Kawasaki

KLR 600

Motorcycle Service Manual

Quick Reference Guide

To use, bend the manual back and match the desired chapter below against the black spot showing at the edge of these pages.

Kawasaki

KLR 600

Motorcycle Service Manual

First Edition (16) : Jul. 4, 1997 (K)

SAFETY AWARENESS

Whenever you see the symbols shown below, 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.

"NOTE"

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

LIST OF ABBREVIATIONS

A	ampere(s)	lb	pound(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

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 and California Air Resources Board. Additionally, Kawasaki has incorporated an evaporative emission control system (3) in compliance with applicable regulations of the California Air Resources Board on vehicles sold in California only.

1. Crankcase Emission Control System
   This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the carburetion system.
2. Exhaust Emission Control System
   This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel and ignition systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.
3. Evaporative Emission Control System
   Vapors caused by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped. Liquid fuel is caught by a vapor separator and returned to the fuel tank.

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.

This warning may apply to any of the following components or any assembly containing one or more of these components:–

Brake Shoes or Pads
Clutch Friction Material
Gaskets
Insulators

SAFETY INSTRUCTIONS

- Operate if possible out of doors or in a well ventilated place.
- Preferably use hand tools or low speed tools equipped, if necessary, with an appropriate dust extraction facility. If high speed tools are used, they should always be so equipped.
- If possible, dampen before cutting or drilling.
- Dampen dust and place it in properly closed receptacle and dispose of it safely.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop, although it contains enough detail and basic information to make it useful to the motorcycle user who desires to carry out his own basic maintenance and repair work. Since a certain basic knowledge of mechanics, the proper use of tools, and workship procedures must be understood in order to carry out maintenance and repair satisfactorily; the adjustments, maintenance, and repair should be carried out only by qualified mechanics whenever the owner has insufficient experience, or has doubts as to his ability to do the work, so that the motorcycle can be operated safely.

In order to perform the work efficiently and to avoid costly mistakes, the mechanic should read the text, thoroughly familiarizing himself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment is specified, makeshift tools or equipment should not be used. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation of the motorcycle.

"NOTE"

○*Explanation on major changes and additions, that the unique to later year units since the publication of the Service Manual, will be added to the end of the text as "Supplements".*

For the duration of your warranty period, especially, 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 Motorcycle:

- Follow the Periodic Maintenance Chart in the General Information Chapter.
- 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 listed in the Special Tool 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.

General Information

1

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, and 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. 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) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to 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 of 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.

(4) 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.

(5) 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.

(6) 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.

(7) 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.

(8) 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.

(9) 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).

(10) 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.

(11) Ball Bearing

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft.

(12) 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 evenly contacts the side of seal, until the face of the seal is even with the end of the hole.

(13) Seal Guide

A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little high temperature grease to the seal lips to reduce rubber to metal friction.

(14) Circlip, Retaining Ring

Replace any circlips and retaining rings that are 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.

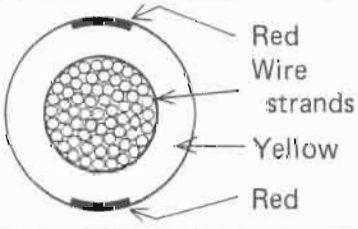
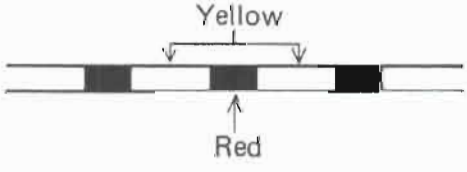
(15) Lubrication

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	Picture in Wiring Diagram
	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 following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

Abrasion	Denting	Hardening	Warping
Bending	Deterioration	Scratching	Wear
Cracking	Discoloration	Seizure	

(19) Service Data

Numbers of service data in this text have following meanings:

"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.

KL600-A1 US Model

KL600-A1 European Model

Specifications

Items		KL600-A1
Dimensions:		
Overall length		2,240 mm/Ⓤ Ⓒ Ⓒa 2,230 mm
Overall width		875 mm
Overall height		1,225 mm
Wheelbase		1,470 mm
Road clearance		280 mm
Seat height		870 mm
Dry weight		1,280 N (130 kg), Ⓒa 1,280 N (130.5 kg)
Curb weight:	Front	670 N (68 kg), Ⓒa 670 N (68.5 kg)
	Rear	760 N (77 kg)
Fuel tank capacity		11.5 L
Performance:		
Climbing ability		32°
Braking distance		12.5 m from 50 km/h
Minimum turning radius		2.2 m
Engine:		
Type		4-stroke, DOHC, 4-valve, 1-cylinder
Cooling system		Liquid cooled
Bore and stroke		96.0 x 78.0 mm
Displacement		564 mL
Compression ratio		9.5
Maximum horsepower		30.9 kW (42 PS) @7,000 r/min (rpm) Ⓦ Ⓖ 19.9 kW (27 PS, DIN) @6,000 r/min (rpm)
Maximum torque		46.1 N-m (4.7 kg-m, 34.0 ft-lb) @5,000 r/min (rpm) Ⓦ Ⓖ 39.2 N-m (4.0 kg-m, 28.9 ft-lb) 3,000 r/min (rpm)
Carburetion system		Carburetor, Keihin CVK40
Starting system		Primary kick
Ignition system		CDI
Timing advance		Electronically advanced
Ignition timing		From 10° BTDC @1,300 r/min (rpm) to 40° BTDC @3,000 r/min (rpm)
Spark plug		NGK DR8ES, or ND X24ESR-U ⓊⒶⓈⒾ NGK D8EA, or ND X24ES-U

Items			KL600-A1
Valve timing:			
	Inlet	Open	19° (BTDC)
		Close	69° (ABDC)
		Duration	268°
	Exhaust	Open	55° (BBDC)
		Close	25° (ATDC)
		Duration	260°
Lubrication system			Forced lubrication (wet sump)
Engine oil:			
Grade			SE class
Viscosity			SAE10W40, 10W50, 20W40, or 20W50
Capacity			2.0 L
Drive Train:			
Primary reduction system:			
Type			Gear
Reduction ratio			2.428 (68/28)
Clutch type			Wet multi disc
Transmission:			
Type			5-speed, constant mesh, return shift
Gear ratios:	1st		2.437 (39/16)
	2nd		1.529 (26/17)
	3rd		1.181 (26/22)
	4th		0.954 (21/22)
	5th		0.791 (19/24)
Final drive system:			
Type			Chain drive
Reduction ratio			2.866 (43/15)
Overall drive ratio			5.511 @Top gear
Frame:			
Type			Tubular, diamond
Caster (rake angle)			29.5°
Trail			122 mm
Front Tire:			
Type			Tube type
Size			3.00S21 4PR, Ⓤ Ⓒ Ⓒa 3.00-21 4PR
Rear Tire:			
Type			Tube type
Size			5.10S17 4PR, Ⓤ Ⓒ Ⓒa 5.10-17 4PR
Front suspension:			
Type			Telescopic fork (pneumatic)
Wheel travel			230 mm

Items	KL600-A1
Rear suspension:	
Type	Swing arm (uni-trak)
Wheel travel	220 mm
Brake type:	
Front	Single disc
Rear	Drum
Electrical Equipment:	
Battery	12 V 4 AH
Headlight:	
Type	Semi-Sealed beam
Bulb	12 V 60/55 W (quartz-halogen)
Tail/brake light	12 V 5/21 W, Ⓤ Ⓒ Ⓒa Ⓢ 12 V 8/27 W
Alternator:	
Type	Single-phase AC
Rated output	10.5 A @8,000 r/min (rpm), 14 V
Voltage regulator:	
Type	Short-circuit

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

Abbreviation

Ⓐ : Australian Model
Ⓑ : U.K. Model
Ⓒ : Canadian Model
Ⓒa : California Model
Ⓔ : European Model
Ⓕ : French Model
Ⓖ : West German Model
Ⓘ : Italian Model
Ⓝ : Norwegian Model
Ⓢ : South African Model
Ⓢw : Swedish Model
Ⓤ : U.S. Model
Ⓦ : Swiss Model
Ⓖr : Greek Model

Bolt and Nut Tightening

Tightness Inspection

●Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

"NOTE"

○*Check engine fastener tightness when the engine is cold (at room temperature).*

★If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. First loosen each fastener by ½ turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

Bolts, Nuts, and Fasteners to be checked

Wheels

Front axle nut
Spokes
Rear axle nut

Brake

Master cylinder clamp bolts
Caliper mounting bolts
Brake cam lever bolt
Brake pedal bolts
Brake rod clevis pin cotter pin

Suspension

Front fork clamp bolts
Front fork top bolts
Swing arm pivot shaft nut
Rear shock absorber bolt
Rear shock absorber nut

Steering

Handlebar clamp bolts
Stem head nut

Engine

Muffler mounting nuts
Muffler mounting bolts
Exhaust pipe holder nuts
Engine mounting bolts
Engine mounting nuts
Shift pedal bolt
Muffler connecting pipe clamp bolt
Cylinder head nuts
Cylinder head bolts

Others:

Clutch lever holder bolt
Side stand bolt
Front footpeg mounting bolts
Front footpeg cotter pins
Rear footpeg cotter pins
Light switch housing bolts

Standard Torque Table

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

General Fasteners:

Threads dia. (mm)	Torque		
	N-m	kg-m	ft-lb
5	3.4 – 4.9	0.35 – 0.50	30 – 43 in-lb
6	5.9 – 7.8	0.60 – 0.80	52 – 69 in-lb
8	14 – 19	1.4 – 1.9	10.0 – 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	125 – 165
20	225 – 325	23 – 33	165 – 240

General Lubrication

Lubrication

●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"

○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubrication.*

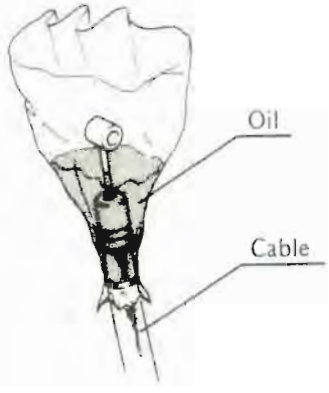
Pivot Points: Lubricate with Motor Oil

Clutch lever
Front brake lever
Kick pedal
Rear brake cable joint
Rear brake pedal
Rear brake pedal shaft
Shift pedal
Side stand

Cables: Lubricate with Motor Oil

Choke cable
Clutch cable
Throttle cable

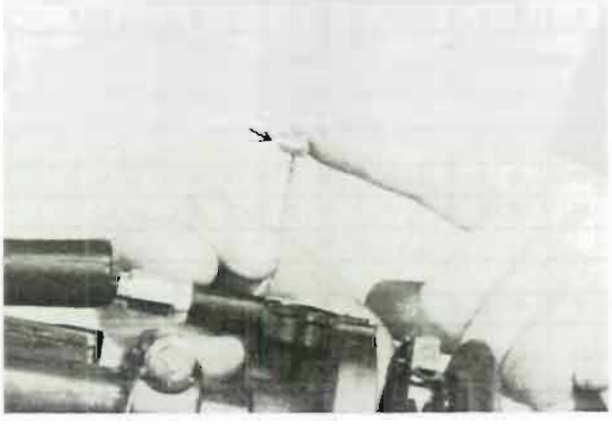
Cable Lubrication



Apply Grease to Following Points

Choke inner cable upper end
Clutch inner cable upper end
Clutch inner cable lower end
Handlebar throttle grip portion
Speedometer inner cable*
Throttle inner cable upper end

*Grease the lower part of the inner cable sparingly.



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.**

OPERATION \ FREQUENCY	Whichever comes first / Every	*ODOMETER READING 800 km	5,000 km	10,000 km	15,000 km	20,000 km	25,000 km	30,000 km	See Page
Spark plug – clean		●	●	●	●	●	●	●	14-9
Spark plug – check †		●	●	●	●	●	●	●	14-9
Valve clearance – check †		●	●	●	●	●	●	●	3-11
Air cleaner element – clean			●		●		●		2-7
Air cleaner element – replace	5 cleanings			●		●		●	2-7
Throttle grip play – check †		●	●	●	●	●	●	●	12-3
Idle speed – check †		●	●	●	●	●	●	●	2-4
Fuel system – check †				●		●		●	2-8
Cylinder head bolt tightness – check †		●		●		●		●	3-18
Cylinder head nut tightness – check †		●		●		●		●	3-18
Coolant – change	2 years							●	5-4
Spark arrestor – clean (for Ⓤ , Ⓒ model)			●	●	●	●	●	●	3-22
Evaporative emission control system – check (for Ⓒa model) †		●	●	●	●	●	●	●	2-10
Engine oil – change	year	●	●	●	●	●	●	●	4-12
Oil filter – replace		●		●		●		●	4-13
Radiator hoses, connections – check †	year	●		●		●		●	5-8
Fuel hose – replace	4 years								– – –
Balancer chain tension – adjust		●	●	●	●	●	●	●	4-16
Clutch – adjust		●	●	●	●	●	●	●	4-8
Drive chain wear – check †			●	●	●	●	●	●	9-4
Drive chain – lubricate	300 km								9-5
Drive chain slack – check †	800 km								9-3
Brake lining wear – check †			●	●	●	●	●	●	10-4, 9
Brake fluid level – check †	month	●	●	●	●	●	●	●	10-4
Brake fluid – change	year			●		●		●	10-4
Brake hose – replace	4 years								– – –
Master cylinder cup and dust seal – replace	2 years								– – –
Caliper piston seal and dust seal – replace	2 years								– – –
Brake play – check †		●	●	●	●	●	●	●	10-8
Brake light switch – check †		●	●	●	●	●	●	●	10-11
Brake camshaft – lubricate	2 years					●			10-11
Brake cable – replace	2 years								– – –
Steering – check †		●	●	●	●	●	●	●	11-6
Steering stem bearing – lubricate	2 years					●			11-7
Front fork oil – change				●		●		●	11-9
Tire wear – check †			●	●	●	●	●	●	8-5
Wheel bearing – lubricate	2 years					●			8-8
Speedometer gear – lubricate	2 years					●			12-4
Spoke tightness and rim runout – check †		●	●	●	●	●	●	●	8-6
Swing arm pivot, uni-trak linkage – lubricate				●		●		●	11-14
Battery electrolyte level – check †	month	●	●	●	●	●	●	●	14-4
General lubrication – perform			●	●	●	●	●	●	1-8
Nut, bolt, and fastener tightness – check †		●		●		●		●	1-8

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

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

Ⓒa : California Model Ⓤ : U.S. Model Ⓒ : Canadian Model

Fuel System

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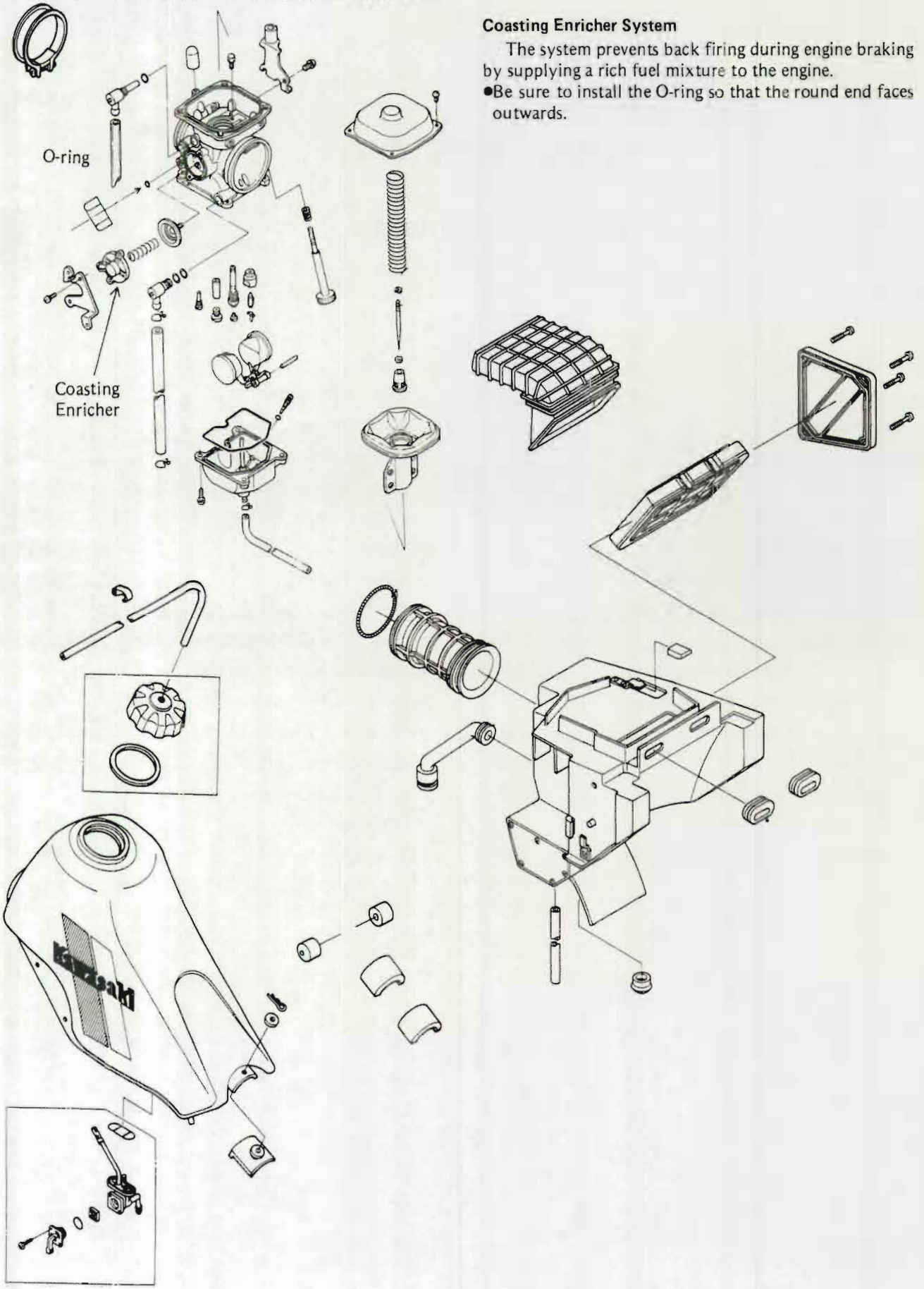
Exploded Views



Coasting Enricher System

The system prevents back firing during engine braking by supplying a rich fuel mixture to the engine.

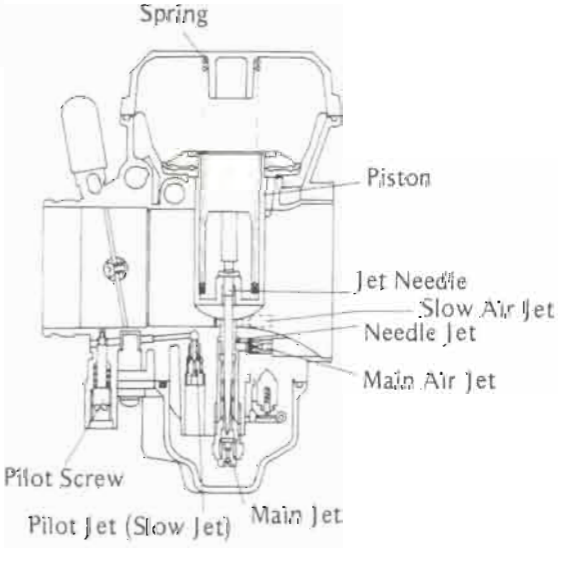
- Be sure to install the O-ring so that the round end faces outwards.

Service Data

Item	Standard				See Page
Carburetor:	Ⓤ	Ⓖ	Ⓦ	Other than ⓊⒼⓌ	
Make & type	Keihin, CVK40	←	←	←	
Main Jet	#138 (#135)	#130	#130	#138	
Main air jet	#50	←	←	←	
Needle jet	#6	←	←	←	
Jet needle mark	N24C	N23B	N23B	N24B	
Slow air jet	#70	←	←	←	
Pilot jet (: slow jet)	#40 (#38)	#40	←	←	
Pilot screw	1 3/8 (for reference)	2 1/4	1 3/8	2 1/4	
Service fuel level	0.5 mm above	←	←	←	2-4
Float height	17.5 mm ±2 mm	←	←	←	2-5
Bore center	37.5 mm	←	←	←	
	( ) : for high altitude				
Throttle Lever:					chap. 12
Free play	2 – 3 mm				
Air Cleaner Element Oil:					2-7
Grade	SE class				
Viscosity	SAE30				

Special Tool

Fuel Level Gauge: 57001-1017



Carburetor

Adjustment:

When the idle speed is too low, the engine may stall; when the idle speed is too high, the fuel consumption becomes excessive, and the resulting lack of engine braking may make the motorcycle difficult to control.

Idle Inspection

- Thoroughly warm up the engine.
- With the engine idling, turn the handlebar to each side.

★If handlebar movement changes the idle speed, the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged. Be sure to correct any of these conditions before riding.

WARNING

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

- Check that the idle speed is within the specified range.

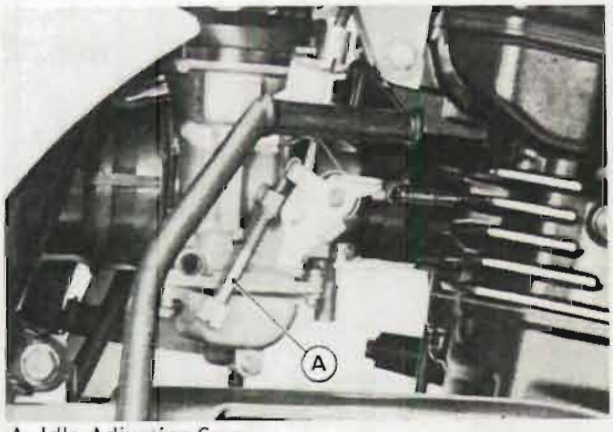
Idle Speed

1,300 ±100 r/min (rpm)

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

Idle Adjustment

- Turn the adjusting screw to adjust the idle speed.



A. Idle Adjusting Screw

- Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.

High Altitude Performance Adjustment (U.S. model)

○To improve the EMISSION CONTROL PERFORMANCE of vehicles operated above **4,000 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

Main Jet:	#135
Pilot Jet:	#38

"NOTE"

○*When properly performed, these specified modifications only, are not considered to be emission system "tampering" and vehicle performance is generally unchanged as a result.*

Maintenance:

Carburetor trouble can be caused by dirt, wear, maladjustment, or improper fuel level in the float chamber.

Mixture Trouble Symptoms

Starting difficulty
Poor running
Overheating
Exhaust smokes excessively
Frequent backfiring in the exhaust system during engine braking

The following explanation covers the inspection of the carburetor.

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.**

○**Make sure the engine is cold before working. Wipe any fuel off the engine before starting it.**

Service Fuel Level Inspection

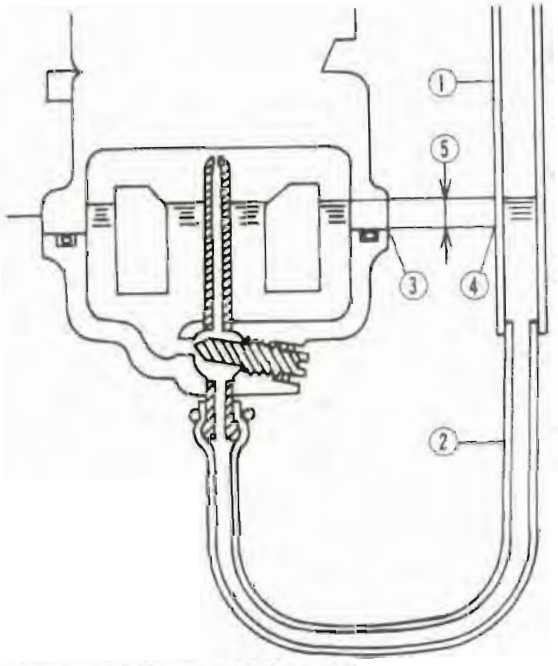
- Remove the carburetor, and hold it in a true vertical position on a stand.
- Secure an optional fuel tank with a valve to some high place to supply fuel to the carburetor.
- Attach fuel level gauge (Special tool) to the open end of the overflow tube.
- Holding the gauge against the side of the carburetor body so that the "0" line is several millimeters higher than the bottom edge of the carburetor body, turn out the carburetor drain plug 1 – 2 turns to feed fuel to the gauge.
- Wait until the fuel level in the gauge settles. If the fuel does not appear or overflows, inspect the float and float valve.
- Keeping the gauge vertical, slowly lower it until the "0" line is even with the bottom edge of the carburetor body.

"NOTE"

○*Do not lower the "0" line below the bottom edge of the carburetor body. If the gauge is lowered and then moved upwards, the fuel level measured shows somewhat higher than the actual fuel level, necessitating to repeat the measurement from the beginning.*

●Read the service fuel level in the gauge.

Service Fuel Level Measurement



1. Fuel Level Gauge: 57001-1017
2. Fuel Hose
3. Carburetor Body Bottom Edge
4. Zero Line
5. Fuel Level

Fuel level
0.5 ±1 mm above the bottom edge of carburetor body

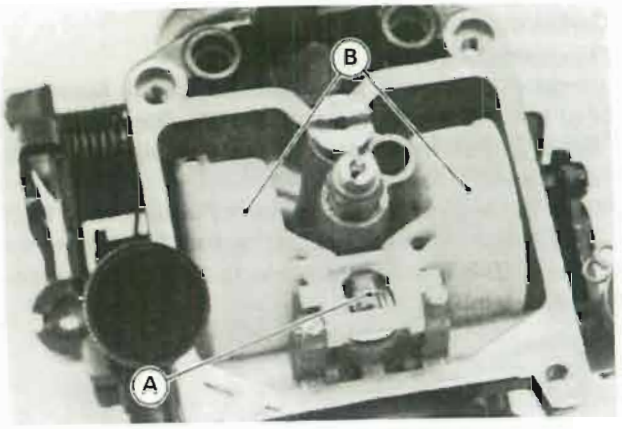
Service Fuel Level Adjustment

●Remove the float from the carburetor.

●Bend the tang on the float a very slight amount to change the float height. (Refer to the "NOTE" below for the float height measurement.) Increasing the float height lowers the fuel level, and decreasing the float height raises the fuel level.

●After adjustment, assemble the carburetor, and inspect the service fuel level again.

★Readjust the service fuel level if necessary. If the service fuel level cannot be corrected by adjusting the float height within the specified range, the float and/or float valve may be damaged necessitating float and/or valve replacement.



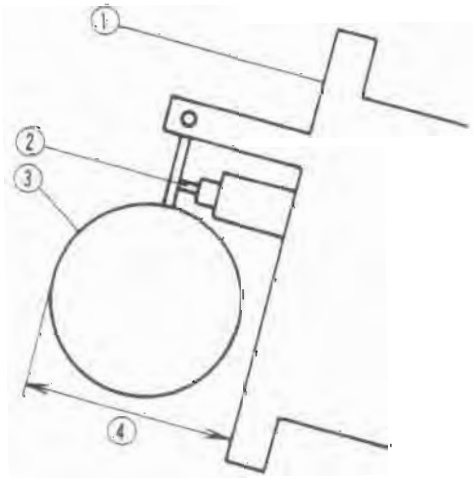
A. Tang B. Float

"NOTE"

○*Float height is the distance from the float bowl mating surface of the carburetor body (with the gasket removed) to the top of the float.*

●Measure the height with the carburetor almost laid down so that the spring loaded rod in the float valve needle makes contact with the tang on the float but is not pushed in.

Float Height Measurement—Keihin Carburetor



1. Float bowl mating surface
2. Float valve needle rod
3. Float
4. Float Height

Carburetor Disassembly:

Disassembly Points

●If the pilot screw is to be removed, do the following:

○For the US model, remove the pilot screw plug as follows. Punch and pry out the plug with an awl or other suitable tools.

○Turn in the pilot screw and count the number of turns until it seats fully but not tightly, and then remove the screw. This is to set the screw to its original position when assembling.

Assembly Points

●After installing the upper chamber cover, check that the vacuum piston slides up and down smoothly without binding in the carburetor bore.

CAUTION

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

●Turn in the pilot screw fully but not tightly, and the back it out the same number of turns counted during disassembly.

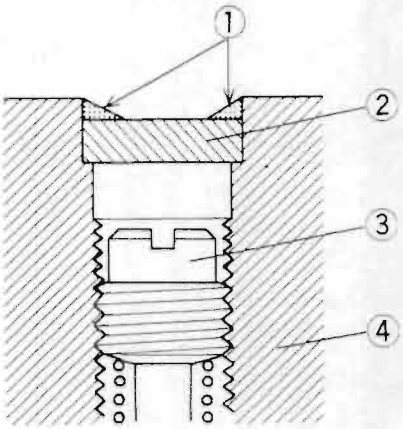
●For the US model, install the pilot screw plug as follows.

○Install a new plug in the pilot screw hole, and apply a small amount of a bonding agent to the circumference of the plug.

CAUTION

○**Do not apply too much bond to the plug in order to keep the pilot screw itself from being fixed.**

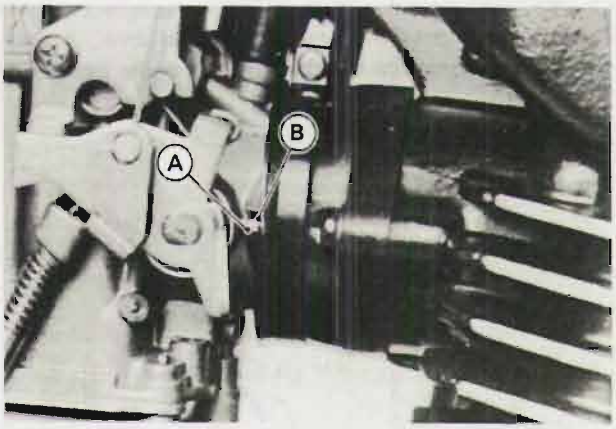
Plug Installation (US model only)



1. Apply a bonding agent.
2. Plug
3. Pilot Screw
4. Carburetor body

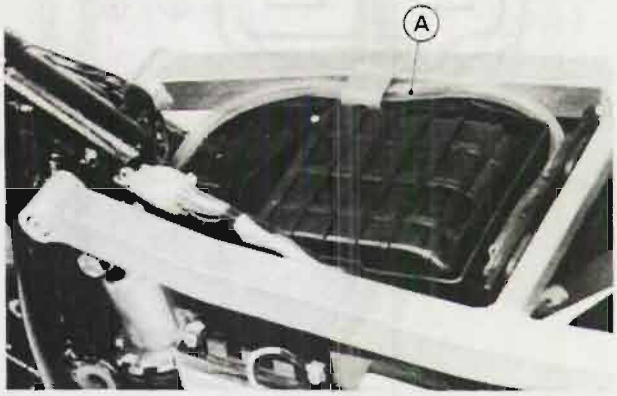
Carburetor Installation

●When installing the carburetor, fit the ridge into the notch on the carburetor holder.



A. Ridge B. Notch

●Route and clamp air vent tube as shown.



A. Air Vent Tube

●Route and clamp the over flow tube with the battery vent hose and the reserve tank tube (See Battery in Electrical System)

CAUTION

○**Always keep the tubes free of obstruction, make sure they do not touch the chain.**

Adjustment After Installation

●Adjust the following items:

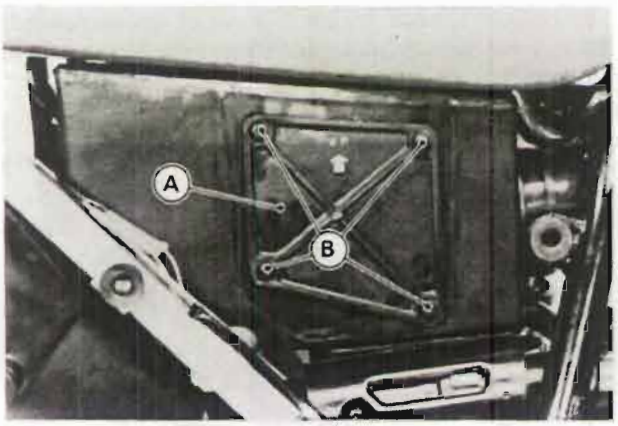
Throttle grip play (See Throttle Grip Adjustment in Chapter 12.)
Idle speed (See Idle Adjustment)

Air Cleaner

In non-racing use, inspect the element according to the **Periodic Maintenance Chart.**

Element Removal

- Pull off the right side cover.
- Remove the screws, and take off the air cleaner element cap.



A. Element Cap B. Screws

- Pull out the element.
- Push a clean, lint-free towel into the air cleaner housing to keep dirt or other foreign material from entering.

CAUTION

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

Inspection and Cleaning

A clogged air cleaner restricts the engine's air intake, increasing fuel consumption, reducing engine power, and causing spark plug fouling.

"NOTE"

○In dusty 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.

- Separate the element from the frame and inspect the element parts for damage.

★If any part is damaged, the damaged part must be replaced or it will allow dirt into the carburetor.

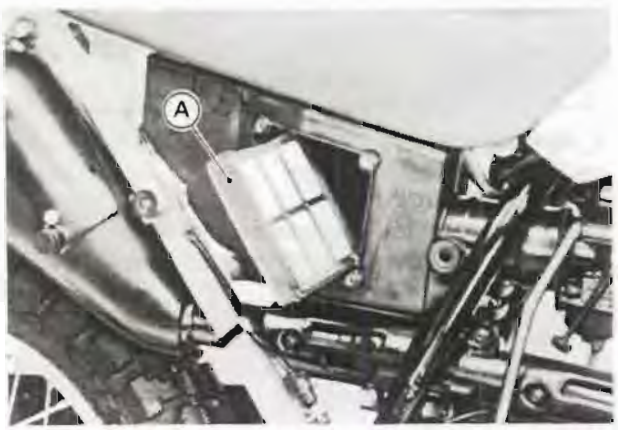
- Clean the element in a bath of high flash-point solvent, and then dry it with compressed air or by shaking it.

WARNING

○Clean the element 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 the element. A fire or explosion could result.

- After cleaning, saturate the sponge filter with SE class SAE 30 oil, squeeze out the excess, then wrap it in a clean rag and squeeze it dry as possible. Be careful not to tear the sponge filter.

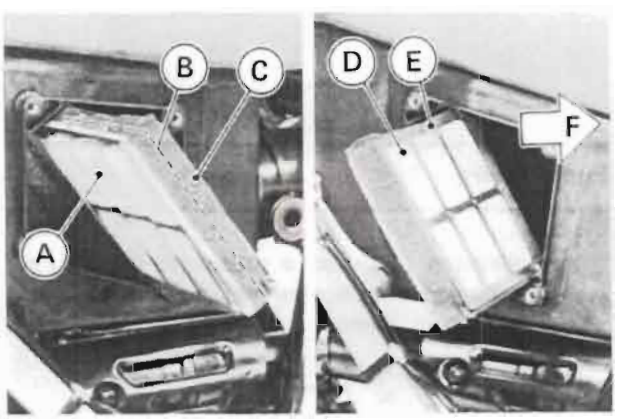


A. Element

Element Installation

○When installing the element, coat the element lip with a layer of all purpose grease to assure a complete seal against the cleaner case.

- Set the element into the frame so that the element sponge meets with the wire netting of the frame.
- Install the element assembly so that the wire netting side faces forward.



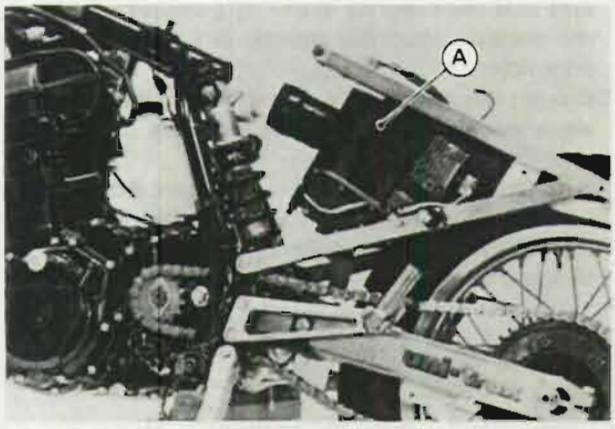
A. Felt
B. Apply Grease
C. Sponge
D. Wire Netting
E. Frame
F. Forward

"NOTE"

○Replace the element after cleaning it 5 times or if it is damaged.

Body Removal

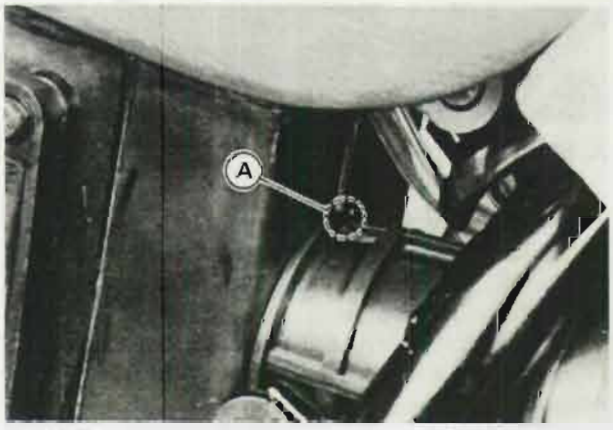
After removal of rear frame (See Rear Shock Removal on chapter 11), take out the air cleaner body.



A. Air Cleaner Body

Body Installation Point

- When installing the air cleaner duct, fit the notch in the duct onto the ridge on the air cleaner housing.



A. Notch

Fuel System

Accumulation of moisture or sediment in the fuel system will restrict the flow of fuel and cause carburetor and/or fuel tap malfunction.

WARNING

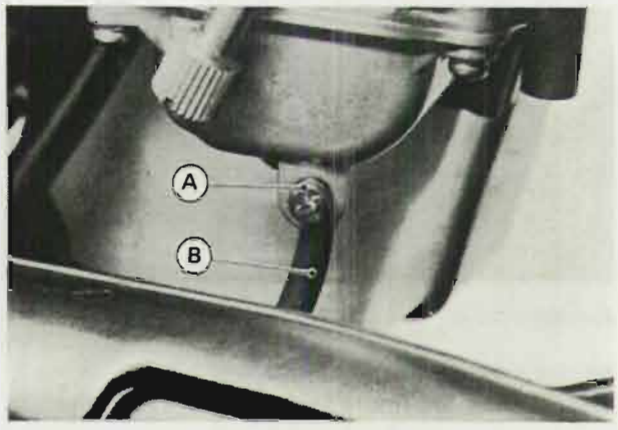
- **Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**
- **Make sure the engine is cold before working.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

Inspection

- Turn the fuel tap lever to the OFF position.
- Run the lower end of the carburetor overflow tube into a suitable container.
- Turn out the drain plug a few turns to drain the carburetor, and check to see if water or dirt comes out.

★If any water or dirt comes out, clean the fuel system as follows.

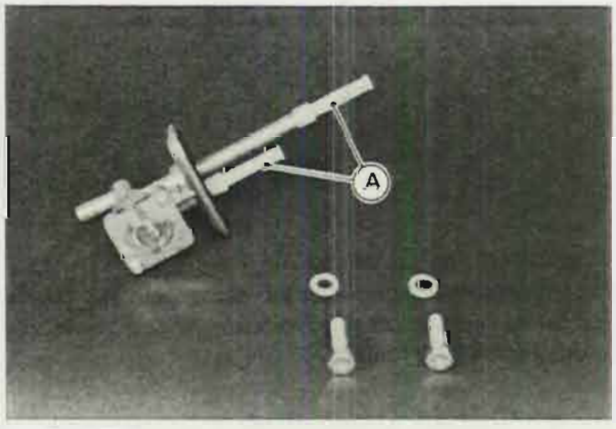
- Tighten the drain screw securely.



A. Drain Plug B. Overflow Tube

Cleaning

- Remove the fuel tank, and remove the fuel tap from the tank.
- Flush out the fuel tank with a high flash-point solvent.
- Wash the fuel filter on the fuel tap clean of dirt with a high flash-point solvent.



A. Fuel Filter

- Remove the carburetor, and disassemble it to clean the fuel and air passages.

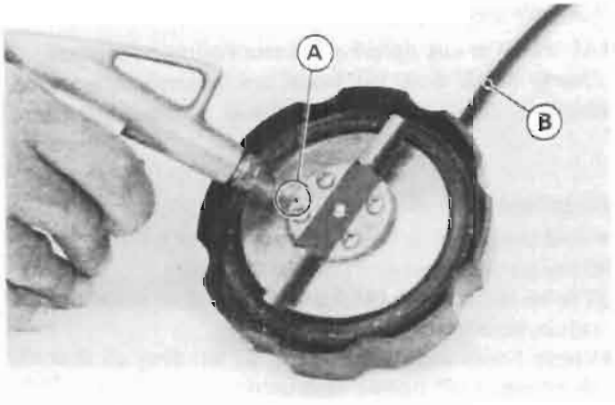
CAUTION

- **Remove the float before cleaning the carburetor with compressed air, or it will be damaged.**
- **Do not use a strong carburetor cleaning solution which could attack rubber or plastic parts; instead, use a mild cleaning solution safe for these parts.**
- **Do not use wire for cleaning as this could damage the jets.**

- Wash the disassembled parts, and air and fuel passages with a high flash-point solvent. If necessary, use a bath of automotive type carburetor cleaner.
- Blow the jets, and air and fuel passages clean with compressed air.
- Assemble the disassembled parts, and install the removed parts.

Fuel Tank Cap Inspection

- Visually inspect the gasket on the tank cap for any damage.
- ★Replace the gasket if it is damaged.
- Blow the air vent in the tank cap bottom free with compressed air.



A. Air Vent B. Breather Hose

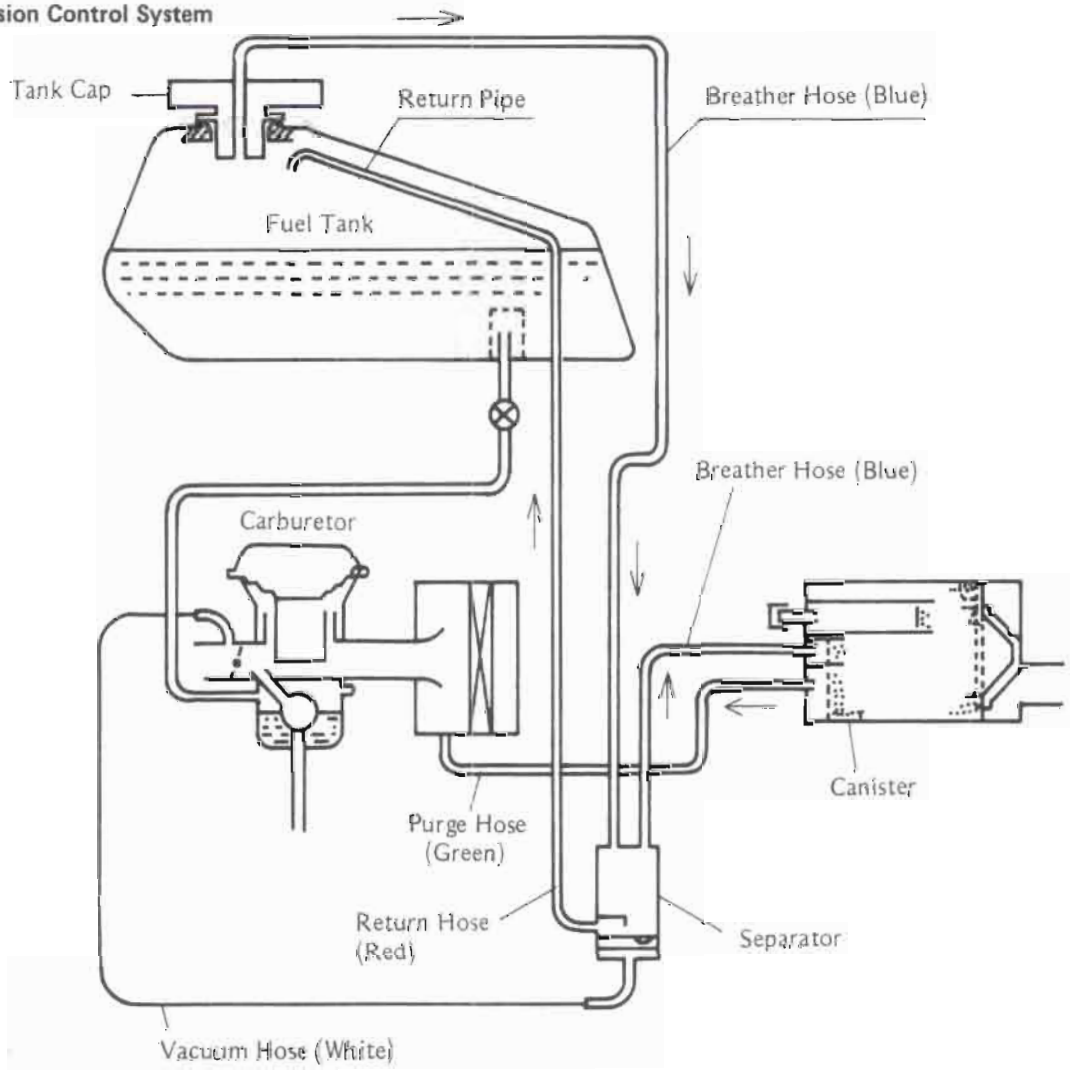
CAUTION

○**Do not apply compressed air to the air vent from the breather hose on the cap top. This could cause damage and clogging of the labyrinth in the cap.**

Evaporative Emission Control System (California Model)

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the **Periodic Maintenance Chart.**

Evaporative Emission Control System



Periodic Inspection

- At the intervals specified in the Periodic Maintenance Chart, check that the hoses are securely connected.
- Replace any kinked, deteriorated or damaged hoses.

Installation

- Hold the separator perpendicular to the ground.
- Connect the hoses as shown in the figure.
- The hose fitting at the fuel tank bottom is for the fuel return hose (with red marking tape).
- Route hoses with a minimum of bending so that the air or vapor will not be obstructed.
- Be sure to plug the return hose to prevent fuel spilling before fuel tank removal.

WARNING

When removing the fuel tank, be careful not to spill the gasoline through the return hose.

★If liquid gasoline flows into the breather hose, remove the hose and blow it clean with compressed air.

Canister Inspection

- Remove the canister, and disconnect the hoses.
- Visually inspect the canister for cracks and other damage.

★If the canister is cracked or badly damaged, replace it with a new one.

"NOTE"

The canister is designed to work well throughout the motorcycle's life without any maintenance, if it is used under normal conditions.

CAUTION

If the gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity becomes greatly reduced. If a liquid does contaminate the canister, replace it with a new one.

Do not disassemble the separator or the canister, because they are made with no allowance for replacement of individual parts.

Liquid/Vapor Separator Inspection

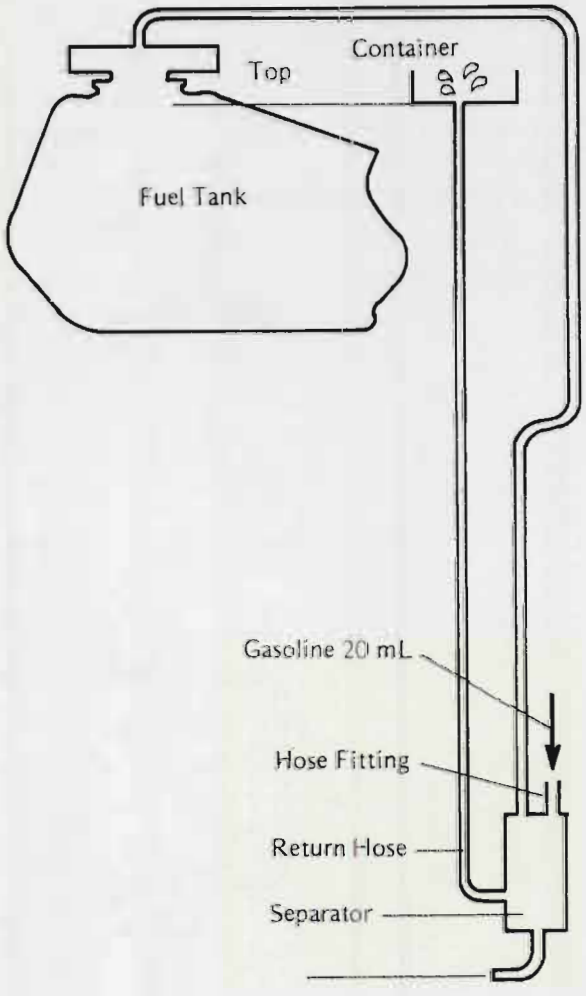
- Disconnect the hoses from the liquid/vapor separator, and remove the separator from the motorcycle.
- Visually inspect the separator for cracks and other damage.

★If the separator has any cracks or bad damage, replace it with a new one.

Separator Test

- Disconnect the canister breather hose from the separator, and inject about **20 mL** of gasoline into the separator through the hose fitting.
- Disconnect the fuel return hose from the fuel tank.
- Run the open end of the return hose into the container level with the tank top.
- Start the engine, and let it idle.

★If the gasoline in the separator comes out of the return hose, the separator works. If it does not, replace the separator with a new one.



Fuel Tank Inspection

- Remove the hoses from the fuel tank, and open the tank cap.
- Check for blockage in the return pipe in the fuel tank.

★If any of them is clogged, clean the pipes by applying compressed air to the hose opening.

Engine Top End

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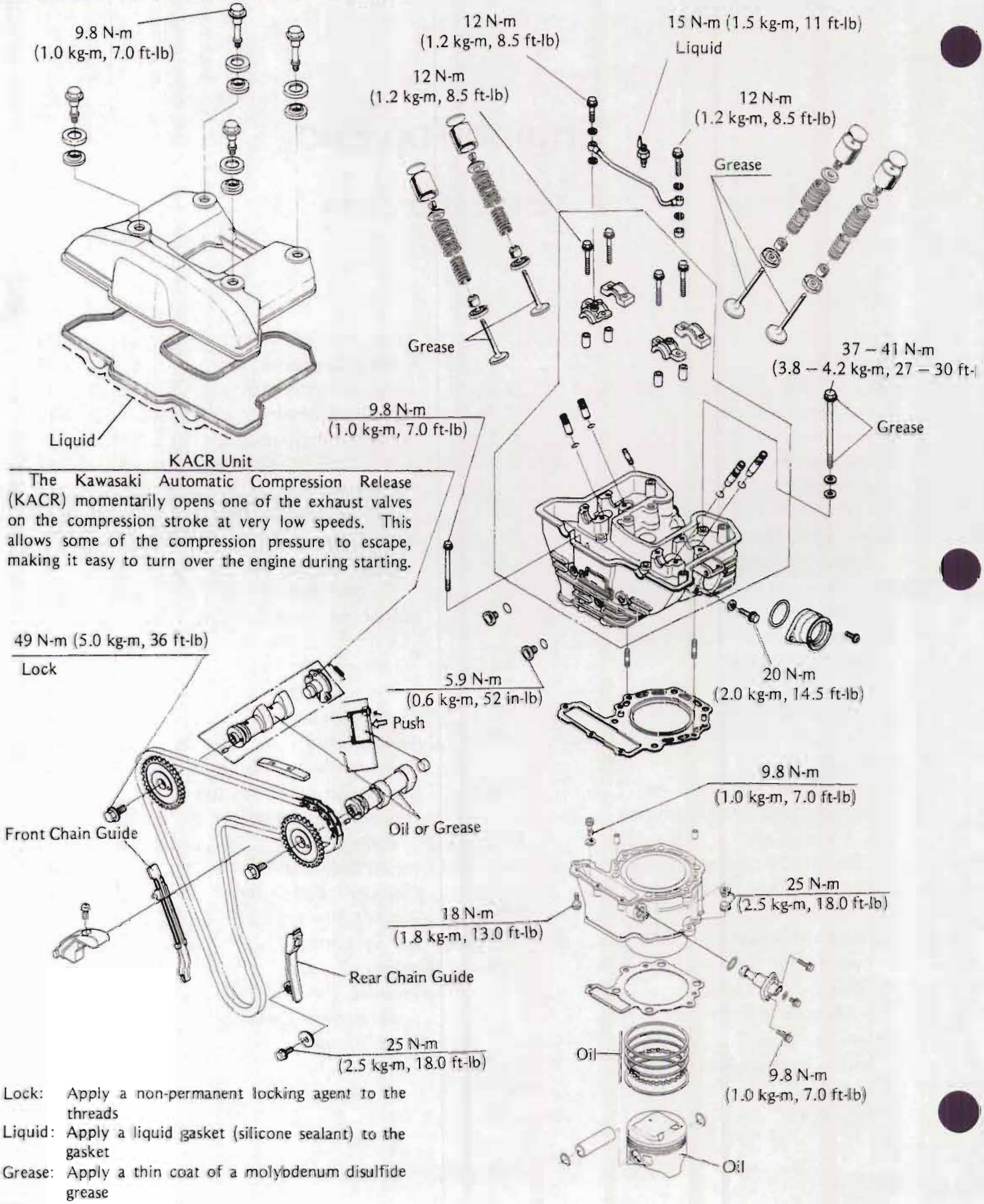
Exploded Views



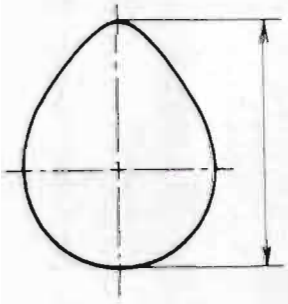
Lock: Apply a non-permanent locking agent to the threads
Liquid: Apply a liquid gasket (silicone sealant) to the gasket
Grease: Apply a thin coat of a molybdenum disulfide grease
Oil: Apply engine oil

Service Data

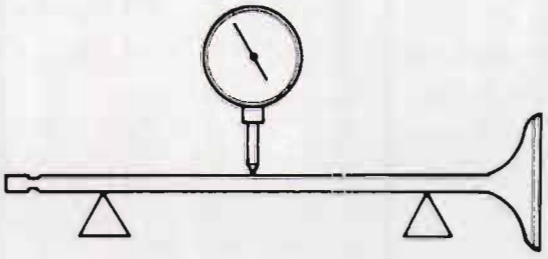
Item		Standard	Service Limit	See Page
Camshafts, Chain:				
Inlet Cam Height		36.63 – 36.77 mm	36.53 mm	– – –
Exhaust Cam Height		36.23 – 36.37 mm	36.13 mm	– – –
Camshaft bearing oil clearance		0.030 – 0.072 mm	0.16 mm	3-10
Camshaft journal diameter		22.949 – 22.970 mm (In. Ex.)	22.92 mm	
Camshaft bearing inside diameter		23.000 – 23.021 mm (In. Ex.)	23.08 mm	
Camshaft chain 20-link length		127.0 – 127.4 mm	128.9 mm	3-10
Balancer chain 20-link length		190.5 – 191.0 mm	193.5 mm	
Valves:				
Valve clearance:				
	Inlet	0.10 – 0.20 mm	– – –	3-12
	Exhaust	0.15 – 0.25 mm		
Valve head thickness:				
	Inlet	0.85 – 1.15 mm	0.7 mm	– – –
	Exhaust	0.85 – 1.15 mm	0.7 mm	– – –
Valve stem bend		Less than 0.01 mm TIR	0.05 mm TIR	– – –
Valve stem diameter:				
	Inlet	6.965 – 6.980 mm	6.95 mm	– – –
	Exhaust	6.955 – 6.970 mm	6.94 mm	
Valve guide inside diameter		7.000 – 7.015 mm	7.08 mm	
Valve guide/valve clearance (wobble method):				
	Inlet	0.04 – 0.11 mm	0.24 mm	3-17
	Exhaust	0.05 – 0.12 mm	0.24 mm	
Valve seating area outside diameter	Inlet	37 mm	– – –	3-16
	Exhaust	32 mm	– – –	
Valve seating area width		0.8 – 1.2 mm	– – –	
Valve spring free length:				
	Inner	37.0 – 37.6 mm	35.7 mm	– – –
	Outer	41.5 – 42.2 mm	40.0 mm	– – –
Cylinder Head:				
Cylinder compression		480 – 785 kPa (4.9 – 8 kg/cm², 70 – 114 psi)	– – –	3-17
Cylinder head warp		– – –	0.05 mm	3-19

Item	Standard	Service Limit	See Page
Cylinder, Piston:			
Cylinder inside diameter	96.000 – 96.012 mm	96.10 mm	3-21
Piston diameter	95.942 – 95.957 mm	95.80 mm	3-21
Piston/cylinder clearance	0.043 – 0.070 mm	– – –	– – –
Piston ring/groove clearance			
Top	0.03 – 0.07 mm	0.15 mm	
Second	0.02 – 0.06 mm	0.15 mm	
Piston ring groove width			
Top	1.22 – 1.24 mm	1.30 mm	
Second	1.51 – 1.53 mm	1.60 mm	
Piston ring thickness			
Top	1.17 – 1.19 mm	1.10 mm	
Second	1.47 – 1.49 mm	1.40 mm	
Piston ring end gap			
Top	0.2 – 0.4 mm	0.5 mm	
Second	0.2 – 0.4 mm	0.5 mm	

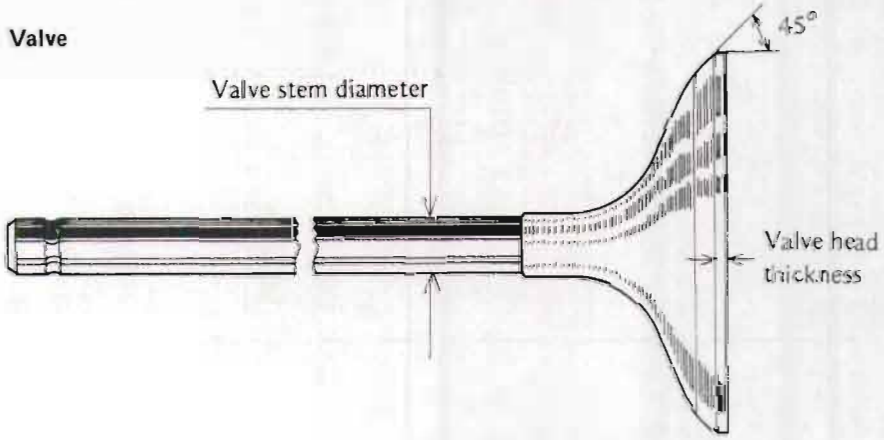
Cam Height



Valve Stem Bend



Valve



Special Tools

Piston Pin Puller Assembly: 57001-910
Piston Pin Puller Adapter: 57001-1211

Cutter Holder ϕ7.0 mm: 57001-1126

Bar: 57001-1128

#4 Seat Cutter: 57001-1116
#5 Seat Cutter: 57001-1117

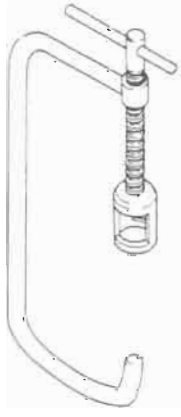
#9 Outside Cutter: 57001-1121
#10 Outside Cutter: 57001-1122

#12 Inside Cutter: 57001-1124

Compression Gauge: 57001-221

Adapter: 57001-1183

Valve Spring Compressor Assembly: 57001-241



Adapter: 57001-243

Valve Guide Arbor: 57001-163

Valve Guide Reamer: 57001-162

Cam Chain Tensioner

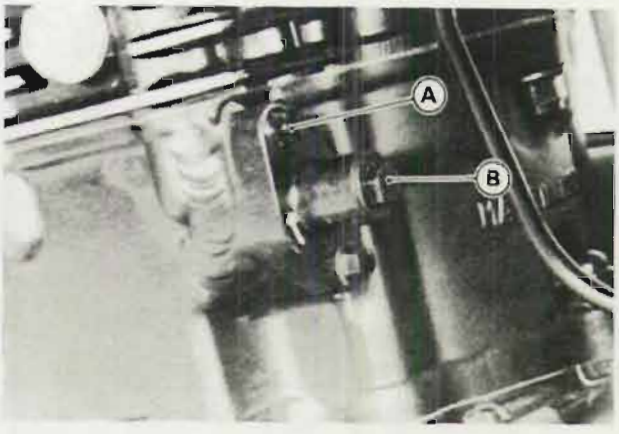
Chain Tensioner Removal

CAUTION

This is a non-return type cam chain tensioner. The push rod does not return to its original position once it moves out to take up cam 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 "Chain Tensioner Installation".**
- **Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.**

- Loosen the cap bolt before tensioner removal for later disassembly convenience.
- Unscrew the mounting bolts and remove the camshaft chain tensioner.



A. Mounting Bolt B. Cap Bolt

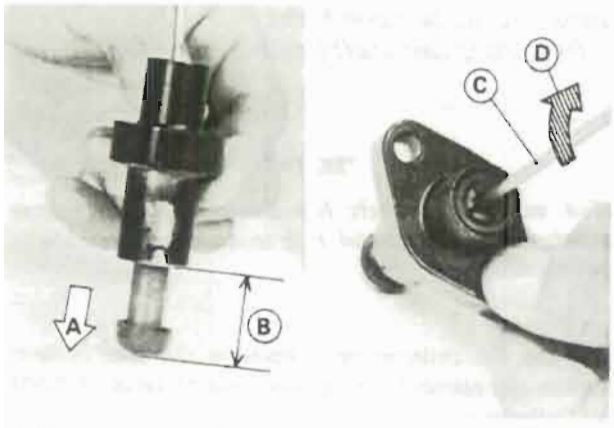
Chain Tensioner Installation

- Remove the cap bolt and O-ring.
- While compressing the push rod, turn it clockwise with a suitable screwdriver until about **10 mm** sticks out of the tensioner body as shown.

CAUTION

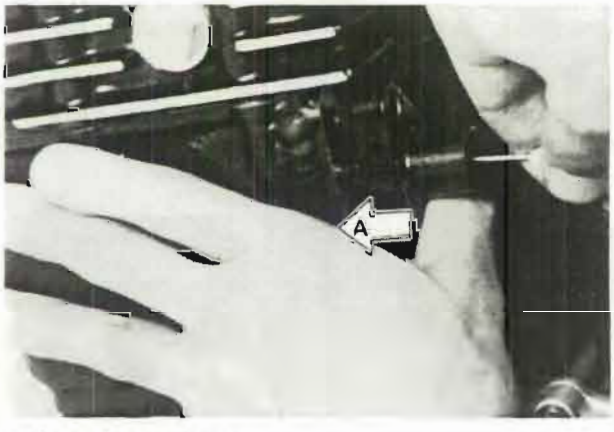
- **Do not turn the rod counterclockwise at installation. This could detach the rod and the tensioner cannot be reinstalled.**

- While holding the rod in position with the screwdriver, install the tensioner on the cylinder block.



A. Compress the rod
B. about 10 mm
C. Screwdriver
D. Clockwise

•While pushing the tensioner against the cylinder block as shown, remove the screwdriver.



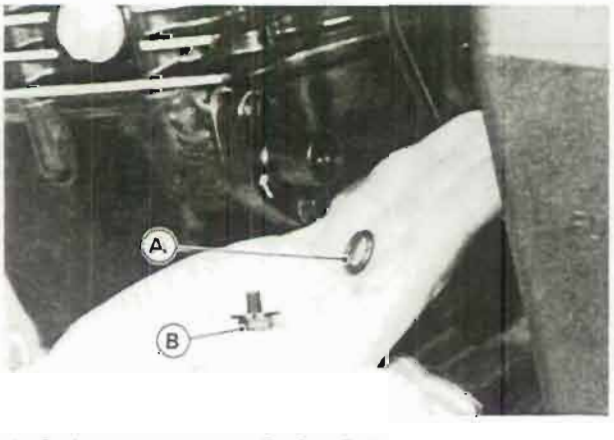
A. Push the tensioner.

•Tighten the mounting bolts finger tight to hold the tensioner.
•Then, tighten the bolts to the specification.

Tightening Torque

Tensioner mounting bolt: 9.8 N-m (1 kg-m, 7.0 ft-lb)

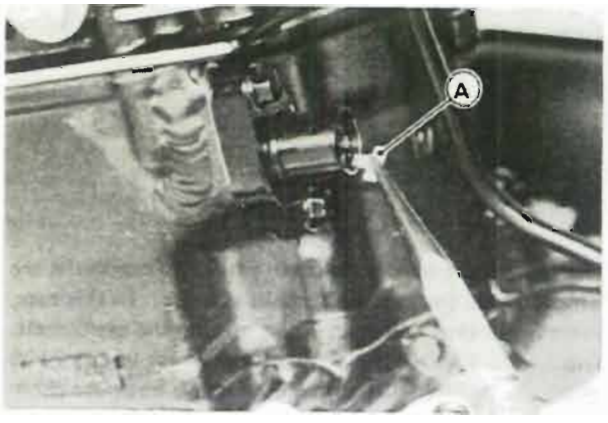
•Install the O-ring and tighten the cap bolt.



A. O-ring
B. Cap Bolt

Replacement Chain Tensioner Installation

○A replacement chain tensioner from stock has a rod holder plate.
•Install the tensioner on the cylinder block, and tighten the mounting bolts to the specification (See above).
•Remove the plate to release the push rod.



A. Rod Holder Plate

•Install the O-ring and tighten the cap bolt.

CAUTION

○**Do not pull the rod while the tensioner is removed. This could detach the rod requiring tensioner replacement.**

Cylinder Head Cover

Adjustment before Head Cover Installation

•If a new camshaft, cylinder head, valve, or valve lifter was installed, check valve clearance and adjust if necessary.

Installation Point

•Replace the head cover gasket with new one, if it is damaged.
•Apply a liquid gasket (silicone sealant) to the plug side of the gasket as shown.

A. Liquid Gasket (Silicone Sealant) Applied Areas

Camshaft Chain Guide
Camshaft Chain
Camshafts

Camshaft Removal Point

- Remove the cam chain tensioner assembly before removing the camshafts.

CAUTION

○The crankshaft may be turned, while the camshafts are removed and the camshaft chain is loose. In this case, 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.

Chain Guide Installation Points

- Be sure to install the chain guides (front and rear) before cylinder head installation (See Exploded Views).

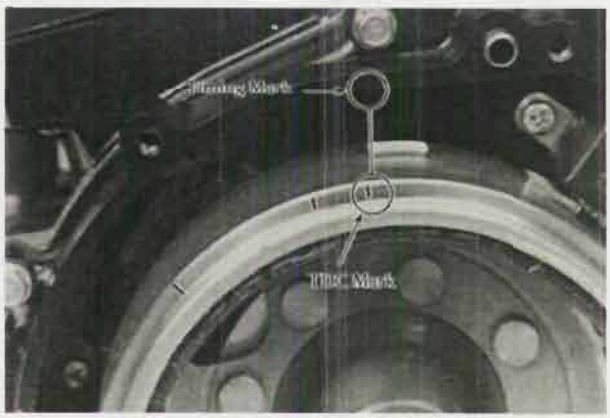
Camshafts Installation Point
(Including Camshaft Chain Timing Procedure)

"NOTE"

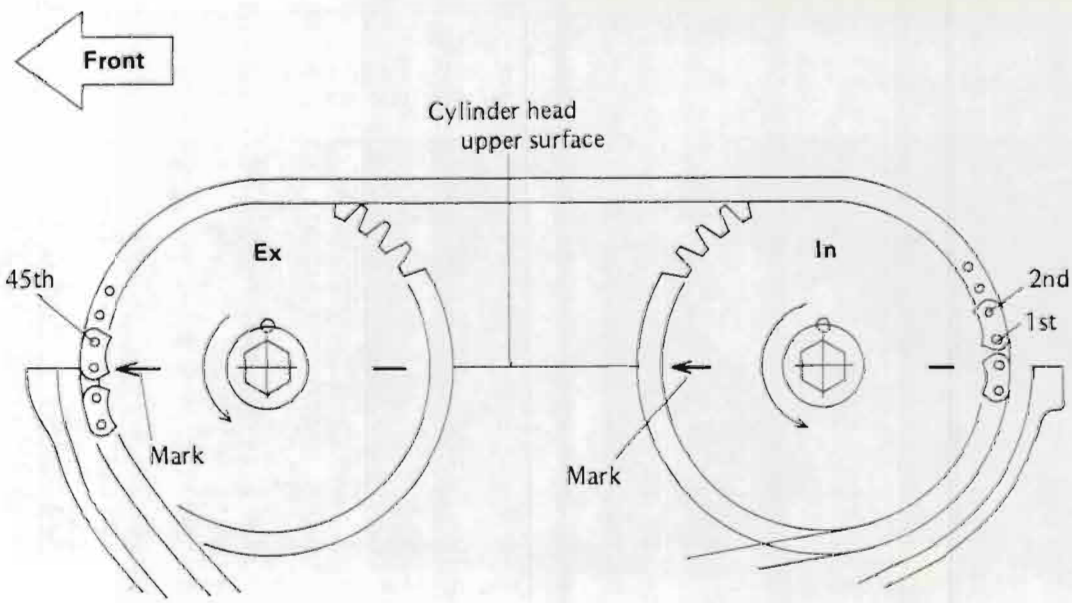
○The exhaust camshaft has the compression release mechanism. Be careful not to confuse these shafts when installing.

