

Quick Reference Guide

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

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

LIST OF ABBREVIATIONS

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

(Continued on next page.)

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 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.

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 or rendering inoperative of device or element of design in order to perform maintenance.
2. Tampering would include:
 - a. Misadjustment of vehicle component 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 component 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 system.

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.



WARNING CONTAINS ASBESTOS

Breathing asbestos
dust is dangerous
to health

Follow safety
instructions

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

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

For the duration of 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 Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Motorcycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki motorcycles are introduced by the 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.

How to Use this Manual

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

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

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

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

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

WARNING

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

CAUTION

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

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

NOTE

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

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

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

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

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

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

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NOTE

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

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

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

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

- To get the longest life out of your motorcycle:
 - Follow the Periodic Maintenance Chart in the Service Manual.
 - Be alert for problems and non-scheduled maintenance.
 - Use proper tools and genuine Kawasaki Motor cycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki motorcycles are introduced by the Special Tool Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
 - Follow the procedures in this manual carefully. Don't take shortcuts.
 - Remember to keep complete records of maintenance and repair work done and any new parts installed.

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 instructions have been included wherever necessary. Nevertheless, when a detail account has limitations, a certain amount of basic knowledge is also required for successful work.

General Information

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Periodic Maintenance Chart	1-9

Before removal and disassembly, clean the motorcycle. Any dirt entering the engine or other parts will work as an abrasive and cause damage. For the same reason, before installing a new part, clean off any dust or metal filings.

(2) Battery Ground
Remove the ground (-) lead from the battery before performing any disassembly operations on the motorcycle. This prevents:

- (a) the possibility of accidentally turning the engine over while partially disassembled.
- (b) the possibility of electrical connections which will occur when they are not intended to be made.

(3) Tighten Specifications
Generally, when installing a part with several bolts, nuts or screws, tighten them in the order and torque specified in this manual. Tighten them evenly in a clockwise direction. This is to avoid warping the part.

(4) Torque
The torque values given in this Service Manual should always be adhered to. 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 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) Lubrication
Follow manufacturer's directions for cleaning and greasing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine oil passages and cause engine damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock-N-Go (Blue). Use the following liquid grease and silicone sealant.

Kawasaki Bond (Silicone Sealant) : 88019-130
Kawasaki Bond (Liquid Grease - Blue) : 88104-1003



1-2 GENERAL INFORMATION

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 detail account has limitations, a certain amount of basic knowledge is also required for successful work.

Especially note the following:

(1) Dirt

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

(2) Battery Ground

Remove the ground (—) lead from the battery before performing any disassembly operations on the motorcycle. This prevents:

- (a) the possibility of accidentally turning the engine over while partially disassembled.
- (b) sparks at electrical connections which will occur when they are disconnected.
- (c) damage to electrical parts.

(3) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, they should all be started in their holes and tightened to a snug fit. Then tighten them evenly in a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter 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

The torque values given in this Service Manual should always be adhered to. 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 plasticfaced 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) Liquid Gasket, Non-permanent Locking Agent, Silicone Sealant

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). Use the following liquid gasket and silicone sealant.

**Kawasaki Bond (Liquid Gasket – Black)
: 92104-1003**



Kawasaki Bond (Silicone Sealant) : 56019-120



(8) High Flash-point Solvent

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

(9) Gasket, O-ring

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

(10) 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 contacts evenly with 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 oil, preferably high temperature grease on the lips to reduce rubber to metal friction.

(14) Circlip, Retaining Ring

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

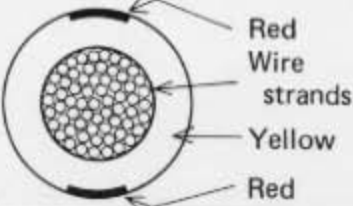
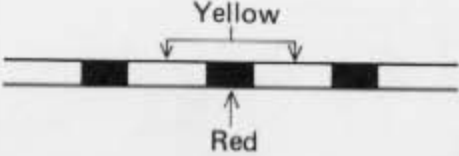
(15) Lubrication

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

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulfide grease (MoS₂) 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
 <p>Red Wire strands</p> <p>Yellow</p> <p>Red</p>	<p>Yellow/red</p>	 <p>Yellow</p> <p>Red</p>

1-4 GENERAL INFORMATION

(17) Replacement Parts

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

(18) Inspection

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

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

(19) 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.

(18) Electrical Wire

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 color were reversed to make red the main color.

Figure in Wiring Diagram	Name of Wire Color	Wire (cross-section)
	Yellow/red	

Model Identification

ZX900-A1 Left Side View:



ZX900-A1 Right Side View:



(Continued on next page.)

1-6 GENERAL INFORMATION

General Specifications

Model Identification

ZX900-A1 Left Side View

Items	ZX900-A1, A2
Dimensions:	
Overall length	2,200 mm, (C) (SA) (U) 2,150 mm
Overall width	750 mm
Overall height	1,215 mm
Wheelbase	1,495 mm
Road clearance	140 mm
Seat height	780 mm
Dry weight	2,240 N (228 kg), (Cal) 2,240 N (228.5 kg)
Curb weight:	1,210 N (123 kg), (Cal) 1,210 N (123.5 kg)
Front	
Rear	1,240 N (126 kg)
Fuel tank capacity	22.0 L
Performance:	
Climbing ability	30°
Braking distance	12.5 m from 50 km/h
Minimum turning radius	2.7 m
Engine:	
Type	4-stroke, DOHC, 4-cylinder
Cooling system	Liquid-cooled
Bore and stroke	72.5 x 55.0 mm
Displacement	908 mL
Compression ratio	11.0
Maximum horsepower	Max. 84.6 kW (115 PS) @9,500 r/min (rpm), (C) (U) 80.9 kW (110 PS) @9,500 r/min (rpm), (S) 50.7 kW (69 PS) @6,000 r/min (rpm)
Maximum torque	85.3 N-m (8.7 kg-m, 62.9 ft-lb) @8,500 r/min (rpm) (S) 85.3 N-m (8.7 kg-m, 62.9 ft-lb) @5,000 r/min (rpm)
Carburetion system	Carburetors, Keihin CVK34 x 4
Starting system	Electric starter
Ignition system	Battery and coil (transistorized)
Timing advance	Electronically advanced
Ignition timing	From 10° BTDC @1,000 r/min (rpm) to 35° BTDC @3,500 r/min (rpm)
Spark plug	NGK DR8ES or ND X27ESR-U (C) NGK DR8ES-L or ND X24ESR-U (A) (SA) (I) NGK D9EA or ND X27ES-U (U) NGK D8EA or ND X24ES-U

ZX900-A1 Right Side View

(Continued on next page.)

Items	ZX900-A1, A2
Cylinder numbering method	Left to right, 1-2-3-4
Firing order	1-2-4-3
Valve timing:	
Inlet	Open
	45° BTDC
	Close
	65° ABDC
	Duration
	290°
Exhaust	Open
	65° BBDC
	Close
	45° ATDC
	Duration
	290°
Lubrication system	Forced lubrication (wet sump with cooler)
Engine oil:	
Grade	SE or SF class
Viscosity	SAE10W40, 10W50, 20W40, or 20W50
Capacity	4.0 L
Drive Train:	
Primary reduction system:	
Type	Gear
Reduction ratio	1.732 (97/56)
Clutch type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear ratios: 1st	2.800 (42/15)
	2nd
	2.000 (38/19)
	3rd
	1.590 (35/22)
	4th
	1.333 (32/24)
	5th
	1.153 (30/26)
	6th
	1.035 (29/28)
Final drive system:	
Type	Chain drive
Reduction ratio	2.882 (49/17), (C) (U) 2.941 (50/17)
Overall drive ratio	5.170, (C) (U) 5.276 @Top gear
Frame:	
Type	Tubular, diamond
Caster (rake angle)	29°
Trail	114 mm
Front tire:	
Type	Tubeless
Size	120/80V16
Rear tire:	
Type	Tubeless
Size	130/80V18

1-8 GENERAL INFORMATION

Items	ZX900-A1, A2
Front suspension:	
Type	Telescopic fork (pneumatic)
Wheel travel	140 mm
Rear suspension:	
Type	Swing arm (unitrak)
Wheel travel	115 mm
Brake type:	
Front	Dual disc
Rear	Single disc
Electrical Equipment:	
Battery	12 V 14 Ah
Headlight:	
Type	Semi-sealed beam
Bulb	12 V 60/55 W (quartz-halogen)
Tail/brake light	12 V 5/21 W x 2 , (C) (SA) (U) 12 V 8/27 W x 2
Alternator:	
Type	Three-phase AC
Rated output	25 A @6,000 r/min (rpm), 14 V
Voltage regulator:	
Type	Short-circuit

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

- (C) : Canadian Model
- (Cal) : California Model
- (I) : Italian Model
- (S) : Swiss Model
- (SA) : South African Model
- (U) : US Model

1-10 GENERAL INFORMATION

OPERATION	FREQUENCY	*ODOMETER READING						See Page
		Whichever comes first	800 km	5,000 km	10,000 km	15,000 km	20,000 km	
	Every							
Anti-dive brake plunger parts: rubber cap, O-ring, seal ring – replace	2 years							12-10
Brake master cylinder cup and dust seal – replace	2 years							11-9
Caliper piston seal and dust seal – replace	2 years							11-6
Brake light switch – check †		•	•	•	•	•	•	16-34
Steering – check †		•	•	•	•	•	•	13-4
Steering stem bearing – lubricate	2 years				•			13-6
Front fork oil – change			•		•		•	12-5
Tire wear – check †			•	•	•	•	•	9-9
Swing arm pivot, uni-trak linkage – lubricate				•			•	12-14
Battery electrolyte level – check †	month	•	•	•	•	•	•	16-9
General lubrication – perform			•	•	•	•	•	17-8
Nut, bolt, and fastener tightness -- check †		•		•		•		17-8

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

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

(Cal) : California vehicle only

(US) : US only

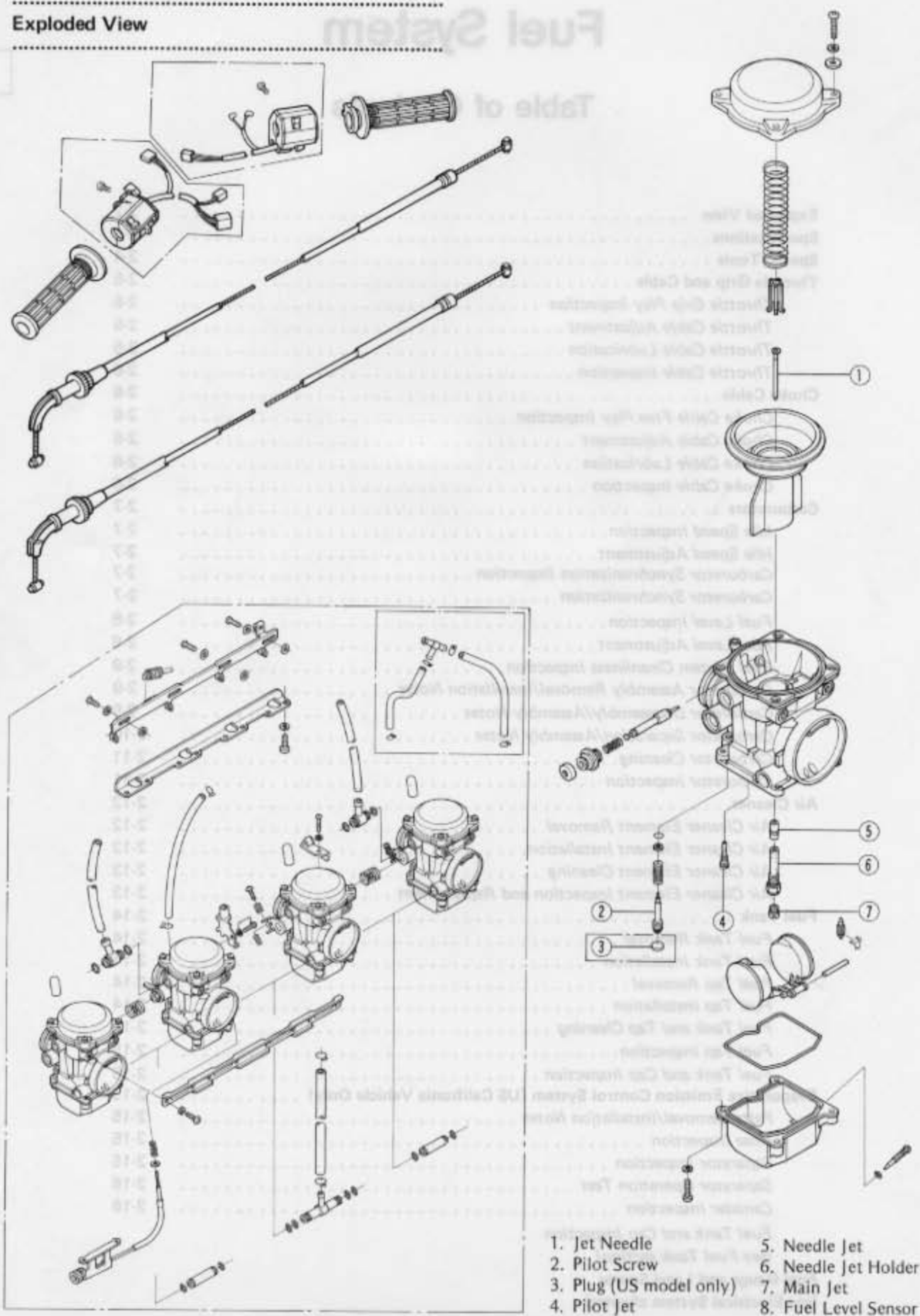
Fuel System

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2-2 FUEL SYSTEM

Exploded View



- | | |
|-------------------------|----------------------|
| 1. Jet Needle | 5. Needle Jet |
| 2. Pilot Screw | 6. Needle Jet Holder |
| 3. Plug (US model only) | 7. Main Jet |
| 4. Pilot Jet | 8. Fuel Level Sensor |

2-4 FUEL SYSTEM

Specifications

Throttle Grip Free Play

Standard: 2 – 3 mm

Choke Cable Free Play

Standard: 2 – 3 mm

Carburetor Specifications

Make/Type	Keihin/CVK34
Main Jet	132, (S) (U) 135, (Cal) 138
Main Air Jet	100
Jet Needle	N27B, (U) N27A
Pilot Jet	35
Pilot Air Jet	160
Pilot Screw	2½ turns out, (U) —
Starter Jet	42, (Cal) 38
Fuel Level	-0.5 mm
Float Height	17 mm

(Cal) : Californian model

(S) : Swiss model

(U) : US model

Idle Speed

Standard: 1,000 ±50 r/min (rpm)

Air Cleaner Element Oil

Grade: SE class

Viscosity: SAE 30

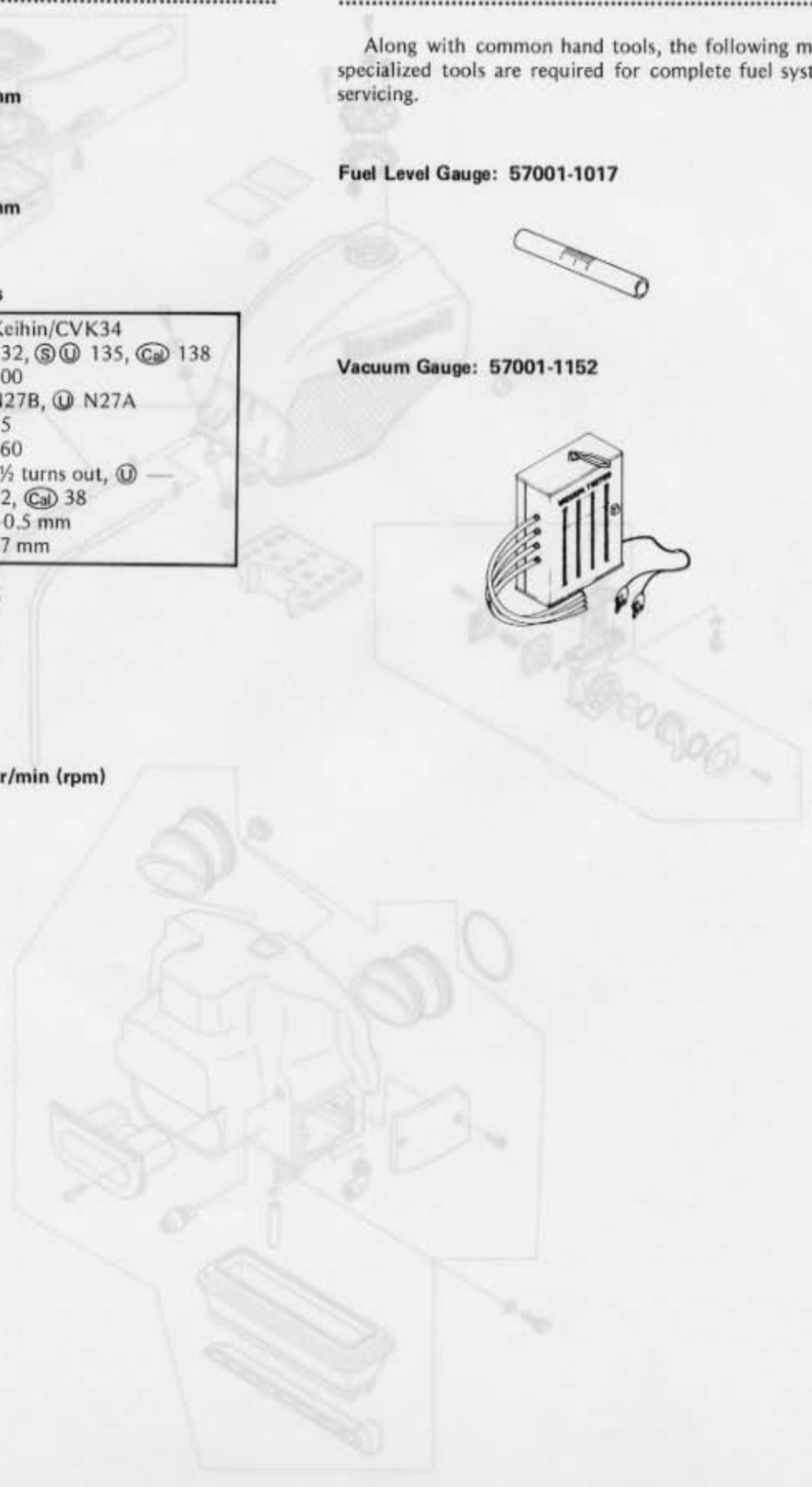
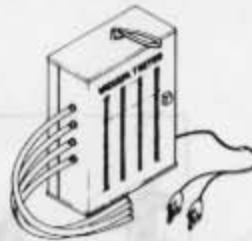
Special Tools

Along with common hand tools, the following more specialized tools are required for complete fuel system servicing.

Fuel Level Gauge: 57001-1017



Vacuum Gauge: 57001-1152



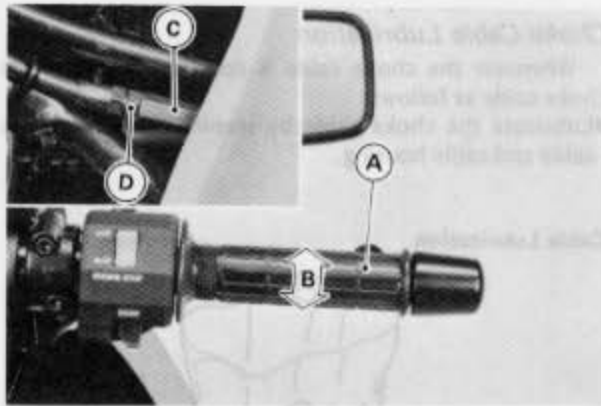
Throttle Grip and Cable

Throttle Grip Play Inspection

- Check throttle grip free play.
- ★ If free play is not correct, adjust the throttle cable.

Throttle Grip Free Play

2 – 3 mm



A. Throttle Grip
B. Free Play
C. Adjuster
D. Locknut

- ★ If the free play is correct make the following test:
- Start the engine.
- Turn the handlebar from side to side while idling the engine.
- ★ If idle speed varies, the throttle cable may be poorly routed or it may be damaged.
- Correct any problem before operating the motorcycle.

WARNING

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

Throttle Cable Adjustment

- Loosen the locknut at the middle of the throttle cable.
- Turn the adjusting nut until throttle grip free play is correct. Turning the adjusting nut OUT (lengthening the adjusting nut) will reduce play.
- Tighten the locknut.
- Start the engine.
- Turn the handlebar from side to side while idling the engine.
- ★ If idle speed varies, the throttle cable may be poorly routed or it may be damaged.
- Correct any problem before operating the motorcycle.

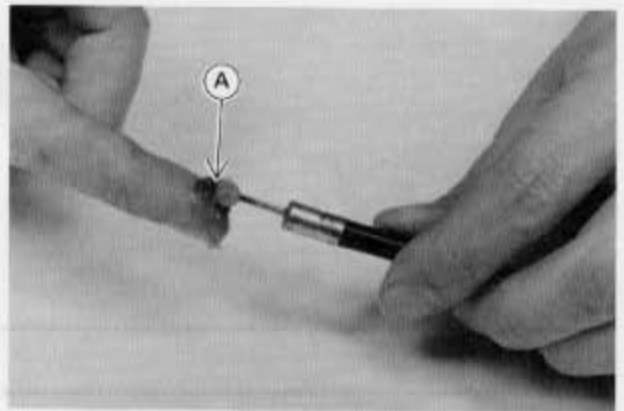
WARNING

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

Throttle Cable Lubrication

Whenever the throttle cable is removed, and in accordance with the Periodic Maintenance Chart (see General Information chapter), perform the following.

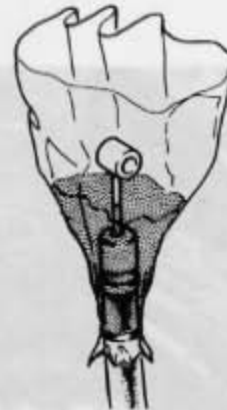
- Apply a thin coating of grease to the throttle cable lower end.



A. Apply grease.

- Lubricate the throttle cable by seeping the oil between the cable and cable housing.

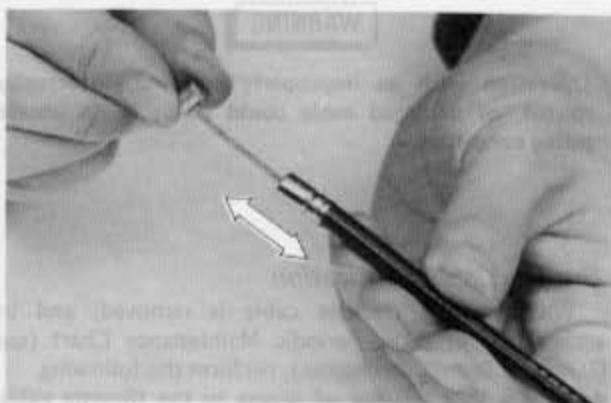
Cable Lubrication



Throttle Cable Inspection

- With the throttle cable disconnected at both ends, the cable should move freely within the cable housing.

2-6 FUEL SYSTEM



★If free play is not correct, adjust the choke cable.

Choke Cable Free Play

2 – 3 mm

Choke Cable Adjustment

- Loosen the locknut at the adjusting nut of the choke cable, and turn the adjusting nut until the cable has the proper amount of play.
- Tighten the locknut after adjustment.

Choke Cable Lubrication

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

- Lubricate the choke cable by seeping oil between the cable and cable housing.

Cable Lubrication



Choke Cable Inspection

- With the choke cable disconnected at the both ends, the cable should move freely within the cable housing.

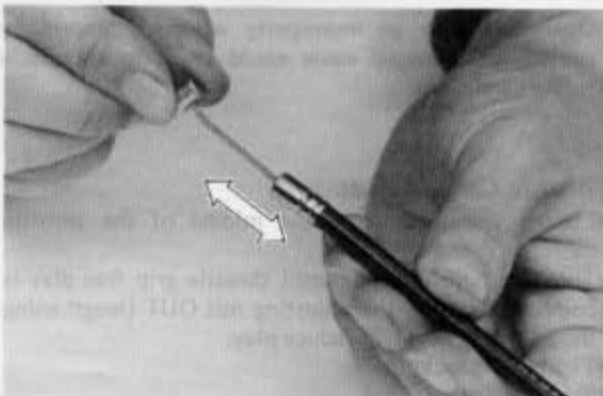
Choke Cable

Choke Cable Free Play Inspection

- Check that the choke lever returns properly and that the inner cable slides smoothly.
- ★If there is any irregularity, check the choke cable as follows:
- Push the choke lever back all the way to its released position.
- Determine the amount of choke cable play at the adjusting nut of the choke cable. Pull out and push in the cable. The amount of cable travel is the amount of cable free play.



A. Choke Lever C. Adjusting Nut
B. Locknut D. Play



- ★If cable movement is not free after lubricating (see Choke Cable Lubrication), if the cable is frayed, or if the housing is kinked, replace the cable.

Carburetors

Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides.
- ★ If handlebar movement changes the idle speed; the throttle 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 a damaged cable could result in an unsafe riding condition.

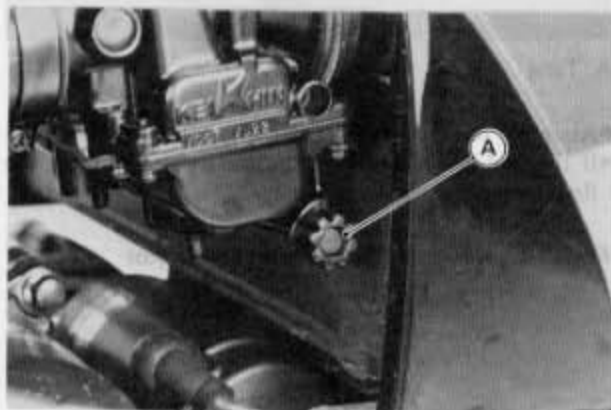
- Check idle speed.
- ★ If the idle speed is out of the specified range, adjust it.

Idle Speed

1,000 ±50 r/min (rpm)

Idle Speed Adjustment

- Turn the adjusting screw until idle speed is correct.



A. Adjusting Screw

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

Carburetor Synchronization Inspection

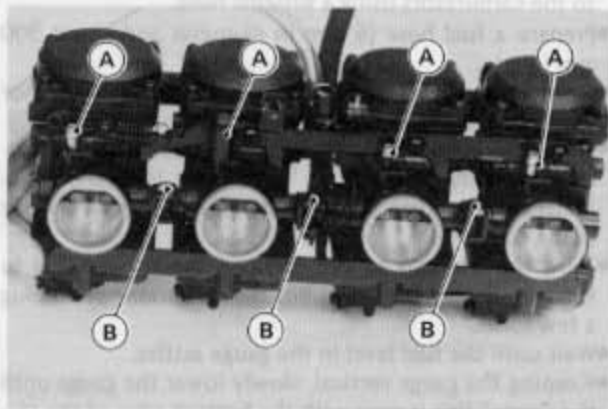
- Warm up the engine.
- Check idle speed and adjust if necessary.
- Remove the fuel tank.
- Supply fuel to the carburetors with an auxiliary fuel tank.

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 spark; this includes any appliance with a pilot light.

- Attach vacuum gauge 57001-1152 to the vacuum hose fittings on the carburetors.

(Viewed from front)



A. Vacuum Hose Fitting B. Adjusting Screw

- Start the engine and let it idle to measure the engine intake vacuum.
- ★ If the intake vacuum difference between any two cylinders exceeds the limit, synchronize the carburetor butterfly valves.

Carburetor Synchronization Vacuum

Less than 2.7 kPa (2 cmHg) difference between any two cylinders

- Remove the vacuum gauge, connect the vacuum hose(s) to the vacuum hose fitting(s), and/or put the cap(s) back on the fitting(s).
- Install the fuel tank.

Carburetor Synchronization

- Turn the adjusting screws to synchronize the butterfly valves.

NOTE

- With the engine idling, first synchronize the left two and then the right two cylinders by means of the adjusting screw between No. 1 and No. 2 cylinders, and between No. 3 and No. 4 cylinders.
- Then synchronize the left two cylinders and the right two cylinders using the center adjusting screw.
- Check idle speed and adjust if necessary.

2-8 FUEL SYSTEM

Fuel Level Inspection

WARNING

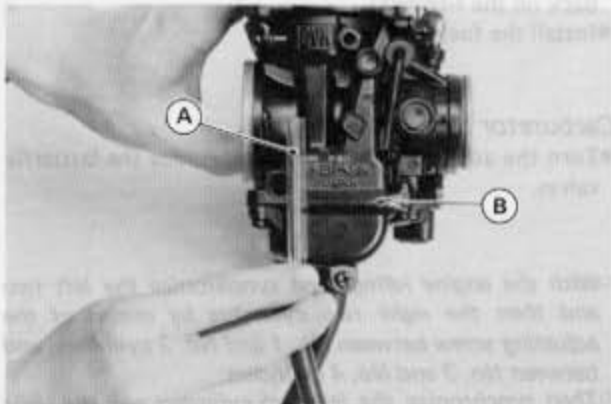
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetors, and hold them in upright on a stand.
- Put the fuel tank on a bench, and connect the fuel tap to the carburetors using a suitable hose.
- Prepare a fuel hose (6 mm in diameter and about 300 mm long).
- Connect fuel level gauge 57001-1017 to the carburetor float bowl with the fuel hose.
- Hold the gauge vertically against the side of the carburetor body so that the "zero" line is several millimeters higher than the bottom edge of the carburetor body.
- Turn the fuel tap to the PRI position to feed fuel to the carburetor, then turn out the carburetor drain plug a few turns.
- Wait until the fuel level in the gauge settles.
- Keeping the gauge vertical, slowly lower the gauge until the "zero" line is even with the bottom edge of the carburetor body.

NOTE

Do not lower the "zero" line below the bottom edge of the carburetor body. If the gauge is lowered and then raised it again, the fuel level measured shows somewhat higher than the actual fuel level. If the gauge is lowered too far, dump the fuel out of it into a suitable container and start the procedure over again.

- Read the fuel level in the gauge and compare it to the specification. Screw in the carburetor drain plug.
- Turn the fuel tap to the ON position and remove the fuel level gauge.
- Inspect the fuel level in the other carburetors in the same manner.
- If any fuel level is incorrect, adjust it (see Fuel Level Adjustment).



A. Fuel Level Gauge: 57001-1017
B. Carburetor Body Bottom Edge

Fuel Level

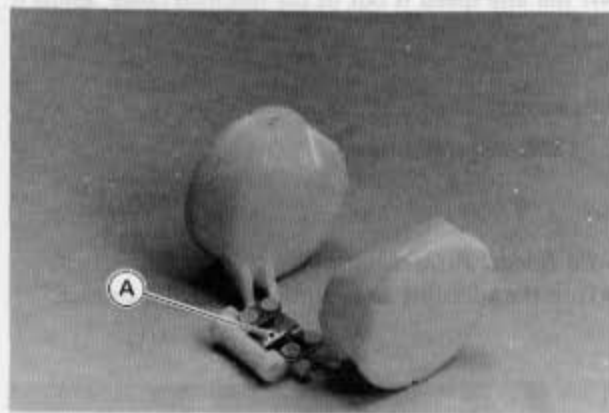
0.5 ± 1 mm above the bottom edge of carburetor body

Fuel Level Adjustment

- Read the WARNING in the Fuel Level Inspection.
- Drain the fuel out of the carburetors into a suitable container.
- Remove the float bowl by taking out the screws with lockwashers.
- Slide out the pivot pin and remove the float.
- Bend the tang on the float arm very slightly to change the float height. Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.

Float Height

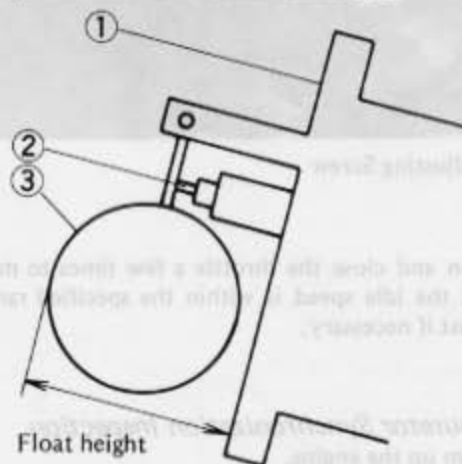
17.0 mm



A. Tang

- Assemble the carburetor, and recheck the fuel level.
- If the fuel level cannot be adjusted by this method, the float or the float valve is damaged.

Float Height Measurement-Keihin Carburetor

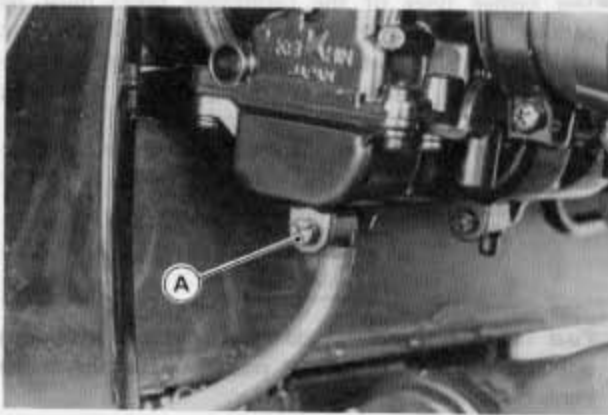


- Float bowl mating surface
- Float valve needle rod (contacted but unloaded)
- Float

Fuel System Cleanliness Inspection

WARNING

- Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.
- Connect a suitable hose to the fitting at the bottom of each carburetor float bowl.
- Run the lower ends of the hoses into a suitable container.
- Turn the fuel tap to the PRI position.
- Turn out each drain plug a few turns and drain the float bowls.



A. Drain Plug

- Check to see if water or dirt comes out.
- Tighten the drain plugs and turn the fuel tap to ON position.
- ★ If any water or dirt appeared during the above inspection, clean the fuel system (see Carburetor Cleaning and Fuel Tank and Tap Cleaning).

Carburetor Assembly Removal/Installation Notes

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.
- After removing the carburetors, stuff pieces of lint-free, clean cloth into the carburetor holders and the intake ducts to keep dirt out of the engine and air cleaner.

WARNING

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

CAUTION

- If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.
- After installing the carburetors, perform the following.
 - Check fuel leakage from the carburetors.

WARNING

- Fuel spilled from the carburetors is hazardous.
- Adjust the following items if necessary.
 - Idle speed
 - Carburetor synchronization
 - Throttle cable
 - Choke cable

Carburetor Disassembly/Assembly Notes

- Read the WARNINGS in the Carburetor Removal/Installation Notes.
- For the US model, remove the pilot screw plug as follows:
 - Punch a hole in the plug and pry it at with an awl or other suitable tool.
 - 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.
 - After installing the upper chamber cover, check that the vacuum piston slides up and down smoothly without binding in the carburetor bore.

CAUTION

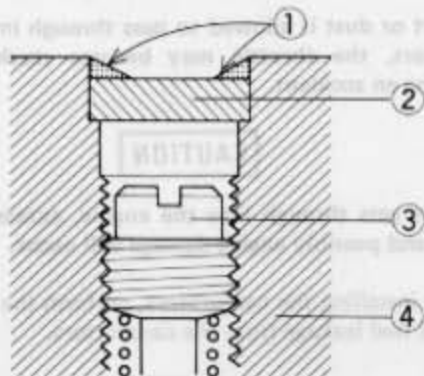
- During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp edge to remove the diaphragm.
- Turn in the pilot screw fully but not tightly, and then back it out the same number of turns counted during disassembly.
- For the US model, install the pilot screw plug as follow:
 - Install a new plug in the pilot screw hole, and apply a small amount of a bonding agent to the circumference of the plug to fix the plug.

CAUTION

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

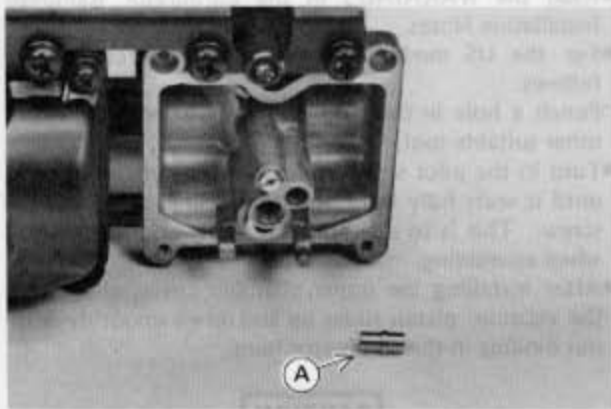
2-10 FUEL SYSTEM

Plug Installation (US model only)



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

- Turn the carburetor body upside-down, and drop the needle jet into place so that the smaller diameter end of the jet goes in first.



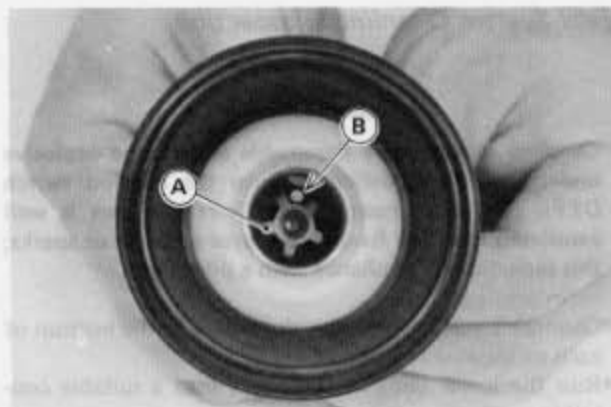
A. Small End

- Carefully screw in the air bleed pipe. It will seat against the needle jet, pushing the end of the jet into the carburetor bore.

CAUTION

- Do not force the air bleed pipe or overtighten it. The needle jet or the carburetor body could be damaged requiring replacement.

- Slip the needle through the hole in the center of the vacuum piston, and put the spring seat on the top of the needle. Turn the seat so that it does not block the hole at the bottom of the vacuum piston.



A. Spring Seat B. Hole

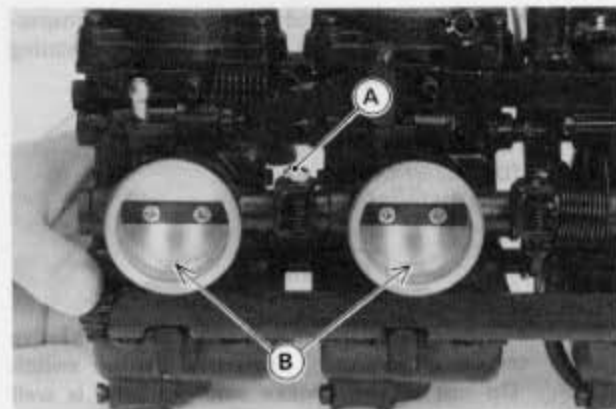
Carburetor Separation/Assembly Notes

- Read the WARNINGS in the Carburetor Removal/Installation Notes.
- The center lines of the carburetor bores must be parallel both horizontally and vertically. If they are not, loosen the mounting screws and align the carburetors on a flat surface. Retighten the mounting screws.
- After assembling the choke mechanism, check to see that the choke shaft slides right to left smoothly without abnormal friction.

CAUTION

- Fuel mixture trouble could result if the starter does not seat properly in its rest position after the choke knob is returned.

- Visually synchronize the throttle (butterfly) valves.
- Check to see that all throttle valves open and close smoothly without binding when turning the pulley.
- Visually check the clearance between the throttle valve and the carburetor bore in each carburetor.



A. Balance Adjusting Screw
B. Clearance

- If there is a difference between any two carburetors, turn the balance adjusting screw(s) to obtain the same clearance.

Carburetor Cleaning

WARNING

○Clean the carburetors in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the carburetors.

CAUTION

- Do not use compressed air on an assembled carburetor, the floats may be crushed by the pressure, and the vacuum piston diaphragms may be damaged.
- Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage or deterioration of the parts.
- The carburetor body has plastic parts that cannot be removed. DO NOT use a strong carburetor cleaning solution which could attack these parts; instead, use a mild high flash-point cleaning solution safe for plastic parts.
- Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.

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

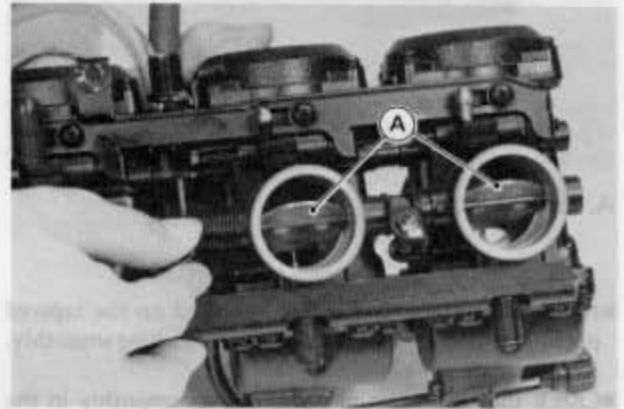
Carburetor Inspection

WARNING

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

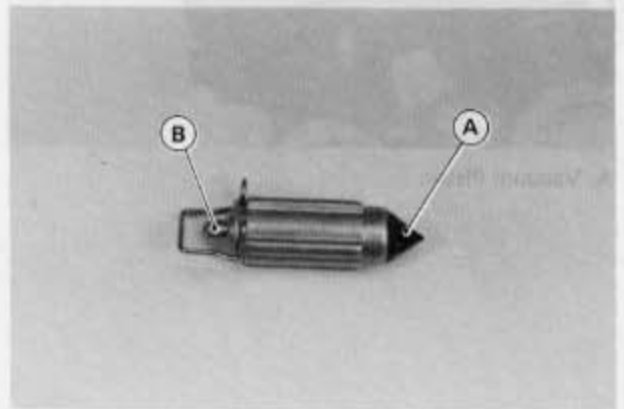
- Remove the carburetors.
- Before disassembling the carburetors, check the fuel level (see Fuel Level Inspection).
- ★If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.
- Move the choke shaft left and release it to check that the starter plungers move smoothly and return by spring tension.
- ★If the starter plungers do not work properly, replace the carburetors.

- Turn the throttle cable pulley to check that the throttle butterfly valves move smoothly and return by spring tension.
- ★If the throttle valves do not move smoothly, replace the carburetors.



A. Throttle Valves

- Disassemble the carburetors.
- Clean the carburetors.
- Check that the O-rings on the float bowl and drain plug and the diaphragm on the vacuum piston are in good condition.
- ★If any of the O-rings or diaphragms are not in good condition, replace them.
- Check the plastic tip of the float valve needle. It should be smooth, without any grooves, scratches, or tears.

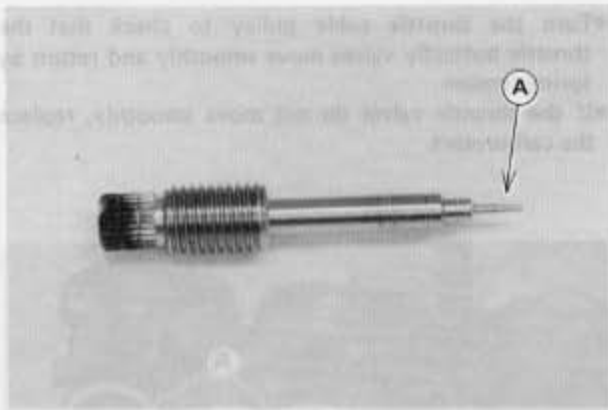


A. Tip

B. Rod

- ★If the plastic tip is damaged, replace the needle.
- Push in the rod in the other end of the float valve needle and then replace it.
- ★If it does not spring out, replace the needle.
- Check the tapered portion of the pilot screw for wear or damage.

2-12 FUEL SYSTEM



A. Tapered Portion

- ★If the pilot screw is worn or damaged on the tapered portion, it will prevent the engine from idling smoothly. Replace it.
- Check that the vacuum piston moves smoothly in the carburetor body. The surface of the piston must not be excessively worn.
- ★If the vacuum piston does not move smoothly, or if it is very loose in carburetor body, replace the carburetor.

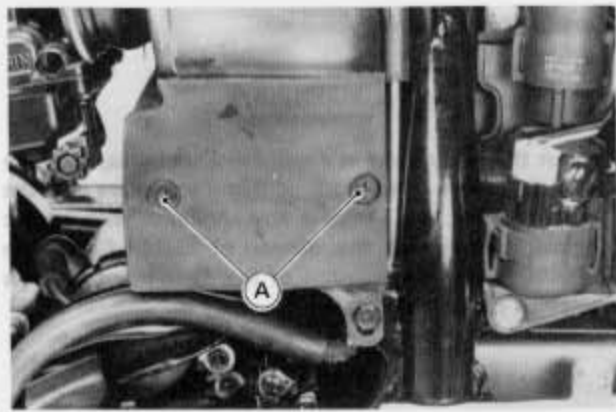


A. Vacuum Piston

Air Cleaner

Air Cleaner Element Removal

- Remove the left side cover.
- Remove the air cleaner cover by taking out the screws.



