+) Terminal				
		1 (Yellow)	2 (green)	3 (red)	4 (black/ yellow)	5 (blue)
*	1 (yellow)	–	8 ~ 35	∞	7.5 ~ 35	∞
	2 (green)	∞	–	∞	∞	∞
	3 (red)	6 ~ 26	9.5 ~ 40	–	9.5 ~ 40	∞
	4 (black/ yellow)	5 ~ 20	1.4 ~ 6.5	∞	–	∞
	5 (blue)	∞	∞	∞	∞	–



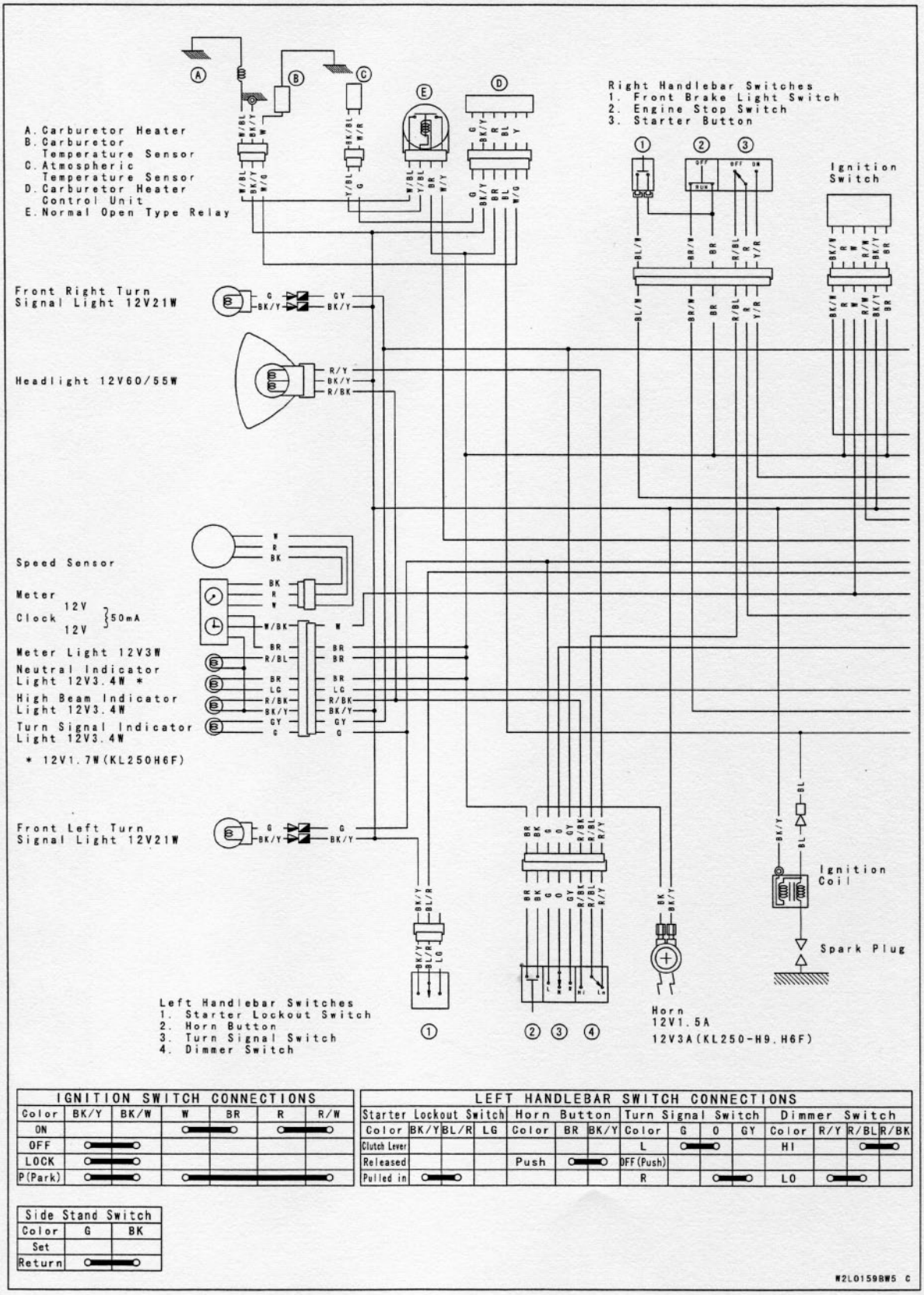
* Tester Negative (–) Terminal

** Due to the effect of the internal condenser, the tester indicator will make a large swing the moment the tester probe contacts the terminal, and moves slowly to an area where it stabilizes. Take the reading at the area where the indicator stabilizes.