- Tighten the cylinder head bolts to the specification before the camshaft installation (See Installation Point of Cylinder Head).
- Apply engine oil to all cam parts. If the camshaft(s) and/or cylinder head are replaced with new ones, apply a thin coat of a molybdenum disulfide engine assembly grease on the new cam part surfaces.
- Temporarily install the magneto flywheel and key.
- Position the crankshaft at **TDC** and engage the camshaft chain with camshaft sprockets as shown in the figure. Pull the tension side of the chain taut to install the chain.

○The timing marks must be aligned with the cylinder head upper surface and pointed toward the FRONT, after the camshaft chain slack is taken up by the tensioner.



Camshaft Chain Timing (Lefthand View)

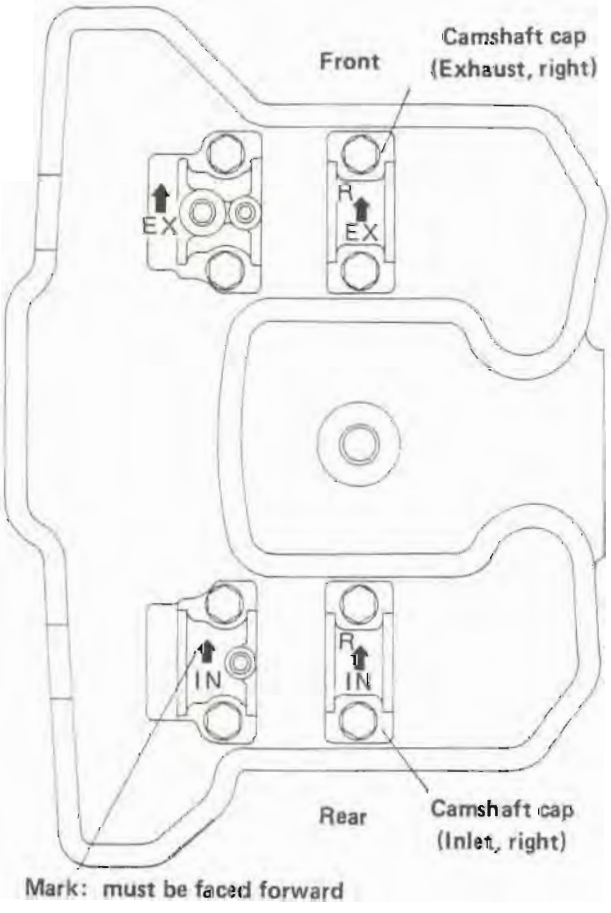


•Install the camshaft caps in the correct locations as shown in the figure below.

CAUTION

○**The camshaft caps are machined with the cylinder head. So, if cap is installed in a wrong location, the camshaft may seize because of improper oil clearance in the bearings.**

Camshaft Cap Installation



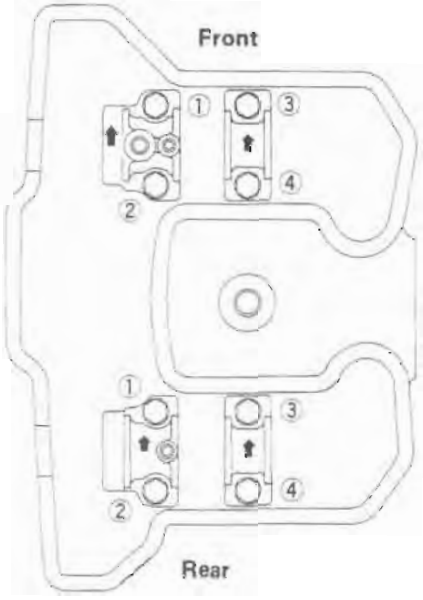
Mark: must be faced forward

•First tighten down the two camshaft cap bolts (#1 and #2 bolts in the figure) evenly to seat the camshafts in place, then torque all bolts to the specification, following the specified tightening sequence.

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.**

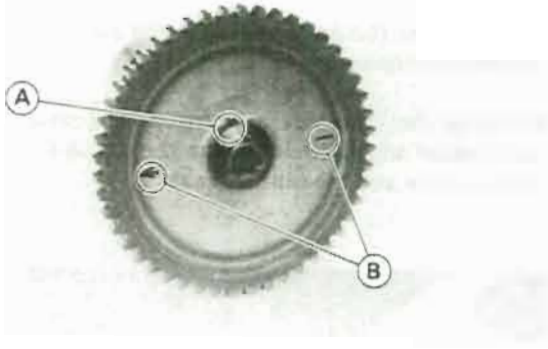
Camshaft Cap Bolt Tightening Sequence



Assembly Points of Camshafts and Sprockets

○The inlet and exhaust sprockets are identical.

•Install the sprockets so that the marked side faces outwards. Fit the knock pin into the camshaft hole.



A. Knock Pin B. Mark

•Apply a locking agent to each camshaft sprocket bolt and tighten it to the specification.

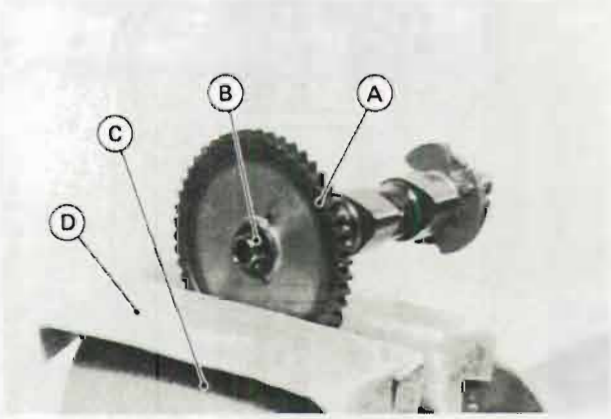
Camshaft Sprocket Bolt

Tightening Torque:	49 N·m (5.0 kg, 36 ft·lb)

•If a new camshaft is to be used, apply a thin coat of a molybdenum disulfide grease to the cam surfaces.

Disassembly Point of Camshaft Sprocket Bolt

- Remove the camshaft assembly from the cylinder head.
- Hold the camshaft sprocket with a vise and unscrew the sprocket bolt. Use rubber or aluminum plates to prevent damage to the sprocket.



A. Sprocket
B. Bolt
C. Vise
D. Aluminum Plate

Camshaft Oil Clearance Inspection

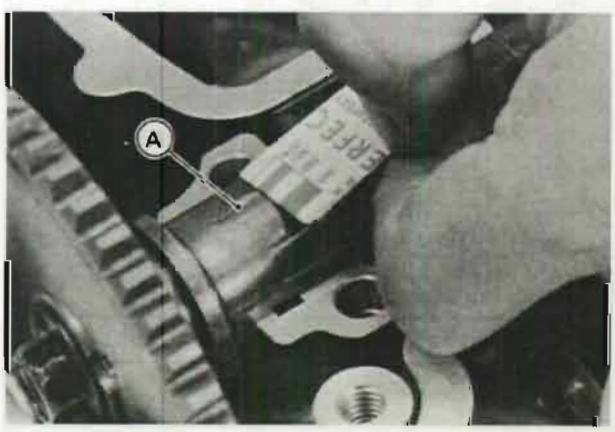
The journal wear is measured using plastigauge (press gauge), which is inserted into the clearance to be measured. The plastigauge indicates the clearance by the amount it is compressed and widened when the parts are assembled.

- Cut strips of plastigauge to journal width. Place a strip on each journal parallel to the camshaft with the camshaft installed in the correct position and so that the plastigauge will be compressed between the journal and camshaft cap.
- Install the camshaft caps, tightening the bolts in the correct sequence to the specified torque.

"NOTE"

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

- Remove the camshaft caps again, and measure the plastigauge width to determine the clearance between each journal and the camshaft cap.



A. Plastigauge

★If any clearance exceeds the service limit, replace the camshaft with a new one and measure the clearance again.

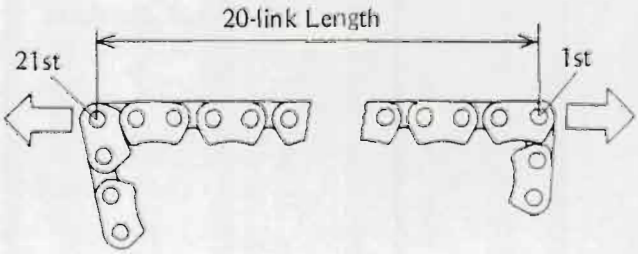
★If the clearance still remains out of the limit, replace the cylinder head.

Camshaft Chain, Balancer Chain Wear

- Hold the chain taut with a force of about 5 kg in some manner, 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 chain.

Chain Length Measurement



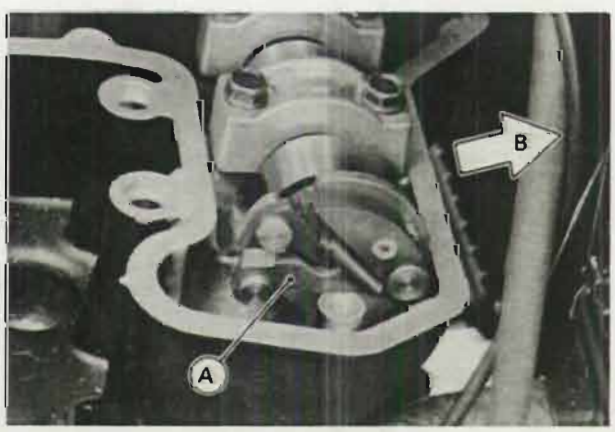
KAWASAKI Automatic Compression Release (KACR)

Due to the simplicity of the mechanism, no periodic maintenance is needed. There are only two symptoms of problems with the KACR mechanism: compression is not released during starting, and compression is released during running.

(1) If compression is not released during starting, the weights are not returning to their rest position.

- Remove the fuel tank.
- Remove the cylinder head cover.
- Visually inspect the spring.

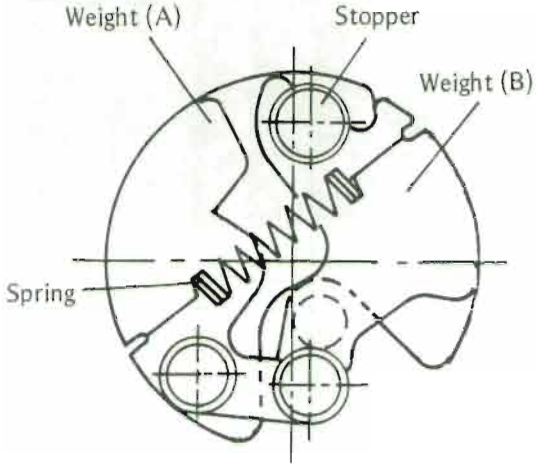
★If the spring is damaged, deformed, or missing, replace it.



A. KACR Unit
B. Front

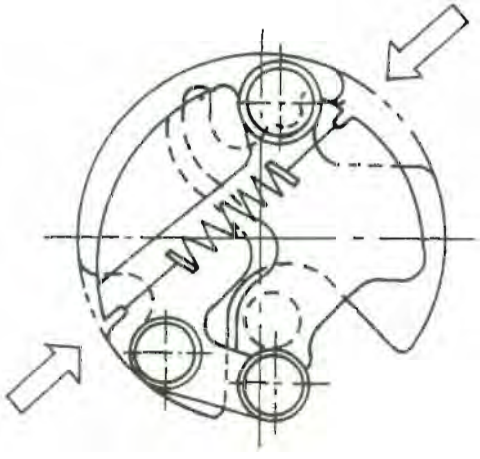
•Remove the spring and move the weights back and forth.
★If the weights do not move smoothly all the way, replace the exhaust camshaft.

Running Position
(compression is not released)



(2) If compression is released while the engine is running, the weights are not swinging out.
•Remove the spring and move the weights back and forth.
★If the weights do not move easily from the retracted position, replace the exhaust camshaft.

Retracted or Rest Position
(compression is released)



Oil Pipe

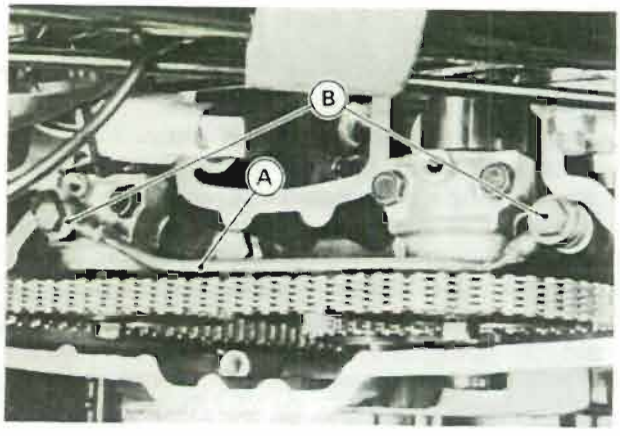
Oil Pipe Installation Point

•Before installation, flush out the oil pipes with a high flash-point solvent.
•Fill the oil pipes with engine oil. This shortens air bleeding time and prevents engine damage.
•Tighten the banjo bolt to the specification.
•Tighten the main pipe banjo bolts according to the following steps.

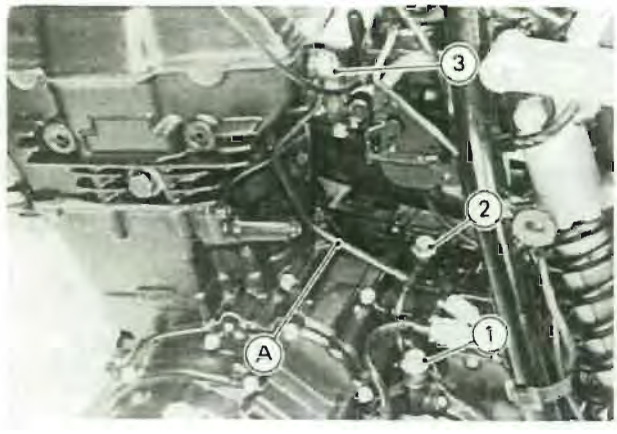
○Install the main pipe and banjo bolts (3).
○Lightly tighten the banjo bolts in the order shown in the figure.
○Tighten the banjo bolts to the specification in the same order.

Oil Pipe Banjo Bolt Tightening Torque

Head oil pipe	:	12 N-m (1.2 kg-m, 8.5 ft-lb)
Main oil pipe	:	20 N-m (2.0 kg-m, 14.5 ft-lb)



A. Head Oil Pipe B. Banjo Bolts



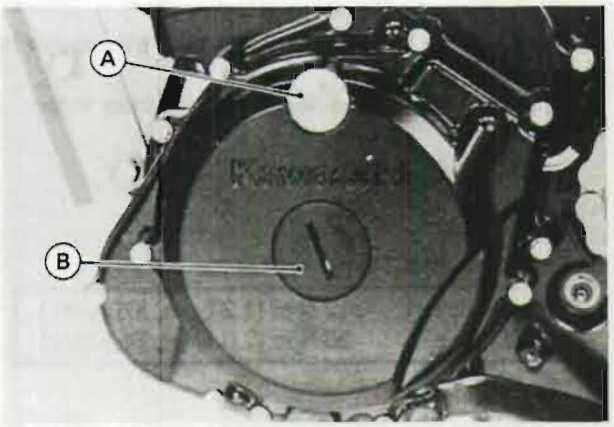
A. Main Oil Pipe
B. Banjo Bolts Tightening Order : ① → ③

Valves

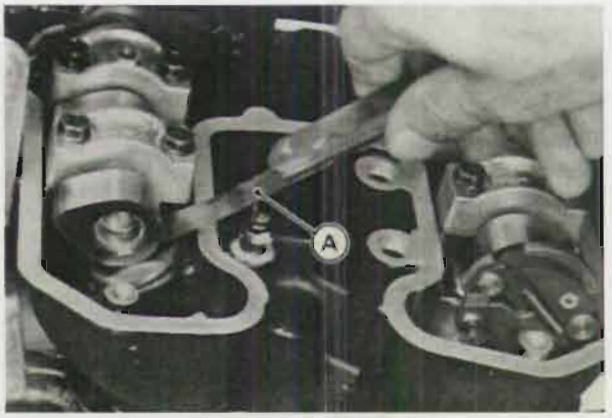
Valve Clearance Adjustment

Inspection

•If the engine is hot, wait until the engine cools. Valve clearance must be checked when the engine is cold (room temperature).
•Remove the fuel tank.
•Remove the cylinder head cover.
•Remove the two caps on the magneto cover.



A. Upper Cap B. Lower Cap



A. Insert the thickness gauge

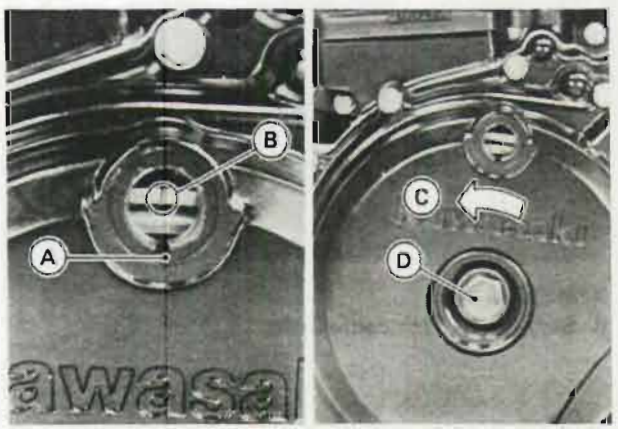
•Check the valve clearance when piston is at TDC.
•Using a wrench on the crankshaft rotation bolt, turn the crankshaft counterclockwise while watching the movement of inlet valves (valves to rear). When the valves have just finished opening and closing (moving downwards and returning upwards), turn the crankshaft in the same direction for about another 1/2 turn until the "T" mark on the magneto flywheel is aligned with the notch on the upper hole of the magneto cover.
○At this point, the marks on the camshaft sprockets point forward and line up with the surface of the cylinder head.

Valve Clearance

Inlet	0.10 – 0.20 mm
Exhaust:	0.15 – 0.25 mm

"NOTE"

○*Check the valve clearance using this method only. Checking the clearance at any other cam position may result in improper valve clearance.*

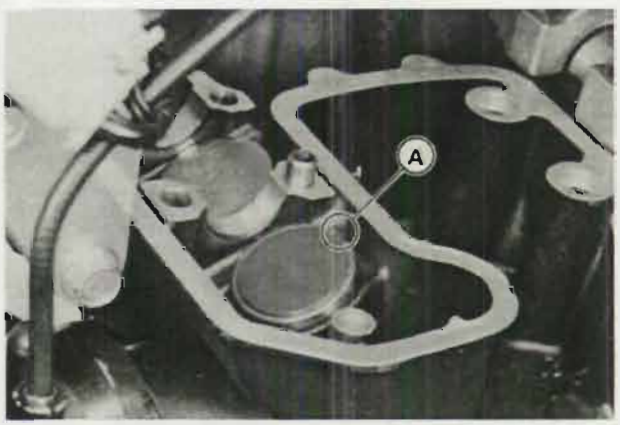


A. Notch
B. T Mark
C. Normal Direction of Crankshaft Rotation
D. Crankshaft Rotation Bolt

Adjustment

•To change the valve clearance, remove the chain tensioner, the camshaft and the shim.
•To select a new shim which brings valve clearance within the specification, refer to the Valve Clearance Adjustment Charts.
•Position the lifter notch so that it faces upwards. This allows the shim to be lifted and removed.

•Measure the clearance between the cam and shim, for all four valves.
★If the valve clearance is incorrect, adjust it.



A. Notch

- Install the camshafts. Be sure to time the camshafts properly.
- Remeasure the valve clearance that was adjusted. Readjust if necessary.

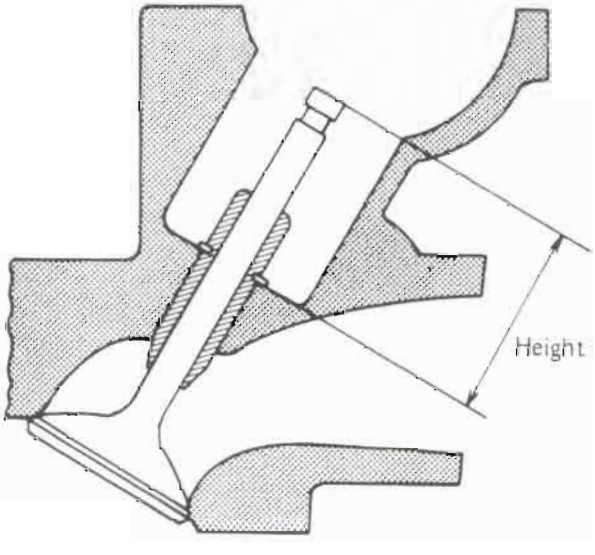
CAUTION

- **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.**
- **Do not grind the valve stem end to repair it or to permit additional valve clearance. If the valve end is ground, the lifter may contact the spring retainer and/or split keepers during operation, allowing the keeper to loosen. Consequently, the valve may drop into the engine, causing serious damage.**

Valve Installed Height

- Install the valve in the cylinder head.
- Pushing up on the valve so that it seats firmly in the valve seat, measure the valve installed height with vernier calipers. The valve installed height is the distance from the bottom of the cylinder head lifter hole to the end of the valve stem.

Measuring Valve Installed Height



Valve Installed Height

Height (mm)		Probable Cause	Recommendation
Inlet	Exhaust		
Less than 37.13	Less than 37.08		• Move valve to deeper cut seat. Remeasure. • Replace valve. Remeasure. • Replace cylinder head. Remeasure.
37.13 – 37.97	37.08 – 37.92	Normal/acceptable	• After assembling check and adjust valve clearance.
More than 37.97	More than 37.92	Valve face or seat worn out, or ground excessively.	• Move valve to shallower cut seat. Remeasure. • Replace valve. Remeasure. • Replace cylinder head. Remeasure.

Inlet Valve Clearance Adjustment Chart

	PRESENT SHIM																								
PART NUMBER (12037 —	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025
THICKNESS (mm)	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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

VALVE CLEARANCE (mm)	INSTALL THE SHIM OF THIS THICKNESS (mm)																								
0.00 ~ 0.02				2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05
0.03 ~ 0.07			2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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
0.08 ~ 0.09		2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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
0.10 ~ 0.20	SPECIFIED CLEARANCE / NO CHANGE REQUIRED																								
0.21 ~ 0.22	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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	
0.23 ~ 0.27	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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		
0.28 ~ 0.32	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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			
0.33 ~ 0.37	2.20	2.25	2.30	2.35	2.40	2.45	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				
0.38 ~ 0.42	2.25	2.30	2.35	2.40	2.45	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					
0.43 ~ 0.47	2.30	2.35	2.40	2.45	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						
0.48 ~ 0.52	2.35	2.40	2.45	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							
0.53 ~ 0.57	2.40	2.45	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								
0.58 ~ 0.62	2.45	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									
0.63 ~ 0.67	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										
0.68 ~ 0.72	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											
0.73 ~ 0.77	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												
0.78 ~ 0.82	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20													
0.83 ~ 0.87	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20														
0.88 ~ 0.92	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20															
0.93 ~ 0.97	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																
0.98 ~ 1.02	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																	
1.03 ~ 1.07	2.90	2.95	3.00	3.05	3.10	3.15	3.20																		
1.08 ~ 1.12	2.95	3.00	3.05	3.10	3.15	3.20																			
1.13 ~ 1.17	3.00	3.05	3.10	3.15	3.20																				
1.18 ~ 1.22	3.05	3.10	3.15	3.20																					
1.23 ~ 1.27	3.10	3.15	3.20																						
1.28 ~ 1.32	3.15	3.20																							
1.33 ~ 1.37	3.20																								

282103

Inlet Valve

1. Measure the clearance (when engine cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. The shim specified where the lines intersect is the one that will give you the proper clearance.

"NOTE"

If there is no clearance, select a shim which is several sizes smaller and then measure the clearance.

Exhaust Valve Clearance Adjustment Chart

	PRESENT SHIM																								
PART NUMBER (12037 -	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025
THICKNESS (mm)	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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

VALVE CLEARANCE (mm)	INSTALL THE SHIM OF THIS THICKNESS (mm)																								
0.00 ~ 0.02					2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00
0.03 ~ 0.07				2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05
0.08 ~ 0.12			2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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
0.13 ~ 0.14		2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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
0.15 ~ 0.25	SPECIFIED CLEARANCE / NO CHANGE REQUIRED																								
0.26 ~ 0.27	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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	
0.28 ~ 0.32	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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		
0.33 ~ 0.37	2.15	2.20	2.25	2.30	2.35	2.40	2.45	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			
0.38 ~ 0.42	2.20	2.25	2.30	2.35	2.40	2.45	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				
0.43 ~ 0.47	2.25	2.30	2.35	2.40	2.45	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					
0.48 ~ 0.52	2.30	2.35	2.40	2.45	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						
0.53 ~ 0.57	2.35	2.40	2.45	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							
0.58 ~ 0.62	2.40	2.45	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								
0.63 ~ 0.67	2.45	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									
0.68 ~ 0.72	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										
0.73 ~ 0.77	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											
0.78 ~ 0.82	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												
0.83 ~ 0.87	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20													
0.88 ~ 0.92	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20														
0.93 ~ 0.97	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20															
0.98 ~ 1.02	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																
1.03 ~ 1.07	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																	
1.08 ~ 1.12	2.90	2.95	3.00	3.05	3.10	3.15	3.20																		
1.13 ~ 1.17	2.95	3.00	3.05	3.10	3.15	3.20																			
1.18 ~ 1.22	3.00	3.05	3.10	3.15	3.20																				
1.23 ~ 1.27	3.05	3.10	3.15	3.20																					
1.28 ~ 1.32	3.10	3.15	3.20																						
1.33 ~ 1.37	3.15	3.20																							
1.38 ~ 1.45	3.20																								

282104

Exhaust Valve

1. Measure the clearance (when engine cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. The shim specified where the lines intersect is the one that will give you the proper clearance.

"NOTE"

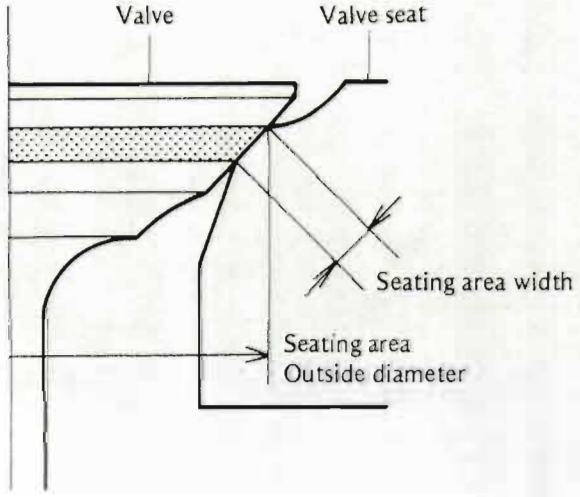
○*If there is no clearance, select a shim which is several sizes smaller and then measure the clearance.*

Valve Maintenance

Valve Seat Inspection

- Remove the valve, and check to see if the valve and valve guide are in good condition before valve seat inspection.
- Apply machinist's dye to the valve seat, and then use a lapper to tap the valve lightly into place.
- Remove the valve, and note where the dye adheres to the valve seating surface. The distribution of the dye on the seating surface gives an indication of seat condition.
- ★If the distribution of the dye shows uneven seating or seat damage, or if the seating area is out of the specified range, repair the valve seat.

Valve Seating Area Dimensions



Valve Seating Area

Valve Seat Repair

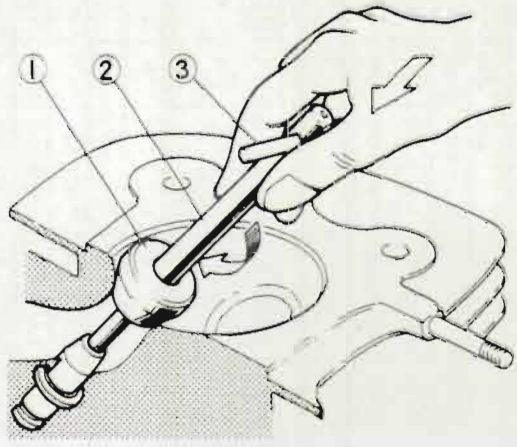
"NOTE"

- **Apply engine oil to the valve seat cutter before cutting the seat surface.**
- **Wash off ground metal particles sticking to the cutter with a high flash point solvent.**

CAUTION

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

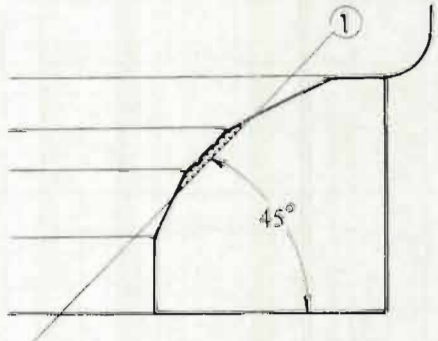
Valve Seat Cutter



1. Cutter
2. Cutter holder ϕ7.0 mm: 57001-1126
3. Bar: 57001-1128

- First, cut the seating surface of the valve seat with the 45° seat cutter and cutter holder (special tools). Cut only the amount necessary to make a good surface; overcutting will reduce the valve clearance, possibly making it no longer adjustable.

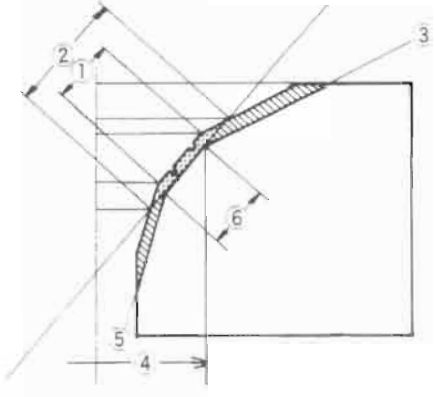
First Step



1. Cut seating surface with following cutters.
   Exhaust: #4 Seat Cutter (57001-1116)
   Inlet: #5 Seat Cutter (57001-1117)

●Next, cut the outermost surface with the outside cutter so that the valve seating surface will have the specified outside **diameter**.
●Then, cut the surface inside the seating surface with the inside cutter so that the seating surface will have the specified **width**.

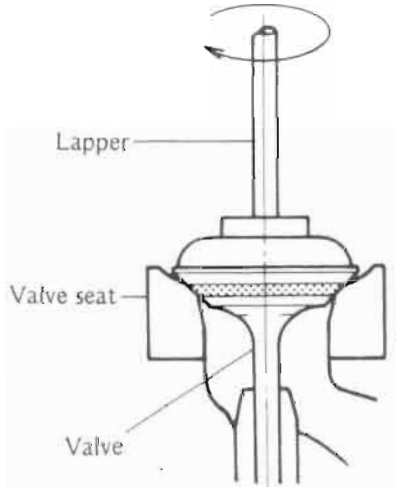
Second Step



1. Original Seating Surface
2. New Seating Surface
3. Cut this surface to adjust outside diameter **4** of new seating surface with following cutters.
   Exhaust: #9 Outside Cutter (57001-1121)
   Inlet: #10 Outside Cutter (57001-1122)
4. Seating Surface Outside Diameter
5. Cut this surface to obtain correct width **6** with following cutters.
   Exhaust and Inlet: #12 Inside Cutter (57001-1124)

After cutting, lap the valve to properly match the valve and valve seat surfaces. Start off with coarse lapping compound, and finish with fine compound.
●Apply compound to the valve seat, and tap the valve lightly into place while rotating it with a lapper. Repeat this until a smooth, matched surface is obtained.
●When lapping is completed, check the valve installed height and adjust if necessary.

Lapping Valve Seat



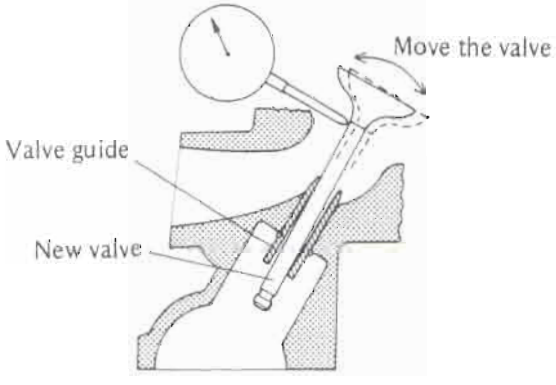
Measuring Valve-to-Guide Clearance (Wobble Method)

●Insert a new valve into the guide 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 to measure valve/valve guide clearance. Read the variation in the dial gauge.
●Repeat the measurement in a direction at a right angle to the first.

"NOTE"

○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

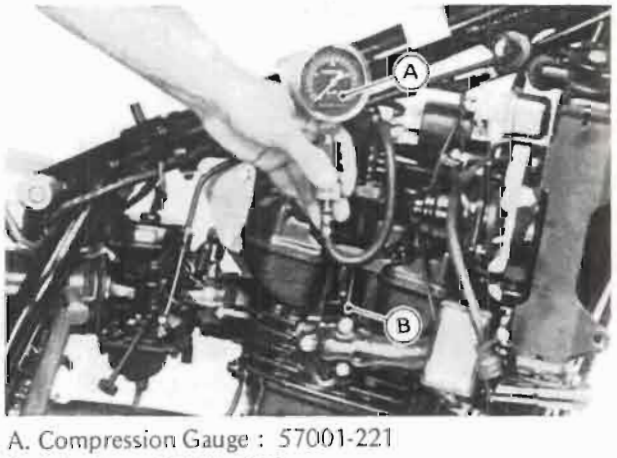
Wobble Method



Cylinder Head

Compression Measurement

●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 and attach compression gauge (special tool) firmly into the spark plug hole.
●With the throttle fully open, turn the engine over sharply with the kickstarter several times until the compression gauge stops rising; the compression is the highest reading obtainable (See Service Data Section).



A. Compression Gauge : 57001-221
B. Adapter : 57001-1183

★If cylinder compression is higher than the usable range, check the following:
(1) Carbon build-up on the piston head and cylinder head – clean off any carbon on the piston head and cylinder head.
(2) Cylinder head gasket, cylinder base gasket – use only the proper gaskets. The use of a gasket of incorrect thickness will change the compression.
(3) Valve stem oil seals and piston rings – rapid carbon accumulation in the combustion chamber may be caused by damaged valve stem oil seals and/or damaged piston oil rings. This may be indicated by white exhaust smoke.
(4) Compression release cam spring is damaged, deformed, missing, or weights do not move smoothly.

★If cylinder compression is lower than the usable range, check the following:
(1) Gas leakage around the cylinder head – replace the damaged gasket and check the cylinder head warp.
(2) Condition of the valve seating.
(3) Valve clearance.
(4) Piston/cylinder clearance, piston seizure.
(5) Piston ring, piston ring groove.
(6) Compression release weights do not move smoothly.

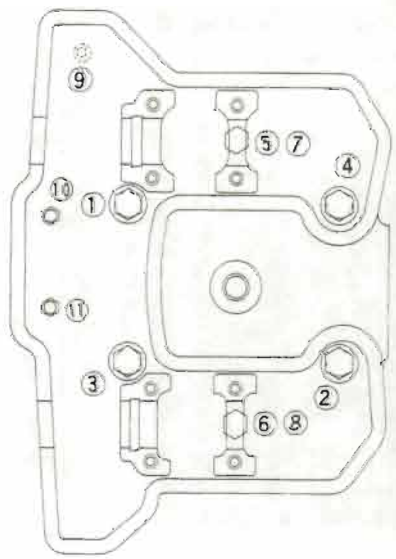
Removal Point of Cylinder Head

●Remove the cylinder head Allen bolts and nuts (8 mm) first, and then remove the cylinder head bolts (10 mm). This prevents excessive stress on the small bolts and nuts.

Installation Point of Cylinder Head

●The camshaft caps are machined together with the cylinder head, so if a new cylinder head is installed, use the caps that are supplied with the new head.
●Apply a molybdenum disulfide grease to the cylinder head bolts bearing surface and threads.
●Torque the cylinder head bolts and the cylinder nuts to the specification following the tightening sequence.

Cylinder Head Bolts and Nuts Tightning Sequence



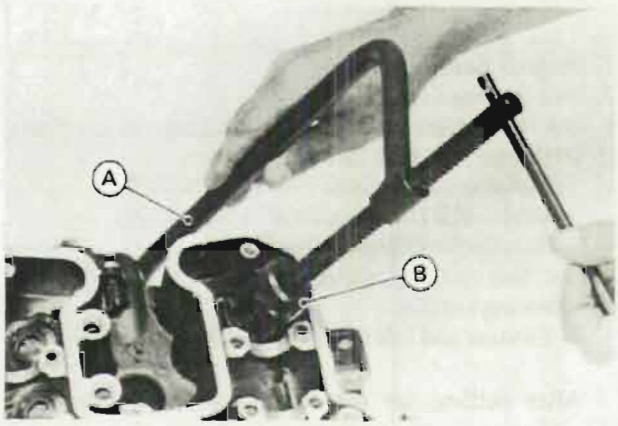
①–④ : 37 – 41 N-m (3.8 – 4.2 kg-m, 27 – 30 ft-lb)
⑤–⑧ : 25 N-m (2.5 kg-m, 18 ft-lb) (Retighten the crankcase side nuts)
⑨ : 18 N-m (1.8 kg-m, 13.0 ft-lb)
⑩–⑪ : 9.8 N-m (1.0 kg-m, 7 ft-lb)

Adjustment and Operation after Installation

●Throughly warm up the engine, and then let it cool completely. Now retighten the cylinder nuts and bolt to the specified torque.

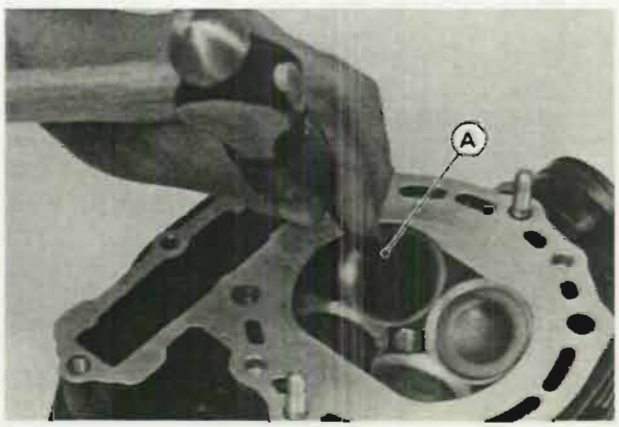
Disassembly Points of Cylinder Head

●Use valve spring compressor assembly 57001-241 to press down the valve spring retainer, and remove the split keepers.
○Be careful not to damage the studs on the cylinder surface.



A. Valve Spring Compresser Assembly : 57001-241
B. Adapter : 57001-243

●Heat the area around the valve guide to about 120 – 150°C (248 – 302°F), and hammer lightly on valve guide arbor (special tool) to remove the guide from the top of the head.

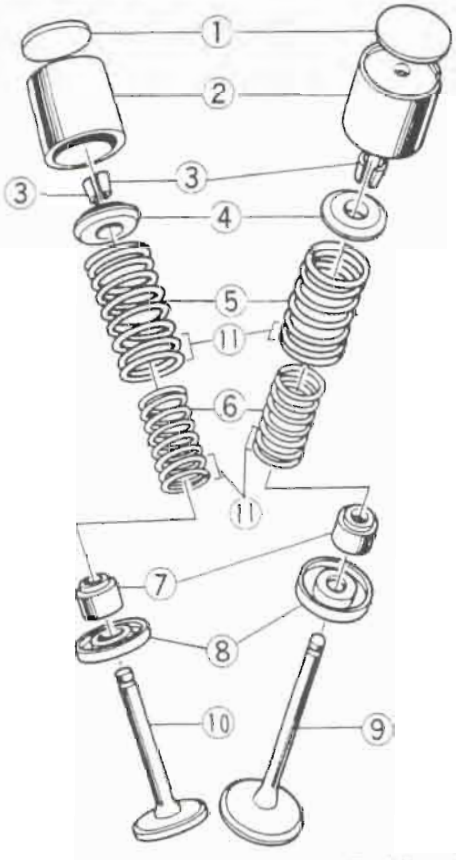


A. Valve guide arbor : 57001-163

●Valve Guide Installation:
○Apply oil to the valve guide outer surface before installation.
○Heat the area around the valve guide hole to about 120 – 150° (248 – 302°F).
○Drive the valve guide in from the top of the head using the valve guide arbor. The circlip stops the guide from going in too far.
○Ream the valve guide with valve guide reamer (special tool) even if the old guide is re-used.

A. Valve guide reamer : 57001-162

Valves, Springs, Guides

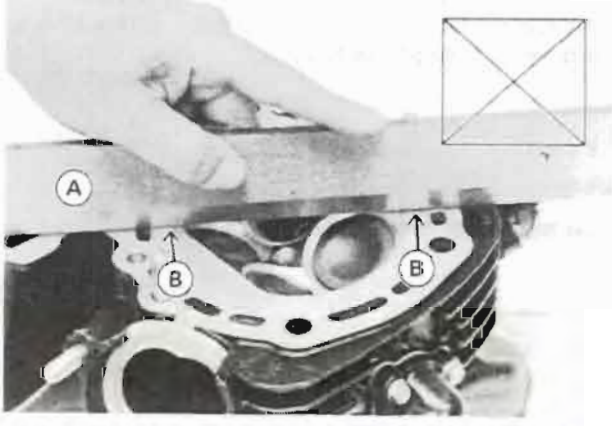


1. Shim
2. Valve lifter
3. Split keeper
4. Spring retainer
5. Valve spring outer
6. Valve spring, inner
7. Oil seal
8. Spring seat
9. Valve, inlet
10. Valve, exhaust
11. Closed coil end

●Valve Installation:
○Check to see that the valve moves smoothly up and down in the guide.
○Check to see that the valve seats properly in the valve seat. If it does not, repair the valve seat. Check the valve installed height (See the chapter 3).
○Apply a thin coat of molybdenum disulfide engine assembly grease to the valve stem before valve installation.

Cylinder Head Warp

●Lay a straightedge across the lower surface of the head at several different points, and measure warp by inserting a thickness gauge between the straightedge and the head.
★If warp exceeds the service limit, repair the mating surface. Replace the cylinder head if the mating surface is badly damaged.

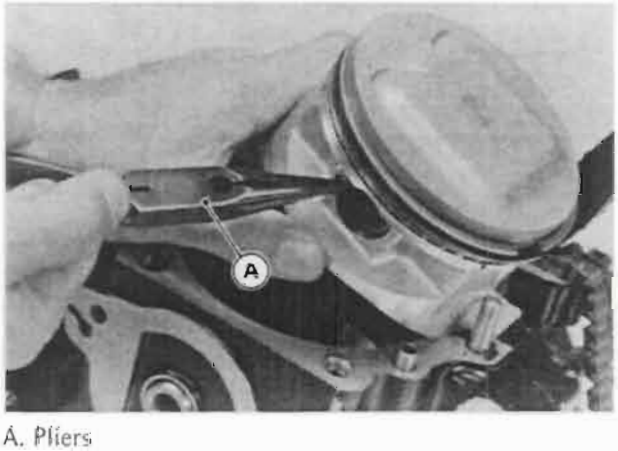


A. Straightedge B. Thickness Gauge

Cylinder, Piston

Removal Point of Piston

●Remove the piston pin snap ring, and remove the piston by pushing its piston pin out the side that the snap ring was removed.

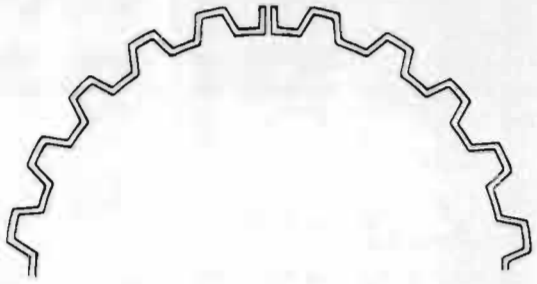


A. Pliers

Installation Points of Piston Rings

●Oil Ring Installation:

○First install the expander in the piston oil ring groove so that expander ends butt together, never overlap.

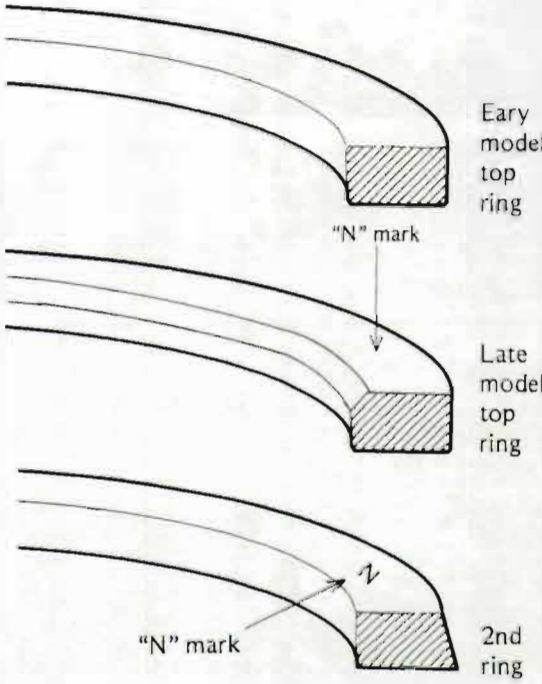


○Install the upper and lower steel rails. There is no "up" or "down" to the rails. They can be installed either way.

●Do not mix up the second and top ring. Early model top ring is rectangular and symmetrical with respect to the horizontal axis; it can be installed either way.

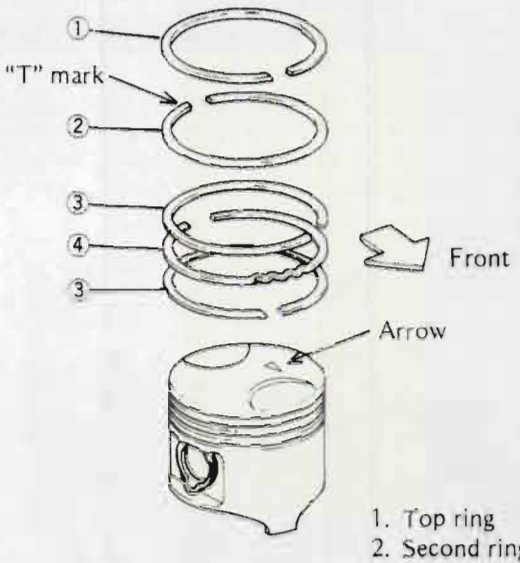
●But late model top ring is not symmetrical. Install it so that the chamfered side faces up.

Cross Section of Piston Rings



●Position each piston ring so that the opening in the top ring and oil ring steel rails are facing forwards, and the second ring and oil ring expander openings face the rear. The openings of the oil ring steel rails must be about 30° to either side.

Piston Ring Openings (viewed from Front)



1. Top ring
2. Second ring
3. Steel rail, oil ring
4. Expander, oil ring

CAUTION

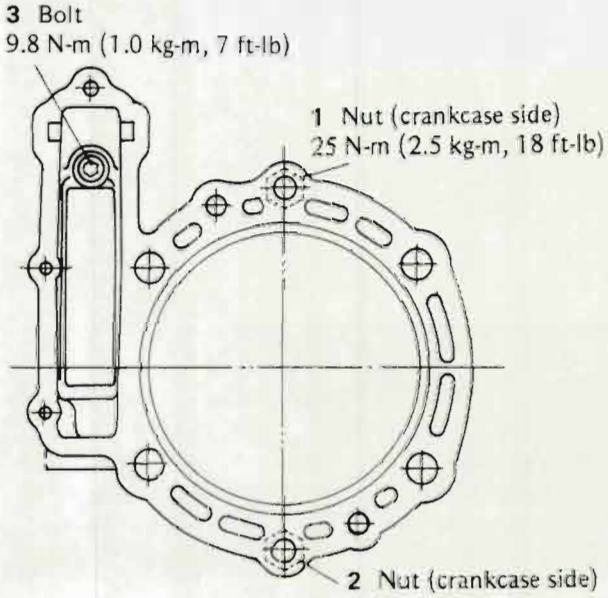
○**Do not reuse snap rings, as removal weakens and deforms the snap ring. It could fall out and score the cylinder wall.**

Installation Point of Cylinder Block

●Tighten the cylinder nuts (crankcase side) and bolt to the specification as shown, before cylinder head installation.

●Apply a engine oil to the cylinder bores, and to the piston skirt.

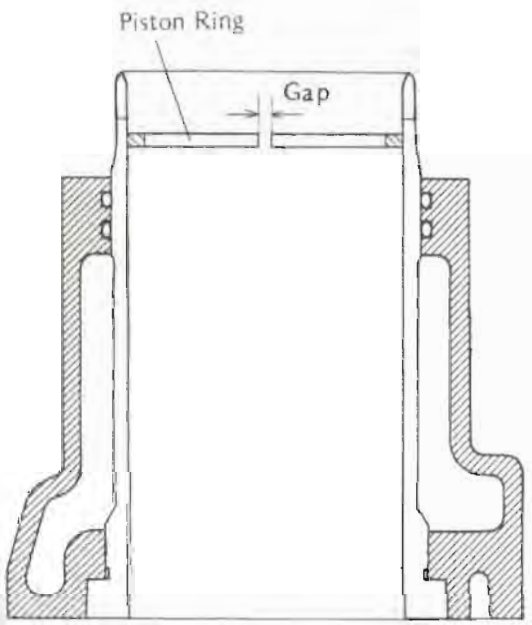
Cylinder Bolts and Nuts Tightening Sequence



Piston Ring End Gap

- Place the piston ring inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap between the ends of the ring with a thickness gauge.

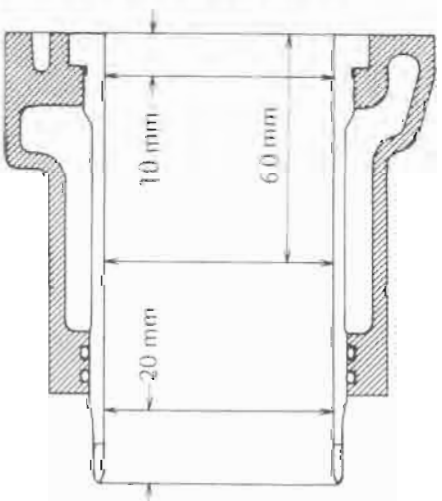
End Gap Measurement



Cylinder Inside Diameter

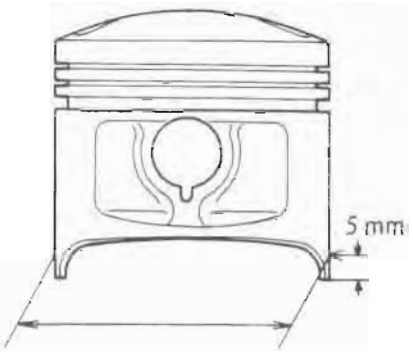
- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the 3 locations (total of 6 measurements) shown in the figure.
- If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be bored to oversize and then honed.

Cylinder Inside Diameter Measurement



Piston Diameter

Piston Diameter Measurement



Boring, Honing

When boring and honing a cylinder, note the following:

- There are two sizes of oversize pistons available. Oversize pistons require oversize rings.

  Oversize Pistons and Rings

0.5 mm	Oversize
1.0 mm	Oversize

- Before boring a cylinder, first measure the exact diameter of the oversize piston, and then, according to the standard clearance in the Service Data Section, determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than 1.0 mm, the cylinder block must be replaced.
- Cylinder inside diameter must not vary more than 0.01 mm at any point.
- Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.
- In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus 0.1 mm and the service limit for the piston is the oversize piston original diameter minus 0.15 mm. If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

Muffler

Installation Points

- Tighten the muffler mounting bolts, nuts, and clamp bolts in the order and method indicated below.
- First, tighten all the bolts and nuts to a snug fit.
- Secondly, tighten the exhaust pipe holder nuts evenly to avoid exhaust leaks.
- Lastly, tighten the rest of the mounting bolts and clamp bolts securely.
- Thoroughly warm up the engine, wait until the engine cools down, and retighten all the clamp bolts.

Spark Arrester Cleaning (U.S. model)

This motorcycle is equipped with a spark arrester approved for off-road use by the U.S. Forest Service. It must be properly maintained to ensure its efficiency. In accordance with the Periodic Maintenance Chart, clean the spark arrester.

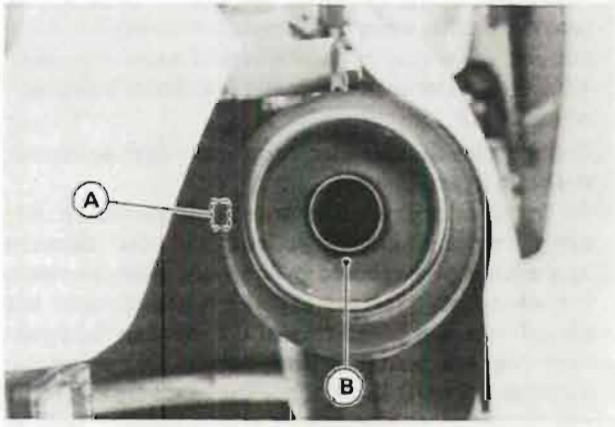
CAUTION

○The spark arrester must be installed correctly and functioning properly to provide adequate fire protection.

WARNING

○To avoid burns, wear gloves while cleaning the spark arrester. Since the engine must be run during this procedure, the muffler will become hot.

- Remove the spark arrester mounting screw from the muffler.
- Pull the spark arrester out of the muffler.



A. Screw B. Spark Arrester

- Remove the drain plugs on the muffler.

A. Drain Plugs

- In an open area away from combustible materials, start the engine with the transmission in neutral.
- Raise and lower engine speed while tapping on the muffler with a rubber mallet until carbon particles are purged from the muffler.

WARNING

○Never run the engine with the spark arrester removed near combustible materials. Hot carbon particles may start a fire.

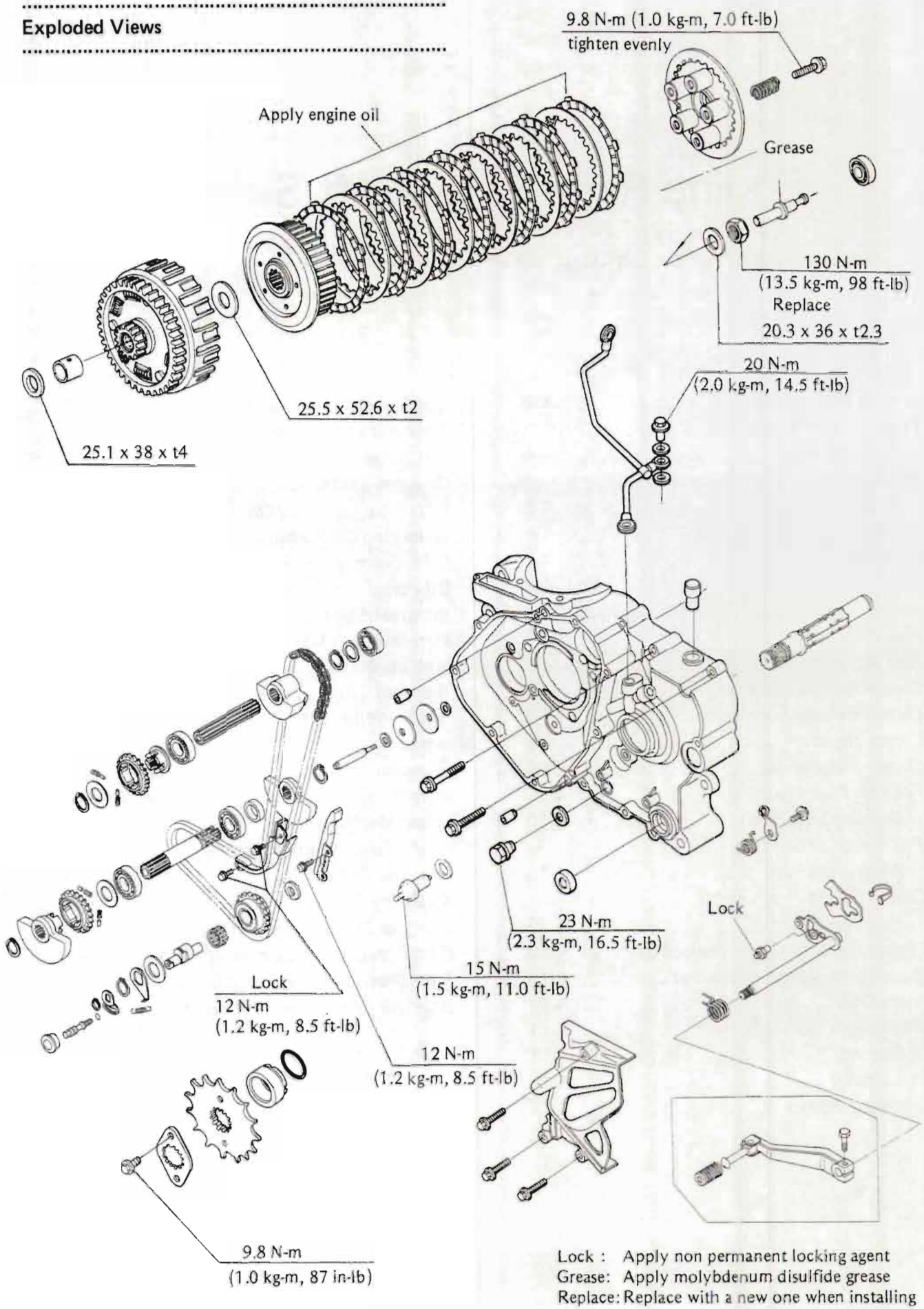
○Do not run the engine in a closed area. Exhaust gases contain carbon monoxide, a colorless, odorless, poisonous gas. Breathing exhaust gas leads to carbon monoxide poisoning, asphyxiation, and death.

- Stop the engine.
- Scrape carbon deposits off the spark arrester and slide it back into the muffler.
- Install the mounting screw and the drain plugs and tighten them securely.

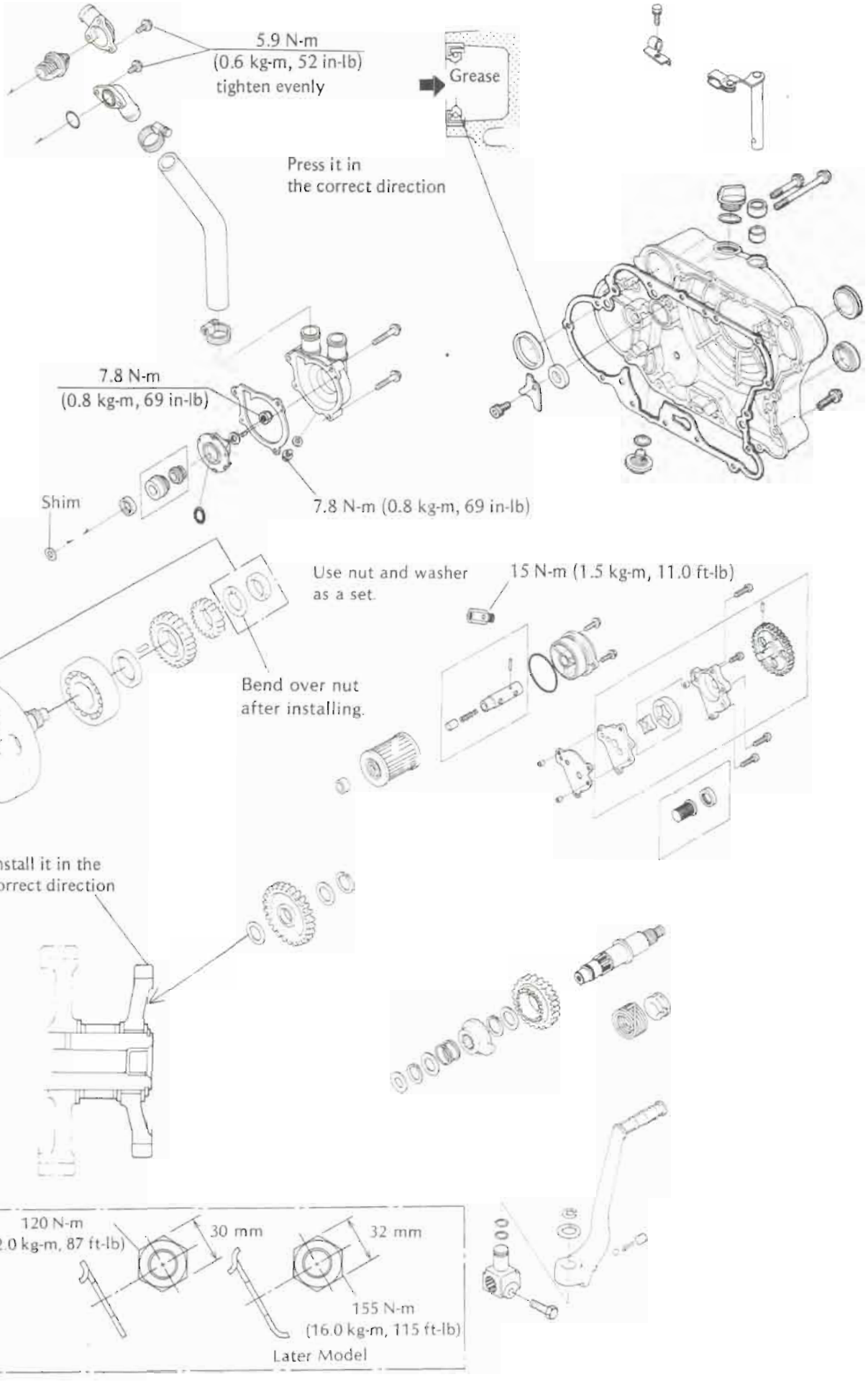
Engine Right Side / Left Side

Table of Contents

Exploded Views

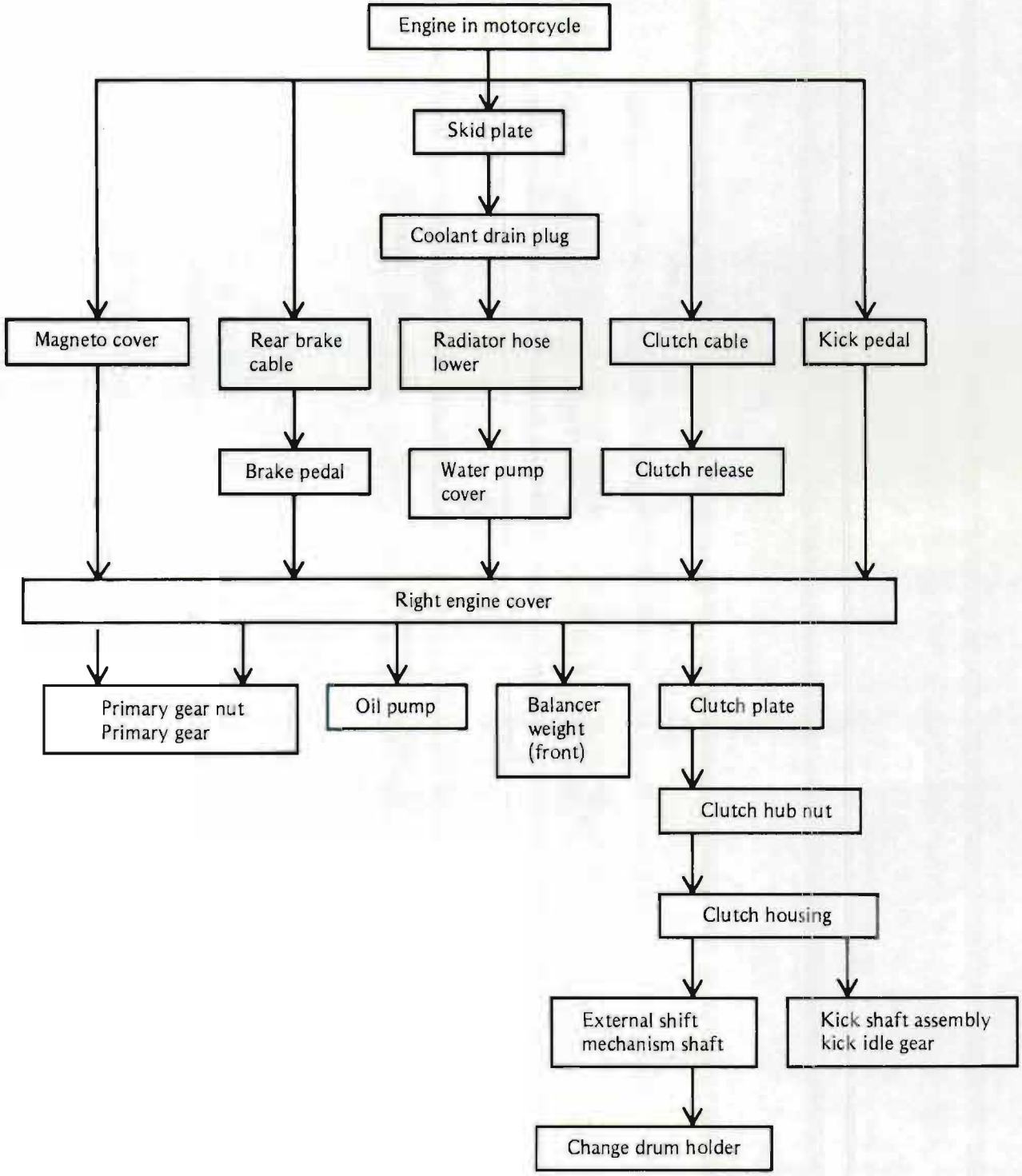


Lock : Apply non permanent locking agent
Grease: Apply molybdenum disulfide grease
Replace: Replace with a new one when installing


5.9 N-m
(0.6 kg-m, 52 in-lb)
tighten evenly
Grease
Press it in
the correct direction
7.8 N-m
(0.8 kg-m, 69 in-lb)
Shim
7.8 N-m (0.8 kg-m, 69 in-lb)
Use nut and washer
as a set.
15 N-m (1.5 kg-m, 11.0 ft-lb)
Bend over nut
after installing.
Install it in the
correct direction
120 N-m
(12.0 kg-m, 87 ft-lb)
30 mm
32 mm
155 N-m
(16.0 kg-m, 115 ft-lb)
Later Model

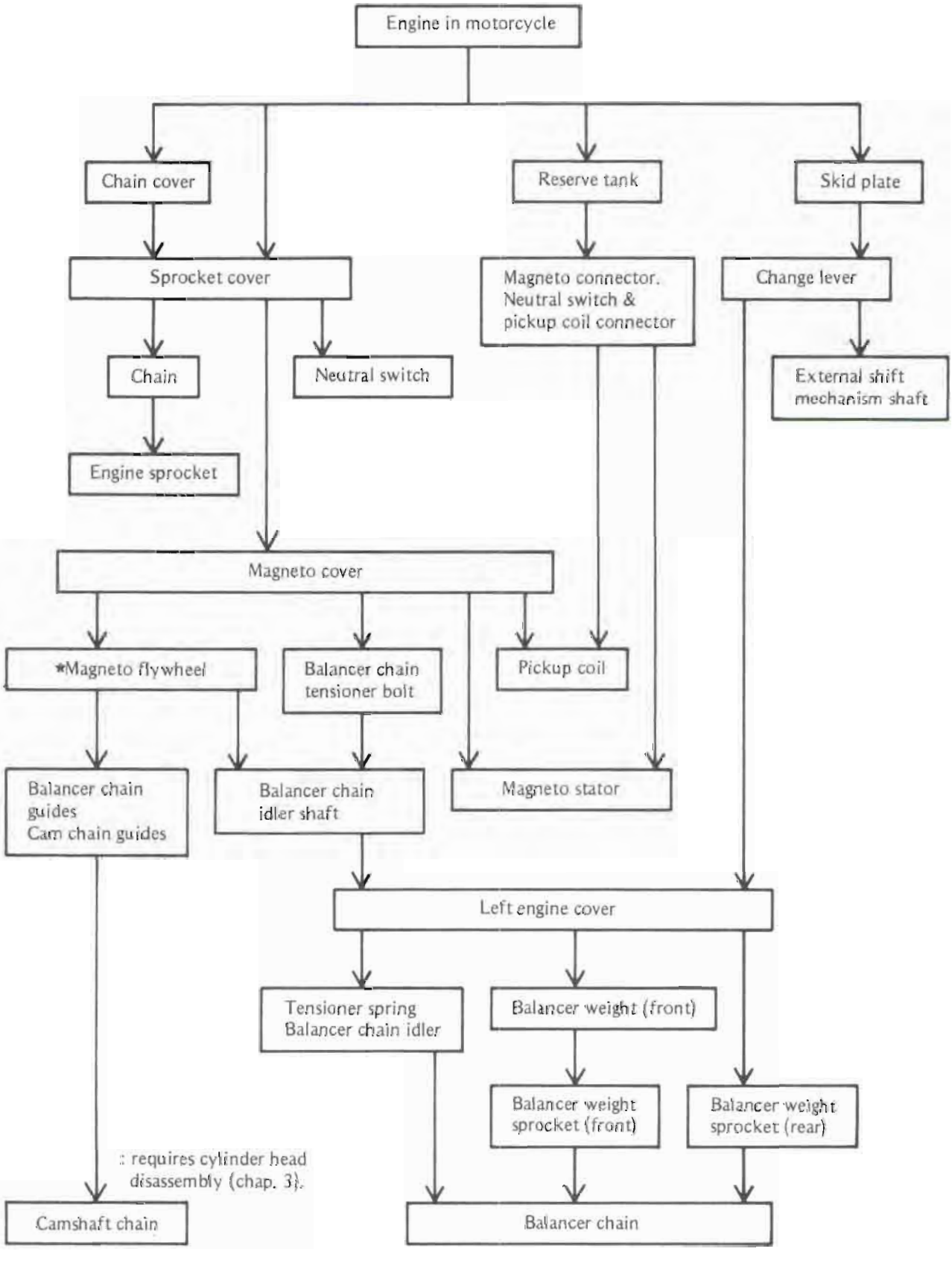
Flow Chart – Right Side Parts Removals

○The following chart is intended to be an aid to proper removal. Select the component you wish to remove and follow the arrows to that point on the chart.