A. Screws

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

WARNING

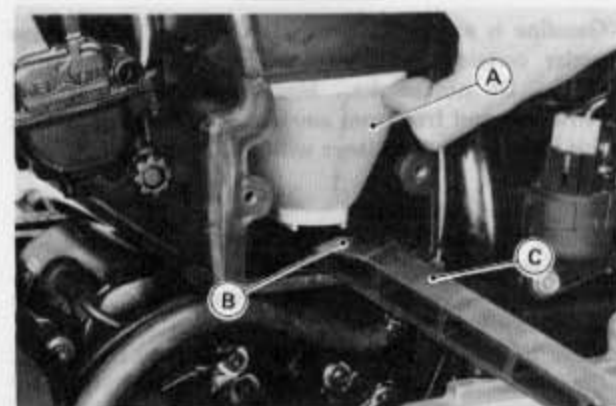
- If dirt or dust is allowed to pass through into the carburetors, the butterfly valves may become stuck, possibly causing an accident.

CAUTION

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

Air Cleaner Element Installation

- Element installation is the reverse of removal. Note the following.
- Meet the element sponge with the body opening.
- While pushing the element, against the opening, insert the element holder with the chamfer facing upwards. The element holder should be easily installed.



A. Element
B. Chamfer

C. Holder

Air Cleaner Element Cleaning

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.

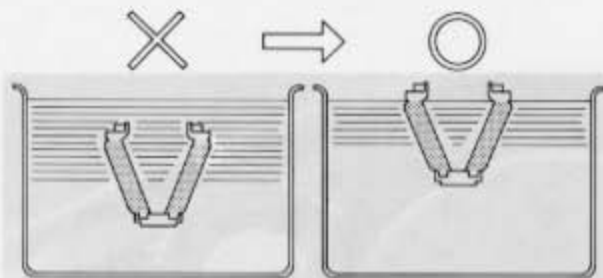
- Remove the air cleaner element (see Air Cleaner Element Removal).

WARNING

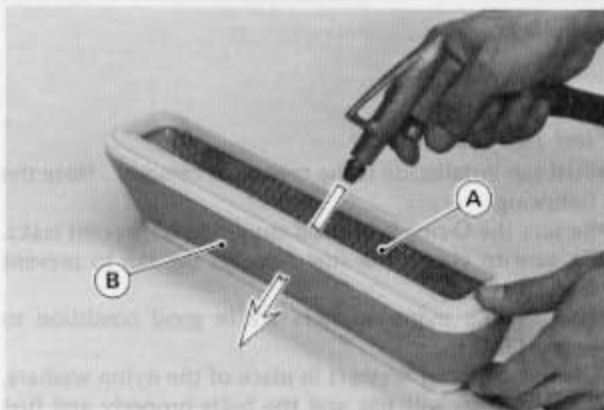
- Clean the element in a well-ventilated area, and take care that there is no spark or flame near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the element.

- Clean the element in a bath of a high flash-point solvent, and then dry it with compressed air or by shaking it.
- When rinsing the element in solvent, do not mix the element inside bath and the element outside bath to prevent the contamination of the inside element.

Element Rinse



- Dry the element by directing a stream of compressed air from the inside to the outside (from the clean side to the dirty side).



A. Inside

B. Outside

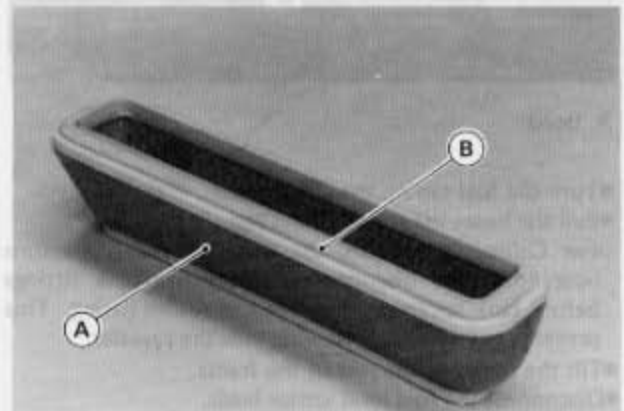
- After cleaning, saturate a clean, lint-free towel with SE class SAE 30 oil and apply the oil to the element by tapping the element outside with the towel.



- Inspect the element before installing it (see Air Cleaner Element Inspection and Replacement and Air Cleaner Element Installation).

Air Cleaner Element Inspection and Replacement

- Remove the air cleaner element (see Air Cleaner Element Removal).
- Clean the air cleaner element (see Air Cleaner Element Cleaning).
- Visually check the element for tears or breaks. Check the sponge gasket also, and the plastic frame.



A. Element

B. Gasket

- ★ If the element or gasket have any tears or breaks, replace the element.
- ★ If the element frame is damaged or distorted, replace the element.
- ★ If the sponge gasket comes loose, stick it back on with an adhesive sealant.
- Repeated cleaning opens the pores of the foam in the element. Replace the element according to the Periodic Maintenance Chart (see General Information chapter).

2-14 FUEL SYSTEM

Fuel Tank

Fuel Tank Removal

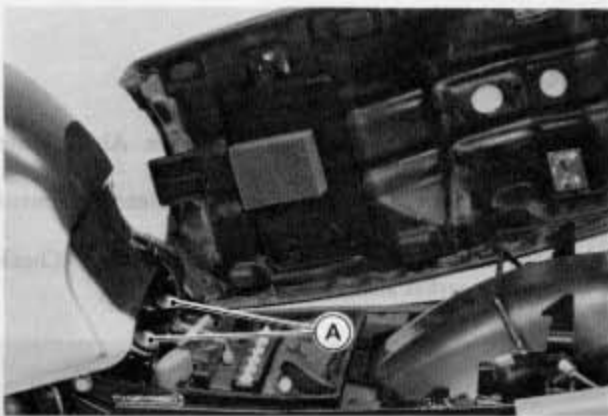
WARNING

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

CAUTION

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

- Remove the seat and both side covers.
- Remove the bolts from the rear end of the tank.

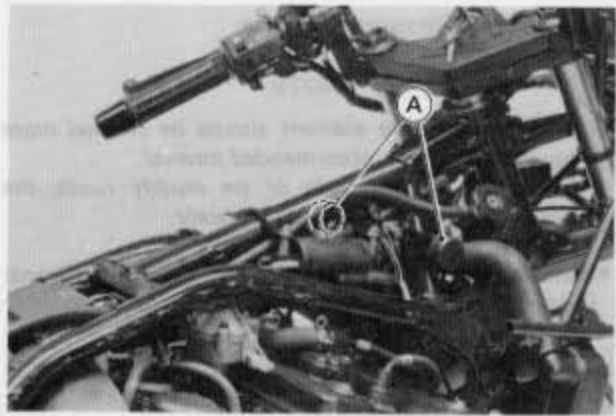


A. Bolts

- Turn the fuel tap on the ON position.
 - Pull the hoses off the tank and tap.
- For California vehicles, the breather and fuel return hoses must be disconnected from the tank fittings before tank removal. Plug the fuel return fitting. This prevents gasoline from flowing into the canister.
- Tilt the tank out the rear of the frame.
 - Disconnect the fuel level sensor leads.
 - Drain the fuel tank.
- Arrange a suitable container under the fuel tank.
- Turn the fuel tap to the PRI position to drain the fuel into the container.

Fuel Tank Installation

- Fuel Tank installation is the reverse of removal. Note the following.
- Read the WARNING in the Fuel Tank Removal section.
- Check the rubber dampers on the frame top-tube.

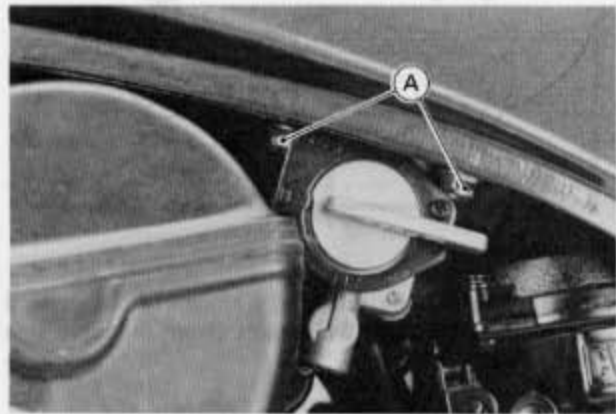


A. Dampers

- If the dampers are damaged or deteriorated, replace them.
- Be sure the hoses are clamped to the fuel tap and fuel tank to prevent leaks.

Fuel Tap Removal

- Remove the fuel tank and drain it (see Fuel Tank Removal).
- Remove the bolts with nylon flat washers and take out the fuel tap.



A. Bolts

Fuel Tap Installation

- Fuel tap installation is the reverse of removal. Note the following.
- Be sure the O-ring is in good condition to prevent leaks.
- Be sure to clamp the fuel hose to the tap to prevent leaks.
- Be sure the nylon washers are in good condition to prevent leaks.
- Do not use steel washers in place of the nylon washers, because they will not seal the bolts properly and fuel will leak.

Fuel Tank and Tap Cleaning

- Remove the fuel tank and drain it (see Fuel Tank Removal).
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.

WARNING

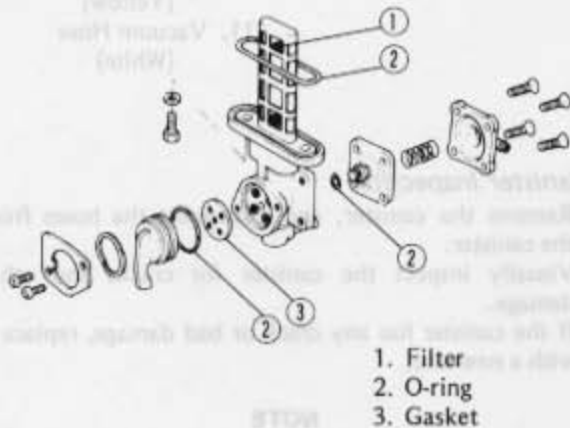
○ Clean the tank in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the tank.

- Pour the solvent out of the tank.
- Remove the fuel tap from the tank by taking out the bolts with nylon washers.
- Clean the fuel tap filter screens in a high flash-point solvent.
- Pour high flash-point solvent through the tap in all lever positions.
- Dry the tank and tap with compressed air.
- Install the tap in the tank (see Fuel Tap Installation).
- Install the fuel tank (see Fuel Tank Installation).

Fuel Tap Inspection

- Remove the fuel tap by taking out the bolts with nylon washers.
- Check the fuel tap filter screens for any breaks or deterioration.

Fuel Tap



- ★ If the fuel tap screens have any breaks or are deteriorated, it may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap.
- ★ If the fuel tap leaks, or allows fuel to flow when it is ON or RES without engine running, replace the damaged gasket or O-ring.

Fuel Tank and Cap Inspection

- Visually inspect the gaskets on the tank and cap for any damage.
- ★ Replace the gaskets if they are damaged.
- Remove the hose(s) from the fuel tank, and open the tank cap.

- Check to see if the breather and water drain pipes (also the fuel return pipe for the US California vehicle) in the tank are not clogged. Check the tank cap breather too.
- ★ If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.

Evaporative Emission Control System (US California Vehicle only)

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.

Parts Removal/Installation Notes

WARNING

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

CAUTION

- If gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated replace it with a new one.
- To prevent the gasoline from flowing into the canister or from flowing out of the canister, hold the separator perpendicular to the ground.
- Connect the hoses according to the diagram of the system. Make sure they do not get pinched or kinked.

Hose Inspection

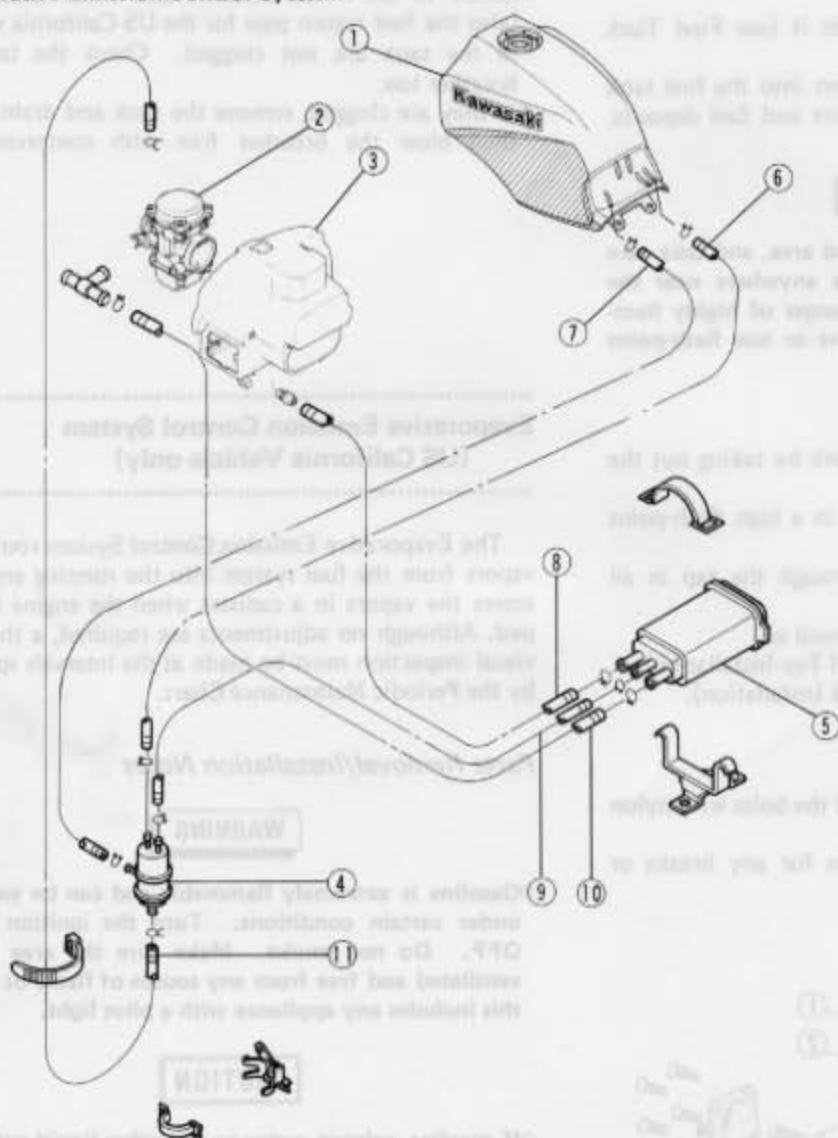
- Check that the hoses are securely connected.
- Replace any kinked, deteriorated or damaged hoses.

Separator Inspection

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

2-16 FUEL SYSTEM

Evaporative Emission Control System



1. Fuel Tank
2. Carburetor
3. Air Cleaner Housing
4. Liquid/Vapor Separator
5. Canister
6. Breather Hose (Blue)
7. Fuel Return Hose (Red)
8. Purge Hose (Green)
9. Breather Hose (Blue)
10. Breather Hose (Yellow)
11. Vacuum Hose (White)

Separator Operation Test

WARNING

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

- Connect the hoses to the separator, and install the separator on the motorcycle.
- Disconnect the breather hose from the separator, and inject about 20 mL of gasoline into the separator through the hose fitting.
- Disconnect the fuel return 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 hose, the separator works well. If it does not, replace the separator with a new one.

Canister Inspection

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

NOTE

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

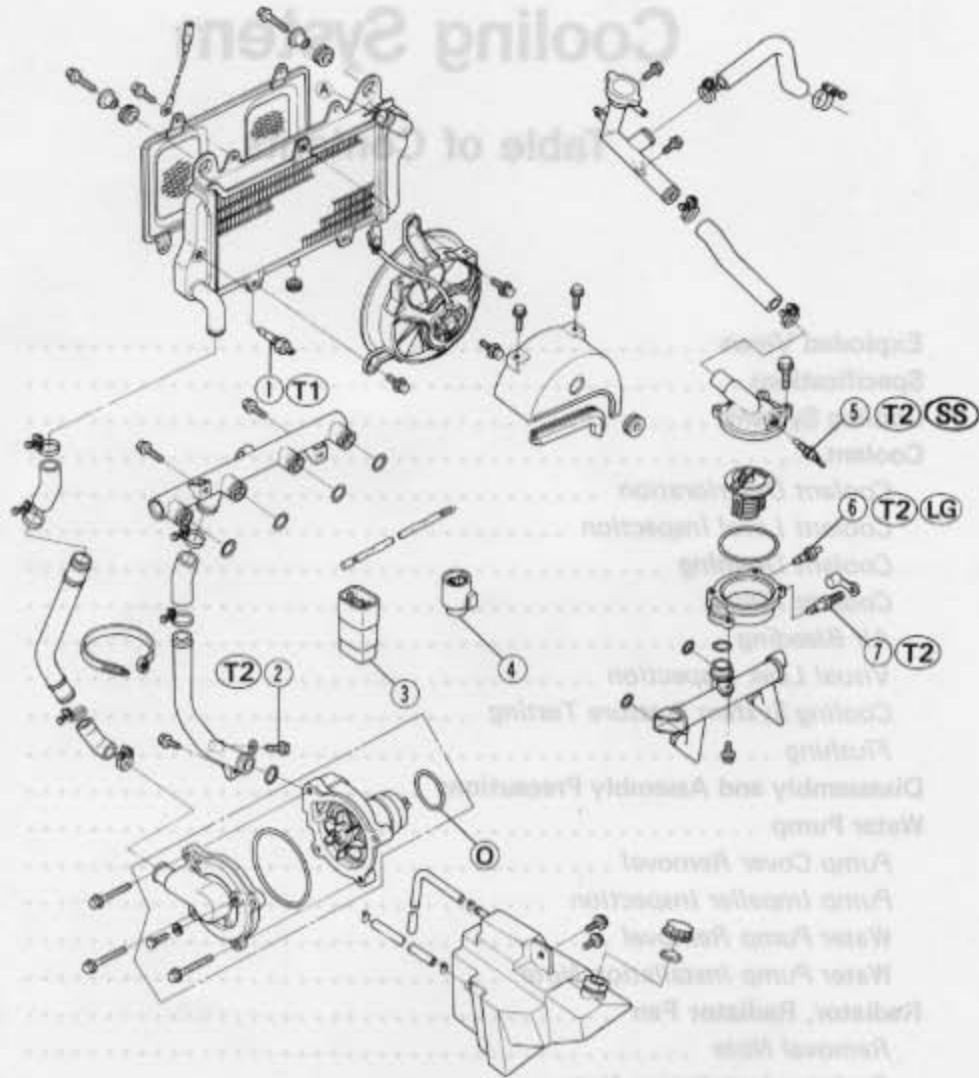
Cooling System

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3-2 COOLING SYSTEM

Exploded Views



1. Fan Switch (97°C)
2. Drain Plug
3. Fan Switch Relay
4. Fan Relay
5. Water Temperature Sensor
6. Fan Switch (110°)
7. Bleeder Bolt

LG : Apply liquid gasket to the threads.

O : Apply oil at installation.

SS : Apply silicone sealant.

T1 : 7.4 N·m (0.75 kg·m, 65 in·lb)

T2 : 7.8 N·m (0.80 kg·m, 69 in·lb)

If the liquid or engine oil temperature goes up beyond the predetermined level, either thermostatic fan switch conducts to operate the fan relay. The fan relay closes its contacts, completes the fan motor circuit, and the cooling fan turns to speed up the cooling action of the radiator. When the liquid or oil cools down; the fan switches cut the relay current, and the fan stops. This electric cooling fan system saves engine power, and reduces the battery load.

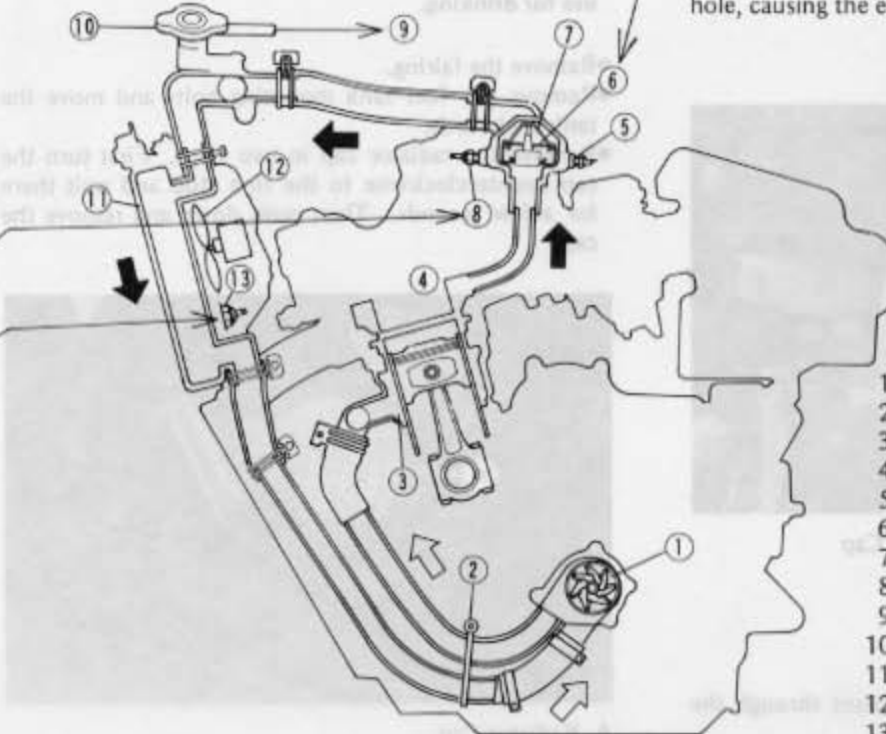
Specifications

Item	Standard
Coolant Provided when Shipping	
Type	Permanent type of antifreeze for aluminum engine and radiator
Color	Green
Mixed ratio	Soft water 50%, coolant 50%
Freezing point	-35°C (-31°F)
Total amount	2.9 L
Radiator Cap:	
Relief pressure	73.5 – 103 kPa (0.75 – 1.05 kg/cm ² , 11 – 15 psi)
Thermostat:	
Valve opening temperature	80 – 84°C (176 – 183°F)
Valve full opening lift	not less than 8 mm @ 95°C (203°F)

Cooling System

The liquid cooling system is a pressurized forced circulation type. When the engine load varies, this system controls the engine temperature within narrow limits where the engine operates most efficiently. In this way the engine performs stably in various riding conditions, and is very durable.

When the engine is cold, the thermostat is closed so that the coolant flow is restricted through the bypass hole, causing the engine to warm up more quickly.



- 1. Water pump : driven by oil pump
- 2. Plastic clamp : Replacement parts
- 3. Cylinder jacket
- 4. Cylinder head
- 5. Water temperature sensor
- 6. Bypass hole (Air bleeder hole)
- 7. Thermostat
- 8. Thermostatic fan switch
- 9. To reservoir tank
- 10. Radiator cap
- 11. Radiator
- 12. Fan
- 13. Thermostatic fan switch

3-4 COOLING SYSTEM

Coolant

Coolant Deterioration

- Visually inspect the coolant in the reservoir 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.
- 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

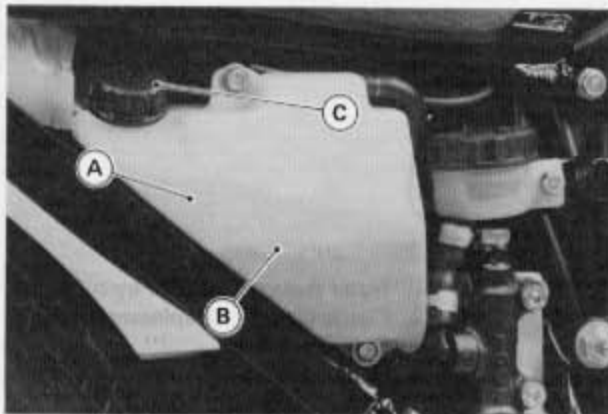
- Be sure to inspect the coolant at the reservoir tank. If the coolant is checked by removing the radiator cap, the air must be bled from the cooling system.

Coolant Level Inspection

- Situate the motorcycle so that it is perpendicular to the ground (on its center stand).
- Check the level through the coolant level gauge on the reservoir tank. 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).



A. "FULL" Mark
B. "LOW" Mark

C. Tank Cap

- ★ If the coolant level is low, 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 anticorrosion 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 reservoir 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 Draining

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

CAUTION

- Use coolant containing corrosion inhibitors made specifically for aluminum engines and radiators in accordance with the instructions of the manufacturers (see Coolant Filling Section).

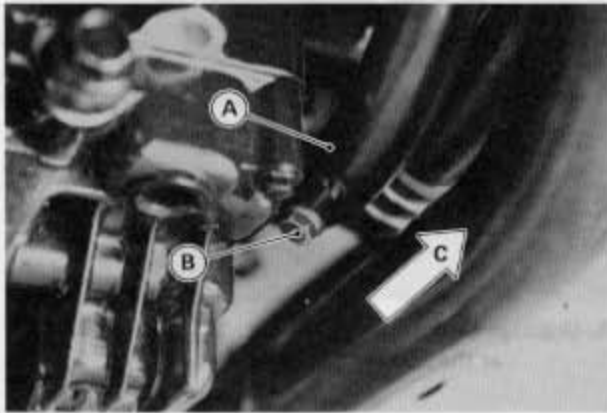
WARNING

- 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. Immediately wipe up or wash away any coolant that spills on the frame, engine, or other painted parts.
- Since coolant is harmful to the human body, do not use for drinking.
- Remove the fairing.
- Remove the fuel tank mounting bolts and move the tank backwards.
- 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.



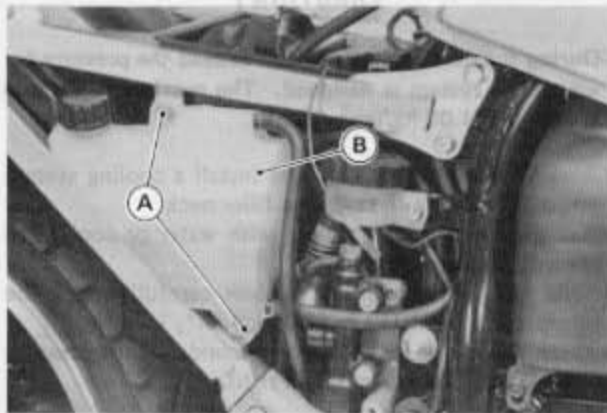
A. Radiator Cap

- Drain the coolant from the radiator and engine by removing the drain plug at the bottom of the radiator pipe.



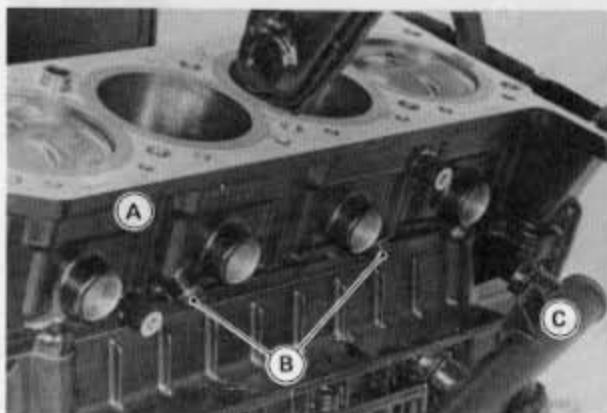
A. Radiator Pipe
B. Drain Plug
C. Front

- Remove the right side cover.
- Unscrew the bolts and remove the reservoir tank with hoses attached.
- Unscrew the cap and pour the coolant into a container.



A. Bolt
B. Reservoir Tank

- Remove the drain plugs (2) at the bottom of the cylinder after removal of the exhaust pipes and the front water pipe.



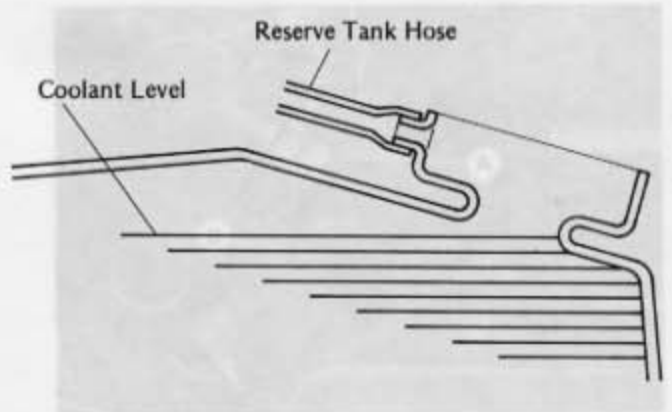
A. Cylinder
B. Drain Plug
C. Front Water Pipe

- Inspect the old coolant for color, smell (see Coolant Deterioration).

Coolant Filling

- Install the drain plugs. Always replace the gaskets with new ones, if they are damaged.
- Tighten the drain plugs to the specification (see Exploded Views).
- Fill the radiator up to the bottom of the radiator filler neck with coolant, and install the cap turning it clockwise about ¼ turn.

Radiator Filler Neck



● Pour the coolant into the radiator until the coolant begins to flow out the air bleeder bolt (first it will be the remaining air bubbles out).

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 reservoir tank up to the FULL mark with coolant, and install the cap.

CAUTION

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

NOTE

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

3-6 COOLING SYSTEM

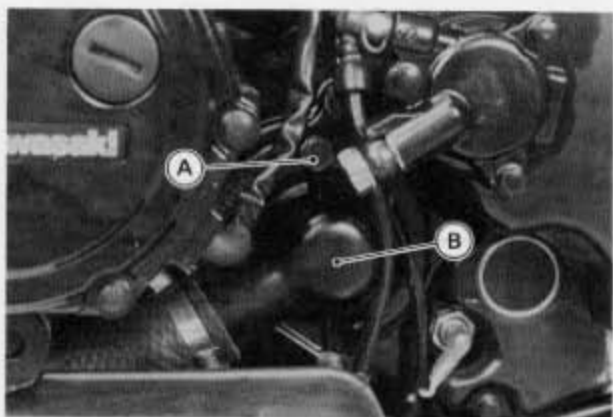
Original coolant

Type	: Permanent type antifreeze for aluminum engine and radiator
Color	: green
Mixed ratio	: soft water 50%, coolant 50%
Freezing point	: -35°C (-31°F)
Total amount	: 2.9 L (up to "Full" mark)

Air Bleeding

Before putting the motorcycle into operation, any air trapped in the cooling system must be removed as follows.

- Remove the radiator cap.
- Loosen the air bleeder bolt on the top of the water pump cover.



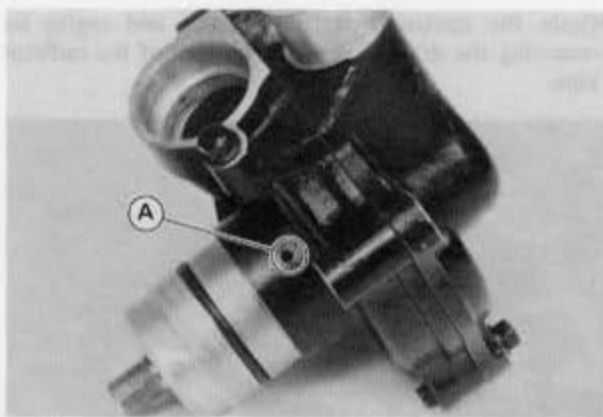
A. Air Bleeder Bolt B. Water Pump Cover

- Pour the coolant into the radiator until the coolant begins to flow out the air bleeder bolt hole (that is, when all the remaining air has been forced out).
- Tighten the air bleeder bolt.
- Fill the radiator up to the radiator filler neck with coolant.
- Check the cooling system for leaks.
- Install the radiator cap.
- Start the engine, warm it up thoroughly, and then stop it.
- Check the coolant level in the reservoir tank after the engine cools down.
- ★ If the coolant level is low, add coolant up to the Full mark through the reservoir tank opening.

Visual Leak Inspection

Any time the system slowly loses water, inspect for leaks.

- Check the water pump body drainage outlet passage for coolant leaks.
- ★ If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the water pump unit.
- ★ If there are no apparent leaks, pressure test the system.



A. Drainage Outlet Passage
: at the bottom of the pump body

Cooling System Pressure Testing

CAUTION

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

- Remove the radiator cap, and install a cooling system pressure tester on the radiator filler neck.
- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
- 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.

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the cylinder liner O-ring leak.

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 passage 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.

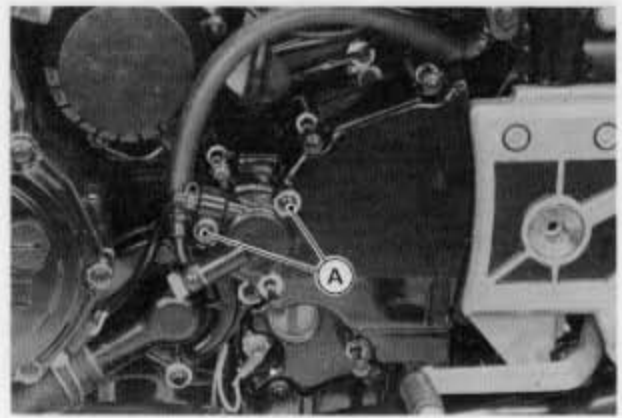
Disassembly and Assembly Precautions

- Prior to disassembly of cooling system parts (radiator, pump, sensors, etc), wait until the coolant cools down, and then drain the coolant.
- After assembling and filling the system with coolant, bleed any air from the system.

Water Pump

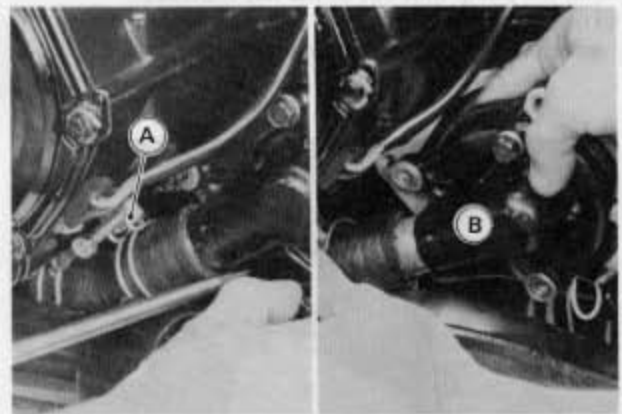
Pump Cover Removal

- Remove the engine sprocket cover with the clutch slave cylinder installed. The two cover bolts removal is not needed.
- Remove the clutch push rod to prevent its damage.



A. Bolt removal is not needed

- Loosen the clamp and remove the water pump cover.

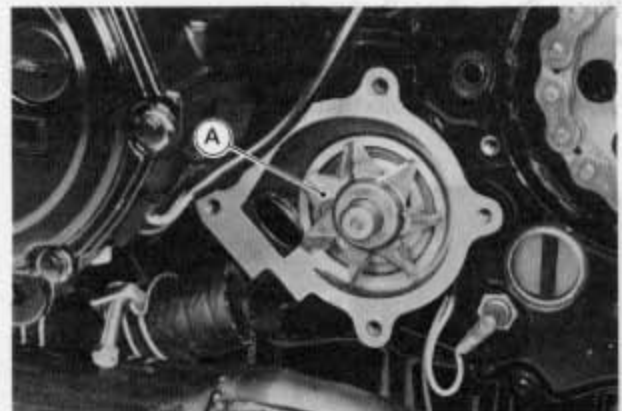


A. Clamp

B. Water Pump Cover

Pump Impeller Inspection

- Visually check the impeller.
- ★If the surface is corroded, or if the blades are damaged, replace the water pump unit.

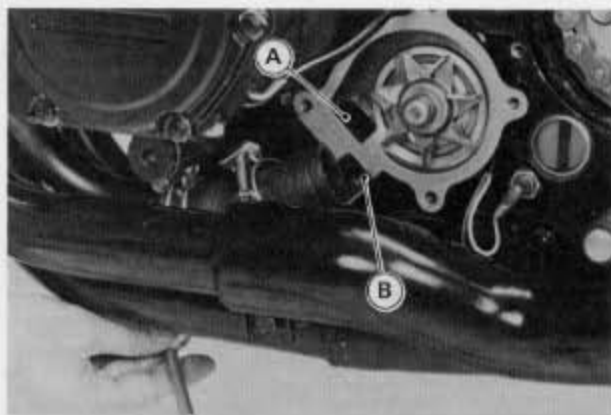


A. Impeller

Water Pump Removal

- Drain the engine oil (see Engine Oil and/or Filter Change in the Engine Lubrication System Chapter).
- Remove the water pipe mounting bolt and pull the pipe out of the pump case.

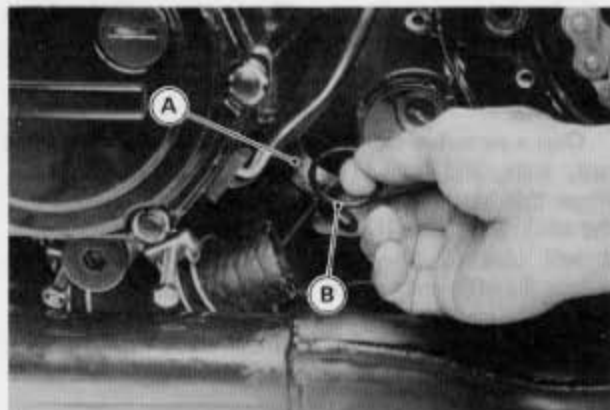
3-8 COOLING SYSTEM



A. Water Pipe

B. Bolt

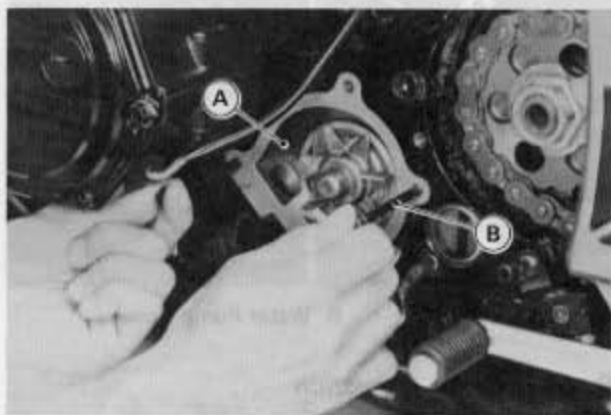
- Be sure to install the water pipe O-ring.



A. Water Pipe

B. O-ring

- Pull the pump unit out of the left crankcase.
- The pump unit may be removed by installing the sprocket cover bolts and pulling them.



A. Pump Unit

B. Bolt

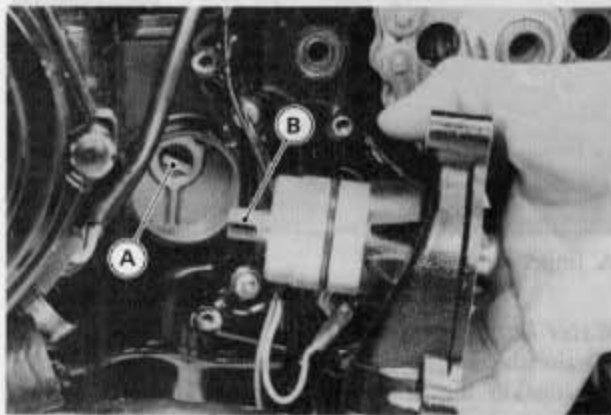
- Install the clutch push rod so that the round end faces outwards.



A. Push Rod Round End

Water Pump Installation Note

- When installing the water pump, note the position of the oil pump shaft projection and turn the water pump shaft so that the projection fits into the slot.



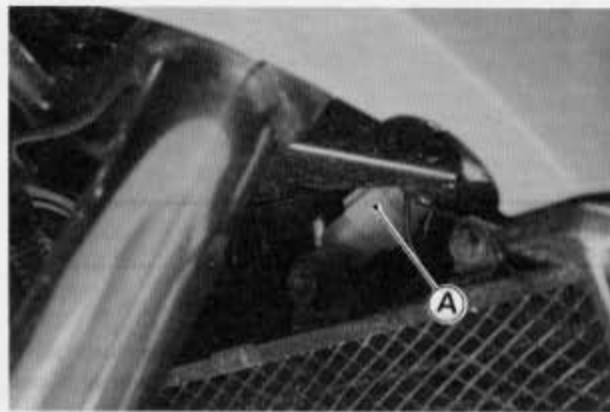
A. Oil Pump Shaft

B. Water Pump Shaft

Radiator, Radiator Fan

Removal Note

- Disconnect the fan motor connector before removal of the radiator or radiator fan.

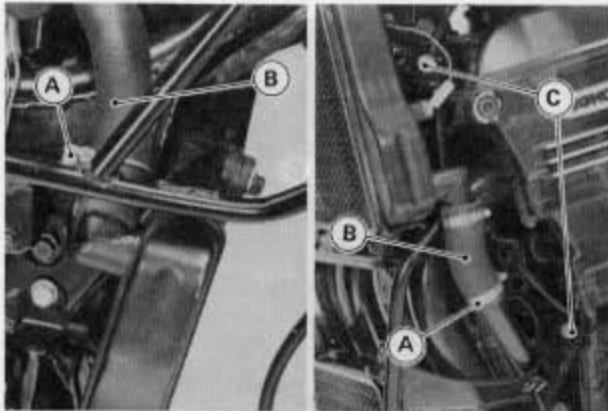


A. Fan Motor Connector

WARNING

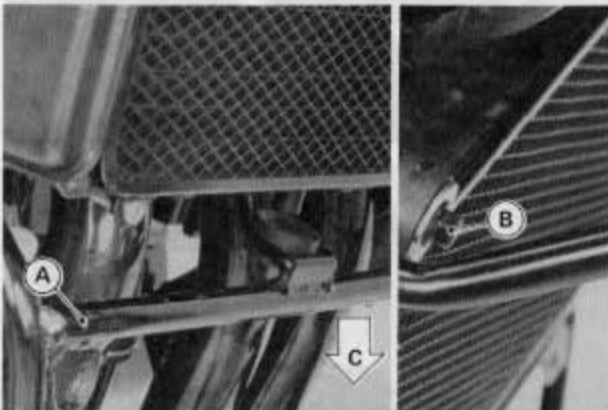
○The radiator fan and fan switch are connected directly to the battery. The radiator fan may start even if the ignition switch is off. **NEVER TOUCH THE RADIATOR FAN UNTIL THE ENGINE COMPLETELY COOLS OFF. TOUCHING THE FAN BEFORE THE ENGINE COOLS COULD CAUSE INJURY FROM THE FAN BLADES.**

- Loosen the hose clamps and pull out the radiator hoses on both sides.
- Remove the mounting bolts (2) from the fairing bracket.



A. Clamp C. Fairing Bracket Mounting Bolt
B. Radiator Hose

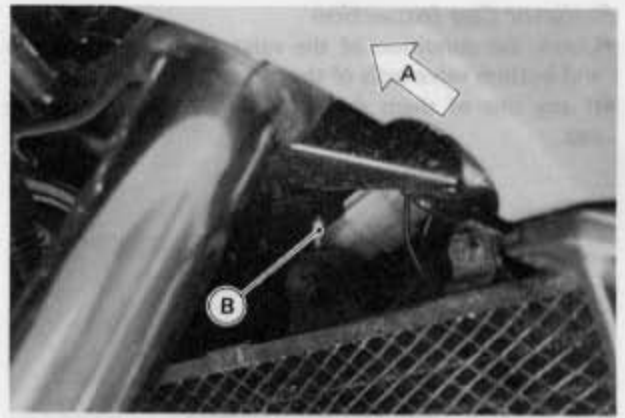
- Remove the radiator mounting bolts (2).
- Push the fairing bracket down and remove the radiator taking care not to damage the radiator core and the fan.



A. Fairing Bracket C. Removal Direction
B. Radiator Mounting Bolt

Radiator Installation Note

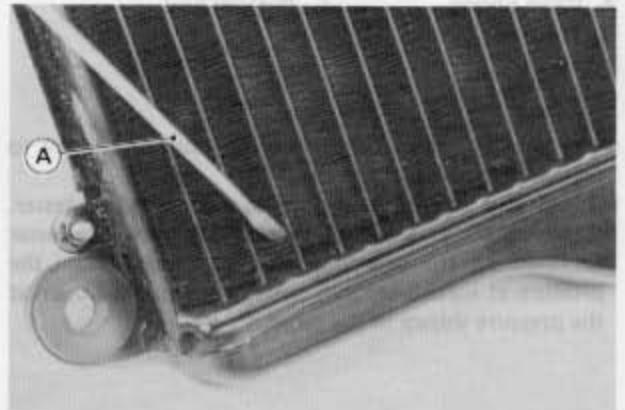
- Be sure to install the fan switch ground lead on the chassis.



A. Front B. Fan Switch Ground Lead

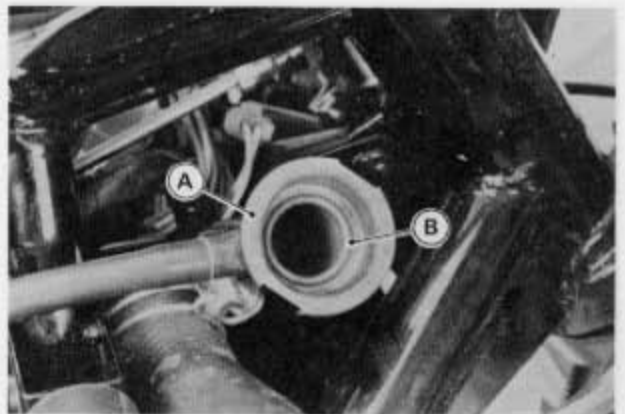
Radiator Inspection

- 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 screw driver.