Dummy Page

Electrical System

Wiring Diagram (KL250-H, H6F ~ Australia Model)



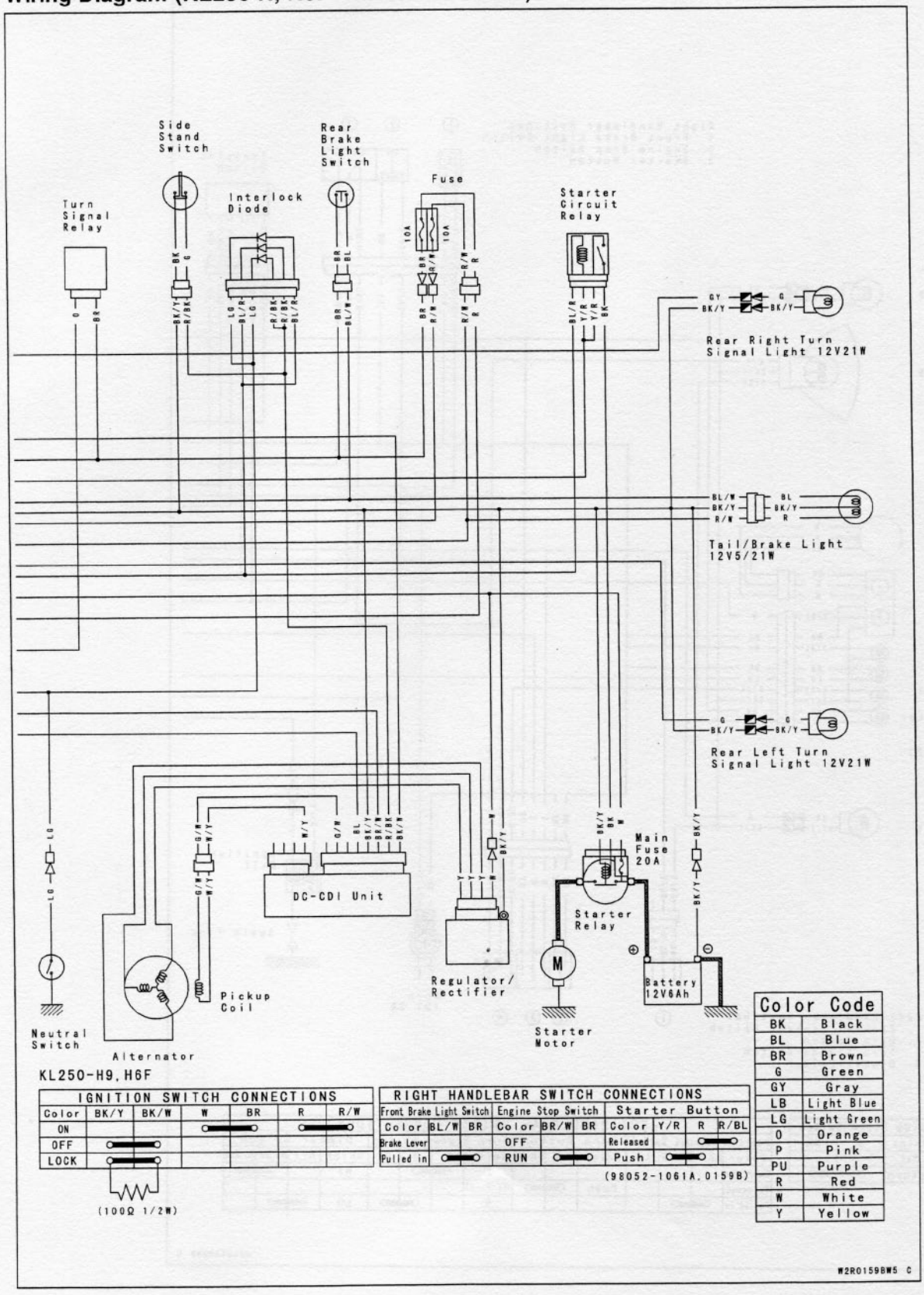
IGNITION SWITCH CONNECTIONS						
Color	BK/Y	BK/W	W	BR	R	R/W
ON			○—○		○—○	
OFF	○—○					
LOCK	○—○					
P(Park)	○—○		○—○			○—○