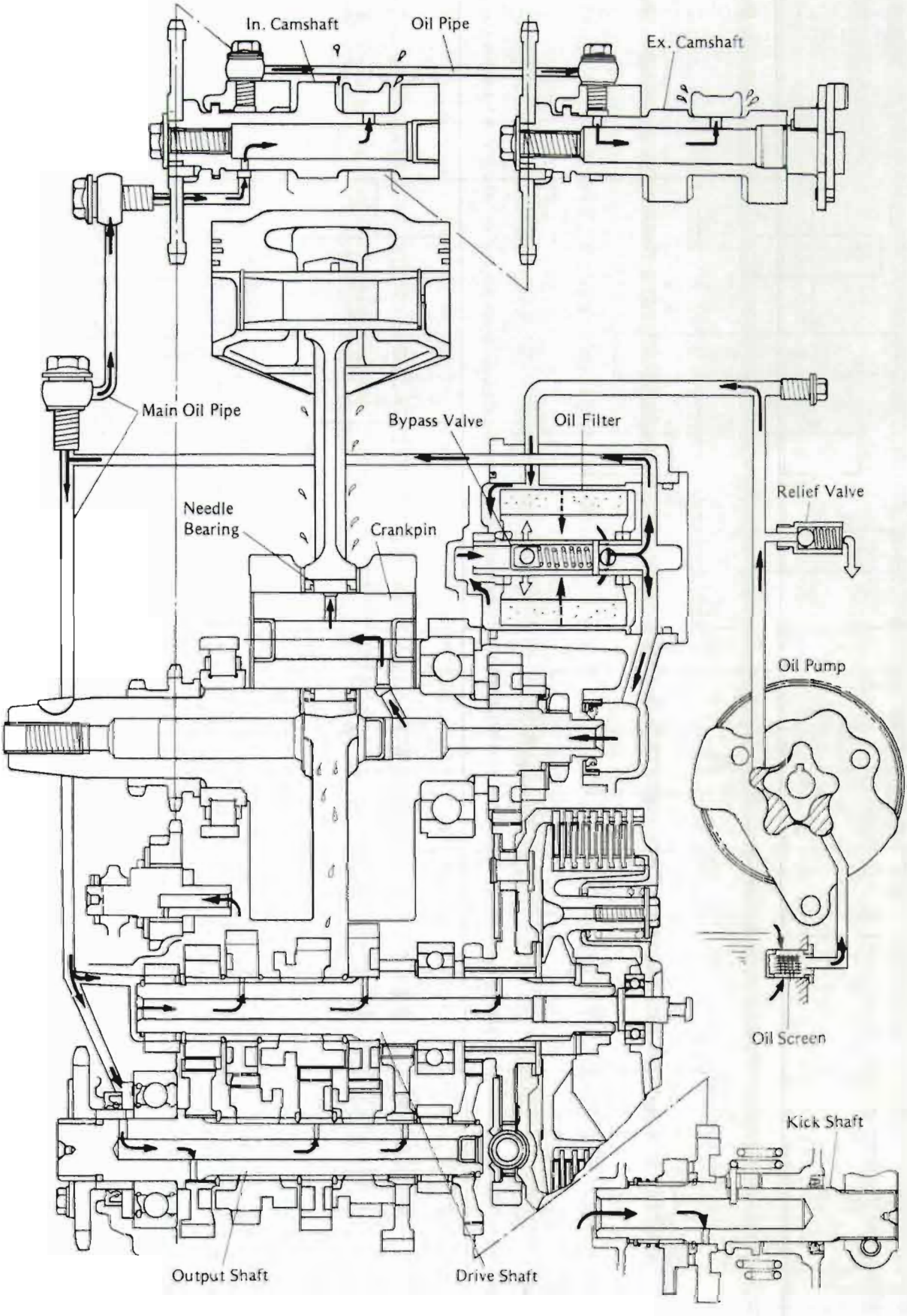


Flow Chart – Left Side Part Removal

□The following chart is intended to be an aid to proper removal. Select the component you wish to remove and follow the arrows to that point on the chart.



Engine Lubrication System

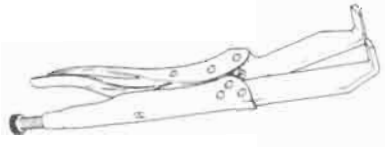


Service Data

Item	Standard	Service Limit	See Page
Engine Lubrication System:			
Oil pressure	196 – 245 kPa	– – –	4-14
@4,000 rpm (r/min), 90°C (194°F)	(0.8 – 1.5 kg/cm², 11 – 21 psi)		
Engine Oil : Grade	SE class		4-13
Viscosity	SAE 10W40, 10W50, 20W40 or 20W50		
Amount	1.7 L (filter is not removed)	– – –	
	2.0 L (filter is removed)		
Level	Between upper and lower level lines		
Clutch:			
Clutch lever play	2 – 3 mm	– – –	4-8
Clutch spring free length	32.3 – 32.9 mm	31.7 mm	4-10
Friction plate thickness	2.9 – 3.1 mm	2.75 mm	4-10
Friction, steel plate warp	– – –	0.3 mm	4-10

Special Tool

Holder: 57001-305

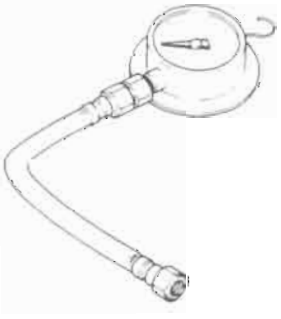


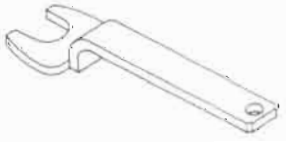
Adapter: 57001-1182

Circlip Pliers: 57001-144

Magneto Holder: 57001-1184

Oil Pressure Gauge: 57001-164





Clutch

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.

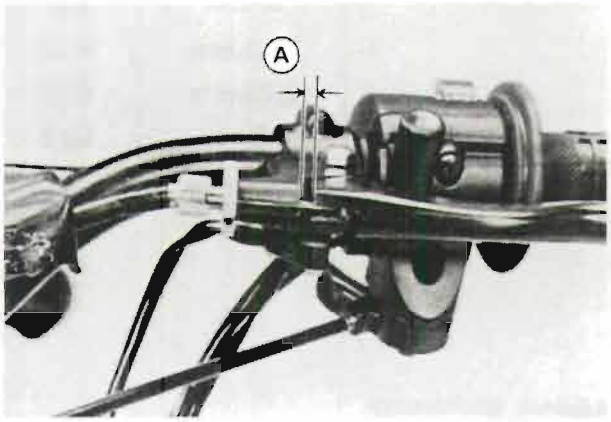
WARNING

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

Play Inspection

●Check that the clutch lever has **2 – 3** mm of play as shown in the figure.

★If the check reveals improper play, adjust the clutch.

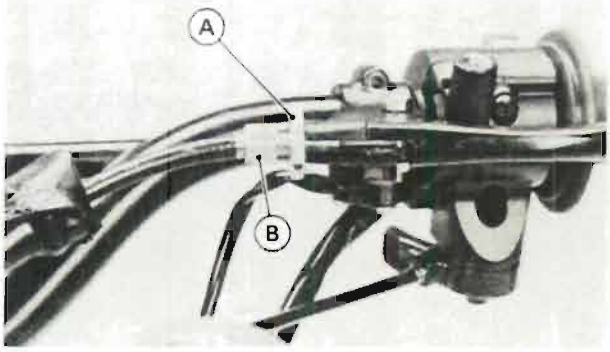


A. Clutch Lever Play 2 – 3 mm

Play Adjustment

When there is too much lever play, first try adjusting the cable at the upper cable adjuster.

●Loosen the knurled locknut, turn the adjuster to obtain the proper amount of lever play, and tighten the locknut.



A. Knurled Locknut B. Upper Cable Adjuster

★If the upper cable adjuster has reached its limits, adjust the cable with the mounting nuts on the lower end of the clutch cable.

●Loosen the mounting nuts on the lower end of the clutch cable.

●Slide the lower cable adjuster to give the cable plenty of play.

●Turn the clutch release lever clockwise until it becomes hard to turn. This is the point where the clutch is just starting to release. At this time, check that the clutch release lever to clutch cable angle is 80° – 90°.

●Tighten the nuts.

●Adjust the upper cable adjuster again.

"NOTE"

○*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 the place later, creating enough cable play to prevent clutch disengagement.*

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

"NOTE"

○*Prior to removal of the right engine cover, the clutch release shaft must be removed.*

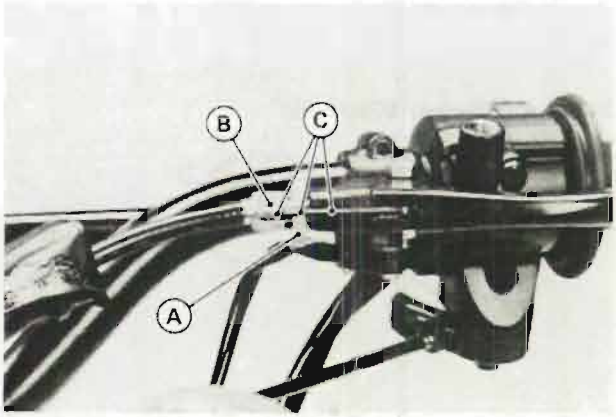
Clutch Release Removal

●Slide the dust cover at the clutch cable lower end out of place.

●Loosen the nuts, and slide the lower end of the clutch cable to give the cable plenty of play.

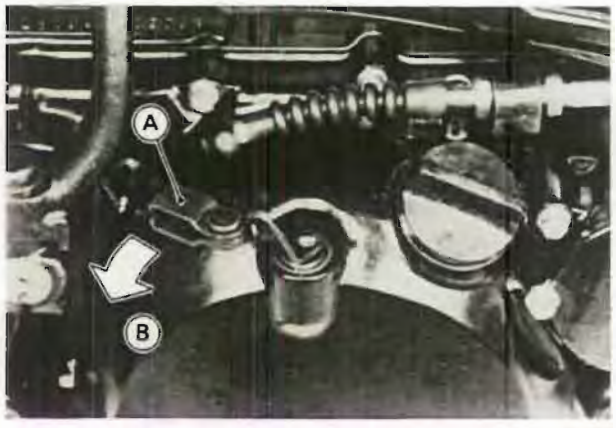
●Loosen the knurled locknut at the clutch lever, and screw in the adjuster.

●Line up the slots in the clutch lever, knurled locknut, and adjuster, and then free the cable from the lever.



A. Knurled Locknut B. Adjuster C. Slot

- Free the clutch inner cable tip from the clutch release lever.
- Turn the release lever toward the rear as shown in the figure and pull out the lever and shaft assembly.

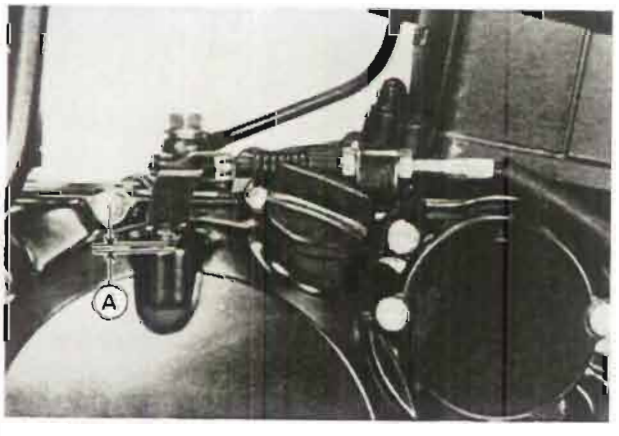


A. Release Lever B. Rear

Clutch Release Installation

- Apply oil to the release shaft.
- Turn the release lever clockwise until it becomes hard to turn.

The release lever should have proper clearance and angle as shown.

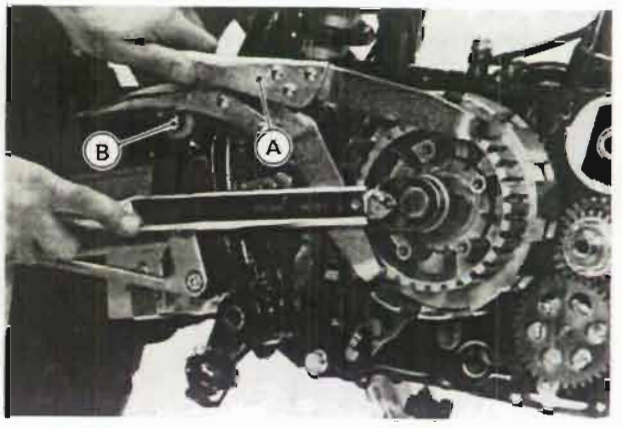


A. 1 – 3 mm

A. About 80°

Clutch Removal

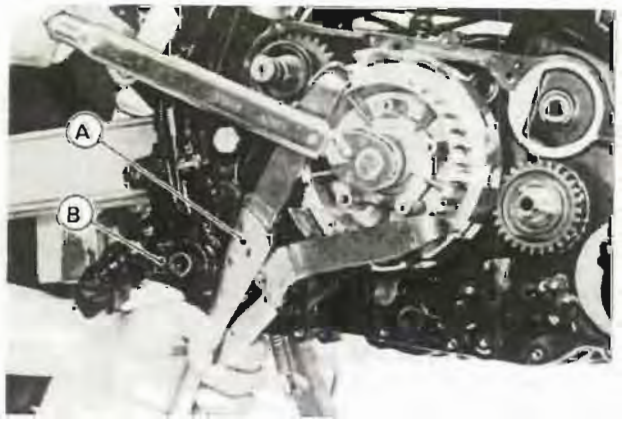
- When loosening the clutch hub selflocking nut, use the holder (special tool) to the keep the clutch hub from turning as shown.



A. Holder : 57001-305
B. Suitable Bolt and Nut

Clutch Installation

- Discard the used clutch hub self-locking nut, and install a new nut.
- Use the clutch holder to keep the clutch hub from turning.

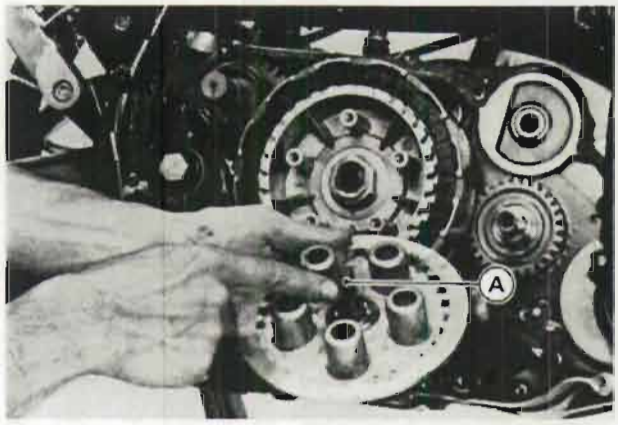


A. Holder: 57001-305
B. Footpeg: Temporarily install it upside-down.

- If new steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch seizure.

- Be careful not to mix up the thrust washer with the other washers (See Exploded Views).

- Install the clutch spring plate pusher, applying a molybdenum disulfide grease to the surface.



A. Clutch Spring Plate Pusher

Friction Plate Wear, Damage Inspection

- Visually inspect the friction plates to see if they show any signs of seizure, overheating, or uneven wear.
- ★If any plates show signs of damage, replace the friction plates and steel plates as a set.

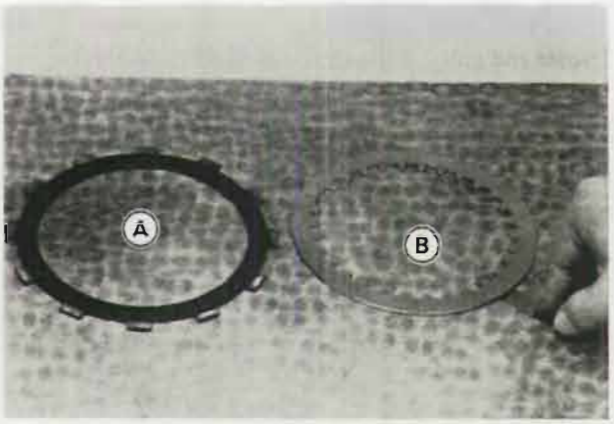
Friction Plate Thickness Measurement

A. Friction Plate

Friction or Steel Plate Warp Inspection

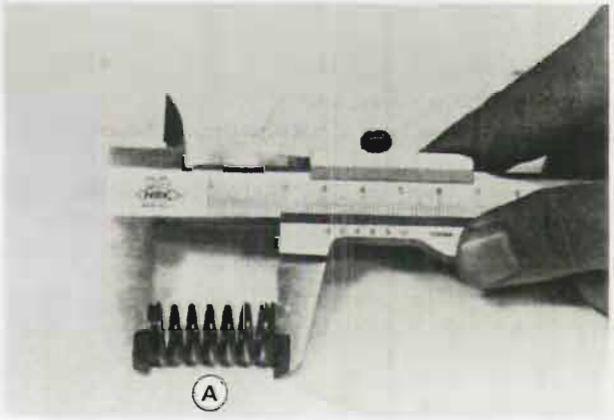
- Place each friction plate or steel plate on a surface plate, and measure the gap between the surface plate and each friction plate or steel plate. This gap is the amount of friction or steel plate warp.
- ★If any plate is warped over the service limit, replace it with new one.

Friction and Steel Plate Warp Measurement



A. Friction Plate B. Steel Plate

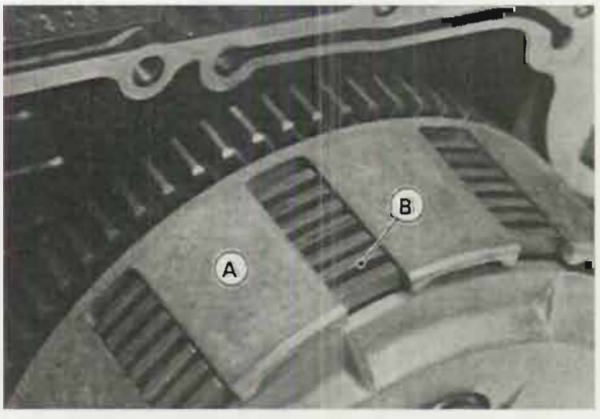
Clutch Spring Free Length Measurement



A. Clutch Spring

Clutch Housing Finger Inspection

- Visually inspect the fingers of the clutch housing where the tangs of the friction plates hit them.
- ★If they are badly worn or if there are grooves cut where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.

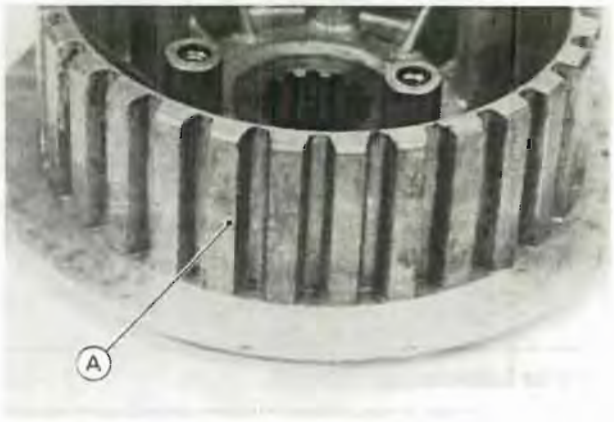


A. Clutch Housing Finger B. Friction Plate Tang

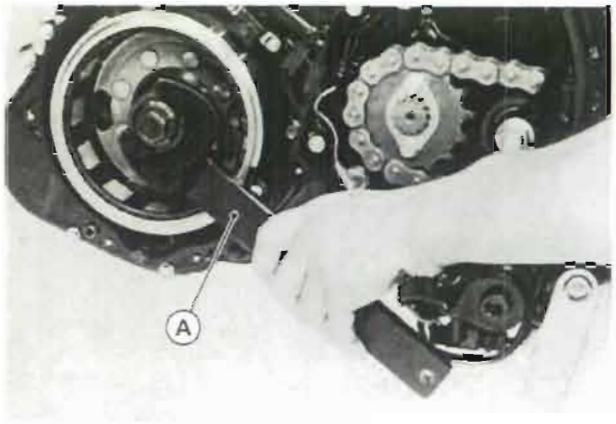
Clutch Hub Spline Inspection

•Visually inspect where the teeth on the steel plates wear against the splines of the clutch hub.

★If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



A. Clutch Hub Spline



A. Magneto Holder: 57001-1184

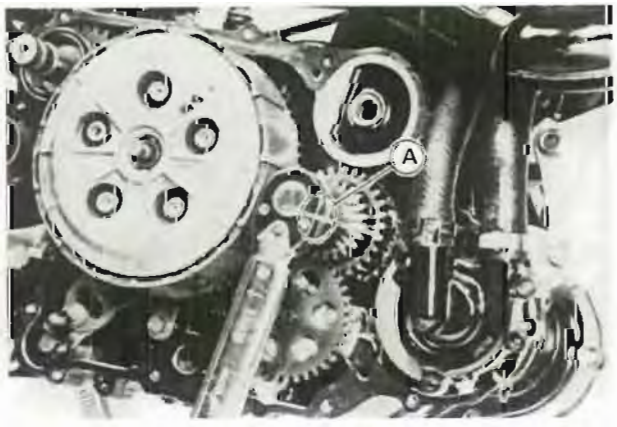
Primary Gear

Removal or Installation

•Using the magneto holder (special tool) to hold the magneto, loosen or tighten the primary gear nut.

Tightening Torque

Primary Gear Nut	120 N-m (12 kg-m, 87 ft-lb)



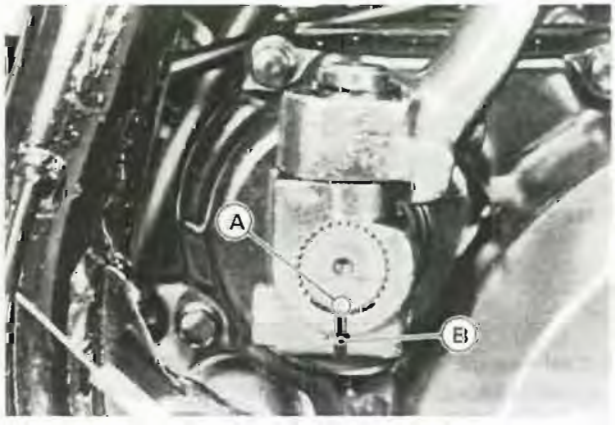
A. Primary Gear Nut

Kick Starter

Installation

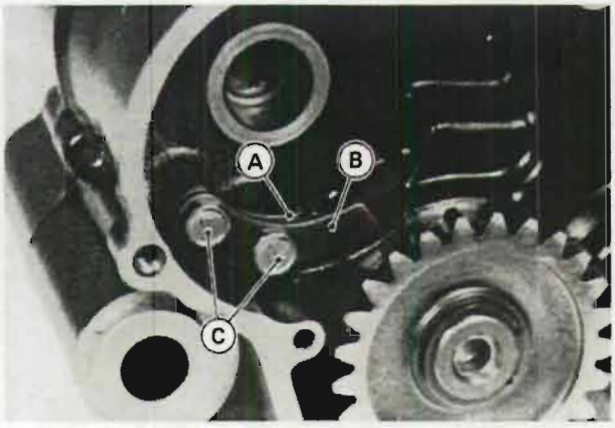
•When installing the kick pedal, align the slot with the shaft punch mark.

○Late model kick shaft has not a punch mark.



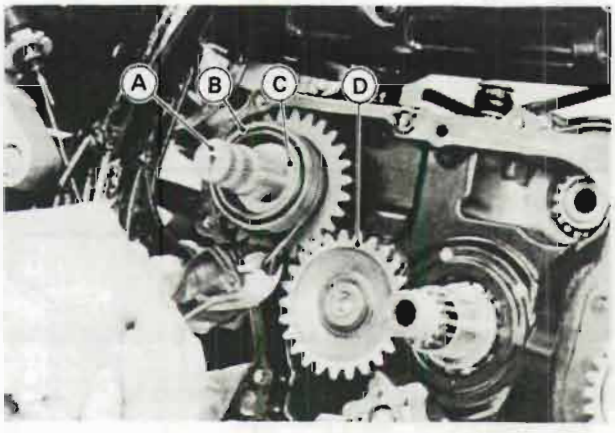
A. Punch Mark B. Slot

•Tighten the guide mounting bolts securely.



A. Lever Stop
B. Guide
C. Bolt

•Install the kick idler gear so that the shoulder side faces inwards (See Exploded Views).
•With needle nose pliers, insert the end of the kick spring in the crankcase hole.



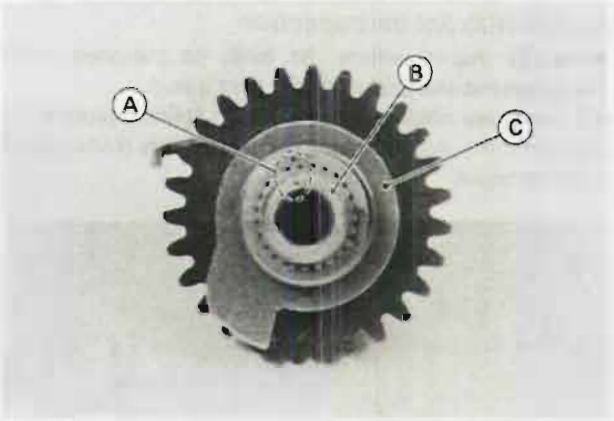
A. Kickstarter Assembly
B. Kick Spring
C. Spring Guide
D. Output Shaft Idle Gear

Assembly Points

•Apply a little transmission oil to the inside of the kick gear and ratchet lever before installation.
•Align the ratchet gear punch mark with the punch mark on the kick shaft.

CAUTION

○Misalignment of the ratchet gear changes the kick spring preload. Light preload could cause mechanism noise and heavy preload could weaken or break the spring.



A. Align the marks
B. Kick Shaft
C. Ratchet Gear

Engine Lubrication System

Engine Oil and Filter:

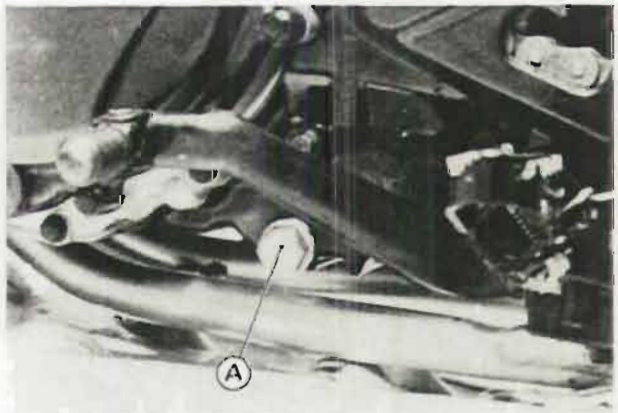
In order for the engine, transmission, and clutch to function properly; change the engine oil and oil filter, and maintain the oil at the proper level. Not only do dirt and metal particles collect in the oil, but the oil itself loses its lubricative quality if used too long.

WARNING

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

Oil Change

•Warm up the engine so that the oil will pick up any sediment and drain easily. Then stop the engine.
•With the motorcycle perpendicular to the ground, let the oil drain completely.
•Tighten the drain plug to the specified torque.
•Check the following after filling the engine with oil:
Oil leaks
Oil level



A. Drain plug

Tightening Torque

Engine drain plug: 23 N-m (2.3 kg-m, 16.5 ft-lb)

Engine Oil

Grade: SE class
Viscosity: SAE 10W40, 10W50, 20W40, or 20W50
Required amount:
When oil filter is not removed 1.7 L
When oil filter is removed 2.0 L

Oil Level Inspection

●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.

CAUTION

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

●If the motorcycle has just been used, wait several minutes for all the oil to drain down.

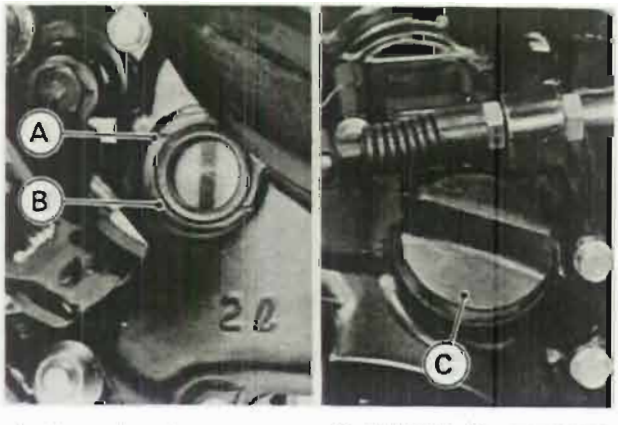
●Situate the motorcycle so that it is perpendicular to the ground, and check the engine oil level through the oil level gauge. The oil level should come up between the the upper and lower level lines.

★If the oil level is too high, remove the excess oil, 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"

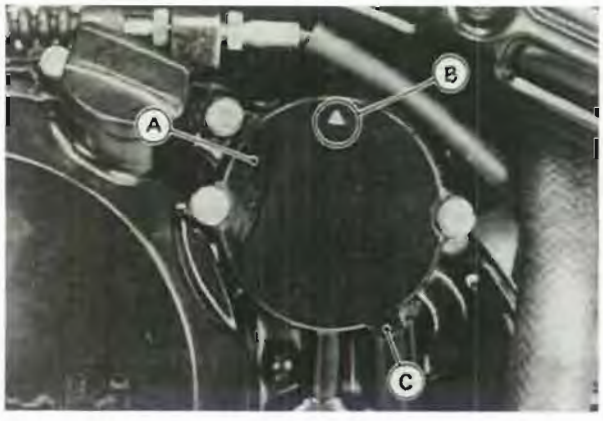
○*If the oil must be refilled but the type and brand of the oil that is already in the engine are unidentified, change the oil in the engine completely.*



A. Upper Level
B. Lower Level
C. Oil Filler Opening Cap

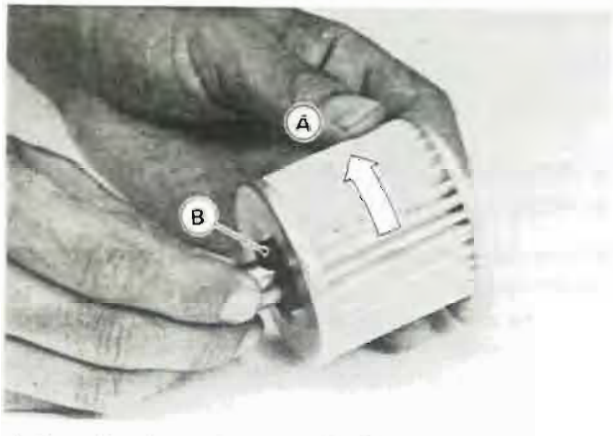
Installation Point of Oil Filter

●Install the oil filter cap so that the arrow points upwards.



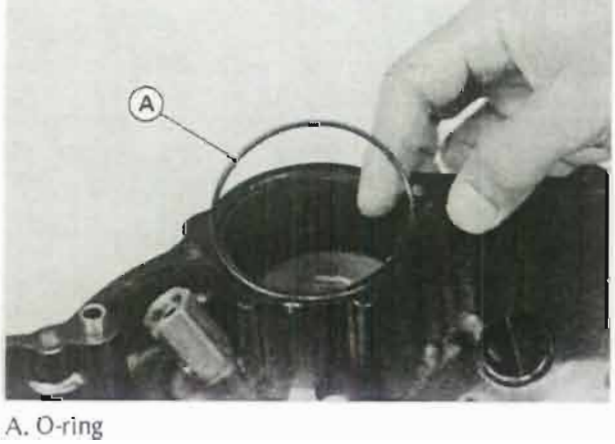
A. Oil Filter Cap
B. Arrow
C. Pry Point (for removal)

●Apply oil to the mounting pin, turn the filter element or the mounting pin to work the element into place. Be careful that the element grommets do not slip out of place.



A. Turn the element
B. Grommet

●Fit the O-ring of the oil filter in place, being careful not to twist the O-ring.



A. O-ring

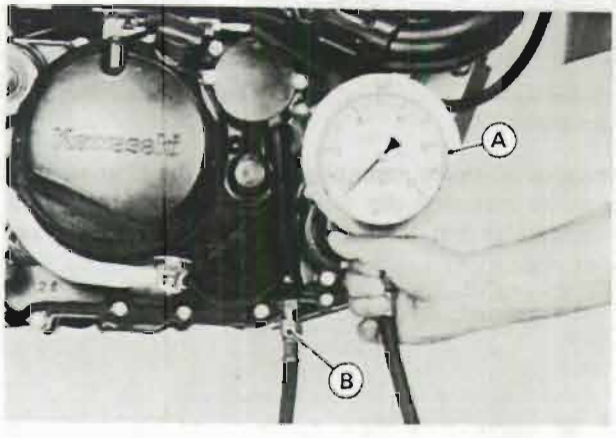
Measuring Oil Pressure:

Oil Pressure Measurement

- Remove the skid plate.
- Remove the oil passage plug.
- Install oil pressure gauge 57001-164 and adapter 57001-1182.

WARNING

If the oil passage plug is removed while the engine is warm, hot engine oil will drain through the oil passage; take care against burns.



A. Oil Pressure Gauge : 57001-164
B. Adapter: 57001-1182

- Warm up the engine to the normal operating temperature.
- Run the engine at the specified speed, and read the oil pressure gauge.

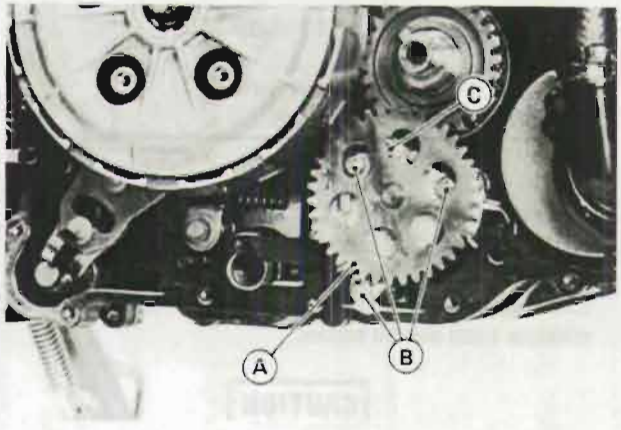
  Normal operating temperature: 90°C (194°F)
  Oil pressure measuring engine speed:
  4,000 r/min (rpm)

★If the oil pressure is significantly below the standard pressure, inspect the engine oil pump and relief valve.
★If the pump and relief valve are not at fault, inspect the rest of the lubrication system.

Oil Pump:

Removal Point

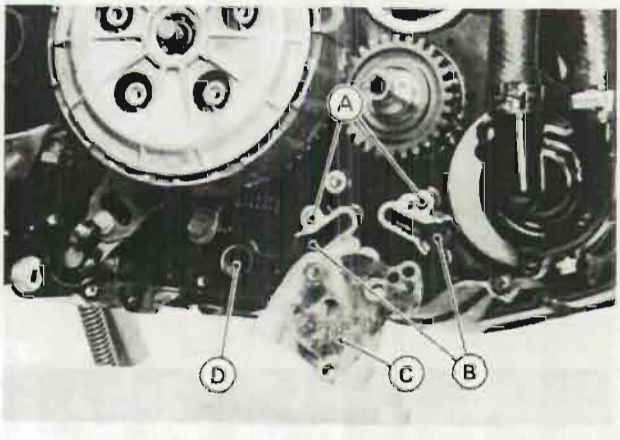
- Remove the right engine cover.
- Turn the crankshaft so that the engine oil pump screws (3) can be removed through the oil pump gear hole, and remove the screws (3) and oil pump.



A. Oil Pump Gear
B. Screws: removal is required
C. A Screw: removal is not required

Installation Point

- Clean any metal particles and dirt off the oil screen.
- Fill the oil pump with engine oil for initial lubrication.
- Check to see that the knock pins (2), plugs (2), the screen and new gasket are in place.

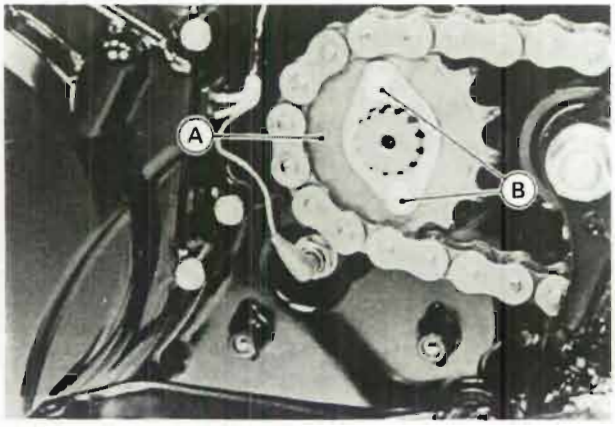


A. Knock Pin
B. Plug
C. Gasket
D. Oil Screen

Engine Sprocket

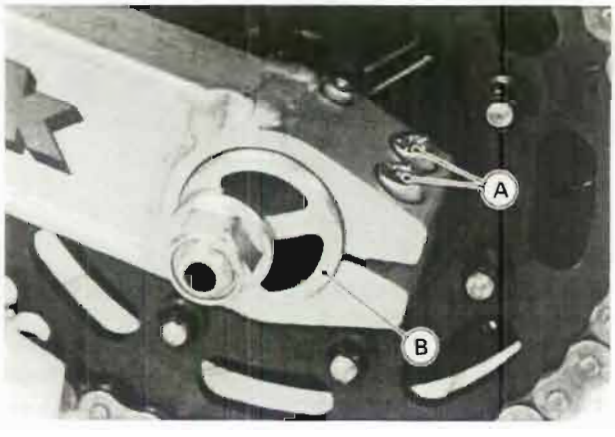
Removal

- Remove the engine sprocket cover.
- Loosen the engine sprocket bolts.



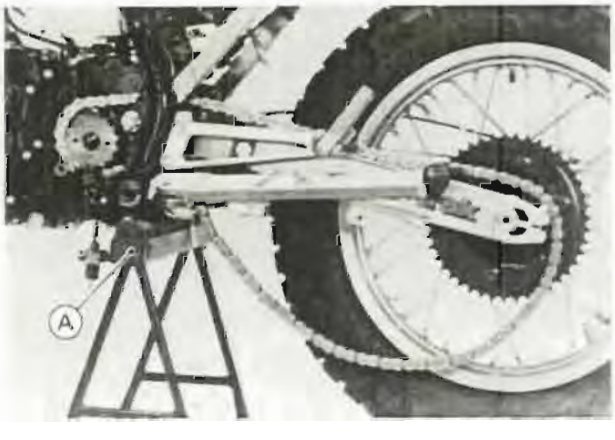
A. Engine Sprocket B. Bolts

- Remove the chain cover and chain tensioner.
- Loosen the two left and two right chain adjuster clamp bolts.



A. Chain Adjuster Clamp Bolts B. Chain Adjuster

- Support the bottom of the motorcycle with a suitable stand so that the rear wheel is raised off the ground.



A. Suitable Stand

- Turn the chain adjusters so that the chain is too loose.
- Remove the chain from the rear sprocket. The wheel removal is not needed.
- Pull out the engine sprocket.

Installation Points

- Be sure to install the O-ring under the collar, smearing a thin coat of grease on it.
- Install the output shaft collar so that the oil groove goes first and the collar does not pinch the O-ring.

A. O-ring C. Oil Groove
B. Collar

- Install the sprocket so that the shoulder is inside.
- Tighten the engine sprocket bolts to the specification.

A. Sprocket Shoulder
B. Engine Sprocket Bolts:
Tighten to **9.8 N-m (1.0 kg-m, 87 in-lb)**

Magneto

Removal

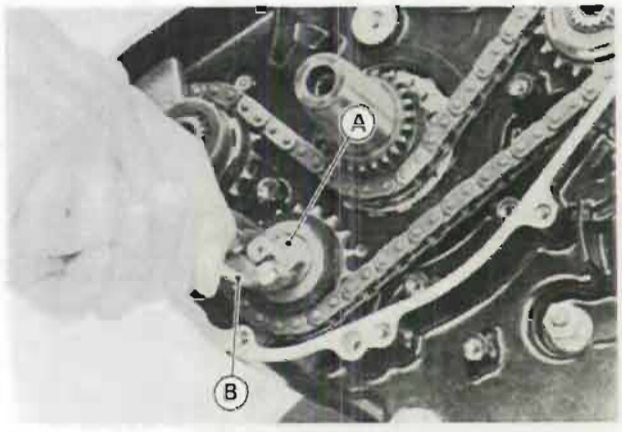
Refer to chapter 14.

Installation

Refer to chapter 14.

Removal Point

- After pulling out the idler shaft with pliers, remove the sprockets, couplings and the balancer chain.



A. Idler Shaft B. Pliers

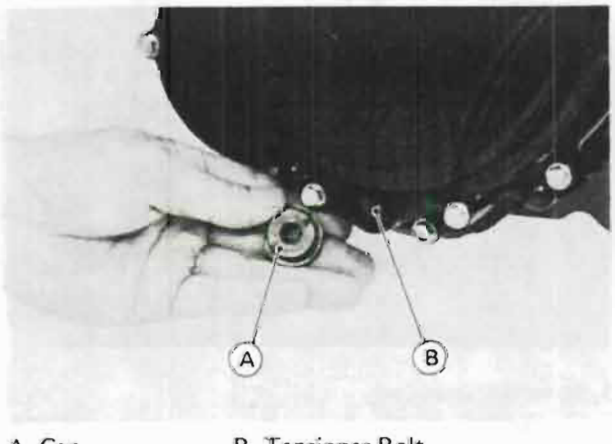
Balancer Mechanism

Chain Tension Adjustment

Balancer chain wear and chain guide wear cause the chain to develop slack, which will make noise and may result in engine damage.

To prevent this, tension adjustment is necessary in accordance with the **Periodic Maintenance Chart.**

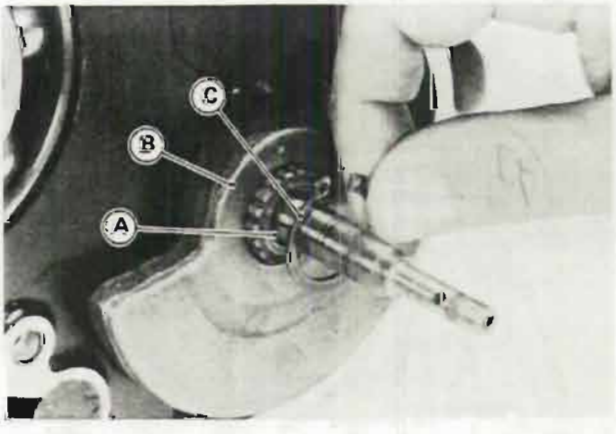
- Remove the tensioner cap and loosen the tensioner bolt a few turns.
- Tighten the bolt and install the cap in the original position.



A. Cap B. Tensioner Bolt

Assembly Point

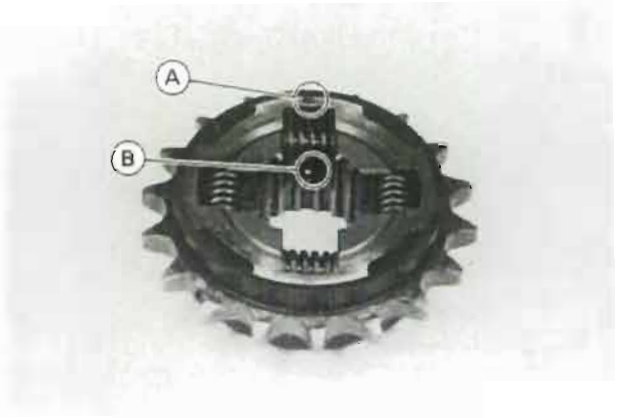
- Rear balancer weight and shaft must be installed before the crankcase is assembled.
- The balancer shafts, weights, couplings and sprockets have punch marks. Assembly them, aligning their marks with each other as shown in the figure.
- Insert the balancer shaft through the crankcase bearings so that the water pump shaft faces right.
- Install the collar, the right weight and the circlip.



A. Water Pump Shaft C. Circlip
B. Right Weight

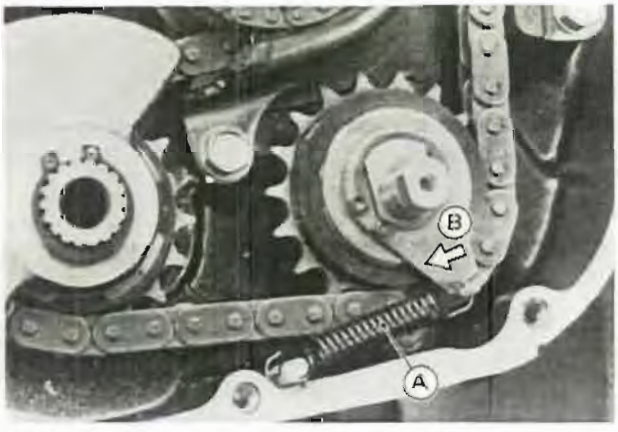
•After the chain timing procedure (remarked below) is done, tap the idler shaft and sprocket into the hole in the left crankcase.

A. Idler Shaft and Sprocket

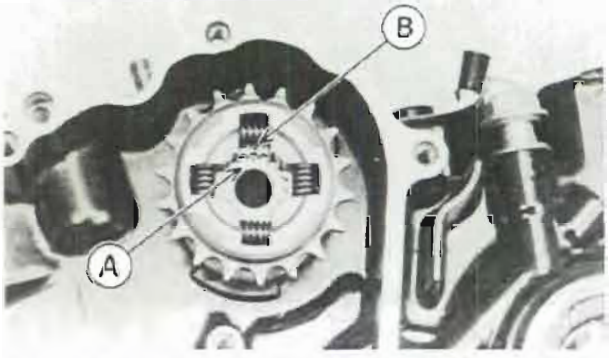


A. Sprocket Mark B. Coupling Punch Mark

•Be sure to install the tensioner spring.
•Turn the tensioner lever clockwise to tighten the chain.

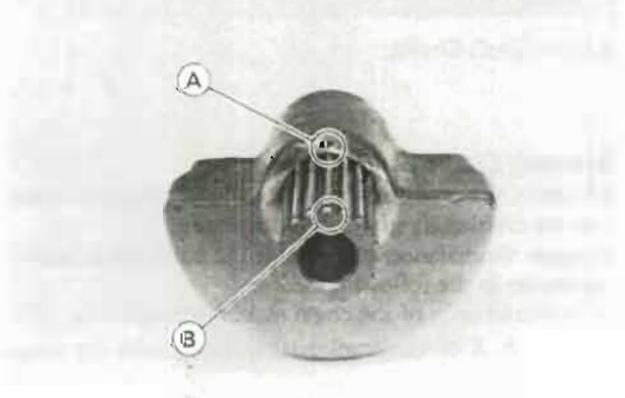


A. Tensioner Spring B. Tensioner Lever



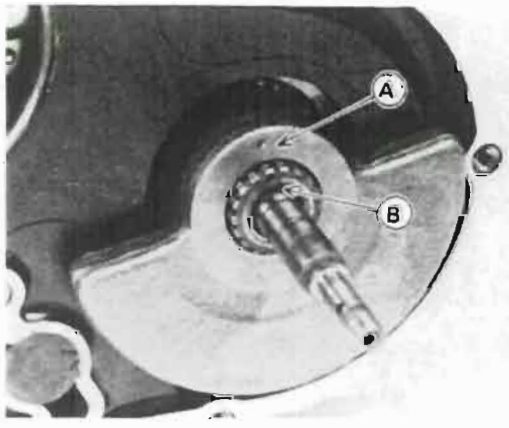
A. Shaft Punch Mark B. Coupling Punch Mark

Rear Balancer Assembly

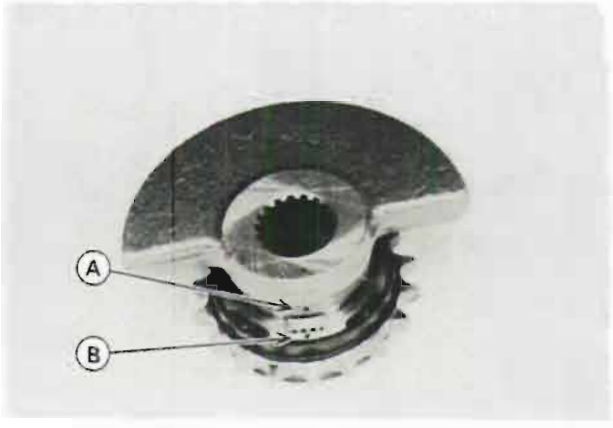


A. Weight Punch Mark B. Shaft Punch Mark

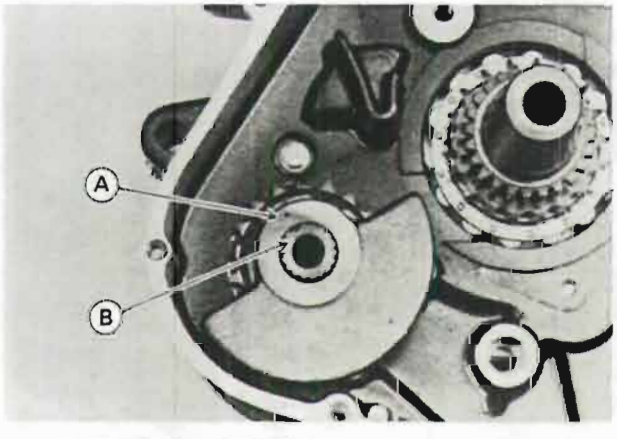
Front Balancer Assembly



A. Right Weight Punch Mark
B. Shaft Punch Mark (right side)



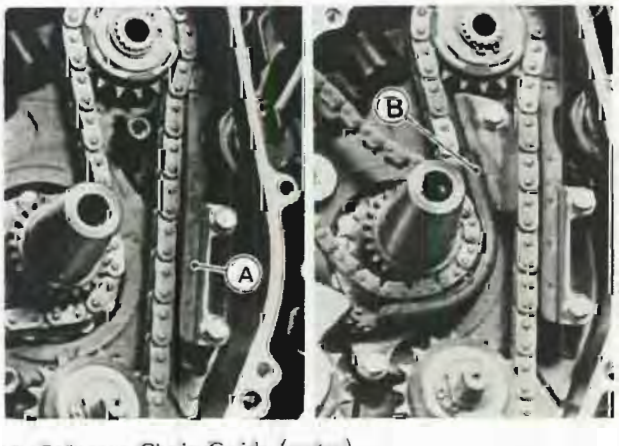
A. Left Weight Punch Mark B. Sprocket Mark



A. Left Weight Punch Mark
B. Shaft Punch Mark (left side)

Balancer Chain Guide Installation

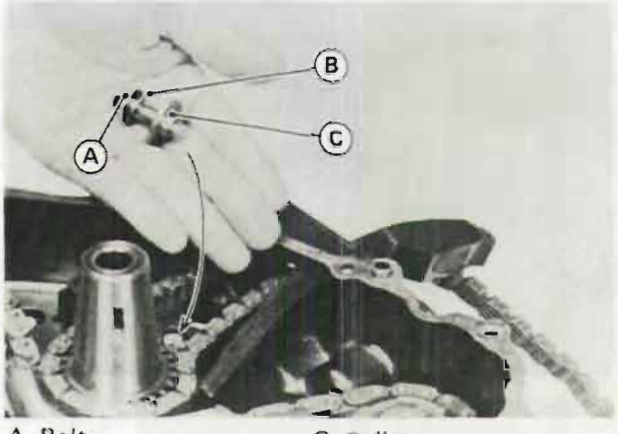
- Install the balancer chain guide (outer) prior to the balancer chain guide (inner).



A. Balancer Chain Guide (outer)
B. Balancer Chain Guide (inner)

Camshaft Chain Guide Installation

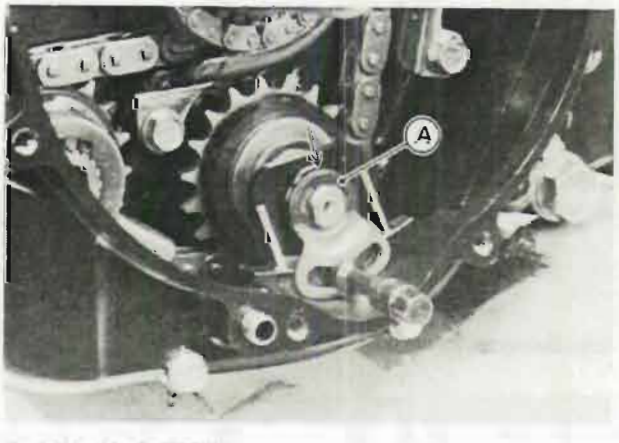
- Install the chain guide mounting bolt, washer and collar as shown in the figure below.



A. Bolt
B. Washer
C. Collar

Idler Shaft Circlip Installation

- After installing the left engine cover, be sure to insert the idler shaft circlip.



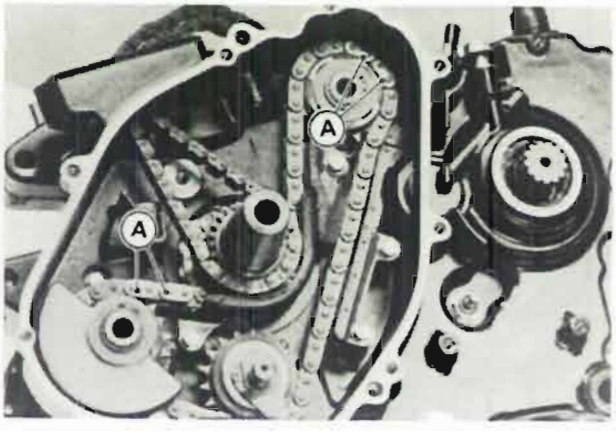
A. Idler Shaft Circlip

Balancer Chain Timing Procedure

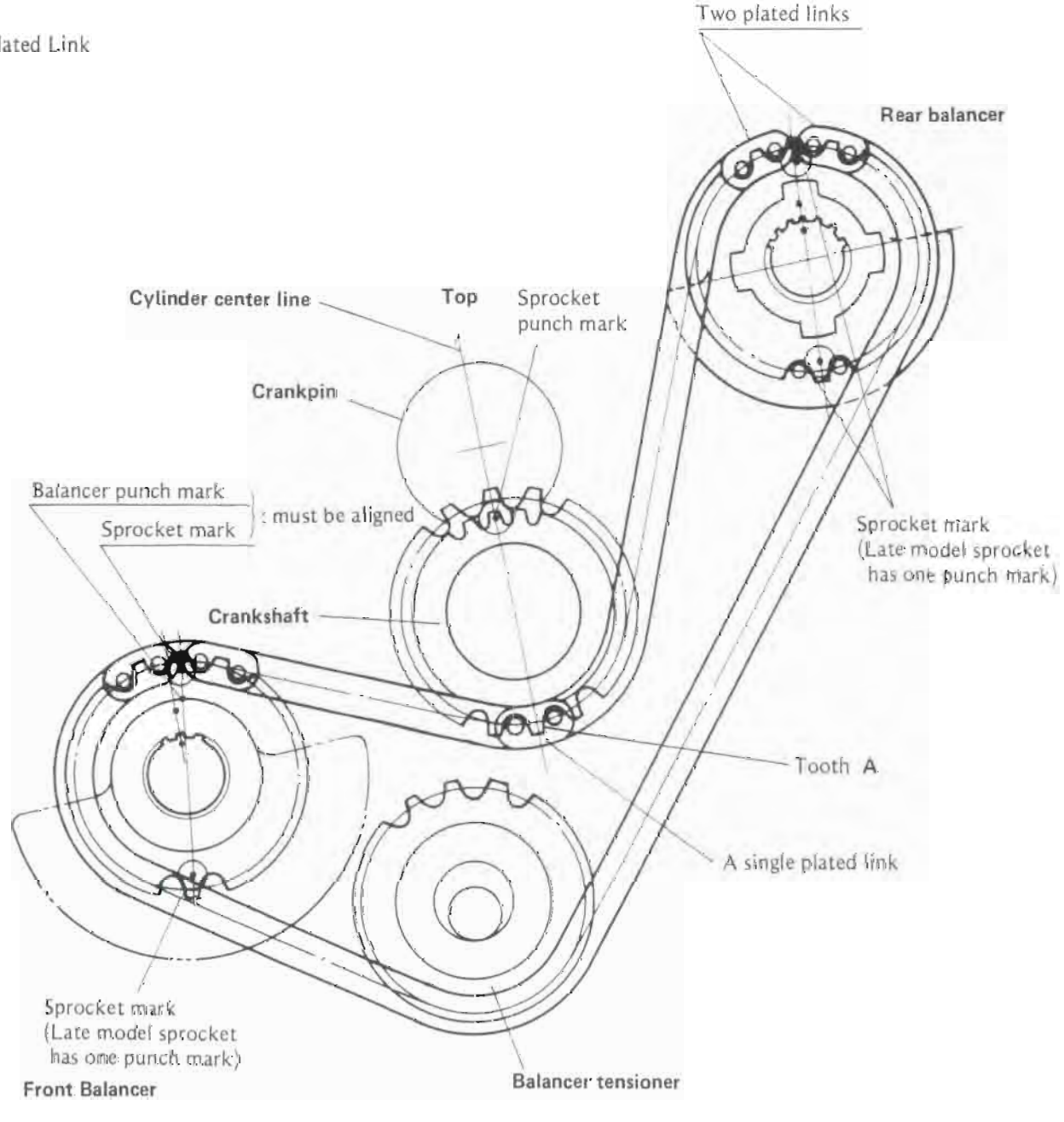
- Position the crankshaft at **TDC** where the punch mark on the crankshaft sprocket is at the top.
- Engage the balancer chain with the balancer sprockets as shown in the following figure.
  - The plated links of the chain must face outwards.
- Fit tooth **A** of the crankshaft sprocket into the single plated link.
- The other two sprocket teeth with the punch mark must fit between the plated links.

Balancer Chain Timing Procedure:

□The tooth **A** engaged with a single plated link is on opposite side to the sprocket punch mark.



A. Plated Link

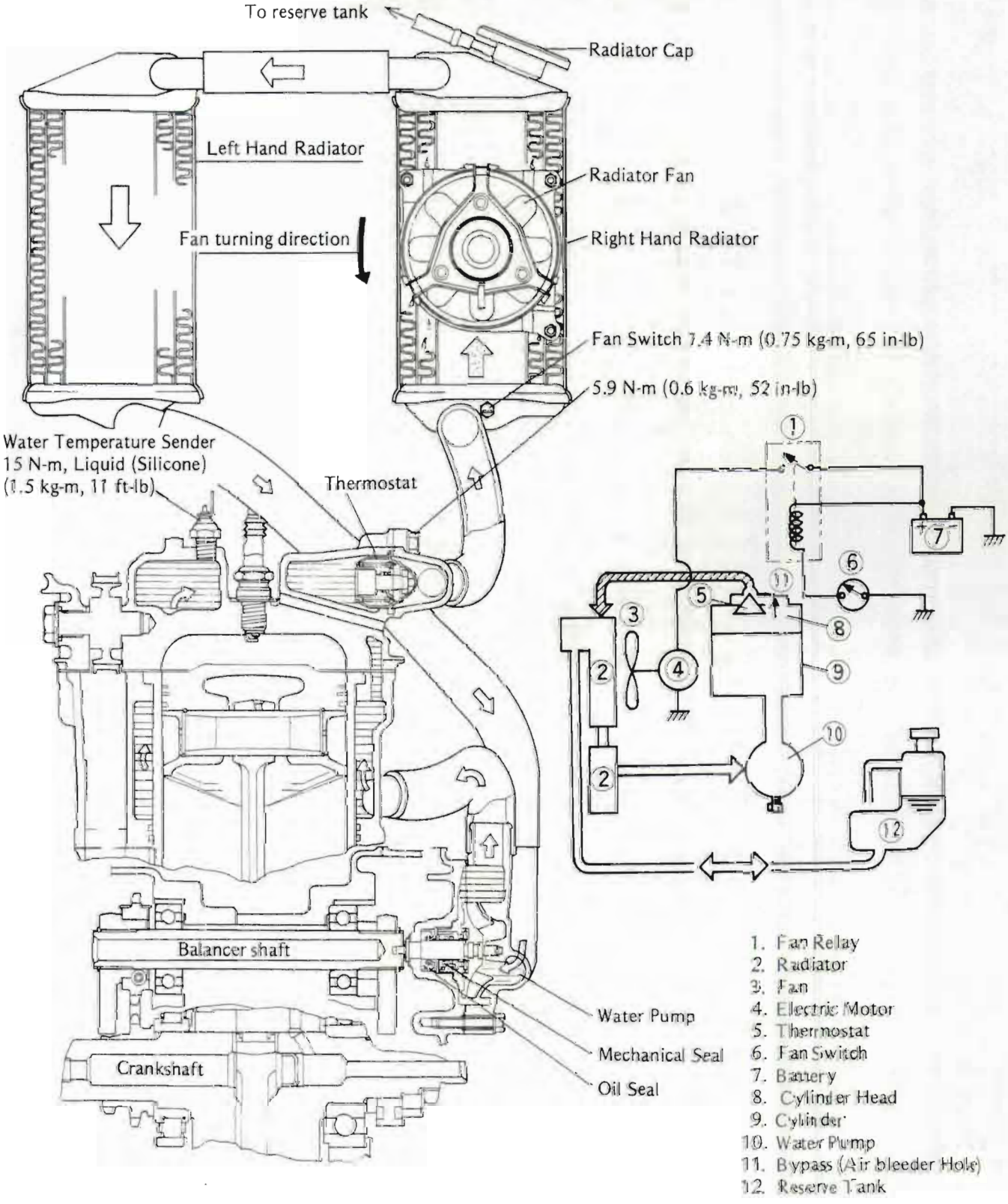


Cooling System

Table of Contents

Cooling System

By circulating in the cooling system, the coolant transfers the heat generated by the engine to the radiator. To protect the cooling system (consisting of the aluminum engine and radiator) from rust and corrosion, the use of corrosion and rust inhibitor chemicals in the water is essential. If coolant containing corrosion and rust inhibitor chemicals is not used, over a period of time the cooling system accumulates rust and scale in the water jacket and radiator. This clogs up the water passages, and considerably reduces the efficiency of the cooling system.



Service Data

Item	Standard	See Page
Coolant provided when shipping:		
Type	Permanent type of antifreeze for engine and radiator	5-5
Color	Green	
Mixed ratio	Soft water 57%, Coolant 43%	
Freezing point	−30°C (−22°F)	
Total amount	1.2 L	
Radiator Cap:	73.5 – 103 kPa	5-7
Relief pressure	(0.75 – 1.05 kg/cm², 11 – 15 psi)	
Thermostat:		
Valve opening temperature	69.5 ~ 72.5°C (157 – 162°F)	5-9
Valve full opening lift	not less than 3 mm @85°C (185°F)	

Special Tool

Bearing Driver Set: 57001-1129

Coolant

Check the coolant level each day before riding the motorcycle, and replenish coolant if the level is low. Change the coolant in accordance with the Periodic Maintenance Chart.