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.

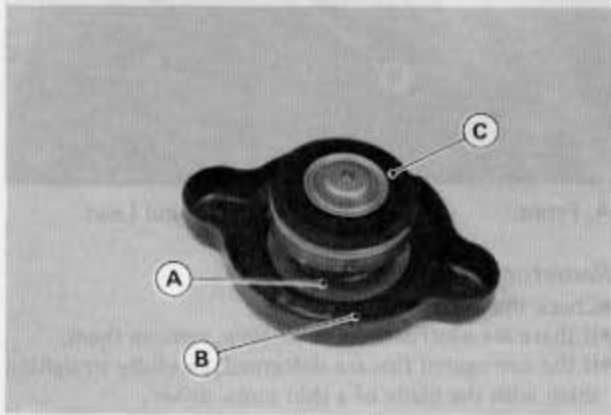


A. Top Sealing Seat B. Bottom Sealing Seat

3-10 COOLING SYSTEM

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. Valve Spring C. Bottom Seal
B. Top Seal

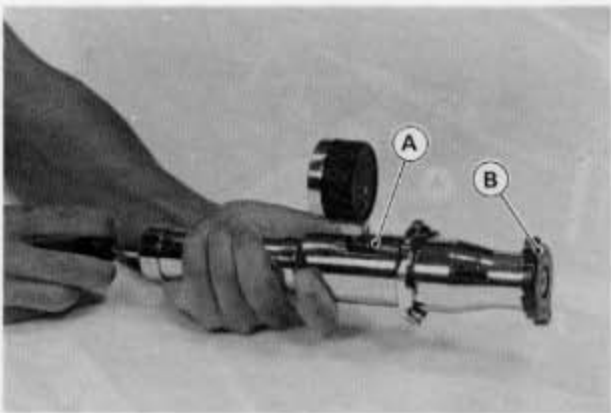
- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
- Install the cap on a cooling system pressure tester.
- Watching the pressure gauge, pump the pressure tester to build up the pressure. The cap must retain the pressure at least 6 seconds. Also the cap must open at the pressure shown in the table.

Radiator Cap Relief Pressure

73.5 – 103 kPa

(0.75 – 1.05 kg/cm², 11 – 15 psi)

- ★ 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

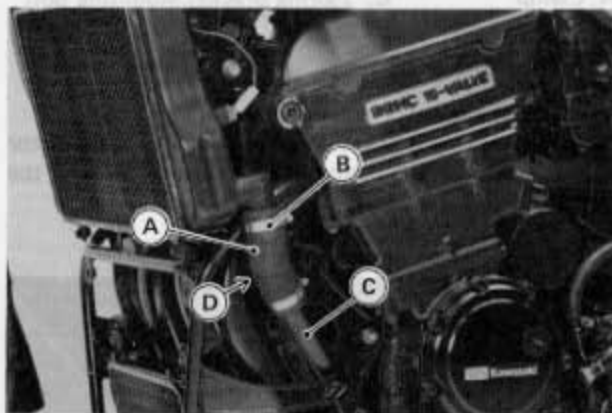
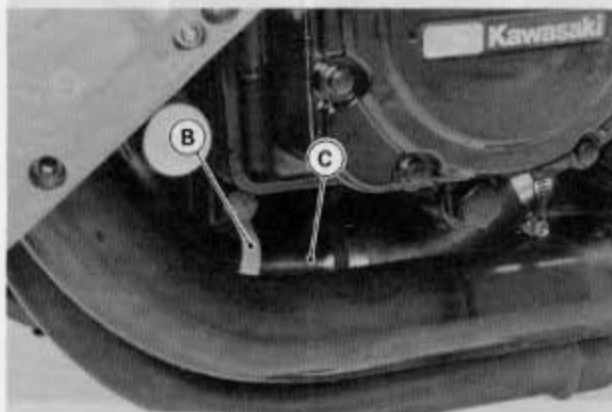
Radiator Hose, Reservoir Tank Hose Inspection

- 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.

Radiator Hose, Pipe,

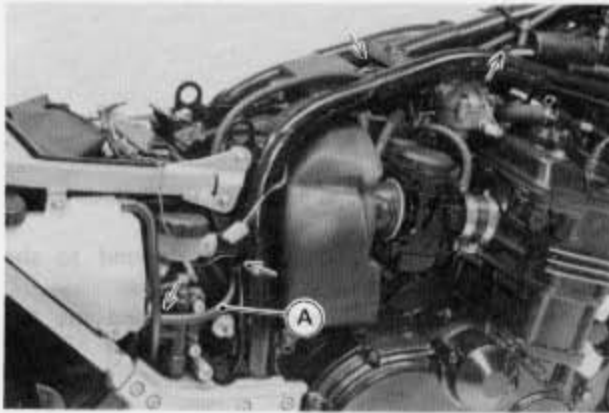
Reservoir Tank Hose Installation Note

- Install the radiator hoses or pipes being careful to follow bending direction (see Exploded Views). Avoid sharp bending, kinking, flattening, or twisting.
- Tighten the hose clamps securely.
- Bind water pipes with a plastic clamp and make sure they do not touch the exhaust pipe.



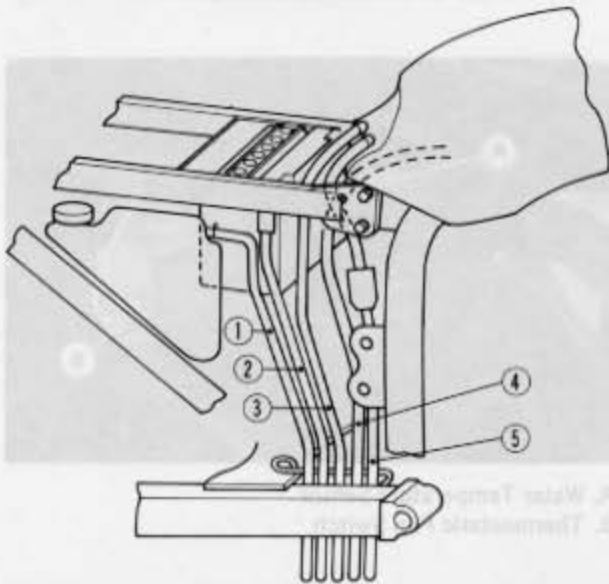
A. Radiator Hose C. Pipe
B. Clamp D. Bend

- Route the reservoir tank hoses as shown.



A. Reservoir Tank Hose

Reservoir Tank Hose Installation

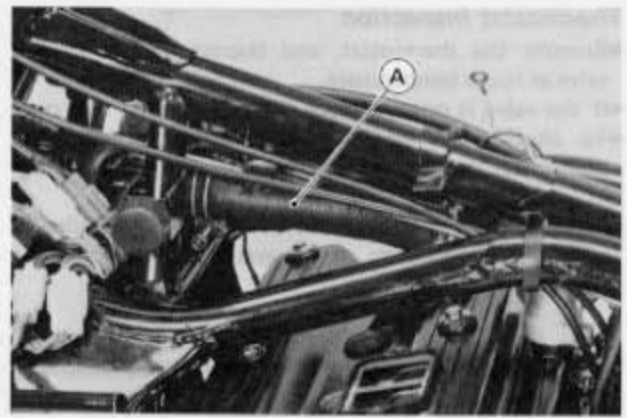


1. Reservoir Tank Hose
2. Battery Vent Hose
3. Overflow Hose (Fuel tank)
4. Overflow Hose (Fuel gauge)
5. Air Vent Hose (Fuel tank)

Thermostat

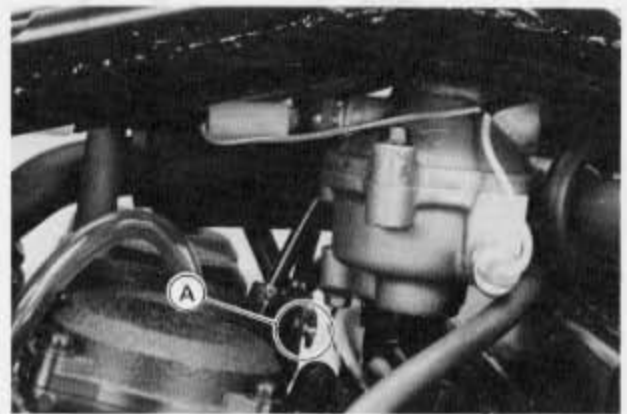
Thermostat Removal

- Remove the following parts.
 - Fairings
 - Fuel tank
 - Ignition coils
 - Air suction valves and hoses (US model)
- Remove the radiator hose.

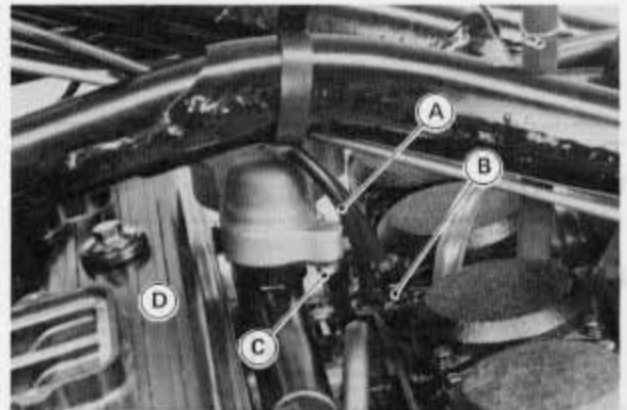


A. Radiator Hose

- Loosen the locknut at the choke cable adjusting nut.
- Remove the choke cable lower end, clamp screw, and thermostat mounting bolt.
- Remove the thermostat housing with the head cover.



A. Choke Cable Lower End



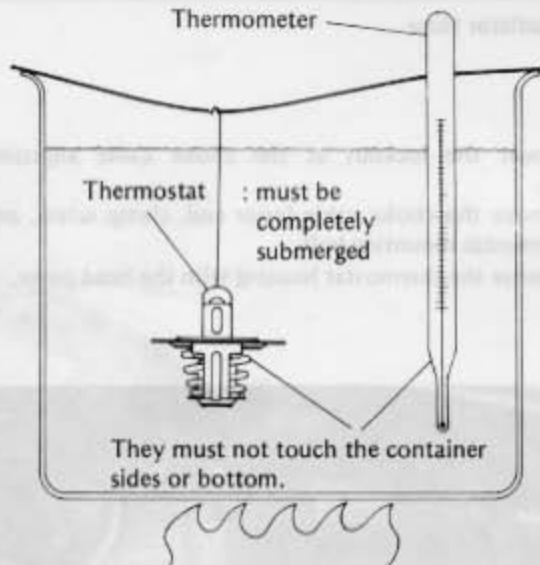
A. Choke Cable B. Clamp Screw
C. Mounting Bolt D. Head Cover

3-12 COOLING SYSTEM

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



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

Thermostat Valve Opening Temperature

80 – 84°C (176 – 183°F)

Thermostatic Fan Switches Water Temperature Sensor

Water Temperature Sensor Removal

CAUTION

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

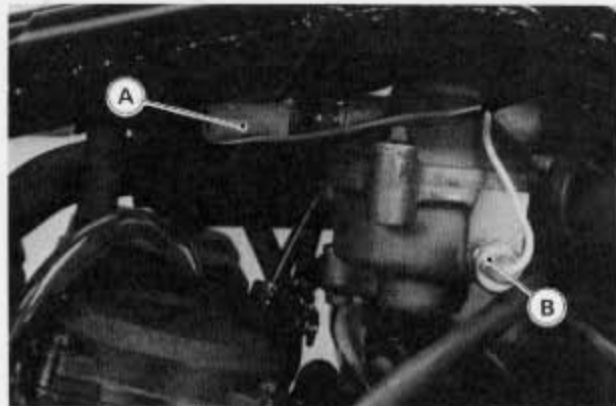
- Drain the coolant (see Coolant Draining).
- Remove the sensor connector.
- Remove the thermostat housing (see Thermostat Removal).
- Remove the sensor.

Installation Note

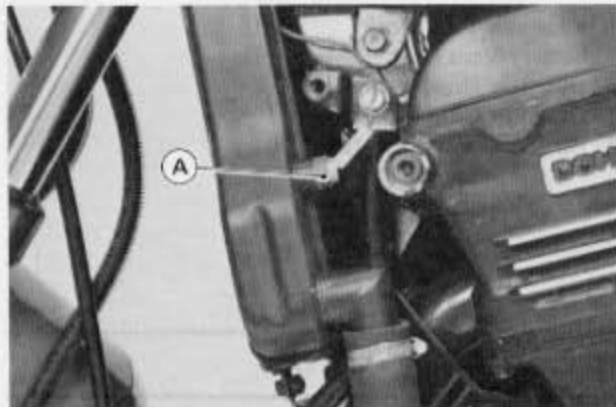
- Apply a liquid gasket compound to the threads before mounting the sensor and the switch.
- Do not apply a liquid gasket compound to the thermostatic fan switch on the radiator.
- Tighten the water temperature sensor and the fan switch to the specification (see Exploded Views).

Inspection

Refer to the Electrical System chapter.



A. Water Temperature Sensor
B. Thermostatic Fan Switch

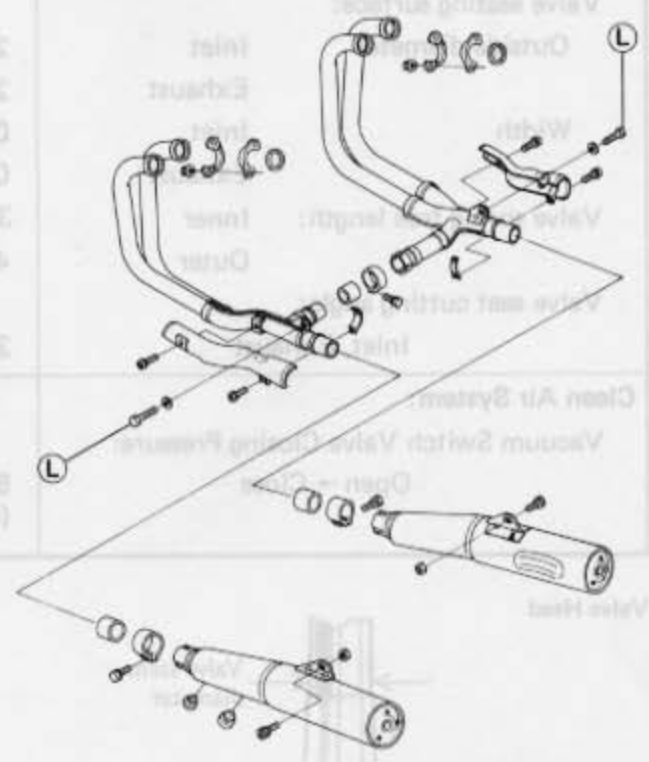
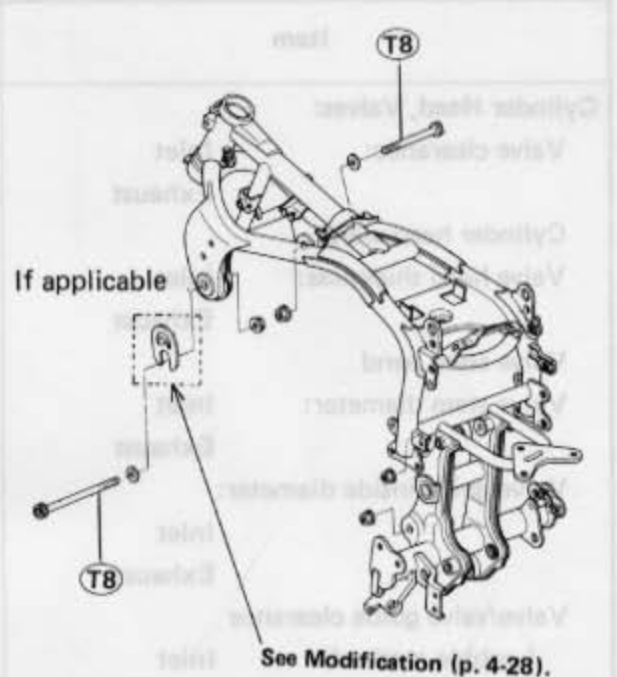
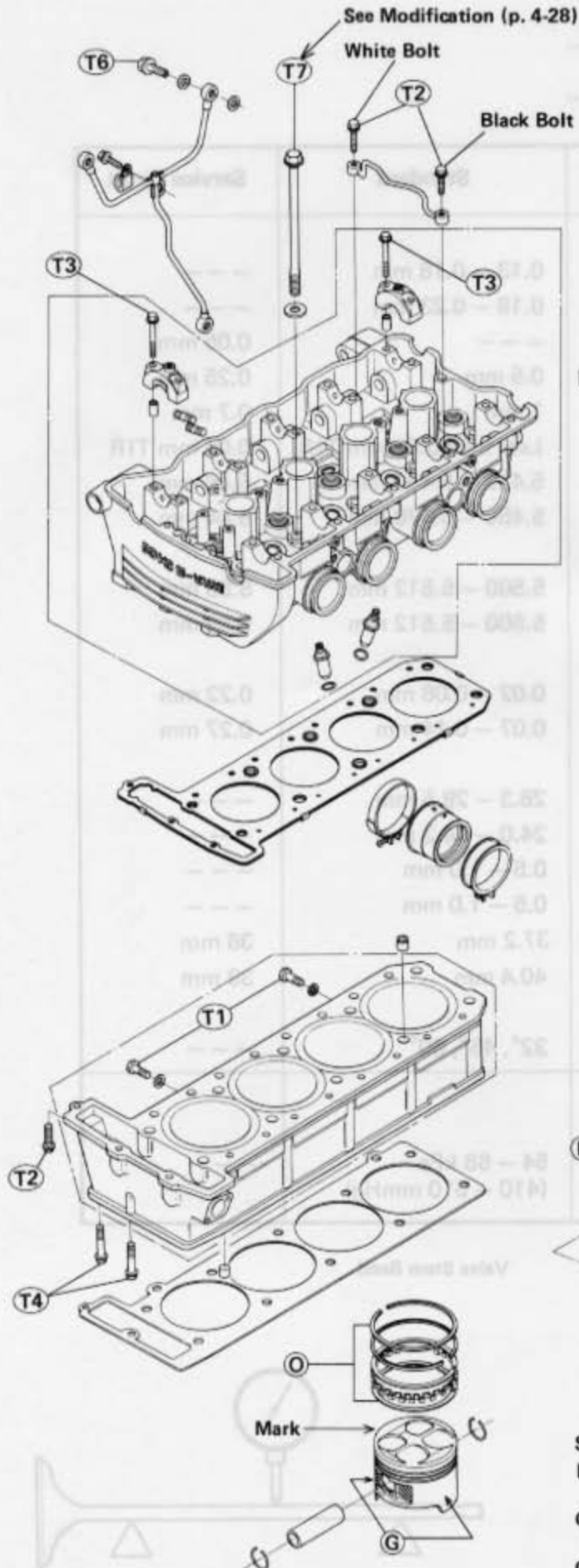


A. Thermostatic Fan Switch on the radiator

Engine Top End

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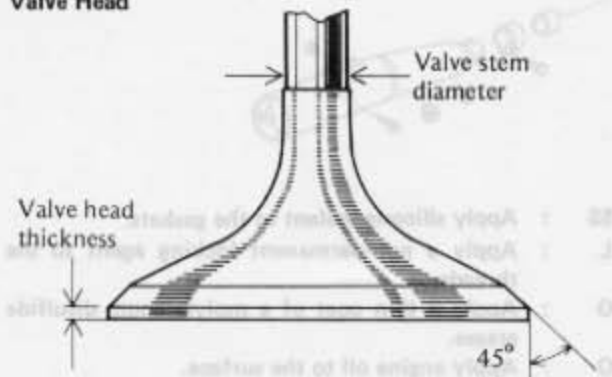
- SS : Apply silicone sealant to the gaskets.
- L : Apply a non-permanent locking agent to the threads.
- G : Apply a thin coat of a molybdenum disulfide grease.
- O : Apply engine oil to the surface.

4-4 ENGINE TOP END

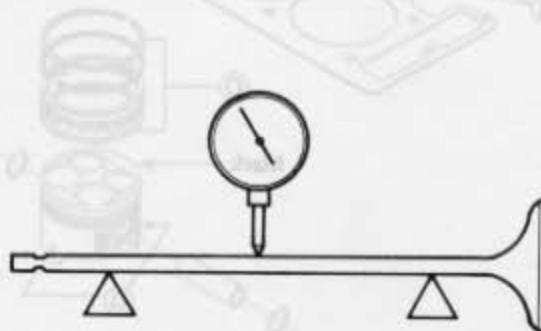
Specifications

Item	Standard	Service Limit
Cylinder Head, Valves:		
Valve clearance:		
Inlet	0.13 – 0.18 mm	---
Exhaust	0.18 – 0.23 mm	---
Cylinder head warp	---	0.05 mm
Valve head thickness:		
Inlet	0.5 mm	0.25 mm
Exhaust	1 mm	0.7 mm
Valve stem bend	Less than 0.02 mm TIR	0.05 mm TIR
Valve stem diameter:		
Inlet	5.475 – 5.490 mm	5.46 mm
Exhaust	5.455 – 5.470 mm	5.44 mm
Valve guide inside diameter:		
Inlet	5.500 – 5.512 mm	5.58 mm
Exhaust	5.500 – 5.512 mm	5.58 mm
Valve/valve guide clearance (wobble method):		
Inlet	0.02 – 0.08 mm	0.22 mm
Exhaust	0.07 – 0.14 mm	0.27 mm
Valve seating surface:		
Outside diameter		
Inlet	28.3 – 28.5 mm	---
Exhaust	24.0 – 24.2 mm	---
Width		
Inlet	0.5 – 1.0 mm	---
Exhaust	0.5 – 1.0 mm	---
Valve spring free length:		
Inner	37.2 mm	36 mm
Outer	40.4 mm	39 mm
Valve seat cutting angle:		
Inlet, Exhaust	32°, 45°, 60°	---
Clean Air System:		
Vacuum Switch Valve Closing Pressure:		
Open → Close	54 – 68 kPa (410 – 510 mmHg)	---

Valve Head

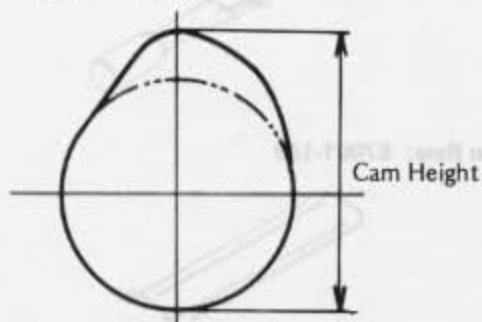


Valve Stem Bend

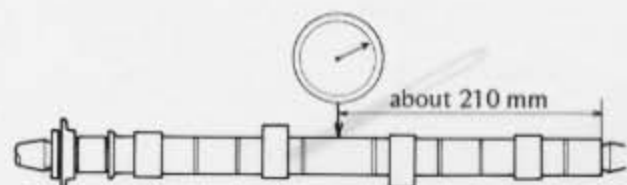


Item	Standard	Service Limit	
Camshaft:			
Cam height	Inlet	35.824 – 35.940 mm	35.71 mm
	Exhaust	35.824 – 35.940 mm	35.71 mm
Camshaft bearing oil clearance		0.078 – 0.121 mm	0.21 mm
Camshaft journal diameter		24.900 – 24.922 mm	24.87 mm
Camshaft bearing inside diameter		25.000 – 25.021 mm	25.08 mm
Camshaft runout		not more than 0.02 mm TIR	0.1 mm TIR
Camshaft chain 20-link length		158.8 – 159.2 mm	161.5 mm
Rocker arm inside diameter		12.500 – 12.518 mm	12.55 mm
Rocker shaft diameter		12.466 – 12.484 mm	12.44 mm
Cylinder Compression:			
	(usable range) 920 kPa – 1,420 kPa @ 450 r/min (rpm) (9.4 – 14.5 kg/cm ² 134 – 206 psi)		
Cylinder Block, Piston:			
Cylinder inside diameter	72.494 – 72.506 mm	72.6 mm	
Piston diameter	72.435 – 72.450 mm	72.3 mm	
Piston/cylinder clearance	0.044 – 0.071 mm	---	
Oversize piston and rings	+ 0.5 mm	---	
Piston ring/groove clearance	Top	0.03 – 0.07 mm	0.17 mm
	Second	0.02 – 0.06 mm	0.16 mm
	Oil	2.51 – 2.53 mm	2.6 mm
Piston ring groove width	Top	1.02 – 1.04 mm	1.12 mm
	Second	1.01 – 1.03 mm	1.12 mm
	Oil	2.51 – 2.53 mm	2.6 mm
Piston ring thickness	Top	0.97 – 0.99 mm	0.9 mm
	Second	0.97 – 0.99 mm	0.9 mm
Piston ring end gap	Top	0.2 – 0.35 mm	0.7 mm
	Second	0.2 – 0.35 mm	0.7 mm
	Oil	0.2 – 0.7 mm	1.0 mm

Cam Height Measurement



Camshaft Runout

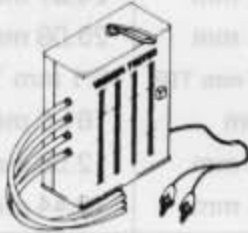


4-6 ENGINE TOP END

Special Tools

Along with common hand tools, the following more specialized tools are required for complete engine top end servicing.

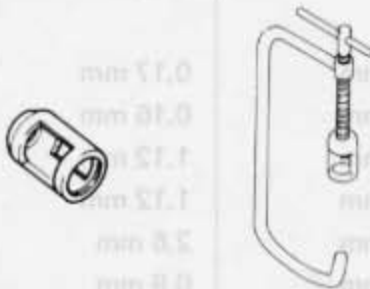
Vacuum Gauge: 57001-1152



**Compression Gauge: 57001-221
Adapter: 57001-1018**



**Valve Spring Compressor Assembly: 57001-241
Adapter: 57001-1019**



Valve Guide Arbor: 57001-1021



Valve Guide Reamer: 57001-1079



**Valve Seat Cutter: 57001-1114
Valve Seat Cutter: 57001-1119
Valve Seat Cutter: 57001-1120
Valve Seat Cutter: 57001-1123
Valve Seat Cutter: 57001-1187**



Cutter Holder - ϕ 5.5 mm : 57001-1125



Bar: 57001-1128



Piston Pin Puller Assembly: 57001-910



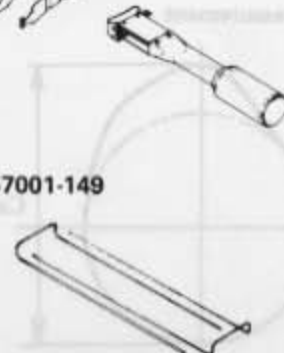
Piston Ring Pliers: 57001-115



Piston Ring Compressor Assembly: 57001-1094



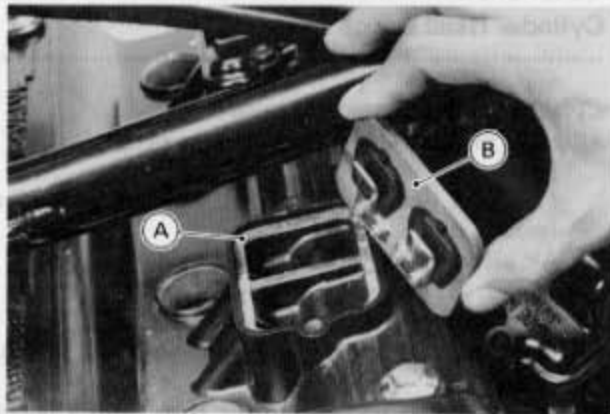
Piston Base: 57001-149



Clean Air System (US model)

Air Suction Valve Installation

- Replace the gasket with a new one, and install it between the cylinder head cover and the valve assembly.

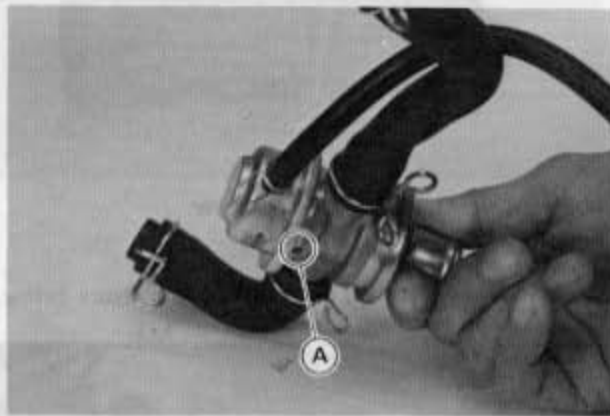


A. Gasket

B. Valve Assembly

Vacuum Switch Valve Installation

- Install the switch valve so that the air hole faces downwards.



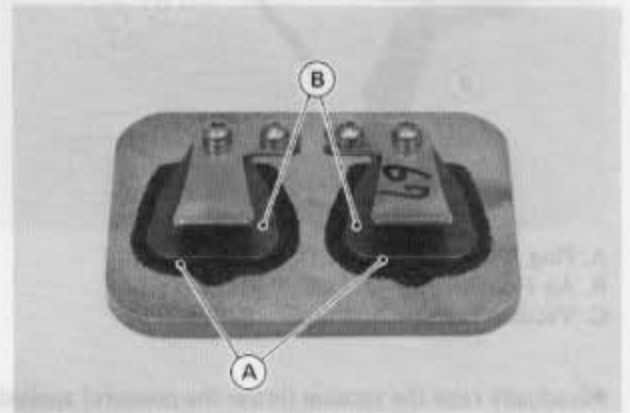
A. Air Hole

Air Suction Valve Inspection

The air suction valve is essentially a check valve which allows fresh air to flow from the air cleaner into the exhaust port. Any air that has passed the air suction valve is prevented from returning to the air cleaner.

- Remove the air suction valves.
- Visually inspect the reeds for cracks, folds, warps, heat damage, or other damage.

- ★ If there is any doubt as to the condition of the reed, replace the air suction valve as an assembly.



A. Valve Holder

B. Reeds

- Check the reed contact areas of the valve holder for grooves, scratches, any signs of separation from the holder, or heat damage.
- ★ If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.
- If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high flash-point solvent.

CAUTION

- Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.

Clean Air System Hose Inspection

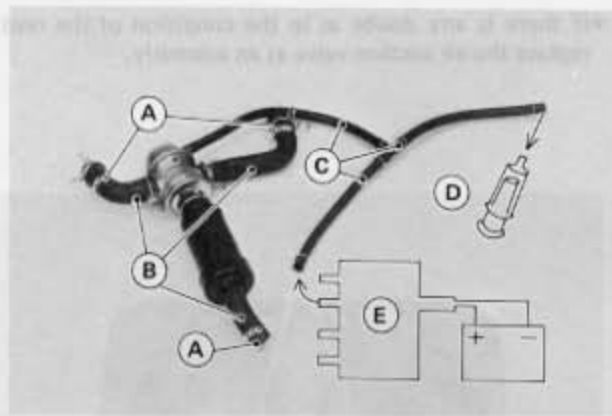
- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, silencer, vacuum switch valve, #1 and #4 carburetors, and air suction valve covers.
- ★ If they are not, correct them. Replace them if they are damaged.

Vacuum Switch Valve Test

Using the vacuum gauge (special tool) and a syringe, inspect the vacuum switch operation as follows:

- Remove the vacuum switch valve.
- Connect the vacuum gauge and syringe to the vacuum hoses as follows.

4-8 ENGINE TOP END

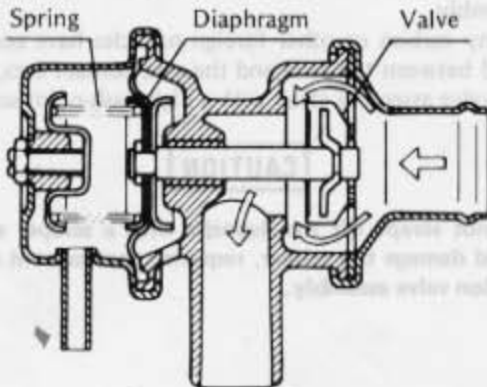


A. Plug
B. Air Hose
C. Vacuum Hose
D. Syringe
E. Vacuum Gauge:
57001-1152

● Gradually raise the vacuum (lower the pressure) applied to the vacuum switch valve, and check the valve operation. When the vacuum is low, the vacuum switch valve should permit air to flow. When the vacuum rises a certain level 54 – 68 kPa (410 – 510 mmHg), it should stop air flow. When the vacuum is high enough, the air cannot flow through the valve.

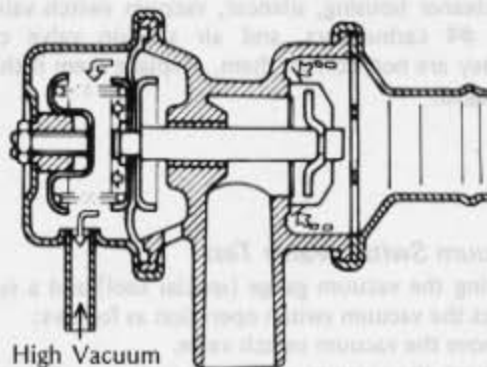
Vacuum Switch Valve Operation

1. During Cruising (open throttle)



Secondary air flows.

2. During Engine Braking (Closed throttle)



Secondary air cannot flow.

★ If the vacuum switch valve does not operate as described, replace it with a new one.

NOTE

○ To check air flow through the vacuum switch valve, just blow through the air cleaner hose.

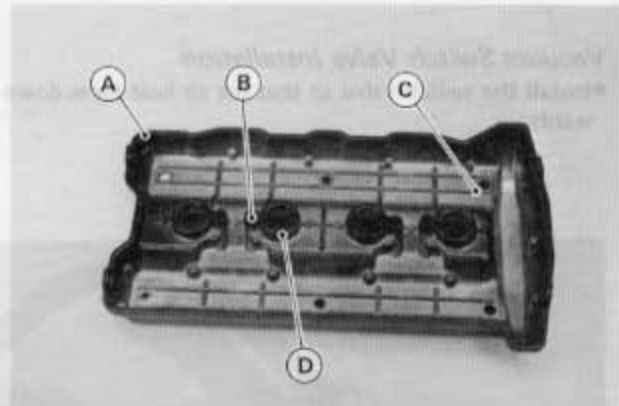
Cylinder Head Cover

Cylinder Head Cover Removal

- Remove the following parts before the removal.
 - Fairings
 - Fuel tank (see Fuel Tank Removal in Fuel System)
 - Ignition coils
 - Air suction valves and hoses (US model).

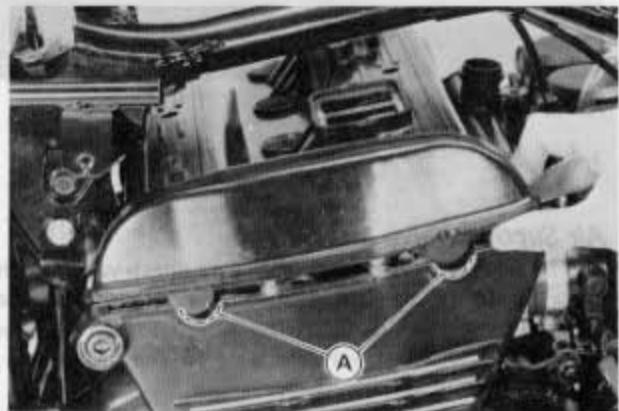
Installation Note

- Replace the head cover gasket with new one, if it is damaged.
- Stick the gaskets partially to the cover with a liquid gasket for installation convenience.
- Be sure to install the knock pins.



A. Headcover Gasket
B. Knock Pin
C. Head Cover
D. Gasket

- Apply silicone sealant as shown in the figure below.



A. Apply silicone sealant here.

- Tighten the cover bolts to the specification (See Exploded Views).

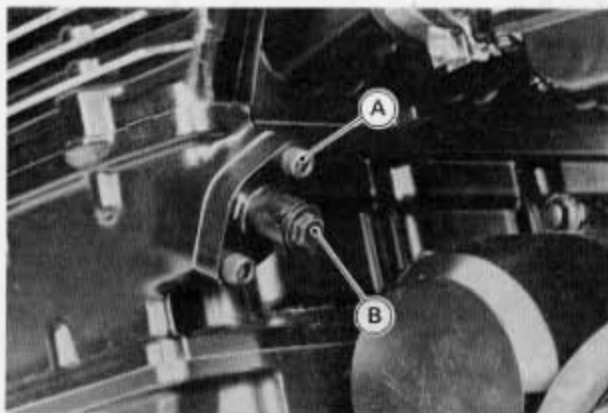
Cam Chain Tensioner

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.



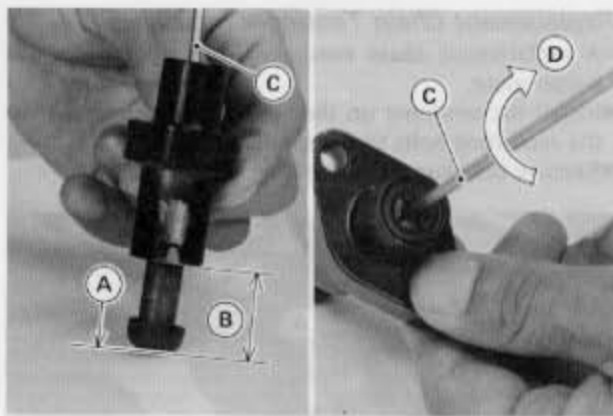
A. Mounting Bolt B. Cap Bolt

Chain Tensioner Installation

- Remove the cap bolt and O-ring.
- While compressing the push rod, turn it **clockwise** with a suitable screwdriver to put it into until the rod protrusion comes to about **10 mm** from 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.



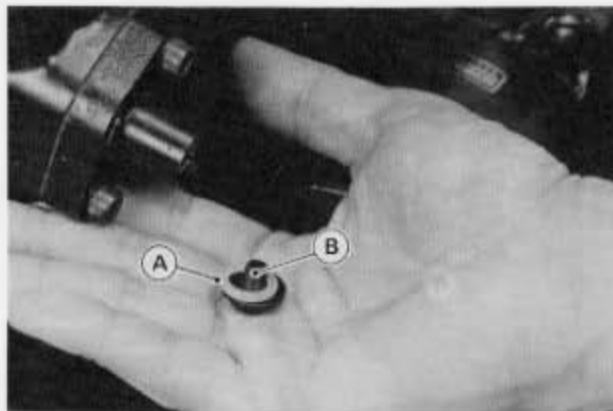
A. Compress the rod C. Screwdriver
B. About 10 mm D. Clockwise

- While holding the rod in position with the screwdriver install the tensioner on the cylinder block.
- While pushing the tensioner against the cylinder block as shown, remove the screwdriver.
- Tighten the mounting bolts finger tight to hold the tensioner.



A. Push the tensioner.

- Tighten the mounting bolts to the specification.
- Install the O-ring and tighten the cap bolt.



A. O-ring B. Cap Bolt

4-10 ENGINE TOP END

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.
- Remove the plate to release the push rod.



A. Rod Holder Plate

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

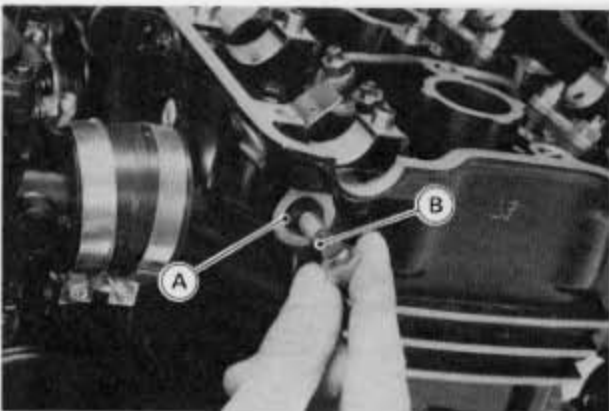
CAUTION

○Do not pull the rod while the tensioner is removed. This could detach the rod and the tensioner cannot be reinstalled.

Camshaft, Camshaft Chain, Rocker Shaft

Camshafts, Rocker Shafts Removal Note

- Remove the cam chain tensioner assembly before removing the camshafts.
- Remove the rocker shaft (small).
- Using a suitable bolt (8 P 1.25 x more than 18 mm long), pull the rocker shaft (long) out.



A. Rocker Shaft

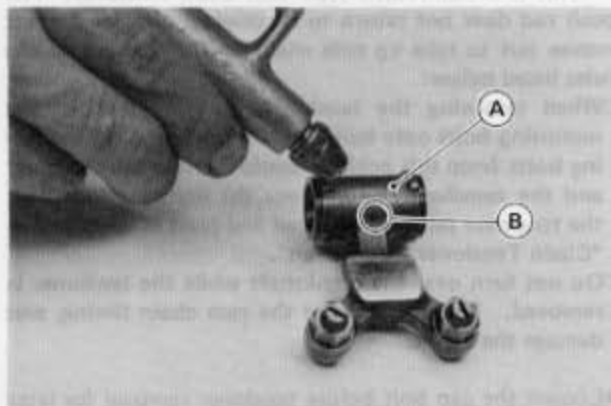
B. Bolt

CAUTION

○The crankshaft may be turned, while the camshafts are removed, but 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.

Camshafts, Rocker Shafts Installation Notes

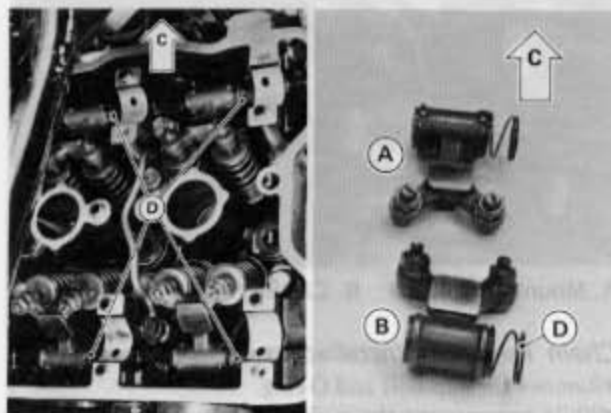
- Blow the rocker arm oil passage clean with compressed air and apply oil to the internal surface before installation.



A. Rocker Arm

B. Oil Passage

- Install the retainer spring on each rocker arm so that the spring is placed on the rocker arm right side at the installation.



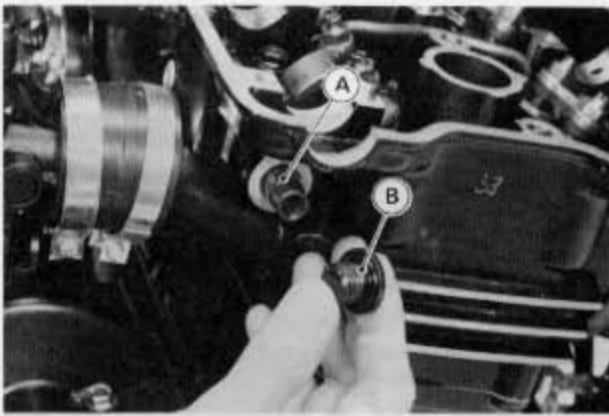
A. Exhaust Side

C. Front

B. Inlet Side

D. Retainer Spring

- Apply engine oil to the rocker shaft, insert the shaft running it through the cylinder head, the rocker arms and springs.
- Tighten the rocker shaft (small) to the specification (See Exploded Views).

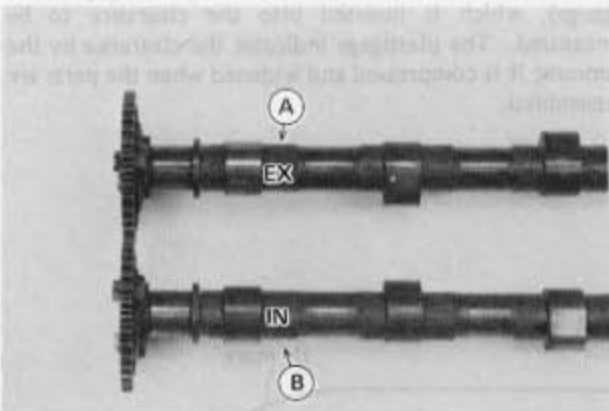


A. Rocker shaft (long) B. Rocker shaft (small)

- Tighten the head bolts to the specification, following the specified tightening sequence (See Cylinder Head Installation Note).
- Install the head oil pipes (See Head Oil Pipe Installation).
- 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.

NOTE

○ The exhaust camshaft has an EX mark and the inlet camshaft has an IN mark. Be careful not to mix up these shafts.