LEFT HANDLEBAR SWITCH CONNECTIONS															
Starter Lockout Switch				Horn Button			Turn Signal Switch				Dimmer Switch				
Color	BK/Y	BL/R	LG	Color	BR	BK/Y	Color	G	O	GY	Color	R/Y	R/BL	R/BK	
Clutch Lever							L	○—○			HI		○—○		
Released				Push	○—○		OFF(Push)								
Pulled in	○—○						R		○—○		LO	○—○			

Side Stand Switch		
Color	G	BK
Set		
Return	○—○	

Electrical System

Wiring Diagram (KL250-H, H6F ~ Australia Model)



KL250-H9, H6F

IGNITION SWITCH CONNECTIONS						
Color	BK/Y	BK/W	W	BR	R	R/W
ON			●		●	
OFF	○	●				
LOCK	○	●				

(100Ω 1/2W)

RIGHT HANDLEBAR SWITCH CONNECTIONS									
Front Brake Light Switch			Engine Stop Switch			Starter Button			
Color	BL/W	BR	Color	BR/W	BR	Color	Y/R	R	R/BL
Brake Lever			OFF			Released		●	
Pulled in	○	●	RUN	●	●	Push	●		

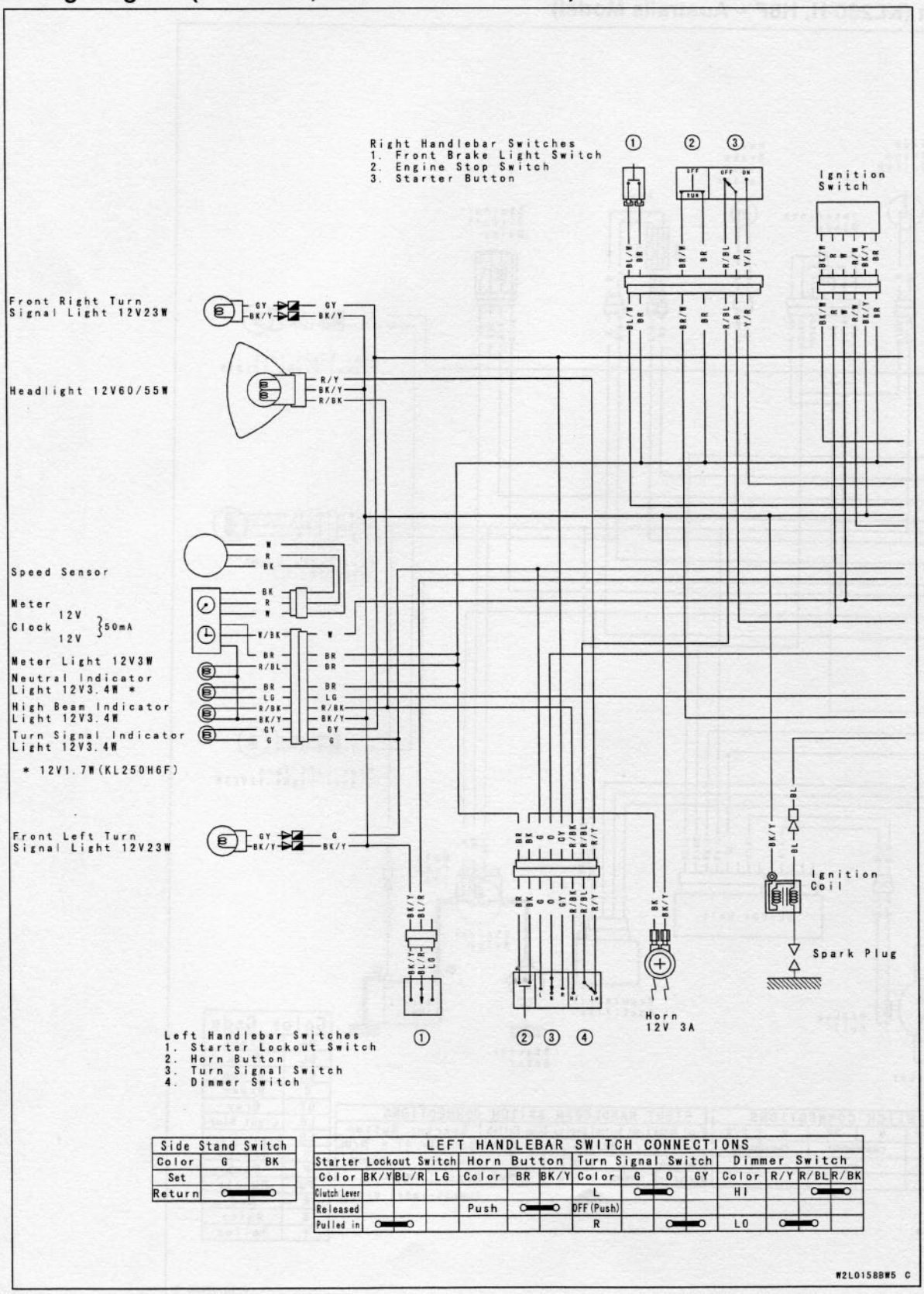
(98052-1061A, 0159B)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