Coolant Deterioration

- Visually inspect the coolant in the reserve tank.
  - If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system (remarked below).
  - If the coolant gives off an abnormal smell when changing, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

"NOTE"

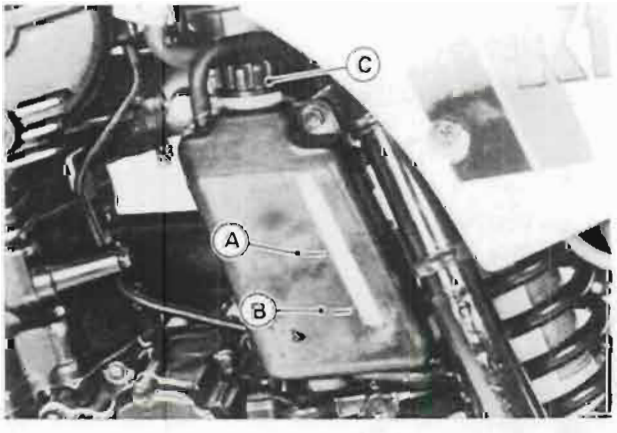
- *Be sure to inspect the coolant at the reserve tank. If the coolant is checked at the radiator by removing the radiator cap, the air must be bled from the cooling system.*

Coolant Level Inspection

- Situate the motorcycle so that it is perpendicular to the ground (off its side stand).
- Check the level through the coolant level gauge on the reserve tank cover. The coolant level should be between the FULL and the LOW marks.

"NOTE"

- *Check the level when the engine is cold (room or ambient temperature).*
- *Do not check the level through the radiator. If the cap is removed, air may get into the coolant, and lower the cooling efficiency.*



A. "FULL" Mark
B. "LOW" Mark
C. Tank Cap

- If the amount of coolant is insufficient, add coolant through the filler opening to the FULL mark.

CAUTION

- **For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anti-corrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.**
- **If coolant must be added often, or the reserve tank has run completely dry; there is probably leakage in the cooling system. Check the system for leaks (See Visual Leak Inspection, and Pressure Testing).**

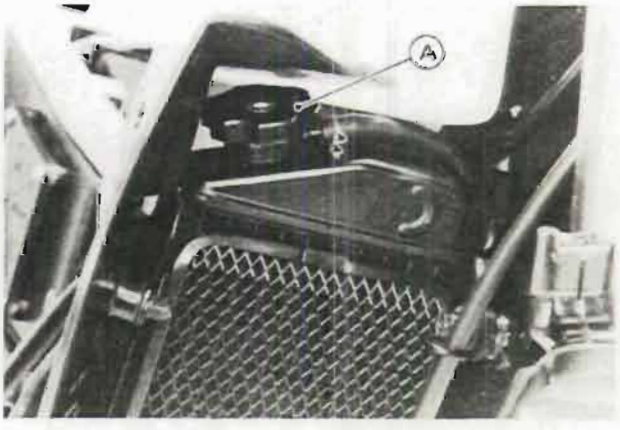
Coolant Changing

The coolant should be changed periodically to ensure long engine life.

WARNING

- **To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.**
- **Coolant on tires will make them slippery and can cause an accident and injury.**
- **Use coolant containing corrosion inhibitors made specifically for aluminum engines and radiators in accordance with the instructions of the manufacturers. Chemicals are harmful to the human body.**

- Remove the right engine shroud.
- Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop and wait there for a few seconds. Then push down and remove the cap.

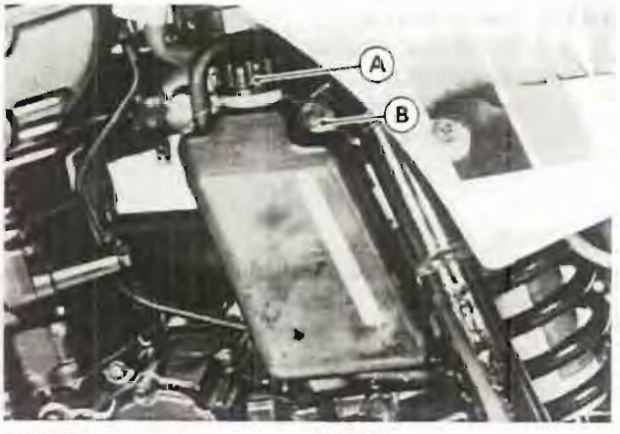


A. Radiator Cap

- Remove the skid plate.
- Situate the motorcycle so that it is perpendicular to the ground.
- Drain the coolant from the radiator and engine by removing the drain plug at the bottom of the water pump cover. Immediately wipe up or wash out any coolant that spills on the frame, engine, or wheel.

A. Water Pump Cover B. Drain Plug

- Remove the bolt and the reserve tank with hoses installed.



A. Cap B. Bolt

- Unscrew the cap, turn over the tank and pour the coolant into a suitable container.
- Inspect the old coolant for color, smell (remarked above).
- Immediately wipe up or wash away any coolant that spills on the frame, engine, or other painted parts.

Coolant Filling

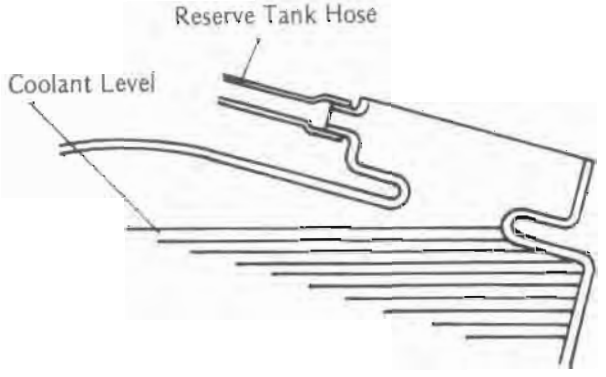
- Install the drain plug. Always replace the gasket with a new one, if it is damaged.

Tightening Torque of Drain Plug

Water Pump Cover: 7.8 N-m (0.8 kg-m, 69 in-lb)

- Fill the radiator up to the bottom of the radiator filler neck with coolant, and install the cap by turning it clockwise about ¼ turn.

Radiator filler neck



"NOTE"

- *Pour in the coolant slowly so that it can expel the air from the engine and radiator.*
- *The radiator cap must be installed in two steps. First turn the cap clockwise to the first stop. Then push down on it and turn it the rest of the way.*

- Fill the reserve tank up to the FULL mark with coolant, and install the cap, and then bleed the system (see Air Bleeding).

CAUTION

- **Soft or distilled water must be used with the inhibitor chemicals and the antifreeze (see below for antifreeze) in the cooling system.**
- **If hard water is used in the system, it causes scale accumulation in the water passages, and considerably reduces the efficiency of the cooling system.**

"NOTE"

- *Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*

The coolant provided when shipping

Type	:	Permanent type of antifreeze for aluminum engine and radiator
Color	:	green
Mixed ratio	:	soft water 57%, coolant 43%
Freezing point	:	– 30°C (– 22°F)
Total amount	:	1.2 L (up to "Full" mark)

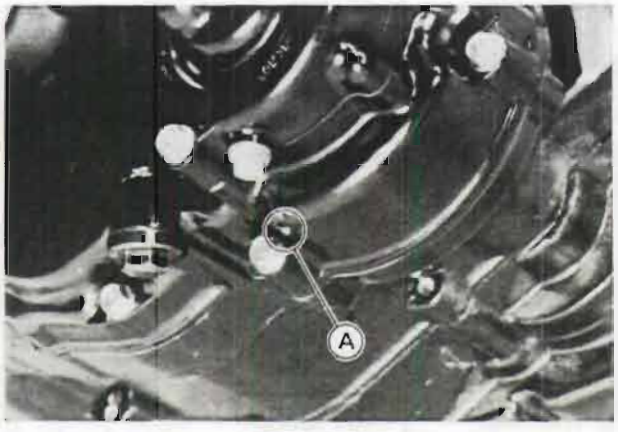
Air Bleeding

- Having filled the radiator up to the filler neck with coolant and installed the cap, run the engine for 10 – 20 seconds, and stop the engine.
- Remove the cap and refill the radiator up to the filler neck with coolant. Install the cap.
- Check the coolant level in the reserve tank. Add coolant up to the FULL mark.
- Inspect the drain plug and radiator cap for leaks.

Visual Leak Inspection

Any time the system slowly loses water, the leak inspection should be done.

- Check the drainage outlet of the water pump cover for coolant leak.
- ★If the mechanical seal is damaged, the coolant leaks through the seal, and the leaking coolant is drained through the passage. Disassemble the mechanical seal and check it.
- ★If there are no apparent leaks, pressure test the system.



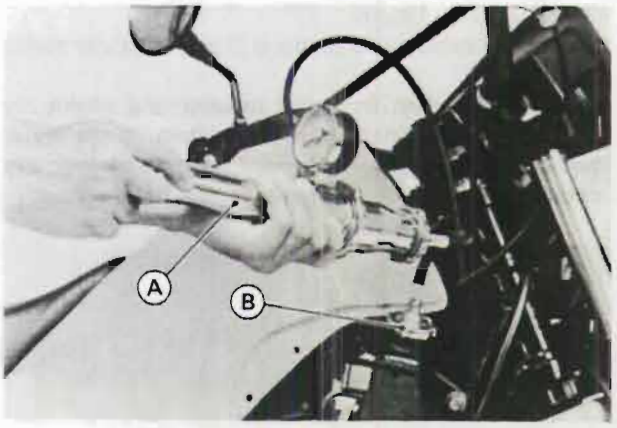
A. Drainage Outlet

Cooling System Pressure Testing

CAUTION

○**During pressure testing operation, do not exceed the pressure for which the system is designed to work. The maximum pressure: 103 kPa (1.05 kg/cm², 15 psi)**

- Set the motorcycle up on its side stand.
- Remove the radiator cap, and install a cooling system pressure tester on the radiator filler neck.
- Build up pressure in the system carefully until the pressure reaches 103 kPa (1.05 kg/cm², 15 psi).
- Watch the gauge for at least 6 seconds. If the pressure holds steady, the system is all right.



A. Pressure Tester B. Adapter

- Remove the pressure tester, replenish the coolant, and install the radiator cap.
- Run the engine until normal operating temperature is obtained.
- Remove the radiator cap carefully, and recheck for leaks when hot.
- ★If the pressure drops, check all areas for external leakage. Any trace or source of leakage shows the damaged seal or part.
- ★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage.

Check the internal water sealing:
Cylinder head gasket
Cylinder liner O-ring
Water pump mechanical seal, oil seal

Flushing

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

- Drain the cooling system.
- Fill the cooling system with fresh water mixed with a flushing compound.

CAUTION

○**Avoid the use of a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.**

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

Precaution of Disassembly, Assembly

•Prior to disassembly of cooling system parts (radiator, pump, sensers, etc.), wait until coolant cools down and release coolant pressure.
•After assembly the parts and filling the cooling system with coolant, bleed the air from the system.

Radiator, Radiator Fan

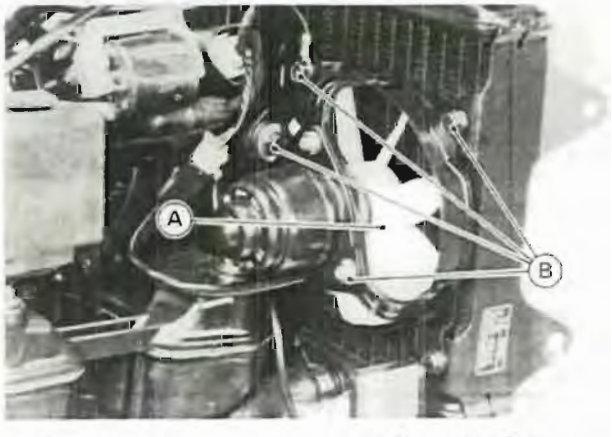
Removal Point

•Disconnect the fan motor wiring before removal of the radiator or radiator fan.

WARNING

○The radiator fan and fan switch are connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE ENGINE COMPLETELY COOLS OFF. TOUCHING THE FAN BEFORE THE ENGINE COOLS COULD CAUSE INJURY FROM THE FAN BLADES.

•Remove the mounting bolts and free the radiator fan from the motorcycle.



A. Radiator Fan B. Mounting Bolt

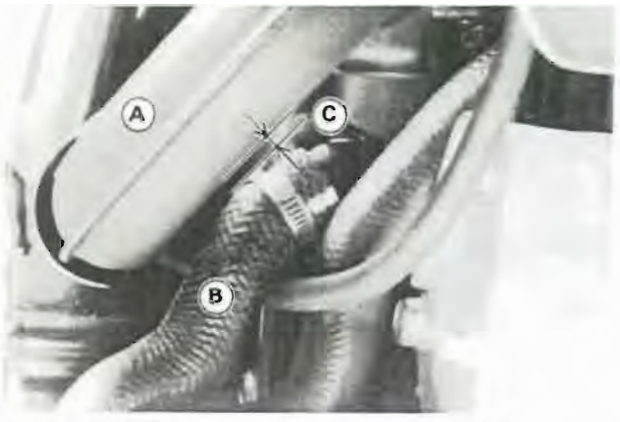
○Remove the radiator taking care not to damage the radiator core.

Radiator Cleaning Points

When cleaning the radiator with a steam cleaner, be careful of the following to prevents radiator damage.
•Keep the steam gun away more than **50 cm** from the radiator core.
•Run the gun horizontally following the core fin direction holding it perpendicular to the core surface.

Radiator Hose Installation Point

•Route the radiator hose as shown in the figure to avoid its being burned by the exhaust pipe.



A. Exhaust Pipe C. Gap: more than 10 mm
B. Hose

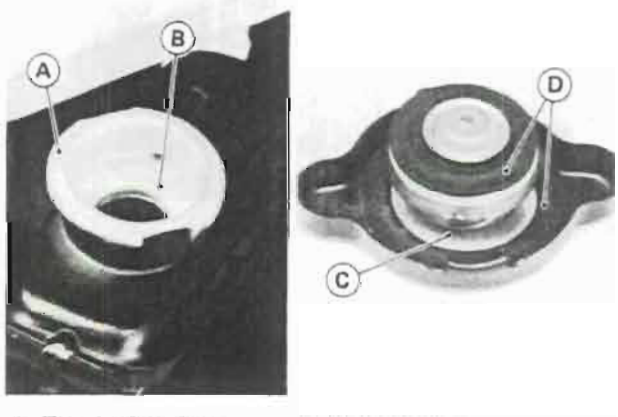
Radiator Inspection

•Check the radiator core.
★If there are obstructions to air flow, remove them.
★If the corrugated fins are deformed, carefully straighten them with the blade of a thin screwdriver.

★If the air passages of the radiator core are blocked more than **20%** by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.
•Check the radiator filler neck for signs of damage.
•Check the condition of the top and bottom sealing seats in the filler neck. They must be smooth and clean for the radiator cap to function properly (See below).

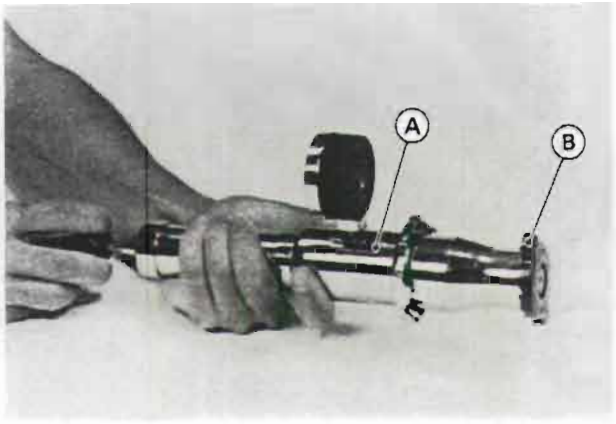
Radiator Cap Inspection

•Check the condition of the valve spring, and the top and bottom valve seals of the radiator cap.
★If any one of them shows visible damage, replace the cap.



A. Top Sealing Seat C. Valve Spring
B. Bottom Sealing Seat D. Seal

•Install the cap on a cooling system pressure tester.
•Watching the pressure gauge, pump the pressure tester to build up the pressure. The cap must retain the pressure. (Watch the pressure gauge at least 6 seconds to check that the pressure holds steady.) Also the cap must open at the pressure shown in the table.
★If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.



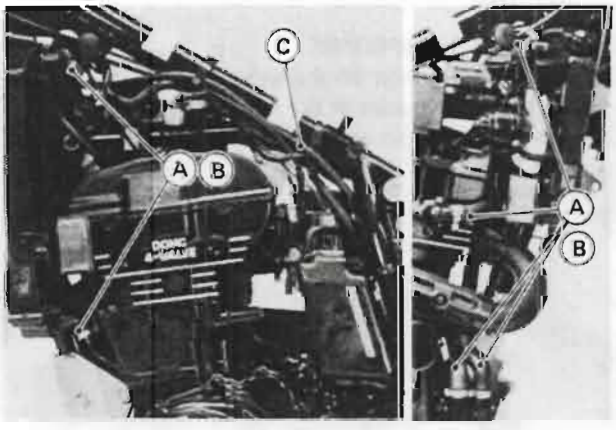
A. Pressure Tester B. Radiator Cap

Radiator Cap Specification

Pressure Valve Opening Pressure : 73.5 – 103 kPa (0.75 – 1.05 kg/cm², 11 – 15 psi)

Radiator Hose, Reserve Tank Hose Inspection

- In accordance with the Periodic Maintenance Chart, visually inspect the hoses for signs of deterioration. Squeeze the hose. A hose should not be hard and brittle, nor should it be soft or swollen.
- Replace any damaged hose.
- Tighten the hose clamps securely.



A. Radiator Hose B. Clamp

Thermostatic Fan Switch Water Temperature Sender

Removal Point

CAUTION

○The fan switch or the water temperature sender should never be allowed to fall on a hard surface. Such a shock to these parts can damage them.

Installation Point

- Apply a liquid gasket (silicone sealant) to the threads before mounting the water temperature sender.
- Tighten the water temperature sender and the switch to the specification.

Tightening Torque

Water temperature sender: 15 N·m (1.5 kg-m, 11 ft-lb)
Fan Switch: 7.4 N·m (0.75 kg-m, 65 in-lb)

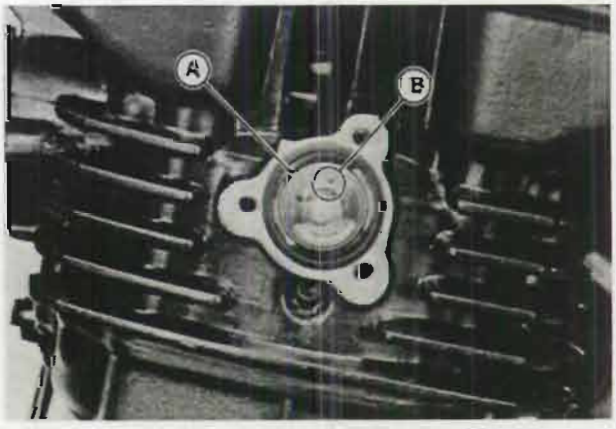
Inspection

Refer to Electrical System Chapter 14.

Thermostat

Installation Point

- Install the termostat so that the air bleeder hole is on top.

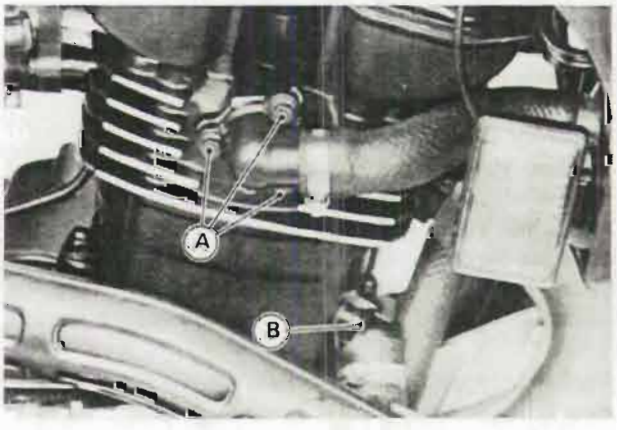


A. Thermostat B. Air Bleeder Hole

○Tighten evenly the thermostat cap bolts and the fitting bolts to the specification.

Tightening Torque

Cap or Fitting Bolts: 6.4 N·m (0.65 kg-m, 56 in-lb)

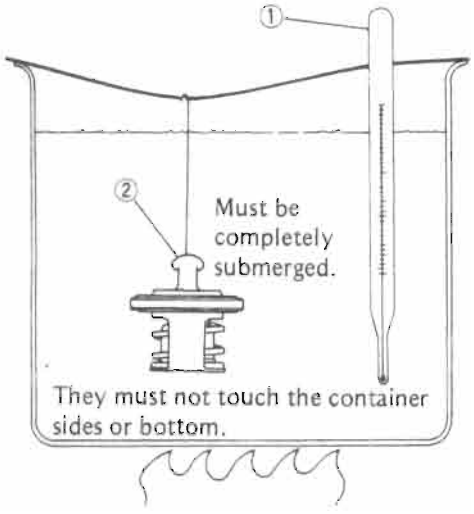


A. Thermostat Cap Bolt B. Fitting Bolt

Thermostat Inspection

- Remove the thermostat, and inspect the thermostat valve at room temperature.
- ★If the valve is open, replace the valve with a new one.
- To check valve opening temperature, suspend the thermostat and an accurate thermometer in a container of water.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.

Valve Opening Temperature Measurement



1. Thermometer
2. Thermostat

- Watch the valve. As soon as the valve starts to open, note the temperature.
- ★If it is out of the service limit, replace the thermostat.

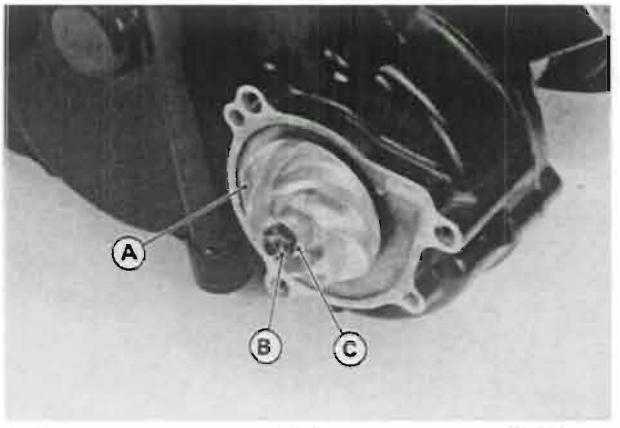
Valve Opening Temperature

Service Limit:	69.5 – 72.5°C (157 – 162°F)

Water Pump, Mechanical Seal

Disassembly

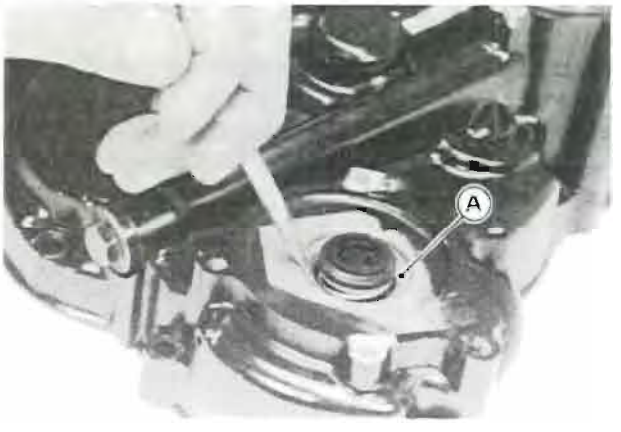
- Remove the skid plate.
- Drain the coolant and engine oil.
- Remove the water pump cover.
- Remove the impeller nut, washer and impeller.
- Remove the right engine cover.



A. Impeller B. Nut C. Washer

CAUTION

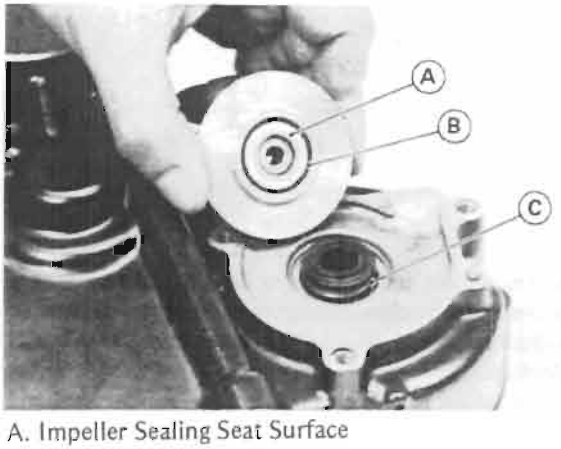
- ○**Be careful not to damage the sealing surface of the mechanical seal.**
- Pull the mechanical seal out of the right engine cover with a sharp hook, after prying the flange off.
- Pull out the oil seal with a sharp hook.



A. Flange

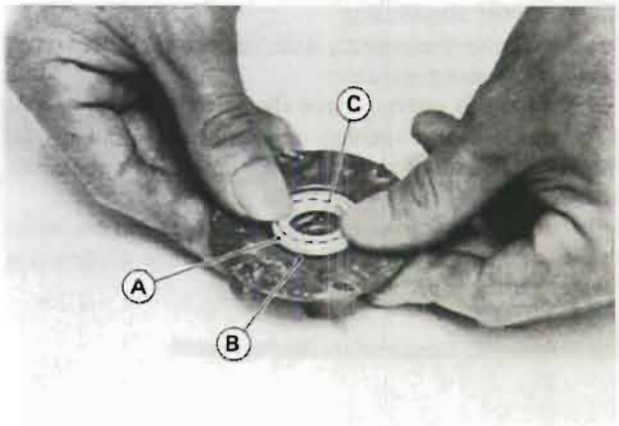
Inspection

- Visually inspect the mechanical seal.
- ★If any one of the parts is damaged, replace the mechanical seal as a unit.
- ○The sealing seat and rubber seal may be removed easily by hand.



A. Impeller Sealing Seat Surface
B. Rubber Seal
C. Mechanical Seal Diaphragm

●Visually check the impeller.
★If the surface is corroded, or if the blades are damaged, replace the impeller.



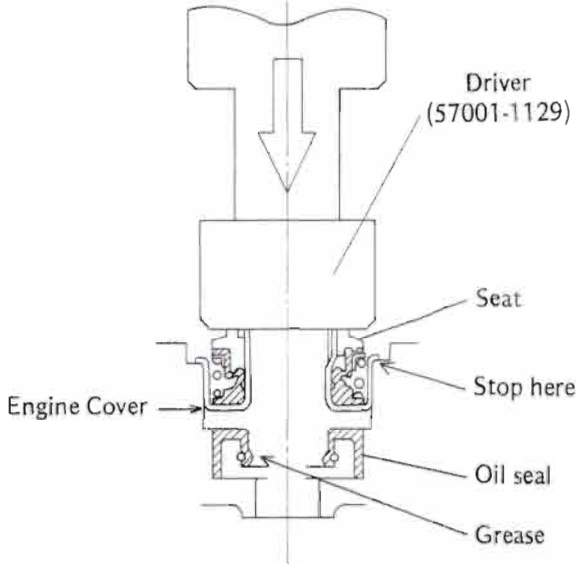
A. Sealing Seat
B. Rubber Seal
C. Apply coolant to the surfaces

Assembly Point
●Discard the used mechanical seal.

NOTE

○*As the spare mechanical seal has the body applied a compound previously, do not smear a liquid gasket to it.*

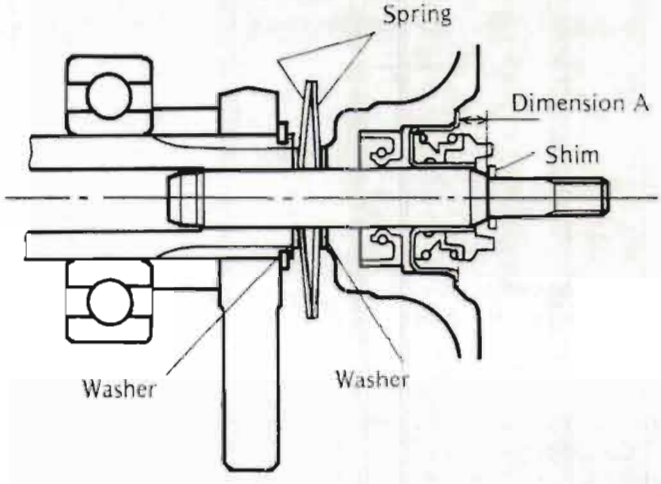
●Apply high temperature grease and install the oil seal as shown.
●Press the seat into the hole by using a bearing driver (special tool) until it stops at the bottom surface of the engine cover.



●Clean the sliding surface of the mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
●Apply coolant to the surfaces of the rubber seal and sealing seat, and install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.

●Install the washers and springs being careful of the installation direction as shown.
●Install the right engine cover.

Water pump installation



●Measure the dimension A and select a shim according to the table below.

Impeller Shim Selection

Dimension A	Shim No.	Thickness
not less than – less than	92025	
4.7 mm – 5.3 mm	–1501	t2.0 mm
5.3 mm – 5.9 mm	–1502	t1.4 mm
5.9 mm – 6.5 mm	–1503	t0.8 mm
6.5 mm – 7.0 mm	–1504	t0.3 mm

●Installing the selected shim, the impeller (with O-ring) and washer, tighten the impeller locknut to the specification.

Tightening Torque

Impeller Nut:	7.8 N-m (0.8 kg-m, 69 in-lb)

CAUTION

○**Turn the impeller clockwise at installation, and turn it counterclockwise at removal. This is to prevent impeller O-ring damage by the shaft screw threads.**

Engine Removal, Installation

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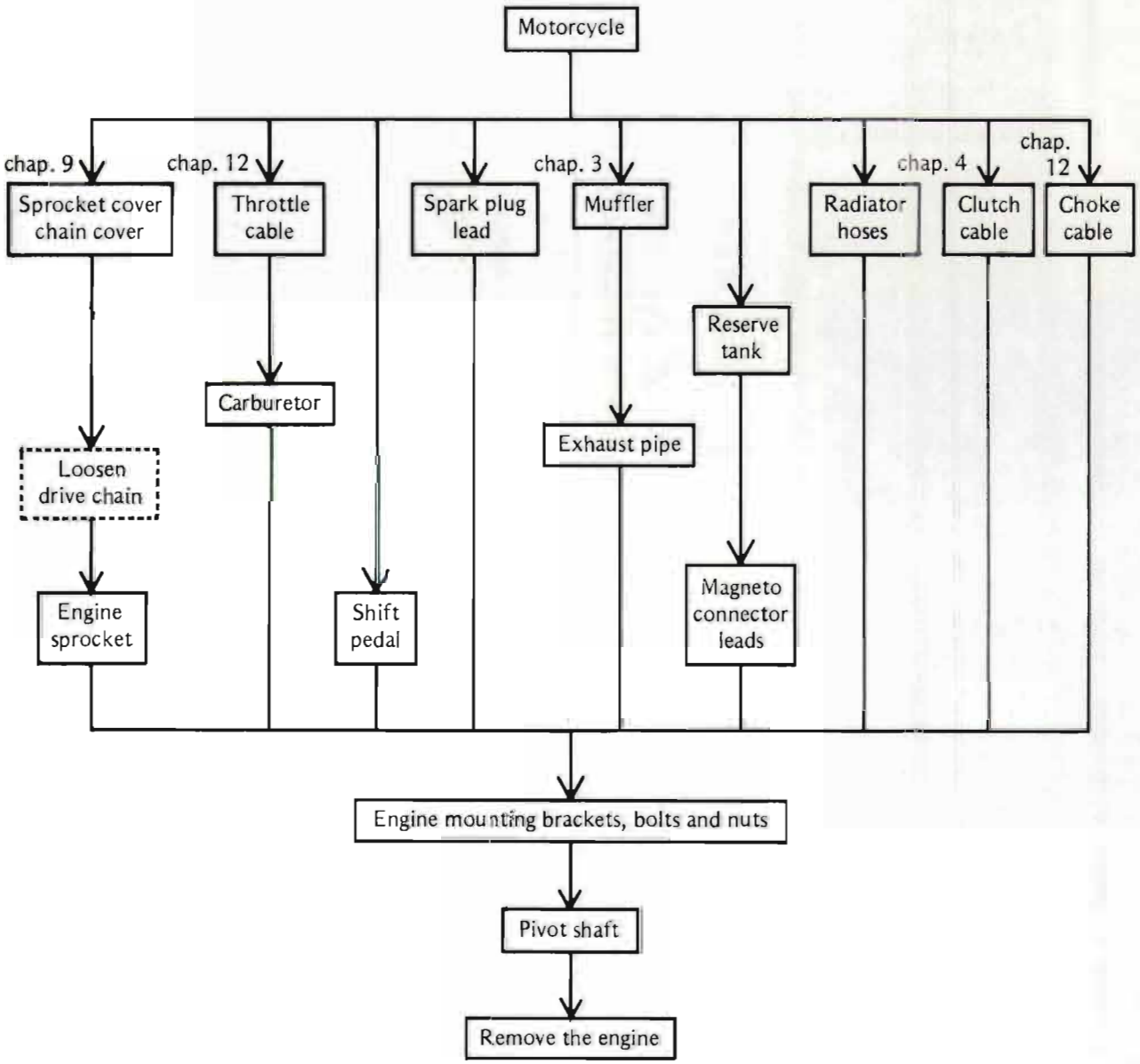
Engine Unit

Removal

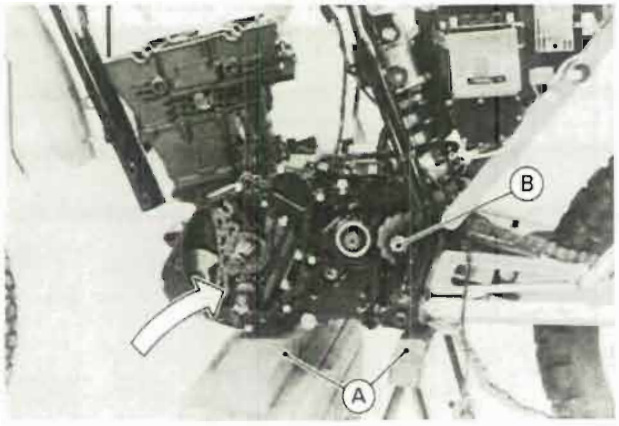
- For later installation convenience, note and record how and where cables, wires, and hoses are routed. They should not be bent sharply, kinked, or twisted (See chapter 13).
- Drain the engine oil (chap. 4) and coolant (chap. 5).
- Remove the parts and free the cables and wiring shown in the chart.
- Turn the fuel tap **OFF** and pull off the fuel hose.
- Take off the fuel tank.
- Loosen the drive chain (chap. 9) and remove the engine sprocket (chap. 4).
- Loosen the engine mounting bolts and nuts.
- Place a stand or block under the engine and remove the engine mounting brackets, bolts and nuts.

○This chart is designed to aid in determining proper removal sequence. Select the component you wish to remove and follow the arrows to that point on the chart.



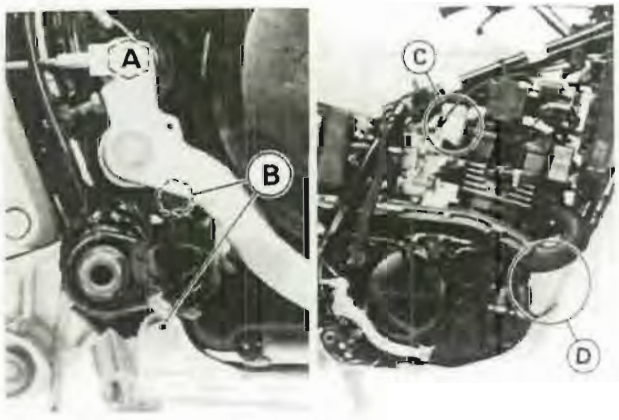
Installation

•Insert the pivot shaft first, while supporting the engine.



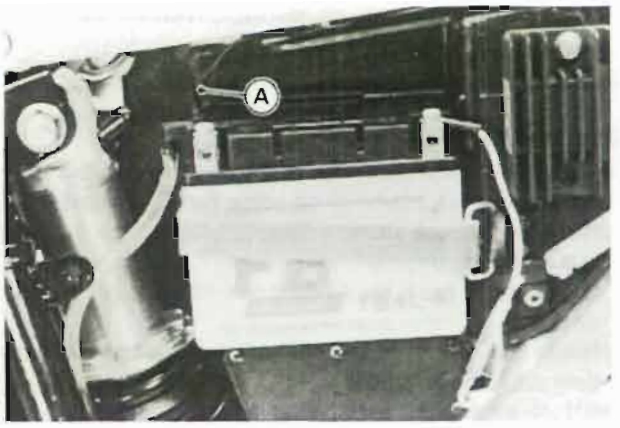
A. Block or Stand B. Pivot Shaft

•Tighten the following parts.
○Engine mounting bolts and pivot shaft (remarked below)
○Oil drain plug with a new gasket . . . . . chap. 4.
○Coolant drain plug with a new gasket. . . . . chap. 5.



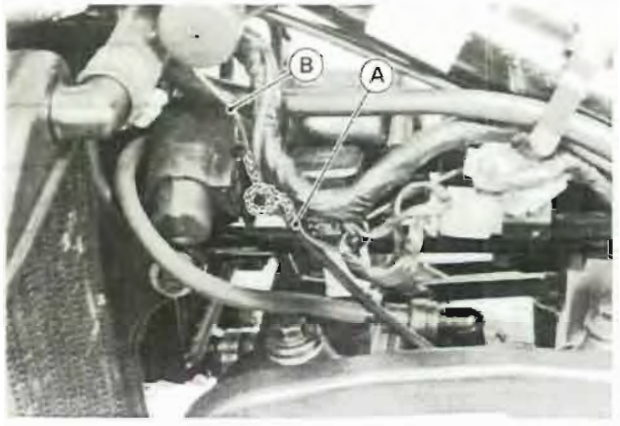
A. Swing Arm Pivot Shaft, 14 mm
98 N-m (10.0 kg-m, 72 ft-lb)
B. Engine Mounting Bolt, 10 mm
49 N-m (5.0 kg-m, 36 ft-lb)
C. Engine Mounting Bolt, 8 mm
24 N-m (2.4 kg-m, 17.5 ft-lb)
D. Engine Mounting Bolt, 10 mm
39 N-m (4.0 kg-m, 29 ft-lb)

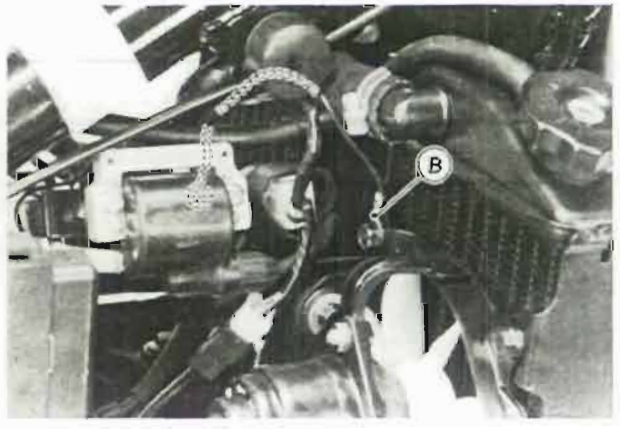
•Be sure to install the main harness negative (–) lead on the battery negative (–) terminal.



A. Main harness negative (–) lead

•Be sure to install the main harness ground lead and the fan ground lead on the chasis.





A. Main Harness Ground Lead
B. Fan Ground Lead

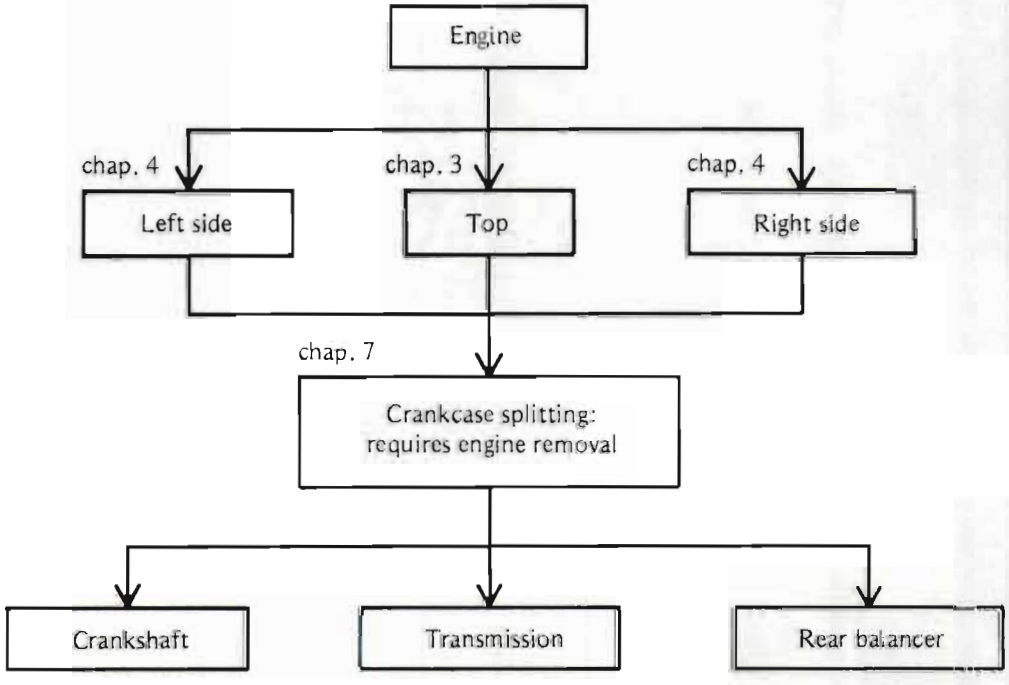
•Fill the engine with engine oil . . . . . chap. 4.
•Fill the cooling system with coolant . . . . . chap. 5.
•Adjust the following parts.
○Throttle control cable. . . . . chap. 12.
○Choke cable . . . . . chap. 12.
○Clutch cable . . . . . chap. 12.
○Drive chain . . . . . chap. 9.
○Carburetor (idle speed) . . . . . chap. 2.
○Rear brake . . . . . chap. 10.

Engine Disassembly

Precautions

- Turn the crankshaft always in the direction of normal rotation: clockwise as viewed from the right side.
- An arrow mark is placed on some parts. The arrow shows either the orientation or the rotation direction of a part.
  - If the arrow mark shows orientation, install the part so that the arrow points toward the front of the motorcycle when it is installed.
  - If the arrow mark shows direction of rotation, install the part so that the arrow mark coincides with the rotational direction.
  - Install the gaskets in the correct position and direction so that they perfectly match with the mating surfaces where they are to be installed.
- Before assembling parts, wear an eye protector, and blow the oil passages in the parts clean with compressed air.

Flow Chart



Engine Bottom End/Transmission

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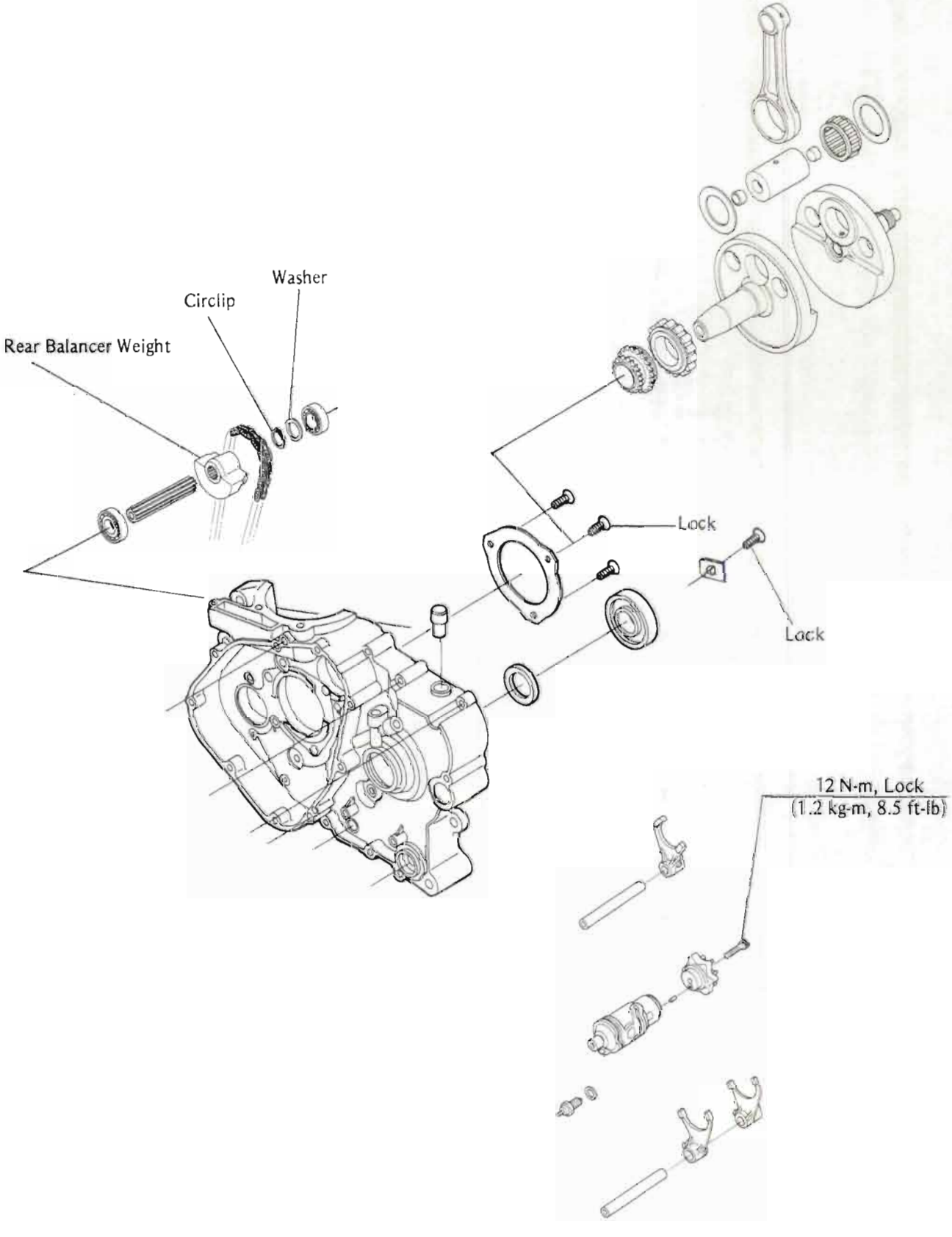
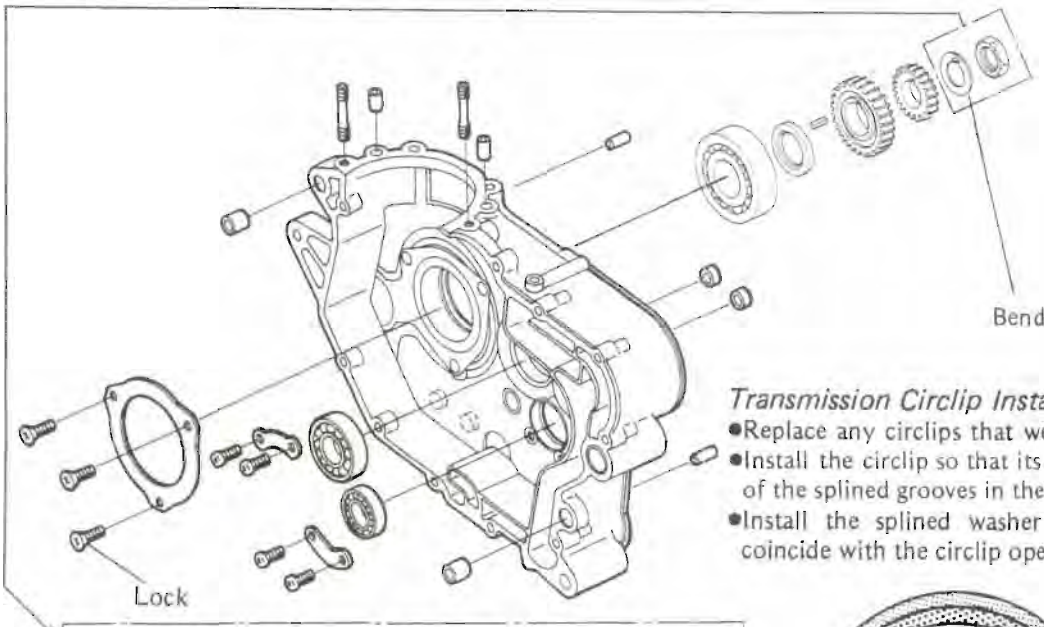
Exploded Views

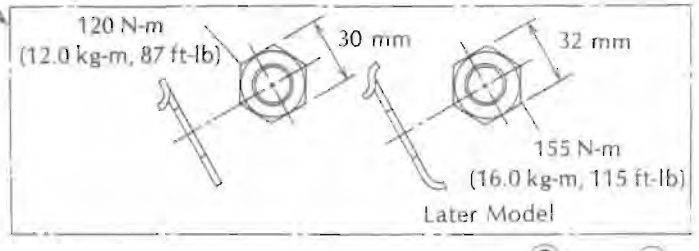


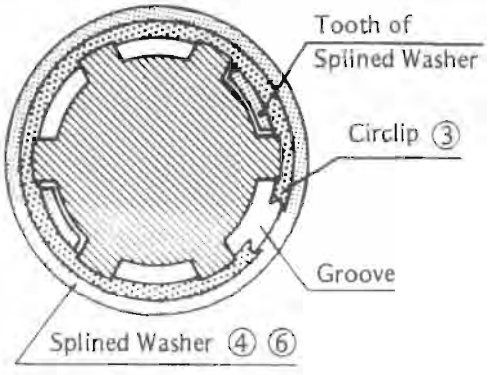
Lock : Apply a non-permanent locking agent to the threads.

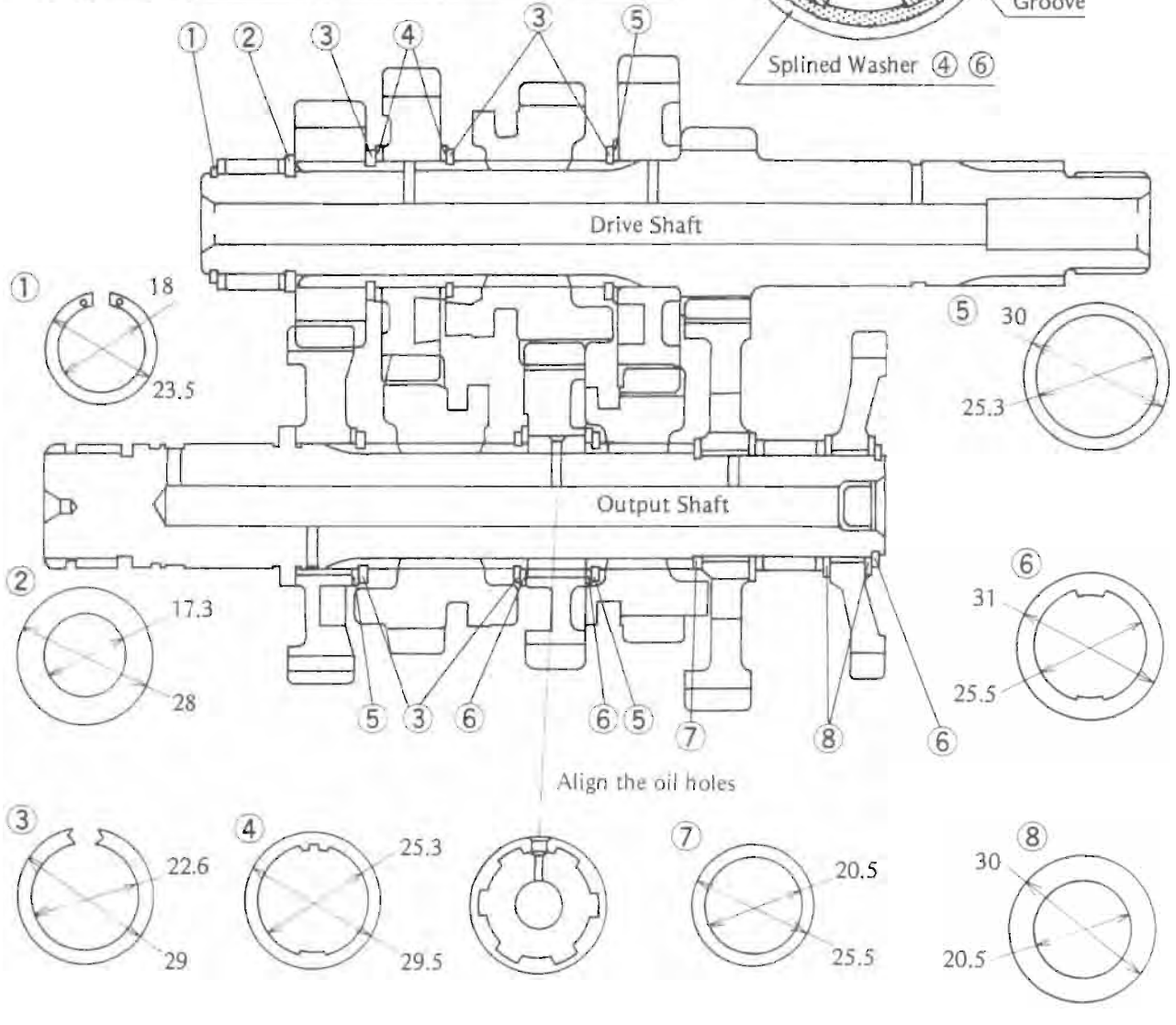


Transmission Circlip Installation

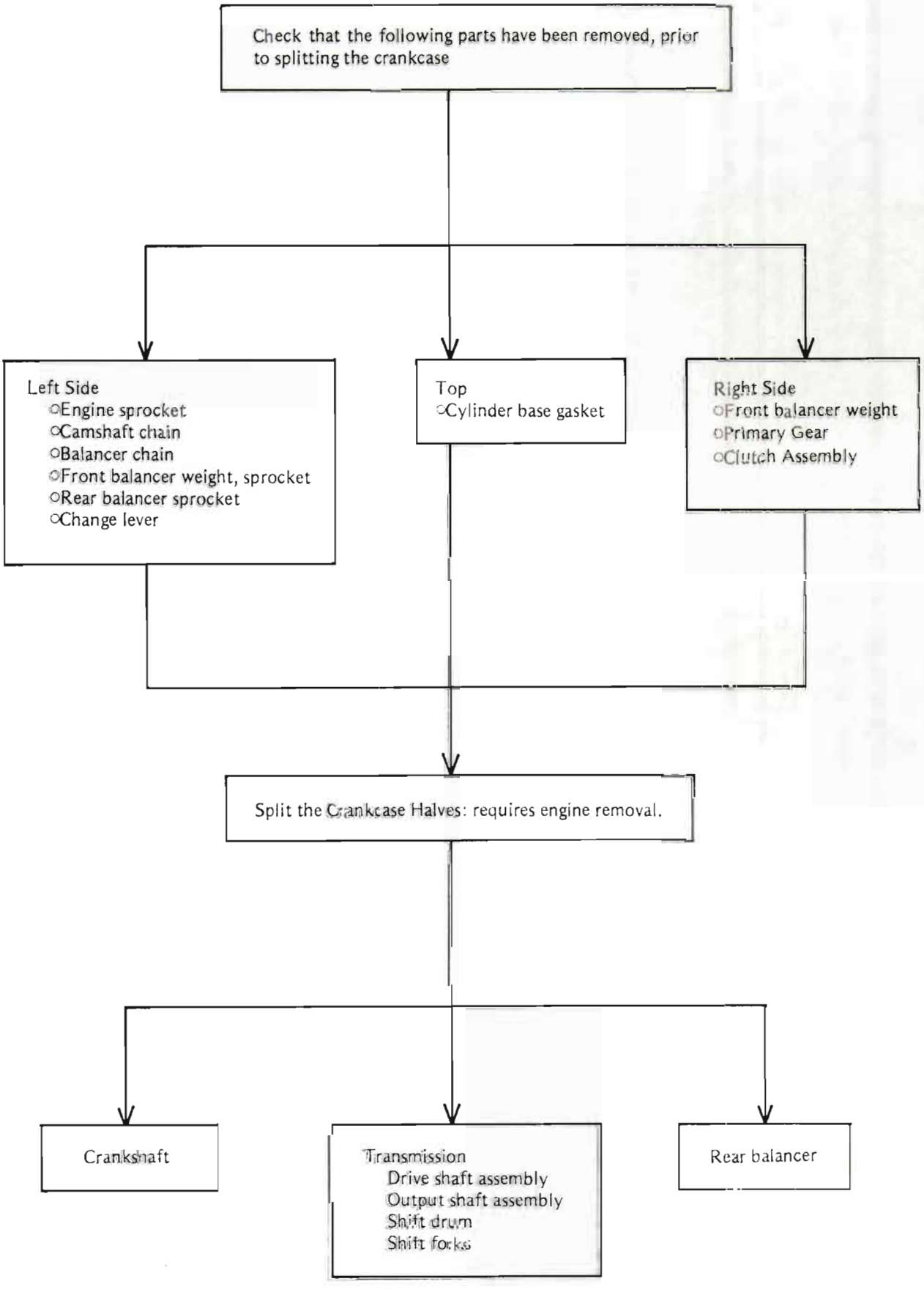
- Replace any circlips that were removed with new ones.
- Install the circlip so that its opening coincides with one of the splined grooves in the transmission shaft.
- Install the splined washer so that its teeth do not coincide with the circlip opening.







Disassembly Flow Chart:



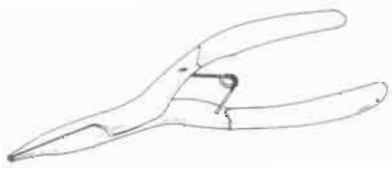
Service Data

Item	Standard	Service Limit	See Page
Transmission:			
Shift fork finger thickness	4.4 – 4.5 mm	4.3 mm	7-6
Gear shift fork groove width	4.55 – 4.65 mm	4.8 mm	7-6
Shift fork guide pin diameter	5.9 – 6.0 mm	5.8 mm	7-7
Shift drum groove width	6.05 – 6.20 mm	6.3 mm	7-7
Crankshaft:			
Connecting rod big end radial clearance	0.004 – 0.018 mm	0.10 mm	7-7
Connecting rod side clearance	0.25 – 0.35 mm	0.60 mm	7-7
Crankshaft runout	A : 0.03 mm B: 0.04 mm	0.10 mm	7-7
Cold-fitting tolerance between crankpin and flywheels	0.087 – 0.122 mm	– – –	

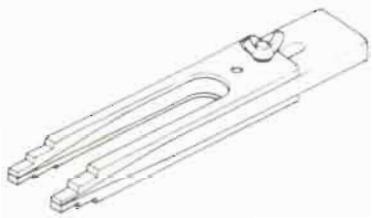
Special Tool

Bearing Driver Set: 57001-1129

Circlip Pliers: 57001-144



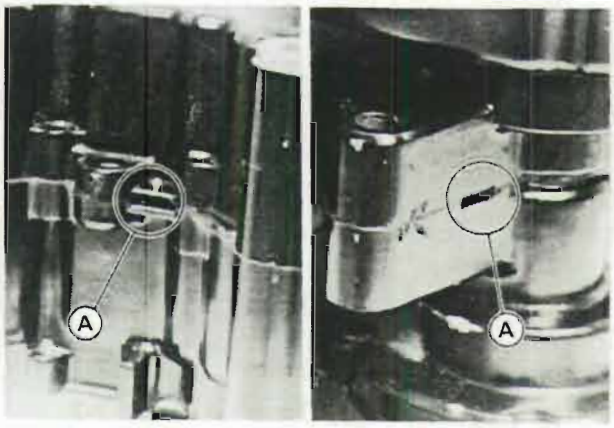
Crankshaft Installing Jig: 57001-1174



Crankcase Splitting

Crankcase Disassembly Point

- The front and rear of the crankcase must be pulled apart evenly. With a large screwdriver, pry at the gap.



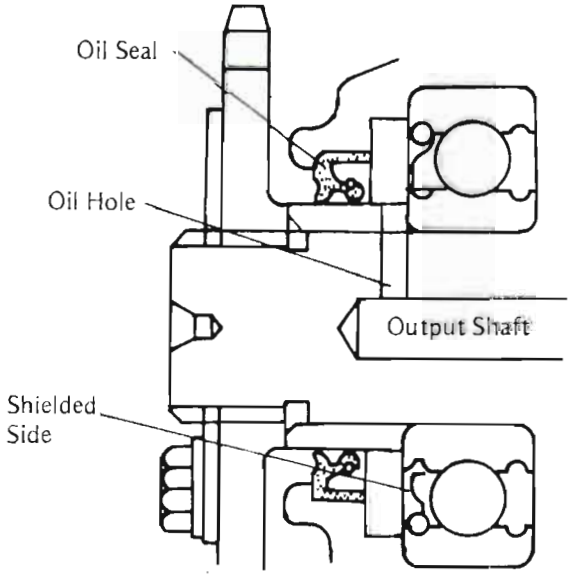
A. Pry Point

CAUTION

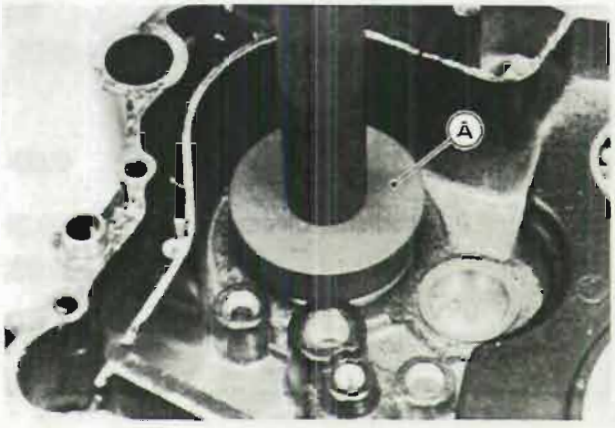
- **Do not hammer on the screwdriver while it is in the pry point as engine damage could result.**

Crankcase Assembly Points

- Apply a high temperature grease to the lips of the new oil seals.
- Put the output shaft oil seal in, being careful of the installation direction.
- Press the output shaft bearing in the crankcase so that the shielded side faces outwards (See Exploded Views).



- Clean the mating surfaces of the crankcase halves with a high flash-point solvent and wipe them dry.
- Apply liquid gasket to the mating surface of the left crankcase half.
- Any oil seal that is removed is damaged and must be replaced with a new one. Press in the new oil seal using a press and suitable adapters so that the face of the seal is level with the surface of the crankcase.
- Install the ball bearings using a press and the bearing driver set (special tool). Install the needle bearing using a press and the driver set (special tool).

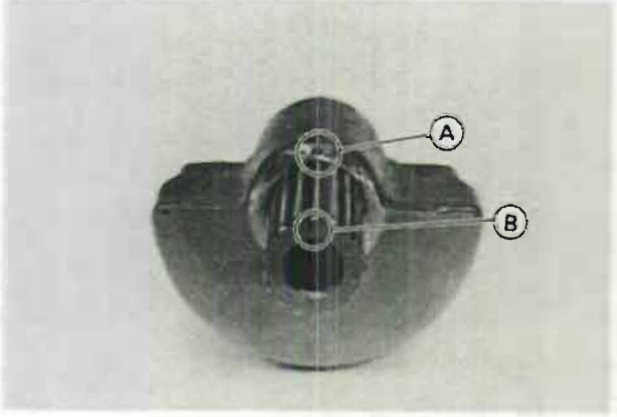


A. Bearing Driver Set: 57001-1129

- Apply a non-permanent locking agent to the crankshaft bearing retainer screws.

Rear Balancer Installation

- Install the rear balancer weight on the balancer shaft, aligning the weight punch mark with the shaft punch mark.



A. Weight Punch Mark B. Shaft Punch Mark

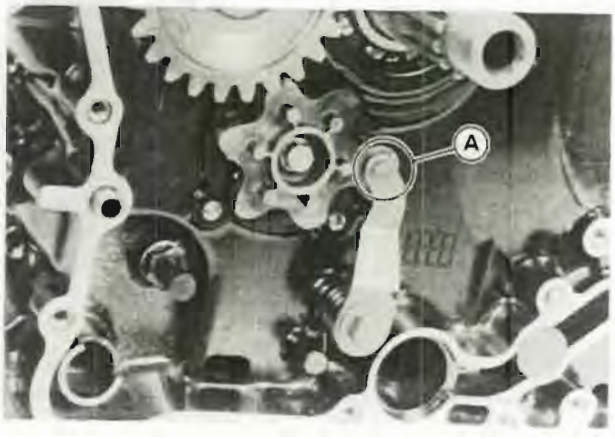
- Prior to putting the rear balancer shaft into the crankcase, be sure to install the washer and circlip (See Exploded Views).

Transmission Disassembly Point

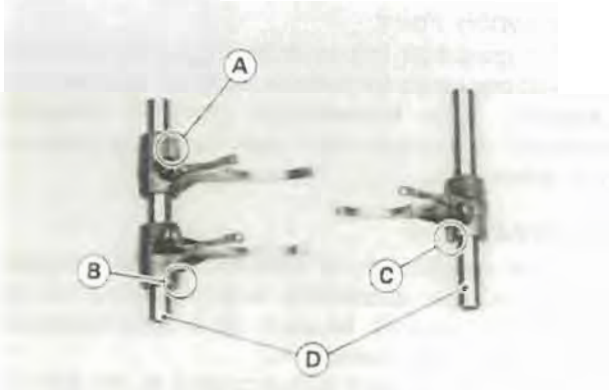
- After pulling out the shift rods, remove the shafts and gears.

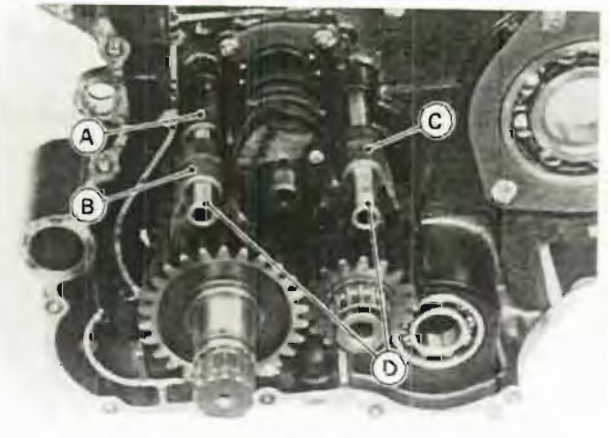
Transmission Assembly Point

- Apply transmission oil to the transmission gears and shift drum where they turn in the crankcase and on the drive and output shafts.
- Install the drive shaft, output shaft, and shift drum in the right crankcase half and set the shift drum in neutral position as shown.
- Mesh output shaft gears with those on the drive shaft as shown in the figure (see Exploded Views)
- Fit each shift fork guide pin into a shift drum groove.
- Insert the shift rods into the shift forks.



A. Neutral Detent



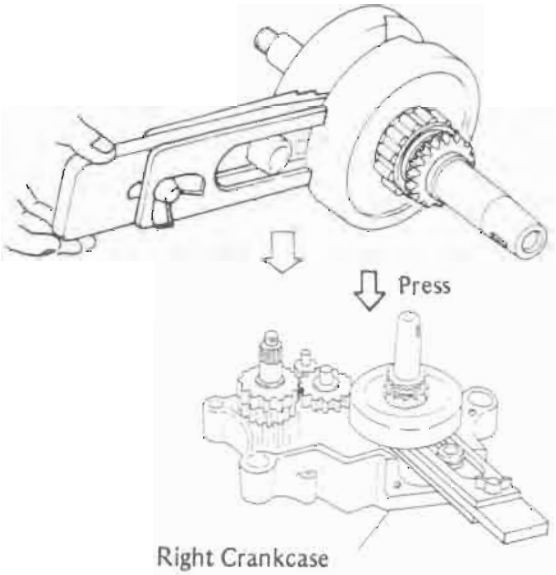


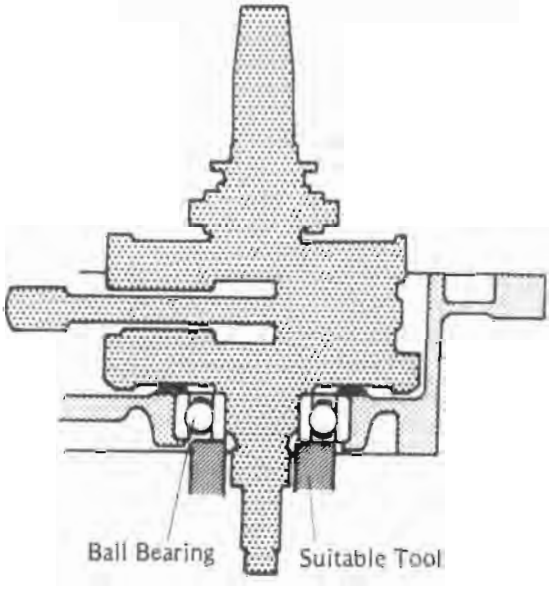
A. Output shaft 1st gear shift fork
: has the widest machined surface.
B. Output shaft 2nd – 3rd gear shift fork
: has narrow machined surface.
C. Drive shaft 4 – 5th gear shift fork with short fingers
D. Shift Rod: these two are identical.