A. EX mark B. IN mark

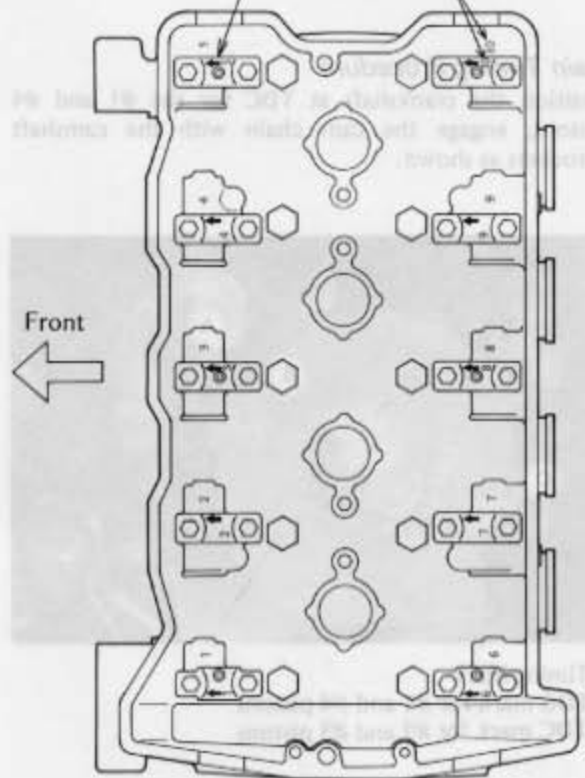
- Apply engine oil to the camshaft bearing portion.
- Install the camshaft caps in the correct locations as shown in the figure below. Location numbers are marked on the cylinder head and each caps.

CAUTION

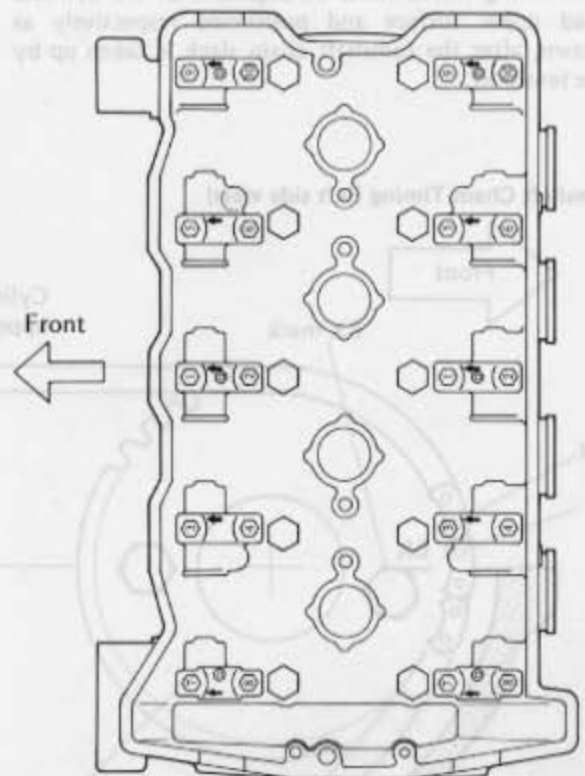
○ The camshaft caps are machined with the cylinder head. So, if a cap is installed in a wrong location, the camshaft may seize because of improper oil clearance in the bearings.

Camshaft Cap Installation

Mark: must be faced forwards
Identification No.



Camshaft Cap Bolt Tightening Sequence

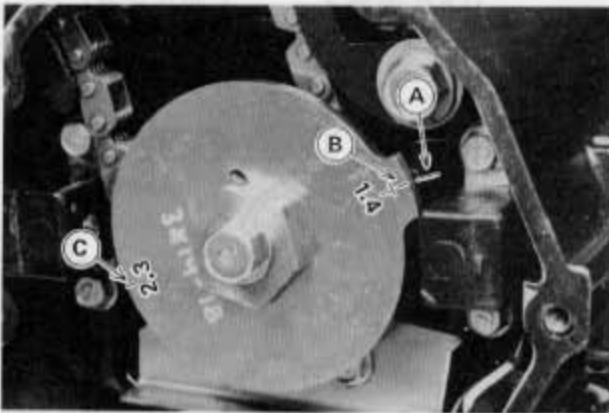


4-12 ENGINE TOP END

- 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.

Chain Timing Procedure

- Position the crankshaft at TDC for the #1 and #4 pistons, engage the cam chain with the camshaft sprockets as shown.

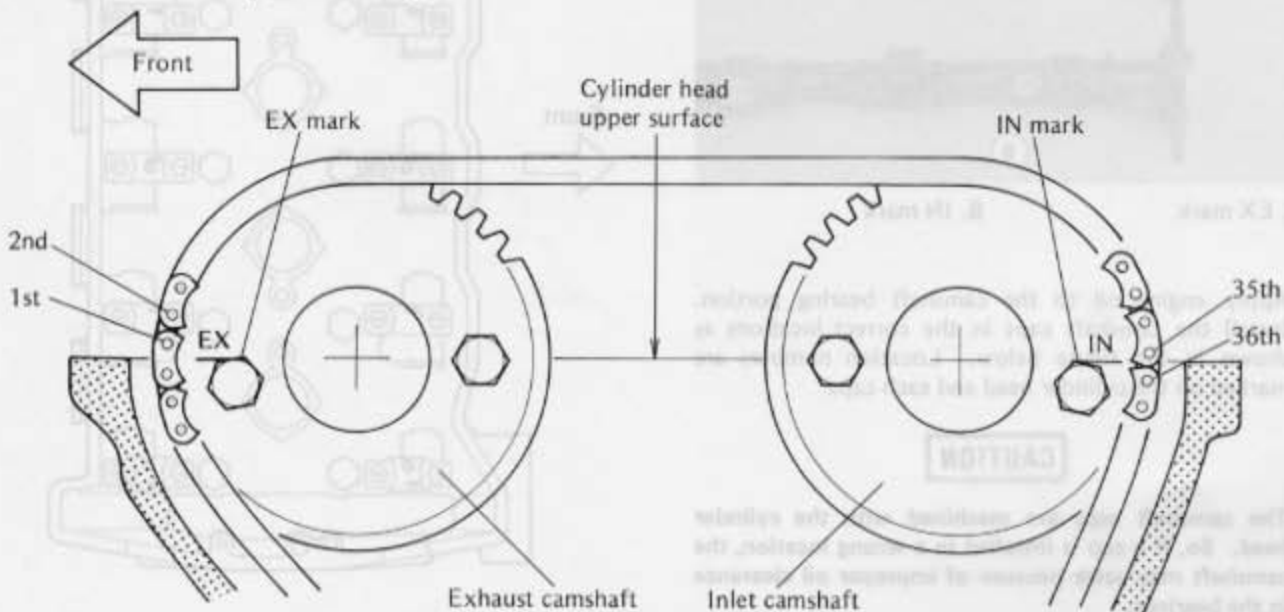


- A. Timing Mark
- B. TDC mark for #1 and #4 pistons
- C. TDC mark for #2 and #3 pistons

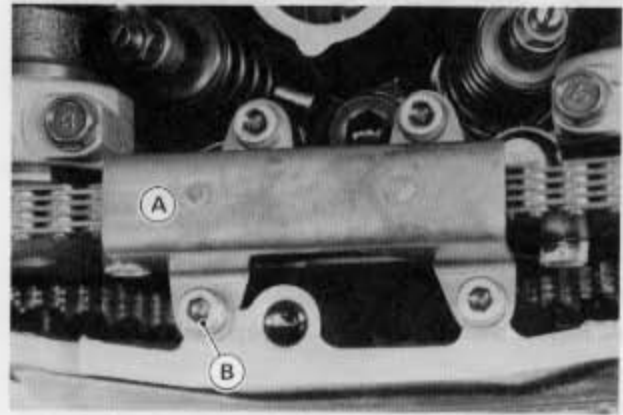
- Pull the tension side (exhaust side) of the chain taut to install the chain.

- The timing marks must be aligned with the cylinder head upper surface and positioned respectively as shown, after the camshaft chain slack is taken up by the tensioner.

Camshaft Chain Timing (left side view)



- Install the top chain guide and tighten the mounting bolts to the specification (See Exploded Views).



- A. Top Chain Guide
- B. Mounting Bolt

Camshaft and Sprocket Assembly Notes

- The inlet and exhaust sprockets are identical.

- Install the sprockets so that the marked side faces outwards.

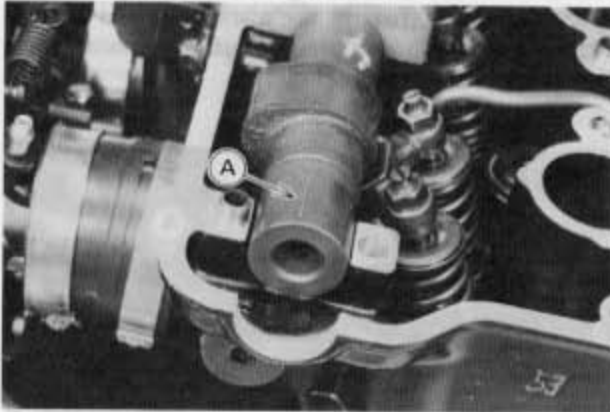
- Apply a locking agent to the camshaft sprocket bolts and tighten them to the specification (See Exploded Views).

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

Camshaft Oil Clearance Inspection

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

- Cut strips of plastigage 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 plastigage will be compressed between the journal and camshaft cap.

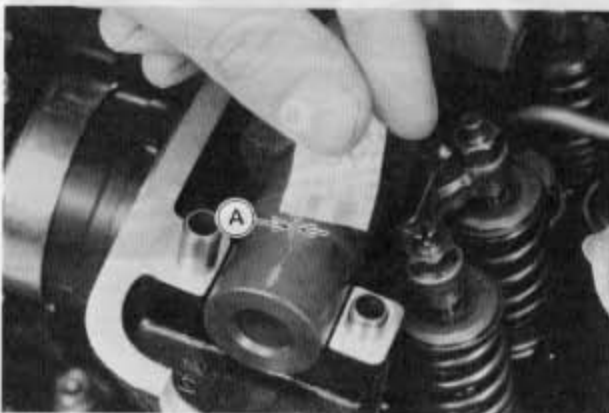


A. Plastigage Strip

- Install the camshaft caps, tightening the bolts in the correct sequence to the specified torque.

NOTE

- Do not turn the camshaft when the plastigage is between the journal and camshaft cap.
- Remove the camshaft caps again, and measure the plastigage width to determine the clearance between each journal and the camshaft cap. Measure the widest portion of the plastigage.



A. Plastigage Width

- ★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 unit.

Camshaft Bearing Oil Clearance

Standard	: 0.078 – 0.121 mm
Service limit	: 0.21 mm

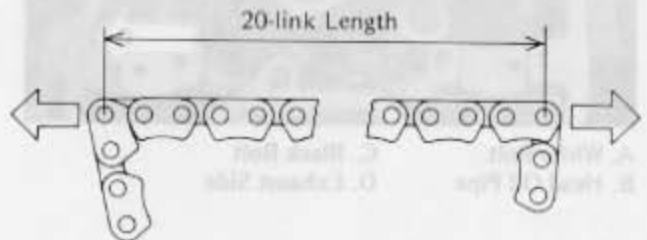
Camshaft Chain Wear

- 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.

Camshaft Chain 20-link Length

Standard	: 158.8 – 159.2 mm
Service limit	: 161.5 mm

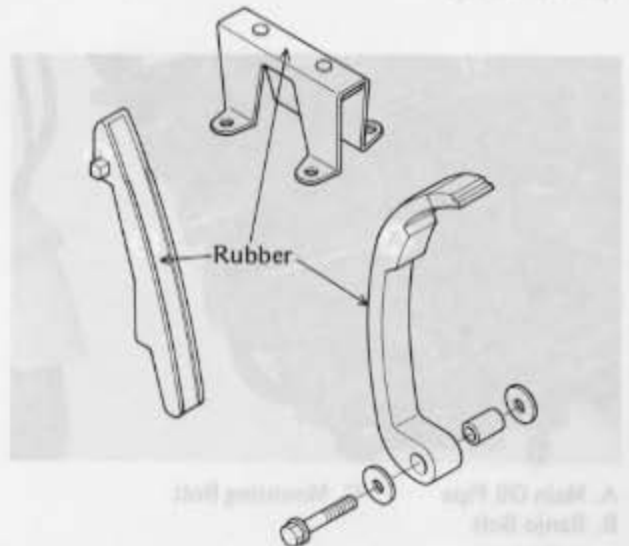
Chain Length Measurement



Camshaft Chain Guide Wear

- Visually inspect the rubber on the guides.
- ★If the rubber is damaged, cut, or is missing pieces, replace the guides.

Camshaft Chain Guides



4-14 ENGINE TOP END

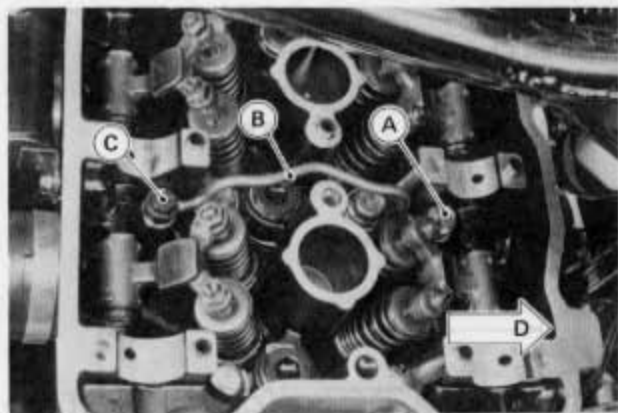
Oil Pipe

Oil Pipe Installation Note

- Before installation, flush out the oil pipes with a high flash-point solvent.

Head Oil Pipe Installation Note

- Install the white bolts on the exhaust side and the black bolts on the inlet side.
- Tighten the oil bolts to the specification (See Exploded Views).



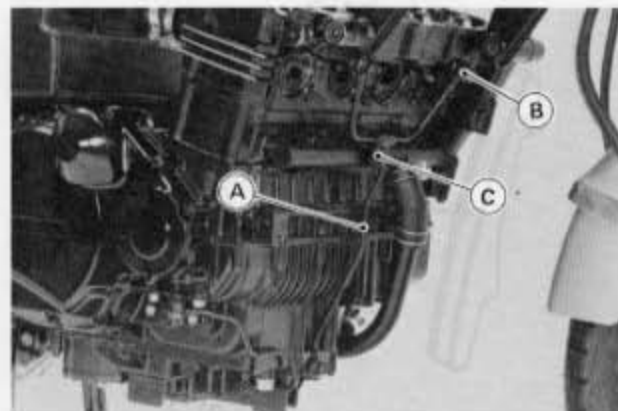
A. White Bolt
B. Head Oil Pipe
C. Black Bolt
D. Exhaust Side

Main Oil Pipe Removal Note

- Remove the radiator (See Radiator Removal in Cooling System) before removal of the main oil pipes.

Main Oil Pipe Installation Note

- Discard the used flat washers and install new washers on each side of the pipe fittings.
- Tighten the banjo bolts and mounting bolts to a snug fit, and tighten them to the specification (See Exploded Views).

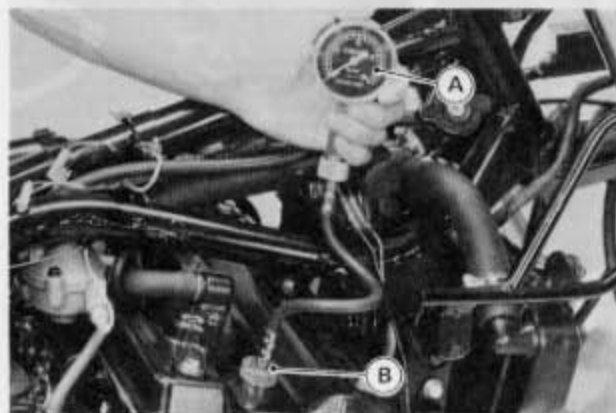


A. Main Oil Pipe
B. Banjo Bolt
C. Mounting Bolt

Cylinder Head

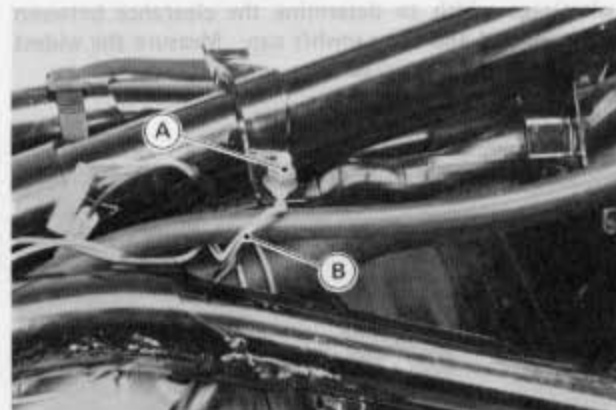
Compression Measurement

- 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 plugs and ignition coils, and attach compression gauge (special tool) firmly into the spark plug hole.



A. Compression Gauge: 57001-221
B. Adapter: 57001-1018

- Install the main harness ground lead using a suitable bolt.



A. Suitable Bolt and Nut
B. Main Harness Ground Lead

- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.
- Repeat the measurement for the other cylinder.

Cylinder Compression (Usable Range)

920 – 1,420 kPa @450 r/min (rpm)
(9.4 – 14.5 kg/cm², 134 – 206 psi)

★If cylinder compression is higher than the standard value, check the following:

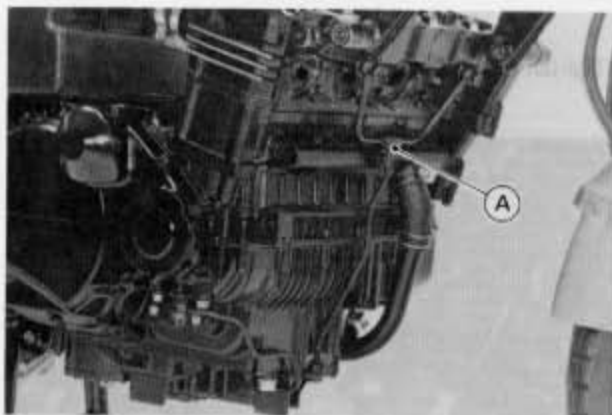
1. Carbon build-up on the piston head and cylinder head. — clean off any carbon on the piston head and cylinder head.
2. Cylinder head gasket, cylinder base gasket — use only the proper gaskets for the cylinder head and base. The use of gaskets of the incorrect thickness will change the compression.
3. Valve stem oil seals and piston rings — rapid carbon accumulation in the combustion chambers may be caused by damaged valve stem oil seals and/or damaged piston oil rings. This may be indicated by white exhaust smoke.

★If cylinder compression is lower than the service limit, check the following:

1. Gas leakage around the cylinder head — replace the damaged gasket and check the cylinder head for warp.
2. Condition of the valve seating.
3. Valve clearance — if a valve requires an unusually adjustment to obtain proper clearance, the valve may be bent, and not seating completely.
4. Piston/cylinder clearance, piston seizure.
5. Piston ring, piston ring groove.

Cylinder Head Removal Notes

- Remove the following parts.
Cylinder head cover (see Cylinder Head Cover Removal).
Cam chain tensioner (see Chain Tensioner Removal).
Camshaft
Camshaft
- Remove the main oil pipe.



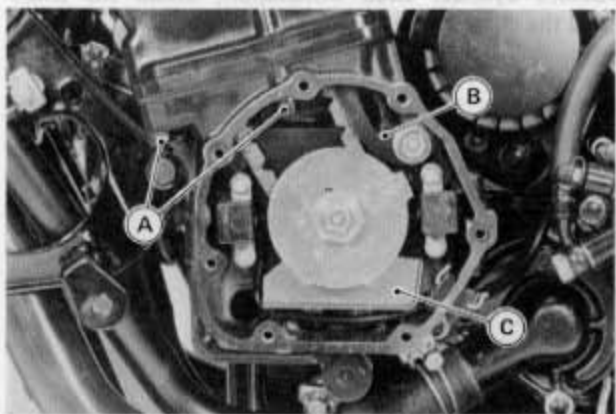
A. Main Oil Pipe

- Remove the plate.

- Remove the cylinder head bolt and the cylinder bolts (6 mm) first, then remove the cylinder head bolts (10 mm). This prevents excessive stress on the small bolts.

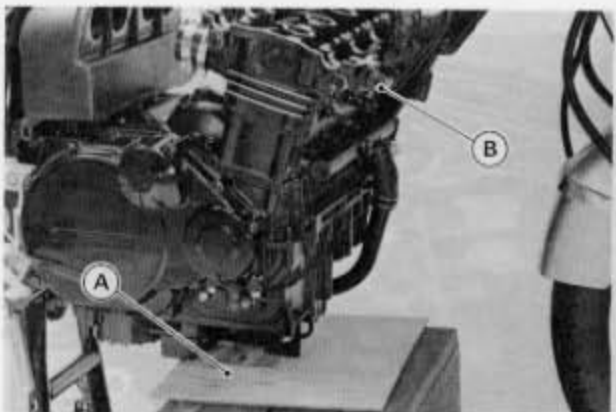


A. Cylinder Head Bolt (6 mm)



A. Cylinder Bolt (6 mm) C. Plate
B. Chain Guide (Mounting Bolt and Collar)

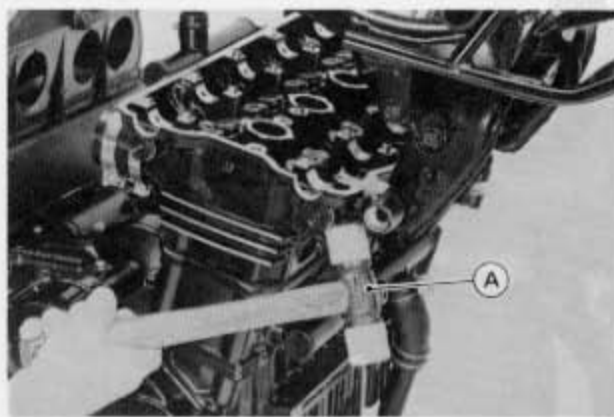
- At removal of the cylinder head mounting bolts, use a jack or stand so that the engine unit is stable during removal and installation operation.



A. Stand
B. Cylinder Head Mounting Bolt

4-16 ENGINE TOP END

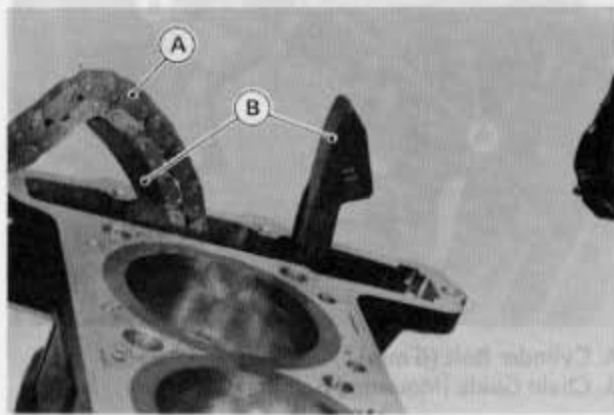
- Tap the portions as shown with a mallet to remove the cylinder head.



A. Mallet

Cylinder Head Installation Notes

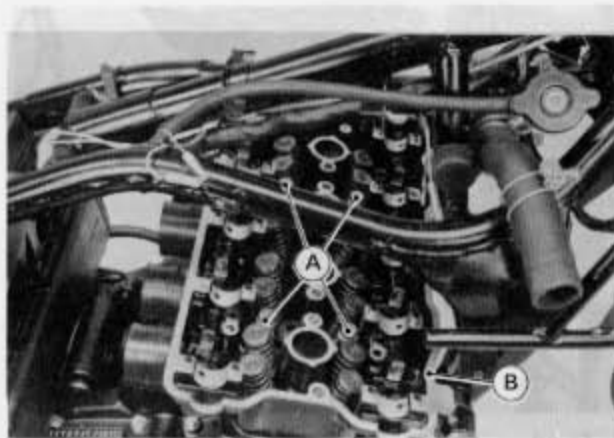
- Before cylinder head installation, install the chain and the chain guides.



A. Chain

B. Chain Guide

- Insert the following bolts (4) into the cylinder head prior to the head installation.

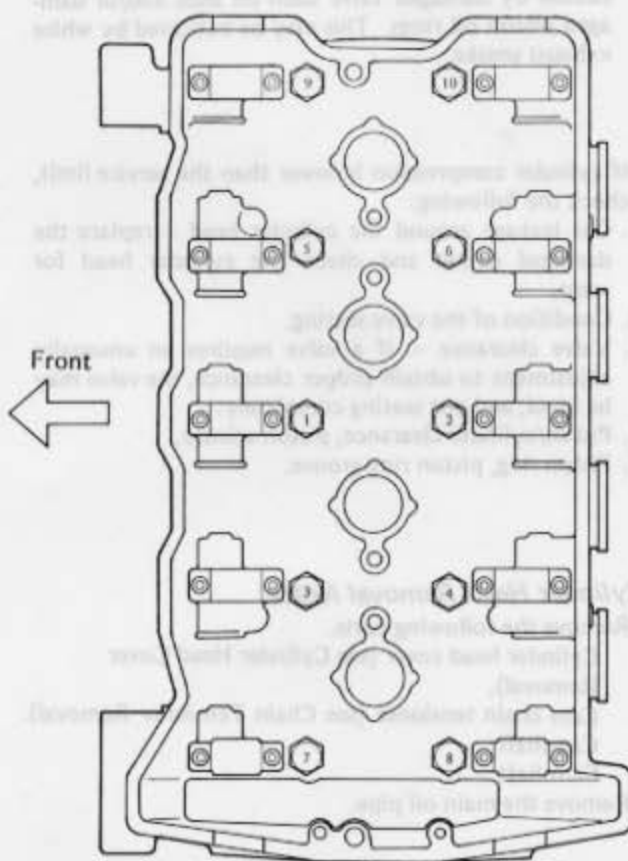


A. Bolt

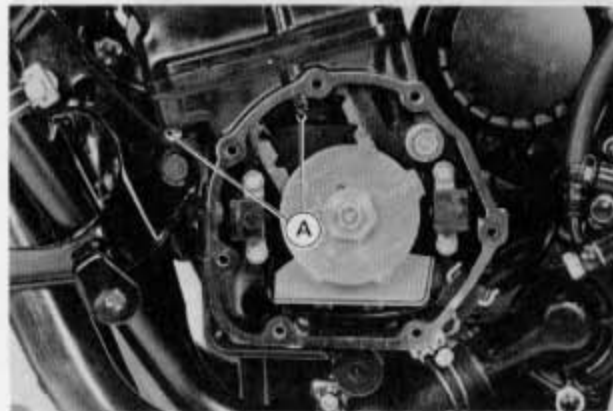
B. Cylinder Head

- The camshaft caps are machined with the cylinder head so if a new cylinder head is installed, use the caps that are supplied with the new head.
- Torque the cylinder head bolts following the tightening sequence. Torque them first to about one half of the specification and then torque them to the specification as shown.

Cylinder Head Bolt Tightening Sequence



- Tighten the cylinder bolts to the specification.

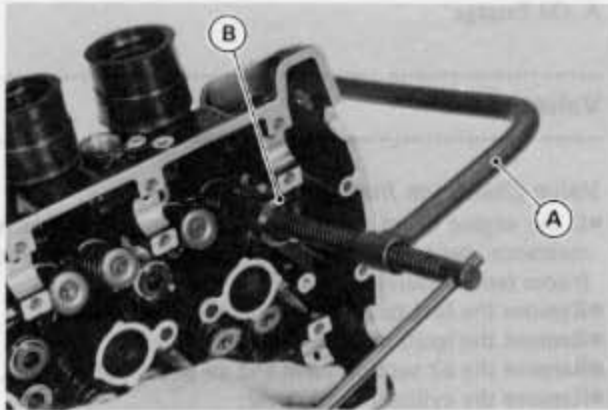


A. Cylinder Bolt

- Install the head oil pipes (see Head Oil Pipe Installation).
- Install the cam shafts and camshaft caps (see Camshaft Installation Note).
- Tighten the cylinder head mounting bolts to the specification (see Exploded Views).

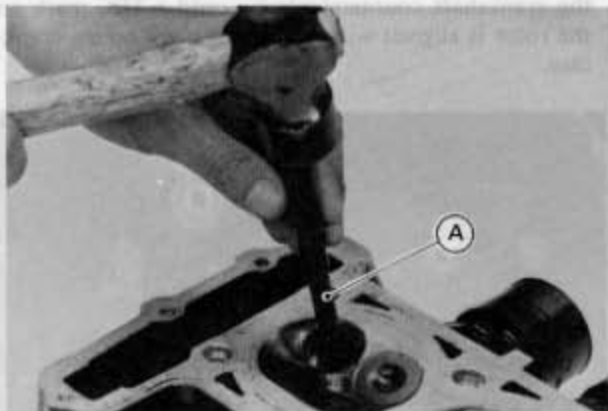
**Cylinder Head Disassembly and Assembly
(Valve Mechanism Removal and Installation)**

- Use valve spring compressor assembly (special tool) to press down the valve spring retainer, and remove the split keepers.



A. Valve Spring Compressor Assembly: 57001-241
B. Adapter: 57001-1019

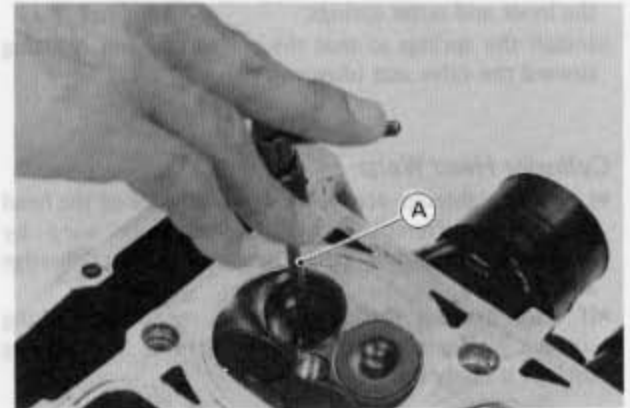
- Heat the area around the valve guide to about 120 – 150°C (248 – 302°F), and hammer lightly on valve guide arbor (special tool) to remove the guide from the top of the head.



A. Valve Guide Arbor: 57001-1021

- 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°C (248 – 302°F).
 - Drive the valve guide in from the top of the head using the valve guide arbor.

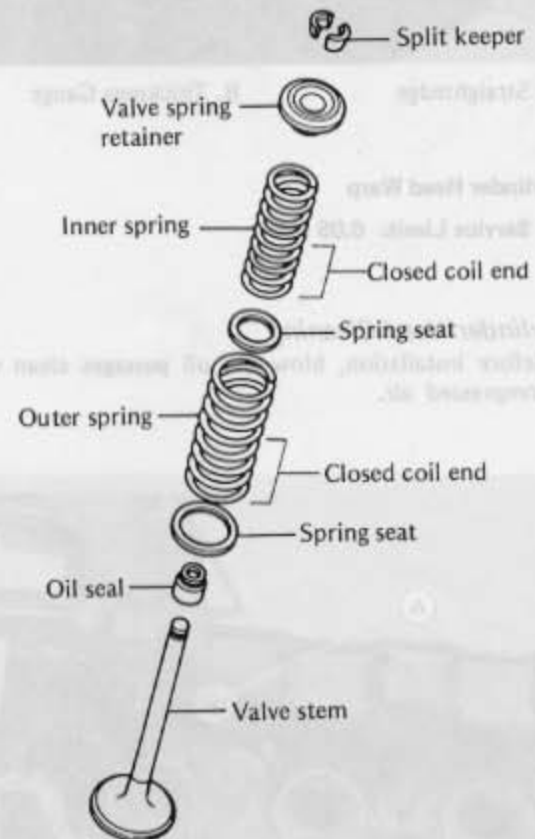
- Ream the valve guide with a valve guide reamer (special tool) even if the old guide is re-used.



A. Valve Guide Reamer: 57001-1079

- 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.

Valve and Springs

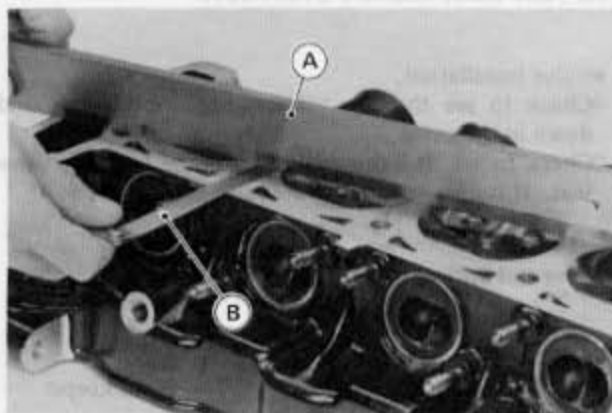


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- Apply a thin coat of molybdenum disulfide engine assembly grease to the valve stem before valve installation.
- Be sure to install the inner and outer spring seats under the inner and outer springs.
- Install the springs so that the closed coil end is facing toward the valve seat (downwards).

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.



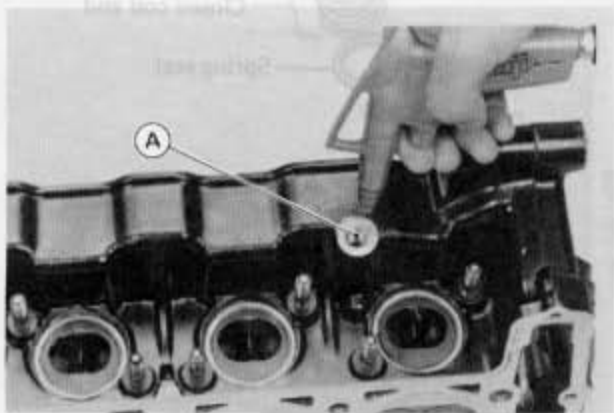
A. Straightedge B. Thickness Gauge

Cylinder Head Warp

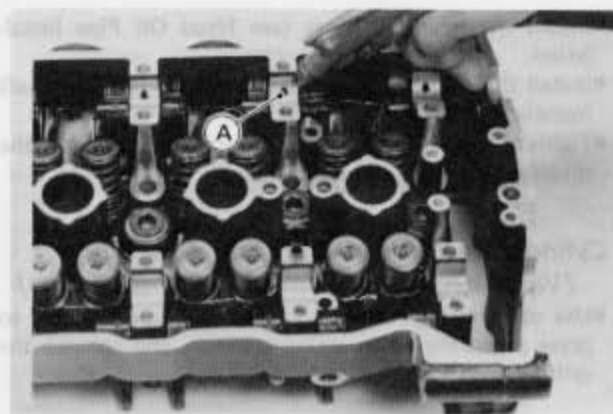
Service Limit: 0.05 mm

Cylinder Head Cleaning

- Before installation, blow the oil passages clean with compressed air.



A. Oil Passage

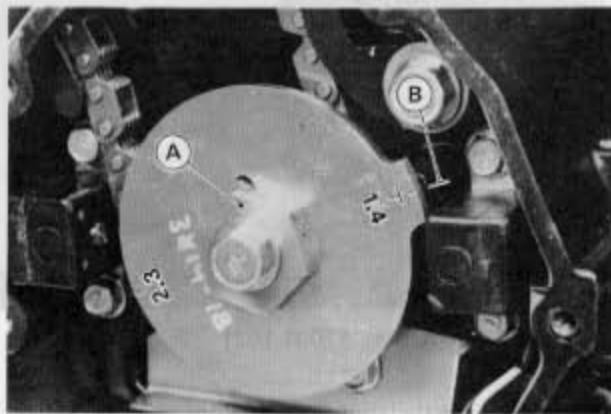


A. Oil Passage

Valves

Valve Clearance 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 (See Fuel Tank Removal).
- Remove the ignition coils.
- Remove the air suction valve and air hoses (US model).
- Remove the cylinder head cover.
- Situate the motorcycle on its center stand to make engine oil loss to a minimum.
- Place an oil pan beneath the pickup coil cover and remove the cover.
- Check the valve clearance when the pistons are at TDC, according to the table below.
- The pistons are numbered beginning with the engine left side.
- Using a wrench on the crankshaft rotation nut, turn the crankshaft counterclockwise until a TDC mark on the rotor is aligned with the timing mark on the crankcase.



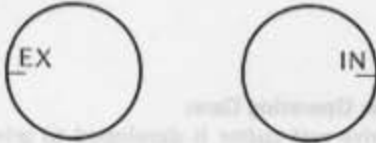
A. Rotation Nut B. TDC Mark

- Measure the valve clearance for the valves whose cam lobe is pointing away from the rocker arm.
- Each piston has two inlet and two exhaust valves. Measure both inlet or both exhaust valves at the same time.

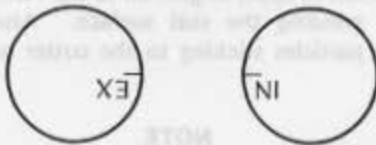
Valve Clearance Measuring Position

#4 Piston TDC at End of Compression Stroke →
Inlet valve clearance of #2 and #4 pistons, and
Exhaust valve clearance of #3 and #4 pistons

Camshaft Sprocket Position



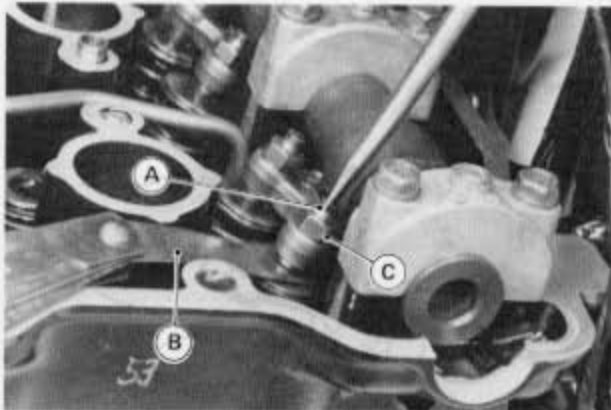
#1 Piston TDC at End of Compression Stroke →
Inlet valve clearance of #1 and #3 pistons, and
Exhaust valve clearance of #1 and #2 pistons



NOTE

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

●Measure the clearance of each valve by inserting a thickness gauge between the adjusting screw and the valve stem.



A. Adjusting Screw
B. Thickness Gauge
C. Locknut

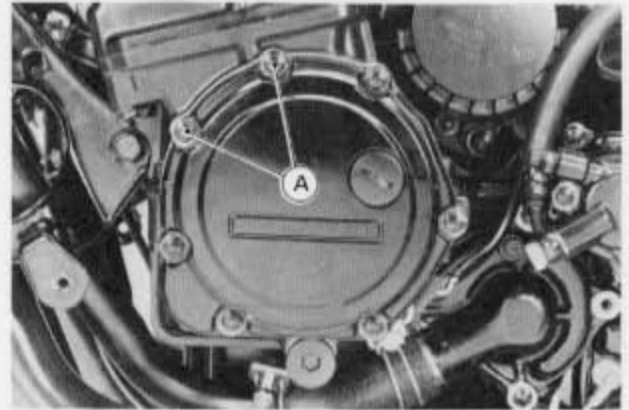
Valve Clearance (when cold)

Inlet : 0.13 – 0.18 mm
Exhaust : 0.18 – 0.23 mm

Valve Clearance Adjustment

- ★If the valve clearance is incorrect, loosen the locknut and turn the adjusting screw until the correct clearance is obtained.
- Tighten the locknut.
- Install the pickup coil cover and new gasket.

○Apply a non-permanent locking agent to the following bolts(2) at installation.



A. Bolt

○Check the engine oil level and add if necessary (See Oil Level Inspection in Engine Lubrication System).

Valve Seat Inspection

- Remove the valve (see Cylinder Head Disassembly and Assembly).
- Coat valve seat with machinist's dye.
- Push the valve into the guide.
- Rotate the valve against the seat with a lapping tool.
- Pull the valve out, and check the seating pattern on the valve head. It must be the correct width and even all the way around.

Valve Seating Surface Width

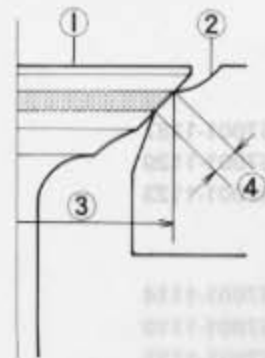
Inlet : 0.5 – 1.0 mm
Exhaust : 0.5 – 1.0 mm

NOTE

○The valve stem and guide must be in good condition or this check will not be valid.

★If the valve seating pattern is not correct, repair the seat (see Valve Seat Repair).

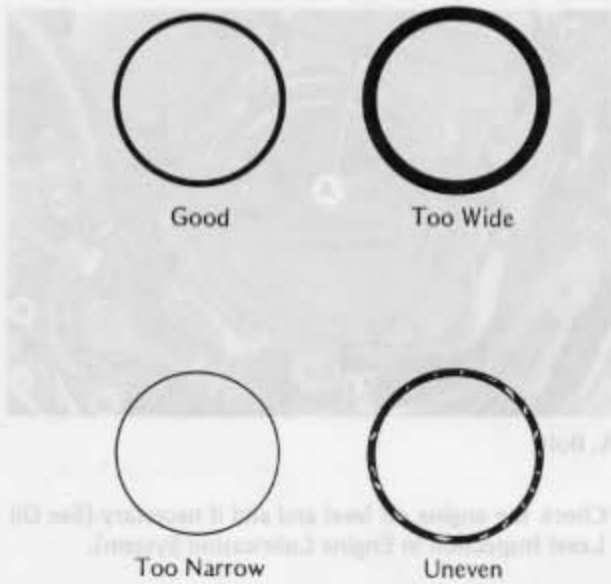
Valve Seating Area Dimensions



1. Valve
2. Valve Seat
3. Seating Area Outside diameter
4. Seating Area Width

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Valve Seating Pattern



- Measure the outside diameter of the seating pattern on the valve seat.
- ★ If the outside diameter of the valve seating pattern is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter

Inlet	:	28.3 – 28.5 mm
Exhaust	:	24.0 – 24.2 mm

Valve Seat Repair

- Use the following procedures and tools to repair the valve seat.

Valve Seat Cutters

Inlet Valves

45°	–	φ30.0	57001-1187
32°	–	φ30.0	57001-1120
60°	–	φ30.0	57001-1123

Exhaust Valves

45°	–	φ27.5	57001-1114
32°	–	φ28.0	57001-1119
60°	–	φ30.0	57001-1123

Holder and Bar

Holder – φ5.5	57001-1125
Bar	57001-1128

Seat Cutter Operating Care:

1. This valve seat cutter is developed to grind the valve seat for repair. Therefore the cutter must not be used for other purposes than seat repair.
2. Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTE

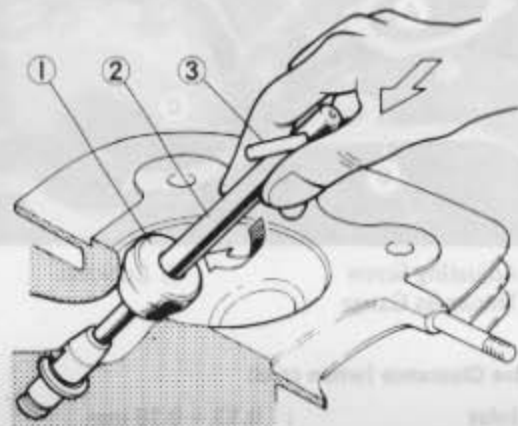
○ Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.

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

NOTE

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

Valve Seat Cutter



1. Cutter
2. Cutter Holder
3. Bar

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

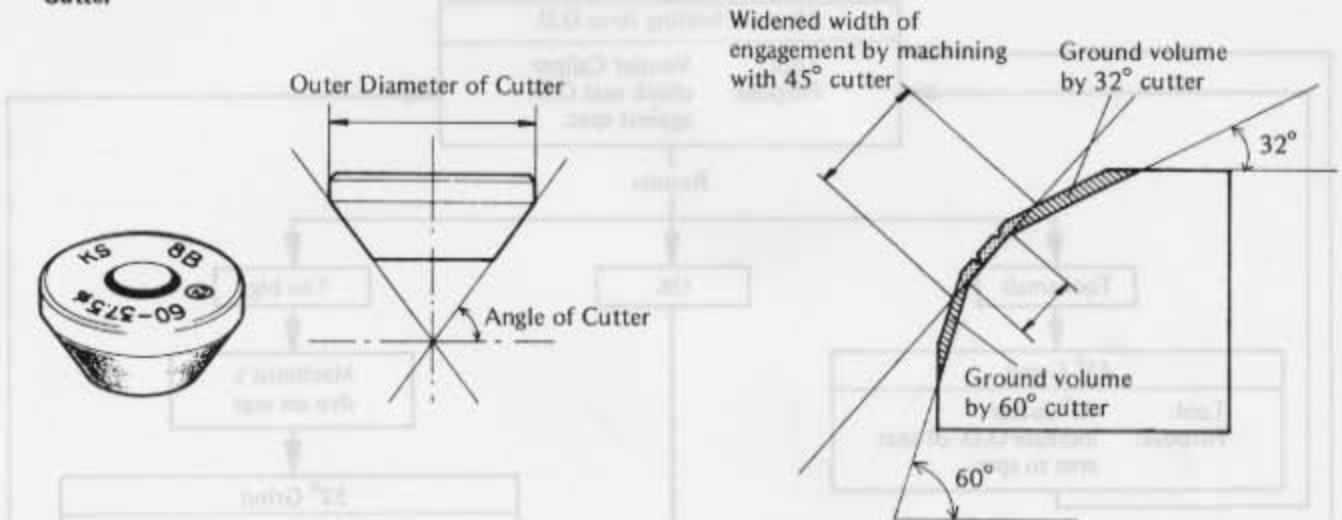
Marks Stamped on the Cutter:

The marks stamped on the back of the cutter represent the following.