W2R0159BW5 C

Electrical System

Wiring Diagram (KL250-H9, H6F ~ Canada Model)

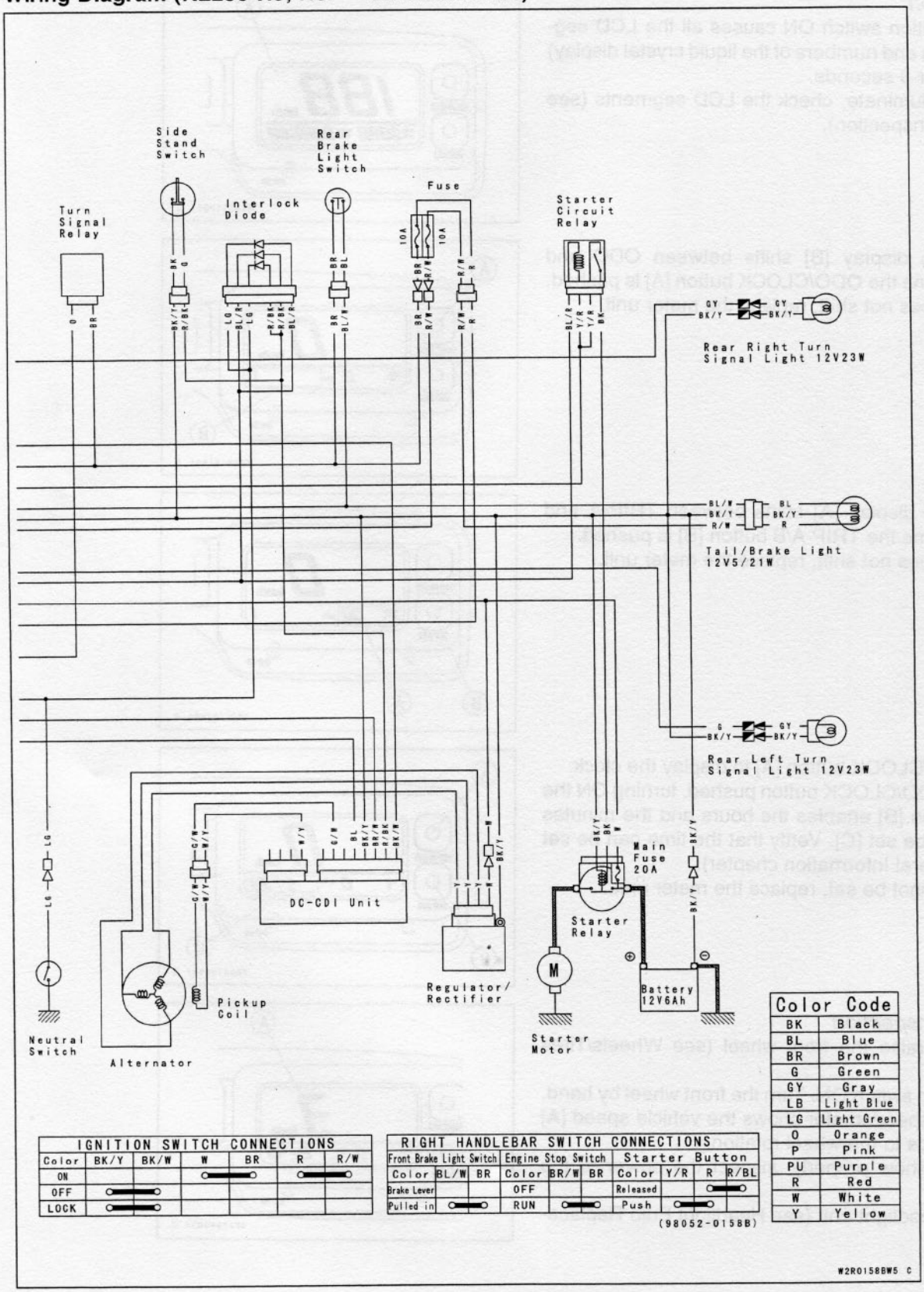


Side Stand Switch		
Color	G	BK
Set		
Return	○——	——○

LEFT HANDLEBAR SWITCH CONNECTIONS															
Starter Lockout Switch					Horn Button			Turn Signal Switch				Dimmer Switch			
Color	BK/Y	BL/R	LG		Color	BR	BK/Y	Color	G	O	GY	Color	R/Y	R/BL	R/BK
Clutch Lever								L	○——			HI			○——
Released					Push	○——		OFF (Push)							
Pulled in	○——							R		○——		LO	○——		

Electrical System

Wiring Diagram (KL250-H9, H6F ~ Canada Model)



IGNITION SWITCH CONNECTIONS						
Color	BK/Y	BK/W	W	BR	R	R/W
ON			○—○		○—○	
OFF	○—○					
LOCK	○—○					