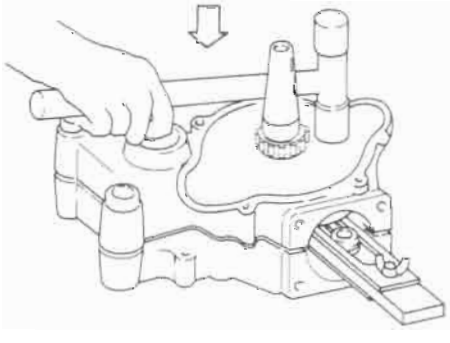
Crankshaft Installation Point

- Fit the crankshaft assembly into the right crankcase using a crankshaft installing jig inserted between the flywheels opposite the connecting rod big end.
- This special tool is easily adjustable to fit in any gap between the flywheels. Install the crankshaft as follows.

Crankshaft Installing Jig: 57001-1174







•Constantly check the alignment of the two crankcase halves, and the position of the transmission shafts, and shift drum. The front and rear of the crankcase must be pushed together evenly.
•Check to see that the crankshaft, drive shaft, and output shaft all turn freely (in the neutral position).
★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.
•Spinning the output shaft, shift the transmission through all the gears to make certain there is no binding and that all the gears shift properly.

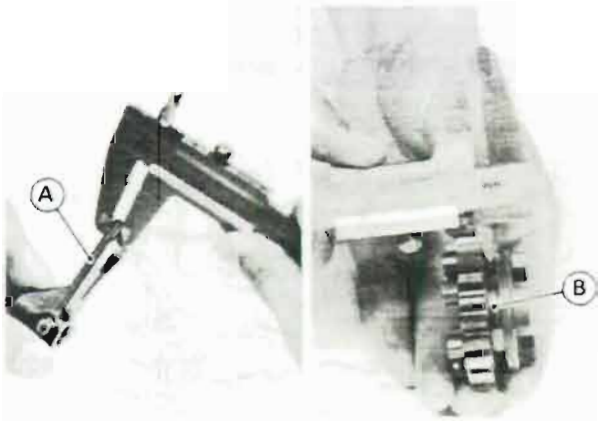
Transmission Maintenance

Transmission or shift mechanism damage, causing the transmission to misshift, overshift, and/or jump out of gear, can cause more damage to the transmission and overrev damage to the engine.

Shift Drum, Shift Fork, Shift Rod, Gear Groove Inspection

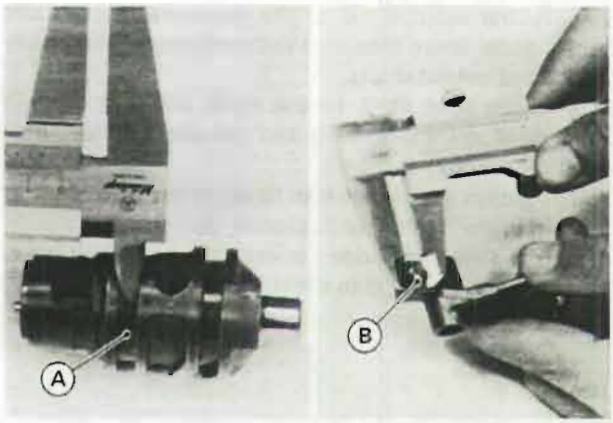
•Visually inspect the shift rods and shift forks.
★If they are badly worn or if they show stepped wear, replace them.
★Replace any fork if the fingers are burned.
★Replace any fork that is bent. A bent fork could cause difficulty in shifting or allow the transmission to jump out of gear when under power.

Shift Fork, Gear Groove Wear Measurement



A. Shift Fork Measurement B. Gear Groove Measurement

Shift Fork Guide Pin/Shift Drum Groove Wear



A. Shift Drum Groove Measurement
B. Guide Pin Measurement

Crankshaft Disassembly

Disassembly Point

The crankshaft left main bearing, chain sprockets, and left crankshaft are available separately as spare parts, however, it is recommended that the crankshaft assembly be replaced rather than attempting to replace the components.

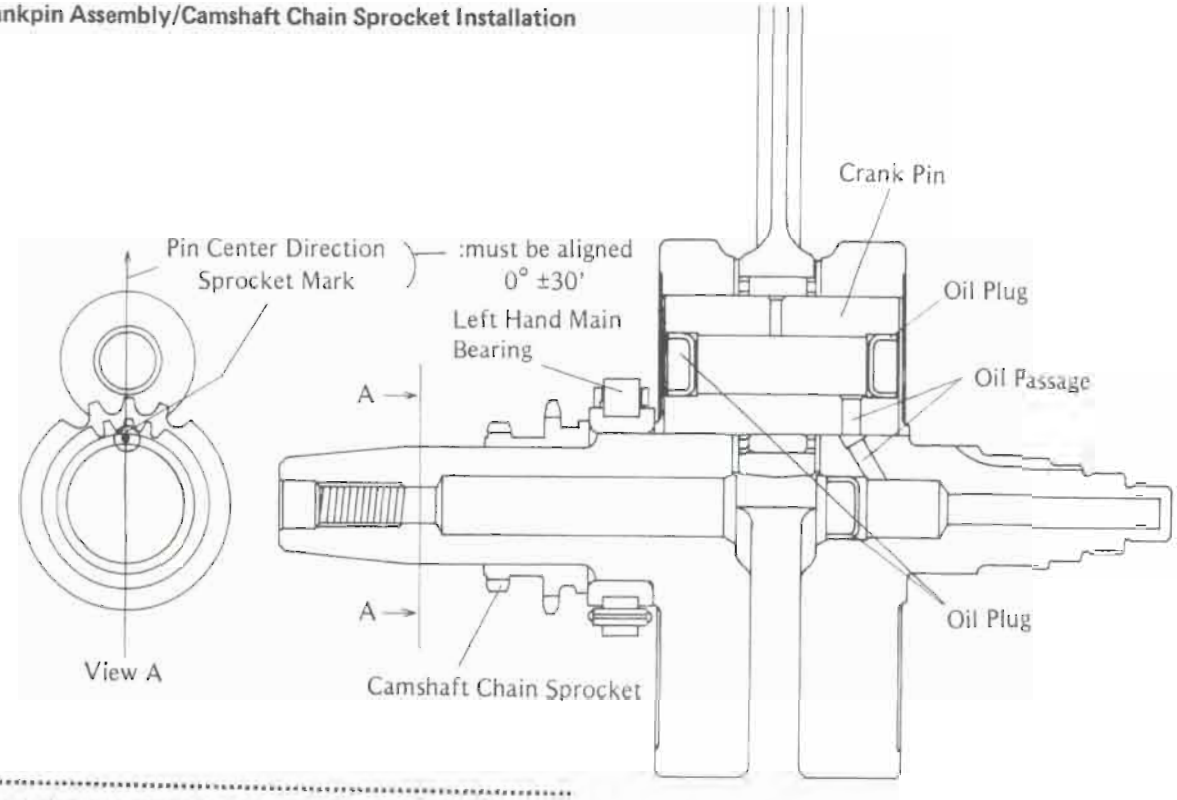
Assembly Point

Since assembly of the crankshaft demands exacting tolerances, the disassembly and reassembly of the crankshaft can only be done by a shop having the necessary tools and equipment.
•Reassemble the crankshaft according to the standard tolerances in the Service Data Section.

Inspection Points:
○Connecting rod big end radial clearance.
○Cold-fitting tolerance between crankpin and flywheels.
○Side clearance between the connecting rod and one of the flywheels.
○Crankshaft runout.

•Make sure oil passages of crank and crank pin are lined up during assembly.
•Apply a locking agent to the oil plugs and push them until they stop at the bottom of the hole.
•Press the camshaft chain sprocket onto the crankshaft as shown.

Crankpin Assembly/Camshaft Chain Sprocket Installation

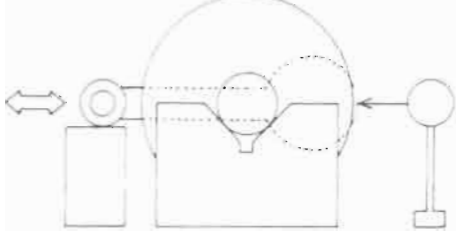


Crankshaft Maintenance

Connecting Rod Big End Radial Clearance

- Set the crankshaft in a flywheel alignment jig or on V blocks, and place a dial gauge against the big end of the connecting rod.
- Push the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.
- ★If the radial clearance exceeds the service limit, the crankshaft should be either replaced or disassembled and the crankpin, needle bearing, and connecting rod big end examined for wear.

Radial Clearance



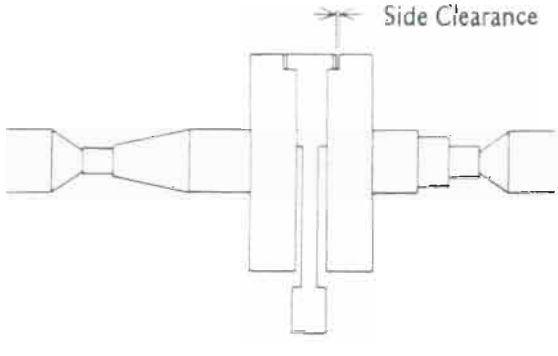
Big End Seizure

- ★In case of serious seizure with damaged flywheels, the crankshaft must be replaced.
- ★In case of less serious damage, disassemble the crankshaft and replace the crankpin, needle bearing, side washers, and connecting rod.

Connecting Rod Side Clearance

- Measure the side clearance of the connecting rod with a thickness gauge.
- ★If the clearance exceeds the service limit, replace the crankshaft.

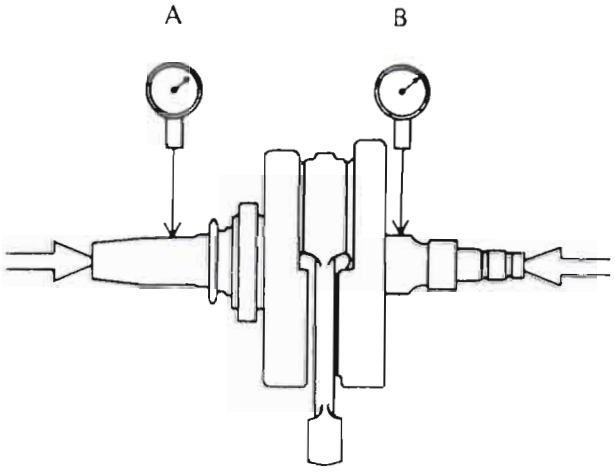
Side Clearance



Crankshaft Runout

- Set the crankshaft in a flywheel alignment jig, and place a dial gauge at the ball bearing (B) and at the sprocket (A).
- Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.
- ★If the runout at either point exceeds the service limit, align the flywheels so that the runout falls within the service limit.

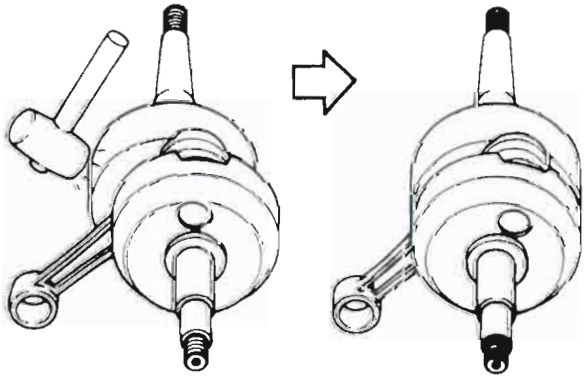
Crankshaft Runout



Crankshaft Alignment

- In the case of horizontal misalignment, which is the most common, strike the projecting rim of the flywheel with a plastic, soft lead, or brass hammer as indicated in the figure.
- Recheck the runout with a dial gauge, repeating the process until the runout falls within the service limit.
- Vertical misalignment is corrected either by driving a wedge in between the flywheels or by squeezing the flywheel rims in a vise, depending on the nature of the misalignment. Correct the horizontal misalignment first.
- ★If flywheel misalignment cannot be corrected by the above method, replace the crankpin or the crankshaft itself.

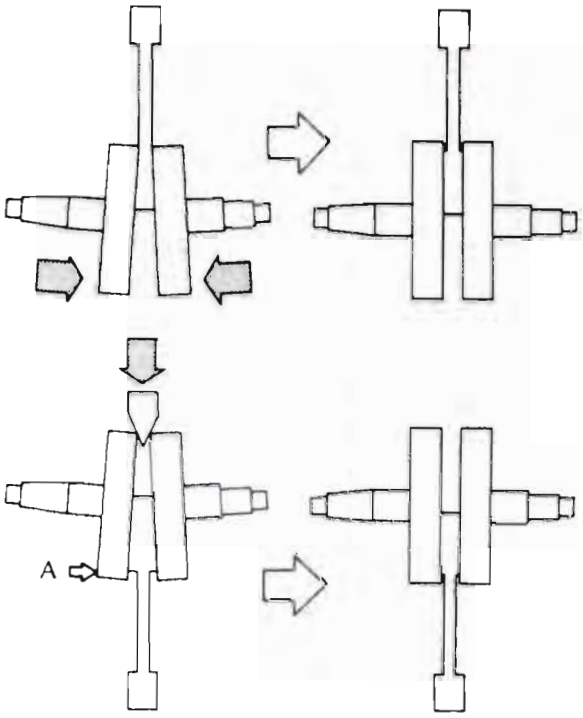
Horizontal Misalignment



CAUTION

○**Don't hammer the flywheel at point "A".**

Vertical Misalignment



Roller Bearing Wear, Damage

The rollers of the bearing wear so little that the wear is difficult to measure.

- Inspect the bearing for abrasion, color change, or other damage.
- ★If there is any doubt as to the condition of the rollers, replace the left crankshaft or the crankshaft assembly.

- Inspect the bearing outer race in the left crankcase half.
- ★If there is any damage on the outer race, replace the crankcases as a unit.

Wheel and Tires

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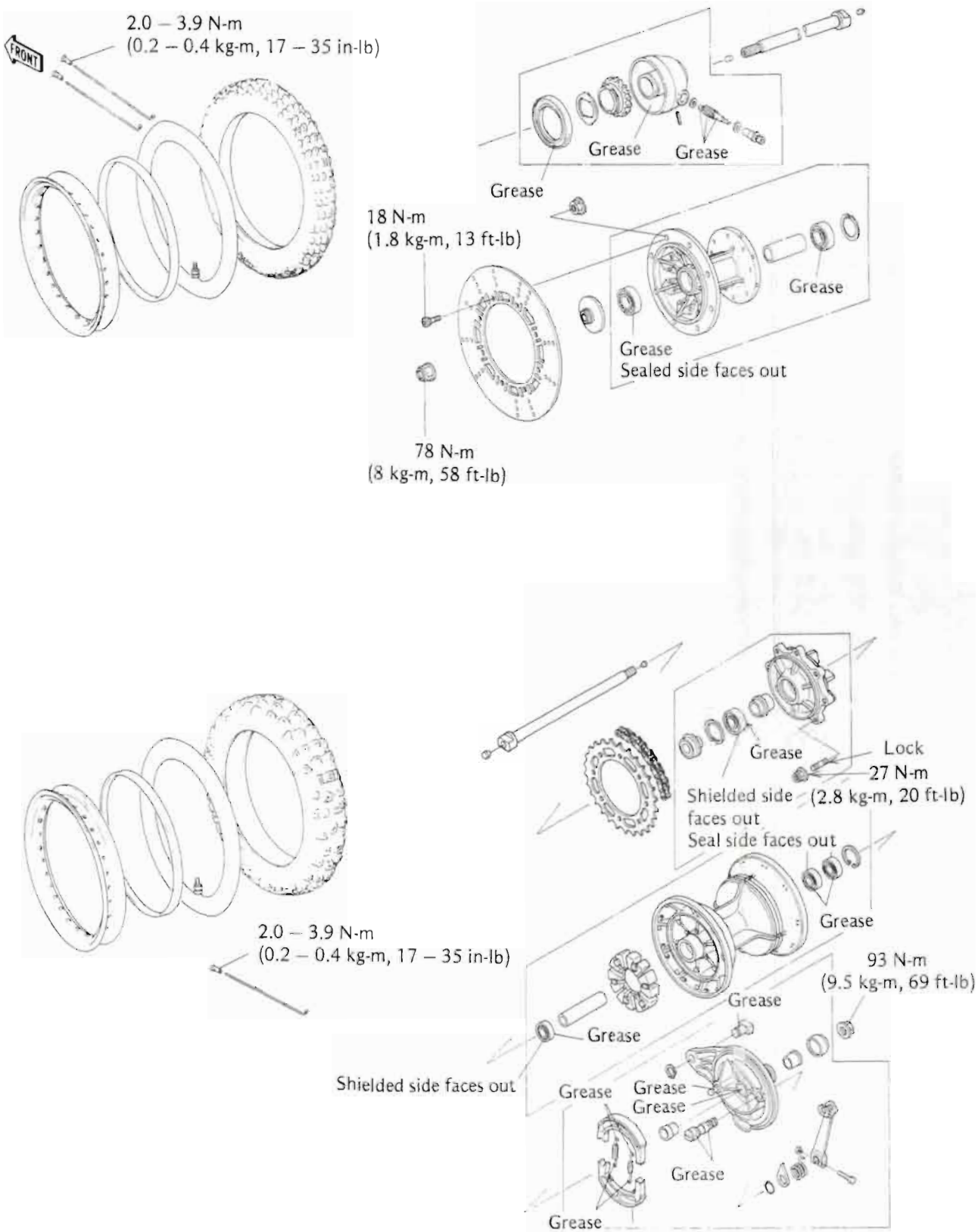


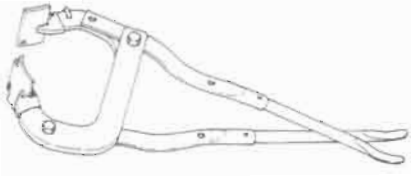
Lock: Apply a non-permanent locking agent.
Grease: Apply grease

Service Data

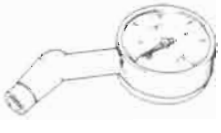
Item	Standard	See Page
Front Tire		
Make & type	DUNLOP K750, K750A, or K550	8-5
Tire Size	3.00 – 21 4PR Ⓤ Ⓒ Ⓒa , 3.00 S21 4PR	
Air Pressure	150 kPa (1.5 kg/cm², 21 psi)	
Tread depth	8.8 mm (service limit: 2 mm)	
Rear Tire		
Make & type	DUNLOP K750, K750A, or K550	
Tire size	5.10 – 17 4PR Ⓤ Ⓒ Ⓒa , 5.10 S17 4PR	
Air pressure	Up to 955 N : 150 kPa (1.5 kg/cm², 21 psi) (97.5 kg, 215 lb) 955 – 1,470 N : 172 kPa (1.75 kg/cm², 25 psi) (97.5 – 150 kg) (215 – 330 lb)	
Tread depth	10.8 mm (service limit : 2 mm)	
Rim Runout		
Radial, Axial	– (service limit : 2 mm)	

Special Tool

Bead Breaker: 57001-1072



Air Pressure Gauge: 52005-1003



Tire Irons: 57001-1073

Bearing Drive Set: 57001-1129

Rim Protectors: 57001-1063

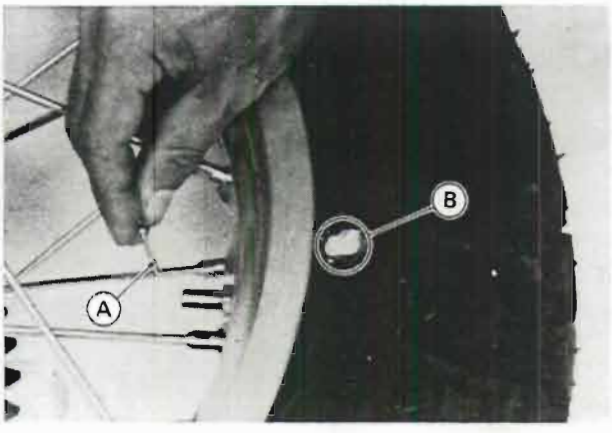
Tires

Tire Removal

CAUTION

○**Do not lay the wheel on the ground with the disc facing downwards. This can damage or warp the disc.**

- Remove the wheel from the motorcycle.
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
- Take out the valve core to let out the air.



A. Unscrew valve core. B. Mark valve stem position.

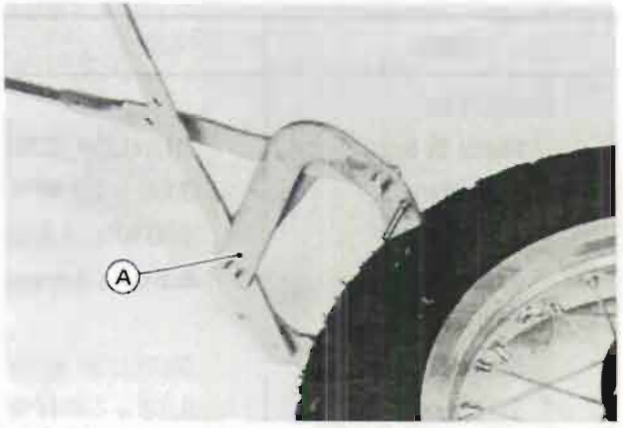
○When handling the rims, be careful not to damage the aluminum rim flanges.

- 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

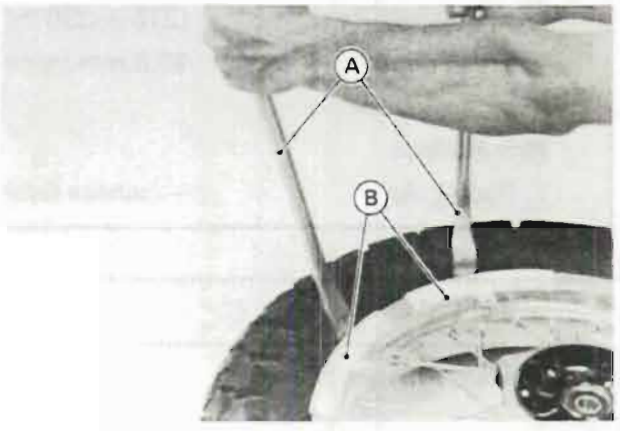
○**Never lubricate with mineral oil (engine oil) or gasoline because they will cause deterioration of the tire.**

- Break the beads away from both sides of rim with bead breaker 57001-1072.



A. Bead breaker: 57001-1072

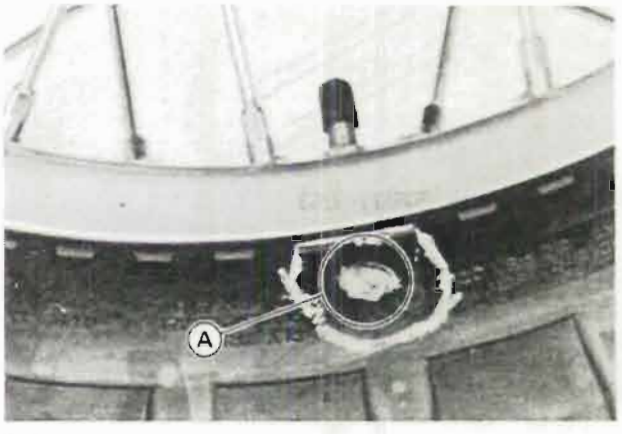
- Pry the tire off the rim with tire irons 57001-1073, protecting the rim with rim protectors 57001-1063.



A. Tire Irons B. Rim Protectors

Installation Points of Tires

- Position the tire on the rim so that the valve is at the tire balance mark (the chalk mark made during removal or the yellow paint mark on a new tire).



A. Balance mark

Adjustment after Tire Installation

●Check and adjust the tire air pressure.

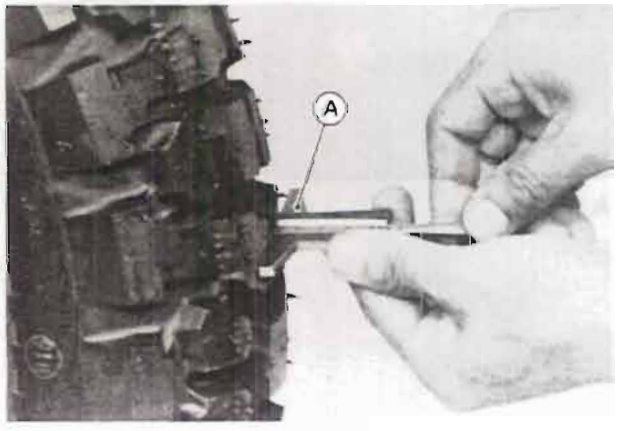
WARNING

○To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Tire Wear 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 bad damage. Swelling or high spots indicate internal damage, requiring tire replacement.
●Measure the tread depth at the center of the tread with a depth gauge. Since the tire may wear unevenly, take measurements at several places.
★If any measurement is less than the service limit, replace the tire.



A. Tire Depth Gauge

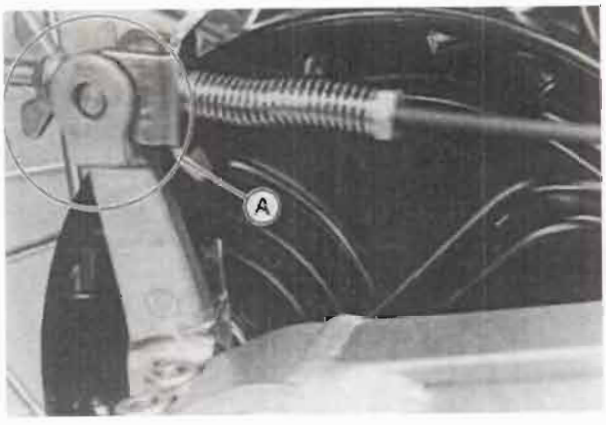
Service Limit of Tire Tread Depth

Front and Rear : 2 mm

Wheels

Rear Wheel Removal

●Remove the brake cable.

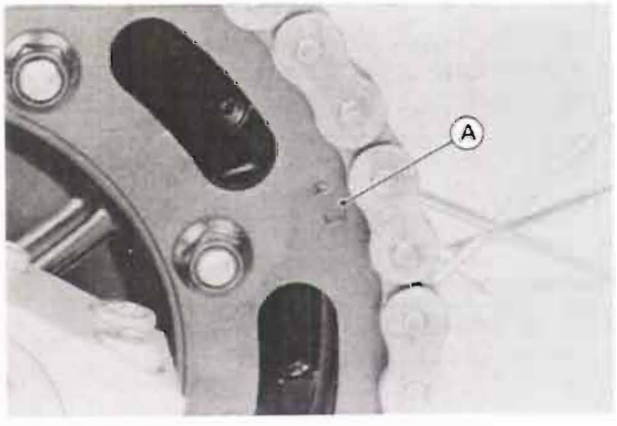


A. Brake Cable Removal Point

●Remove the drive chain from the rear sprocket (See Engine Sprocket Removal in chap. 4).
●Remove the rear axle and pull the rear wheel backward.
○It is necessary to raise the rear wheel off the ground with a suitable stand.

Rear Sprocket Installation

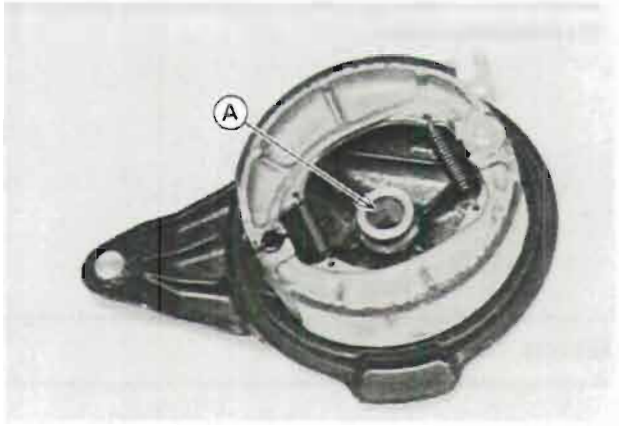
●Install the rear sprocket facing the tooth number marking outward for wheel alignment.



A. Tooth Number Marking

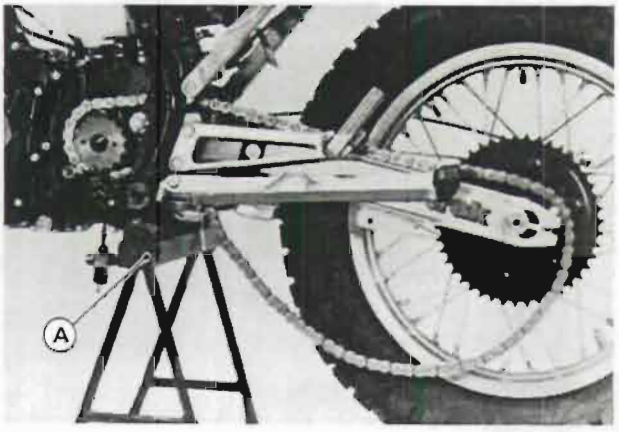
Rear Wheel Installation Point

- Apply a little grease to the inside surface of the hole in the brake panel where the rear hub fits.



A. Grease

- Place a stand or block under the motorcycle so that the rear wheel is raised off the ground.



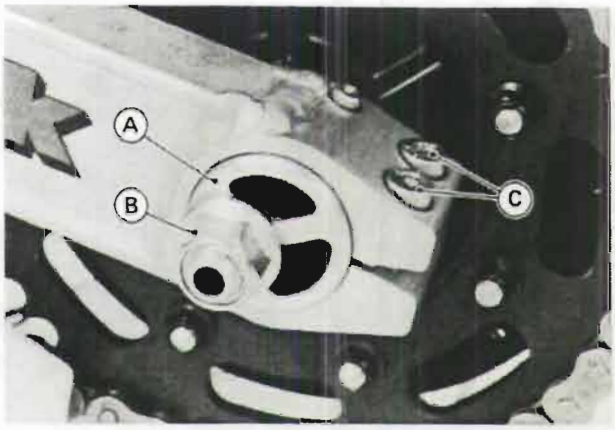
A. Stand

- Install the chain adjusters so that the drive chain is too loose; the swing arm notch is aligned with the adjuster mark respectively on both sides.
- Temporarily install the axle shaft and the wheel. Do not tighten the axle nut yet.
- Tighten the chain adjuster clamp bolts temporarily to lock the adjuster before tightening the axle nut.
- After wheel installation, check and adjust the following items:

  Drive Chain Slack Adjustment (See chap. 9)
  Rear Brake Pedal Position, Play (See chap. 10)
  Rear Brake Light Switch Adjustment (See chap. 10)

Tightening Torque

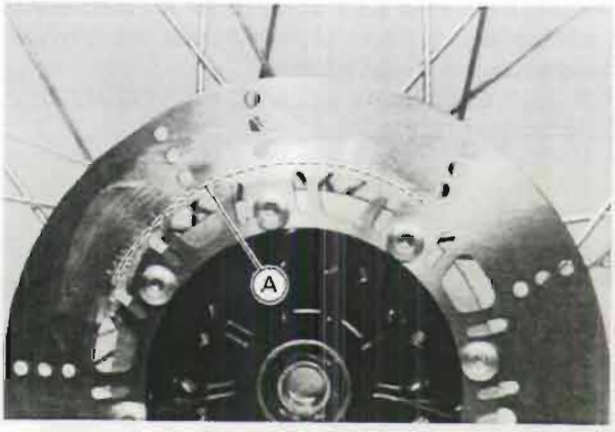
Chain Adjuster Clamp Bolts 24 N-m (2.4 kg-m, 17.5 ft-lb)
Axle Nut 93 N-m (9.5 kg-m, 69 ft-lb)



A. Chain Adjuster
B. Axle Nut
C. Chain Adjuster Clamp Bolts

Front Disc Installation

- Clean the disc and wheel hub mating surfaces of any dirt and foreign particles.
- Mount the brake disc on the wheel so that the marked side faces out.
- After installing the disc, check the disc runout (See chap. 10).



A. Mark

Spokes and Rims

Since the spokes must withstand repeated stress, it is important to take sufficient care that the spokes are not allowed to loosen and that they are tightened evenly. Loose or unevenly tightened spokes cause the rim to warp, increase the possibility of spoke breakage, and hasten nipple and spoke metal fatigue.

Spoke Tightness Inspection

- Check that all the spokes are tightened evenly.
- Standard spoke tightening torque is shown below. Over or undertightening may cause breakage.

Tightening Torque

Spokes:	2.0 – 3.9 N-m (0.2 – 0.4 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 spokes, which will eventually cause other spokes to break.**

Rim Runout Inspection

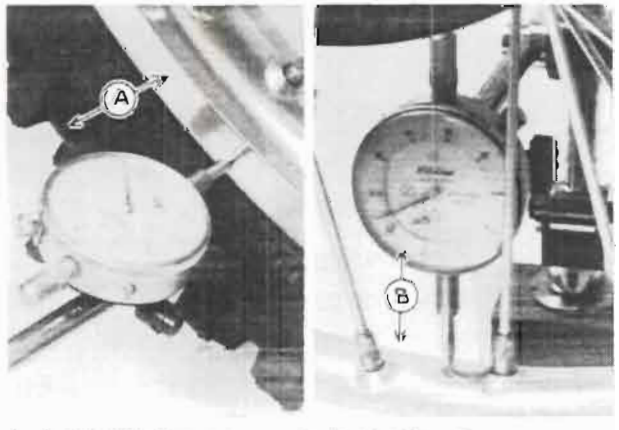
●Set a dial gauge against the side of the rim, and rotate the wheel to measure axial runout. The difference between the highest and lowest dial readings is the amount of runout.

●Set the dial gauge to the inner circumference of the rim, and rotate the wheel to measure radial runout. The difference between the highest and lowest dial readings is the amount of runout.

★If rim runout exceeds the service limit, 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 should be replaced.

Maximum Rim Runout (with tire installed)

Axial and Radial:	2 mm



A. Axial Rim Runout B. Radial Rim Runout

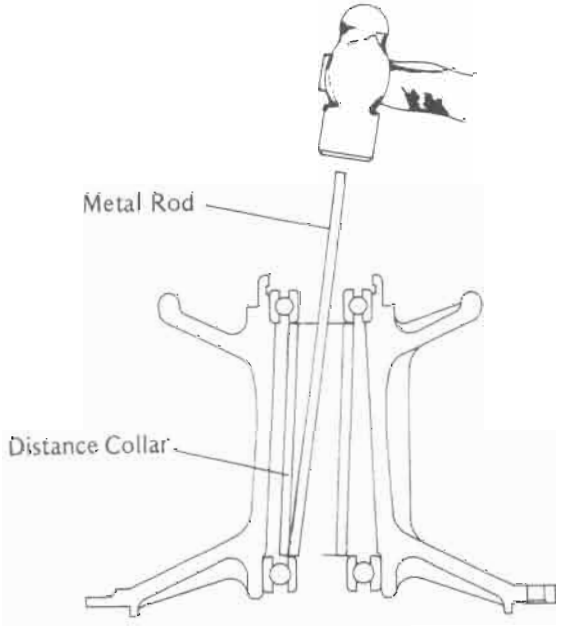
Wheel Bearing

Bearing Removal

●Remove the bearing as shown in the figure.

●Tap the distance collar to remove the remaining bearing.

Bearing Removal



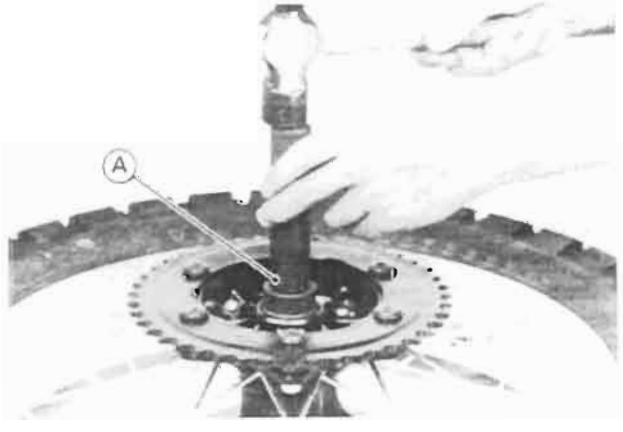
Installation Points

●Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air.

●Press each bearing into the hub. Use the bearing driver (special tool) which does not contact the bearing inner race.

○Install the bearing so that the shielded side faces outward.

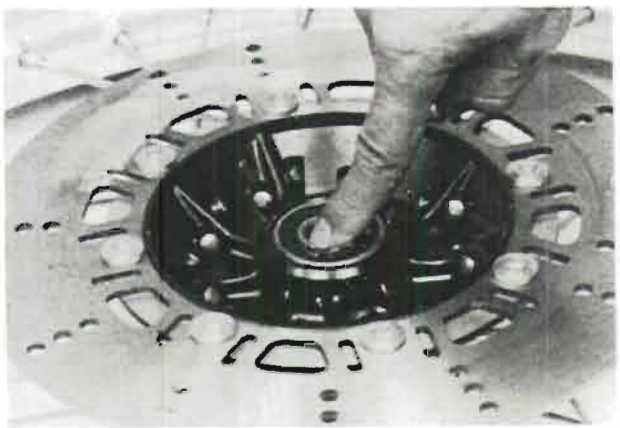
●Press the wheel bearing (right side) into the hub until it stops at the bottom of the hole.



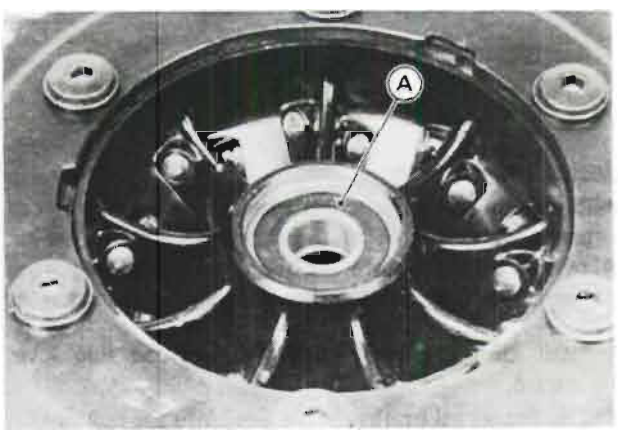
A. Bearing Driver: 57001-1129

Wheel Bearing Inspection

- Turn each bearing back and forth while checking for roughness or binding. If roughness or binding is found, replace the bearing.



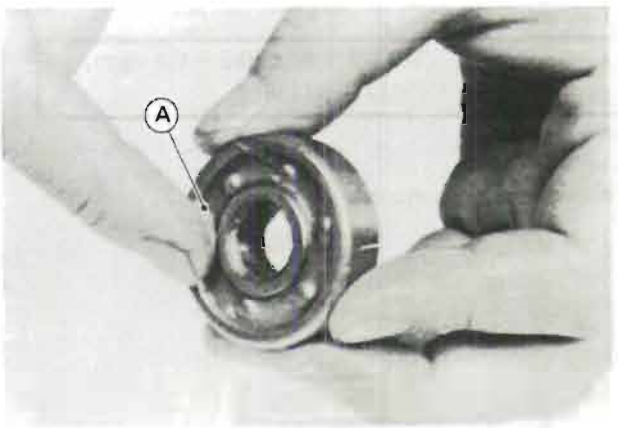
- Examine the bearing seal for tears or leakage. If the seal is torn or is leaking, replace the bearing.



A. Bearing Seal

Bearing Lubrication

- Remove the wheel bearings from the wheel hub and wheel coupling.
- Wash the bearings with a high flash-point solvent, dry them (do not spin them while they are dry), and oil them.
- Spin each bearing by hand to check its condition.
- ★If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
- If the same bearing is to be used again, re-wash it with a high flash-point solvent, and dry it.
- Pack each bearing with good quality bearing grease before installation. Turn each bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of each bearing housing before bearing installation.



A. Pack the bearing with grease.

Final Drive

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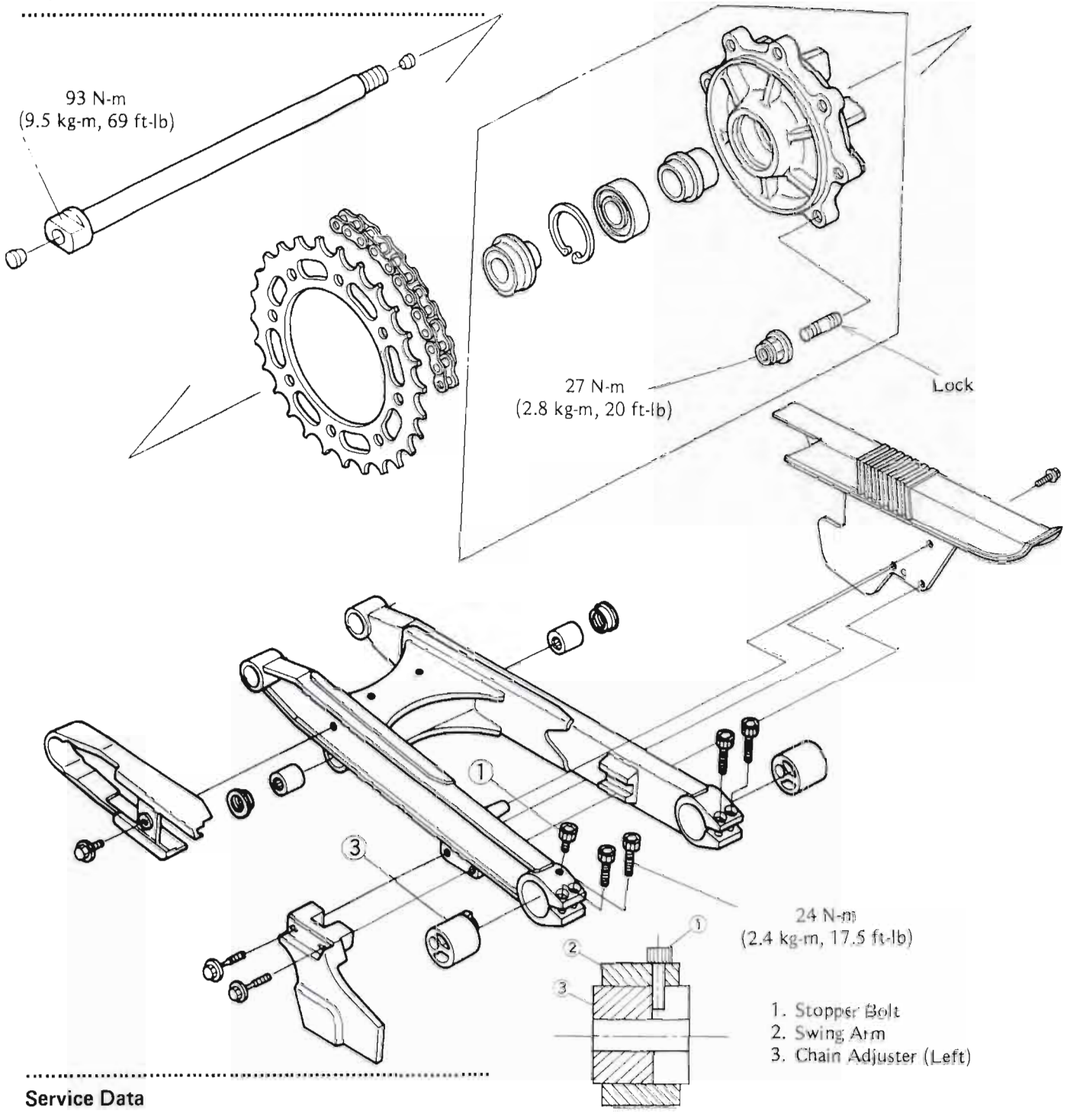
Exploded Views



Service Data

Item	Standard	Service Limit	See Page
Drive Chain			
Make and Type	Enuma, Endless EK520-LDO 104L		9-3
Chain Slack : normal	40 – 45 mm	– – –	
muddy conditions	45 – 50 mm	– – –	
20-Link Length	317 – 317.7 mm	323 mm	

Drive Chain

The drive chain must be checked, adjusted, and lubricated for safety and to prevent excessive wear. If the chain becomes badly worn or maladjusted – either too loose or too tight – the chain could jump off the sprockets or break.

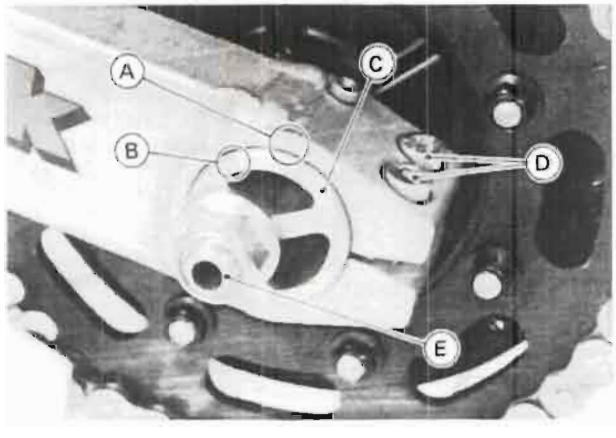
WARNING

○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.

Chain Slack Inspection

- Stand the motorcycle on its side stand.
- If the drive chain appears dry, lubricate it.
- Check to see that both chain adjusters are in the same position. If they are not, adjust wheel alignment as described in Wheel Alignment Adjustment.



A. Swing Arm Notch
B. Chain Adjuster Notch
C. Chain Adjuster
D. Clamp Bolts
E. Rear Axle

"NOTE"

○Wheel alignment can also be checked using the straightedge or string method.

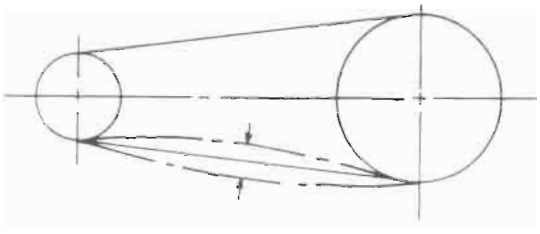
WARNING

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

- Rotate the rear wheel to find the place where the chain is tightest because the chain wears unevenly.
- Measure the vertical movement midway between the sprockets.

★If the drive chain is too tight or too loose, adjust it so that the chain slack is within the standard value.

Drive Chain Slack



Drive Chain Slack

Standard:	40 – 45 mm
Too tight:	less than 40 mm
Too loose:	more than 50 mm

"NOTE"

○In wet and muddy conditions, mud sticks to the chain and sprockets resulting in an overly tight chain, and the chain may break. To prevent this, adjust the chain to the following specification.

Drive Chain Slack–wet, muddy condition

Standard:	45 – 50 mm
Too tight:	less than 45 mm
Too loose:	more than 55 mm

Chain Slack Adjustment

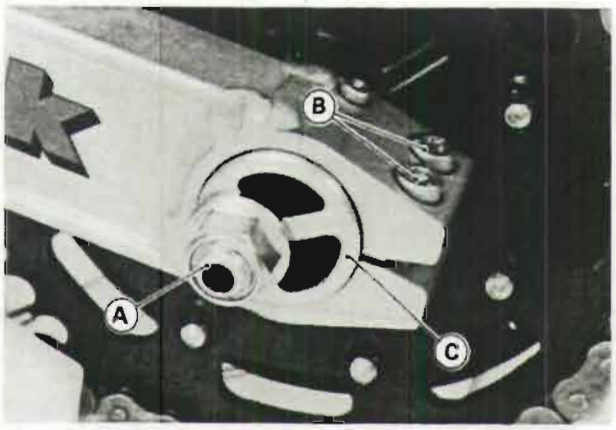
"NOTE"

○Do not loosen the axle nut.

- Loosen the left and right chain adjuster clamp bolts.
- Insert the wrench into the rear axle head, and turn the chain adjusters forward or rearward until the drive chain has the correct amount of chain slack.
- Tighten the chain adjuster clamp bolts to the specified torque.

Tightening Torque

Adjuster Clamp Bolts: 24 N-m (2.4 kg-m, 17.5 ft-lb)



A. Rear Axle
B. Adjuster Clamp Bolt
C. Chain Adjuster

WARNING

○If the clamp bolts are not securely tightened, an unsafe riding condition may result.

- Rotate the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Check the rear brake effectiveness. Adjust as required. See chapter 10.

Wheel Alignment Adjustment

- Loosen the axle nut.
- Loosen the left and right adjuster clamp bolts, and turn the adjusters so that the notches on both sides are aligned with the swing arm notches.
- Tighten the clamp bolts temporarily, and then the axle nut to the specification.
- Adjust the chain slack (remarked above).

WARNING

○If the axle nut and clamp bolts are not securely tightened, an unsafe riding condition may result.

Tightening Torque

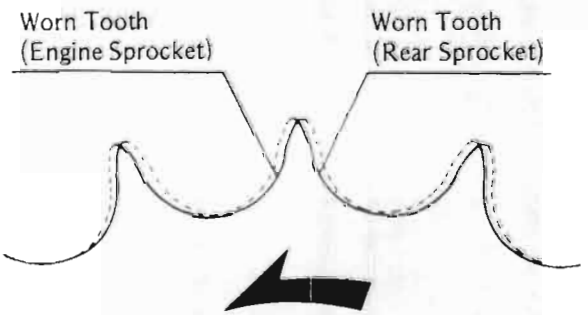
Axle Nut: 93 N-m (9.5 kg-m, 69 ft-lb)

Wear Inspection

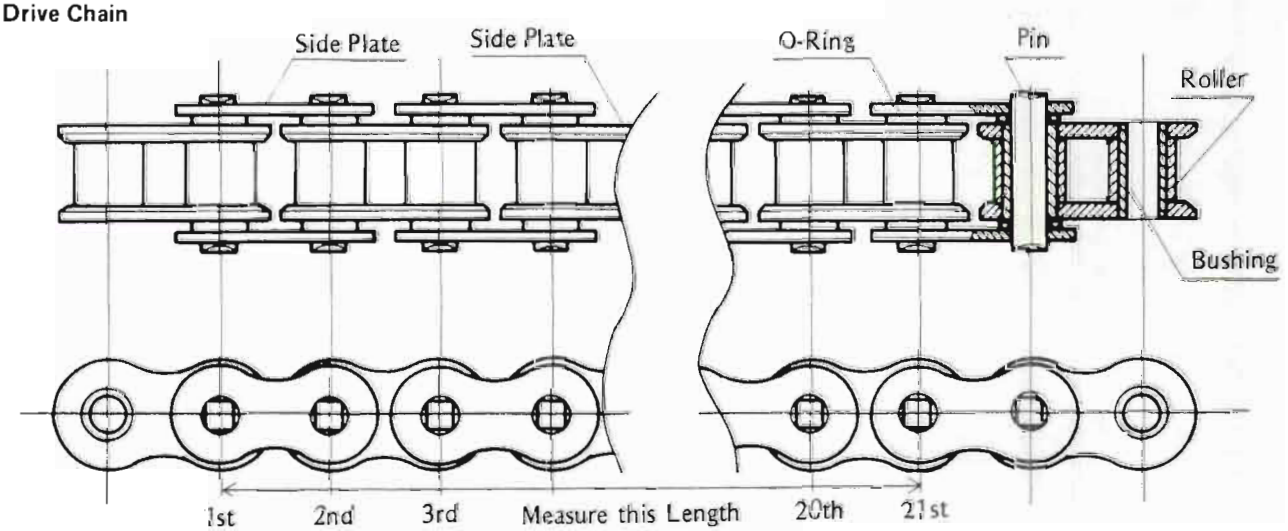
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.
- Also inspect the sprockets for unevenly or excessively worn teeth; and damaged teeth.

★If there is any irregularity, replace the drive chain and both sprockets.

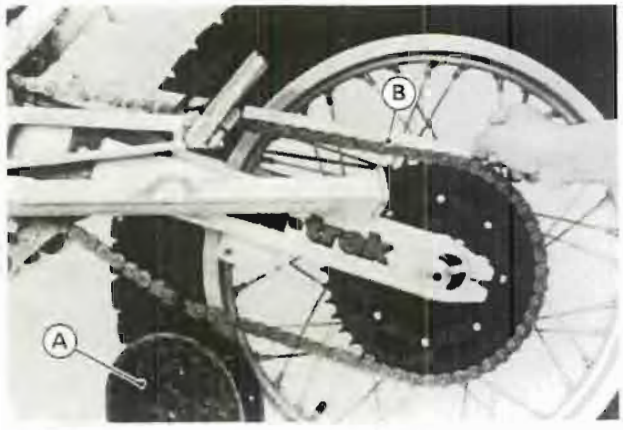
Sprocket Wear (exaggerated for illustration)



Drive Chain



•If the chain appears dry, lubricate it.
•Stretch the chain taut by hanging a **10 kg** weight on the chain.
•Measure the length of 20 links on the straight part of the chain from pin center of the 1st pin to pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.



A. Weight B. Measure

★If any measurement exceeds the service limit, (see Service Data Section) replace the chain. Also replace the engine and rear sprockets when the drive chain is replaced.

Chain Guide Wear

•Visually inspect the drive chain guide.
★If the guide is worn excessively or damaged, replace it.

A. Drive Chain Guide

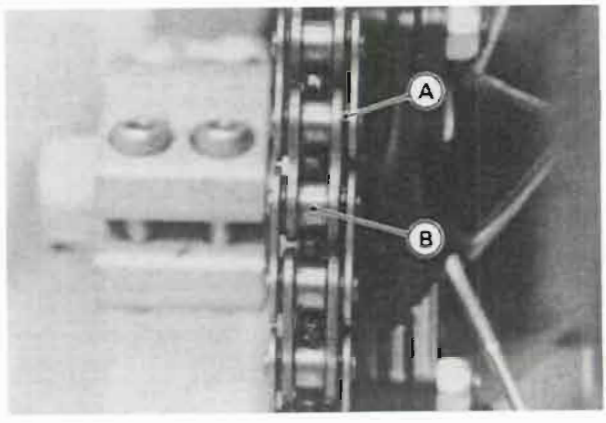
Lubrication

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. 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.
•If the chain appears especially dirty, it should be cleaned before 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 oil for cleaning an O-ring drive chain . Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-rings.**
○**Immediately blow the chain dry with compressed air after cleaning.**
○**Completely clean and dry the chain within 10 minutes.**

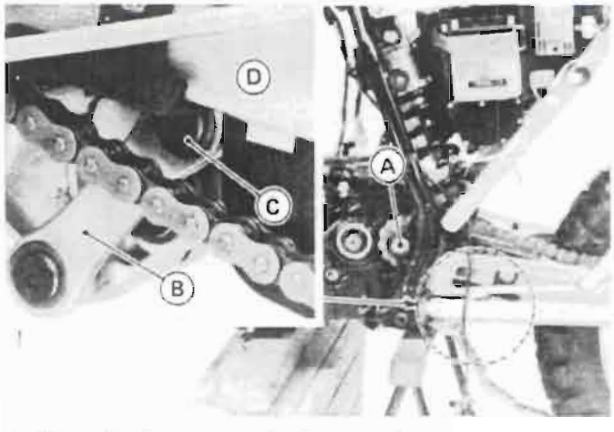
•Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
•Wipe off any excess oil.



A. O-Ring B. Roller

Drive Chain Removal

•Loosen the pivot shaft nut.
•After the engine sprocket removal (See chapter 4) and the rear wheel removal (See chapter 8), remove the pivot shaft, the circlip, and the sleeve.
○It is necessary to raise the rear wheel off the ground with a suitable stand.
•Remove the drive chain along with the swing arm.



A. Pivot Shaft C. Removal Point
B. Tie Rod D. Swing Arm

Engine Sprocket

Removal Point

See chapter 4.

Installation Point

See chapter 4.

Brakes

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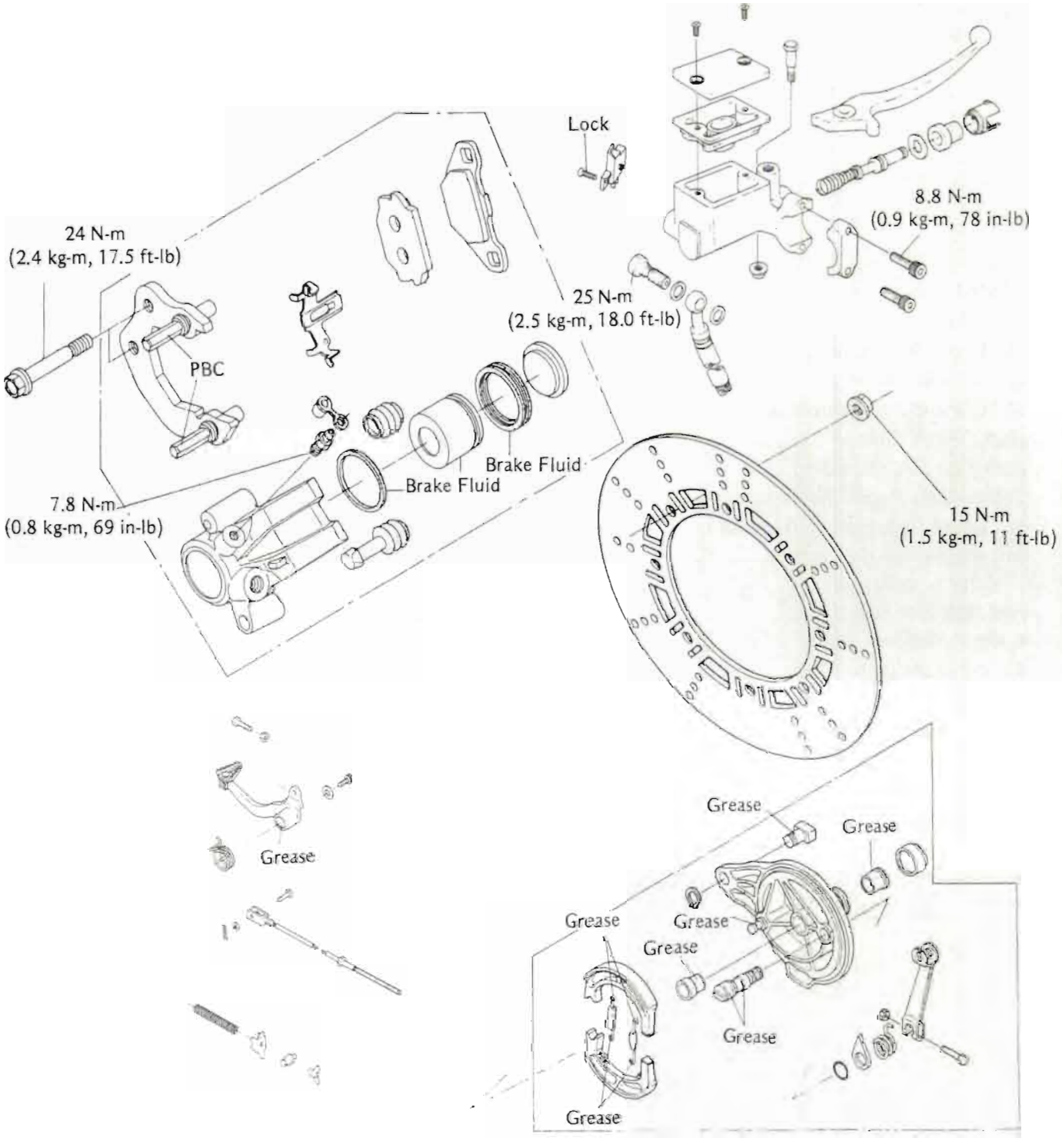
Exploded Views



PBC : Apply PBC (Poly Butyl Cuprysil) grease.

Brake Fluid : Apply brake fluid to the slipping surface.

Grease : Apply grease

Service Data

Item	Standard	Service Limit	See Page
Front Brake:			
Brake fluid grade	D.O.T.3	– – –	10-5
Pad lining thickness	4.5 mm	1 mm	10-4
Disc thickness	2.8 – 3.1 mm	2.5 mm	– – –
Disc runout	0.2 mm	0.3 mm	10-11
Brake light switch	Non-adjustable	– – –	– – –
Rear Brake:			
Brake pedal position	0 – 30 mm	– – –	10-8
Brake pedal play	20 – 30 mm	– – –	10-8
Drum brake cam lever angle	80°		10-9
Drum inside diameter	130.00 – 130.16 mm	130.75 mm	– – –
Brake light switch	ON after about 15 mm pedal travel	– – –	10-11

Recommended Brake Fluid

Atlas Extra Heavy Duty
Shell Super Heavy Duty
Texaco Super Heavy Duty
Wagner Lockheed Heavy Duty
Castrol Girling – Universal
Castrol GT (LMA)
Castrol Disc Brake Fluid

Front Brake Adjustment/Inspection

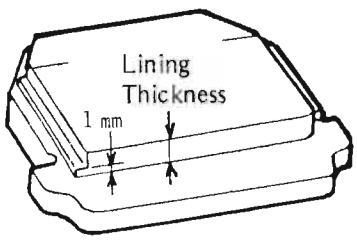
Brake Lining Wear Inspection

●Check the lining thickness of the pads in the caliper.
★If the lining thickness of either pad is less than the service limit, replace both pads in the caliper as a set.

Pad Lining Thickness

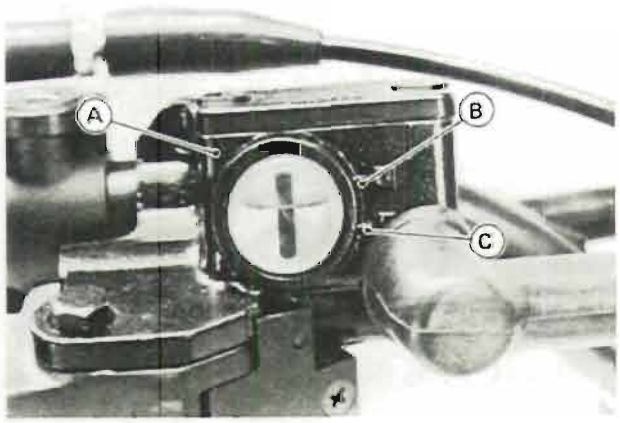
Standard	:	4.5 mm
Service Limit	:	1 mm

Brake Pad



Brake Fluid Level Inspection

●Holding the reservoir horizontally, check that the brake fluid level in the reservoir is between the upper and lower level lines.



A. Reservoir
B. Upper Level
C. Lower Level

★If the fluid level is under the lower level line, check for fluid leakage from the brake line, and add the brake fluid as follows.
○Remove the reservoir cap, and fill the reservoir to the upper level with the same type and brand of brake fluid that already is in the reservoir. Then install the reservoir cap.

WARNING

○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 already is in the reservoir are unidentified.
○After changing the fluid, use only the same type and brand of fluid thereafter.

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

WARNING

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

Brake Fluid Change

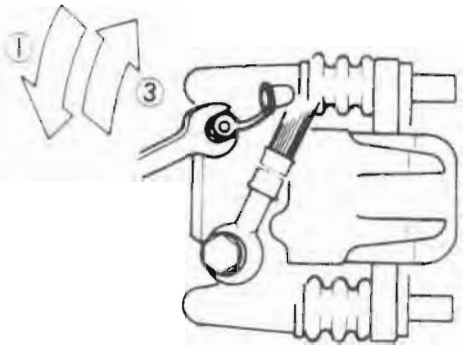
●Remove the reservoir cap, and remove the rubber cap on the bleed valve.
●Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
●Open the bleed valve (counterclockwise to open), and pump the brake lever until all the fluid is drained from the line.
●Close the bleed valve.
●Fill the reservoir with fresh brake fluid.
●Open the bleed valve, apply the brake by the brake lever, close the valve with the brake held applied, and then quickly release the lever. Repeat this operation until the brake line is filled and fluid starts coming out of the plastic hose.

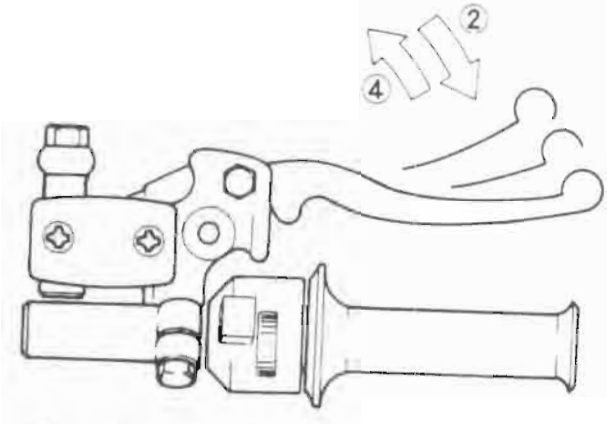
"NOTE"

○Replenish the fluid in the reservoir as often as necessary to keep it from running completely out.

●Bleed the air from the line.

Filling Up the Brake Line





1. Open the bleed valve.
2. Apply the brake and hold it.
3. Close the bleed valve.
4. Then release the brake suddenly.

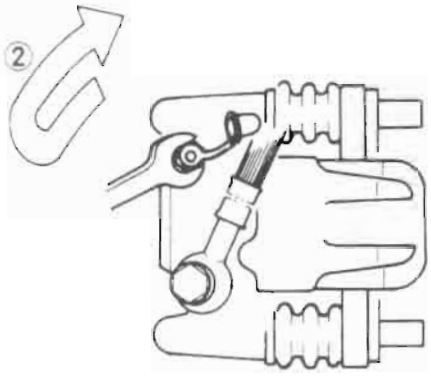
Brake Line Air Bleeding

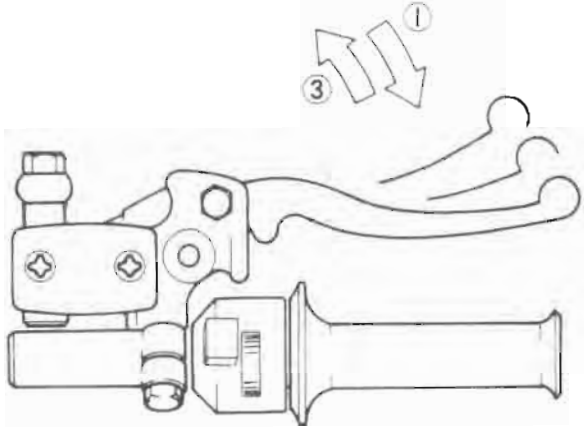
- Remove the reservoir cap, and check that there is plenty of fluid in the reservoir.
- With the reservoir cap off, slowly pump the brake lever several times until no air bubbles can be seen rising up from the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.
- Install the reservoir cap.
- Remove the rubber cap on the bleed valve.
- Attach a clear plastic hose to the bleed valve on the caliper, running the other end of the hose into a container.
- Pump the brake lever a few times until it becomes hard and then, holding the lever squeezed, quickly open (turn counterclockwise) and close the bleed valve. Then release the lever. Repeat this operation until no more air can be seen coming out into the plastic hose.