- ① Cutter number, selected from ① to ⑫
 45° Cutter angle
 24.5φ Outer diameter of cutter
 KS00 Manufactured lot number

CAUTION

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

Valve Seat Repair**Cutter****Operating Procedures:**

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

CAUTION

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

- Measure the outside diameter of the seating surface with a vernier caliper.
- ★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
- ★If the outside diameter of the seating surface is too large, make the 32° grind described below.
- ★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.
- Grind the seat at a 32° angle until the seat O.D. is within the specified range.
- To make the 32° grind, fit a 32° cutter to the holder, and slide it into the valve guide.
- Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

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

- To measure the seat width, use a vernier caliper to measure the width of the 45° portion of the seat at several places around the seat.

- ★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.

- ★If the seat width is too wide, make the 60° grind described below.

- ★If the seat width is within the specified range, lap the valve to the seat as described below.

- Grind the seat at a 60° angle until the seat width is within the specified range.

- To make the 60° grind, fit a 60° cutter to the holder, and slide it into the valve guide.

- Turn the holder, while pressing down lightly.

- After making the 60° grind, return to the seat width measurement step above.

- Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.

- Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.

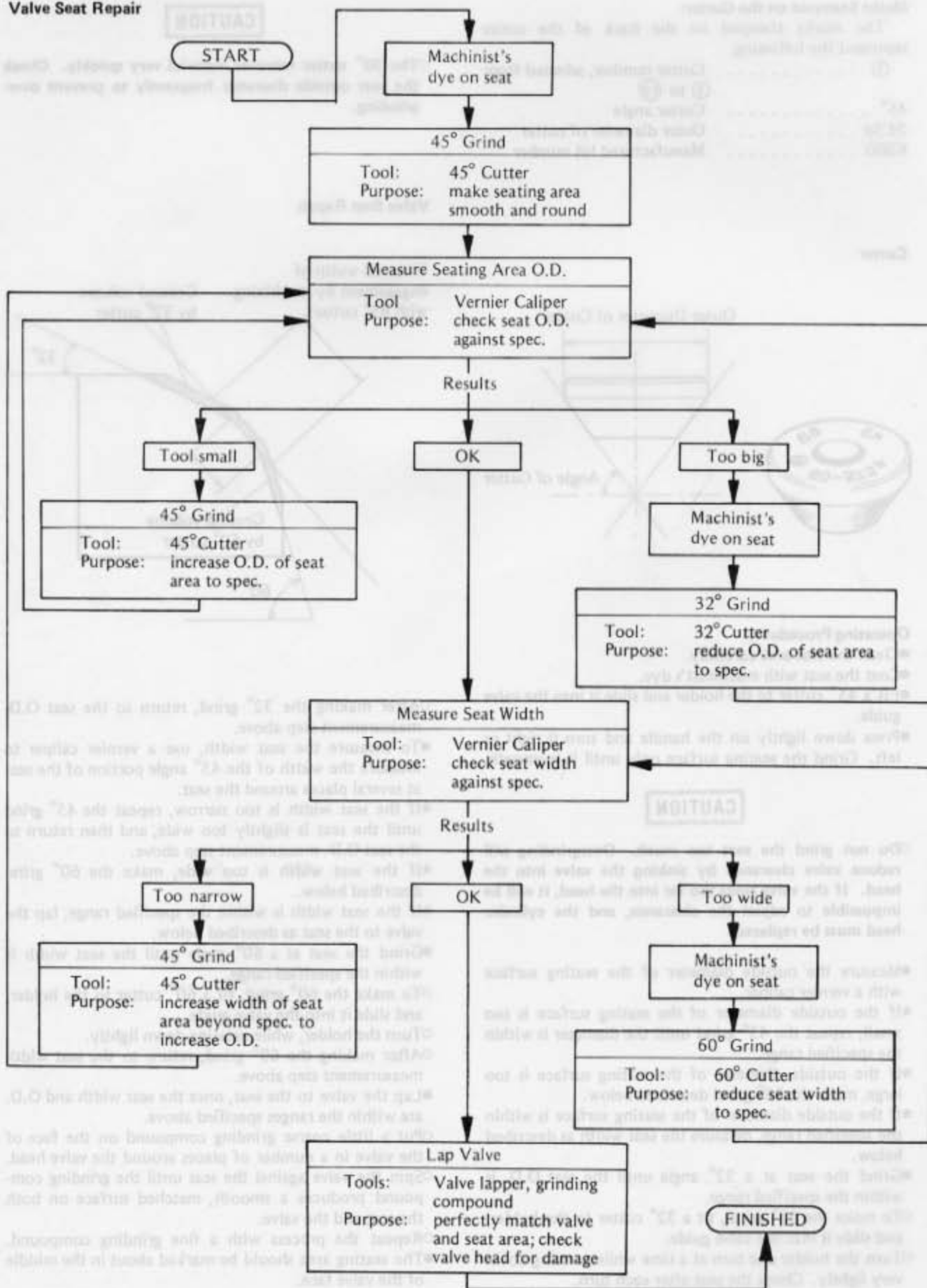
- Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.

- Repeat the process with a fine grinding compound.

- The seating area should be marked about in the middle of the valve face.

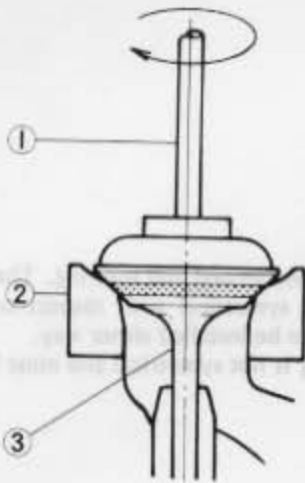
4-22 ENGINE TOP END

Valve Seat Repair



- ★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearances (see Valve Clearance Adjustment).

Valve Lapping



- 1. Lapper
- 2. Valve Seat
- 3. Valve

Measuring Valve-to-Guide Clearance (Wobble Method)

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

- 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.
- Repeat the measurement in a direction at a right angle to the first.
- ★If the reading exceeds the service limit, replace the guide.

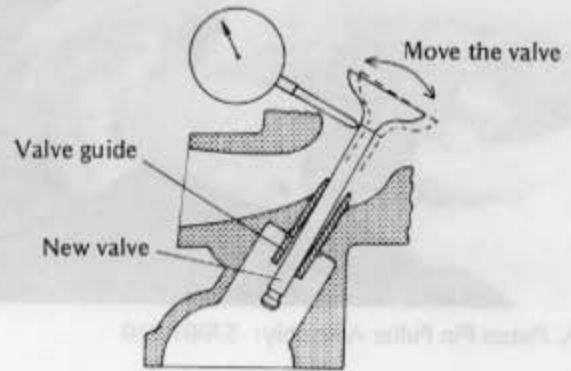
NOTE

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

Valve/Valve Guide Clearance (Wobble Method)

	Standard	Service Limit
Inlet	0.02 – 0.08 mm	0.22 mm
Exhaust	0.07 – 0.14 mm	0.27 mm

Wobble Method



When the reading is within the limits, the valve guide is OK. If the reading is outside the limits, the valve guide is worn and should be replaced. The dial gauge should be held perpendicular to the stem of the valve. The dial gauge should be held against the stem of the valve as close as possible to the cylinder head mating surface. The dial gauge should be held perpendicular to the stem of the valve. The dial gauge should be held perpendicular to the stem of the valve.

Cylinder, Piston

Piston Removal Notes

- Remove the piston pin snap rings from the outside of each piston.

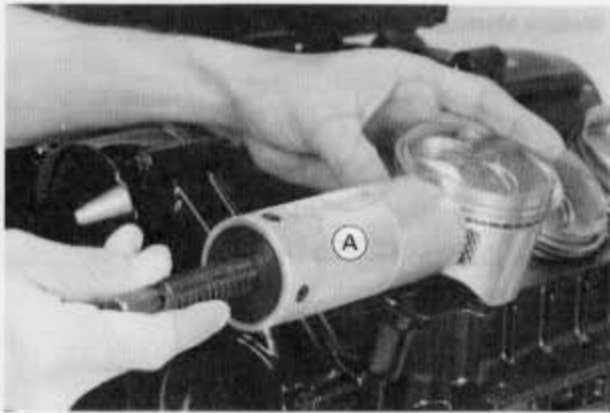


A. Snap Ring

CAUTION: Do not use a screwdriver to pry the snap ring out. The snap ring puller is the correct tool to use.

- Remove the piston by pushing its piston pin out the side that the snap ring was removed. Use piston pin puller assembly (special tool), if the pin is tight.
- Be sure to place a clean cloth under the piston to prevent the snap ring from falling into the crankcase.

4-24 ENGINE TOP END



A. Piston Pin Puller Assembly: 57001-910

- Remove the top and second rings with the piston ring pliers (special tool). If the special tool is not available, carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



A. Piston Ring Pliers: 57001-115

Piston Installation Note

- The arrow on the top of the piston must point toward the front of the engine.
- When installing a piston pin snap ring, compress it only enough to install it and no more.

CAUTION

- Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.
- Oil Ring Installation:
 - First install the expander in the piston oil ring groove so that expander ends butt together, never overlap.

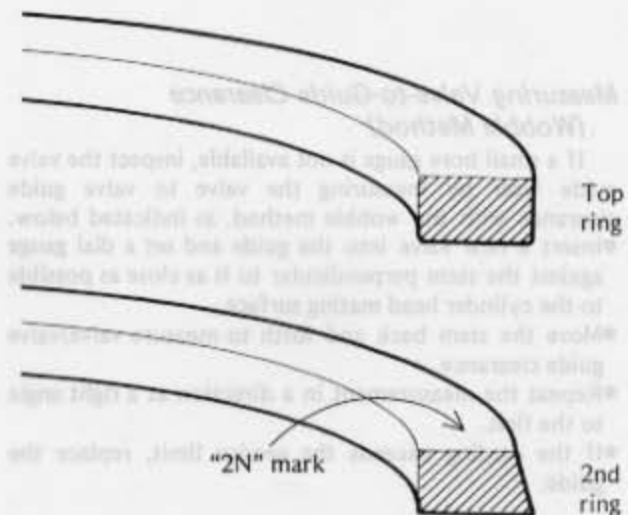
- Install the upper and lower steel rails. There is no UP or DOWN to the rails. They can be installed either way.

Oil Ring Expander Installation



- Do not mix up the second and top ring. The top ring is rectangular and symmetrical with respect to the horizontal axis; it can be installed either way.
- The second ring is not symmetrical and must be installed as shown.

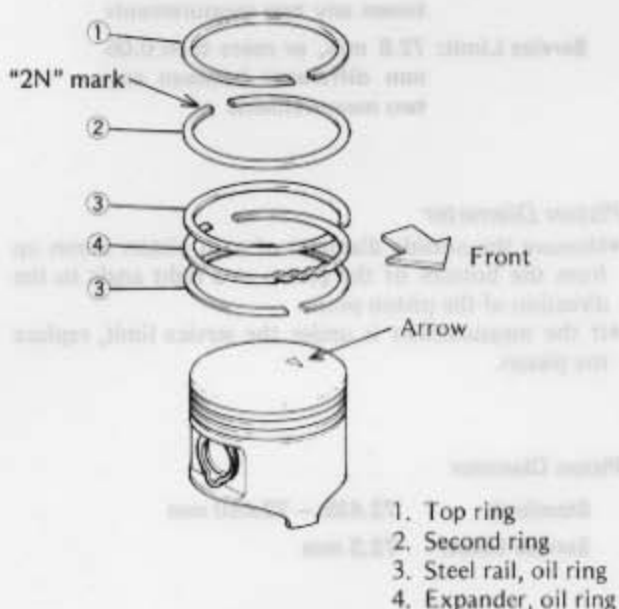
Cross Section of Piston Rings



NOTE: 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 - 40° of angle from the opening of the top ring.

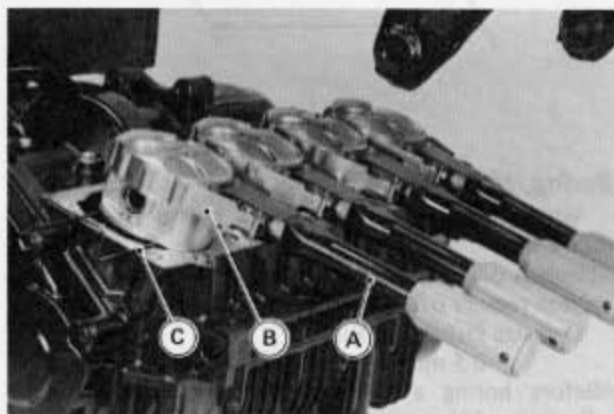
- Position each piston ring so that the opening in the top ring and oil ring steel rails are facing forwards, and the second ring and oil ring expander openings face the rear. The openings of the oil ring steel rails must be about 30 - 40° of angle from the opening of the top ring.

**Piston Ring Openings
: Viewed from Front**



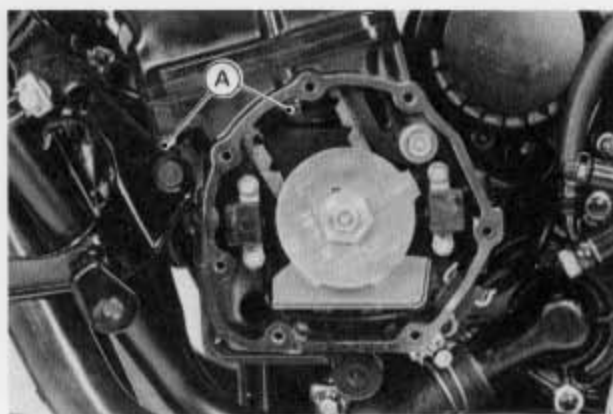
Cylinder Installation Notes

- Apply a engine oil to the cylinder bores, and apply a thin coat of a molybdenum disulfide grease to the piston skirt.
- Slip piston bases (special tool) under the pistons to hold them level.
- Compress the piston rings using piston ring compressor assemblies (special tool).



- A. Piston Ring Compressor Assembly: 57001-1094
- B. Use belt ($\phi 50 - \phi 67$).
- C. Piston base: 57001-149

- Torque the cylinder bolt after the cylinder head bolts tightening.



A. Cylinder Bolt

Piston Ring, Piston Ring Groove Wear

- Check for uneven groove wear by inspecting the ring seating.
- ★The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.
- With the piston rings in their grooves, make several measurements with a thickness gauge to determine piston ring/groove clearance.

Piston Ring Groove Clearance

	Standard	Service Limit
Top	0.03 – 0.07 mm	0.17 mm
Second	0.02 – 0.06 mm	0.16 mm



A. Thickness Gauge

Piston Ring End Gap

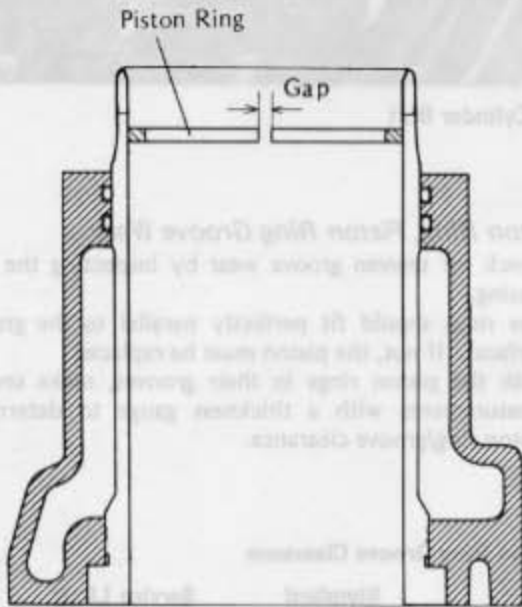
- Place the piston ring inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap between the ends of the ring with a thickness gauge.

4-26 ENGINE TOP END

Piston Ring End Gap

	Standard	Service Limit
Top	0.2 – 0.35 mm	0.7 mm
Second	0.2 – 0.35 mm	0.7 mm
Oil	0.2 – 0.7 mm	1.0 mm

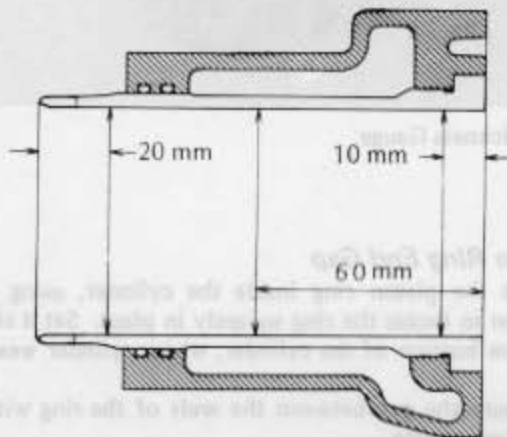
End Gap Measurement



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



Cylinder Inside Diameter

- Standard: 72.494 – 72.506 mm and less than 0.01 mm difference between any two measurements
- Service Limit: 72.6 mm, or more than 0.05 mm difference between any two measurements

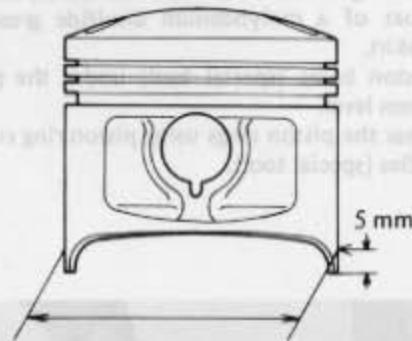
Piston Diameter

- Measure the outside diameter of each piston 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.
- ★ If the measurement is under the service limit, replace the piston.

Piston Diameter

- Standard: 72.435 – 72.450 mm
- Service Limit: 72.3 mm

Piston Diameter Measurement



Boring, Honing

When boring and honing a cylinder, note the following:

- There is one size of oversize piston available. Oversize piston require oversize ring.

Oversize Piston and Ring

0.5 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 re bore diameter. However, if the amount of boring necessary would make the inside diameter greater than **0.5 mm** oversize, the cylinder block must be replaced.

- Cylinder inside diameter must not vary more than **0.01 mm** at any point.

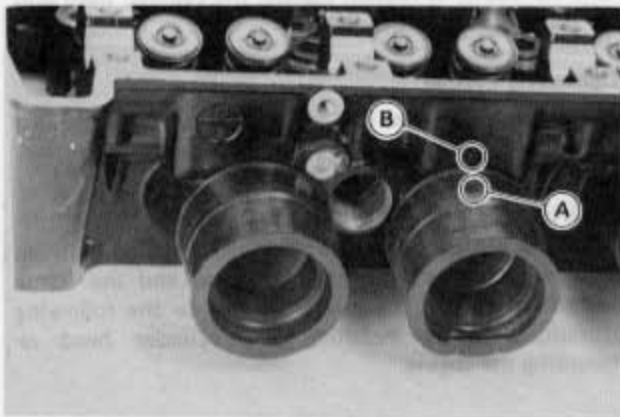
- Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.

- 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.
- Never separate the liner from the cylinder, because the top surface of cylinder and liner is machined at the factory as an assembly.

Carburetor Holder

Carburetor Holder Installation

- Install the carburetor holders so that the projections face upwards and align with the cylinder head marks.



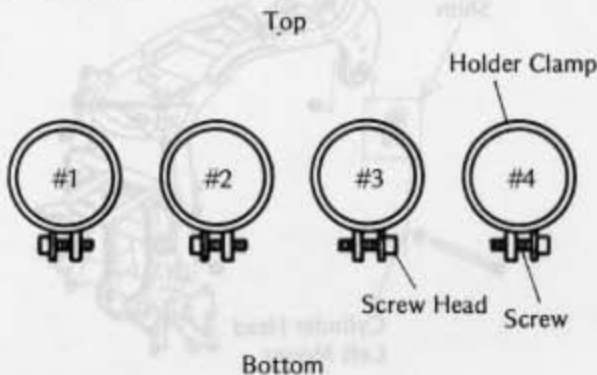
A. Holder Projection B. Mark

- Install the holder clamps as shown being careful of the screw position and the screw head direction.

WARNING

- Install the clamp screws horizontal. Or, the screws could come in contact with the vacuum adjusting screws, resulting in an unsafe riding condition.

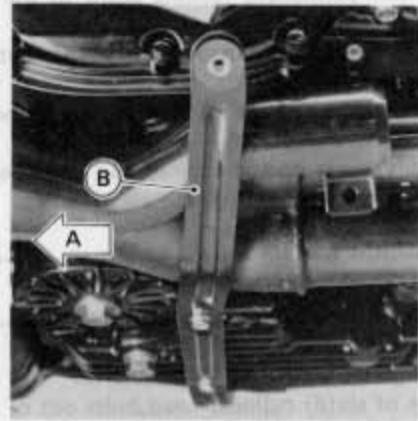
Holder Clamp Installation



Muffler

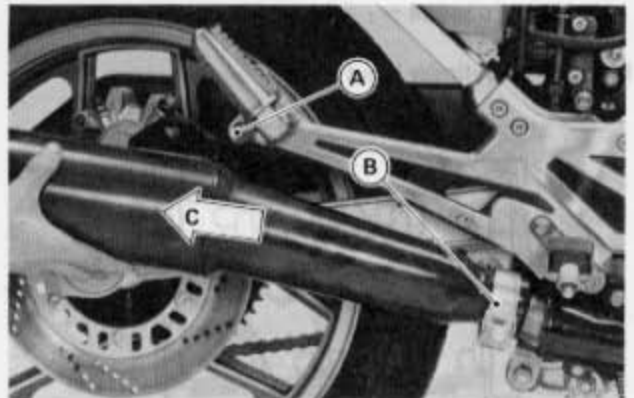
Removal Notes

- Remove the radiator (See Radiator Removal in Cooling System Chapter).
- Remove the bracket from the engine bottom.



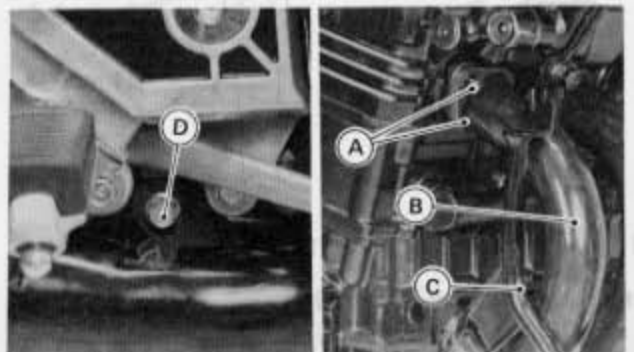
A. Front B. Bracket

- Remove the mounting bolts on both sides.
- Loosen the clamps and pull the mufflers out of the exhaust pipes.



A. Mounting Bolt B. Clamp C. Pull out

- Remove the exhaust pipe mounting bolts on both sides.



A. Exhaust Pipe Holder Nuts B. Exhaust Pipe C. Fairing Bracket
D. Exhaust Pipe Mounting Bolts

4-28 ENGINE TOP END

- Remove the horns.
- Remove the exhaust pipe holders and nuts.
- Remove the exhaust pipes with the fairing bracket.

Installation Notes

- 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.
- Apply a non-permanent locking agent to the exhaust pipe mounting bolts threads.
- 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.

Modification

Size Change of Cylinder Head Bolts:

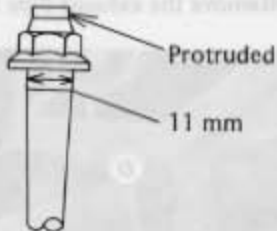
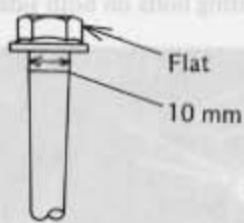
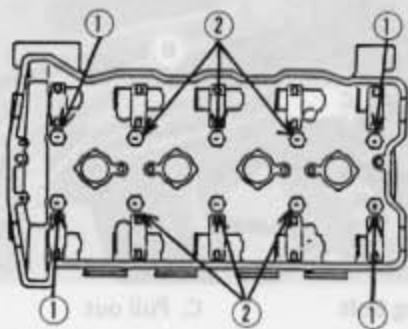
The size of six(6) cylinder head bolts out of ten(10) were changed from 10 mm diameter to 11 mm diameter.

Effective Starting Engine Number

ZX900AG004601 ~ : West Germany and Sweden models

ZX900AE030894 ~ : Other than above models

Location of Cylinder Head Bolts



1. 10 mm Dia. Bolts

2. 11 mm Dia. Bolts

Instruction When Tightening Cylinder Head Bolts:

A new procedure is added and tightening torques are changed to obtain more accurate tension in the cylinder head bolts as explained below.

NOTE

○ See *Cylinder Head Installation Notes* for detail information not mentioned here.

○ Following procedures should also be applied to all the ZX900A engines on 1984 and 1985 models with an engine number smaller than those specified in the table above.

- Apply a molybdenum disulfide lubricant (grease or oil type, either will do) to both upper and lower sides of the cylinder head bolt washers.
- When the cylinder head, cylinder head bolt and its washer are all new parts, tighten the cylinder head-bolt to the torque specified below.

Tightening Torque

10 mm : 39 N-m (4.0 kg-m, 29 ft-lb)

11 mm : 51 N-m (5.2 kg-m, 38 ft-lb)

- When any one of the cylinder head, cylinder head bolt and its washer is reused, tighten the cylinder head bolt to the torque specified below.

Tightening Torque

10 mm : 36 N-m (3.7 kg-m, 27 ft-lb)

11 mm : 48 N-m (4.9 kg-m, 35 ft-lb)

Addition of Shim Adjustment:

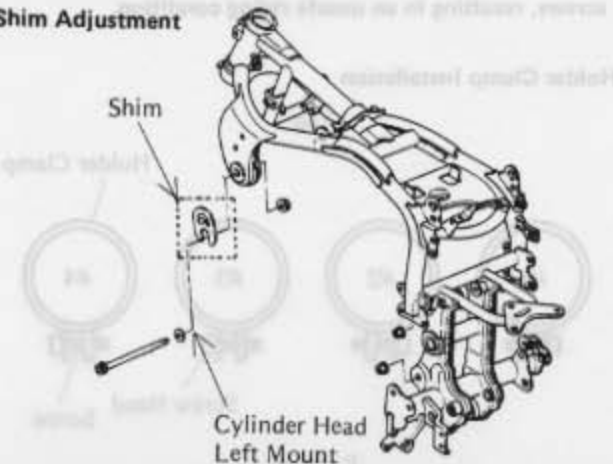
On the same models, the shim was installed between the left mount of the cylinder head and the frame bracket to reduce the stress. Refer to the following procedures when installing the cylinder head or mounting the engine.

NOTE

○ Two sizes of shims are available: 2.0 mm and 1.2 mm thickness.

- Insert the 2.0 mm thick shim into the gap between the left mount of the cylinder head and the frame bracket.
- ★ If the 2.0 mm thick shim can not be inserted in the gap, use the thinner one: 1.2 mm thick shim. Also, if the 1.2 mm thick shim can not be inserted in, the shim adjustment is not necessary for that model.

Shim Adjustment



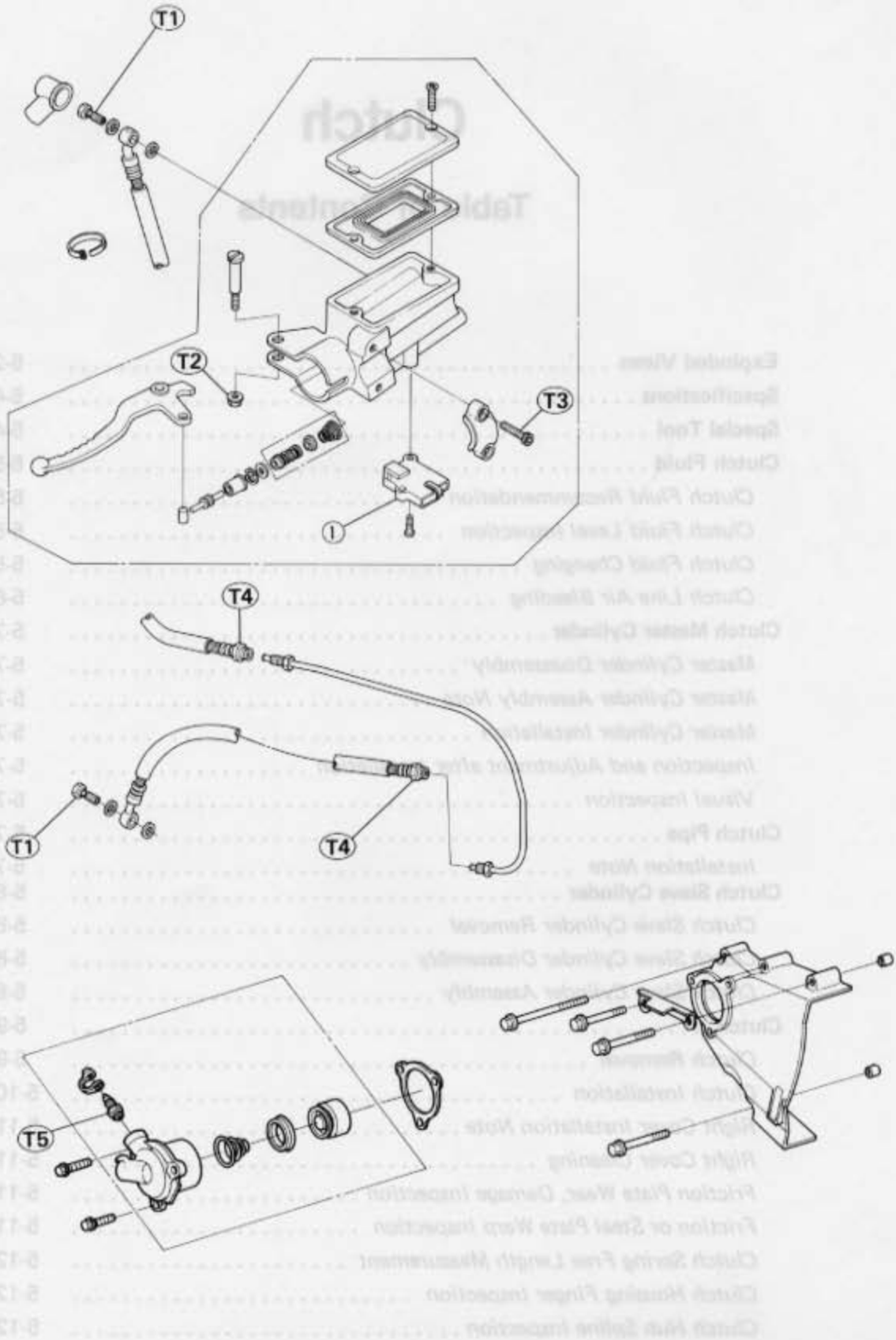
Clutch

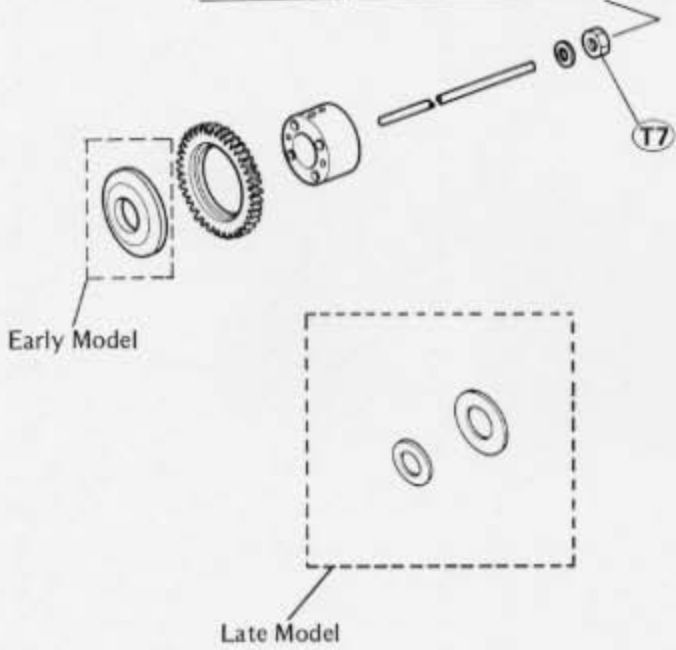
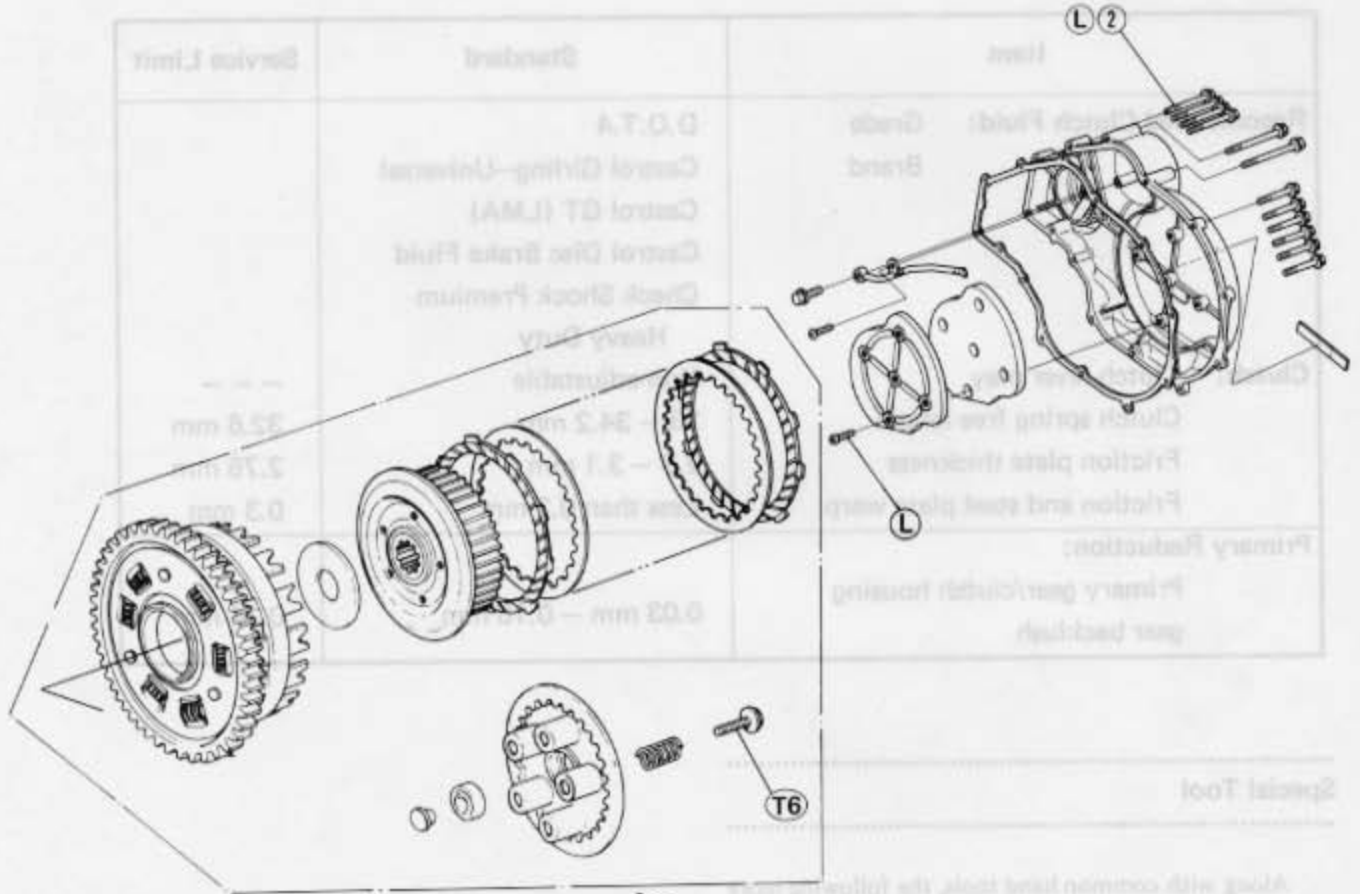
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5-2 CLUTCH

Exploded Views





Along with common hand tools, the following specialized tool is required for complete clutch servicing:

Model: 07001-008

1. Starter Lockout Switch
2. Cover Bolts: Four of them require a non-permanent locking agent (see Right Cover Installation Note).

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

- T1: 29 N-m (3.0 kg-m, 22 ft-lb)
- T2: 5.9 N-m (0.60 kg-m, 52 in-lb)
- T3: 11 N-m (1.1 kg-m, 95 in-lb)
- T4: 18 N-m (1.8 kg-m, 13.0 ft-lb)
- T5: 7.8 N-m (0.80 kg-m, 69 in-lb)
- T6: 9.8 N-m (1.0 kg-m, 87 in-lb)
- T7: 130 N-m (13.5 kg-m, 98 ft-lb)

5-4 CLUTCH

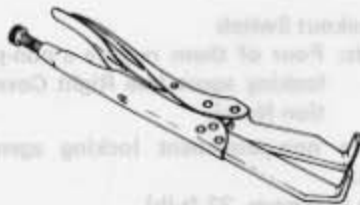
Specifications

Item	Standard	Service Limit
Recommended Clutch Fluid: Grade Brand	D.O.T.4 Castrol Girling—Universal Castrol GT (LMA) Castrol Disc Brake Fluid Check Shock Premium Heavy Duty	
Clutch: Clutch lever play Clutch spring free length Friction plate thickness Friction and steel plate warp	Non-adjustable 33 – 34.2 mm 2.9 – 3.1 mm Less than 0.2 mm	--- 32.6 mm 2.75 mm 0.3 mm
Primary Reduction: Primary gear/clutch housing gear backlash	0.03 mm – 0.10 mm	0.14 mm

Special Tool

Along with common hand tools, the following more specialized tool is required for complete clutch servicing.

Holder: 57001-305



1. The holder

Clutch Fluid

Clutch Fluid Recommendation

Recommended fluids are given in the table below. If none of the recommended fluids are available, use extra heavy-duty brake fluid only from a container marked D.O.T.4.

Recommended Clutch Fluid

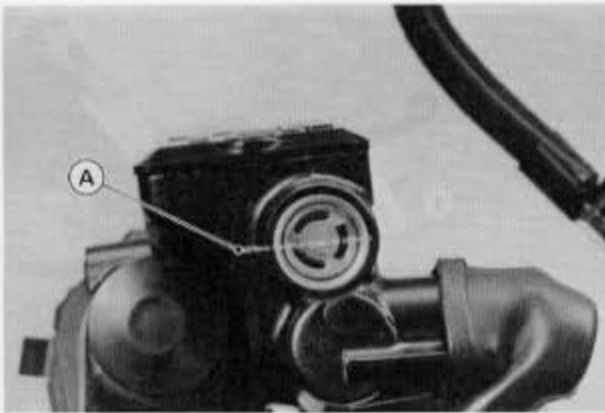
Grade:	D.O.T.4 Heavy Duty Brake Fluid
Brand:	Castrol Girling — Universal Castrol GT (LMA) Castrol Disc Brake Fluid Check Shock Premium Heavy Duty

NOTE

Since the clutch fluid is the same as the brake fluid, refer to Brake Fluid Section in Brakes for further details.

Clutch Fluid Level Inspection

Position the reservoir horizontal, and check that the fluid level in the reservoir is higher than the lower level.



A. Lower Level Line

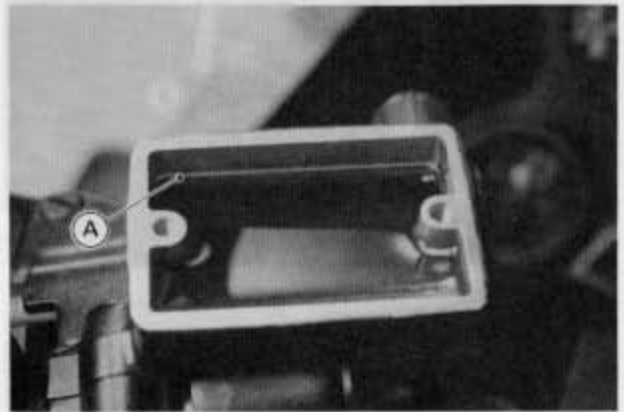
If the fluid level is lower than the lower level, check for the fluid leakage of the clutch line, and add the fluid as follows.

Remove the reservoir cap, and fill the reservoir to the upper level line in the reservoir with the same type and brand of the fluid that already is in the reservoir. And then install the reservoir cap.

WARNING

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

After changing the fluid, use only the same type and brand of fluid thereafter. Mixing different types and brands of fluid lowers the fluid boiling point and could cause the clutch to be ineffective. It may also cause the rubber clutch parts to deteriorate.



A. Upper Level Line

Operate the clutch, and check for fluid leakage around the fittings.

WARNING

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

Clutch Fluid Changing

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

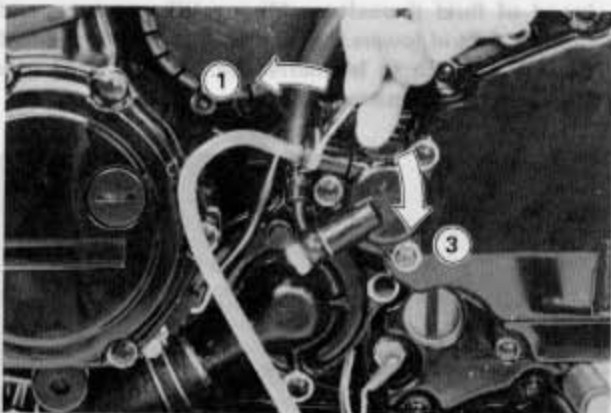
NOTE

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

Tighten the bleed valve to the specification (see Exploded Views).

5-6 CLUTCH

Filling up Clutch Line



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

Clutch Line Air Bleeding

- Remove the reservoir cap, and check that there is plenty of fluid in the reservoir.

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.

- Connect a clear plastic hose to the bleed valve at the clutch slave cylinder, running the other end of the hose into a container.
- With the reservoir cap off, slowly pump the clutch lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.
- Pump the clutch 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.

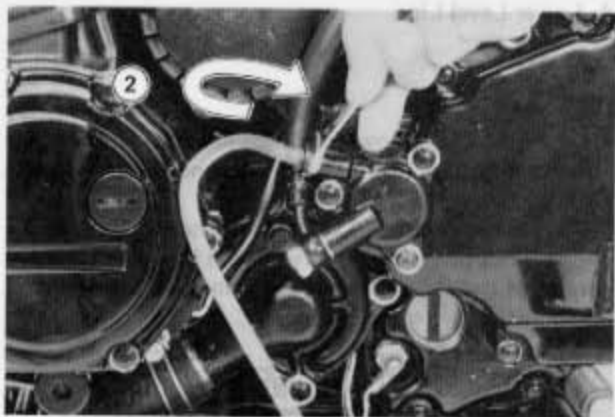
- When air bleeding is finished, check that the fluid is filled to the upper level line marked in the reservoir.



A. Upper Level Line

- Install the reservoir cap.
- Tighten the bleed valve to the specification.
- Apply the clutch lever forcefully for a few seconds, and check for fluid leakage around the fittings.

Bleeding Clutch Line



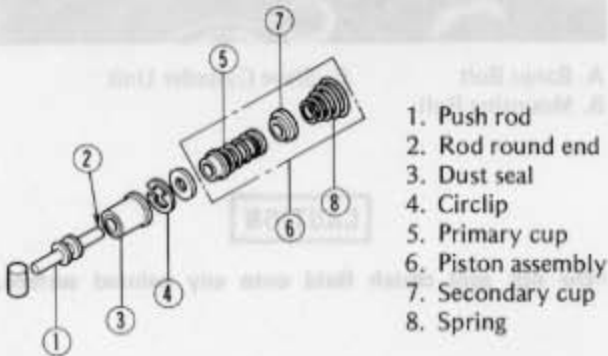
1. Hold the clutch lever applied.
2. Quickly open and close the valve.
3. Release the clutch lever.

Clutch Master Cylinder

Master Cylinder Disassembly

- Drain the clutch fluid.
- Remove the clutch lever and the master cylinder.
- Remove the push rod, the dust seal and the circlip.

Master Cylinder Inside Parts



1. Push rod
2. Rod round end
3. Dust seal
4. Circlip
5. Primary cup
6. Piston assembly
7. Secondary cup
8. Spring

CAUTION

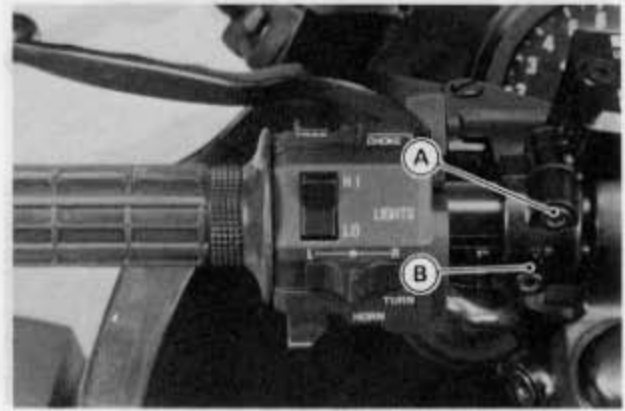
- Do not remove the primary cup and secondary cup from the piston or the cylinder since removal will damage them.

Master Cylinder Assembly Note

- 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.
- Install the push rod with the dust seal fitted into the groove.
- The push rod round end must be faced inwards.