RIGHT HANDLEBAR SWITCH CONNECTIONS									
Front Brake Light Switch			Engine Stop Switch			Starter Button			
Color	BL/W	BR	Color	BR/W	BR	Color	Y/R	R	R/BL
Brake Lever			OFF			Released		○—○	
Pulled in	○—○		RUN	○—○		Push	○—○		

(98052-0158B)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

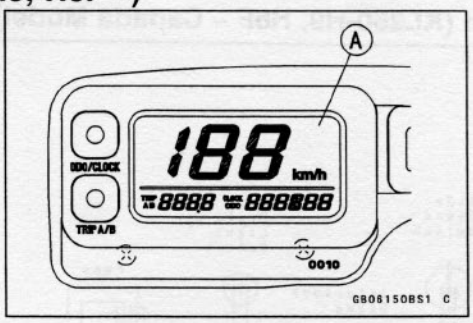
W2R0158BW5 C

Digital Meter (KL250G9F Canada model/KL250-H9, H6F ~)

Switch Inspection

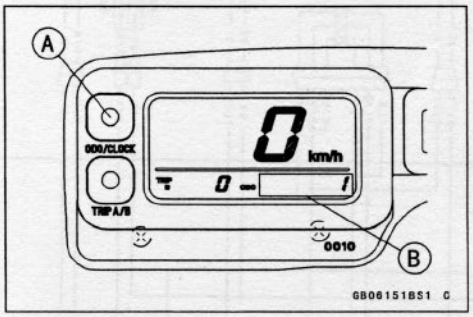
- Turning the ignition switch ON causes all the LCD segment (the letters and numbers of the liquid crystal display) [A] illuminate for 3 seconds.

★If they do not illuminate, check the LCD segments (see LCD Segment Inspection).