"NOTE"

- *The fluid level must be checked several times during the bleeding operation and replenished 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.*

Air Bleeding





1. Hold the brake applied.
2. Quickly open and close the valve.
3. Release the brake.

- Install the rubber cap on the bleed valve.
- Tighten the bleed valve to the specification.

Tightening Torque

Bleed Valve	:	7.8 N-m (0.8 kg-m, 69 in-lb)

- Fill the brake fluid to the proper level, referring to the brake fluid level inspection.
- Install the reservoir cap.
- Apply the brake forcefully for a few seconds, and check for fluid leakage around the fittings.

Brake Fluid Recommendation

Recommended fluids are given in the table on the Service Data section. If none of the recommended brake fluids is available, use extra heavy-duty brake fluid only from a container marked D.O.T.3.

WARNING

○Never reuse old brake fluid.
○Do not use fluid from a container that has been left unsealed or that has been open for a long time.
○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.
○Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
○Don't add or change the fluid in the rain or when a strong wind is blowing.
○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, motor 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 reach and break down the rubber used in the disc brake.
○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.
○If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE.

CAUTION

○Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.

Front Brake Disassembly/Assembly

●Observe the WARNING and CAUTION above when disassembling or assembling the front brake.

Inspection and Adjustment after Installation

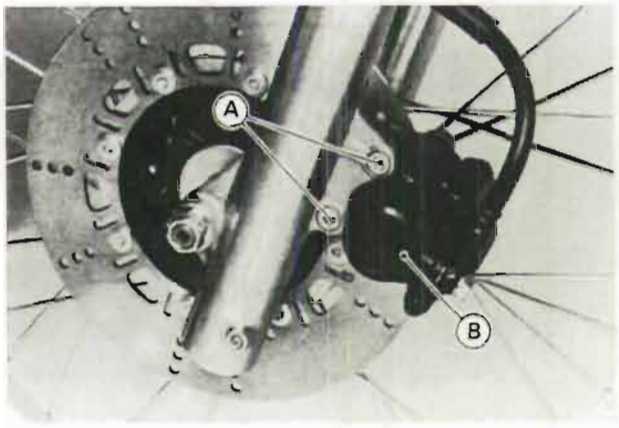
●Bleed the brake line after master cylinder and brake hose installation. (See Brake Line Air Bleeding paragraph).
●Check the front brake for good braking power, no brake drag, and no fluid leakage.

WARNING

○Do not attempt to drive 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.

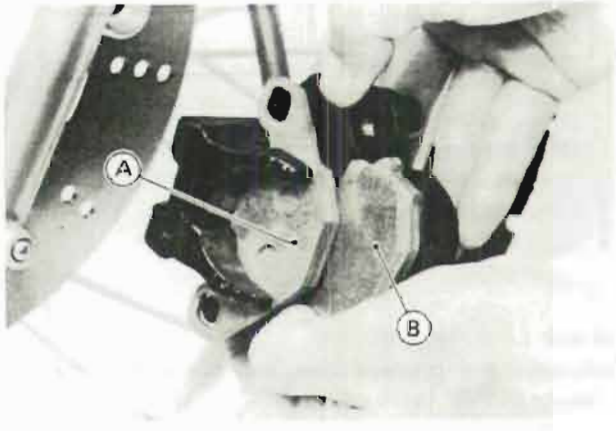
Pad Removal Points

●Remove caliper mounting bolts (2) and lift the caliper off the disc.



A. Caliper Mounting Bolts B. Caliper

●Push the caliper piston in by hand as far as it will go and remove the pads.



A. Pad B. Pad

Caliper Removal Points

●If the caliper is to be disassembled after removal and if compressed air is not available, remove the piston using the following two steps before disconnecting the brake hose from the caliper.
○Remove the pads.
○Pump the brake lever to remove the caliper piston.

Caliper Installation Points

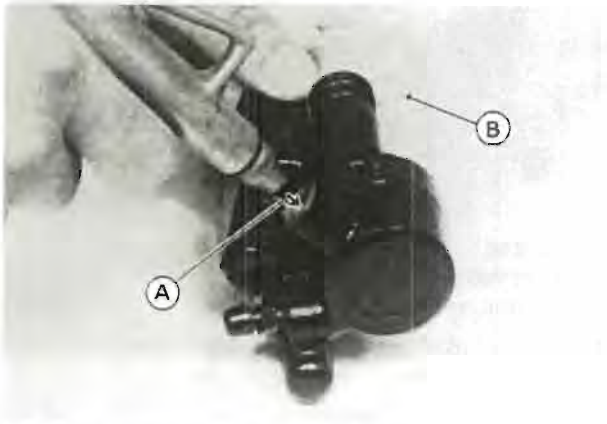
●Discard the used flat washers, and install a new washer on each side of the brake hose fittings.
●Check the fluid level in the master cylinder, and bleed the brake line (See Brake Line Air Bleeding Paragraph).
●Check the brake for good braking power, no brake drag, and no fluid leakage.

Caliper Disassembly Points

- Using compressed air, remove the piston.
  - Cover the caliper opening with a clean, heavy cloth.
  - Remove the piston by lightly applying compressed air to where the brake line fits into the caliper.

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.**

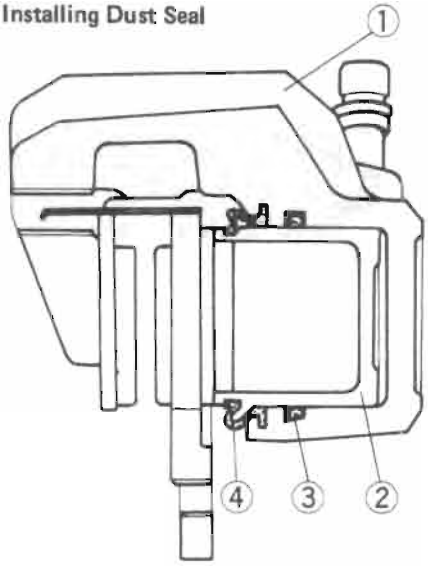


A. Apply compressed air. B. Cloth

Caliper Assembly Points

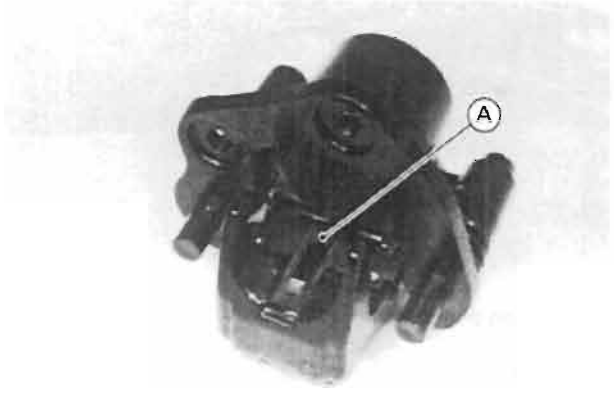
- Apply brake fluid to the outside of the piston and the fluid seal, and push the piston into the cylinder by hand. Take care that neither the cylinder nor the piston skirt get scratched.
- Install the dust seal around the piston. Check that the dust seal is properly fitted into the grooves in the piston and caliper.

Installing Dust Seal



1. Caliper
2. Piston
3. Fluid Seal
4. Dust Seal

- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts and holder holes. (PBC is a special high temperature, water-resistant grease).
- Install the anti-rattle spring in the calipers as shown.



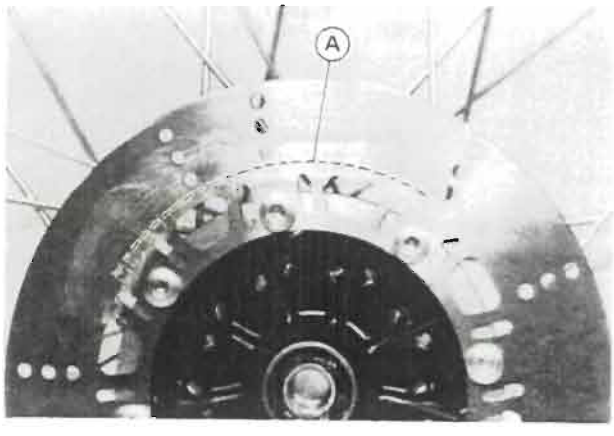
A. Anti-rattle spring

Disc Installation Points

"NOTE"

- *Clean the disc and wheel hub mating surfaces of any dirt and foreign particle.*

- Mount the brake disc on the wheel so that the marked side faces outwards.

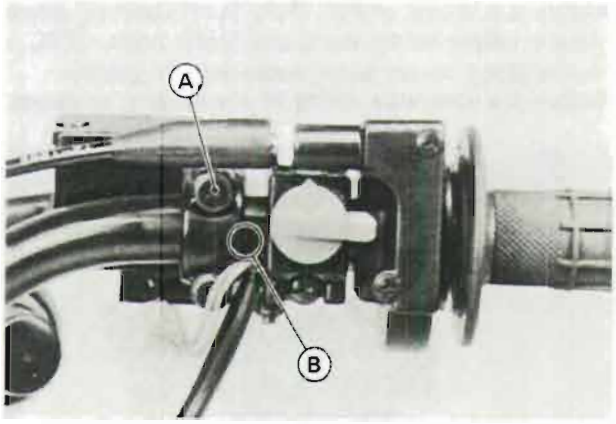


A. Marking

- After installing the disc, check the disc runout (See the Maintenance paragraph).

Front Master Cylinder Installation

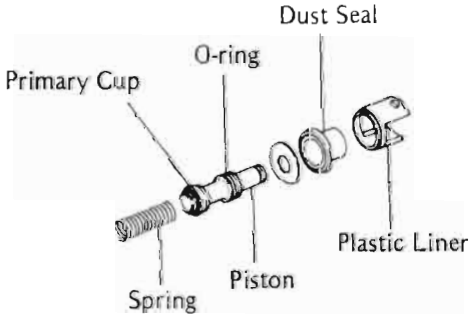
- The master cylinder clamp must be installed with the small projection towards the throttle grip.
- Torque the upper clamp bolt first, and then the lower clamp bolt to the specification. There will be a gap at the lower part of the clamp after tightening.



A. Tighten upper clamp bolt first. B. Projection

Front Master Cylinder Disassembly Points

- To remove the liner, using a thin-bladed screwdriver or some other suitable tool, press in the plastic liner tabs which catch in the holes in the master cylinder.



CAUTION

Do not remove the primary cup and O-ring from the piston since removal will damage them.

Front Master Cylinder Assembly Points

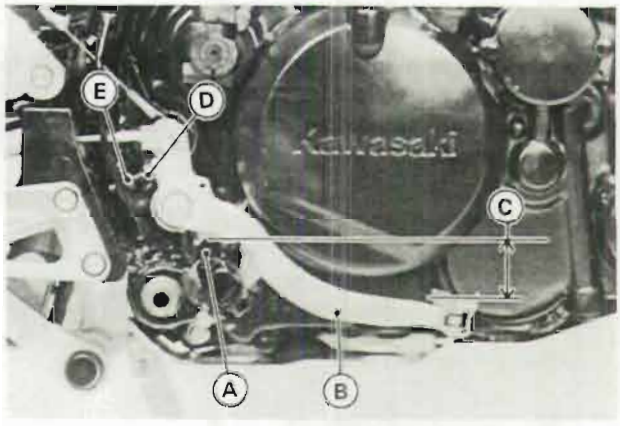
- Apply brake fluid to the parts removed and to the inner wall of the cylinder. Take care not to scratch the piston or the inner wall of cylinder.
- Check to see that the piston return spring pushes back the piston to its rest position when the spring is compressed.

Rear Brake Adjustment/Inspection

Rear brake adjustment consists of two separate adjustments: brake pedal position and brake pedal travel.

Pedal Position Adjustment

- When the brake pedal is in its rest position, it should be **0 – 30** mm lower than the top of the footpeg.
- If it is not, loosen the locknut, turn the adjusting bolt to obtain the correct pedal position, and then tighten the locknut.



A. Footpeg
B. Brake Pedal
C. 0 – 30 mm
D. Adjusting Bolt
E. Locknut

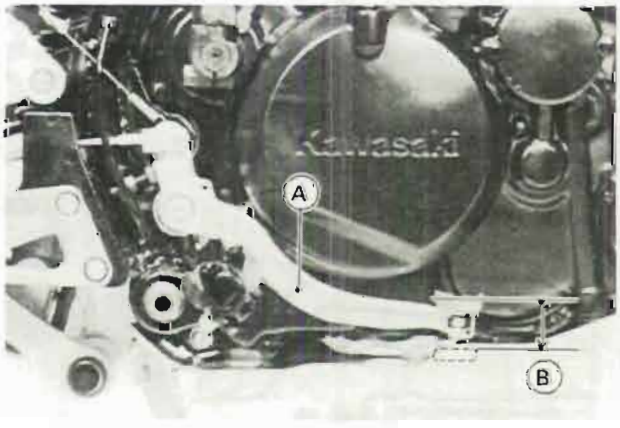
- After the adjustment is made, adjust the brake light switch if necessary.

Pedal Play Adjustment

- Check that the rear brake pedal has the specified play when the pedal is pushed down lightly by hand.

Brake Pedal Play

Standard:	20 – 30 mm

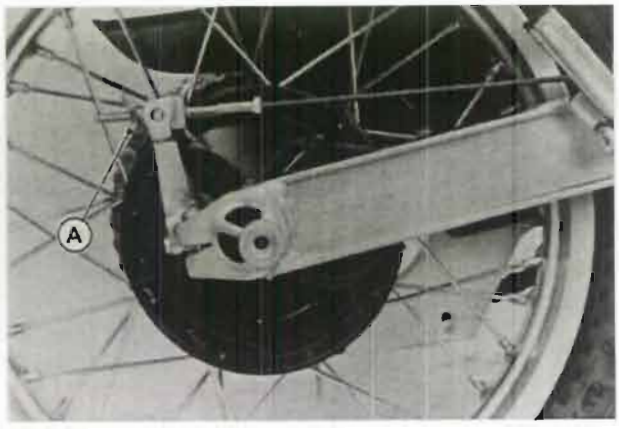


A. Rear Brake Pedal B. Play

★If the pedal play is wrong, adjust it.

- Turn the adjusting nut at the brake panel so that the pedal has proper play.
- Operate the pedal a few times to see that it returns to its rest position immediately upon release.
- Rotate the front and rear wheels to check for brake drag.
- Check braking effectiveness.

★If there is any doubt as to the condition of the brakes, check the brake parts for wear or damage.

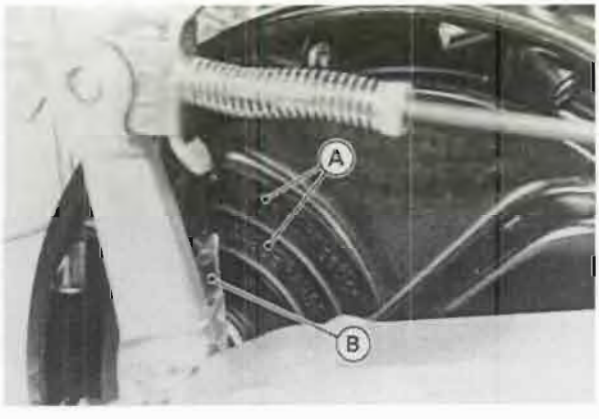


A. Adjusting Nut

Brake Lining Wear Inspection

•Check that the brake lining wear indicator points within the USABLE RANGE when the rear brake is fully applied.

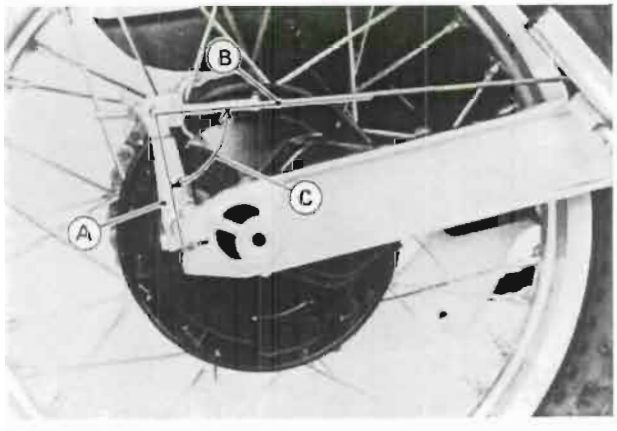
★If does not, the brake shoes must be immediately replaced and the other brake parts examined.



A. USABLE RANGE B. Wear Indicator

•Check that the rear brake cam lever comes to an 80° – 90° angle with the rear brake rod when the rear brake is fully applied.

★If it does not, adjust the rear brake cam lever angle.



A. Cam Lever C. 80 – 90°
B. Brake Cable D. Indicator

WARNING

○**Since a cam lever angle greater than 90° reduces braking effectiveness, cam lever angle adjustment should not be neglected.**

Cam Lever Angle Adjustment

•Remove the bolt and nut, and take off the cam lever.
•Mount the cam lever at a new position so that the cam lever has a proper angle when the brake is fully applied.
•Adjust the brake play.

WARNING

○**When remounting the cam, be sure that the position of the indicator on the serrated shaft is not altered.**
○**A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper operation, taking particular note of the brake lining wear indicator position.**
○**In case of doubt as to braking effectiveness, disassemble and inspect all internal brake parts. Worn parts could cause the brake to lock or fail.**

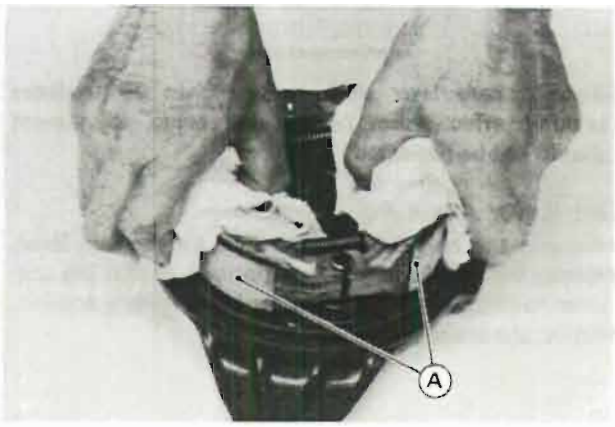
Rear Brake Disassembly/Assembly

Disassembly Points

WARNING

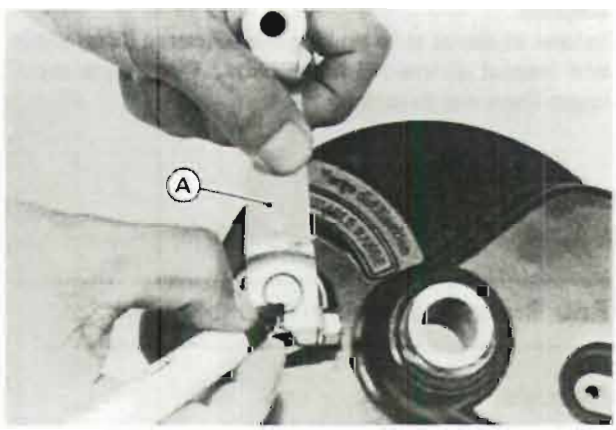
○**Brake linings contain asbestos fiber. Inhalation of asbestos may cause serious scarring of the lungs and may promote other internal injury and illness, including cancer. Observe the following precautions when handling brake linings.**
○**Never blow brake lining dust with compressed air.**
○**If any components are to be cleaned, wash with detergent, then immediately discard the cleaning solution and wash your hands.**
○**Do not grind any brake lining material unless a ventilation hood is available and properly used.**

•Using a clean cloth around the linings to prevent grease or oil from getting on them, remove the brake shoes by pulling up on the center of the linings.



A. Brake Shoes

●Before removing the brake cam lever, mark the position of the cam lever so that it can be installed later in the same position.



A. Brake Cam Lever

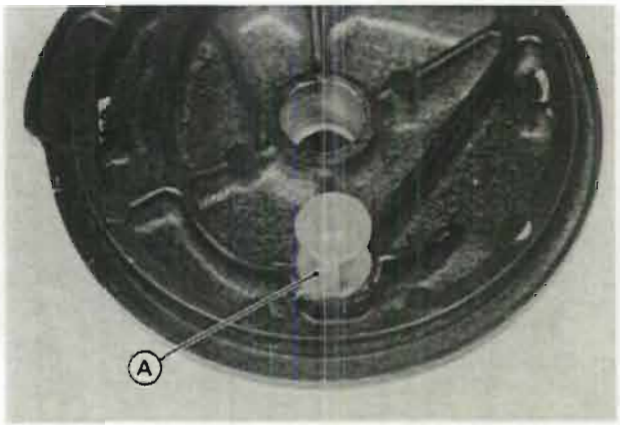
Assembly Points

●Clean the old grease from the camshaft, and regrease using regular cup grease. Apply grease to the center of the shaft and to the cam surfaces. Do not overgrease.

"NOTE"

○*Do not get any grease on the brake shoe linings, and wipe off any excess grease so that it will not get on the linings or drum after brake assembly.*

○*The brake cam is not symmetrical. Install the brake camshaft so that the round edge of the cam lies as shown in the figure at the top of the next column.*

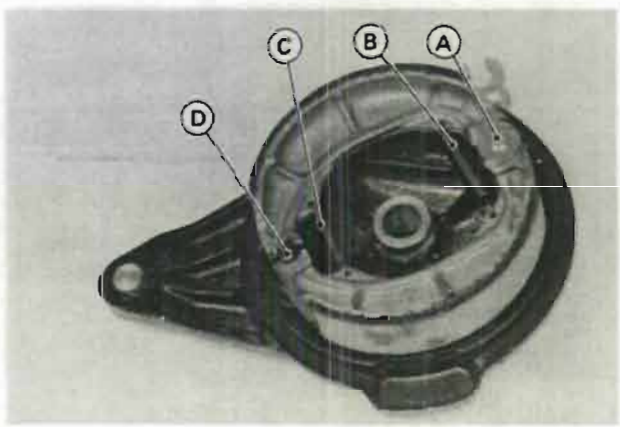


A. Round Edge

○When hooking the brake shoe springs onto the brake shoes, the longer spring should be on the camshaft side.

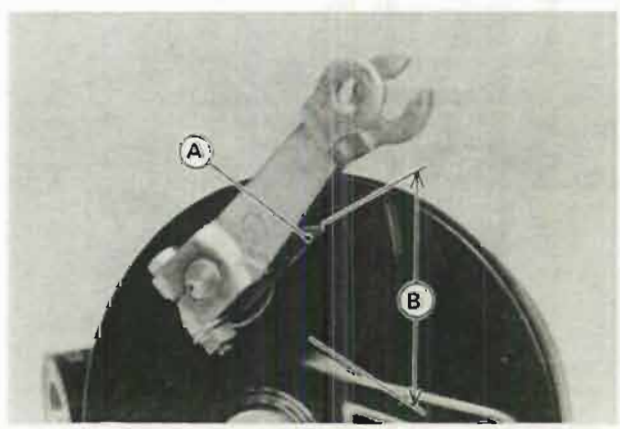
WARNING

○**Improper installation will cause ineffective braking.**



A. Brake Camshaft
B. Long Spring
C. Short Spring
D. Anchor Pin

●Install the O ring and fit the indicator on the serration so that it points to the extreme right of the USABLE RANGE.



A. Indicator
B. USABLE RANGE

•Install the cam lever in its original position on the camshaft, and tighten its bolt.

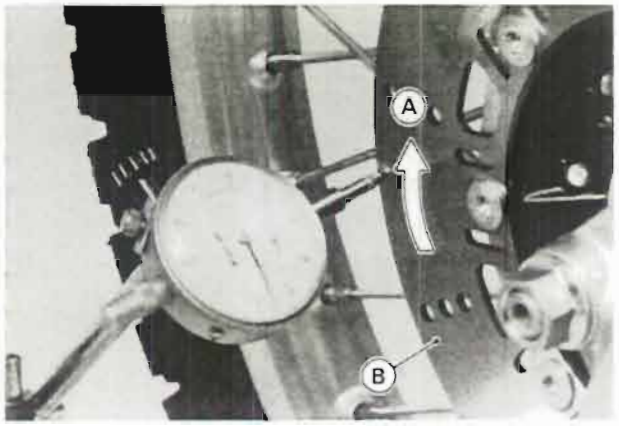
Brake Maintenance

Front Brake Disc Runout Inspection

A warped disc will cause the brake pads to drag on the disc and will wear down both the pads and disc quickly. Dragging will also cause overheating and poor braking efficiency.

•Raise the front wheel off the ground.
•Turn the handlebar fully to one side.
•Set up a dial gauge against the brake disc and rotate the wheel to measure the runout. The difference between the highest and lowest dial reading is the amount of runout.

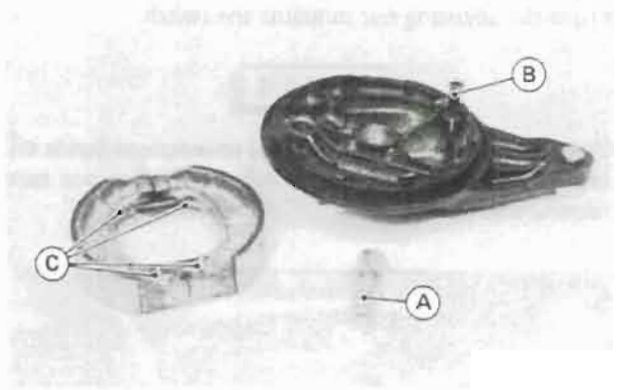
★If runout is beyond the service limit, replace the brake disc.



A. Turn B. Brake Disc

Rear Brake Camshaft Lubrication

•Disassemble the rear drum brake.
•Using a high flash-point solvent, clean the old grease off the brake camshaft, camshaft hole, and other pivot points.
★Replace the drum brake parts if they show wear or damage.
•Apply grease to the brake pivot points (brake shoe anchor pin, spring ends, and cam surface of the camshaft) and fill the camshaft groove with grease. Do not get any grease on the brake shoe linings, and wipe off any excess grease so that it does not get on the linings or drum after brake assembly.



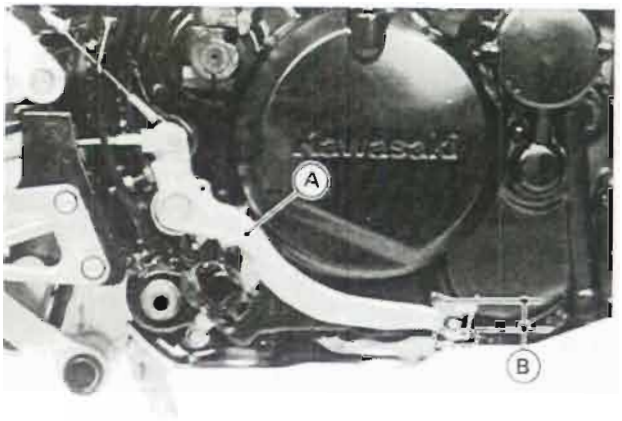
A. Brake Camshaft
B. Anchor Pin
C. Spring Ends
— Apply grease

•Assemble the rear drum brake.
•Adjust the brake play.

Brake Light Switch

Inspection

•Turn on the ignition switch.
•Check the operation of the rear brake light switch by depressing the brake pedal. The brake light should go on after about **15 mm** of pedal travel.
★If it does not, adjust the brake light switch.



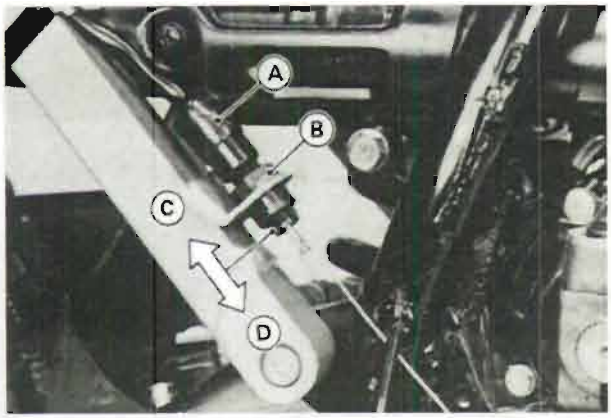
A. Rear Brake Pedal B. 15 mm

Adjustment

●Turn the adjusting nut to adjust the switch.

WARNING

○**To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.**



A. Rear Brake Light Switch
B. Adjusting Nut
C. Lights sooner.
D. Lights later.

Removal

●Press in the rear brake light switch tabs which catch in the bracket hole, and remove the rear brake light switch.

Suspension

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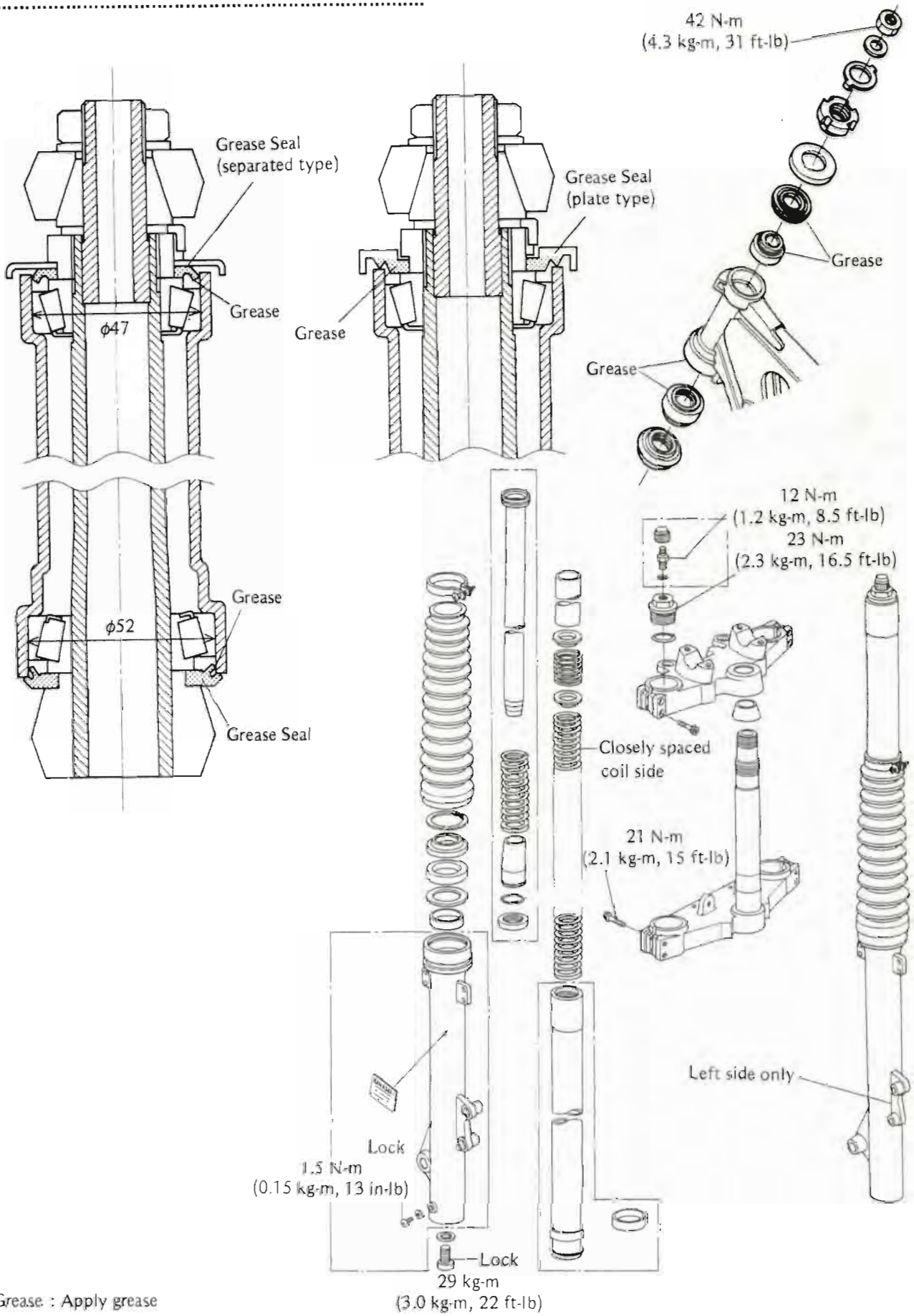
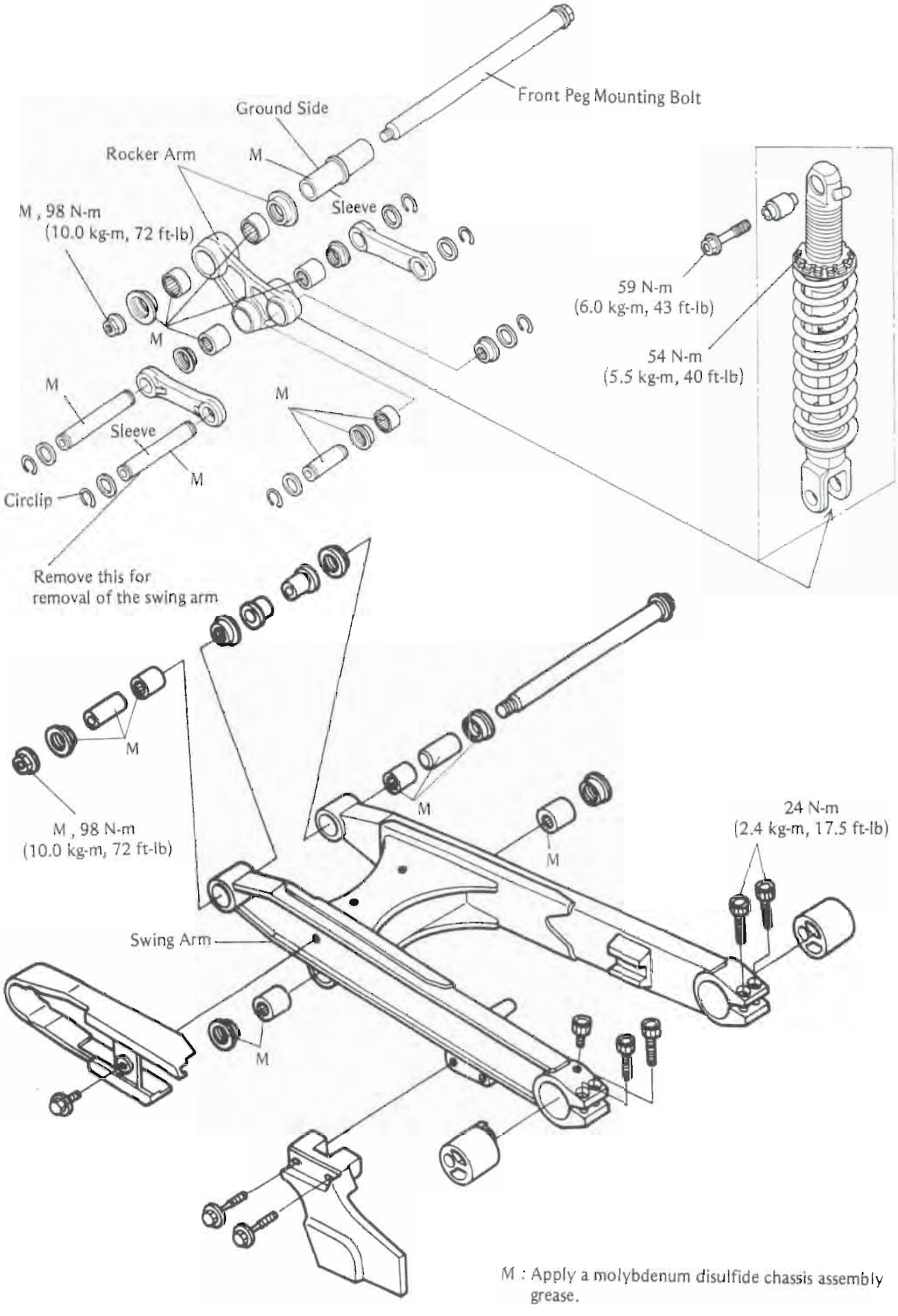
Exploded Views



Grease : Apply grease

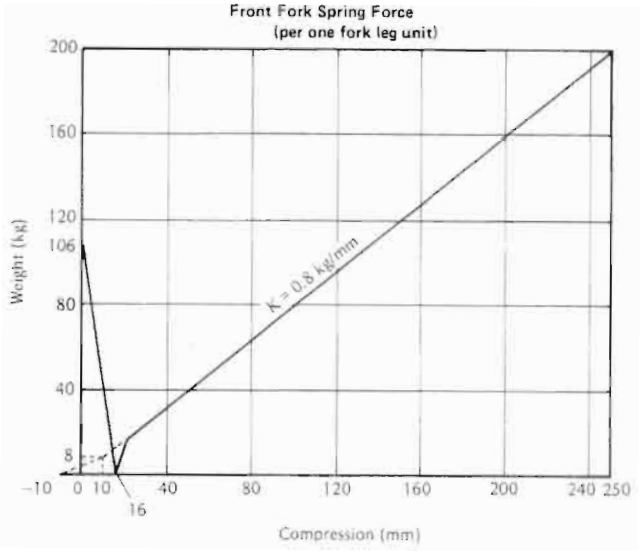


M : Apply a molybdenum disulfide chassis assembly grease.

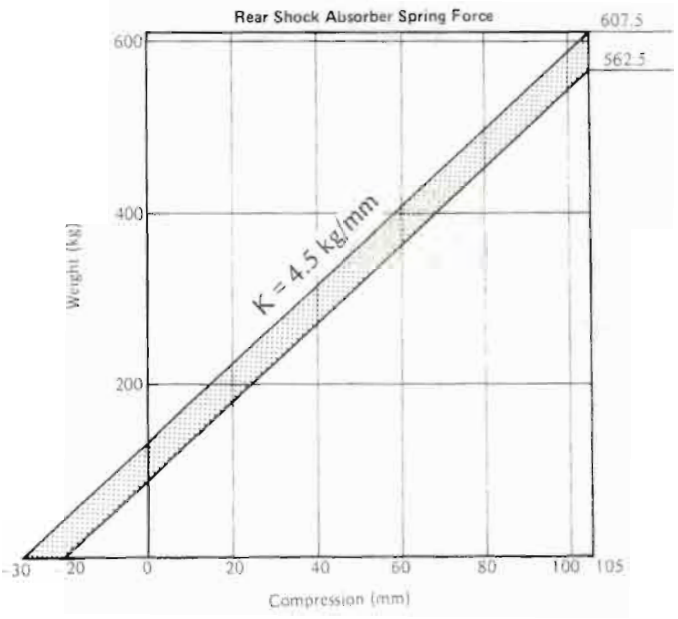
Service Data

Item	Standard	Service Limit	See Page
Front Fork:			
Air pressure	Atmospheric pressure		11-8
Oil amount	430 ±4 mL	— — —	11-9
Oil level	170 ±2 mm	— — —	11-9
(compressed without main spring)	(from the top of the inner tube)		
Oil viscosity	SAE 10W		
Rear Shock Absorber:			
Spring preload	882 N (90 kg, 199 lb)	— — —	11-12
Damper setting position	2	— — —	
Swing Arm			
Sleeve outside diameter	19.979 – 20.000 mm	19.95 mm	11-14
Uni-trak			
Sleeve outside diameter	19.979 – 20.000 mm	19.95 mm	11-14

Front Fork Spring Force
(per one fork leg unit)



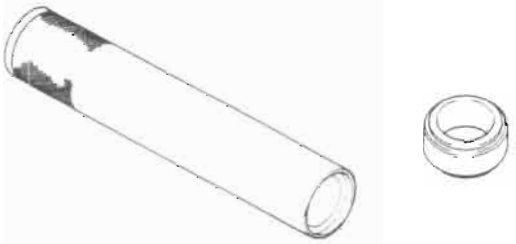
Rear Shock Absorber Spring Force



Special Tool

Stem Nut Wrench: 57001-1100

Stem Bearing Driver: 57001-137
Adapter: 57001-1074



Stem Bearing Remover: 57001-1107

Handle: 57001-183
Adapter: 57001-1057

Driver Press Shaft: 57001-1075

Oil Seal Driver: 57001-1104

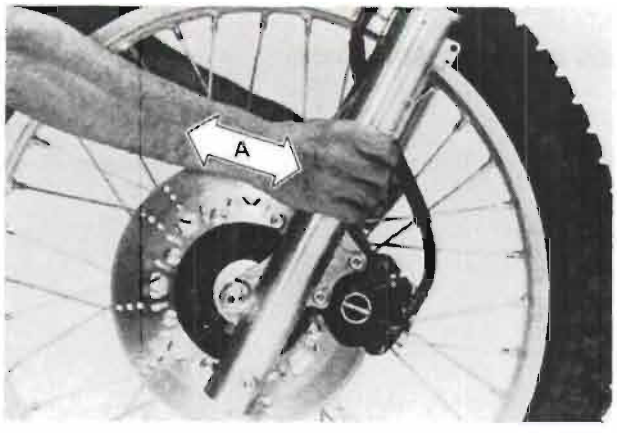
Driver: 57001-1076, 1106

Steering

If the steering is too tight, it will be difficult to turn the handlebar quickly, the motorcycle may pull to one side, and the steering stem bearings may be damaged. If the steering is too loose, the handlebar will vibrate and the motorcycle will be unstable and difficult to steer in a straight line.

Steering Inspection

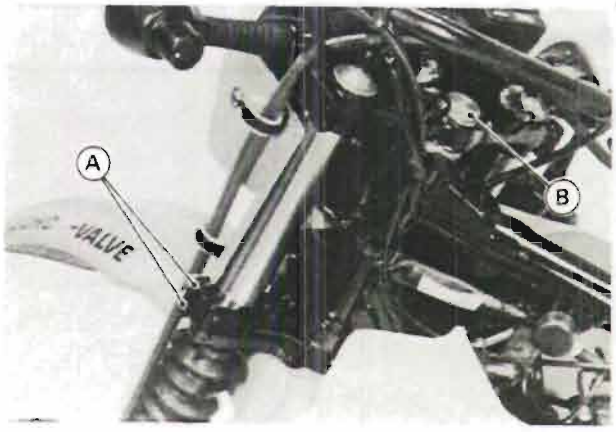
- Place a stand under the frame to raise the front wheel off the ground.
- From the centered position of the fork slowly push the handlebar to either side.
- ★If the handlebar begins to turn by the action of gravity and continues moving until the ridge on the stem base stops against the stop plate on the frame head pipe, the steering is not too tight.
- ★If the handlebar does not begin to turn by the action of gravity, the steering is too tight, necessitating adjustment.
- Squat in front of the motorcycle and grasp the lower ends of the front fork. Push and pull the fork end back and forth.
- ★If play is felt, the steering is too loose, necessitating adjustment.



A. Push and pull the front fork.

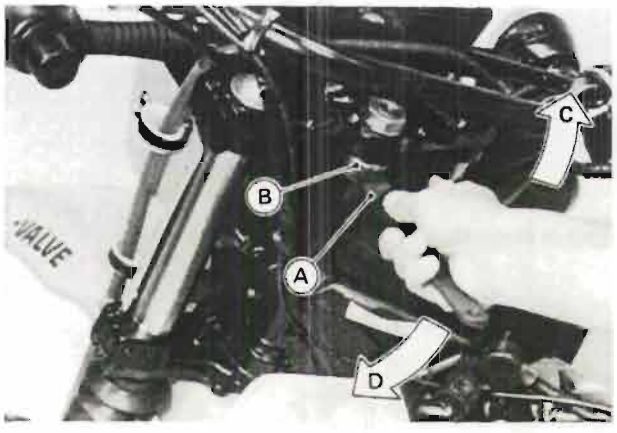
Steering Adjustment

- Remove the fuel tank.
- Loosen the front fork lower clamp bolts(2) to free the fork tubes from the steering stem during adjustment.
- Remove the handlebar clamp bolts and take off the handle.
- Loosen the steering stem head nut.



A. Front Fork Lower Clamp Bolts
B. Stem Head Nut

- Turn the steering stem locknut $\frac{1}{8}$ turn (maximum) at a time using stem nut wrench 57001-1100. If the steering is too tight, loosen the locknut a fraction of a turn; if the steering is too loose, tighten it a fraction of a turn.



A. Stem Nut Wrench: 57001-1100
B. Stem Locknut
C. Loosen the stem locknut
D. Tighten the stem locknut

- Tighten the steering stem head nut first and then the front fork lower clamp bolts to the specified torque in this order.

Tightening Torque

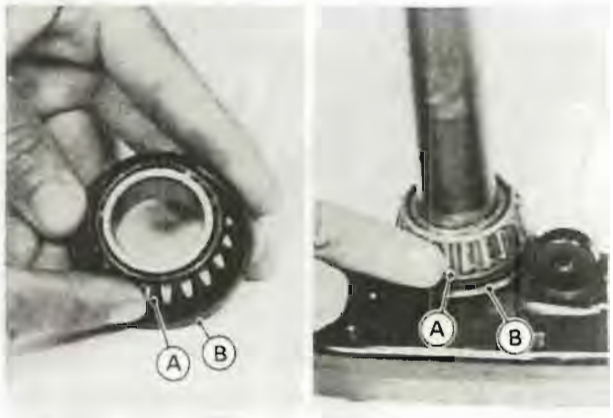
Stem head nut:	42 N-m (4.3 kg-m, 31 ft-lb)
Front fork lower clamp bolts:	21 N-m (2.1 kg-m, 15 ft-lb)

- Temporarily install the handlebar on the stem head.
- Check the steering again.
- ★If the steering is still too tight or too loose, repeat the adjustment. If the proper condition cannot be obtained, inspect the steering parts.
- Install the handlebar correctly. (See chapter 12).

Stem Bearing Lubrication

Whenever the steering stem is disassembled, the steering stem bearings should be relubricated.

- Wipe all the old grease off the races and rollers. If neccessary, wash them in a high flash-point solvent.
- Apply grease liberally to the upper and lower races, and pack the cone bearings with grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.



A. Grease B. Grease Seal

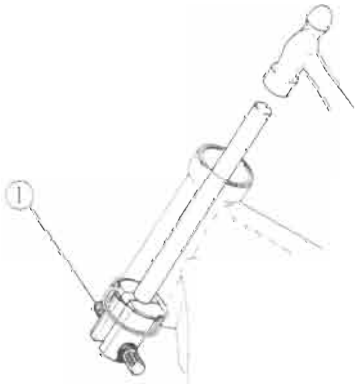
Grease Seal Deterioration, Damage

- Inspect the grease seal for any signs of deterioration or damage, and replace if necessary.
- Replace the grease seal with a new one whenever it has been removed. The grease seal comes off whenever the lower bearing inner race is removed.

Stem Bearing Removal

- Remove the following parts.
  - Fuel tank
  - Headlight unit
  - Meter unit
  - Front wheel
  - Front fork legs
  - Handlebar, holders
  - Stem head nut
  - Steering stem head
- To remove the outer races pressed into the head pipe, install a stem bearing remover as shown below, and hammer the stem bearing remover to drive it out.

Outer Race Removal



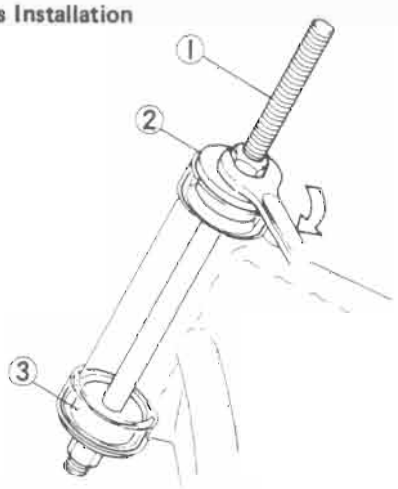
1. Stem Bearing Remover (57001-1107)

- Remove the lower inner race, which is pressed onto the steering stem, with a chisel.
  - If any steering stem bearing is damaged, it is recommended that all the bearings and the steering stem should be replaced with new ones.

Stem Bearing, Grease Seal Installation

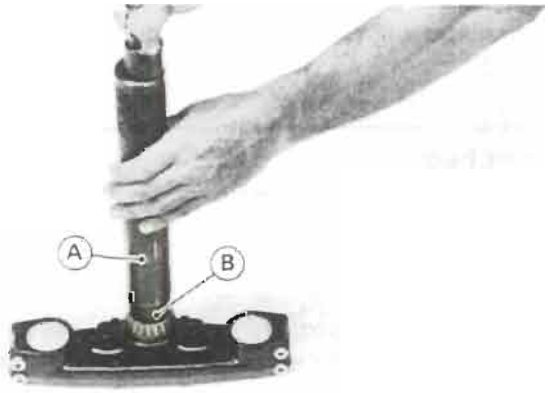
- Apply grease to the outer races, and then drive them into the head pipe using a bearing driver and driver press shaft (special tool). Be sure to press them in until they stop at the stepped portion in the head pipe.

Outer Races Installation



1. Driver Press Shaft (57001-1075)
2. Drivers (57001-1106)
3. Drivers (57001-1076)

- Install the lower grease seal on the stem being careful of the installation direction (See Exploded Views). The lower grease seal has bigger diameter than the upper grease seal.
- Apply grease to the tapered roller bearing, and drive it onto the steering stem using the bearing driver (special tool).



A. Stem Bearing Driver: 57001-137
B. Adapter: 57001-1074

Steering Stem Installation

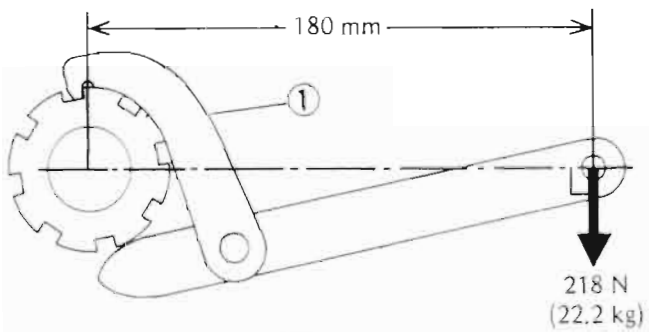
- Lubricate the steering stem bearings with grease.
- If a new steering bearing is installed, or if the removed bearing is reinstalled, seat the bearing according to the following.
  - Tighten the stem locknut to **39** N-m (**4.0** kg-m, **29** ft-lb).
  - Check that there is no play and that the steering stem turns smoothly without rattling. If the steering stem does not turn smoothly, the bearings may be damaged.
  - Loosen the steeering stem locknut a little until it turns lightly.
  - Turn the steering stem locknut lighly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.

"NOTE"

○Tightening the stem locknut to 39 N-m (4.0 kg-m, 29 ft-lb) of torque is only to seat the bearing. After seating the bearing, loosen and handtighten the locknut.

○To torque the locknut with steering stem nut wrench (special tool), hook the wrench on the stem locknut, and pull the wrench at the hole with 218 N (22.2 kg) force in the direction shown.

Torquing Stem Locknut



1. Stem nut wrench: 57001-1100

Adjustment after Installation

- Check and adjust the following items:
  Steering
  Headlight aim (See Headlight Adjustment on chapter 14.)

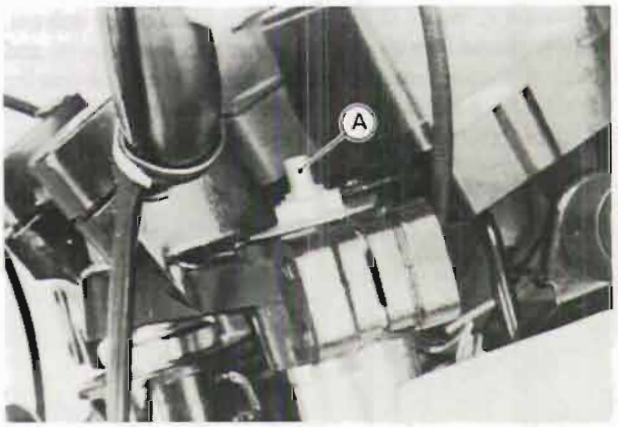
Front Fork

Air Pressure Adjustment

- Use a jack under the engine or other suitable means to lift the front off the ground.
- The standard air pressure is **atmospheric pressure.**
- Remove the air valve cap and push the air valve to open.
- Install the air valve cap.

Front Fork Air Pressure

Standard: Atmospheric Pressure



A. Air Valve

NOTE

○Addition of air pressure is not recommended since atmospheric pressure is the most suitable setting for all ranges of riding.

WARNING

○Do not remove the springs and rely on air only. Correct springs must be used in this suspension system. Use without springs can lead to a condition causing accident and injury.

○Do not incinerate the front fork without first removing the air valve or it may explode.

Fork Oil Level

- With the front wheel on the ground and the front brake fully applied, push down on the handlebar a few times to expel the air in the fork oil.
- Release the front fork air pressure.
- Remove the top plug and main spring in the fork leg.
- With the fork fully **compressed**, insert a tape measure or thin rod in the fork inner tube, and measure the distance from the top end of the fork inner tube to the oil.
- ★If the oil is above or below the specified level, remove or add oil and recheck the oil level.
- After assembling the removed parts, adjust the fork air pressure.

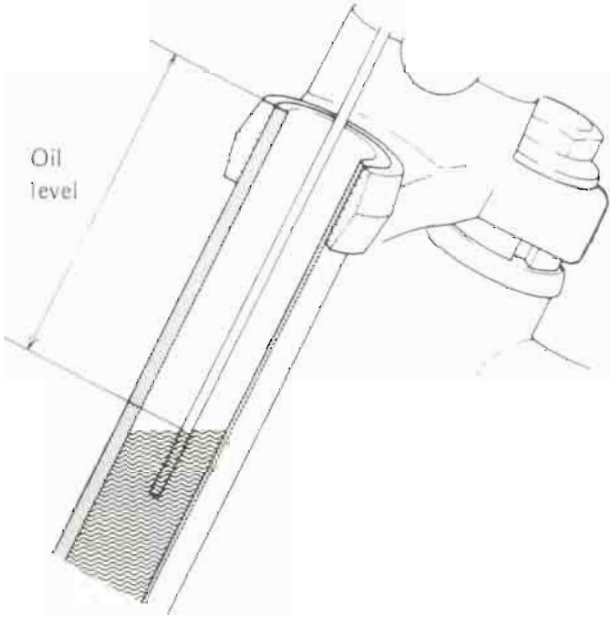
CAUTION

○**The operation of an air front fork is especially dependent upon correct oil level. Higher level than specified may cause oil leakage and seal breakage. Be sure to maintain the specified level.**

Front Fork Oil Level

170 ±2 mm below the top end of the inner tube

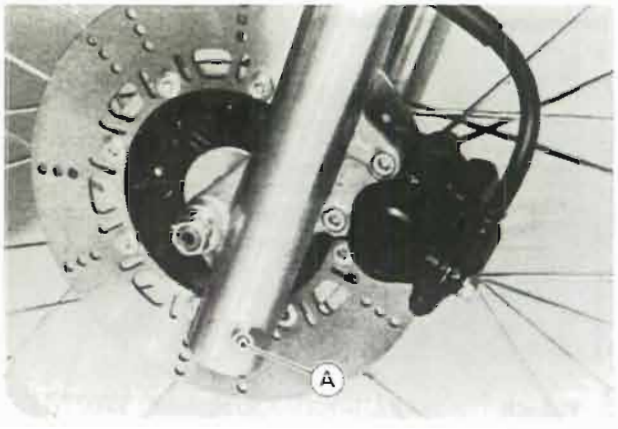
Fork Oil Level Measurement



- After assembling the removed parts, pressurize the fork to the specified pressure.

Fork Oil Changing

- Release the front fork air pressure before draining out the fork oil.
- Remove the drain plug to drain the oil.
- To pump out the oil, with the front wheel on the ground and the front brake fully applied, push down on the handlebar a few times.



A. Drain Plug

- Apply a non-permanent locking agent to its threads, and install the drain plug with a new gasket.
- Tighten the drain plug to the specification.
- Remove the top plug and main spring in the fork leg, and fill the fork leg with the specified amount of oil.
- Check the oil level in the fork leg.
- Change the fork oil in the other fork leg in the same manner.

Front Fork Oil

Rating:	KAYABA G10
Viscosity:	SAE 10W
Amount per side	
when changing oil:	365 mL
After disassembly and completely dry:	426 – 434 mL

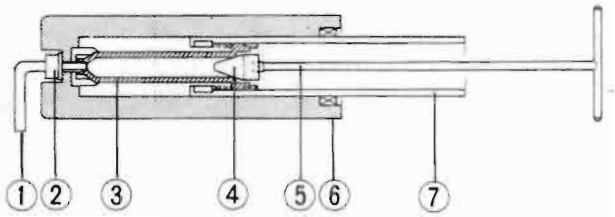
Tightening Torque

Drain Plug:	1.5 N-m (0.15 kg-m, 13 in-lb)
Apply Locking Agent	

Front Fork Disassembly

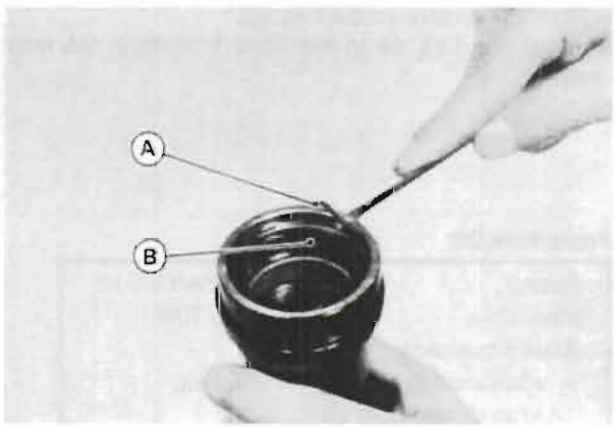
- Before removing the front fork from the frame, release the air and loosen the fork top bolts.
- Remove the following parts.
  - ○Caliper, brake hose
  - ○Front wheel
  - ○Rubber boot
  - ○Fork tube
  - ○Top bolt, spring guides, main spring
  - ○Drain screw – pump out the oil into a container.
- Push the inner tube all the way in, and remove the Allen bolt on the bottom of the outer tube using the cylinder holder handle and adapter (special tools).

Removing Bottom Allen Bolt



1. Wrench
2. Bolt
3. Cylinder
4. Adapter: 57001-1057
5. Handle: 57001-183
6. Outer Tube
7. Inner Tube

•Remove the circlip and dust seal with a sharp hook.

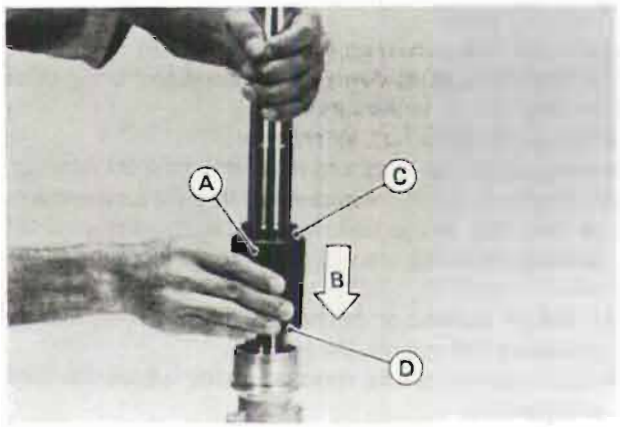


A. Circlip B. Dust Seal

•Holding the inner tube by hand and keeping the fork leg in a vertical position, tap the outer tube on the upper end with the driver (special tool) until the outer tube falls off the inner tube. Face the big end of the driver downward.

CAUTION

To avoid damaging the inner tube guide bush, do not tap the outer tube when the fork leg is laid horizontally on a work bench.



A. Driver: 57001-1104
B. Tap.
C. Big End
D. Small End

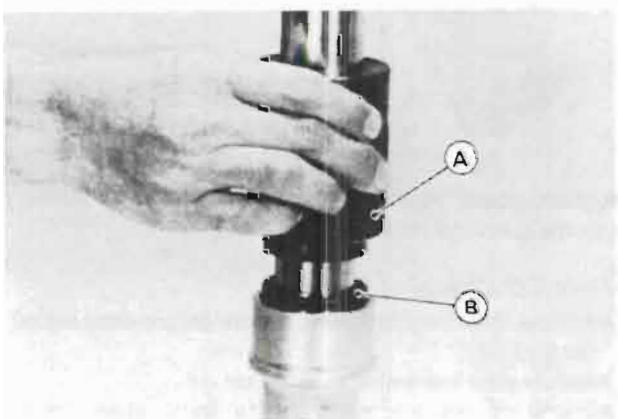
Fork Assembly

•Apply a non-permanent locking agent to the drain screw and install the screw.
•Apply liquid gasket to both sides of the Allen bolt gasket.
•Apply a non-permanent locking agent to the Allen bolts and install them with the cylinder holder handle and adapter (special tools).

Allen Bolt Tightening Torque

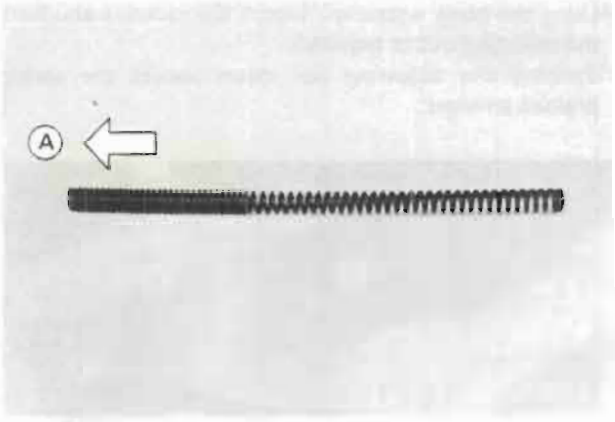
23 N-m (2.3 kg-m, 16.5 ft-lb)

•Inspect the guide bushes and replace them with new ones if necessary (See Guide Bush Inspection paragraph).
•Replace the oil seal with a new one.
•Apply oil to the outside, and install it with the oil seal driver (special tools).



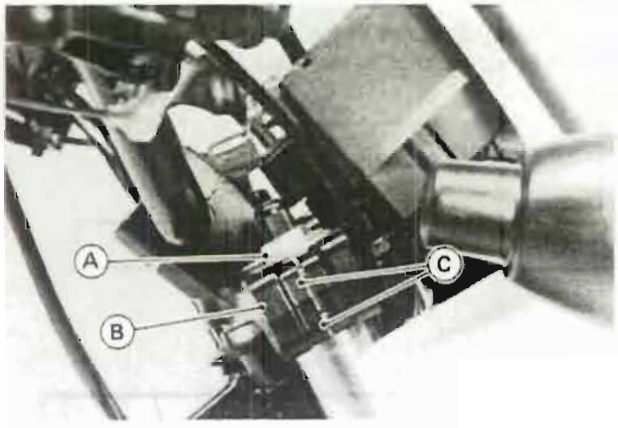
A. Oil Seal Driver: 57001-1104 B. Oil Seal

•Install the fork main springs so that the end with more closely spaced coils is upward.



A. Top

•Install the fork tube so that the bottom of the fork top bolt is aligned with the upper surface of the steering stem head.
•Tighten the clamp bolts to the specification (See Exploded Views).



A. Top Bolt
B. Steering Stem Head
C. Clamp Bolts

•After installing the fork tube, tighten the top bolt to the specification (See Exploded Views).
•Apply a non-permanent locking agent to the air valve, and tighten the valve to the specification (See Exploded Views).

Inner Tube Inspection

A bent, dented, scored, or otherwise damaged inner tube will damage the oil seal, causing oil leakage. A badly bent inner tube may cause poor handling.

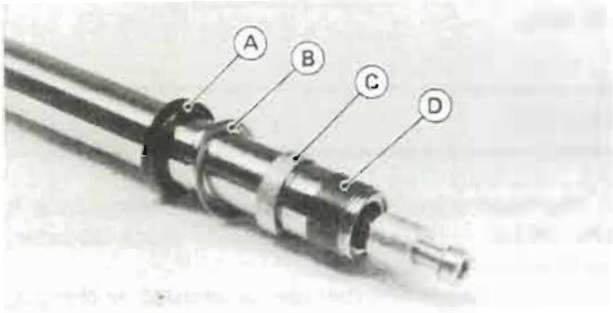
•Visually inspect the inner tube, and repair any damage.
•If the damage is not repairable, replace the inner tube. Since damage to the inner tube spoils the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.
•Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

CAUTION

○**If the inner tube is bent or badly creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.**

Guide Bush Inspection

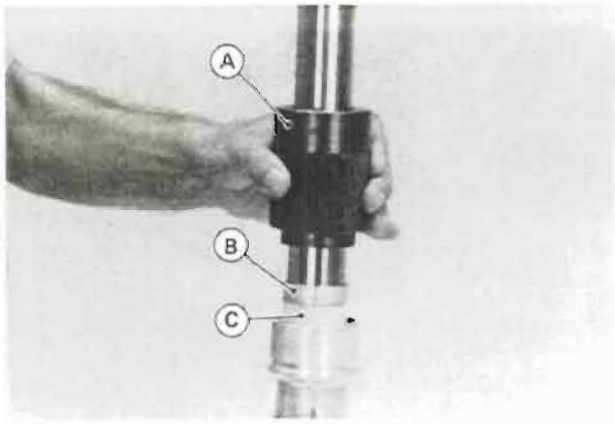
•Visually inspect the guide bushes.
★Replace the inner tube guide bush or outer tube guide bush if it is badly damaged.



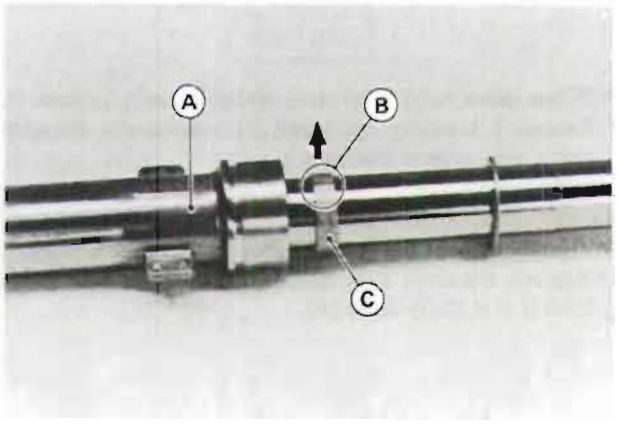
A. Oil Seal
B. Washer
C. Outer Tube Guide Bush
D. Inner Tube Guide Bush

Guide Bush Replacement

•Install the guide bush with a used guide bush as a tool by tapping the used guide bush with the driver (special tool) until it stops. The bush split must be faced toward the left or right.



A. Driver: 57001-1104
B. Used Guide Bush
C. Guide Bush



A. Outer Tube
B. Split
C. Guide Bush

Uni-Trak

The rear suspension system of this motorcycle is UNI-TRAK. It consists of a rear shock absorber, uni-trak arm, and link.

The rear shock absorber can be adjusted by changing the spring preload and the damping force. It is necessary to remove the rear shock absorber for spring replacement.

Damper Adjustment:

The damper adjuster on the rear shock absorber has 4 positions so that the damping force can be adjusted for different road and loading conditions.

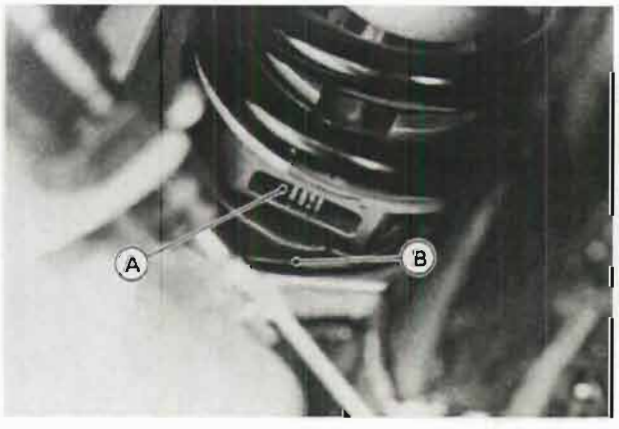
★If the damper setting feels too soft or too stiff, adjust it in accordance with the following table:

Damping Force

Position	1	2	3	4
Damping Force	→ Stronger			
Standard	2			

•Slide the dust cover off the bottom of the shock absorber.