Master Cylinder Installation

- The master cylinder clamp must be installed with the UP mark faced upwards.
- 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. Up mark

Inspection and Adjustment after Installation

- Bleed the clutch line after master cylinder installation (see Clutch Line Air Bleeding).
- Check that the clutch line has proper fluid pressure and no fluid leakage.

Visual Inspection

- Check that there are no scratches, rust or pitting on the inside of the master cylinder and on the outside of the piston.
- ★ If the master cylinder or piston shows any damage, replace the master cylinder and piston.
- Inspect the primary cup.
- ★ If a cup is worn, damaged, softened (rotted), or swollen, replace the piston assembly.
- ★ If fluid leakage is noted at the clutch lever, the piston assembly should be replaced to renew the cups.

NOTE

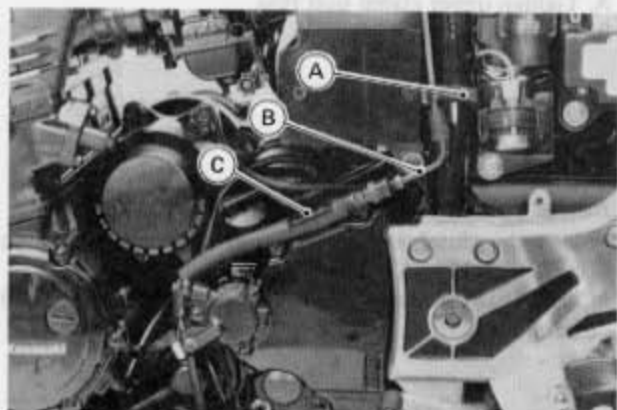
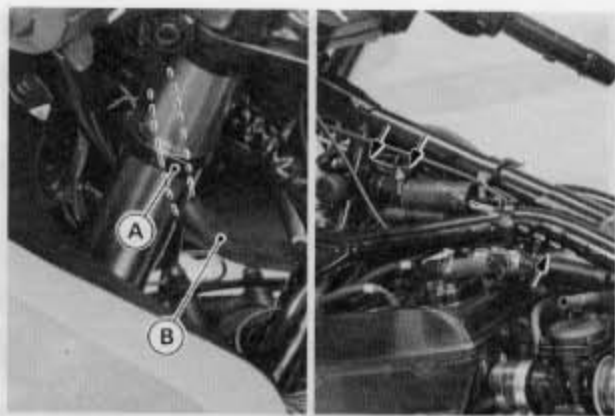
- The cups and spring are part of the piston assembly. Replace the piston assembly if any one of the cups or the spring requires replacement.

Clutch Pipe

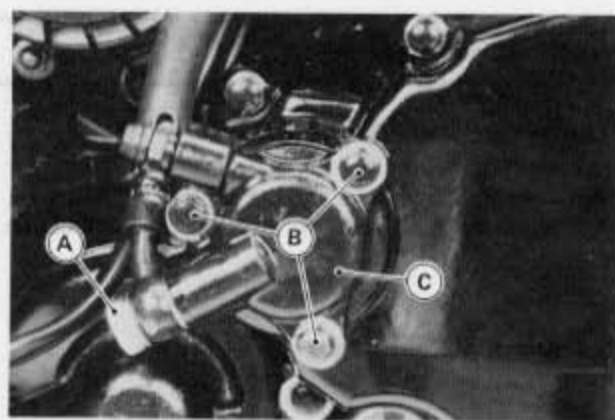
Installation Note

- Route and clamp the clutch pipe as shown.
- Tighten the banjo bolts and the pipe joint to the specification (see Exploded Views).

5-8 CLUTCH



A. Band
B. Clutch Pipe
C. Clamp



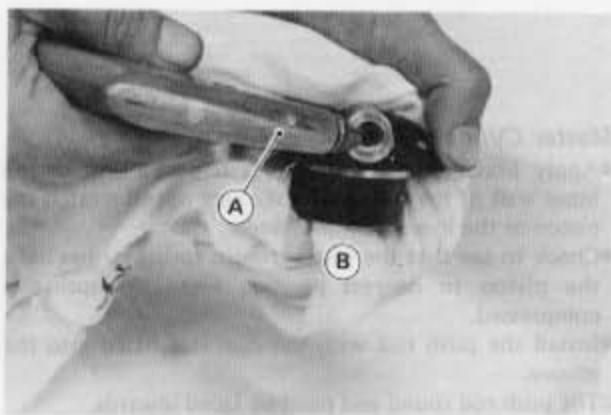
A. Banjo Bolt
B. Mounting Bolt
C. Slave Cylinder Unit

CAUTION

Do not spill clutch fluid onto any painted surface.

Clutch Slave Cylinder Disassembly

- Remove the banjo bolt.
- Using compressed air, remove the piston.
 - Cover the cylinder opening with a clean, heavy cloth.
 - Face the opening downwards.
 - Remove the piston by lightly applying compressed air to where the clutch line fits into the slave cylinder.



A. Apply compressed air.
B. Cloth

Clutch Slave Cylinder

Since the hydraulic clutch compensates automatically for friction plate wear and has no clutch cable, no periodic adjustment is needed.

Clutch Slave Cylinder Removal

- Remove the banjo bolt.
- Remove the mounting bolts.
- Remove the slave cylinder unit.

CAUTION

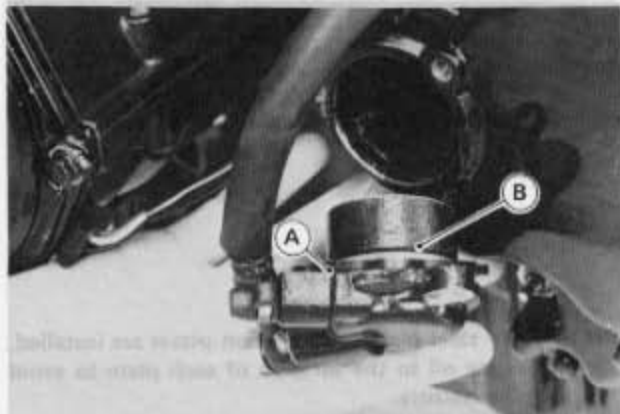
If the fluid seal is removed from the piston, replace the seal with a new one. Removal would damage the seal.

WARNING

○To avoid serious injury, never place your fingers or palm in front of the cylinder opening. If you apply high compressed air to the cylinder, the piston may injure your hand or fingers.

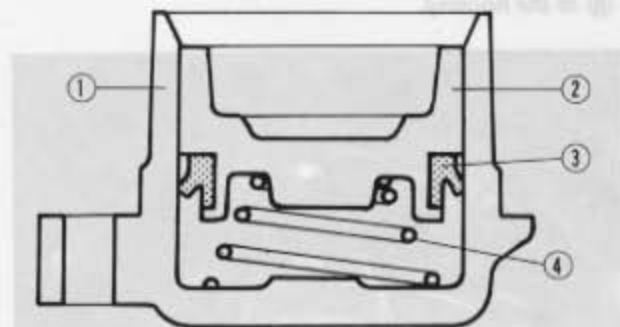
Clutch Slave Cylinder Assembly

- Install the fluid seal being careful of the installation direction.
- Check that the fluid seal is properly fitted into the piston groove.
- Apply clutch 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 get scratched.
- Replace the insulator with a new one whenever the clutch slave cylinder is removed.
- Install the new insulator and the slave cylinder assembly.
- Push the piston in by hand as far as it will go at installation.



A. Insulator B. Slave Cylinder Assembly

Clutch Slave Cylinder



1. Cylinder
2. Piston
3. Fluid Seal
4. Spring

- Use a new flat washer on each side of the hose fitting.
- Tighten the banjo bolt to the specification (see Exploded Views).
- Fill the clutch fluid into the clutch line and bleed the clutch line (see Clutch Fluid Changing and Clutch Line Air Bleeding).



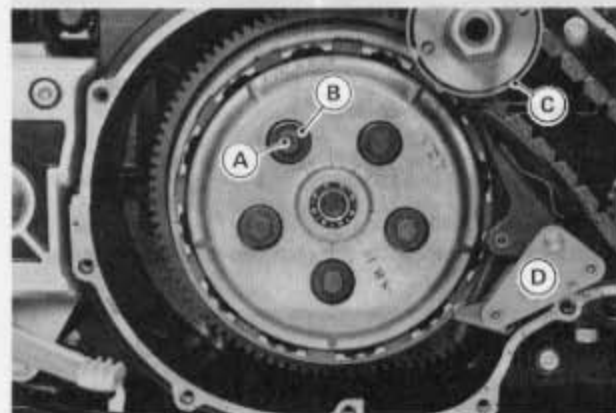
Clutch

Clutch Removal

NOTE

○It is not necessary to remove the alternator sprocket and the chain tensioner for clutch removal.

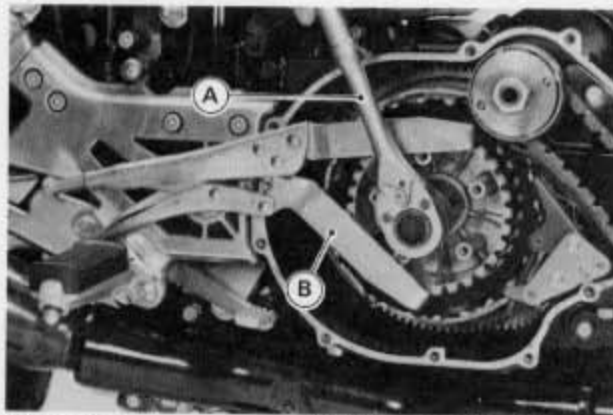
- Remove the right engine cover.
- Remove the clutch spring bolts, washers and springs.
- Remove the friction plates and steel plates.



A. Clutch Spring Bolt C. Alternator Sprocket
B. Washer D. Chain Tensioner

- When loosening the clutch hub self-locking nut, use the holder (special tool) to keep the clutch hub from turning as shown in the figure below.
- Turn the wrench counterclockwise slowly.

5-10 CLUTCH



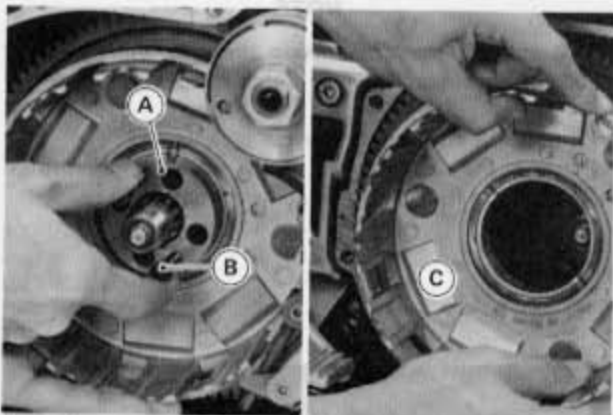
A. Wrench

B. Holder: 57001-305

● Pull out the clutch hub, thrust washer, clutch housing bearing collar, clutch housing, oil pump drive gear, and spacer.

○ The clutch housing bearing collar can easily be removed by installing right engine cover bolts into the collar holes and pulling them.

○ The clutch housing can be removed after removing the bearing collar.



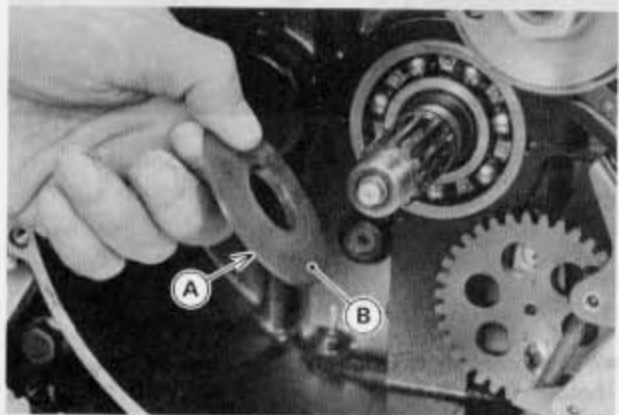
A. Collar

B. Right Engine Cover Bolt

C. Clutch Housing

Clutch Installation

● Install the spacer with the chamfer side facing inwards.



A. Spacer

B. Chamfer

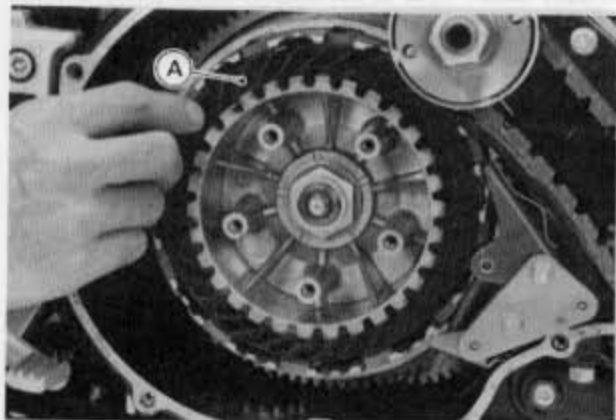
● For the late model, two plane spacers are adopted instead of one chamfered spacer. Install the smaller spacer first, then install the larger one.

● Discard the used clutch hub self-locking nut, and install a new nut.

● Install the clutch holder to keep the clutch hub from turning and tighten the clutch hub nut to the specification (See Exploded Views).

● Install the friction plates and steel plates, starting with a friction plate and alternating them.

○ The grooves on the friction plate surfaces are cut tangentially and radially, install the friction plates so that the grooves run toward the center in the direction of the clutch housing rotation (counterclockwise viewed from the engine right side).



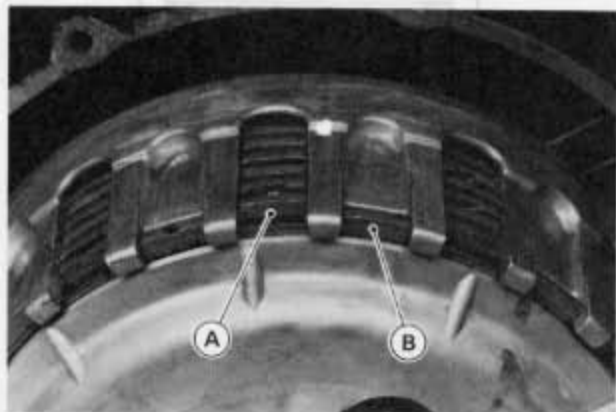
A. Grooves

CAUTION

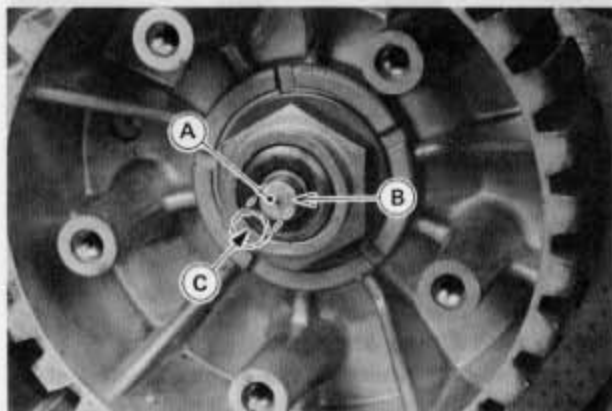
○ If new dry steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

NOTE

○ First, install the seven friction plates fitting the tangs of plates in the grooves (A) in the clutch housing. And then, install the last one fitting the tangs in the grooves (B) in the housing.



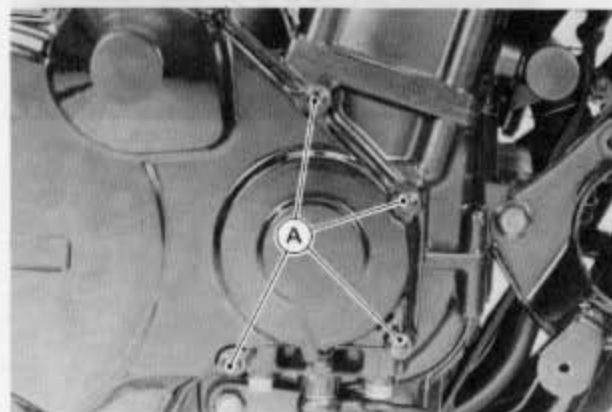
- Install the clutch push rod so that the flat end faces outward (towards the engine right side).
- Check that the clutch push rod is in the retracted position.
- If not, push the rod into the shaft by hand prior to the engine right cover installation.



A. Flat End of the Push Rod C. Push the Rod
B. Retracted Position

Right Cover Installation Note

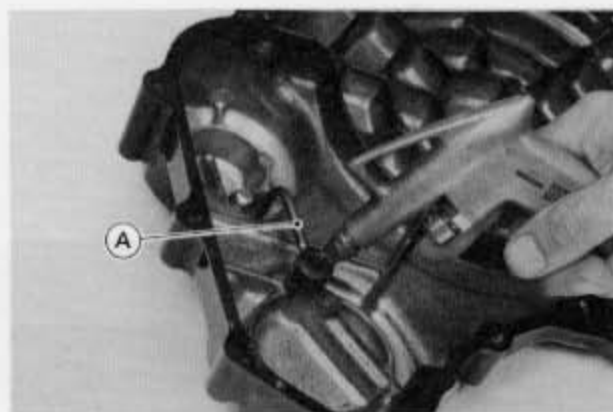
- Apply silicone sealant to the crankcase mating surface on the front and rear sides of the cover mount.
- Apply a non-permanent locking agent to the following bolts.



A. Bolt

Right Cover Cleaning

- Remove the banjo bolt and blow out any particles which may obstruct the oil pipe.

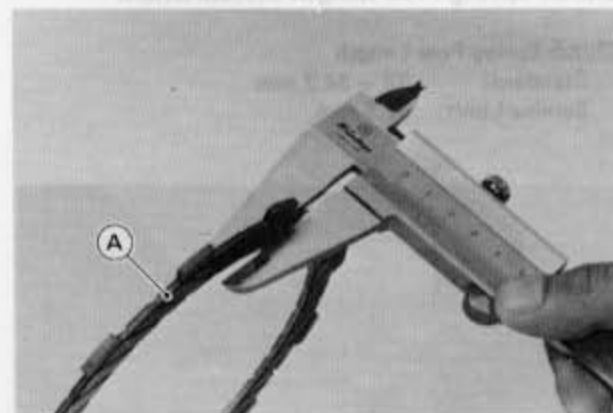


A. Oil Pipe

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 Plate Thickness

Standard: 2.9 – 3.1 mm
Service Limit: 2.75 mm

Friction or Steel Plate Warp Inspection

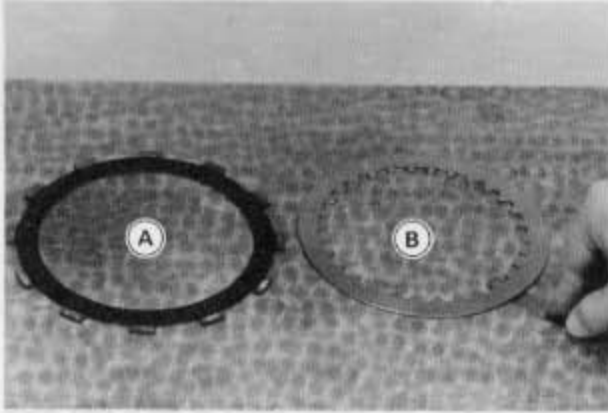
- Place each friction plate or steel plate on a surface plate, and measure the gap between the surface plate and each friction plate or steel plate. The gap is the amount of friction or steel plate warp.
- ★ If any plate is warped over the service limit, replace it with a new one.

5-12 CLUTCH

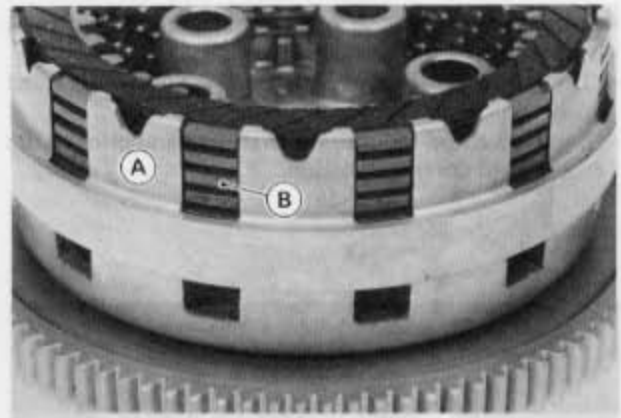
Friction and Steel Plate Warp

Standard: less than 0.2 mm
Service Limit: 0.3 mm

Friction and Steel Plate Warp Measurement



A. Friction Plate B. Steel Plate



A. Clutch Housing Finger B. Friction Plate Tang

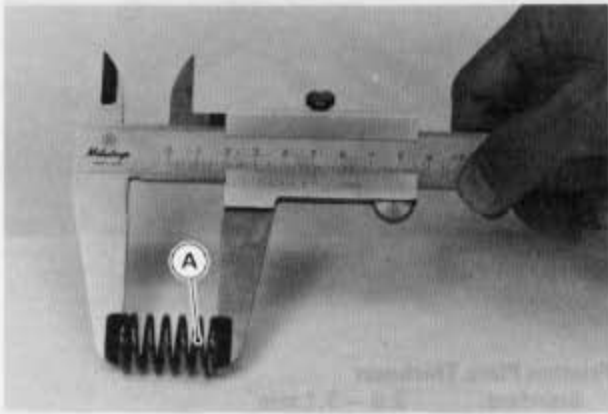
Clutch Hub Spline Inspection

- 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.

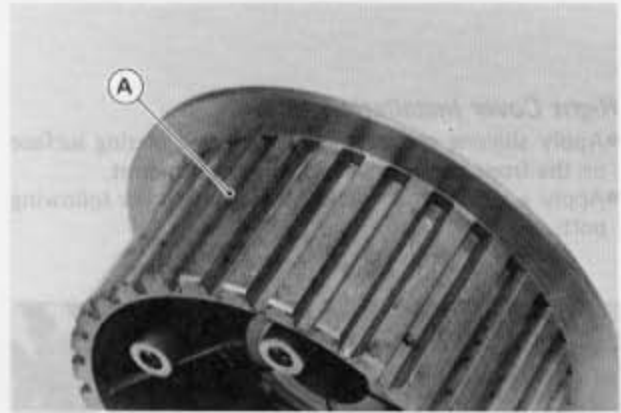
Clutch Spring Free Length Measurement

Clutch Spring Free Length

Standard: 33 – 34.2 mm
Service Limit: 32.6 mm



A. Clutch Spring



A. Clutch Hub Spline

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.

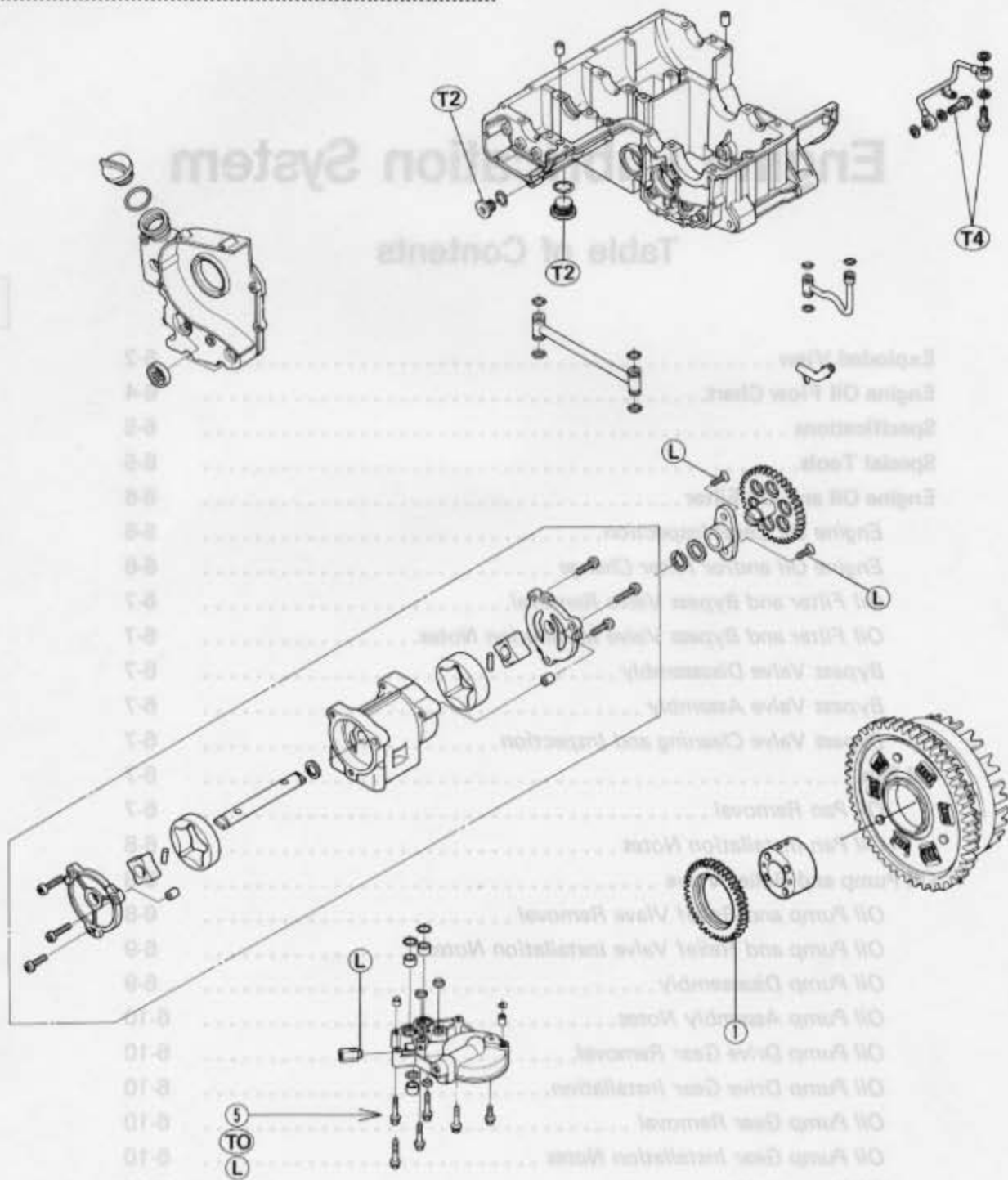
Engine Lubrication System

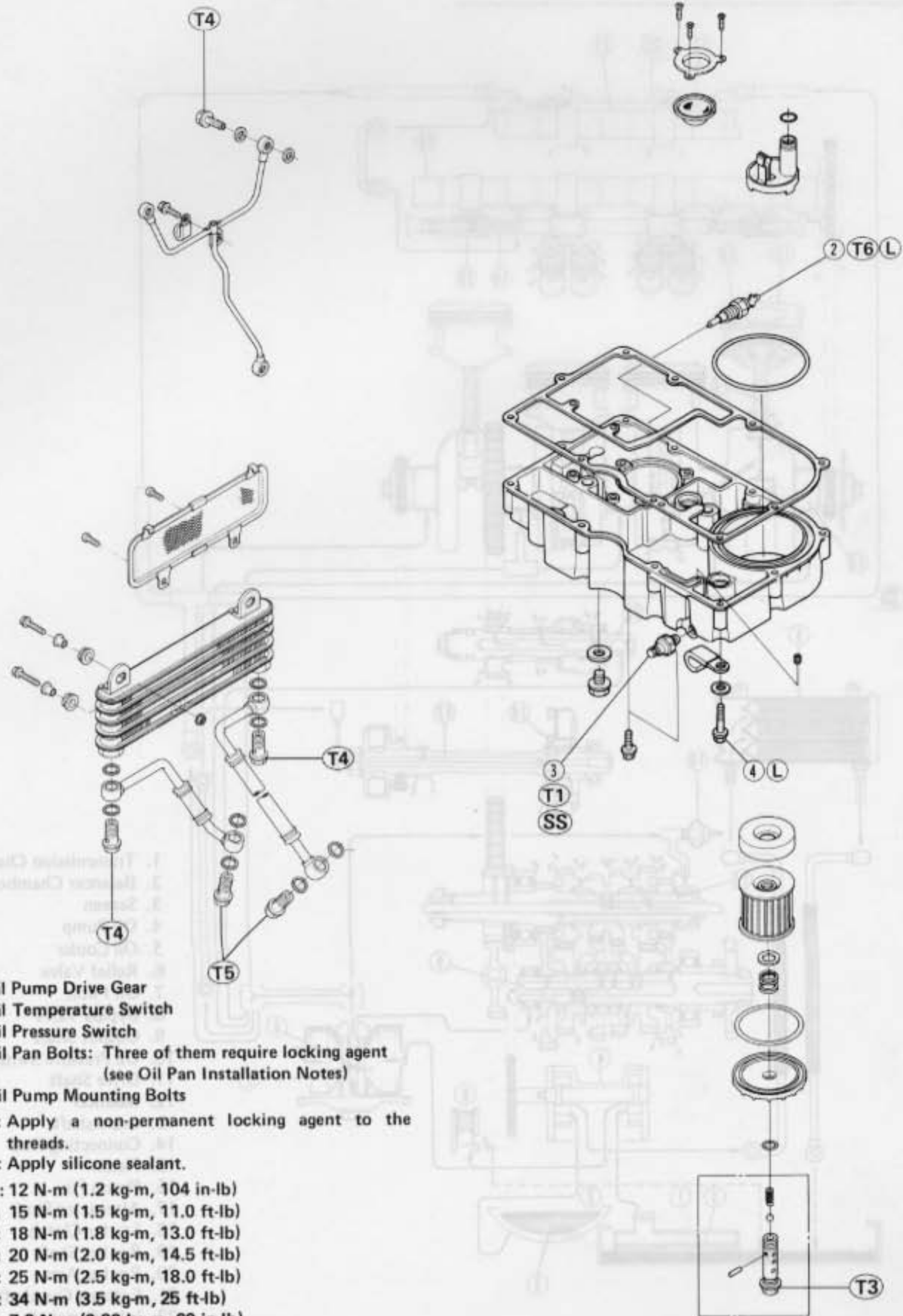
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Oil Pressure Switch (see Electrical System chapter)	

6-2 ENGINE LUBRICATION SYSTEM

Exploded View

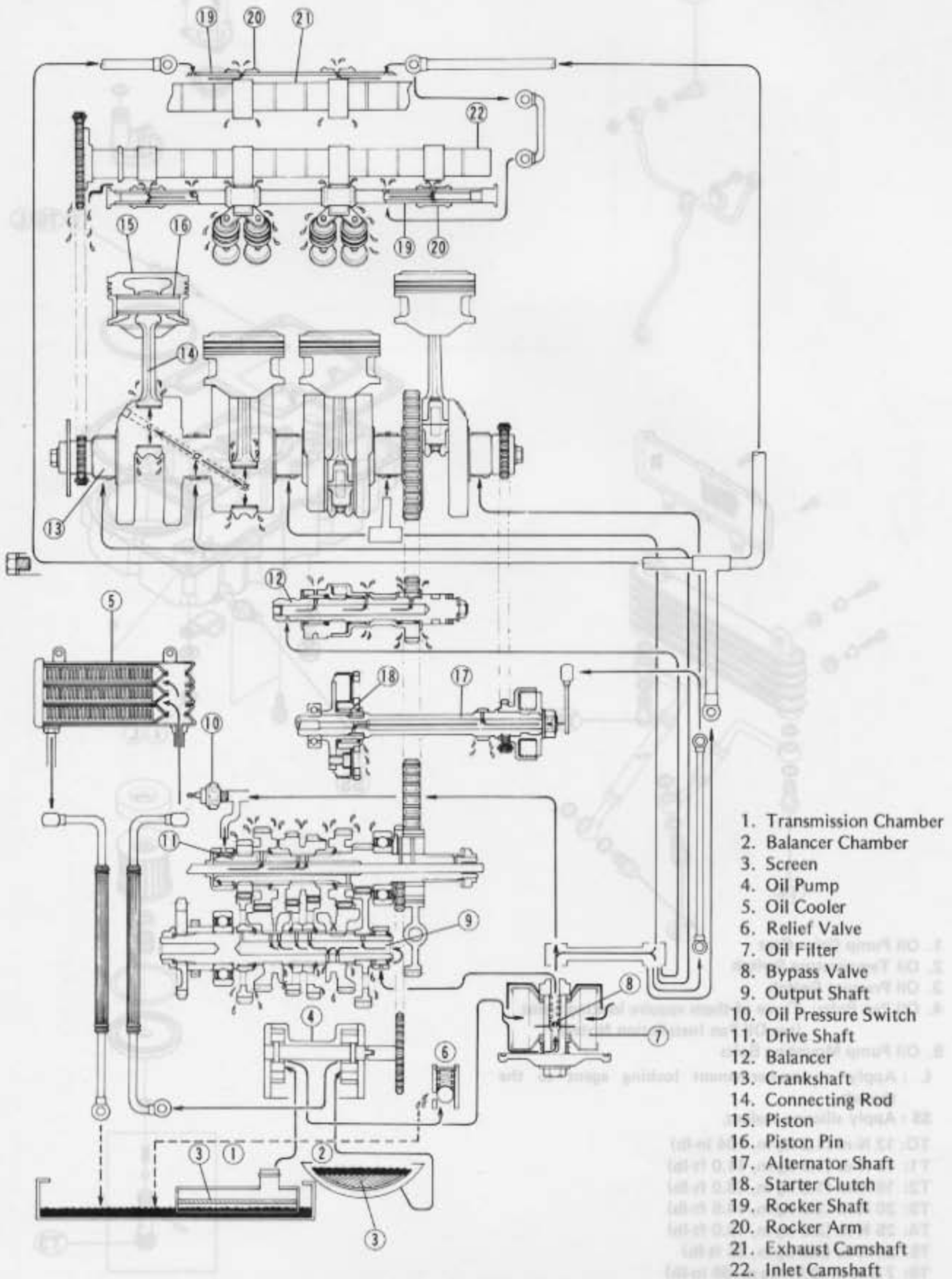




1. Oil Pump Drive Gear
 2. Oil Temperature Switch
 3. Oil Pressure Switch
 4. Oil Pan Bolts: Three of them require locking agent
(see Oil Pan Installation Notes)
 5. Oil Pump Mounting Bolts
- L : Apply a non-permanent locking agent to the threads.
 SS : Apply silicone sealant.
- TO: 12 N-m (1.2 kg-m, 104 in-lb)
 T1: 15 N-m (1.5 kg-m, 11.0 ft-lb)
 T2: 18 N-m (1.8 kg-m, 13.0 ft-lb)
 T3: 20 N-m (2.0 kg-m, 14.5 ft-lb)
 T4: 25 N-m (2.5 kg-m, 18.0 ft-lb)
 T5: 34 N-m (3.5 kg-m, 25 ft-lb)
 T6: 7.8 N-m (0.80 kg-m, 69 in-lb)

6-4 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



1. Transmission Chamber
2. Balancer Chamber
3. Screen
4. Oil Pump
5. Oil Cooler
6. Relief Valve
7. Oil Filter
8. Bypass Valve
9. Output Shaft
10. Oil Pressure Switch
11. Drive Shaft
12. Balancer
13. Crankshaft
14. Connecting Rod
15. Piston
16. Piston Pin
17. Alternator Shaft
18. Starter Clutch
19. Rocker Shaft
20. Rocker Arm
21. Exhaust Camshaft
22. Inlet Camshaft

Specifications

Item	Standard
Engine oil:	
Grade	SE or SF class
Viscosity	SAE 10W40, 10W50, 20W40, or 20W50
Required amount	2.7 L (when filter is not removed) 3.0 L (when filter is removed)
Level	Between upper and lower levels
Relief valve opening pressure	430 – 590 kPa (4.4 – 6.0 kg/cm ² , 63 – 85 psi)
Oil pressure @4,000 r/min (rpm), oil temp. 90°C (194°F)	265 – 325 kPa (2.7 – 3.3 kg/cm ² , 38 – 47 psi)

Special Tools

Along with common hand tools, the following more specialized tools are required for complete engine lubrication system servicing.

Oil Pressure Gauge: 57001-164



Oil Pressure Gauge Adapter: 57001-1188



NOTE
 If the engine oil level is low, the oil pressure will be low. Check the oil level before starting the engine. If the oil level is low, add oil to the correct amount. Do not overfill the oil pan. The oil level should be between the upper and lower levels. If the oil level is too low, the oil pressure will be low. If the oil level is too high, the oil pressure will be high. The oil pressure should be between 2.7 and 3.3 kg/cm² (38 and 47 psi) at 4,000 rpm and 90°C (194°F) oil temperature.



Engine Oil
 Grade: SE or SF class
 Viscosity: SAE 10W40, 10W50, 20W40, or 20W50
 Required Amount:
 When filter is not removed: 2.7 L
 When filter is removed: 3.0 L

A Upper Level
 B Lower Level
 C Oil Filter Covering Cap

6-6 ENGINE LUBRICATION SYSTEM

Engine Oil and Filter

WARNING

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

Engine Oil Level Inspection

- 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.

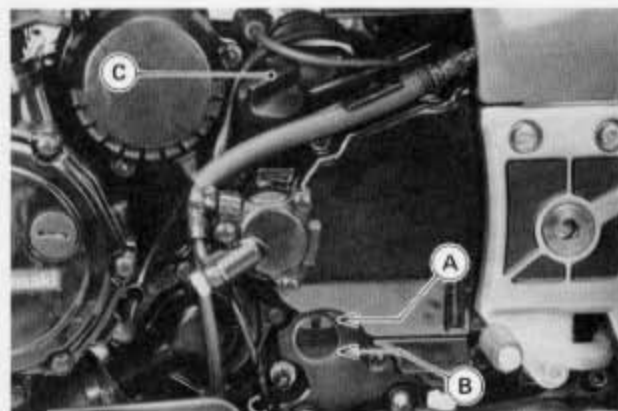
CAUTION

- 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 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 engine oil type and make are unknown, use any brand of the specified oil to top up the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.



A. Upper Level
B. Lower Level

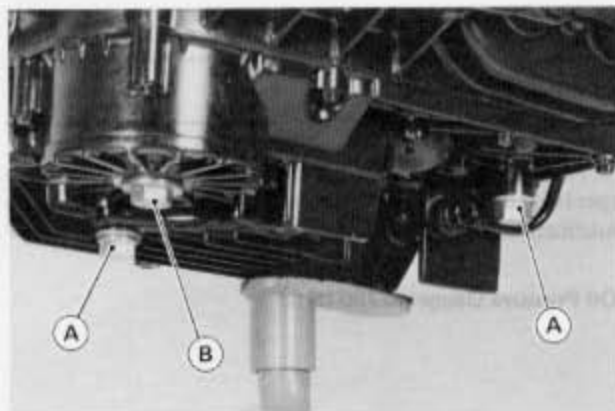
C. Oil Filler Opening Cap

CAUTION

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

Engine Oil and/or Filter Change

- Remove the under cowl.
- Warm up the engine so that the oil will pick up any sediment and drain easily. Then stop the engine.
- With the motorcycle up on its center stand, place an oil pan beneath the engine.
- Remove two engine drain plugs, and let the oil drain completely.



A. Drain Plug

B. Oil Filter Mounting Bolt

- If the oil filter is to be changed, replace it with a new one (see Oil Filter and Bypass Valve Removal and Installation Notes).
- Check the gaskets at the drain plugs for damage.
- Replace the gaskets with new ones if they are damaged.
- After the oil has completely drained out, install the drain plugs with the gaskets, and tighten them.
- Fill the engine with a good quality motor oil specified in the table.
- Check the oil level.

Engine Oil

Grade:	SE or SF class
Viscosity:	SAE 10W40, 10W50, 20W40, or 20W50

Required Amount

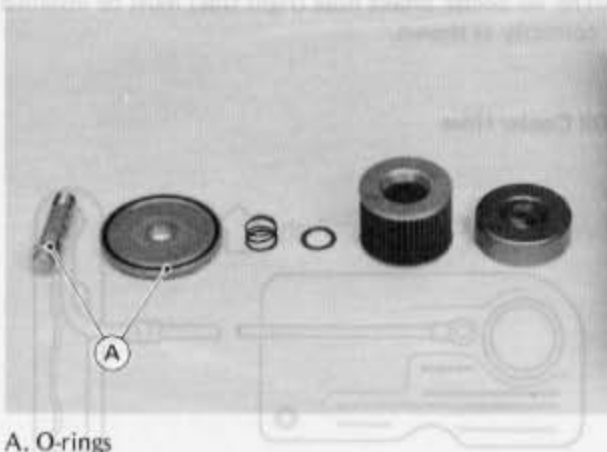
When filter is not removed:	2.7 L
When filter is removed:	3.0 L

Oil Filter and Bypass Valve Removal

- Remove the under cowling.
- With the motorcycle up on its center stand, place an oil pan beneath the engine.
- Unscrew the oil filter mounting bolt and drop out the filter.
- Remove the oil fence.
- Holding the filter steady, turn the mounting bolt to work the filter free.
- Remove the flat washer and spring, and pull the filter cover off the bolt.
- The oil filter bypass valve is assembled in the mounting bolt.

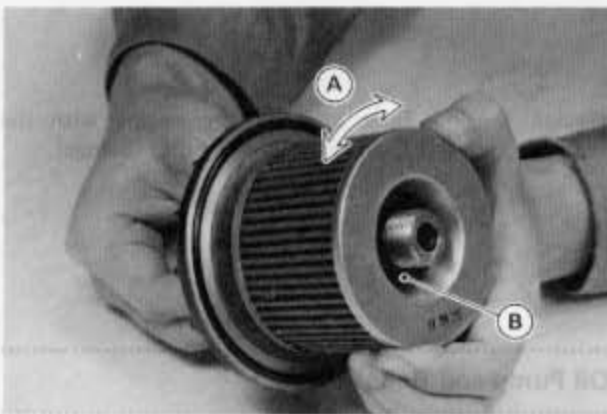
Oil Filter and Bypass Valve Installation Notes

- Check that the O-rings are in good condition.
- ★ If they are damaged, replace them with new ones.



A. O-rings

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



A. Turn the filter. B. Grommet

- Install the oil filter and tighten the mounting bolt to the specified torque (see Exploded View).
- Add engine oil. (see Oil Level Inspection).

Bypass Valve Disassembly

- Remove the oil filter. Oil draining is not necessary.
- Drive the retaining pin out of the filter mounting bolt.
- Drop out the spring and the bypass valve steel ball.

Bypass Valve Assembly

- Drop the bypass valve steel ball into the filter mounting bolt.
- Put the spring into the mounting bolt and compress it beyond the small hole.
- Drive the retaining pin into the small hole to hold the spring.
- Install the oil filter.

Bypass Valve Cleaning and Inspection

- Remove the oil filter.
- Disassemble the bypass valve.
- Clean the bypass valve parts in a high flash-point solvent.

WARNING

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

- Visually inspect the bypass valve parts.
- ★ If there is any damaged part, replace it.

Oil Pan

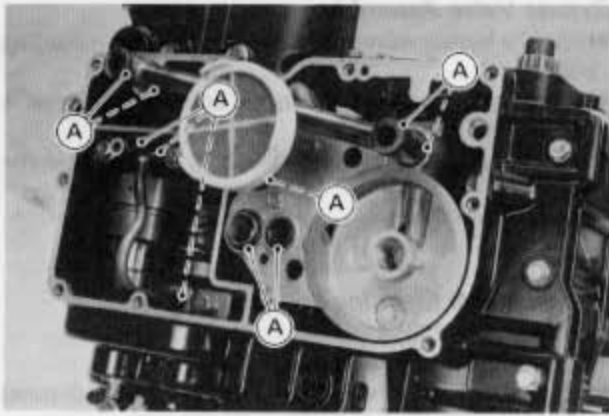
Oil Pan Removal

- Drain the engine oil (see Engine Oil and/or Filter Change).
- Remove the banjo bolts at the ends of both oil cooler hoses.
- Remove the mufflers and exhaust pipes.
- Remove the oil filter. (see Oil Filter and Bypass Valve Removal and Installation Notes).
- Remove the banjo bolts at both ends of the oil pipe connecting the oil pan and the crankcase lower half.
- Remove the banjo bolt at the lower end of the oil pipe connecting the oil pan and the cylinder head.
- Remove the oil pan bolts, and oil pipe and pull the oil pan off the crankcase.
- The oil pipes in the crankcase and one of the oil screens come off with the oil pan.

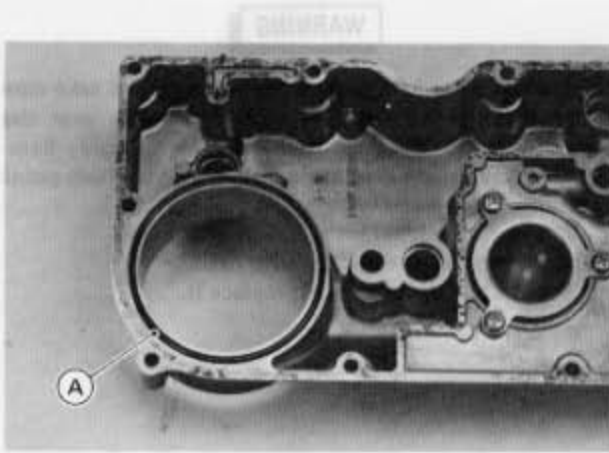
6-8 ENGINE LUBRICATION SYSTEM

Oil Pan Installation Notes

- Check that the O-rings are in good condition.
- The outlet side O-ring between the oil pan and the oil pump bracket must be installed so that flat side faces the bracket.