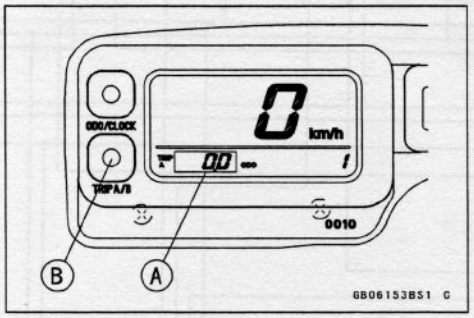
- Check that the display [B] shifts between ODO and CLOCK each time the ODO/CLOCK button [A] is pushed.

★If the display does not shift, replace the meter unit.



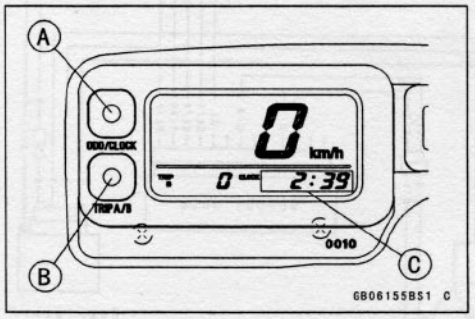
- Check that the display [A] shifts between TRIP-A and TRIP-B each time the TRIP A/B button [B] is pushed.

★If the display does not shift, replace the meter unit.



- Push the ODO/CLOCK button [A] to display the clock.
- Keeping the ODO/CLOCK button pushed, turning ON the TRIP A/B button [B] enables the hours and the minutes of the clock to be set [C]. Verify that the time can be set here (see General Information chapter).

★If the time cannnot be set, replace the meter unit.

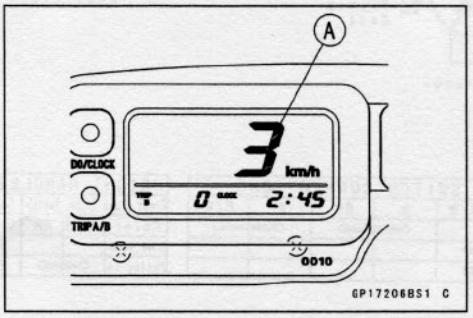


Speedometer Inspection

- Using a jack, raise the front wheel (see Wheels/Tires chapter).
- Turn the ignition switch ON. Turn the front wheel by hand, and see if the speedometer shows the vehicle speed [A] that corresponds to the wheel rotation.

★If it does not show properly, inspect the power to the speed sensor.

- Remove the headlight unit (see Headlight Bulb Replacement).

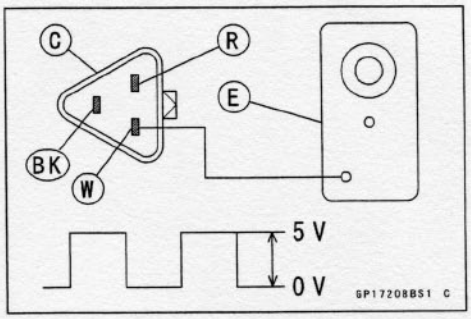


Electrical System

★If an oscillator is available, check the speedometer by the following points.

● Disconnect the white connector [C], and connect the oscillator [E] to the pin [W] of the connector on the meter. The vehicle speed that corresponds to the input frequency will be displayed when a short waveform such as the one shown in the diagram is input.

Example: An input frequency of 60Hz will display 60 km/h.



MODEL APPLICATION

Year	Model	Beginning Frame No.
1997	KL250-H1	JKAKL250GHA000001
1999	KL250-H3	JKAKLMH1□XA014001
2000	KL250-G4	JKAKLMG1□YA018001
2001	KL250-G5 KL250-H5	JKAKLMG1□1A024001 or JKAKLMH1□1A024001
2002	KL250-G6 KL250-H6	JKAKLMG1□2A028001 JKAKLMH1□2A028001 or JKAKL250GHA028001
2003	KL250-G7 KL250-H7	JKAKLMG1□3A033001 or JKAKLMH1□3A033001
2004	KL250-G8 KL250-H8	JKAKLMG1□4A036001 or JKAKLMH1□4A036001
2005	KL250-H9	JKAKLMH1□5A039001
2006	KL250H6F	JKAKLMH1□6A045001
2007	KL250H7F	JKAKLMH1□7A048001
2009	KL250G9F	JKAKLMG1□9A053001

□:This digit in the frame number changes from one machine to another.

Kawasaki
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