•Turn the damper adjuster to the desired number until you feel a click.



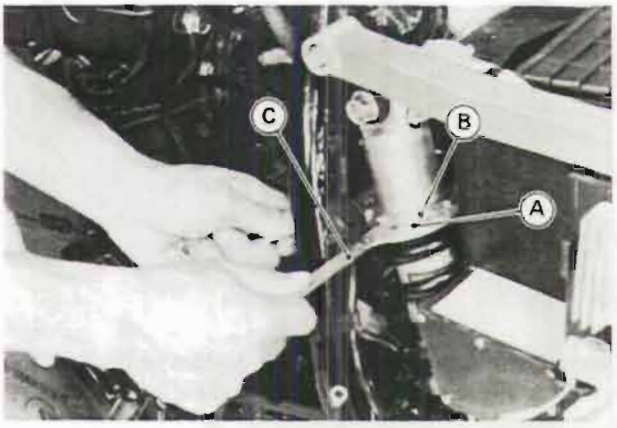
A. Damping Adjuster
B. Dust Cover

Uni-Trak Spring Preload Adjustment

•Remove the left side cover, the battery and the reserve tank.

•Using the hook wrenches, loosen the locknut and turn the adjusting nut as required.

○Turning the adjusting nut down makes the spring preload stronger.



A. Adjusting Nut
B. Locknut
C. Hook Wrench

•Set the adjusting nut to the specification.

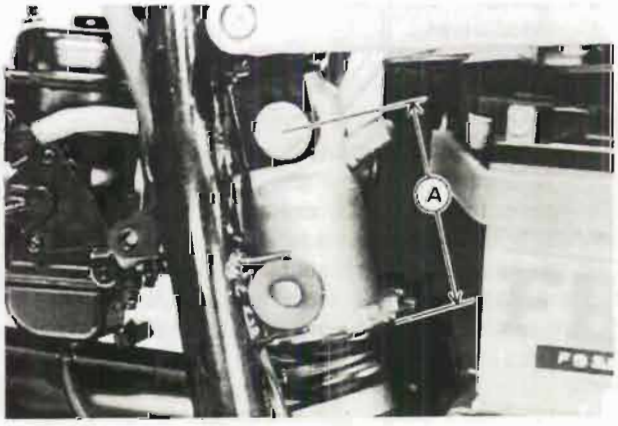
•Tighten the locknut to the specification.

Tightening Torque

Adjusting Nut: 54 N-m (5.5 kg-m, 40 ft-lb)

Spring Preload Setting

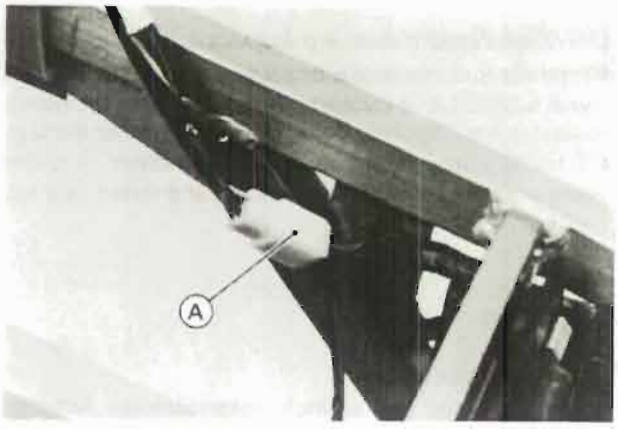
Standard Adjusting Nut Position:	103 mm
Nut Adjusting Range:	83 – 113 mm
(Initial Spring Preload):	882 N (90 kg, 199 lb)
(Preload change per turn of the nut):	66 N per turn (6.75 kg, 14.9 lb)



A. Adjusting Nut Position

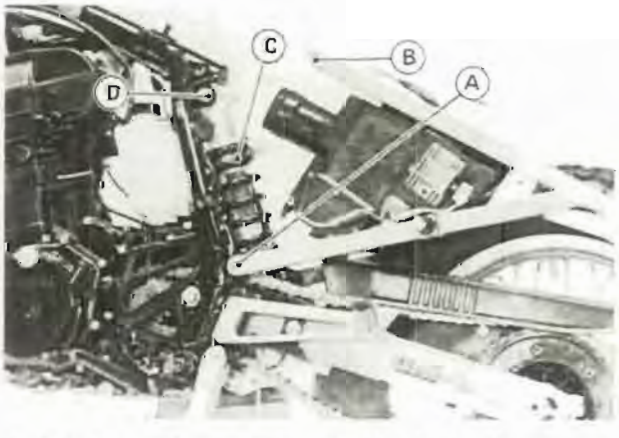
Rear Shock Removal

- Remove the following parts.
  - Side covers
  - Battery
  - Muffler
  - Main harness connector
  - Brake switch connector and spring



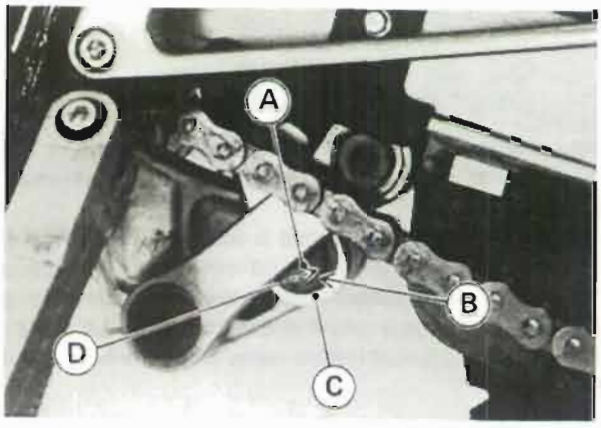
A. Main Harness Connector

- Loosen the rear frame lower bolts and remove the rear frame upper bolts.
- Tilt the rear frame backwards.



A. Rear Frame Lower Bolt
B. Rear Frame Upper Bolt
C. Shock Absorber
D. Mounting Nut and Bolt

- Loosen the upper shock mounting nut. Do not remove it yet.
- Place a sturdy block or support under the frame so that the rear wheel is raised off the ground.
- Remove the snap ring, washer, and sleeve from the lower side of the shock absorber.
- Remove the mounting bolt and nut, and take out the rear shock absorber.



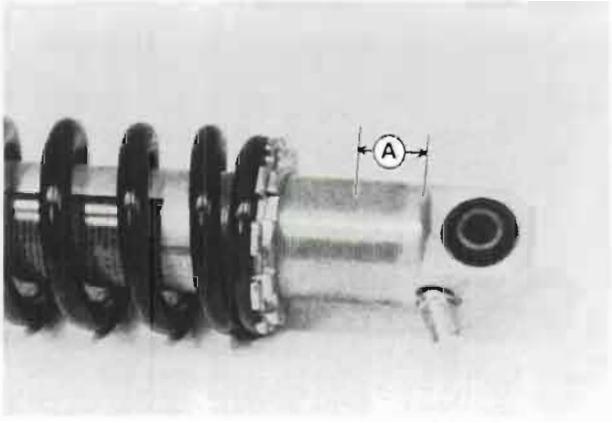
A. Plug
B. Snap Ring
C. Washer
D. Sleeve

Rear Shock Scrapping

WARNING

○Since the rear shock absorber containes nitrogen gas, do not incinerate or disassemble the rear shock absorber.

○Before a rear shock absorber is scrapped, drill a hole at a point about 15 mm (0.6 in) down from the top of the cylinder to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may blow out bits of drilled metal when the hole opens.



A. 15 mm (0.6 in)

Rear Shock Installation

•Fit the ground side of the sleeve into the rocker arm (See Exploded Views).

•Discard the old snap rings, and use new ones.

CAUTION

○Do not reuse snap rings, as removal weakens and deforms the snap ring, and it could fall out.

•Tighten the rocker arm shaft nut and the rear shock absorber mount nut to the specification (See Exploded Views).

•Tighten the rear frame bolts to the specification.

Tightening Torque

Rear frame bolt	24 N·m (2.4 kg-m, 17.5 ft-lb)

Uni-Trak Sleeve Inspection

★If there is visible damage, or the outside diameter is worn past the service limit, replace the sleeve and needle bearing as a set (See Service Data paragraph).

Uni-Trak Needle Bearing Inspection

•The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the needle bearings for abrasion, color change, or other damage.

★If there is any doubt as to the condition of either needle bearing, replace the bearing and sleeve as a set.

Uni-Trak Lubrication

In order for the uni-trak suspension to function properly and wear slowly, it should be lubricated in accordance with the Periodic Maintenance Chart.

•Disassemble the uni-trak suspension.

•Using a high flash-point solvent, wash the sleeves and needle bearings, and dry them.

•Inspect the needle bearings, sleeves and grease seals for abrasion, color change, or other damage.

•Apply a molybdenum disulfide chassis assembly grease to the outer circumference of the sleeves, and pack the needle bearings with the same grease (See Exploded Views).

•Assemble the uni-trak suspension.

Controls and Instruments

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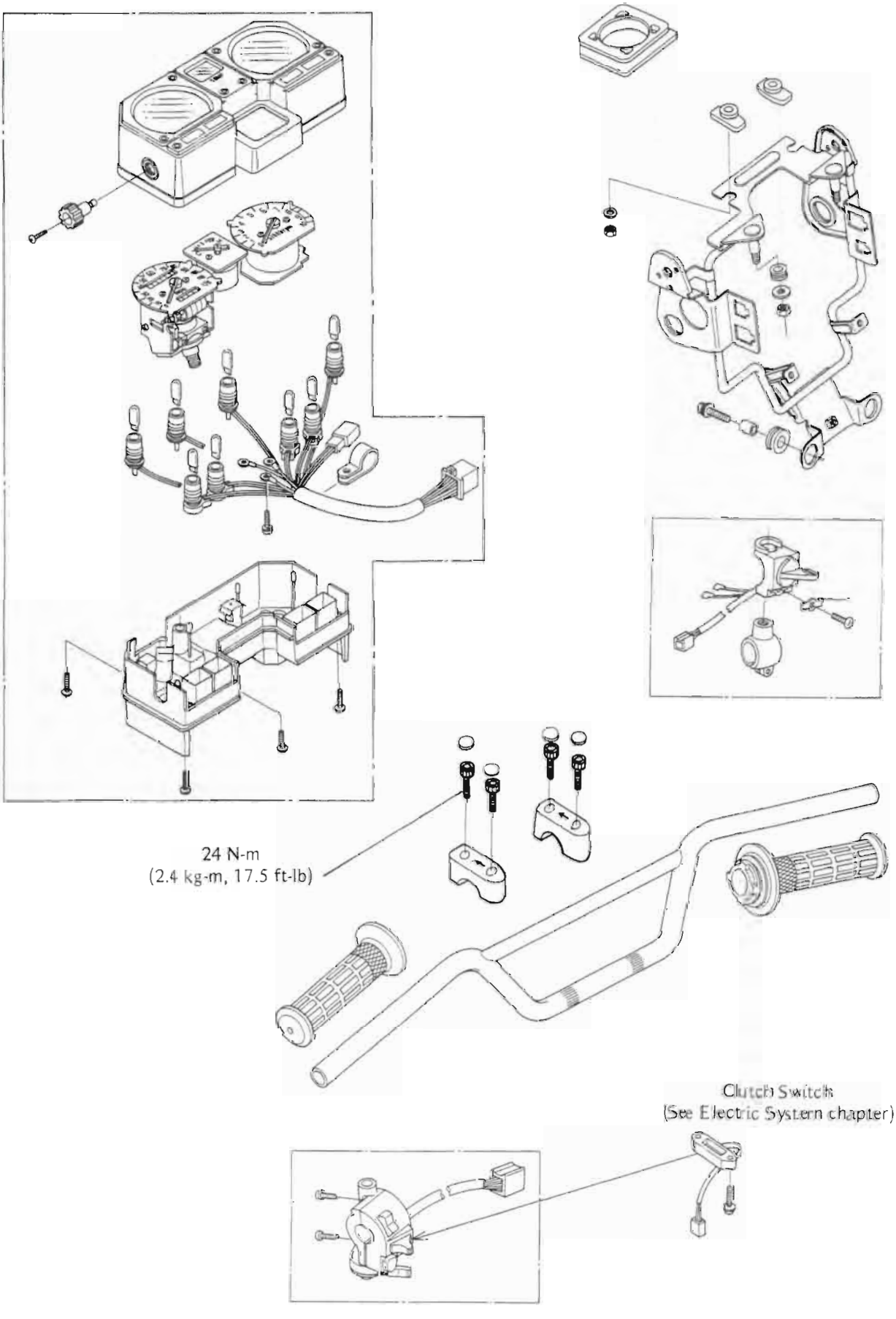
Exploded Views



Specifications

Choke Cable Free Play

2 – 3 mm

Clutch Lever Free Play

2 – 3 mm

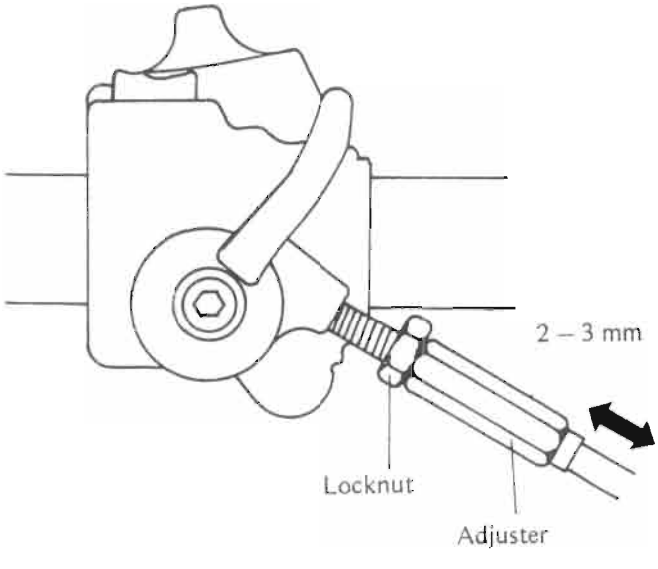
Throttle Lever Free Play

2 – 3 mm

Choke Lever

Adjustment

- Check that the choke cable has **2 – 3 mm** of play.
- If the play is incorrect, loosen the locknut and turn the adjuster to obtain the correct amount of play. Tighten the locknut.



Clutch

Clutch Adjustment

Refer to chapter 4.

Clutch Cable Routing

Refer to chapter 13.

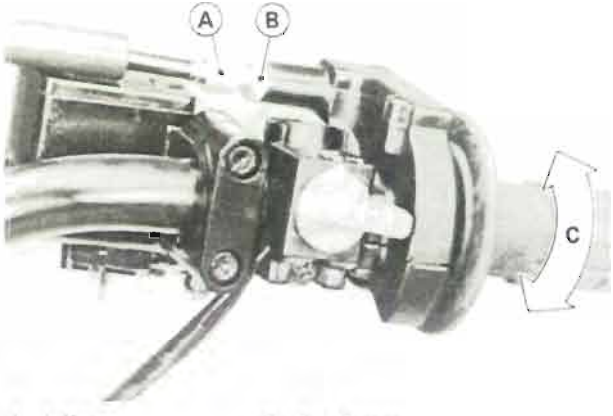
Clutch Release Removal/Installation

Refer to chapter 4.

Throttle Grip

Adjustment

- Check that the throttle grip has 2 – 3 mm of play and turns smoothly.



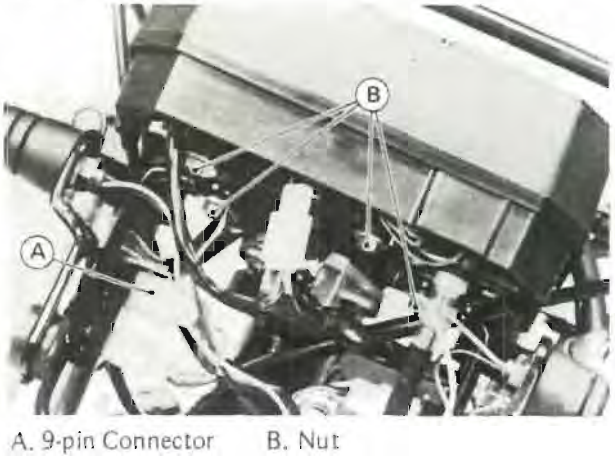
A. Adjuster
B. Locknut
C. 2 – 3 mm

- If the play is incorrect, loosen the locknut in the upper end of the throttle cable, and turn the adjuster to obtain the correct amount of play. Tighten the locknut.

Meter Unit

Removal

- Remove the headlight cover and headlight unit.
- Remove the 9-pin connector, the nuts and the meter unit.



A. 9-pin Connector
B. Nut

Disassembly

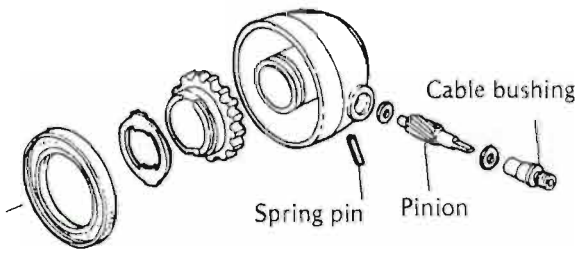
Refer to Tachometer Disassembly in chapter 14.

Speedometer

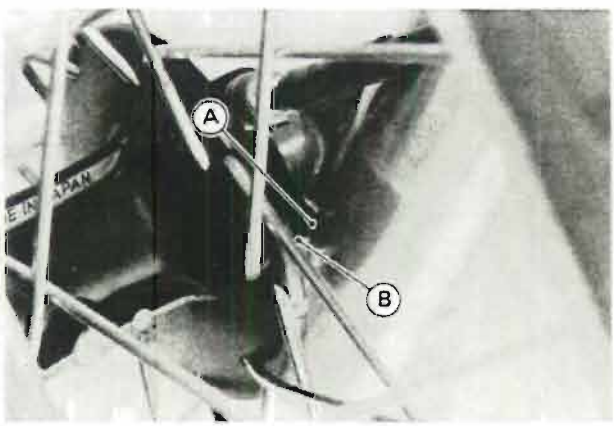
Speedometer Disassembly

○It is recommended that the speedometer pinion assembly be replaced rather than attempting to repair the components.

★If the speedometer cable bushing or speedometer pinion needs to be removed, press the spring pin out of the housing.



●Fit the stopper of the right front fork into the speedometer gear housing slot.



A. Stopper B. Slot

Lubrication

●Remove the speedometer gear housing and disassemble the speedometer gear.

●Clean the gear and the exposed portion of the pinion with a high flash-point solvent, dry them, and grease the gear teeth and the inside of the gear sleeve.

A. Grease.

Handlebar

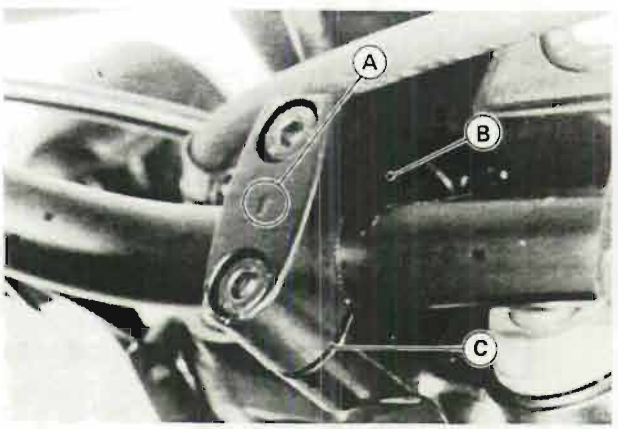
Installation

●Install the handlebar clamps so that the arrow on the clamp points to the front.

●Tighten the front clamp bolts first, and then the rear clamp bolts. There will be a gap at the rear part of the clamp after tightening.

Tightening Torque

Handlebar Clamp Bolts:	24 N-m (2.4 kg-m, 17.5 ft-lb)



A. Arrow B. No gap C. Even gap

●Check and adjust the following items:
Front brake effectiveness
Clutch
Throttle grip play
Rear view mirrors

Frame

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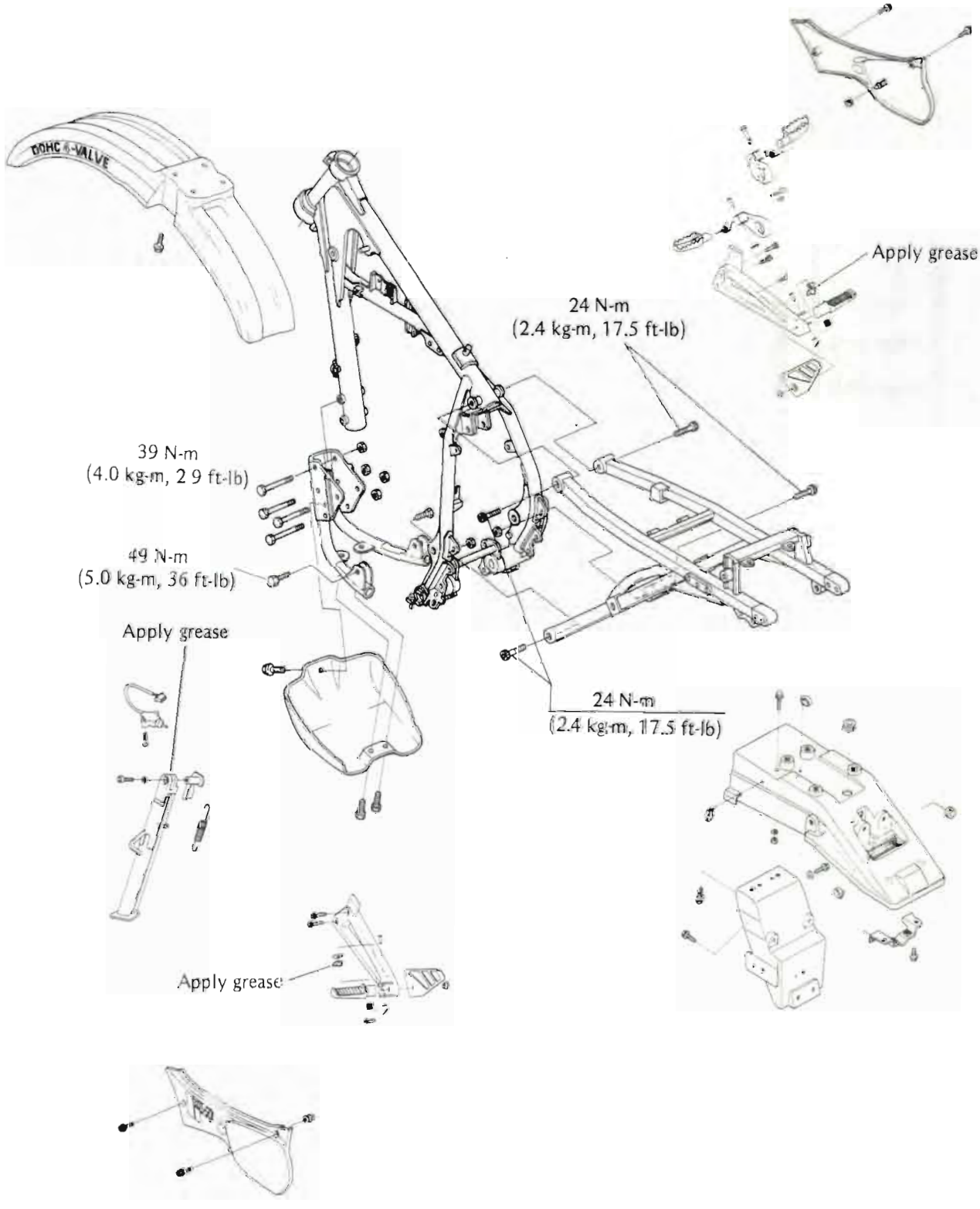
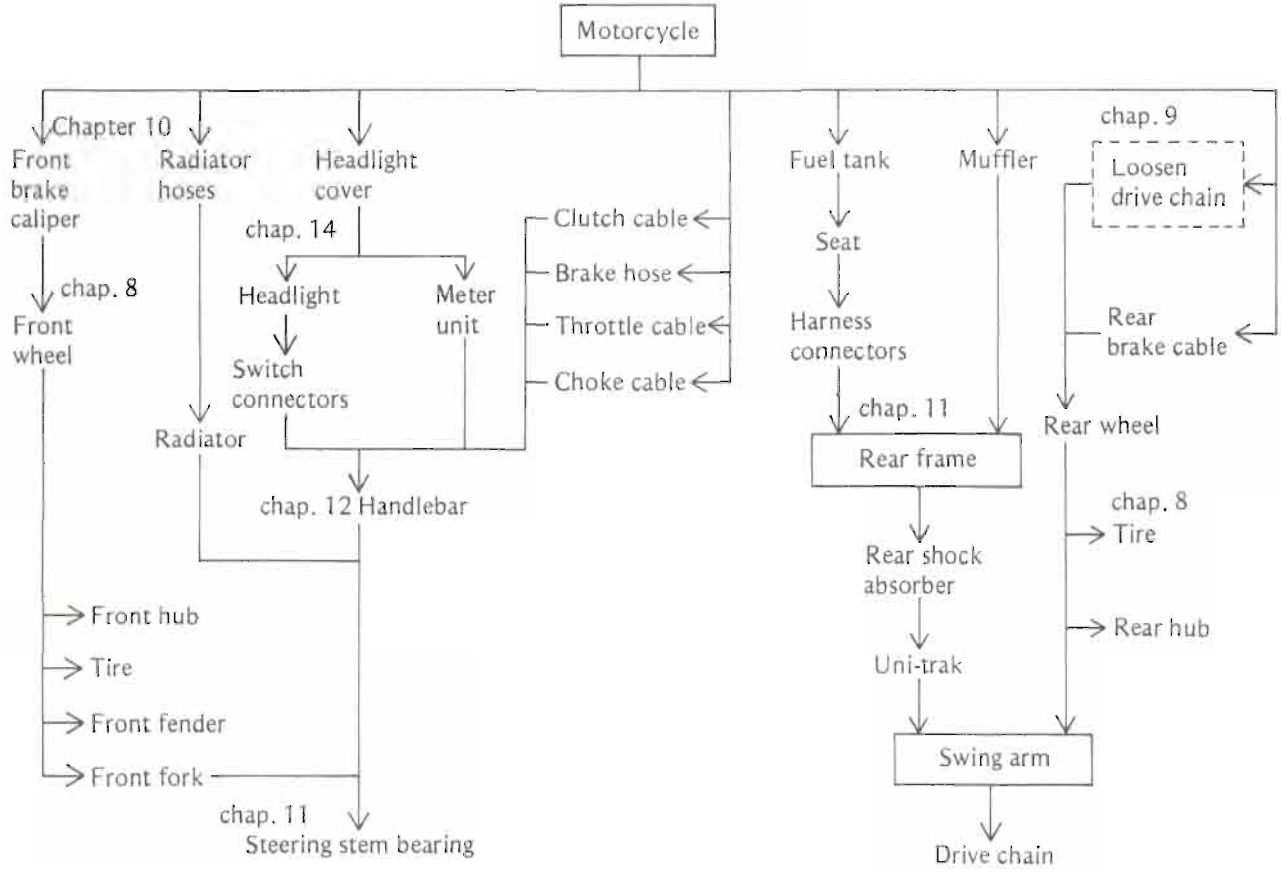
Exploded Views



Disassembly Flow Chart — Chassis

○This chart is designed to aid in determining proper removal sequence. Select the component you wish to remove and follow the arrows to that point on the chart.
●Set the motorcycle up on a stand or jacks so that it is stable during the removal and installation operations.

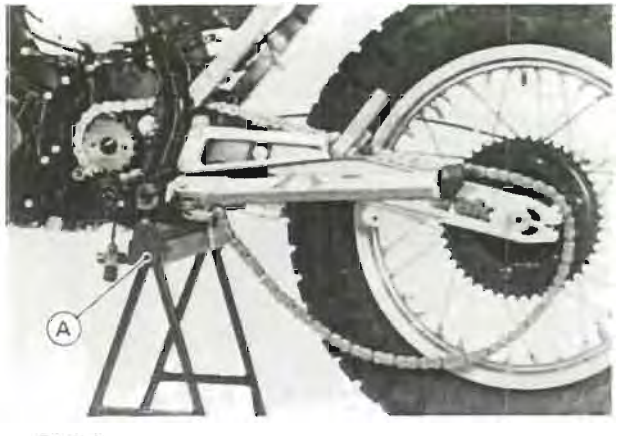


Suggested Cable or Hose Routing

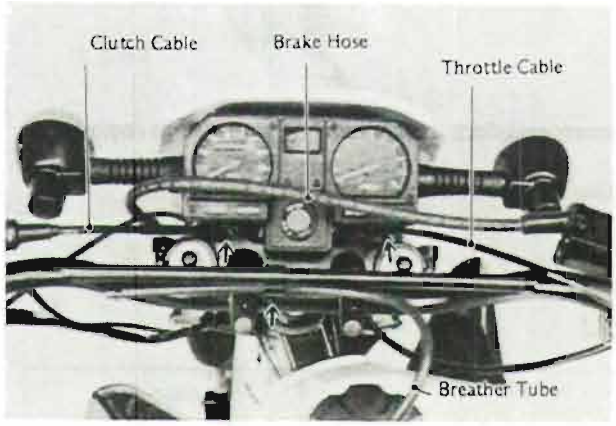
●For later installation convenience, note and record how and where cables, wires, and hoses are routed. They should not be allowed sharp bends, kinking, or twisting.

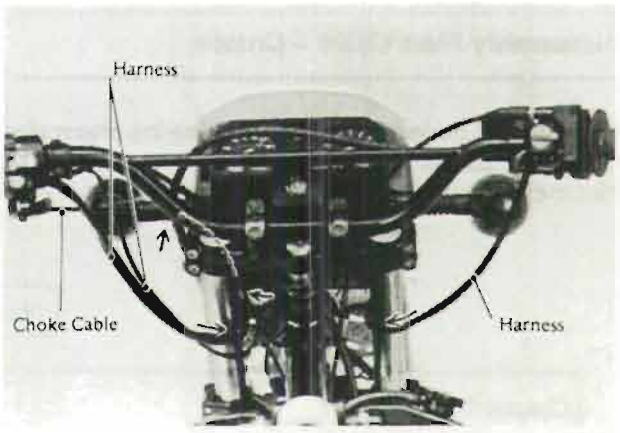
WARNING

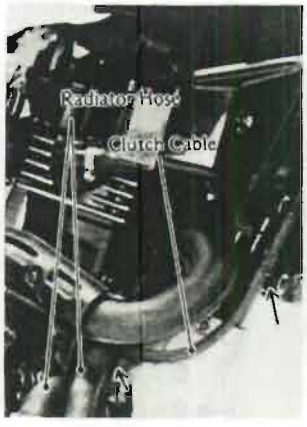
○Operation with improperly adjusted, incorrectly routed, or damaged cables could result in an unsafe riding condition.

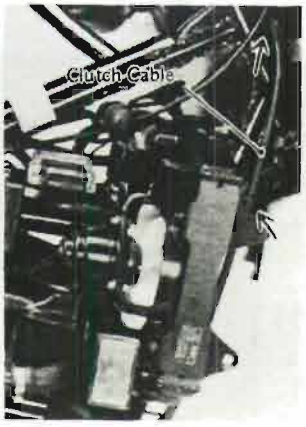


A. Stand


Clutch Cable
Brake Hose
Throttle Cable
Breather Tube

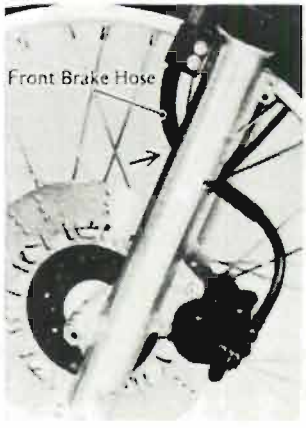

Harness
Choke Cable
Harness

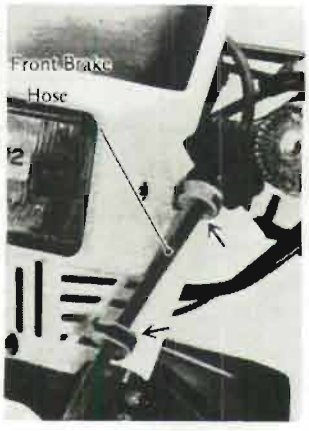

Radiator Hose
Clutch Cable

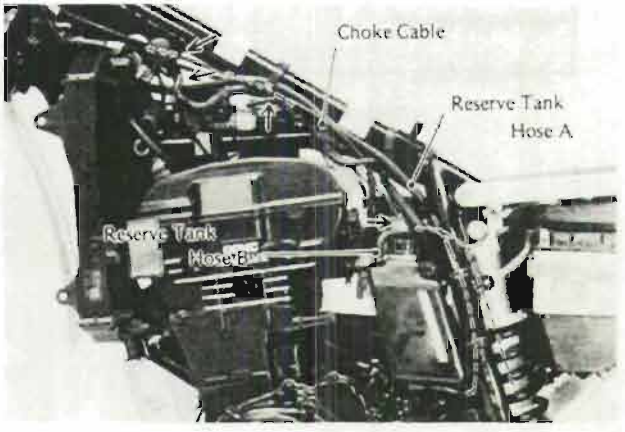

Clutch Cable

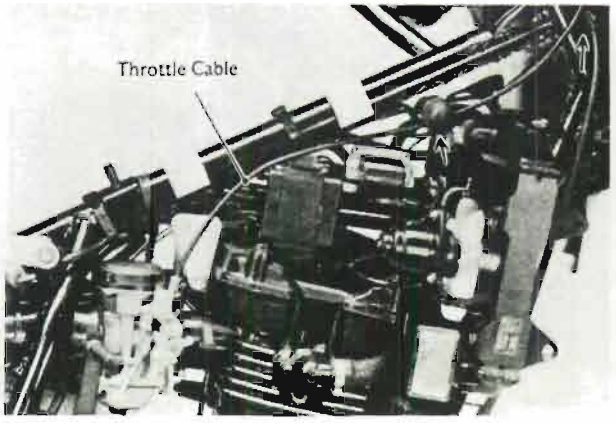

Speedometer Cable

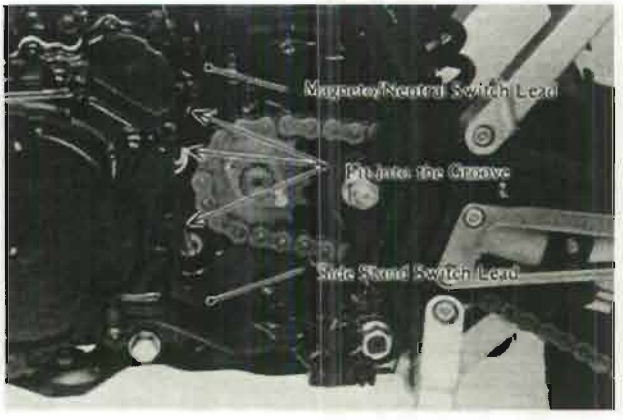

Speedometer Cable


Front Brake Hose


Front Brake Hose


Choke Cable
Reserve Tank Hose A
Reserve Tank Hose B


Throttle Cable


Magneto/Neutral Switch Lead
Side Stand Switch Lead

Electrical System

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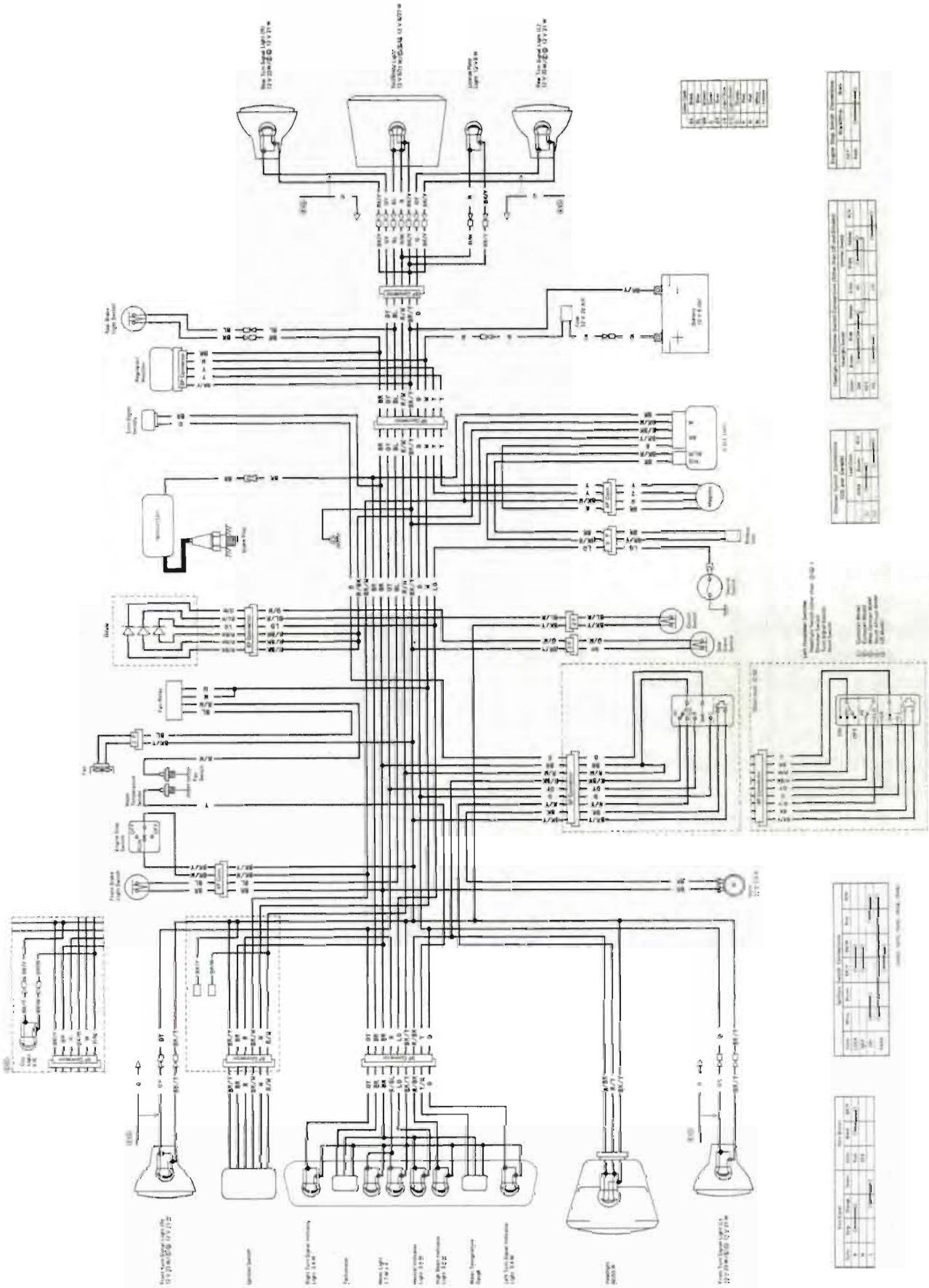
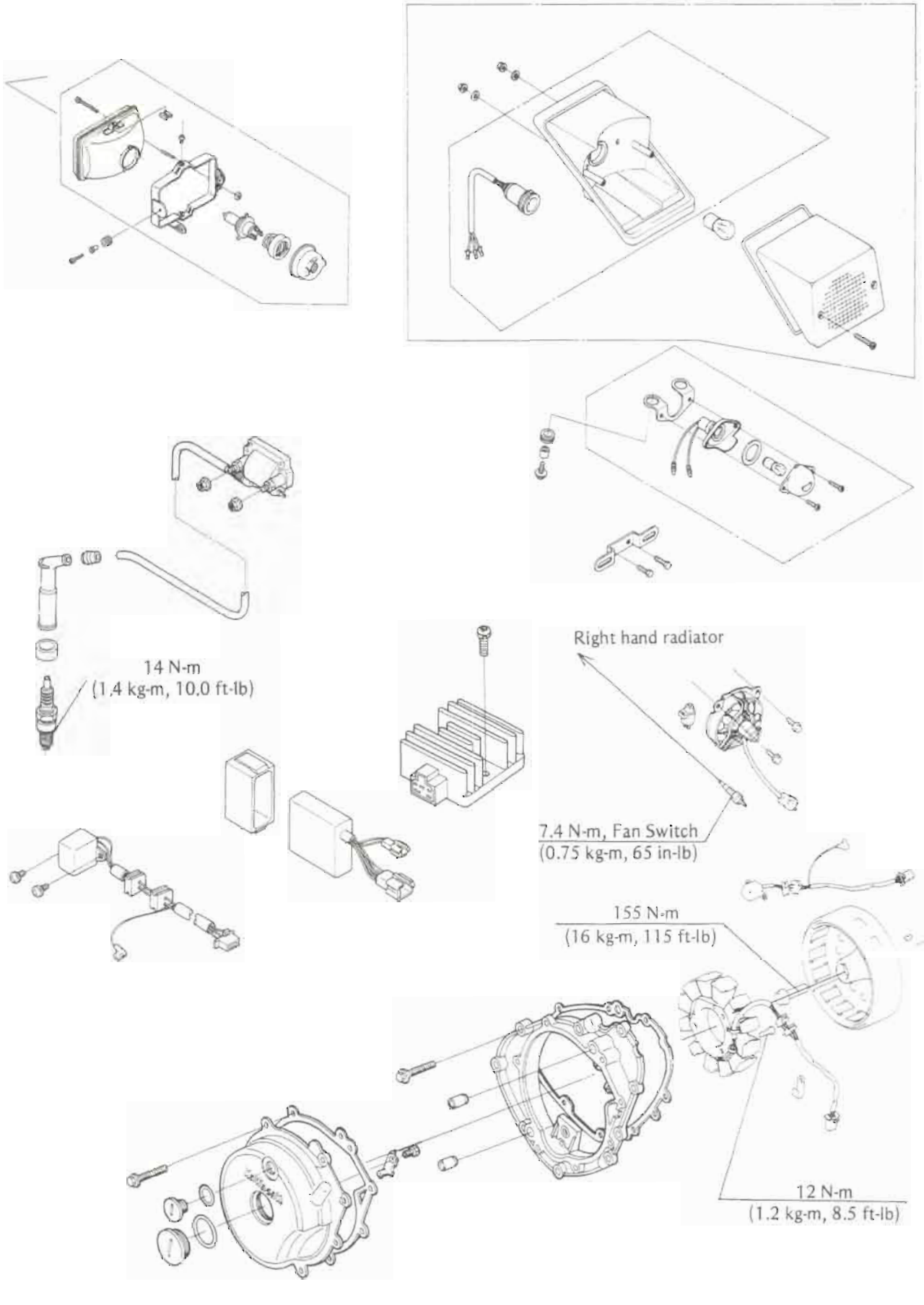
Wiring Diagram



Exploded Views

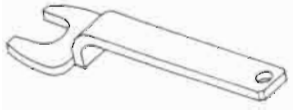


Service Data

Item	Standard	See Page
Battery:		
Electrolyte level	Between upper and lower levels	– –
Electrolyte amount	40 mL per one cell	– –
Specific gravity of electrolyte	1.28 @20°C (68°F)	14-5
Charging System:		14-6
Regulator/rectifier output voltage	Battery – 15 V	14-7
Stator coil resistance	0.1 – 0.7 Ω	14-7
Ignition System:		
Spark plug gap	0.6 – 0.7 mm	14-9
Acring distance	7 mm or more (3-needle method)	14-15
Primary winding resistance	0.17 – 0.25 Ω	14-16
Secondary winding resistance	3.2 – 4.8 kΩ	
Pickup Coil Air Gap	0.7 – 0.9 mm	
Exciter coil resistance	61 – 114 Ω	14-16
Pickup coil resistance	100 – 150 Ω	
Meter Unit:		
Tachometer resistance	65 – 105 Ω	14-21
Water temperature gauge resistance	→	14-21
Water temperature sender	→	14-22

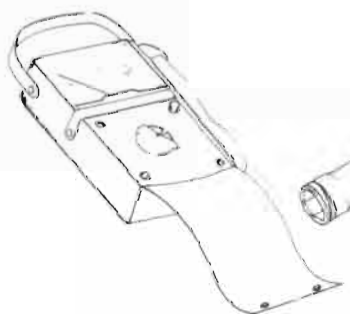
Special Tool

Magneto Holder:
57001-1184



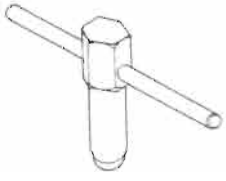
Electro Tester:
57001-980

Hand Tester:
57001-983



Spark Plug Wrench:
57001-1024

Magneto Flywheel Puller: 57001-1185



Precautions

There are a number of important precautions that are musts when servicing electrical systems. Failure to observe these rules can result in serious system damage. Learn and observe all the rules below.

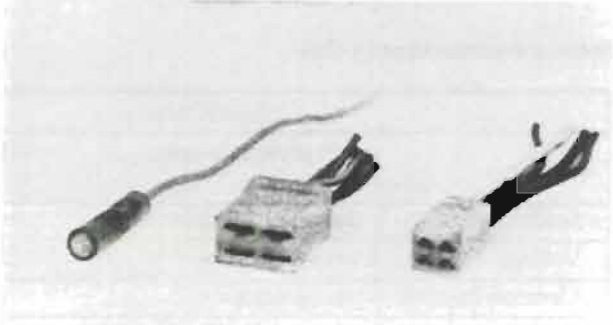
- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- Electrical parts should never 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, unless otherwise instructed during a test, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Do not use a meter illumination bulb rated for other than the 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 on 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 and fraying. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the parts are cold (at room temperature).
- Color Codes:

BK	: Black	LG	: Light green
BL	: Blue	O	: Orange
BR	: Brown	P	: Pink
G	: Green	R	: Red
GY	: Gray	W	: White
LB	: Light blue	Y	: Yellow

- Electric Connectors are labeled as follows.

Male Connectors

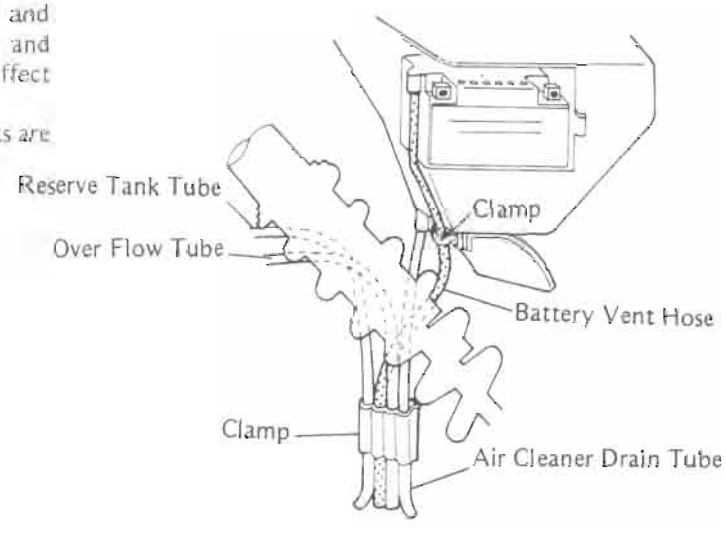
Female Connectors



Battery

- Route the battery vent hose as shown in the figure.

Battery Vent Hose Routing



CAUTION

- **Make sure the battery vent hose is kept away from the drive chain. Battery electrolyte can corrode and dangerously weaken the chain.**
- **Do not let the vent hose become folded, pinched, or melted by the exhaust system. An unvented battery will not keep a charge and it may crack from built-up gas pressure.**

When the battery is suspected of being defective, first inspect the points noted in the table below. The battery can be restored by charging it with the ordinary charge. If it will take a charge so that the voltage and specific gravity come up to normal, it may be considered good except in the following case:

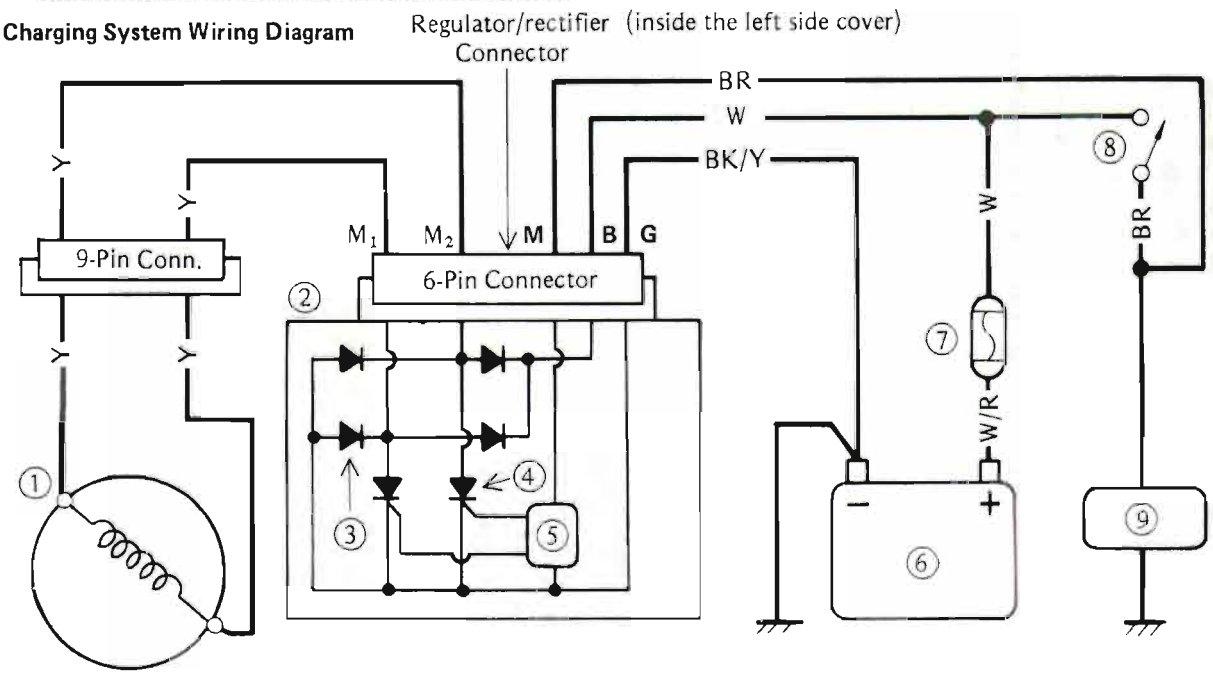
(a) If the voltage suddenly jumps to over 13 V just after the start of charging, the plates are probably sulphated. A good battery will rise to 12 V immediately and then gradually go up to 12.5 – 13 V in about 30 to 60 min after charging is started.
(b) If one cell produces no gas bubbles, or has a very low specific gravity, it is probably shorted.
(c) If there does not appear to be enough sediment to short the plates, but one cell has a low specific gravity after the battery is fully charged, the trouble may be just that there is insufficient acid in that cell. In this instance only, sulphuric acid solution may be added to correct the specific gravity.
(d) If a fully charged battery not in use loses its charge after 2 to 7 days, or if the specific gravity drops markedly, the battery is defective. The self-discharge rate of a good battery is only about 1% per day.

Battery Troubleshooting Guide

	Good Battery	Suspect Battery	Action
Plates	(+) chocolate color (–) gray	white (sulphated); + plates broken or corroded	Replace
Sediment	None, or small amount	sediment up to plates, causing short	Replace
Voltage	above 12 V	below 12 V	Test charge
Electrolyte Level	above plates	below top of plates	Fill and test charge
Specific Gravity	above 1.20 in all cells; no two cells more than 0.02 different	below 1.10, or difference of more than 0.02 between two cells	Test charge

Charging System

Charging System Wiring Diagram



1. Magneto
2. Regulator/rectifier
3. Diodes
4. Thyristors
5. Control circuit
6. 12 V battery
7. Fuse
8. Ignition Switch
9. Loads

Measuring Regulator/Rectifier Output Voltage (Loaded)

- Warm up the engine to obtain actual magneto operating conditions.
- Stop the engine and connect a voltmeter to regulator/rectifier wires.
- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. (To turn off the headlight of US and Canadian models, disconnect the headlight connector)
- *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 stay within the specified range.
- *If the output voltage is much higher than the specification, the regulator/rectifier is defective, or the regulator/rectifier leads are loose or open.
- *If the output voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the magneto output is insufficient for the loads.

Regulator/Rectifier Output Voltage

Meter Connections:	
Lead location	Battery lead (connected)
Meter range	25 V DC
Meter (+) →	White lead
Meter (–) →	Black/yellow lead
Meter Reading:	Battery voltage – 15 V

Measuring Stator Coil Resistance

- Disconnect the regulator/rectifier connector.
- Zero the ohmmeter, and connect it to leads from the magneto.
- *If the measurement is higher than the specification, the stator has an open lead, or there are poor wires or bad connections between the regulator/rectifier connector and the magnetor stator. Replace the damaged parts.
- *If the measurement is lower than the specification, the stator or the wires between the regulator/rectifier connector and the magneto stator are shorted, and must be replaced.

Stator Coil Resistance

Meter Connections:	
Lead location	Male regulator/rectifier connector (disconnected)
Meter range	x 1 Ω
One meter lead →	One yellow lead
Other meter lead →	Another yellow lead
Meter Reading:	0.1 – 0.7 Ω

Testing Stator Coil Insulation

- Disconnect the regulator/rectifier connector.
- Zero the ohmmeter, and connect it to leads from the magneto.
- *Any meter reading less than infinity (∞) indicates a short, necessitating stator replacement.

Stator Coil Insulation

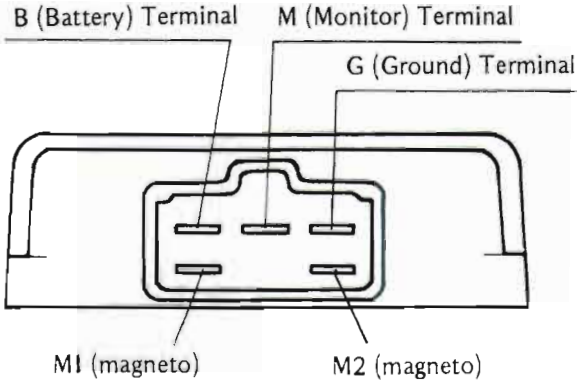
Meter Connections:	
Lead location	Male regulator/rectifier connector (disconnected)
Meter range	x 1 kΩ
One meter lead →	One yellow magneto lead
Other meter lead →	Chassis ground
Meter Reading:	No reading (∞ Ω)

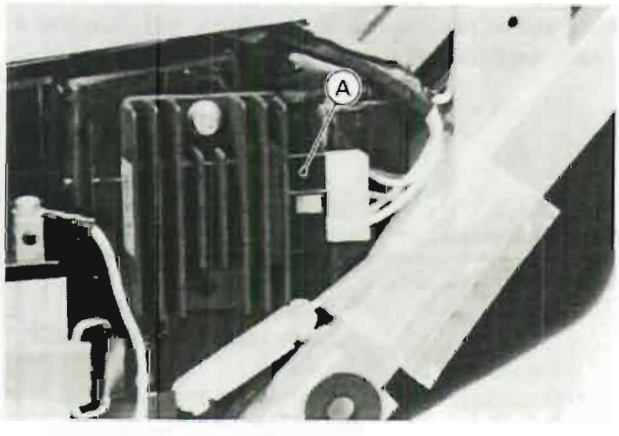
Regulator/Rectifier Inspection

Resistance Check:

- Disconnect the regulator/rectifier connector.
- Zero the ohmmeter, and connect it to leads from the regulator/rectifier.
- Check the resistance between the leads following the table.
- *If there is more resistance than the specified value, the unit has an open lead and must be replaced. Much less than this resistance means the unit is shorted, and must be replaced.

Regulator/Rectifier Terminal





A. Regulator/Rectifier Connector

Regulator/Rectifier Resistance

Meter (−) Lead Connection	Range x 100 Ω / Terminal	Meter (+) Lead Connection: G	M	B	M1 or 2
	G		0.2 – 0.8 kΩ	0.4 – 2 kΩ	0.2 – 0.6 kΩ
	M	0.3 – 1 kΩ		1 – 50 kΩ	0.5 – 3 kΩ
	B	∞	∞		∞
	M1 or 2	∞	∞	0.2 – 0.6 kΩ	

Regulator Circuit Test:

- Disconnect the regulator/rectifier connector.
- Prepare testing tools.

Tools for Regulator Circuit Test

Test light	→	Bulb rated 12 V and 3 – 6 W
Batteries	→	6 V and 12 V batteries
Test wires	→	5 auxiliary wires

CAUTION

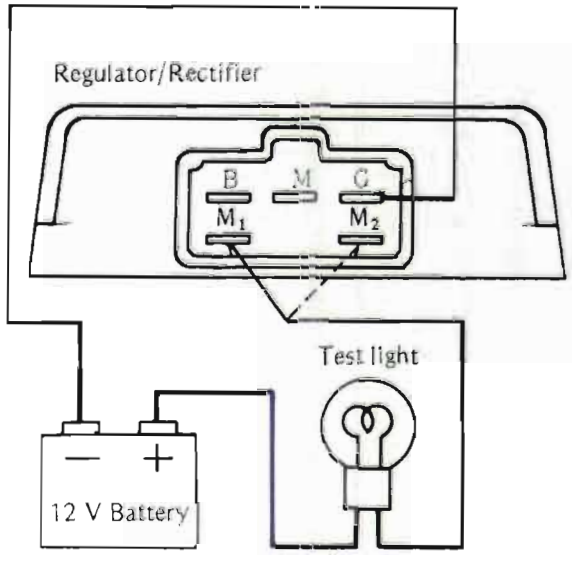
○**The test light works as an indicator and also a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.**

Regulator Circuit Test-1st Step:

- Connect the test light and the 12 V battery to the regulator/rectifier as shown.
- Check M1 and M2 terminal respectively.

★The test light should not go on. If it goes on, the thyristor is shorted; replace the regulator/rectifier.

Regulator Circuit Test-1st Step

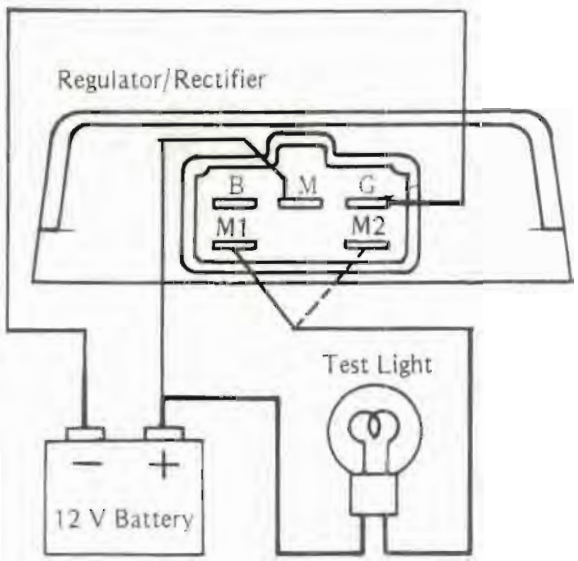


Regulator Circuit Test-2nd Step:

- Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test 1st Step".
- Apply 12 V to the voltage monitoring terminal.
- Check M1 and M2 terminal respectively.

★The test light should not go on. If it goes on, the control circuit in the regulator/rectifier is damaged; replace the regulator/rectifier.

Regulator Circuit Test-2nd Step



CAUTION

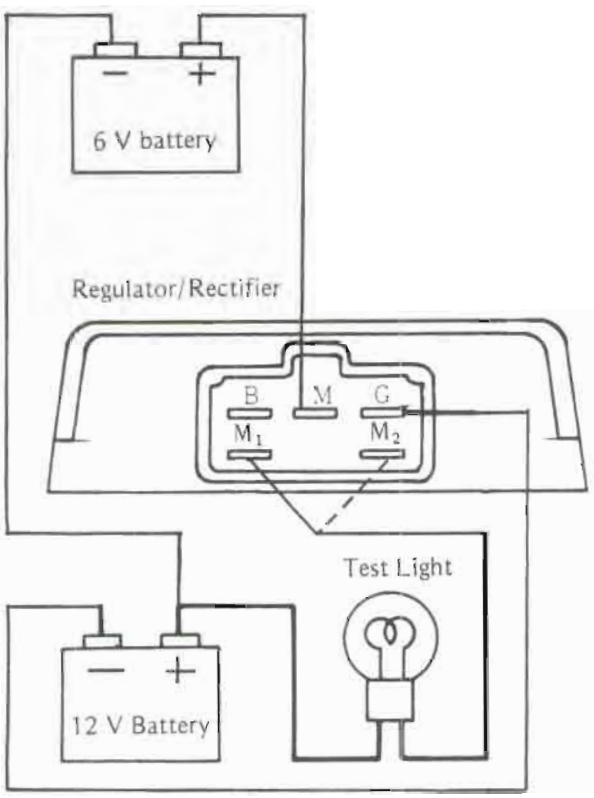
○Do not apply more than 18 V. If more than 18 V is applied, the regulator/rectifier may be damaged.

★The test light should go on at this time. If it does not go on, the control circuit in the regulator/rectifier is damaged; replace the regulator/rectifier.

Regulator Circuit Test-3rd Step:

- Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test 1st Step"
- Apply 18 V to the voltage monitoring terminal by adding a 6 V battery.
- Check M1 and M2 terminals respectively.

Regulator Circuit Test-3rd Step



Ignition System

Adjustment

Spark Plug Cleaning and Gapping

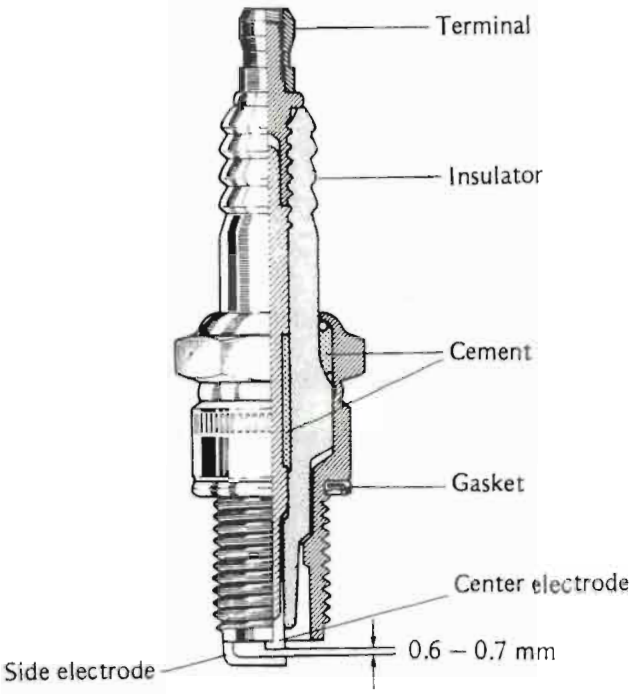
- Remove the spark plug.
- Clean the spark plug, preferably in a sand-blasting device, and then clean off any abrasive particles. Use a high flash point solvent and a wire brush or other suitable tool.
- ★If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard plug or its equivalent.
- Measure the gap with a wire-type thickness gauge.
- ★If the gap is incorrect, carefully bend the outer electrode with a suitable tool to obtain the correct gap.
- Tighten the spark plug in the cylinder head to the specification.

Standard Spark Plug

Plug Type:	NGK DR8ES or ND X24ESR-U
ⒶⒾⓈⓊ	NGK D8EA or ND X24ES-U
Plug Gap:	0.6 – 0.7 mm
Tightening Torque:	14 N-m (1.4 kg-m, 10.0 ft-lb)

Ⓐ : Australian Model
Ⓘ : Italian Model
Ⓢ : South African Model
Ⓤ : US model

Spark Plug

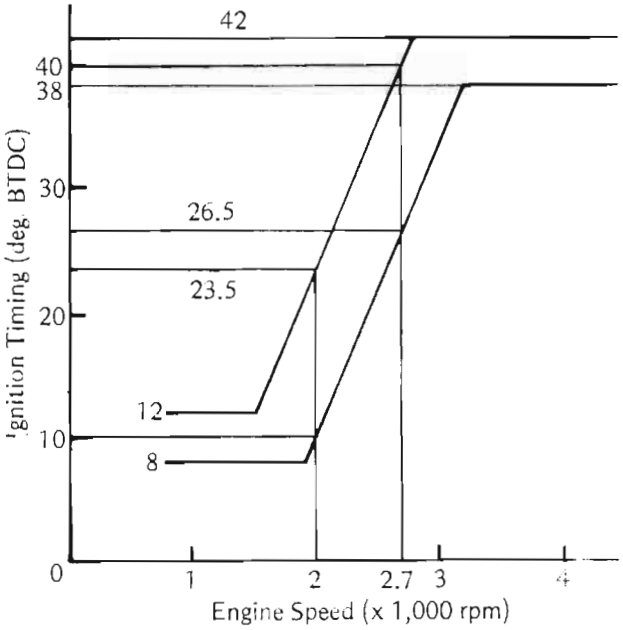


Ignition Timing Inspection (Dynamic)

This model has a Capacitor Discharge Ignition (CDI) system. Since the CDI system has no mechanical parts such as a cam or contact breakers, **no periodic maintenance is required** and the Dynamic Timing Inspection can be omitted. Ignition Timing/Engine Speed Relationship is shown here only for reference.

★If the ignition timing is suspectable, check the CDI unit and the pickup coil (see CDI Unit Inspection, Exciter or Pickup Coil Inspection).

Ignition Timing/Engine Speed Relationship



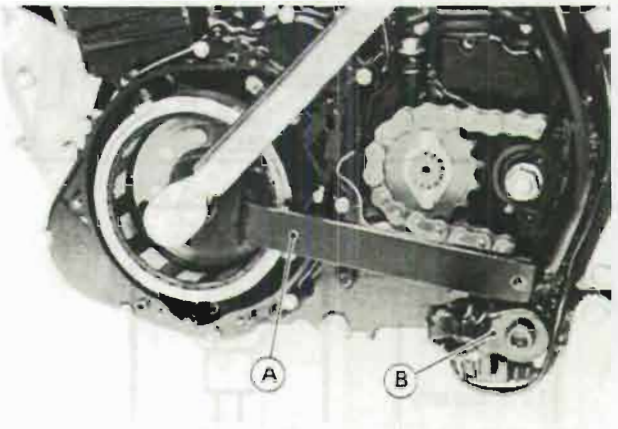
Removal/Installation

Magneto Removal or Installation

●Remove or tighten the magneto flywheel bolt as shown.

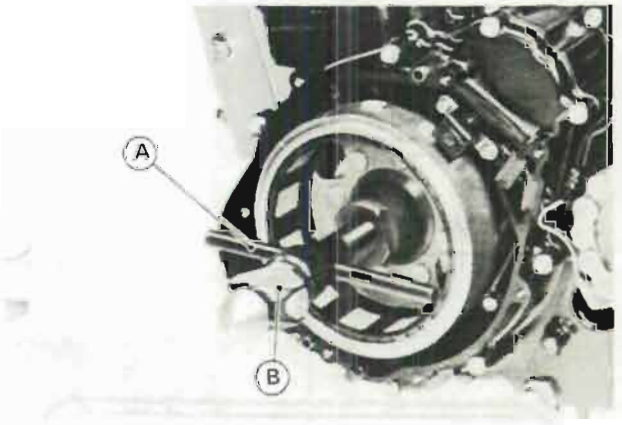
Tightening Torque

Magneto flywheel bolt: 120 N-m (12.0 kg-m, 87 ft-lb)



A. Magneto Holder: 57001-1184
B. Support the holder with the footpeg.

●Remove the magneto flywheel using a magneto flywheel puller (special tool).
○Be sure to tap the tool with a plastic mallet.