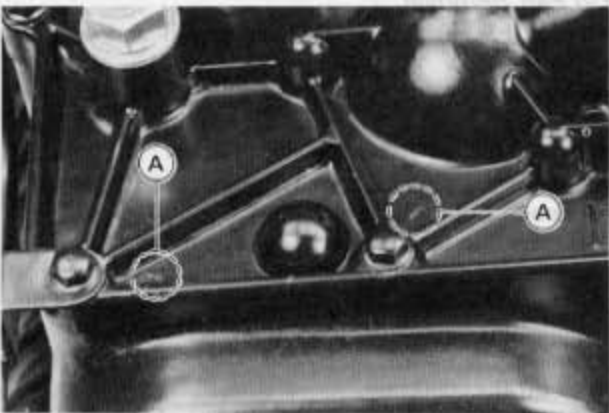


A. O-rings

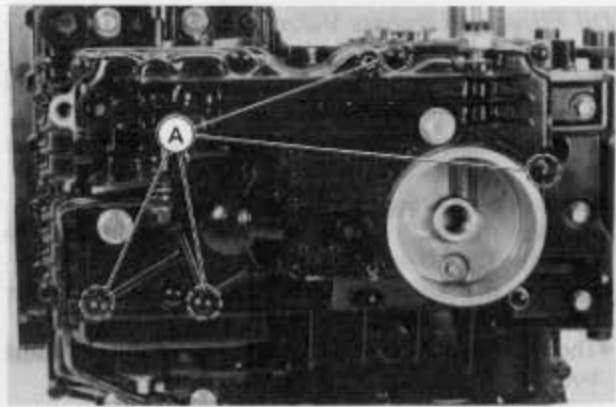


A. O-ring

- Apply a small amount of oil to the O-rings.
- Apply a non-permanent locking agent to the threads of the four oil pan bolts which are indicated by the triangular marks.



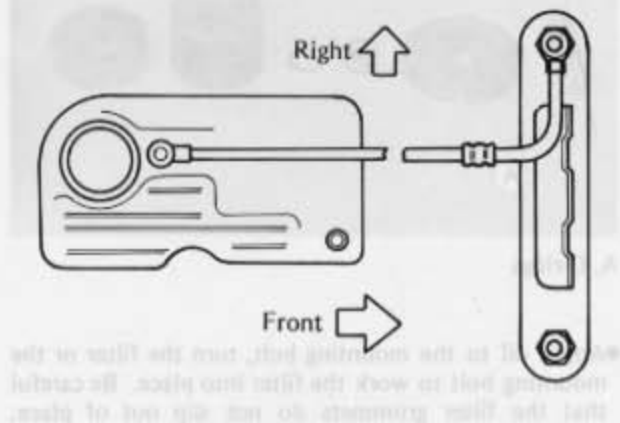
A. Triangular Mark



A. Bolts requiring locking agent.

- Tighten the oil pipe and hose banjo bolts to the specified torque (see Exploded View).
- The oil cooler intake hose (right side) must be installed correctly as shown.

Oil Cooler Hose



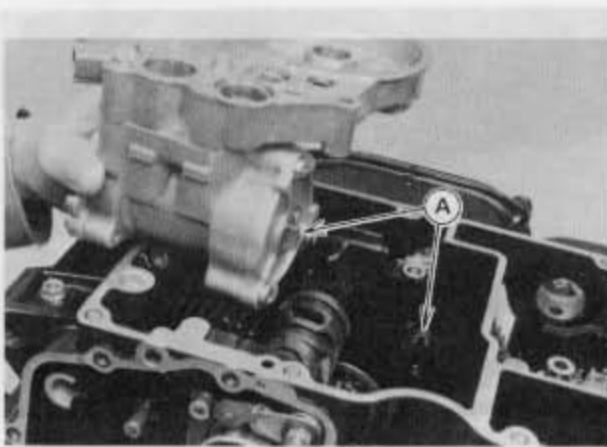
- Install the oil filter and fill the engine with the specified oil. (see Engine Oil and/or Filter Change).

Oil Pump and Relief Valve

Oil Pump and Relief Valve Removal

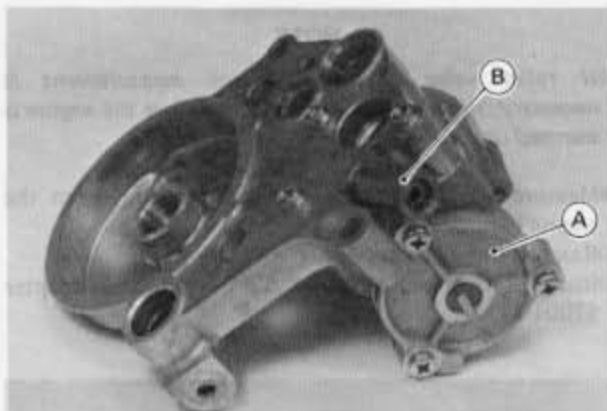
- Remove the oil pan.
- Pull out the oil screen, oil pipe, collar, and O-rings.
- Unscrew the oil pump bracket bolts, and pull out the bracket and pump as an assembly.

Remove the pickup coil cover, and turn the crankshaft until the catches of the pump shaft ends are vertical. This procedure allows the pump and bracket assembly to be removed easily, if the pump drive gear and/or water pump are installed.



A. Catches

Remove the oil pump mounting bolts, and separate the pump from the bracket.



A. Oil Pump B. Relief Valve

Unscrew the relief valve.

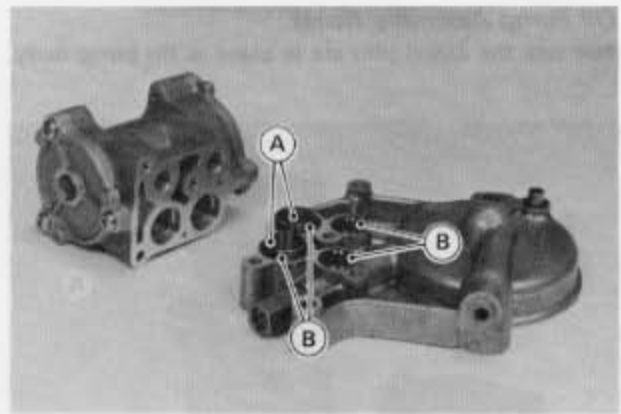
Oil Pump and Relief Valve Installation Notes

Apply a non-permanent locking agent to the threads of the relief valve, and torque it to the specified (see Exploded View).

CAUTION

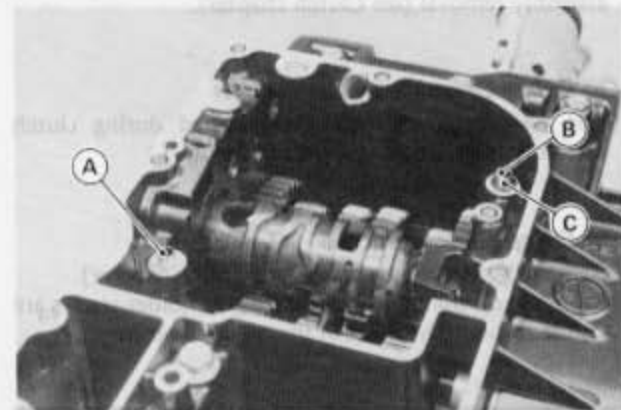
Do not over-apply a non-permanent locking agent to the threads. This may block the oil passage.

Fill the pump with engine oil before installation.
Check that the collars and O-rings are between the oil pump and the bracket. The outlet side O-rings must be installed so that the flat side faces the bracket.



A. Collars B. O-rings

Apply a non-permanent locking agent to the threads of the oil pump mounting bolts.
Tighten the oil pump mounting bolts to the specified torque (see Exploded View).
Check that the knock pin, nozzle, and O-ring are between the crankcase lower half and the oil pump bracket. The small hole of the nozzle must face the bracket.



A. Knock Pin B. Nozzle C. O-ring

If the oil pump drive gear and/or water pump are installed, check that the oil pump shaft catches of both components are vertical.
Install the pickup coil cover if it was removed (see Pickup Coil Removal/Installation Notes).

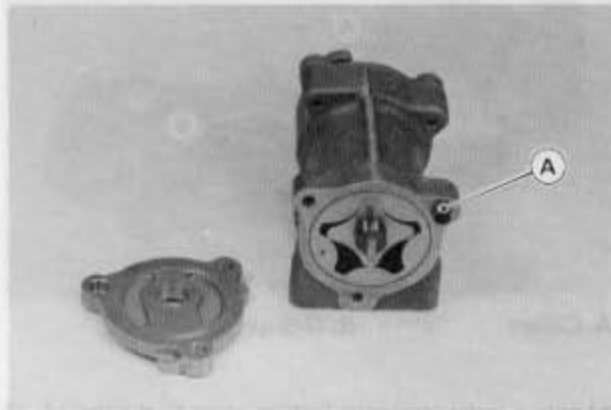
Oil Pump Disassembly

Remove the oil pump.
Take out the oil pump cover screws.
Take out the oil pump cover.
Drop the rotors out of the oil pump body.
Pull the pin out of the pump shaft.
Remove the rotors from the other side of the pump in the same manner.
Pull the oil pump shaft out of the body.

6-10 ENGINE LUBRICATION SYSTEM

Oil Pump Assembly Notes

- Be sure the dowel pins are in place in the pump body.



A. Dowel Pin

- Before installing the oil pump, be sure the shaft and rotors turn freely.

Oil Pump Drive Gear Removal

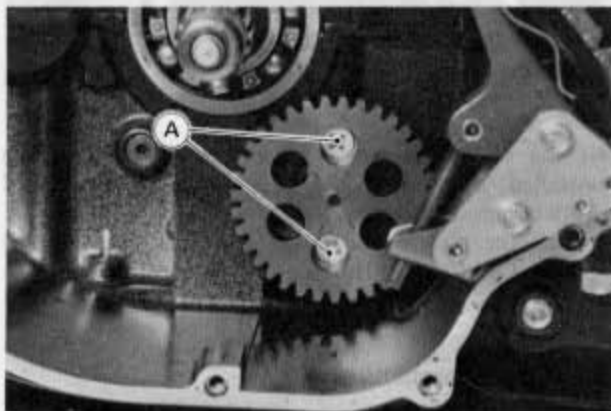
- The oil pump drive gear is removed during clutch assembly removal (see Clutch chapter).

Oil Pump Drive Gear Installation

- The oil pump drive gear is installed during clutch assembly installation (see Clutch chapter).

Oil Pump Gear Removal

- Remove the clutch assembly (see Clutch chapter).
- Turn the oil pump gear until the gear holder screws are visible through the holes in the oil pump gear.

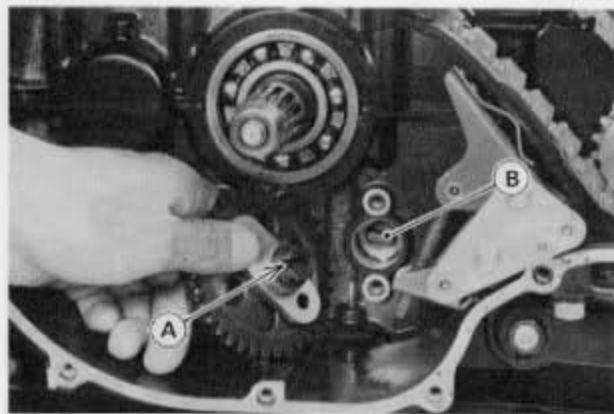


A. Screws

- Take out the screws and remove the oil pump gear with the holder.
- Remove the circlip and separate the gear from the holder.

Oil Pump Gear Installation Notes

- When installing the oil pump gear, note the position of the oil pump shaft projection and turn the gear so that the projection fits into the slot of the shaft.



A. Slot

B. Projection

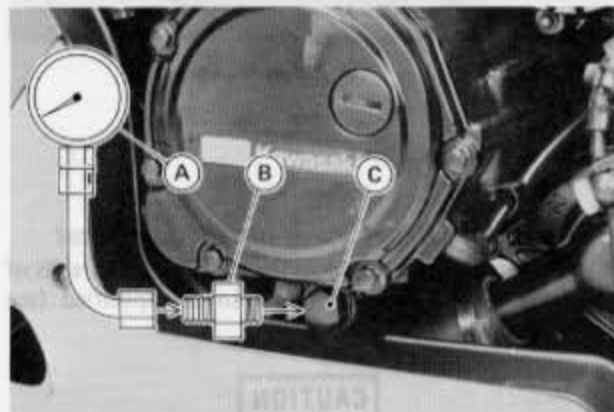
- Apply a non-permanent locking agent to the threads of the holder screws.

Oil Pressure Measurement

NOTE

If relief valve opening pressure measurement is necessary, measure the oil pressure before the engine is warmed up.

- Measure the relief valve opening pressure when the engine is cold.
- Remove the oil passage plug.
- Install oil pressure gauge 57001-164 and adapter 57001-1188.



A. Oil Pressure Gauge: 57001-164

B. Adapter: 57001-1188

C. Plug

- Start the engine, and read the oil pressure gauge while running the engine at various speeds. A normal relief valve keeps the maximum oil pressure between the specified values.

Relief Valve Opening Pressure

430 – 590 kPa
(4.4 – 6.0 kg/cm², 63 – 85 psi)

- Stop the engine.
- Remove the oil pressure gauge and adapter.
- Install the oil passage plug.
- ★ If the reading exceeds the standard by very much, the relief valve is stuck in its closed position.
- ★ If the reading is much lower than the standard, the relief valve may be stuck open, or there may be other damage in the lubrication system. Stop the engine immediately and find the cause.
- Measure the oil pressure at normal operating temperature.
- Warm up the engine, and then stop the engine.
- Install the oil pressure gauge and adapter as shown above.

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.

- Start the engine again.
- Run the engine at the specified speed, and read the oil pressure gauge.
- ★ If the oil pressure is significantly below the specification, inspect the oil pump and relief valve.

Oil Pressure

265 – 325 kPa (2.7 – 3.3 kg/cm², 38 – 47 psi)
@4,000 r/min (rpm), 90°C (194°F) of oil temp.

★ If the oil pump and relief valve are not at fault, inspect the rest of the lubrication system.

Oil Pump Inspection

- Disassemble the oil pump.
- Visually inspect the oil pump body, outer and inner rotors, and covers.
- ★ If there is any damage or uneven wear, replace the rotors or the oil pump assembly.

Relief Valve Inspection

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

NOTE

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

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

WARNING

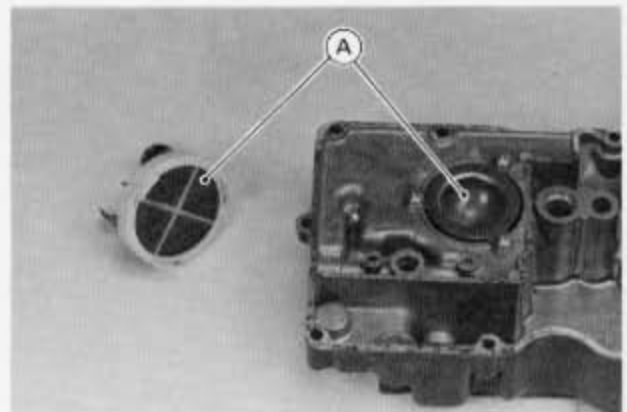
○ Clean the parts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents.

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

Oil Screens

Oil Screen Removal

- Remove the oil pan.
- Pull the oil screen which is located on the oil pump bracket, and take it off the bracket.



A. Oil Screens

- Unscrew the screws and take off the oil screen which is located on the oil pan.

Oil Screen Installation Note

- Clean the oil screens thoroughly whenever they are removed for any reason.

6-12 ENGINE LUBRICATION SYSTEM

Oil Screen Cleaning and Inspection

- Clean the oil screen with high flash-point solvent and remove any particles stuck to it.

WARNING

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

NOTE

- While cleaning the screen, check for any metal particles that might indicate internal engine damage.
- Check the screen carefully for any damage: holes and broken wires.
- ★ If the screen is damaged, replace it.



A. Oil Screen

Remove the screen and take it to the work area to be cleaned in the oil pan.

Oil Screen Installation Work
Clean the oil screen thoroughly whenever the oil is changed.

Relief Valve Opening Pressure
0.25 - 0.35
0.25 - 0.35

Remove the oil pressure gauge and install the oil pressure gauge in the engine. The reading should be normal by the time the engine is started. If the reading is not normal, the engine should be checked for any damage. If the reading is normal, the engine should be checked for any damage. If the reading is normal, the engine should be checked for any damage. If the reading is normal, the engine should be checked for any damage.

WARNING

If the oil pressure gauge is removed while the engine is running, the engine will stop. Do not start the engine until the oil pressure gauge is installed and the engine is running.

Oil Pressure
0.25 - 0.35
0.25 - 0.35

Oil the oil pump and relief valve and install the oil pump in the oil pan.

Oil Pump Inspection
Visually inspect the oil pump body, cover, and relief valve for any damage or wear. If any damage or wear is found, replace the oil pump assembly.

Relief Valve Inspection
Remove the relief valve. Check to see if the relief valve is blocked. If it is blocked, clean it with a wooden or other non-metallic object. If it is not blocked, it should be replaced.

NOTE

Check the oil level in the oil pan after the engine is started. If the oil level is low, add oil to the correct level.

Exploded View

Engine Removal/Installation

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A Mounting Bolts



A Mounting Bolts

Engine Removal

• Drain the engine oil (see Engine Oil Change in the Engine Lubrication System chapter).

• Drain the coolant (see Coolant Change in the Cooling System chapter).

• Remove the following:

- Fuel Tank
- Timing
- Radiator and Oil Cooler
- Engine Sensors
- Water Pump and Hose
- Off-High and Exhaust Pipes (with Hoses and Brackets)
- Ignition Coils
- Vacuum Switch Valve (US model) and Hoses
- Carburetor
- Air Cleaner Housing

• Disconnect wires from the engine components and run them from the chassis if there are:

- Starter Motor Lead
- Neutral Switch Wire
- Oil Pressure Switch Wire
- Oil Temperature Switch Wire
- Battery Ground Lead

• Remove the engine mounting bolts. Support the engine before sliding out the engine mounting bolts.

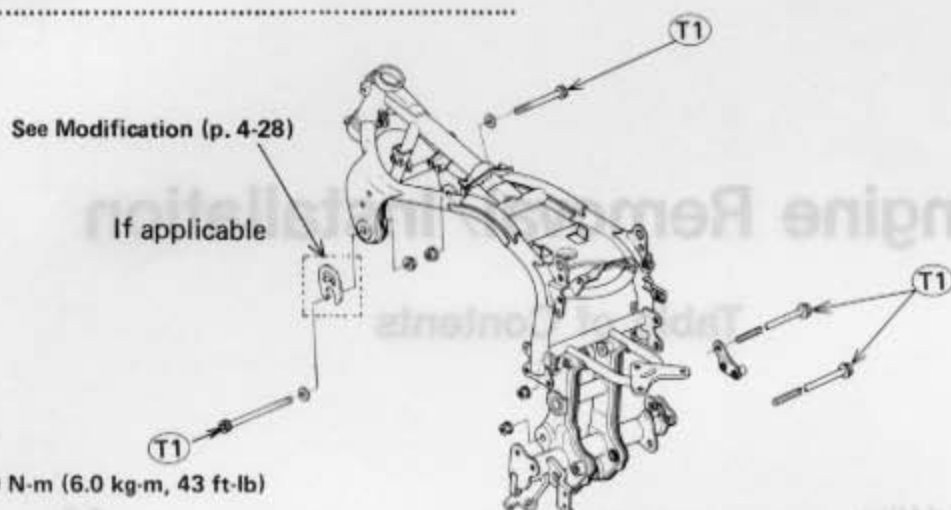
Engine Installation

• Engine installation is the reverse of removal. Note the following:

- Tighten the engine mounting bolts to the specified torque (see Exploded View).
- Fill the engine with engine oil (see Engine Oil Change in the Engine Lubrication System chapter).

7-2 ENGINE REMOVAL/INSTALLATION

Exploded View



Engine Removal/Installation

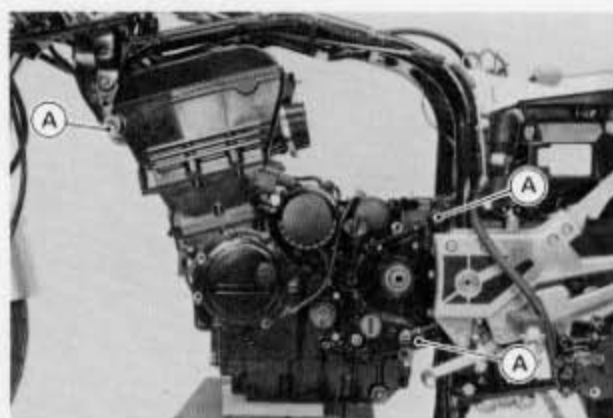
Engine Removal

- Drain the engine oil (see Engine Oil Change in the Engine Lubrication System chapter).
- Drain the coolant (see Coolant Change in the Cooling System chapter).
- Remove the following:
 - Seat
 - Fuel Tank
 - Fairing
 - Radiator and Oil Cooler
 - Engine Sprocket
 - Water Pump and Hoses
 - Mufflers and Exhaust Pipes (with Horns and Bracket)
 - Ignition Coils
 - Vacuum Switch Valve (US model) and Hoses
 - Carburetors
 - Air Cleaner Housing
- Disconnect wirings from the engine components, and free them from the clamps if there are.
- Starter Motor Lead
- Neutral Switch Wire
- Oil Pressure Switch Wire
- Oil Temperature Switch Wire
- Battery Ground Lead
- Remove the engine mounting bolts. Support the engine before sliding out the engine mounting bolts.

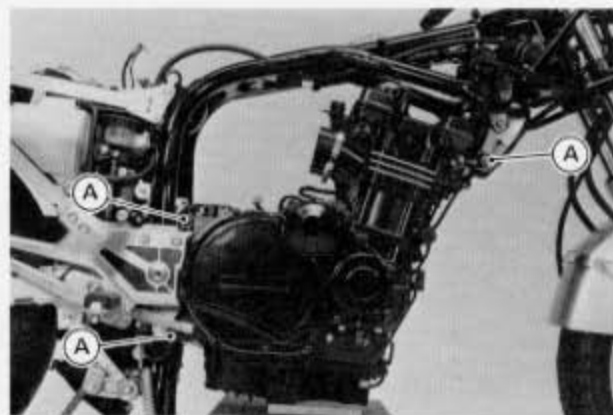
Engine Installation

- Engine installation is the reverse of removal. Note the following.
- Tighten the engine mounting bolts to the specified torque (see Exploded View).
- Fill the engine with engine oil (see Engine Oil Change in the Engine Lubrication System chapter).

- Fill the engine with coolant (see Coolant Change in the Cooling System chapter).
- Adjust the following.
 - Throttle Cable
 - Choke Cable
 - Drive Chain



A. Mounting Bolts



A. Mounting Bolts

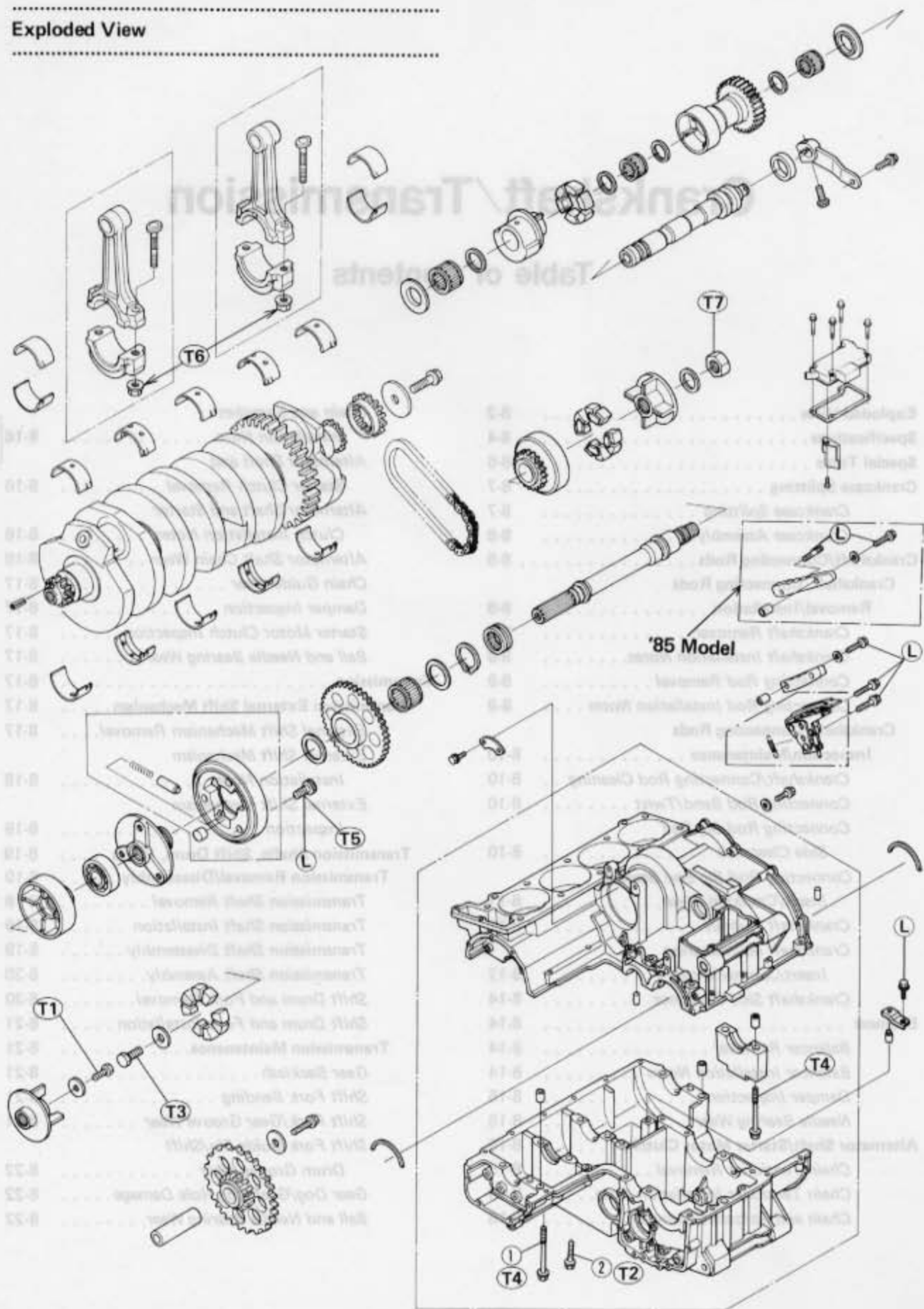
Crankshaft/Transmission

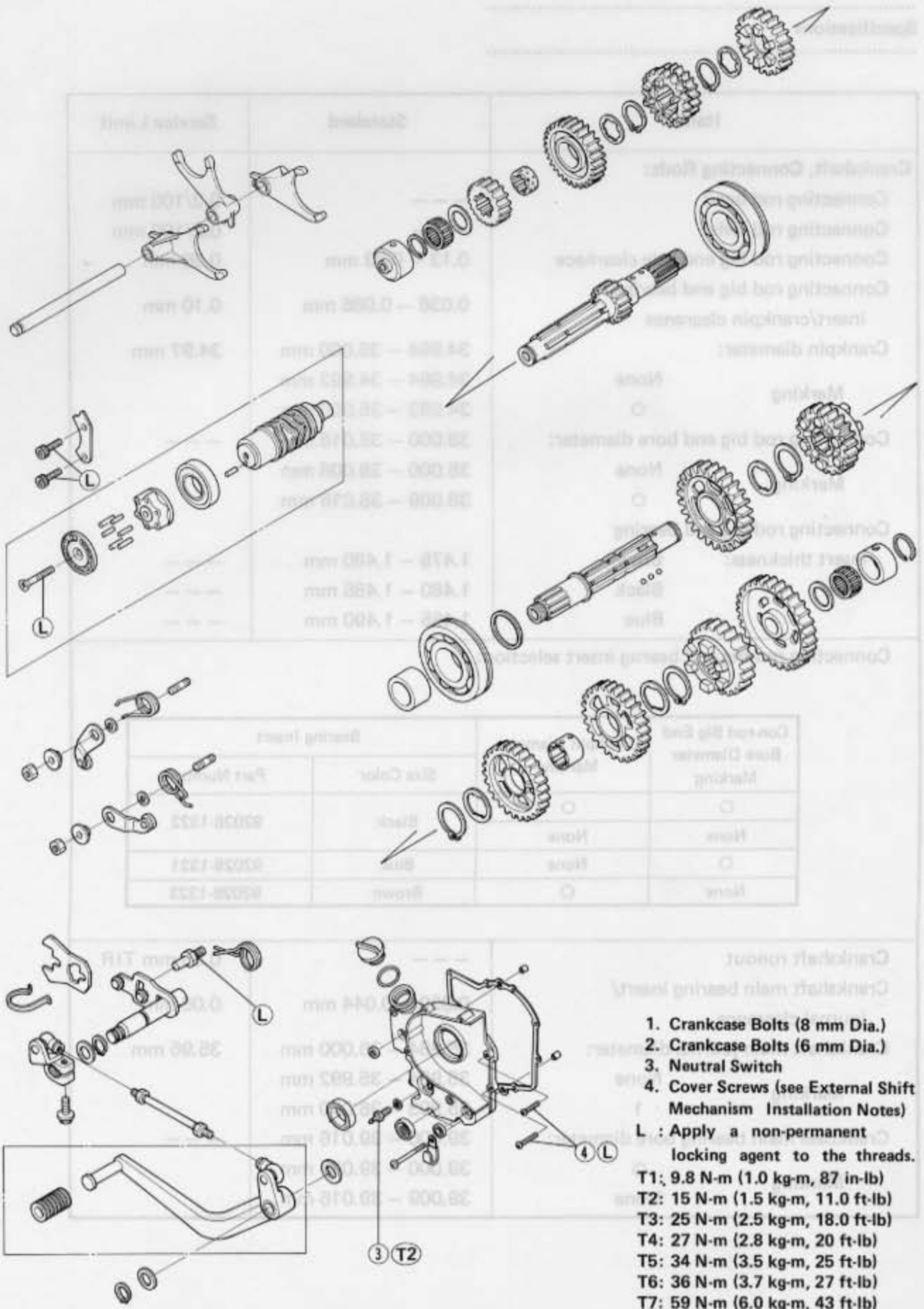
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8-2 CRANKSHAFT/TRANSMISSION

Exploded View





- 1. Crankcase Bolts (8 mm Dia.)
- 2. Crankcase Bolts (6 mm Dia.)
- 3. Neutral Switch
- 4. Cover Screws (see External Shift Mechanism Installation Notes)
- L : Apply a non-permanent locking agent to the threads.
- T1: 9.8 N-m (1.0 kg-m, 87 in-lb)
- T2: 15 N-m (1.5 kg-m, 11.0 ft-lb)
- T3: 25 N-m (2.5 kg-m, 18.0 ft-lb)
- T4: 27 N-m (2.8 kg-m, 20 ft-lb)
- T5: 34 N-m (3.5 kg-m, 25 ft-lb)
- T6: 36 N-m (3.7 kg-m, 27 ft-lb)
- T7: 59 N-m (6.0 kg-m, 43 ft-lb)

8-4 CRANKSHAFT/TRANSMISSION

Specifications

Item	Standard	Service Limit																					
Crankshaft, Connecting Rods:																							
Connecting rod bend	---	0.2/100 mm																					
Connecting rod twist	---	0.2/100 mm																					
Connecting rod big end side clearance	0.13 – 0.33 mm	0.50 mm																					
Connecting rod big end bearing insert/crankpin clearance	0.036 – 0.066 mm	0.10 mm																					
Crankpin diameter:	34.984 – 35.000 mm	34.97 mm																					
Marking	None																						
	○																						
	34.984 – 34.992 mm																						
	34.993 – 35.000 mm																						
Connecting rod big end bore diameter:	38.000 – 38.016 mm	---																					
Marking	None																						
	○																						
	38.000 – 38.008 mm																						
	38.009 – 38.016 mm																						
Connecting rod big end bearing insert thickness:																							
	Brown	1.475 – 1.480 mm																					
	Black	1.480 – 1.485 mm																					
	Blue	1.485 – 1.490 mm																					
Connecting rod big end bearing insert selection:																							
<table border="1"> <thead> <tr> <th rowspan="2">Con-rod Big End Bore Diameter Marking</th> <th rowspan="2">Crankpin Diameter Marking</th> <th colspan="2">Bearing Insert</th> </tr> <tr> <th>Size Color</th> <th>Part Number</th> </tr> </thead> <tbody> <tr> <td>○</td> <td>○</td> <td rowspan="2">Black</td> <td rowspan="2">92028-1322</td> </tr> <tr> <td>None</td> <td>None</td> </tr> <tr> <td>○</td> <td>None</td> <td>Blue</td> <td>92028-1321</td> </tr> <tr> <td>None</td> <td>○</td> <td>Brown</td> <td>92028-1323</td> </tr> </tbody> </table>				Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert		Size Color	Part Number	○	○	Black	92028-1322	None	None	○	None	Blue	92028-1321	None	○	Brown	92028-1323
Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert																					
		Size Color	Part Number																				
○	○	Black	92028-1322																				
None	None																						
○	None	Blue	92028-1321																				
None	○	Brown	92028-1323																				
Crankshaft runout	---	0.05 mm TIR																					
Crankshaft main bearing insert/journal clearance	0.020 – 0.044 mm	0.08 mm																					
Crankshaft main journal diameter:	35.984 – 36.000 mm	35.96 mm																					
Marking	None																						
	1																						
	35.984 – 35.992 mm																						
	35.993 – 36.000 mm																						
Crankcase main bearing bore diameter:	39.000 – 39.016 mm	---																					
Marking	○																						
	None																						
	39.000 – 39.008 mm																						
	39.009 – 39.016 mm																						

Item	Standard	Service Limit																													
Crankshaft main bearing insert thickness:																															
Brown	1.490 – 1.494 mm	---																													
Black	1.494 – 1.498 mm	---																													
Blue	1.498 – 1.502 mm	---																													
Crankshaft main bearing insert selection:																															
<table border="1"> <thead> <tr> <th rowspan="2">Crankcase Main Bearing Bore Diameter Marking</th> <th rowspan="2">Crankshaft Main Journal Diameter Marking</th> <th colspan="3">Bearing Insert*</th> </tr> <tr> <th>Size Color</th> <th>Part Number</th> <th>Journal Nos.</th> </tr> </thead> <tbody> <tr> <td rowspan="2">○</td> <td rowspan="2">1</td> <td rowspan="2">Brown</td> <td>92028-1102</td> <td>2, 4</td> </tr> <tr> <td>92028-1274</td> <td>1, 3, 5</td> </tr> <tr> <td rowspan="2">None</td> <td rowspan="2">None</td> <td rowspan="2">Blue</td> <td>92028-1100</td> <td>2, 4</td> </tr> <tr> <td>92028-1272</td> <td>1, 3, 5</td> </tr> <tr> <td rowspan="2">○</td> <td rowspan="2">None</td> <td rowspan="2">Black</td> <td>92028-1101</td> <td>2, 4</td> </tr> <tr> <td>92028-1273</td> <td>1, 3, 5</td> </tr> </tbody> </table>			Crankcase Main Bearing Bore Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*			Size Color	Part Number	Journal Nos.	○	1	Brown	92028-1102	2, 4	92028-1274	1, 3, 5	None	None	Blue	92028-1100	2, 4	92028-1272	1, 3, 5	○	None	Black	92028-1101	2, 4	92028-1273	1, 3, 5
Crankcase Main Bearing Bore Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*																													
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			92028-1274	1, 3, 5																											
None	None	Blue	92028-1100	2, 4																											
			92028-1272	1, 3, 5																											
○	None	Black	92028-1101	2, 4																											
			92028-1273	1, 3, 5																											
*The bearing inserts for Nos. 2 and 4 journals have oil grooves.																															
Crankshaft side clearance	0.05 – 0.20 mm	0.40 mm																													
Alternator shaft chain 20-link length	158.8 – 159.2 mm	161.5 mm																													
Transmission:																															
Gear backlash	0.06 – 0.23 mm	0.3 mm																													
Gear shift fork groove width	5.05 – 5.15 mm	5.3 mm																													
Shift fork ear thickness	4.9 – 5.0 mm	4.8 mm																													
Shift fork guide pin diameter	7.9 – 8.0 mm	7.8 mm																													
Shift drum groove width	8.05 – 8.20 mm	8.3 mm																													

8-6 CRANKSHAFT/TRANSMISSION

Special Tools

Engine Stand: 57001-900

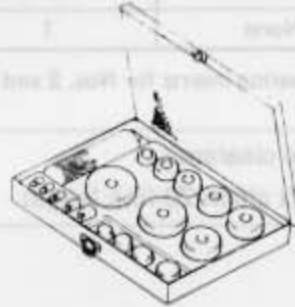
Along with common hand tools and precision instrument specialized tools are required for complete crankshaft/transmission servicing.

Driver: 57001-137



Bearing Driver Set: 57001-1129

Circlip Pliers: 57001-144



Bearing Puller: 57001-158



Coupling Holder: 57001-1189



Oil Seal Guide: 57001-264



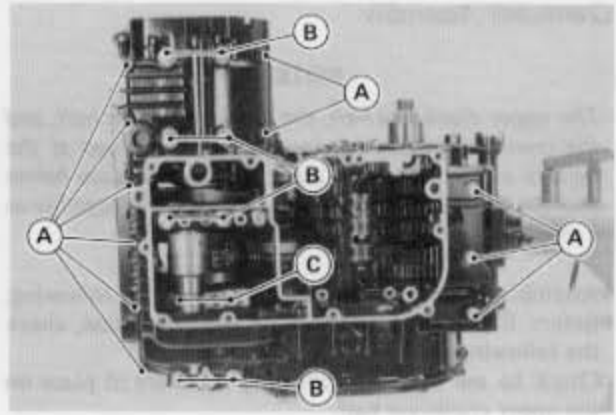
Bearing Puller Adapter: 57001-317



Crankcase Splitting

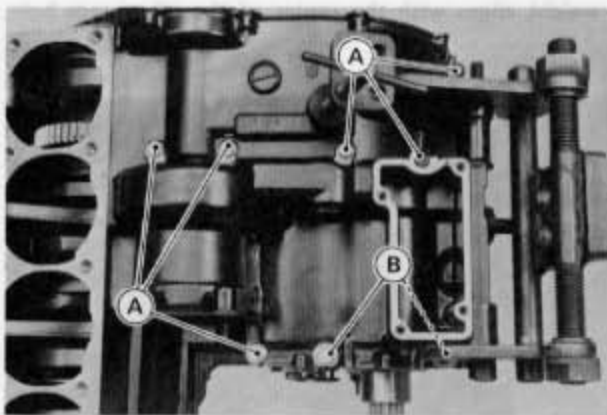
Crankcase Splitting

- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface or, preferably, mount it on engine stand 57001-900 to hold the engine steady while parts are being removed.
- Remove the following parts from the engine.
 - External Shift Mechanism Cover
 - Starter Motor
 - Alternator
 - Pickup Coils
 - Right Engine Cover
 - Alternator Shaft Chain Tensioner
- Remove the following parts only if the crankshaft is to be removed.
 - Pistons
 - Alternator Shaft Chain and Sprockets
- Remove the following part only if the transmission drive shaft assembly is to be disassembled.
 - Clutch
- Remove the 6 mm upper crankcase-half bolts first, and then the 8 mm bolts.

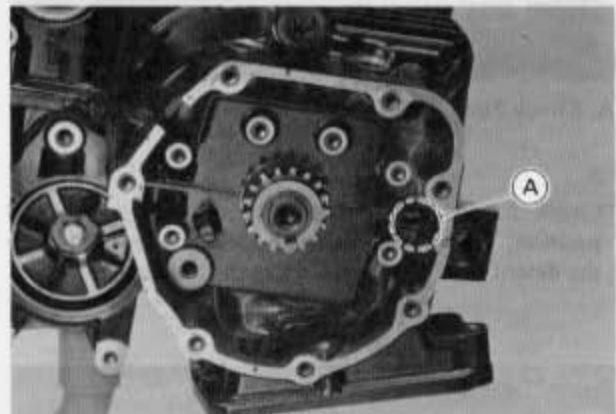


A. 6 mm Bolts
 B. 8 mm Bolts
 C. Remove is not necessary for crankcase split.

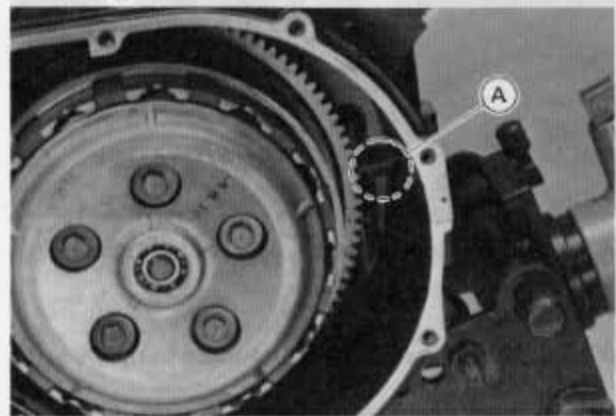
- Pry the points indicated in the figure to split the crankcase halves apart, and remove the lower crankcase half. There are two knock pins on the left and right of the mating surface.



A. 6 mm Bolts B. 8 mm Bolts



A. Pry Point



A. Pry Point

- Turn the engine upside down and remove the following parts.
 - Oil pump and Bracket
- Remove the 6 mm lower crankcase-half bolts first, and then the 8 mm bolts. Be careful not to take out the crankshaft main bearing cap bolts.

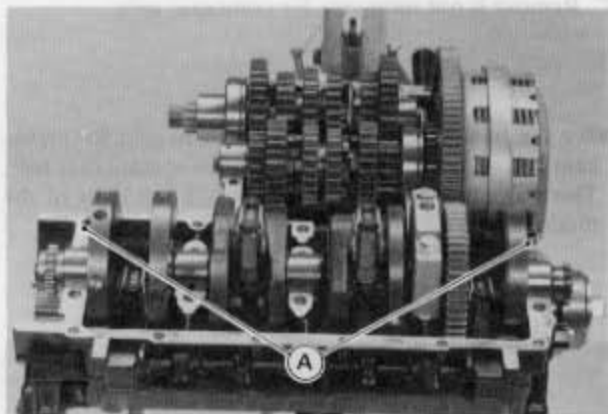
8-8 CRANKSHAFT/TRANSMISSION

Crankcase Assembly

NOTE

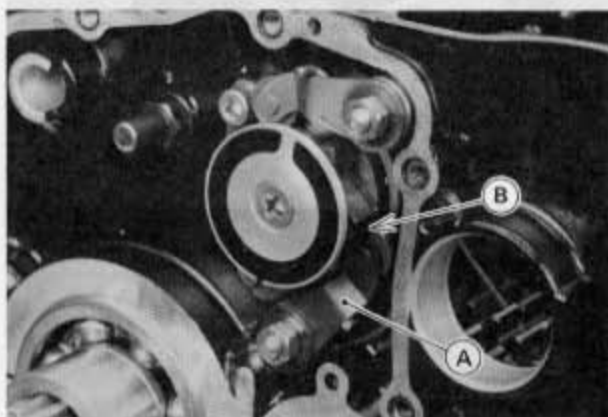
○The upper crankcase half, the lower crankcase half, and the crankshaft main bearing cap are machined at the factory in the assembled state, so the crankcase halves and the main bearing cap must be replaced together as a set.

- Assembly is the reverse of splitting. Note the following.
- Before fitting the lower case on the upper case, check the following.
- Check to see that the following parts are in place on the upper crankcase half.



A. Knock Pins

○Check to see that the shift drum is in the neutral position, that is, the neutral positioning lever fits into the detent on the shift drum bearing holder.



A. Neutral Positioning Lever B. Neutral Detent

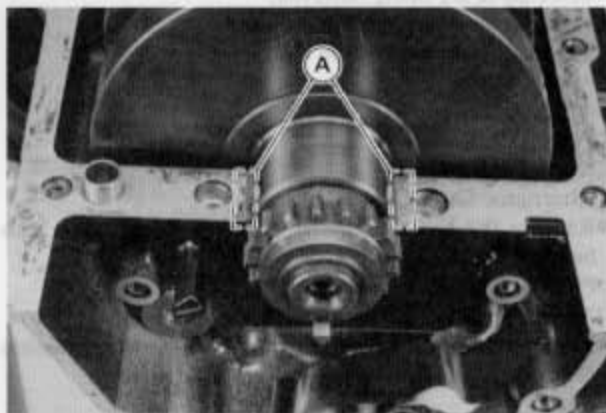
○Check that the crankshaft is positioned so the #1 and 4 pistons are at TDC.

- With a high flash-point solvent, clean off the mating surfaces of the crankcases halves and wipe dry.

- Apply silicone sealant to the mating surface of the lower crankcase half.