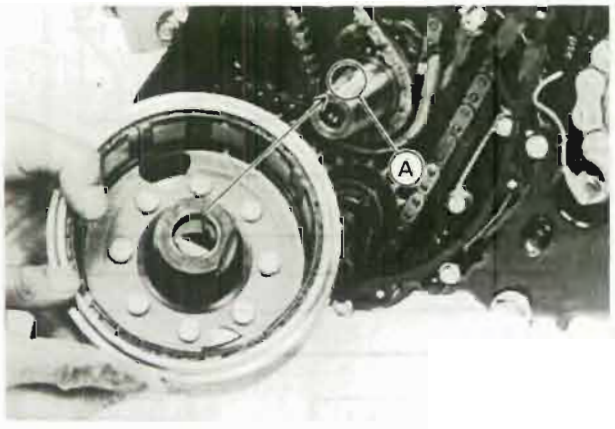
A. Magneto Flywheel Puller: 57001-1185
B. Tap the tool.

CAUTION

○If the flywheel is difficult to remove and a hammer is used, turn the puller shaft with the wrench on it while tapping the head of the shaft with a hammer.
○Be careful not to strike the flywheel itself. Striking the flywheel can cause the magnets to lose their magnetism.

Magneto Installation

- Clean off any oil or dirt that may be on the crankshaft taper or magneto flywheel hub.
- See that the key is fitted in place on the crankshaft properly, and then fit the flywheel in place.



A. Key

CAUTION

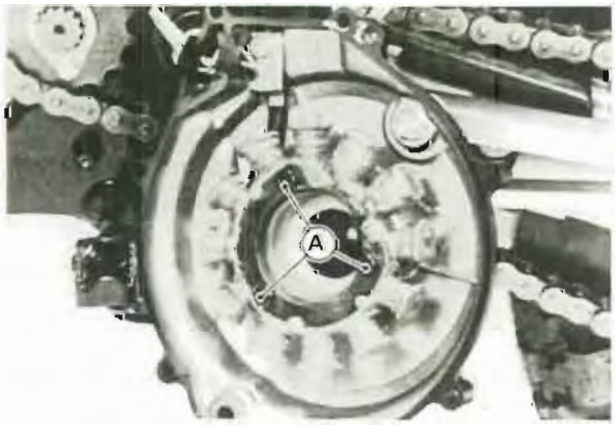
Oil, dirt, or incorrect tightening may cause the flywheel bolt loosening and the serious damage.

Magneto Stator Installation

- Tighten the stator bolts to the specification.

Tightening Torque

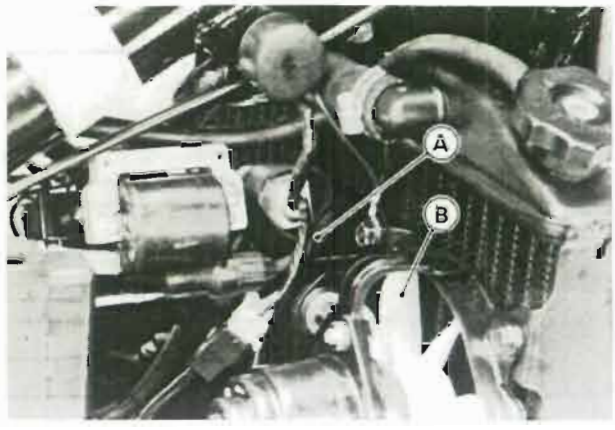
Stator Bolts:	12 N-m (1.2 kg-m, 8.5 ft-lb)

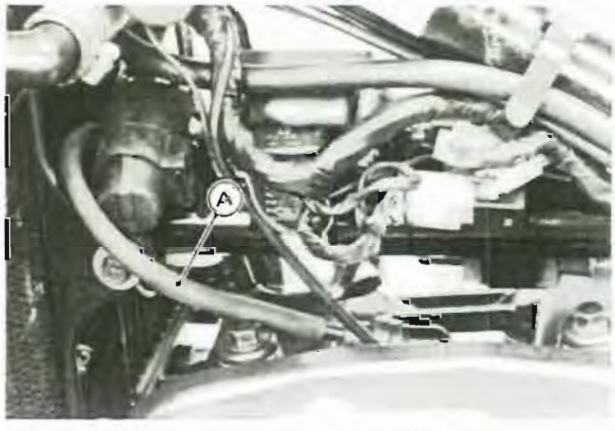


A. Stator Bolt

Ignition Coil Installation

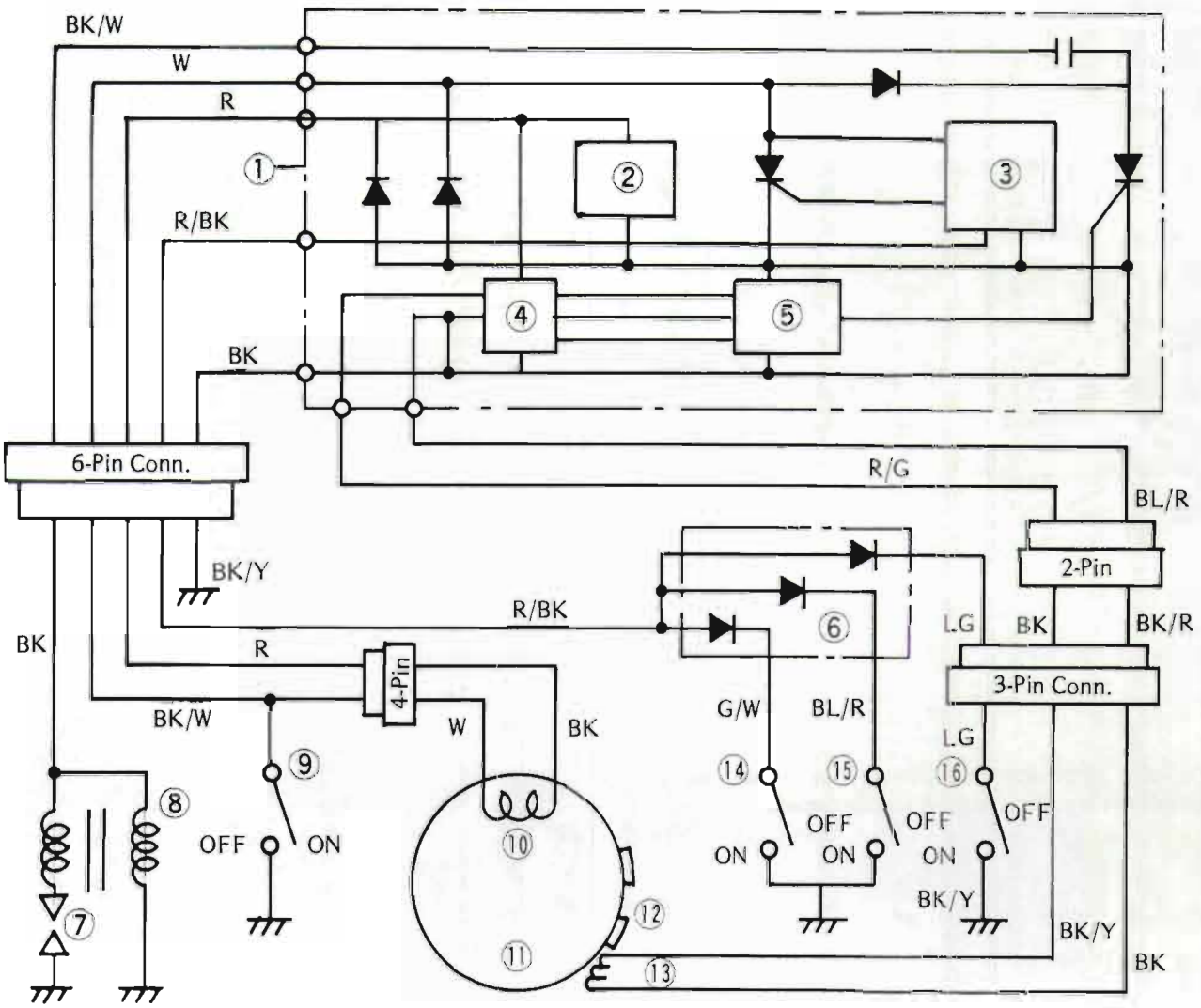
- Route the plug lead as shown in the figure to avoid damage by the fan blade.





A. Plug Lead B. Fan Blade

Ignition System



1. CDI Unit
2. Power Supply Circuit
3. Interlock Circuit
4. Ignition Timing Control Circuit
5. Thyristor Driving Circuit
6. Diode
7. Spark Plug
8. Ignition Coil
9. Engine Stop Switch
10. Exciter Coil
11. Flywheel Magneto
12. Timing Plate
13. Pickup Coil
14. Side Stand Switch
15. Clutch Switch
16. Neutral Switch

CDI Unit:

The CDI unit has two functions. The first function is to supply current to the primary winding of the ignition coil. The second function is to determine the ignition timing at which the charge stored in the capacitor is released in a single surge flowing through the primary winding of the ignition coil.

Pickup Coil:

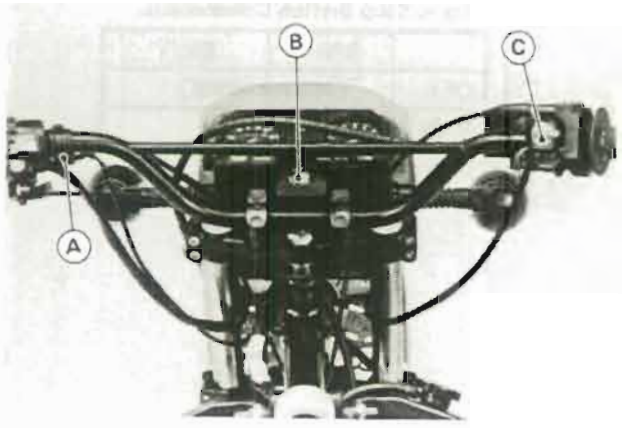
Every time either end of the timing plate on the flywheel passes under the pick-up coil, a pulse is generated and sent to the CDI unit.

Timing Plate:

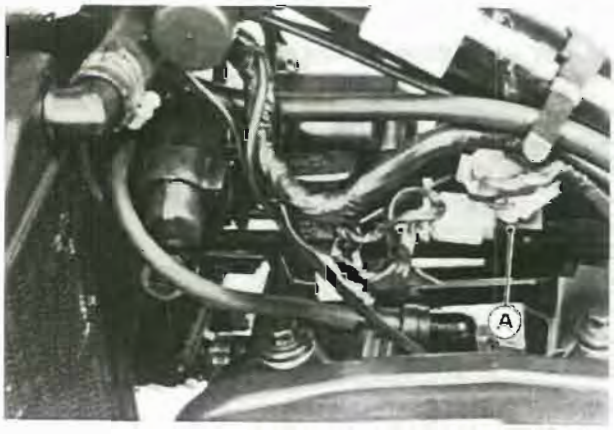
This is used to detect the crankshaft angle in cooperation with the pick up coil.

Interlock Circuit (Safety Device):

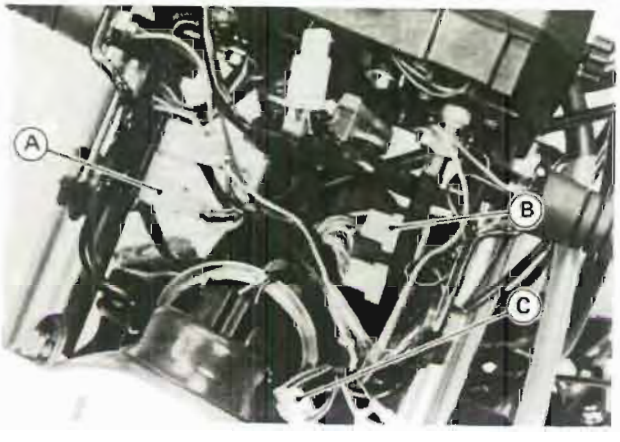
If the side stand is down, the clutch engaged, and the transmission in gear, the ignition system will not work. If any of these conditions is not met, the ignition system works and the engine can be started and run. The motorcycle cannot be ridden with the side stand down.



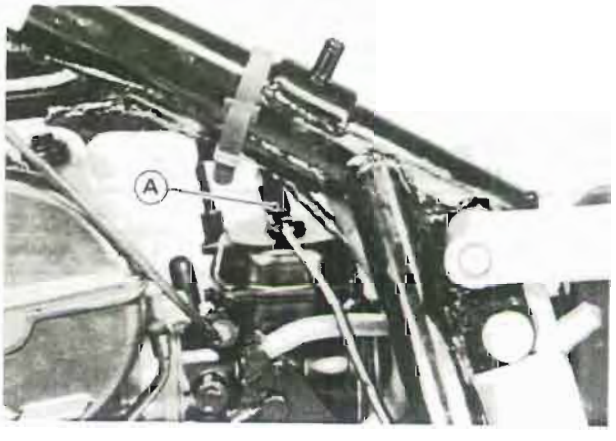
A. Clutch Switch
B. Ignition Switch
C. Engine Stop Switch



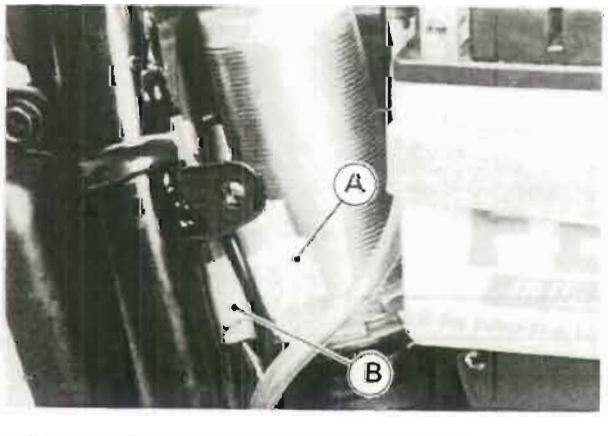
A. Diode



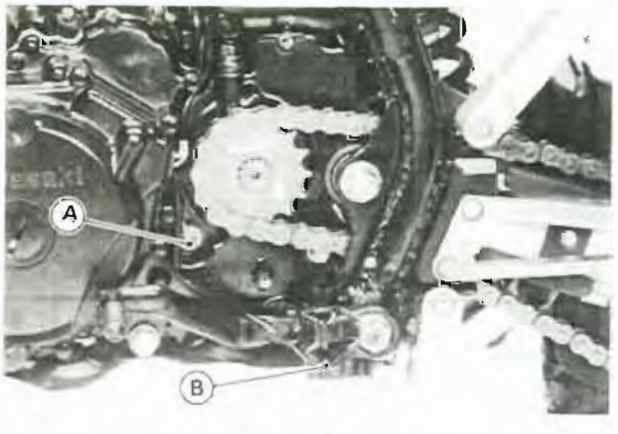
A. Engine Stop Switch 4-pin Connector
B. Ignition Switch 6-pin Connector
C. Clutch Switch 2-pin Connector



A. Side Stand Switch Connector



A. Magneto Connector
B. Neutral Switch and Pickup Coil Connector



A. Neutral Switch
B. Side Stand Switch

Switch Inspection

- Using the ohmmeter, check to see that only the connections shown in the table have continuity (about zero ohms).
- ★If the switch has an open or a short, repair it or replace it with a new one.

Engine Stop Switch Connections

	B/W	BK/Y
OFF	○	○
RUN		

Neutral Switch Connections

Transmission Position	LG	⏚
in neutral	○	○
not in neutral		

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

Clutch Switch Connections

Color	BL/R	BK/Y
When the clutch lever is pulled on	○	○
When the clutch lever is released		

Side Stand Switch Connections

Color	G/W	BR
When the side stand is left up	○	○
When the side stand is left down		

Ignition Switch Connections

Color	W	BR	BK/Y	BK/W	R	R/W
LOCK			○	○		
OFF			○	○		
ON	○	○			○	○
PARK	○		○			○

Diode Inspection

- Remove the connector.
- Zero the ohmmeter, and connect it to each pair of terminals: 1 – 2, 3 – 4, 5 – 6.
- Check the resistance in both directions between the terminals.

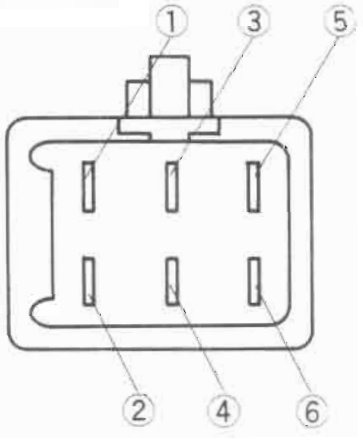
★The resistance should be low in one direction and more than ten times as much in the other direction. If any two terminals are low or high in both directions, the diode is defective and must be replaced.

"NOTE"

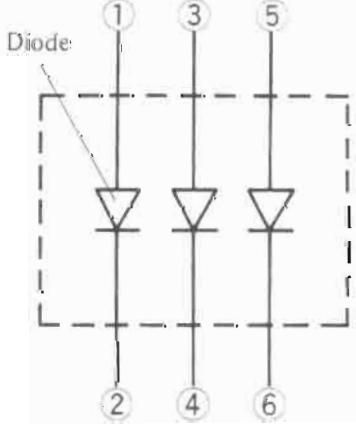
○*The actual meter reading varies with the meter used and the individual diode, but, generally speaking the lower reading should be from zero to the first ⅓ of the scale.*

Diode Circuit Inspection

(Terminal)



(Circuit)



Ignition Coil Inspection

(a) Measuring Arcing Distance:

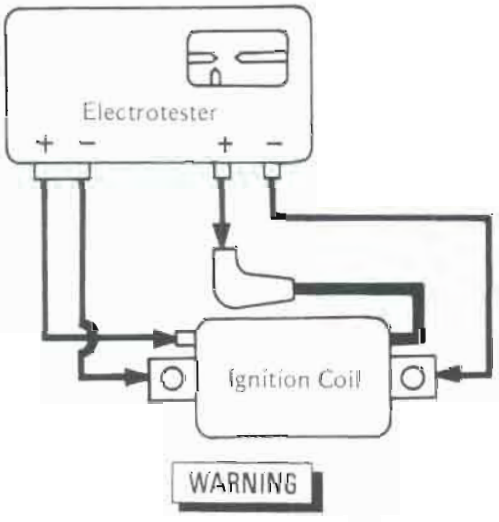
The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with the Kawasaki Electrotester (special tool).

"NOTE"

○*Since a tester other than the Kawasaki Electrotester may produce a different arcing distance, the Kawasaki Electrotester is recommended for reliable results.*

- Turn off the ignition switch, and remove the ignition coil.
- Connect the ignition coil (with the spark plug cap left installed at the end of the spark plug lead) to the Kawasaki Electrotester.
- Turn on the tester switches.

Ignition Coil Test



○**To avoid extremely high voltage shocks, do not touch the coil or leads.**

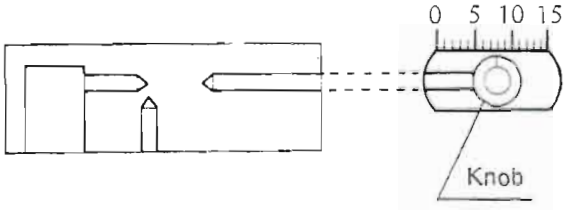
- Gradually slide the arcing distance adjusting knob from left to right (small distance to large distance), carefully checking the arcing.
- Stop moving the knob at the point where the arcing begins to fluctuate, and note the knob position in **mm**.

★If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective. To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil. 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.

Arcing Distance

Standard	7 mm or more

Arcing Distance Measurement



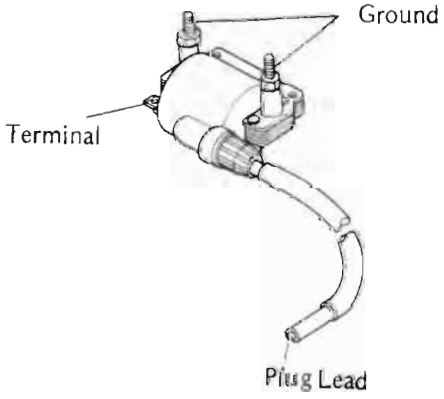
(b) Measuring Coil Resistance:

If an Electrotester is not available, the coil can be checked for a broken or badly shorted winding with an ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

- Remove the spark plug cap from the spark plug lead.
- Zero the ohmmeter, and connect it to the ignition coil.

★If either primary or secondary winding does not have the correct resistance, replace the ignition coil.

Measuring Ignition Coil Resistance



Ignition Coil Resistance

Meter	Connection	Reading
x 1Ω	terminal – ground	0.17 – 0.25 Ω (primary)
x 1 kΩ	plug lead – ground	3.2 – 4.8 kΩ (secondary)

CDI Unit Inspection

- Turn off the ignition switch, and remove the CDI unit under the fuel tank.
- Set the ohmmeter to the x 1 kΩ range, and connect it to the leads from the CDI unit to check the internal resistance of the CDI unit.

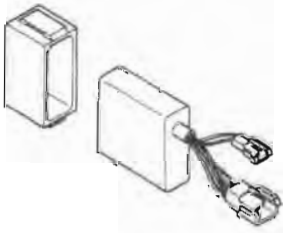
★If the readings do not correspond to the table, replace the CDI unit.

CDI Unit Resistance

Unit : kΩ

Range x 1 kΩ		Meter Positive (+) Lead Connection						
		W	R	BK	R/G	BL/R	BK/W	R/BK
Meter Negative (–) Lead Connection	W		30 – 120	15 – 80	60 – 250	15 – 80	∞	10 – 50
	R	7 – 200		7 – 50	70 – 400	7 – 50	∞	60 – 400
	BK	2 – 8	2 – 8		10 – 40	0	∞	15 – 70
	R/G	∞	∞	∞		∞	∞	∞
	BL/R	2 – 8	2 – 8	0	10 – 40		∞	15 – 70
	BK/W	∞	∞	∞	∞	∞		∞
	R/BK	6 – 25	7 – 30	3 – 12	30 – 130	3 – 12	∞	

CDI unit



Exciter or Pickup Coil Inspection

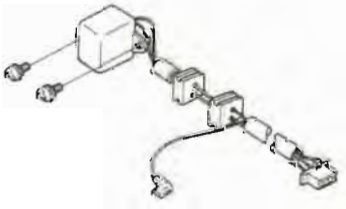
- Turn off the ignition switch, and pull out the pickup coil connector and the magneto connector.
- Zero the ohmmeter, and connect it to the leads from the exciter coil or pickup coil to check the resistance.

★If the reading is not the specified value, replace the stator and/or pickup coils.

- Using the highest resistance range of the ohmmeter, check the resistance between the exciter coil leads and chassis ground, and between the pickup coil leads and chassis ground.

★Any meter reading less than infinity indicates a short, necessitating replacement of the stator and/or pickup coil.

Pickup Coil



Resistance of Exciter and Pickup Coil

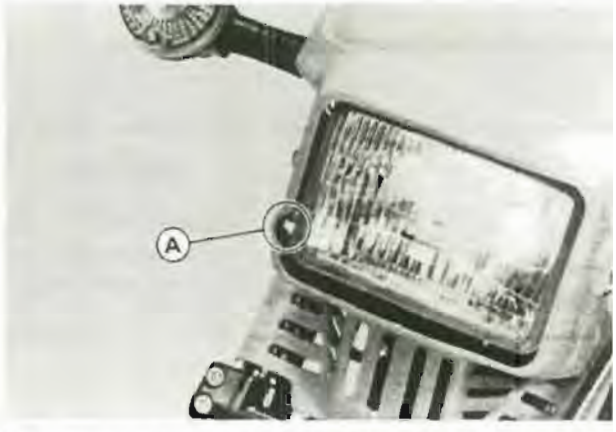
Meter	:	x 10 Ω
Connections	:	female connectors (disconnected)
W – BK	:	61 – 114 Ω (Exciter Coil)
BK/Y – BK	:	100 – 150 Ω (Pickup Coil)

Lighting System

Headlight Horizontal Adjustment

The headlight beam is adjustable both horizontally and vertically. Headlight aiming must be correctly adjusted for your safe riding as well as oncoming drivers. In most areas it is illegal to ride with improperly adjusted headlights.

- Turn the adjusting screw on the headlight rim in or out until the beam points straight ahead. Turning the adjusting screw clockwise makes the headlight beam point to the right.

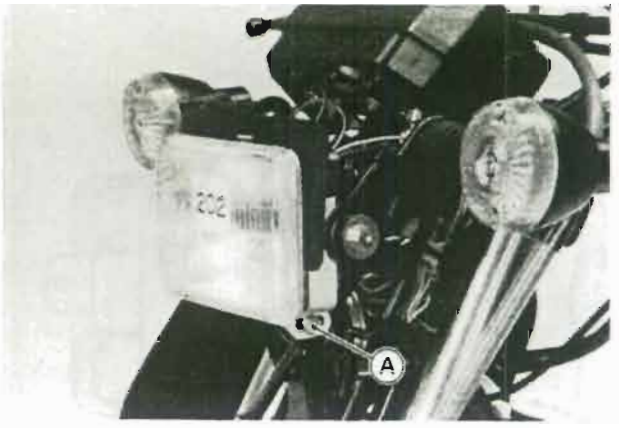


A. Adjusting screw for horizontal adjustment

Headlight Vertical Adjustment

- Loosen the headlight bolt through the rightmost vertical slit on the headlight cover.
- Adjust the headlight vertically.
- Tighten the lower headlight bolt.

A. Slit

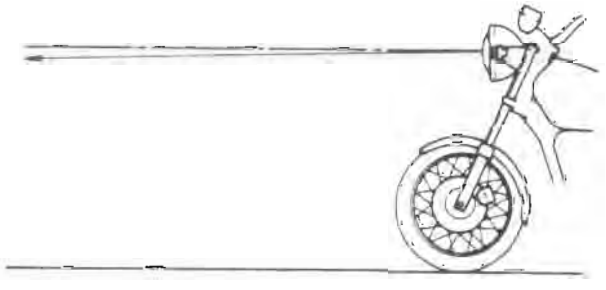


A. Headlight Adjuster Bolt

"NOTE"

On high beam, the brightest point 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.

Vertical Adjustment



Headlight Bulb Installation

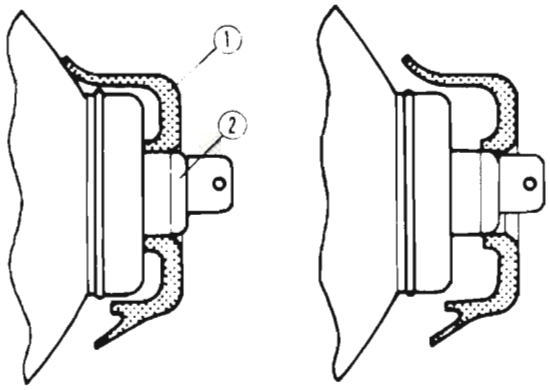
- Check the headlight aim after installation.

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 even cause the bulb to explode.

- Install the bulb dust cover as follows.

Dust Cover Installation

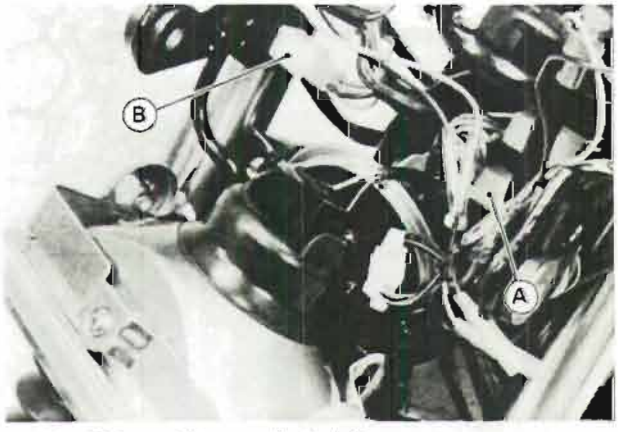


Good Bad

1. Dust cover
2. Headlight bulb

Headlight, Dimmer Switch Inspection

If the bulb does not light, check to see if the bulb has burned out or the fuse has blown. A blown fuse should be replaced. If the bulb and fuse are good, check the switch.



A. Headlight or Dimmer Switch Connector
B. Front Brake Light Switch Connector

- Disconnect the 9-pin connector to the headlight switch or to the dimmer switch.
- Use an ohmmeter to see that only the connections shown in the table have continuity (zero ohms).

★If the switch has an open or a short, it can be disassembled for repair. The contact surfaces may be cleaned, but no internal parts are available for replacement.

★If any parts are not repairable, the switch must be replaced as a unit.

★If the procedure above does not remedy the problem, check the ignition switch, the wiring, and the battery.

Headlight and Dimmer Switch Connections (Other than US and Canada)

Headlight Switch				Dimmer Switch			
Color	BR	R/W		Color	R/BK		R/Y
ON	○——	——○	——○	HI	○——	——○	
OFF							
PO	○——	——○		LO			○—— ——○
Lead Location	White 9-pin male connector behind the headlight housing.						

Dimmer Switch Connections (US and Canada)

	Lead Color			Lead Location
	R/BK	BR	R/Y	
HI	○——	——○		White 9-pin male connector behind the headlight housing.
LO		○——	——○	

Front Brake Light Switch Inspection

- Connect an ohmmeter to the disconnected switch leads, and pull the front brake lever. The ohmmeter should read zero ohms.

★If it does not, replace the switch.

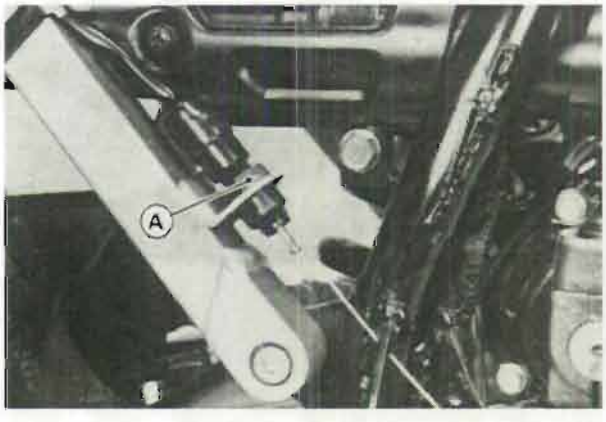
Rear Brake Light Switch Adjustment

See chapter 10. Brakes.

Rear Brake Light Switch Inspection

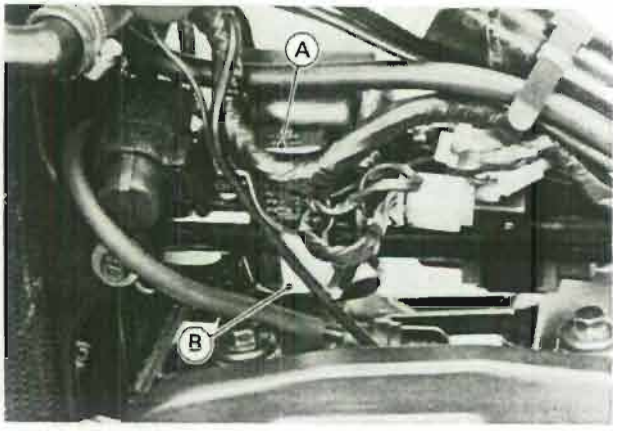
- Inspect the rear brake light switch in the same way as the front brake light switch.

★If there is no continuity whenever the brake pedal is depressed, replace the switch.



A. Rear Brake Light Switch in the right side cover.

Turn Signal Inspection



A. Turn Signal Relay Terminal B. Leads

(1) Neither right nor left turn signals come on at all:
- •Check that battery voltage is normal.
- •Remove the fuel tank.
- •Unplug the relay leads and use an ohmmeter to check that there is continuity (close to zero ohms) between the relay terminals.
- ★If there is no ohmmeter reading, or if there is several ohms resistance, replace the relay with a new one.
- •Turn the meter to the 25 V DC range, connect the (+) meter lead to the brown lead that was disconnected from the relay, and connect the (−) meter lead to the orange lead.
- •With the ignition switch on, first switch the turn signal switch to the R and then to the L position. The meter should register battery voltage at either position.
- ★If it does not, the fuse, ignition switch, or wiring is at fault.

(2) Both right or both left turn signals come on and stay on or flash too slowly:
- •Check that battery voltage is normal.
- •Check that all wiring connections are good.
- •Check that the turn signal bulbs and indicator bulbs are of the correct wattage.
- ★If all of the above check good, replace the relay.

(3) A single light on one side comes on and stays on:
- ★Either the light that does not come on is burned out or of the incorrect wattage, or the wiring is broken or improperly connected.

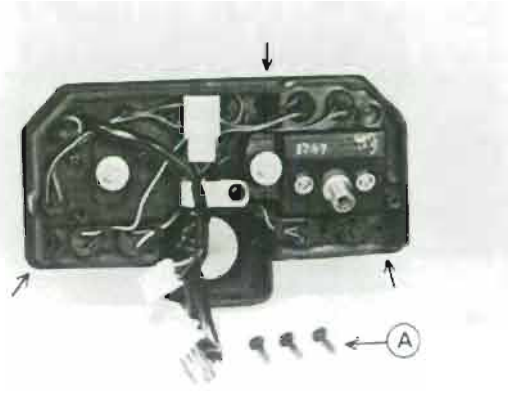
(4) Neither light on one side comes on:
- ★Unless both lights for that side are burned out, the trouble is with the turn signal switch.

(5) Flashing rate is too fast:
- ★If this occurs on both the right and left sides, check that the battery is not being overcharged.
- ★If the magneto and the battery voltage are normal, replace the turn signal relay.
- ★If this occurs on only one side, one or both of the turn signal bulbs are of too high a wattage.

Tachometer and Water Temperature Gauge

Disassembly:

•After removal of the meter assembly, remove the screw (3).

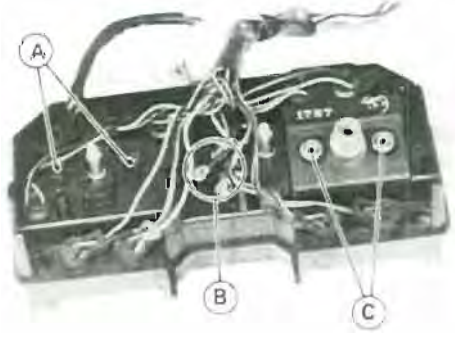


A. Screw

•Remove the screw and knob, and lift up the cover.

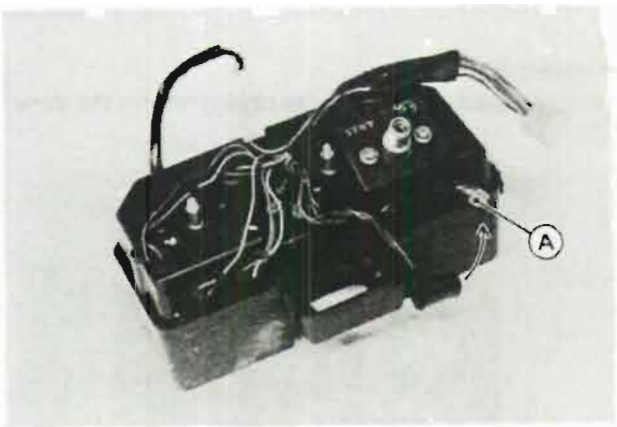
A. Screw B. Knob

○Each removal point is as follows.



A. Tachometer
B. Water Temperature Gauge
C. Speedometer

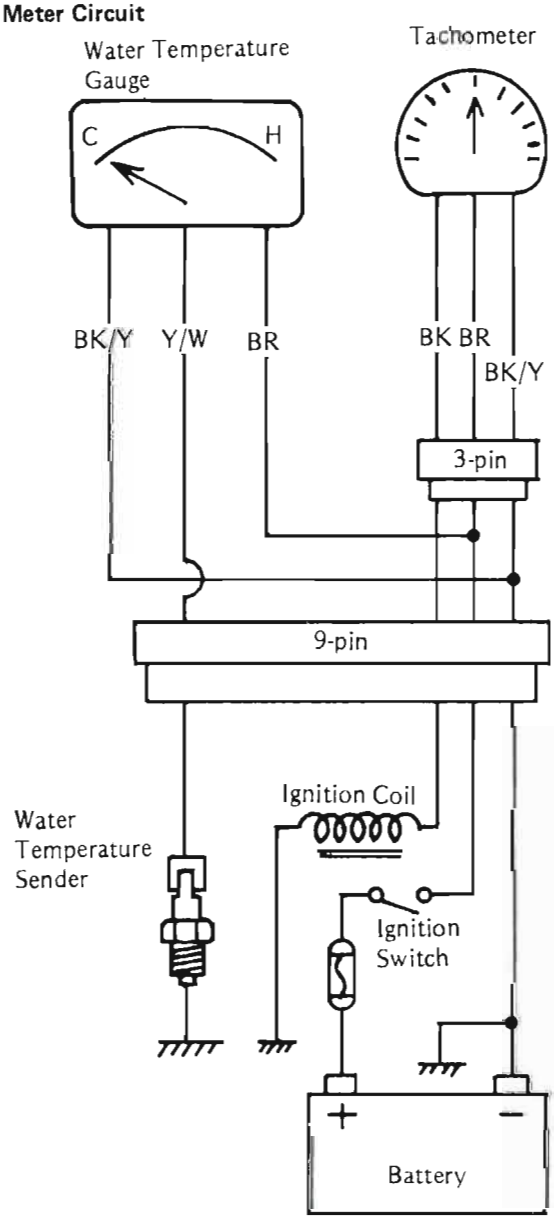
●Pull out the bulb.

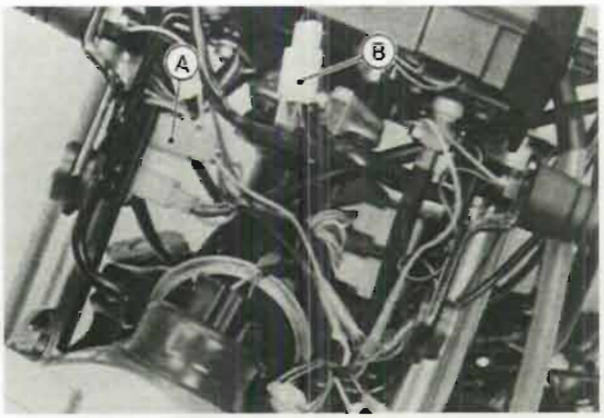


A. Bulb

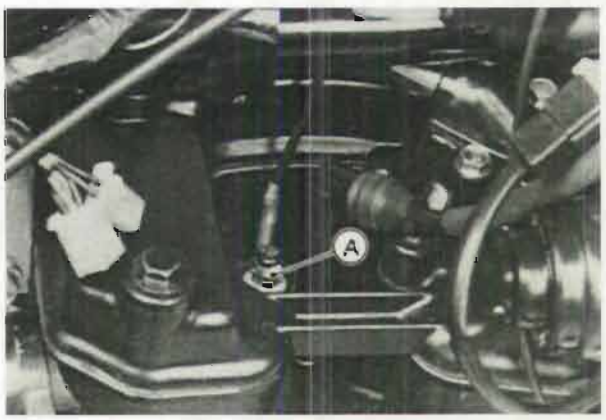
Maintenance:

Meter Circuit





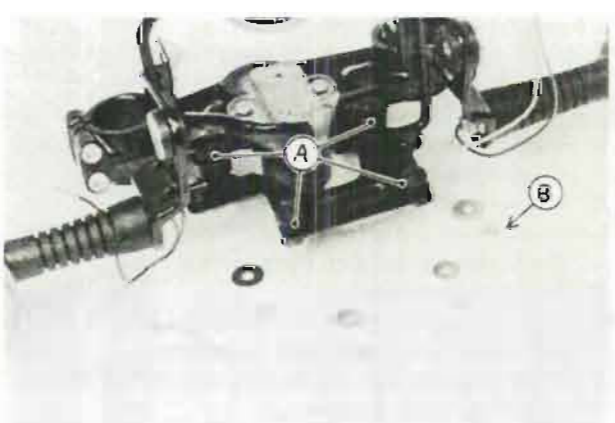
A. Meter 9-pin connector
B. Meter 3-pin connector



A. Water Temperature Sender

Meter Mounting Inspection

●Check to see that the rubber dampers(4) at the meter mounting bracket are in good condition; they should not be hardened or cracked.
●Replace any damaged rubber dampers with new ones.
●Check to see that all meter mounting nuts are tightened securely.
★Tighten any loose fasteners.



A. Rubber Dampers B. Mounting Nuts

Meter Power Supply Test

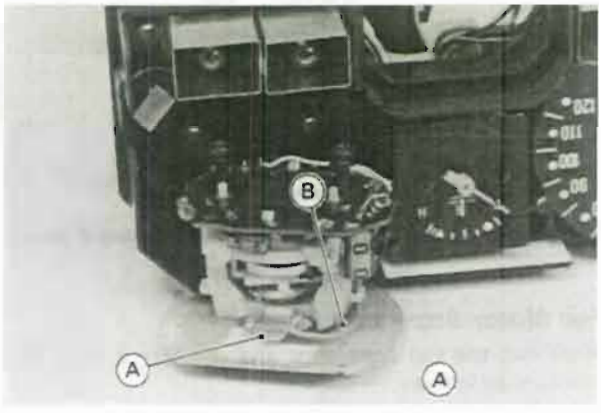
- Remove the headlight housing.
- Disconnect the 9-pin connector from the meter assembly.
- Connect a voltmeter to the 9-pin connector on the main wiring harness side as shown in the table, and turn on the ignition switch. If the voltmeter reading does not correspond to the table, the wiring is bad.
- ★Check the leads and connectors, and replace or repair any damaged wiring.

Wiring Check

Meter range	25 V DC
Connections:	9-pin female connector
Meter (+) →	BR
Meter (–) →	BK/Y
Meter reading:	Battery voltage

Tachometer Resistance Check

- Disconnect the 3-pin connector and remove the tachometer assembly.
- Check the resistance between the leads shown in the figure.



A. R lead B. BK lead

- ★If the resistance is found to be out of the specified range, replace the tachometer unit.

Tachometer Resistance

Meter Connections	
Meter range:	x 10 Ω
BK ← Meter → R:	65 – 105 Ω

Tachometer Engine Speed Signal Test

- Use the voltmeter as shown in the table to check the engine speed signal sent to the meter.
- Turn on the ignition switch, and read the voltmeter.
- Start the engine, and read the voltmeter.
- ★If the meter does not show the voltage shown in the table, the signal is not reaching the meter.

Engine Speed Signal

Meter range :	10 V DC
Connections :	9-pin male connector
Meter (+) →	Brown lead
Meter (–) →	Black lead
Meter Reading	
○0 V with engine stopped	
○2 – 4 V with engine running	

Water Temperature Gauge Check

- Remove the meter assembly.
- Disconnect the 9-pin connector (white male) and the 3-pin connector.
- Check the resistance of the meter using an ohmmeter as shown in the table.
- ★If the resistance is found to be out of the specified range, replace the water temperature gauge unit.

Gauge Resistance

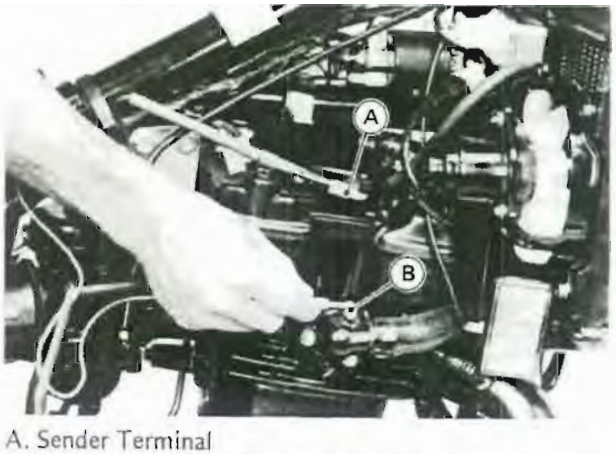
Meter range :	x 10 Ω
Connection :	9-pin male connector (disconnected)
BK/Y ← Meter → W/Y :	80 – 100 Ω
BR ← Meter → W/Y :	95 – 120 Ω

Water Temperature Gauge Circuit Check

- Disconnect the yellow lead from the water temperature sender, and turn on the ignition switch. At this time the gauge should read **C**.
- Ground the sender lead to the engine. At this time the gauge should read **H**.

CAUTION

○**Do not ground the lead longer than necessary. When the hand swings to the "H" position, stop grounding. Otherwise the meter could be damaged.**



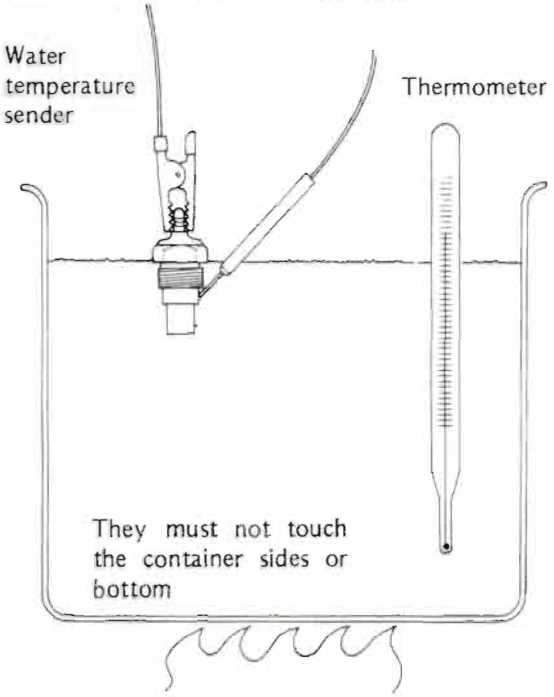
A. Sender Terminal
B. Open or ground the lead to check the circuit.

- If these reading are not obtained, the trouble is with the water temperature gauge, or wiring.

Water Temperature Sender Check

- Remove the water temperature sender.
- Suspend the sender in a container of water so that the temperature (–) sensing projection and threaded portion are submerged.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.

Water Temperature Sender Inspection



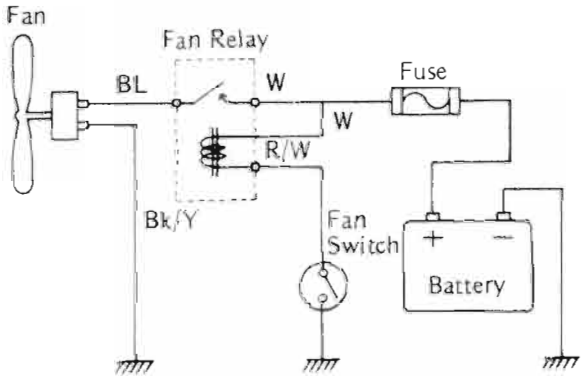
- Measure the internal resistance of the sender across the switch terminal and the body at the temperatures shown in the table. The internal resistance of the sender should change as shown in the table. If it does not, replace the sender.

Internal Resistance of Water Temperature Sender

Water Temperature		
80°C (176°F)	:	100 – 150 Ω
100°C (212°F)	:	52 – 78 Ω

Radiator Fan

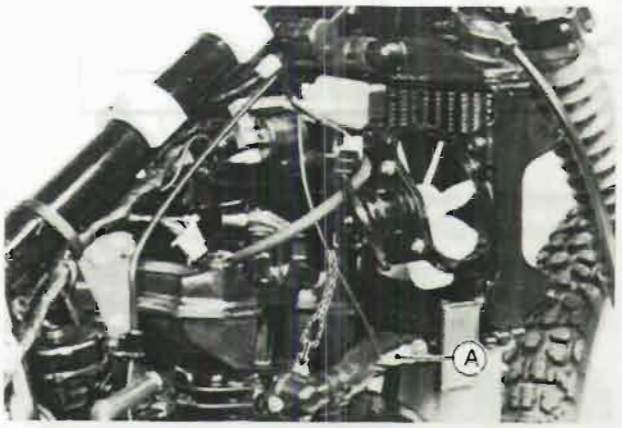
Cooling Fan System Circuit



If the fan does not run while the water temperature gauge hand is in the hot range, check the water temperature gauge (mentioned above), or the cooling fan system (given below).

Initial Check

- Visually inspect the radiator fan.
- ★If the fan blades or shroud are damaged, replace them.
- Pull off the fan switch lead, and ground it with a suitable lead.
- ★If the fan turns, inspect the fan switch (See Fan Switch Inspection).
- ★If the fan does not turn, check the fan, fan relay or wiring as follows.



A. Fan Switch Lead : ground it.

WARNING

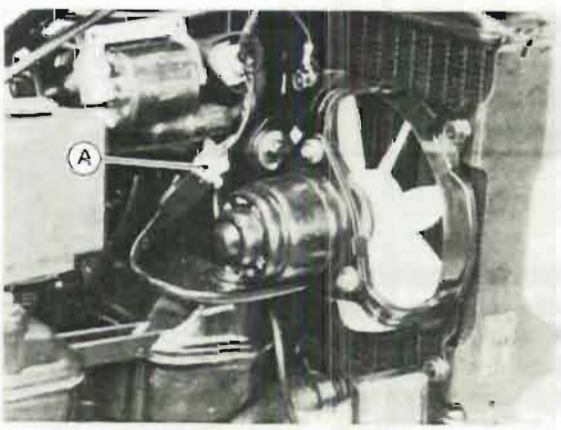
Be careful not to touch the fan blades to avoid injury.

Fan Motor Inspection

- Pull out the fan connector and connect it to a 12 V battery as follows.

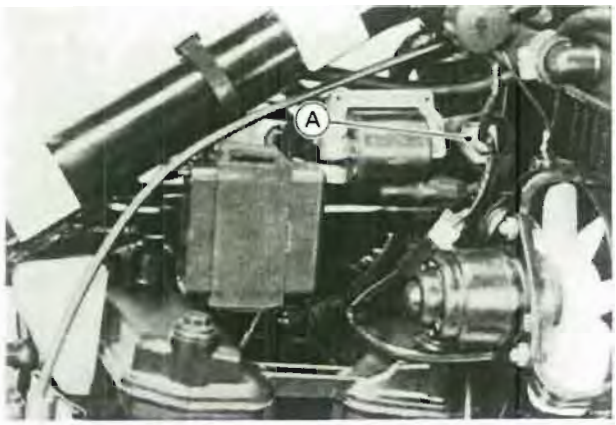
Fan connector (male)
BK/Y → Battery (–)
BL → Battery (+)

- ★If the fan does not turn, the motor is defective and must be replaced.



A. Fan Connector

Fan Relay Inspection

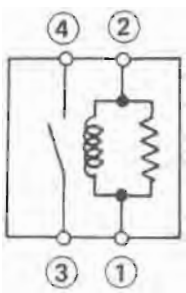


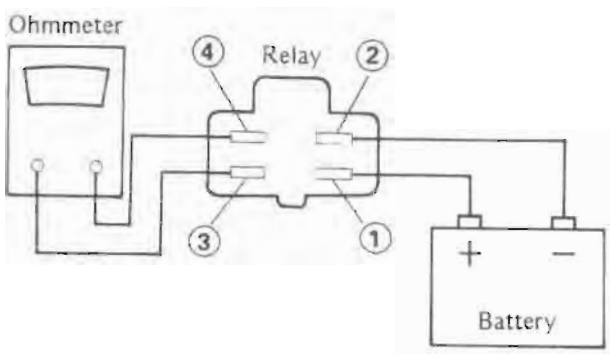
A. Fan Relay

•Connect the ohmmeter and one 12-volt battery to the removed relay as shown.
★If the relay does not work as specified, replace the relay.

Testing Relay

Meter range	:	x 1 Ω range
Connection		
1 ← Meter → **2**	:	65 – 85 Ω
3 ← Meter → **4**	:	0 Ω with battery connected
3 ← Meter → **4**	:	∞ Ω with battery disconnected



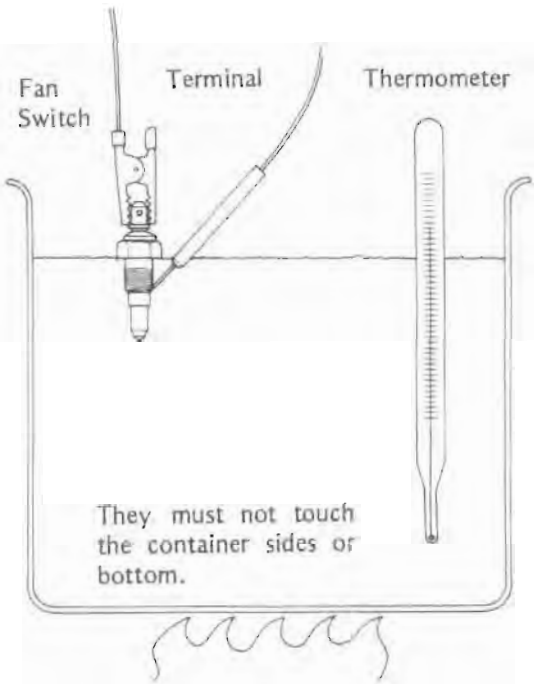


① and ② : Relay Coil Terminals
③ and ④ : Relay Switch Terminal

Fan Switch Inspection

•Remove the fan switch, and check the internal resistance of the fan switch across the switch terminal and the body.
•Suspend the switch in a container of water so that the temperature-sensing projection and threaded portion are submerged.

Fan Switch Inspection



★The fan switch resistance should change as shown in the table. If it does not, replace the switch.

Fan Switch Resistance

Temperature	Resistance Change
Atmospheric temperature	∞ Ω
Raise 94 – 100°C → (201 – 212°F)	∞ → 0.5 Ω
91°C (196°F) Lower ←	∞ ← 0.5 Ω

Appendix

Table of Contents

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 points.

- 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 competitive 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 desiraole 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 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.

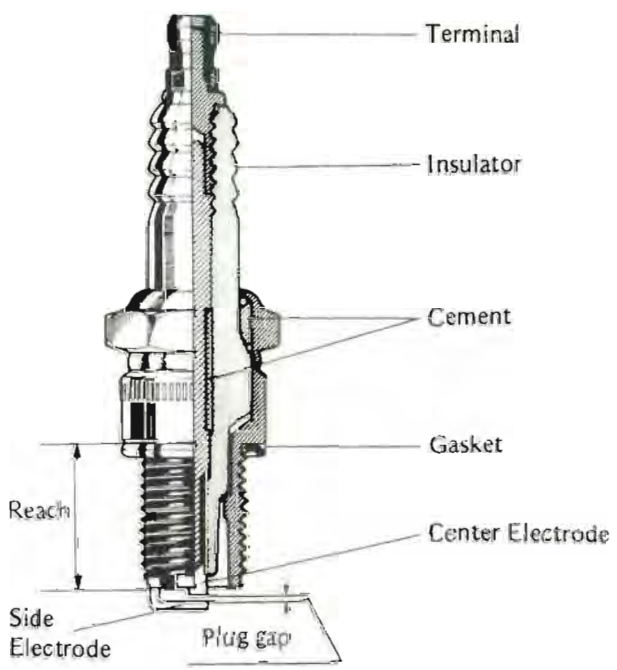
Spark Plug:

The spark plug ignites the fuel/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 adjusted.

Test have shown the plug listed in the "SPECIFICATIONS" section 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 a correct heat range is used should be determined by removing and inspecting the plug.

Spark Plug



Spark Plug Condition

Carbon Fouling | Oil Fouling | Normal Operation | Overheating

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 high a heat range is used – that is, a "cold" plug that cools itself too well – the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceramic insulator.

The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or 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.

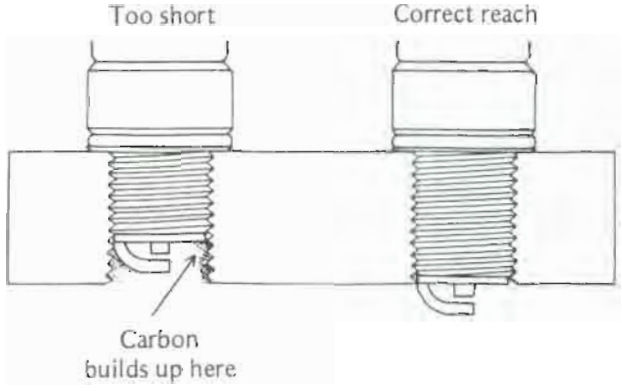
Spark Plug Inspection

- 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 listed in the "SPECIFICATIONS" section, 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.**

Plug Reach



Standard Spark Plug Threads

Diameter	:	12 mm
Pitch	:	1.25 mm
Reach	:	19.0 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). The standard plug has been selected to match the normal usage of this motorcycle in combined street and highway riding. Unusual riding conditions may require a different spark plug heat range. For racing, install the colder plug.*

Troubleshooting Guide

"NOTE"

○This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties. Electrical troubleshooting is not covered here due to its complexity. For electrical problems, refer to the appropriate heading in the Chapter 14.

Engine Doesn't Start; Starting Difficulty

Engine won't turn over
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Compression release cam spring broken (K.A.C.R.)
- Compression release cam sticks close (K.A.C.R.)

No fuel flow
- No fuel in tank
- Fuel tap turned off
- Tank cap air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

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

No spark; spark weak
- Ignition switch not on
- Engine stop switch turned off
- Clutch lever not pulled in or gear not in neutral
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap not in good contact
- CDI unit broken
- Pick-up coil broken
- Ignition coil broken
- Ignition coil resistor open
- Ignition or engine stop switch shorted
- Wiring shorted or open

Compression low
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston rings bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
- Compression release cam (K.A.C.R.) sticks open (Engine stalls when moving off).

Poor Running at Low Speed

Spark weak
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- CDI unit broken
- Pick-up coil broken
- Ignition coil broken
- Ignition coil resistor open

Fuel/air mixture incorrect
- Pilot screw(s) maladjusted
- Pilot jet, or air passage clogged
- Air bleed pipe bleed holes clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner/carburetor poorly sealed
- Starter plunger stuck open
- Fuel level too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Carburetor and carburetor holder not aligned correctly

Compression low
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston rings bad (worn, weak, broken or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
- Compression release cam (K.A.C.R.) stick open (Engine stalls when moving off)

other
- Ignition timing incorrect
- Carburetor vacuum piston does not slide smoothly
- Engine oil viscosity too high
- Brakes dragging
- Over heating
- Clutch slipping
- Throttle valve does not open fully

Poor Running or No Power at High Speed

Firing incorrect
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- CDI unit broken
- Pick-up coil broken
- Ignition coil broken
- Ignition coil resistor open
- Timing not advancing

Fuel/air mixture incorrect
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Fuel level too high or too low
- Air bleed pipe bleed holes clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner/carburetor poorly sealed
- Starter plunger stuck open
- Water or foreign matter in fuel
- Carburetor holder loose
- Carburetor and carburetor holder not aligned correctly
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged

Compression low
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston rings bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)
- Compression release cam (K.A.C.R) sticks open (Engine stalls when moving off)

Knocking
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect

Miscellaneous
- Throttle valve won't fully open
- Carburetor vacuum piston does not slide smoothly
- Timing not advancing
- Brakes dragging
- Clutch slipping
- Overheating
- Engine oil level too high
- Engine oil viscosity too high
- Balancer mechanism malfunctioning

Overheating

Firing incorrect
- Spark plug dirty, damaged, or maladjusted
- Spark plug incorrect

Fuel/air mixture incorrect
- Main jet clogged
- Fuel level too low
- Carburetor holder loose
- Carburetor and carburetor holder not aligned correctly
- Air cleaner poorly sealed, or missing
- Air cleaner/carburetor poorly sealed

Compression high
- Carbon built up in combustion chamber

Engine load faulty
- Clutch slipping
- Engine oil level too high
- Engine oil viscosity too high
- Brakes dragging

Lubrication inadequate
- Engine oil level too low
- Engine oil poor quality or incorrect

Gauge incorrect
- Water temperature gauge broken
- Water temperature sender broken
- Voltage regulator broken

Coolant incorrect
- Coolant level too low
- Coolant deteriorated

Cooling system component incorrect
- Radiator clogged
- Thermostat trouble
- Radiator cap trouble
- Thermostatic fan switch trouble
- Fan relay trouble
- Fan motor broken
- Fan blade damaged
- Water pump not turning
- Water pump impeller damaged

Over Cooling

Gauge incorrect
- Water temperature gauge broken
- Water temperature sender broken

Cooling system component incorrect
- Thermostatic fan switch trouble
- Thermostat trouble

Clutch Operation Faulty

Clutch slipping
- No clutch lever play
- Friction plates worn or warped
- Steel plates worn or warped
- Clutch springs broken or weak
- Clutch release maladjusted
- Clutch inner cable catching
- Clutch release mechanism trouble
- Clutch hub or housing unevenly worn

Clutch not disengaging properly
- Clutch lever play excessive
- Clutch plates warped or too rough
- Clutch spring tension uneven
- Engine oil deteriorated
- Engine oil viscosity too high
- Engine oil level too high
- Clutch housing frozen on drive shaft
- Clutch release mechanism trouble
- Loose clutch hub nut

Gear Shifting Faulty

Doesn't go into gear; shift pedal doesn't return
- Clutch not disengaging
- Shift fork(s) bent or seized
- Gear(s) stuck on the shaft
- Shift pedal return spring weak or broken
- Shift lever broken
- External shift mechanism pawl broken
- Shift return spring pin loose
- Pawl spring broken

Jumps out of gear
- Shift fork(s) worn
- Gear groove(s) worn
- Gear dogs, dog holes, and/or dog recesses worn
- Shift drum groove(s) worn
- Shift drum positioning lever spring weak or broken
- Shift fork pin(s) worn
- Drive shaft, driven shaft, and/or gear splines worn

Overshifts
- Shift drum positioning lever spring weak or broken
- Pawl spring weak or broken

Abnormal Engine Noise

Knocking
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect

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

Valve noise
- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearings worn
- Valve lifter worn

Other noise
- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring(s) worn, broken, or stuck
- Piston seizure damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive
- Engine mounting loose
- Crankshaft bearings worn
- Camshaft chain tensioner trouble
- Camshaft chain, timing chain sprockets, guides worn
- Balancer chain, chain tensioner worn
- Balancer mechanism springs weak or broken
- Loose magneto

Abnormal Drive Train Noise

Clutch noise
- Clutch rubber damper deteriorated
- Clutch housing/friction plate clearance excessive
- Clutch housing gear/primary gear backlash excessive
- Metal chip jammed in clutch housing gear teeth

Transmission noise
- Bearings worn
- Transmission gears worn or chipped
- Metal chips jammed in gear teeth
- Engine oil insufficient
- Kick ratchet gear not properly disengaging from kick gear

Drive chain noise
- Drive chain adjusted improperly
- Chain worn
- Rear and/or engine sprocket(s) worn
- 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 defective

Disc brake noise
- Pad loose
- Pad installed reversely
- Pad surface glazed
- Disc Warped

Other noise
- Brackets, nuts, bolts, etc. not properly mounted or tightened

Exhaust Smokes Excessively

White smoke
- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn

Engine oil level too high

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

Brown smoke
Main jet too small
Fuel level too low
Air cleaner/carburetor poorly sealed
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory

Handlebar hard to turn
Steering stem locknut too tight
Bearing(s) damaged
Race(s) dented or worn
Steering stem lubrication inadequate
Steering stem bent
Tire air pressure too low

Handlebar shakes or excessively vibrates
Tire(s) worn
Swing arm bearing(s) worn
Rim(s) warped, or not balanced
Wheel bearing(s) worn
Handlebar clamps loose
Pivot shaft warped
Steering stem head nut and/or clamp bolt loose

Handlebar pulls to one side
Frame bent
Wheel misalignment
Swing arm bent or twisted
Steering stem bent
Front fork bent
Right/left front fork oil level uneven

Shock absorption unsatisfactory
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Front fork air pressure too high
Tire air pressure too high
Shock absorber maladjusted
Front fork bent

(Too soft)
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low
Front fork, rear shock absorber spring(s) weak
Rear shock absorber oil leaking

Brakes Don't Hold

Air in the brake line
Pad or disc worn
Brake fluid leak
Disc warped
Contaminated pads
Brake fluid deteriorated
Primary or secondary cup damaged
Master cylinder scratched inside

Battery Discharged

Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
Battery leads making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Regulator/Rectifier trouble
Stator coil open or short
Wiring faulty

Battery Overcharged

Regulator/Rectifier trouble
Battery trouble

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	x 1,000,000
kilo	k	x 1,000
centi	c	x 0.01
milli	m	x 0.001
micro	μ	x 0.000001

Units of Mass:

kg	x	2.205	=	lb
g	x	0.03527	=	oz

Units of Volume:

L	x	0.2642	=	gal (US)
L	x	0.2200	=	gal (imp)
L	x	1.057	=	qt (US)
L	x	0.8799	=	qt (imp)
L	x	2.113	=	pint (US)
L	x	1.816	=	pint (imp)
mL	x	0.03381	=	oz (US)
mL	x	0.02816	=	oz (imp)
mL	x	0.06102	=	cu in

Units of Force:

N	x	0.1020	=	kg
N	x	0.2248	=	lb
kg	x	9.807	=	N
kg	x	2.205	=	lb

Units of Length:

km	x	0.6214	=	mile
m	x	3.281	=	ft
mm	x	0.03937	=	in

Units of Torque:

N-m	x	0.1020	=	kg-m
N-m	x	0.7376	=	ft-lb
N-m	x	8.851	=	in-lb
kg-m	x	9.807	=	N-m
kg-m	x	7.233	=	ft-lb
kg-m	x	86.80	=	in-lb

Units of Pressure:

kPa	x	0.01020	=	kg/cm^2
kPa	x	0.1450	=	psi
kPa	x	0.7501	=	cm Hg
kg/cm^2	x	98.07	=	kPa
kg/cm^2	x	14.22	=	psi
cm Hg	x	1.333	=	kPa

Units of Speed:

km/h	x	0.6214	=	mph

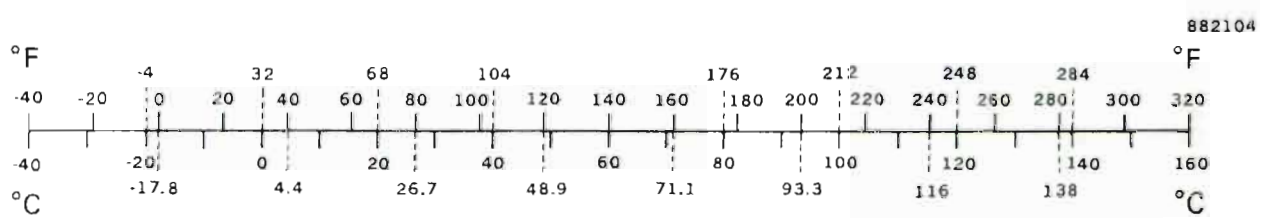
Units of Power:

kW	x	1.360	=	PS
kW	x	1.341	=	HP
PS	x	0.7355	=	kW
PS	x	0.9863	=	HP

Units of Temperature:

$$\frac{9\,(°C + 40)}{5} - 40 = °F$$

$$\frac{5\,(°F + 40)}{9} - 40 = °C$$



MODEL APPLICATION

Year	Model	Beginning Frame Number
1984	KL600-A1 (US and Canadian Models)	JKAKL4A1*EA000001
	KL600-A1 (other than US and Canadian Models)	KL600A-000001

* : This digit in the frame number changes from one machine to another.

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