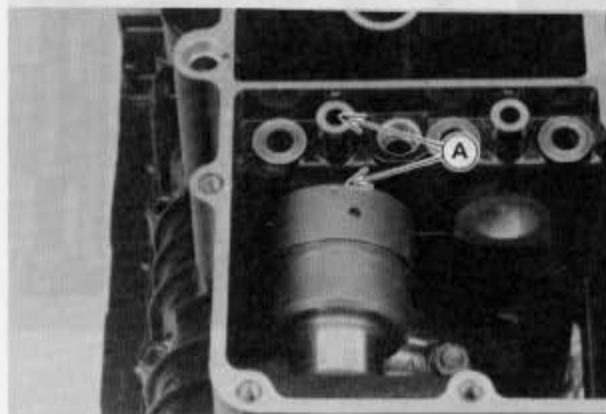
CAUTION

- Do not apply silicone sealant around the crankshaft main bearing inserts.



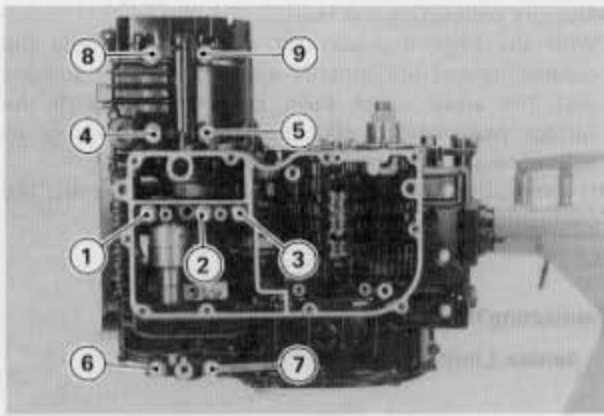
A. Do not apply silicone sealant here.

- Fit the lower crankcase half on the upper crankcase half observing the following.
- Set the shift forks so that the fingers of each fork fit into the grooves of the gears.
- Hold the balancer so that the mark on the balancer weight aligns with the center of the oil passage hole.



A. Align mark with hole center.

- Tighten the lower crankcase half bolts using the following 3 steps:
- Lightly tighten all lower crankcase half bolts to a snug fit. The three 8 mm bolts (sequence numbered 1 through 3) have a flat washer.
- Following the sequence numbers on the lower crankcase half, torque the 8 mm bolts first to about one half of the specification (see Exploded View), and finally to the specification in the same sequence.



Torque Value for 8 mm Bolts

- First: 14 N-m (1.4 kg-m, 10.0 ft-lb)
- Final: 27 N-m (2.8 kg-m, 20 ft-lb)

- Torque the 6 mm bolts to the specification (see Exploded View).
- After tightening all crankcase bolts, check the following items:
 - Drive shaft and output shafts turn freely.
 - While spinning the output shaft, gears shift smoothly from the 1st to 6th gear, and 6th to 1st.
 - When the output shaft stays still, the gear can not be shift to 2nd gear or other higher gear positions.

Crankshaft/Connecting Rods

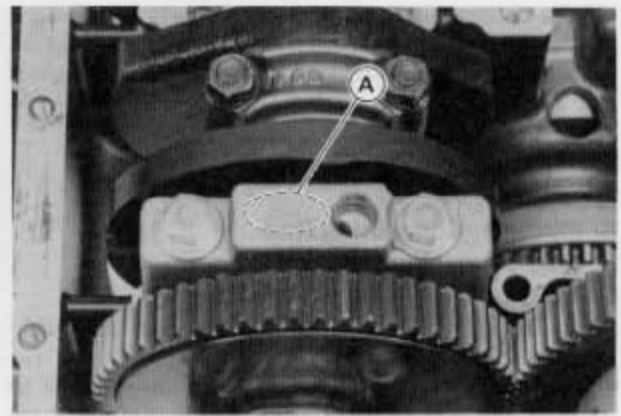
Crankshaft, Connecting Rod Removal/Installation:

Crankshaft Removal

- Remove the engine.
- Remove the pistons.
- Split the crankcase.
- Remove the main bearing cap bolts with flat washers, and take off the cap.

Crankshaft Installation Notes

- If the crankshaft or bearing inserts are replaced with new ones, check clearance with plastigage before assembling engine to be sure the correct bearing inserts are installed.
- Install the crankshaft main bearing cap with the arrow on it pointing forward. Tighten bolts to the specified torque (see Exploded View):



A. Arrow point forward.

Connecting Rod Removal

- Remove the crankshaft.
- Mark and record locations of the connecting rods and their big end caps so that they can be re-assembled in their original positions.
- Remove the connecting rod big end cap nuts, and take off the rod and cap with the bearing inserts.

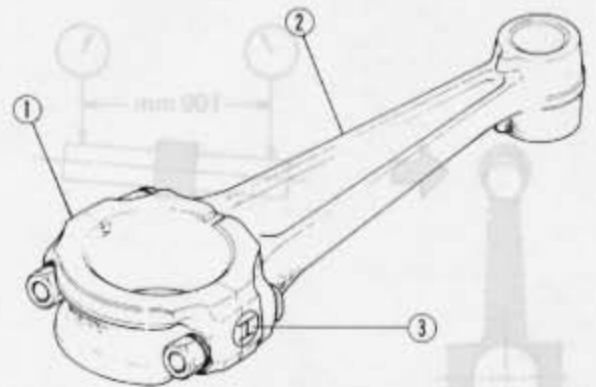
CAUTION

- To prevent damage to the crankpin surfaces, do not allow the big end cap bolts to bump against them.

Connecting Rod Installation Notes

- To minimize vibration, a pair of connecting rod (left two rods or right two) should have the same weight mark. The left two rods are a pair and the right two rods are a pair. The weight mark is indicated by a capital letter, and is stamped on the connecting rod big end.

Weight Mark Location



- 1. Big end cap
- 2. Connecting rod
- 3. Weight mark, alphabet

8-10 CRANKSHAFT/TRANSMISSION

- If the connecting rods or bearing inserts are replaced with new ones check clearance with plastigage before assembling engine to be sure the correct bearing inserts are installed.

Crankshaft, Connecting Rod Inspection/Maintenance:

Crankshaft/Connecting Rod Cleaning

- After removing the connecting rods from the crankshaft with a high flash-point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

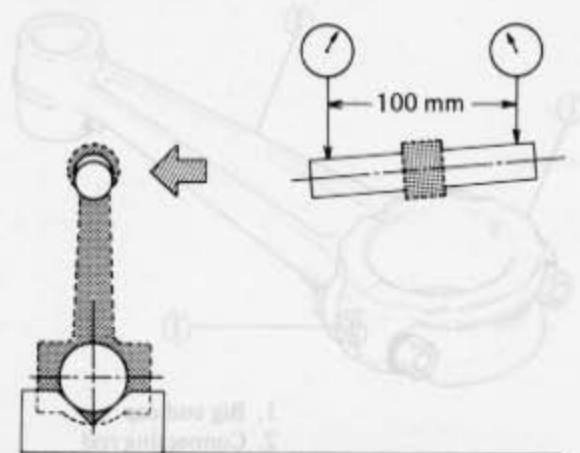
Connecting Rod Bend/Twist

- Measure connecting rod bend.
- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm long, and insert the arbor through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block.
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm length to determine the amount of connecting rod bend.
- ★ If connecting rod bend exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Bend

Service Limit: 0.2/100 mm

Connecting Rod Bend Measurement

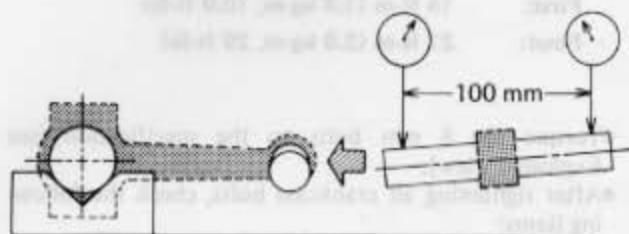


- Measure connecting rod twist.
- With the big-end arbor still on V block, hold the connecting rod horizontally and measure the amount that the arbor varies from being parallel with the surface plate over a 100 mm length of the arbor to determine the amount of connecting rod twist.
- ★ If connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Twist

Service Limit: 0.2/100 mm

Connecting Rod Twist Measurement



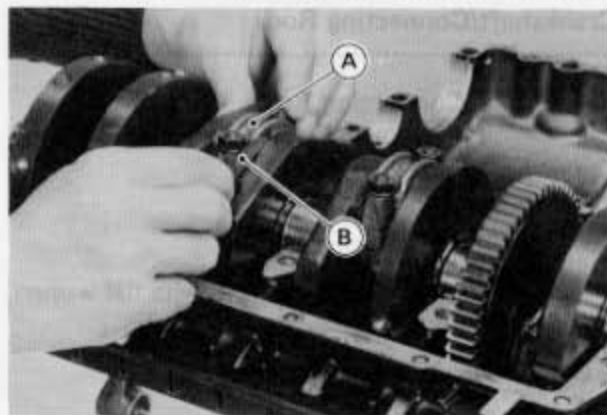
Connecting Rod Big End Side Clearance

- Measure connecting rod big end side clearance.
- Insert a thickness gauge between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance

Standard: 0.13 – 0.33 mm

Service Limit: 0.50 mm



A. Connecting Rod B. Thickness Gauge

- ★ If clearance exceeds the service limit, replace the connecting rod with new one and then check clearance again. If clearance is too large after connecting rod replacement, also the crankshaft must be replaced.

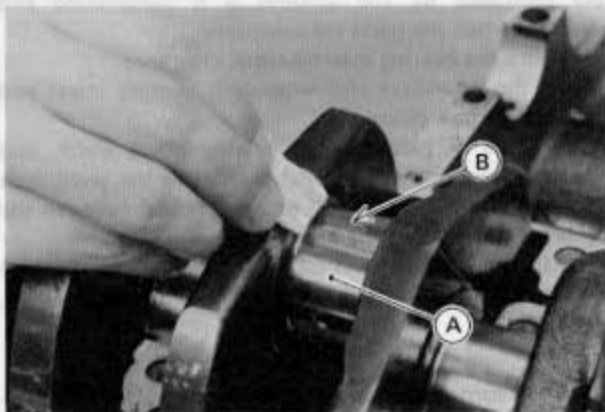
Connecting Rod Big End Bearing Insert/Crankpin Wear

Bearing insert/crankpin wear is measured using a plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

- Measure the bearing insert/crankpin clearance.
- Remove the connecting rod big end caps and wipe each bearing insert and crankpin surface clean of oil.
- Cut strips of plastigage to bearing insert width, and place a strip on the crankpin for each connecting rod parallel to the crankshaft so that the plastigage will be compressed between the crankpin and the bearing insert.
- Install the connecting rod big end caps and tighten the big end cap nuts to the specified torque (see Exploded View).

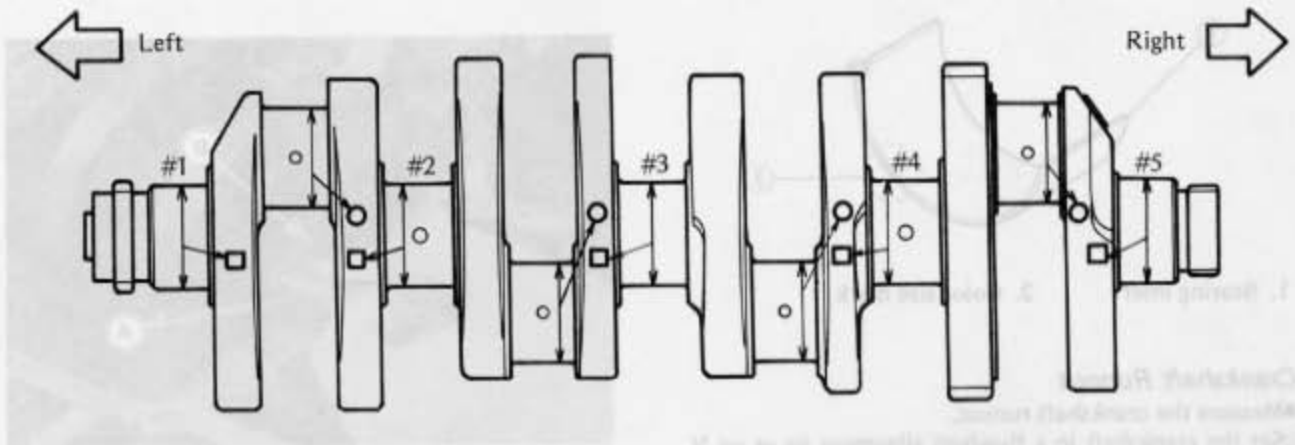
NOTE

- Do not turn the crankshaft during clearance measurement.
- Remove the connecting rod big end caps, and measure the plastigage width to determine the bearing insert/crankpin clearance.



A. Crankpin B. Plastigage

Crankshaft Mark Location



Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard:	0.036 – 0.066 mm
Service Limit:	0.10 mm

- ★ If clearance is within the standard, no bearing replacement is required.
- ★ If clearance is between 0.066 mm and the service limit (0.10 mm), replace the bearing inserts with inserts painted blue. Check insert/crankpin clearance with plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★ If clearance exceeds the service limit, measure the diameter of the crankpins.

Crankpin Diameter

Standard:	34.984 – 35.000 mm
Service Limit:	34.97 mm

- ★ If any crankpin has worn past the service limit, replace the crankshaft with a new one.
- ★ If the measured crankpin diameter are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, write new marks on it.

Crankpin Diameter Marks

None:	34.984 – 34.992 mm
○ :	34.993 – 35.000 mm

- Put the connecting rod big end caps on the rods and tighten the nuts to the specified torque (see Exploded View).
- Measure the inside diameter, and mark each connecting rod big end in accordance with the inside diameter.

NOTE

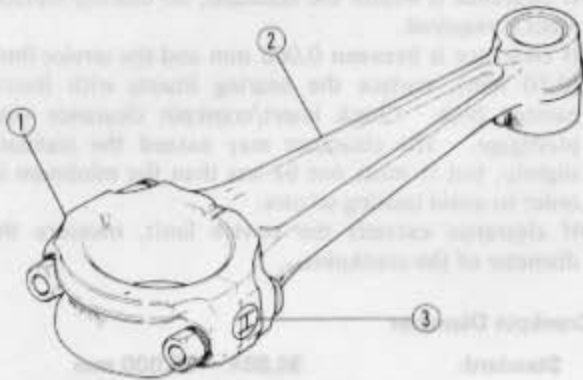
- The mark already on the big end should almost coincide with the measurement.

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Connecting Rod Big End Inside Diameter Marks

- None: 38.000 – 38.008 mm
 ○ : 38.009 – 38.016 mm

Connecting Rod Mark Location



1. Big end cap
 2. Connecting rod
 3. Diameter mark
 ○ mark or no mark, around weight mark alphabet

- Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft coding.
- Install the new insert in the connecting rod and check insert/journal clearance with plastigage.

Bearing Insert Selection

Con-rod Big End Bore Diameter Mark	Crankpin Diameter Mark	Bearing Insert	
		Size Color	Part Number
○	○	Black	92028-1322
None	None		
○	None	Blue	92028-1321
None	○	Brown	92028-1323

Bearing Insert Size Mark Location



1. Bearing insert
 2. Color size mark

Crankshaft Runout

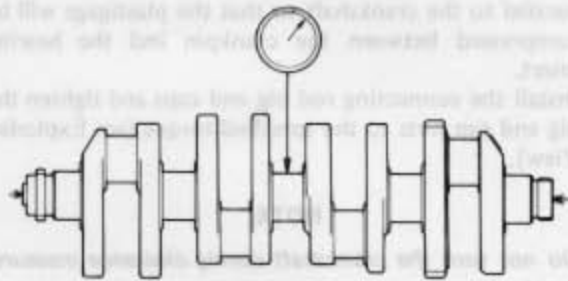
- Measure the crankshaft runout.
- Set the crankshaft in a flywheel alignment jig or on V blocks.

- Set a dial gauge against the center journal.
- Turn the crankshaft slowly to measure the runout. The difference between the highest and lowest dial gauge readings (TIR) is the amount of runout.
- ★ If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout

Service Limit: 0.05 mm TIR

Crankshaft Runout



Crankshaft Main Bearing Insert/Journal Wear

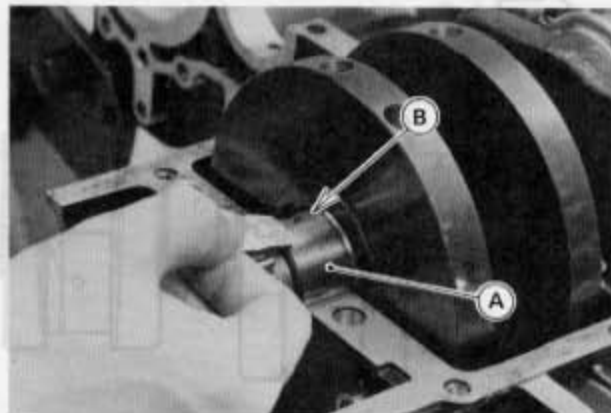
Bearing insert/journal wear is measured using a plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

- Measure the bearing insert/journal clearance.
- Split the crankcase and wipe each bearing insert and journal surface clean of oil.
- Cut strips of plastigage to bearing insert width, and place a strip on each journal parallel to the crankshaft so that the plastigage will be compressed between the journal and the bearing insert.
- Install the lower crankcase half, and tighten the case bolts to the specified torque (see Exploded View).

NOTE

- Do not turn the crankshaft during clearance measurement.

- Remove the lower crankcase half and measure the plastigage width to determine the bearing insert/journal clearance.



A. Journal B. Plastigage

Crankshaft Main Bearing Insert/Journal Clearance

Standard: 0.020 – 0.044 mm
Service Limit: 0.08 mm

- ★If clearance is within the standard, no bearing replacement is required.
- ★If clearance is between 0.044 mm and the service limit (0.08 mm), replace the bearing inserts with inserts painted blue. Check insert/journal clearance with plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★If clearance exceeds the service limit, measure the diameter of the crankshaft main journal.

Crankshaft Main Journal Diameter

Standard: 35.984 – 36.000 mm
Service Limit: 35.96 mm

- ★If any journal has worn past the service limit, replace the crankshaft with a new one.
- ★If the measured journal diameter are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, write new marks on it.

Crankshaft Main Journal Diameter Marks

None: 35.984 – 35.992 mm
1 : 35.993 – 36.000 mm

- Put the lower crankcase half and bearing cap on the upper crankcase half without bearing inserts, and tighten the case and cap bolts to the specified torque and sequence (see Crankcase Assembly).
- Measure the main bearing bore diameter, and mark the upper crankcase half in accordance with the bore diameter.

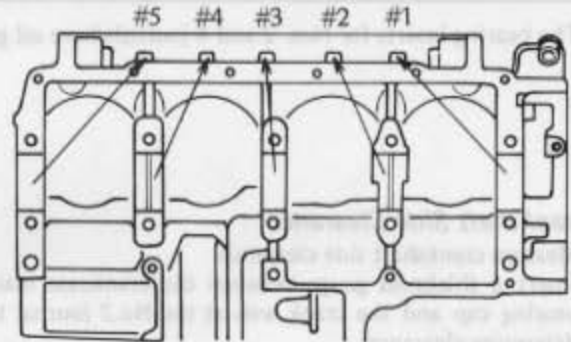
NOTE

○The mark already on the upper crankcase half should almost coincide with the measurement.

Crankcase Main Bearing Bore Diameter Marks

○ : 39.000 – 39.008 mm
None: 39.009 – 39.016 mm

Crankcase Mark Location



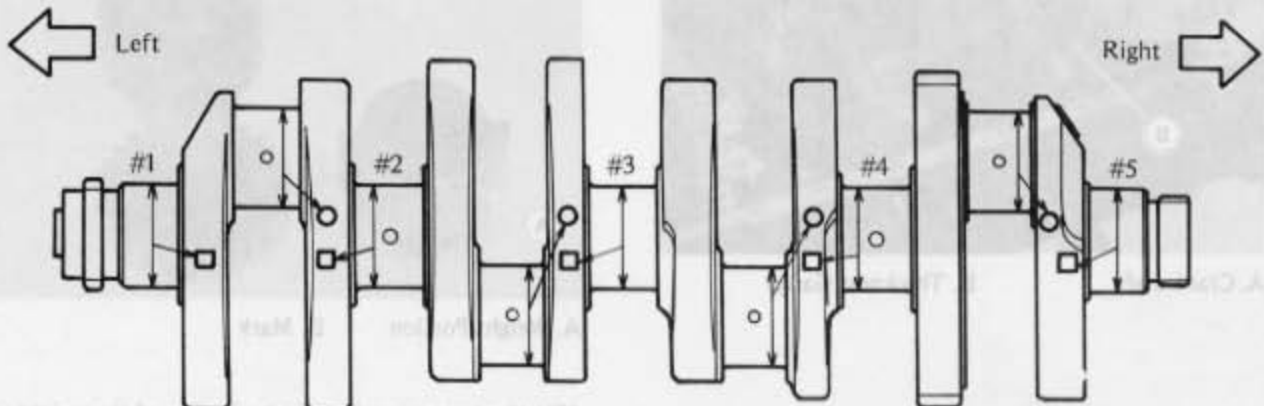
- Select the proper bearing insert in accordance with the combination of the crankcase and crankshaft coding.
- Install the new insert in the crankcase and cap and check insert/journal clearance with plastigage.

Bearing Insert Size Mark Location



1. Bearing insert 2. Color size mark

Crankshaft Mark Location



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Bearing Insert Selection

Crankcase Main Bearing Bore Diameter Mark	Crankshaft Main Journal Diameter Mark	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1102	2, 4
			92028-1274	1, 3, 5
None	None	Blue	92028-1100	2, 4
			92028-1272	1, 3, 5
○	None	Black	92028-1101	2, 4
None	1		92028-1273	1, 3, 5

*The bearing inserts for Nos. 2 and 4 journals have oil groove.

Crankshaft Side Clearance

- Measure crankshaft side clearance.
- Insert a thickness gauge between the crankcase main bearing cap and the crank web at the No.2 journal to determine clearance.
- ★ If the clearance exceeds the service limit, replace the crankcase halves and main bearing cap as a set.

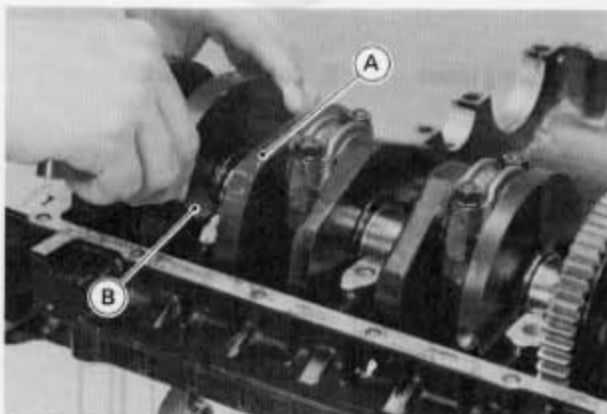
NOTE

- The upper crankcase half, lower crankcase half, and main bearing cap are machined at the factory in the assembled state, so they must be replaced as a set.

Crankshaft Side Clearance

Standard: 0.05 – 0.20 mm

Service Limit: 0.40 mm



A. Crankshaft

B. Thickness Gauge

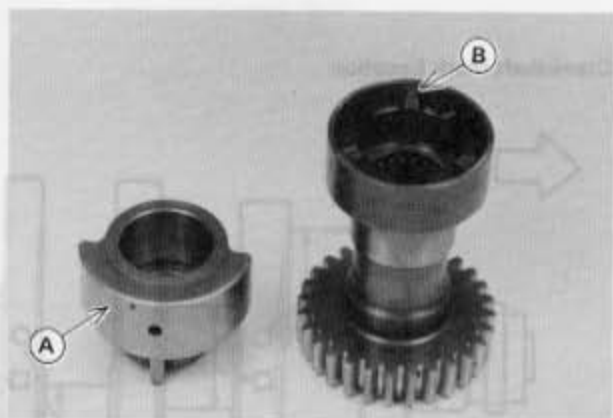
Balancer

Balancer Removal

- Split the crankcase.
- Unscrew the balancer shaft clamp bolts, and pull off the clamp lever.
- Unscrew the bolt holding the balancer shaft guide pin plate, and take off the plate and guide pin.
- Pull the balancer shaft with the oil seal toward the right out of the crankcase. At the same time, the balancer weight and gear assembly comes off.

Balancer Installation Notes

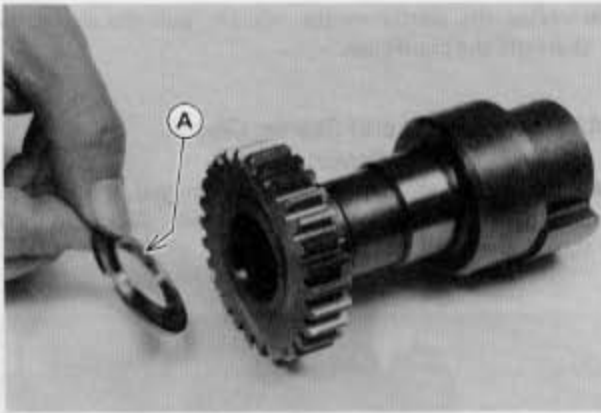
- When coupling the balancer weight and the gear, observe the following.
- Check that the damper rubbers are in place.
- Fit the balancer weight into the gear so that the weight is opposite the mark on the gear.



A. Weight Portion

B. Mark

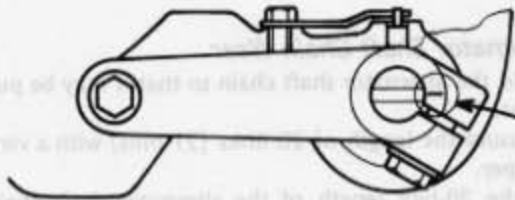
- Fit the copper washers on both sides of the weight and gear assembly. The projected side faces toward the assembly.



A. Projected Side

- Turn the balancer shaft until the line mark on the end of the shaft points to the front. And then, install the clamp lever. Tighten the bolt at the rear of the lever first then tighten the clamp bolt at the front of the lever temporarily.

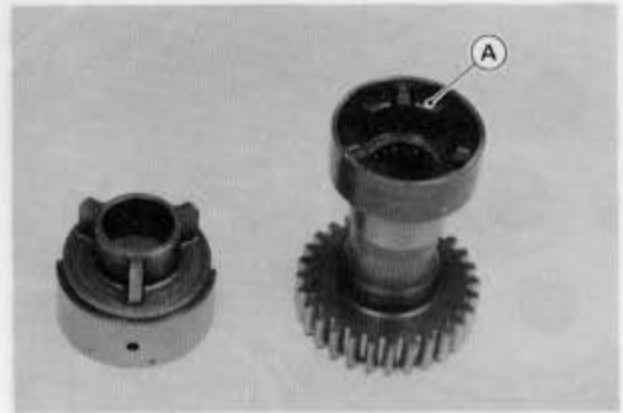
Balancer Shaft Installation



- Adjust the balancer shaft position during the preparation of the motorcycle. This adjustment must be done when engine is cold.
- Start the engine and let it at idle.
- Loosen the clamp bolt and turn the balancer shaft counterclockwise until the balancer gear makes a noise.
- Turn the shaft clockwise until the balancer gear stops to make a noise, and tighten the clamp bolt securely.

Damper Inspection

- Remove the balancer and disassemble the weight and gear assembly.
- Visually inspect the rubber dampers.
- ★ If they appear damaged or deteriorated, replace them.



A. Rubber Dampers

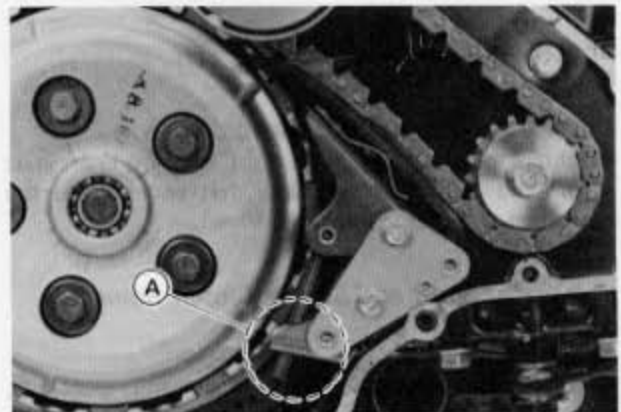
Needle Bearing Wear

- Visually check the needle bearings.
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
- ★ If there is any doubt as to the condition of a needle bearing, replace it.

Alternator Shaft/Starter Motor Clutch

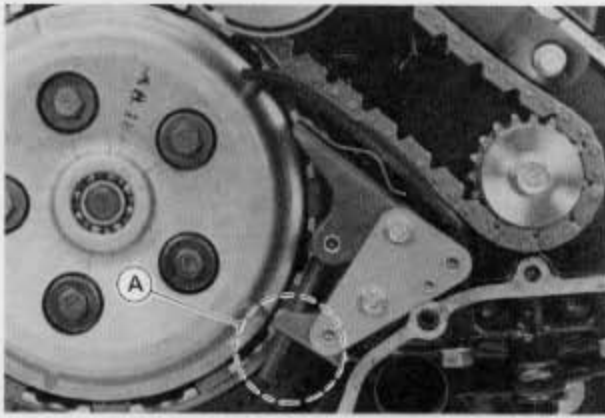
Chain Tensioner Removal

- Remove the right engine cover.
- Lock the alternator shaft chain tensioner.
- Push the tensioner guide and the rod stop lever so that the stop lever keeps the rod from returning.
- Remove the tensioner mounting bolts and take off the tensioner assembly.



A. Tensioner in free positioned

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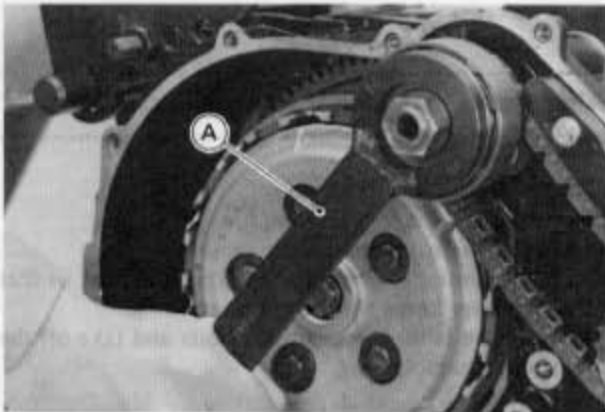
A. Tensioner in lock positioned

Chain Tensioner Installation Note

- Lock the chain tensioner and install it with the mounting bolts. The tensioner should be freed from the locked position after installing it.

Chain and Sprocket Removal

- Remove the right engine cover.
- Remove the chain tensioner.
- Using coupling holder 57001-1189, to keep the alternator shaft from turning, remove the alternator shaft right end nut and crankshaft right end bolt.
- If necessary, remove the coupling bolt at the alternator shaft left end at this time.



A. Coupling Holder: 57001-1189

- Pull the chain and the sprockets as a set.

Chain and Sprocket Installation Note

- Tighten the alternator shaft right end nut, crankshaft right end bolt, and alternator left end bolt to the specified torque (see Exploded View).

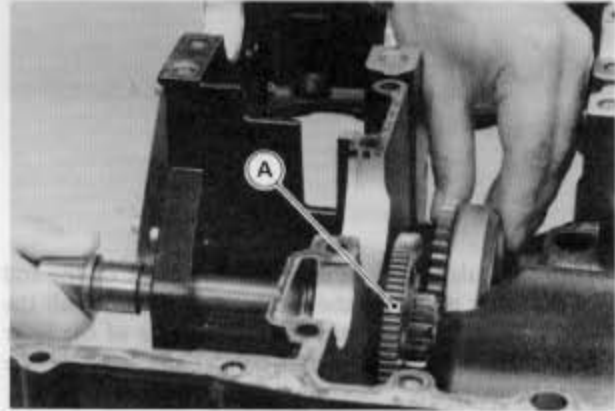
Alternator Shaft and Starter Clutch Removal

- Remove the engine.
- Split the crankcase.
- Remove the alternator shaft chain and sprockets.
- Remove the coupling with the rubber dampers at the left end of the shaft.

- Holding the starter motor clutch, pull the alternator shaft off the crankcase.

Alternator Shaft and Starter Clutch Installation Notes

- If the starter motor idle gear is removed, install it so that the small diameter gear side faces to the starter motor side.



A. Idle Gear

- If the alternator shaft ball bearing and/or needle bearing is removed, install it so that the marked side of it faces out and press it until it stops by bearing driver set 57001-1129.

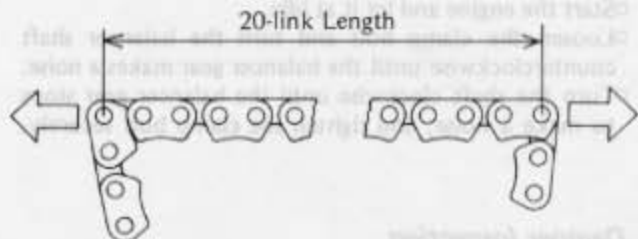
Alternator Shaft Chain Wear

- Hold the alternator shaft chain so that it may be pulled tight.
- Measure the length of 20 links (21 pins) with a vernier caliper.
- ★ If the 20-link length of the alternator shaft chain is greater than the service limit, replace it.

Alternator Shaft Chain 20-link Length

Standard:	158.8 – 159.2 mm
Service Limit:	161.5 mm

Chain 20-Link Length Measurement

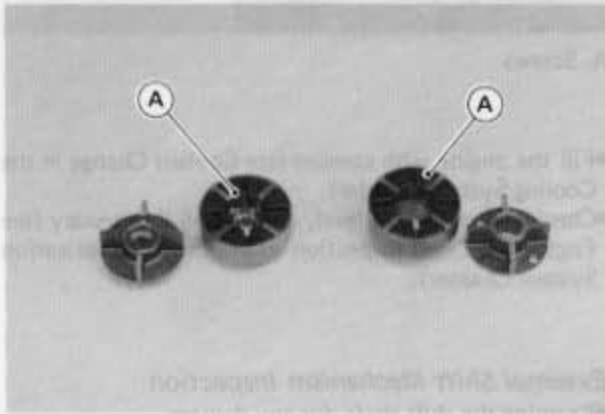


Chain Guide Wear

- Visually inspect the rubber on the guides.
- If the rubber is cut or damaged in any way, replace the guide.

Damper Inspection

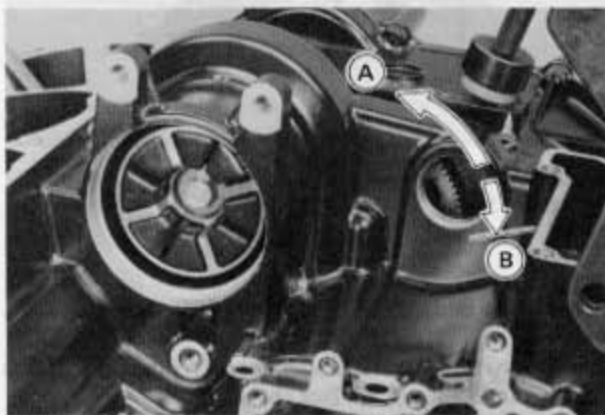
- Visually inspect the rubber dampers at both end couplings of the alternator shaft.
- ★If they appear damaged or deteriorated, replace them.



A. Rubber Dampers

Starter Motor Clutch Inspection

- Remove the starter motor.
- Turn the starter motor idle gear by hand. When viewed from the left side of the engine, the idle gear should turn counterclockwise freely, but should not turn clockwise.



A. Turn freely. B. Locked

- ★If the starter clutch does not operate as it should or if it makes noise, go to the next step.
- Disassemble the starter motor clutch, and visually inspect the clutch parts: springs, spring caps, rollers, and gear.
- ★If there is any worn or damaged part, replace it.

Ball and Needle Bearing Wear

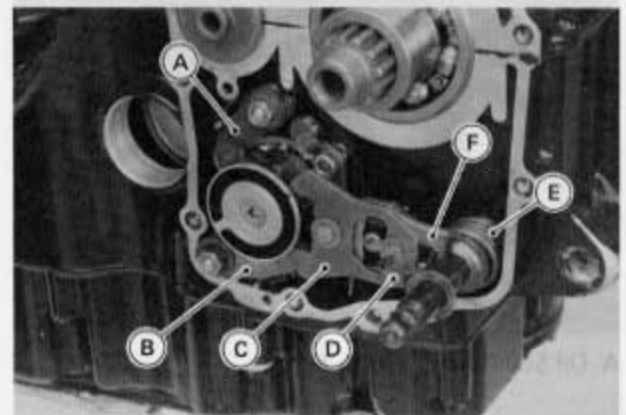
- Check the ball bearing: alternator shaft LH.
- Since the ball bearing is made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean the bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.
- Spin the bearing by hand to check its condition.
- ★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.
- Check the following needle bearings: alternator shaft RH and starter motor clutch.
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
- ★If there is any doubt as to the condition of a needle bearing, replace it.

Transmission

Transmission External Shift Mechanism:

External Shift Mechanism Removal

- Remove the engine sprocket.
- Drain the coolant (see Coolant Change in the Cooling System Chapter).
- Remove the water pump.
- Place an oil pan beneath the external shift mechanism cover.
- Pull out the clutch push rod.
- Remove the external shift mechanism cover screws and bolts. Pull off the external shift mechanism cover and gasket. There are two knock pins in the cover mating surface.
- Move the shift mechanism arm out of its position on the end of the shift drum, and pull out the shift shaft with the arm, spring, and shaft return spring.



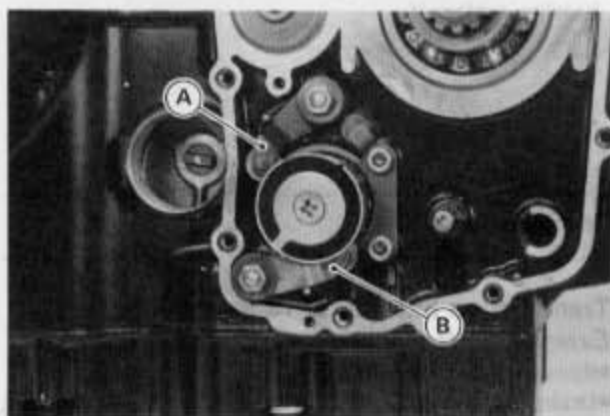
A. Neutral Positioning Lever
 B. Gear Positioning Lever
 C. Shift Mechanism Arm
 D. Arm Spring
 E. Return Spring
 F. Shift Shaft

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- Remove the nuts and take off the neutral positioning lever and gear positioning lever. Each lever has the collar, spring, and washer.

External Shift Mechanism Installation Notes

- The neutral positioning lever and the gear positioning lever are identical. The spring painted blue is for the neutral positioning lever.
- The projected side of the collar must face toward the lever.



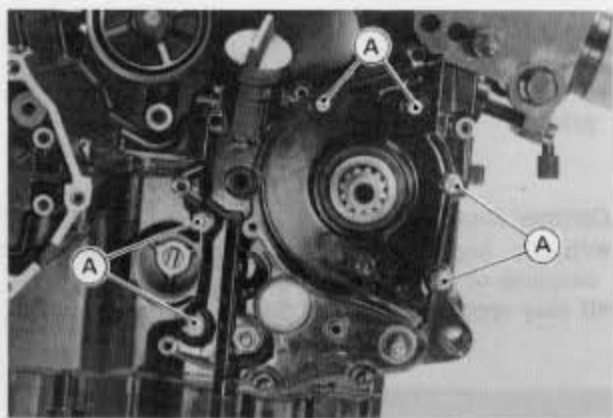
A. Neutral Positioning Lever
B. Gear Positioning Lever

- Apply a high temperature grease to the seal lips.
- Use oil seal guide 57001-264 to protect the seal during shift mechanism cover installation.



A. Oil Seal Guide: 57001-264

- Apply a non-permanent locking agent to the threads of the cover screws.

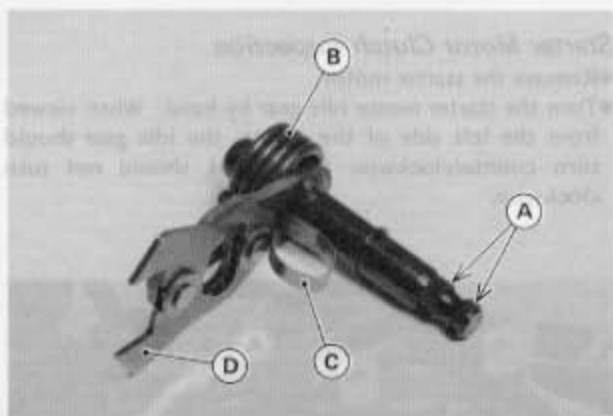


A. Screws

- Fill the engine with coolant (see Coolant Change in the Cooling System Chapter).
- Check the engine oil level, and add oil if necessary (see Engine Oil Level Inspection in the Engine Lubrication System Chapter).

External Shift Mechanism Inspection

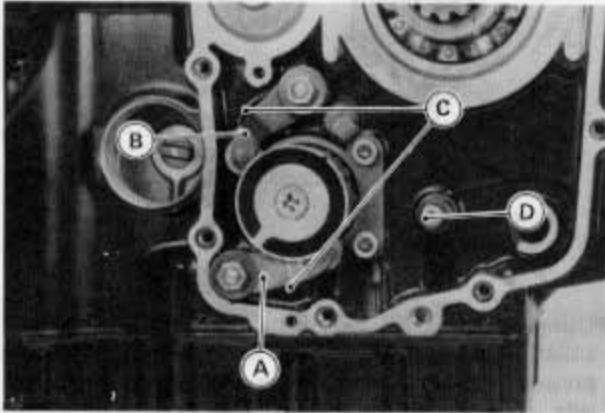
- Examine the shift shaft for any damage.



A. Splines
B. Return Spring
C. Arm Spring
D. Arm

- Check the shift shaft for bending or damage to the splines.
- ★ If the shaft is bent, straighten or replace it. If the splines are damaged, replace the shaft.
- Check the return spring and arm spring for breaks or distortion.
- ★ If the springs are damaged in any way, replace them.
- Check the shift mechanism arm for distortion.
- ★ If the shift mechanism arm is damaged in any way, replace the arm.
- Check the return spring pin is not loose.
- ★ If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it to the specified torque (see Exploded View).

- Check the gear positioning lever, neutral positioning lever, and their springs for breaks or distortion.
- ★If the levers or springs are damaged in any way, replace them.



A. Gear Positioning Lever B. Neutral Positioning Lever C. Springs D. Return Spring Pin

- Visually inspect the shift drum pins, pin holder, and pin plate.
- ★If they are badly worn or if they show any damage, replace them.

Transmission Shafts, Shift Drum, Forks:

Transmission Removal/Disassembly:

Transmission Shaft Removal

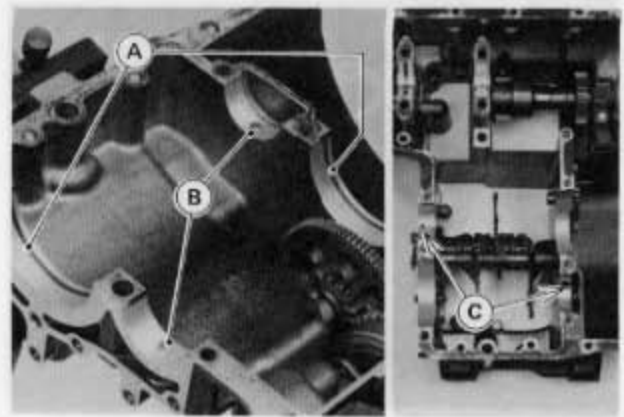
- Remove the engine.
- Split the crankcase.
- Take out the drive and output shaft assemblies.
- If the drive shaft assembly is to be disassembled, remove the clutch.

Transmission Shaft Installation

- Install the clutch if it has been removed.
- With a high flash-point solvent, clean off the outer circumferences of the transmission ball bearings and needle bearings, and their bearing housings, and wipe dry.
- Check to see that the set rings and set pins are in place in the transmission bearing housings, and blow the oil passages in the bearing housings clean with compressed air.

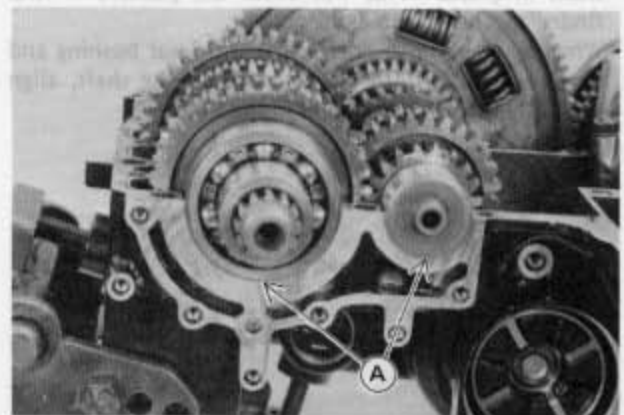
NOTE

○If the standard set rings (P/N: 14013-1005) cannot be put into the crankcase and ball bearing grooves, use the thin set rings (P/N: 14013-1006) instead of the standard set rings.



A. Set Rings B. Set Pins C. Oil Passage Holes

- Install the drive and output shaft assemblies in the upper crankcase half.
- The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly matched, there is no clearance between the crankcase and the bearing outer races.

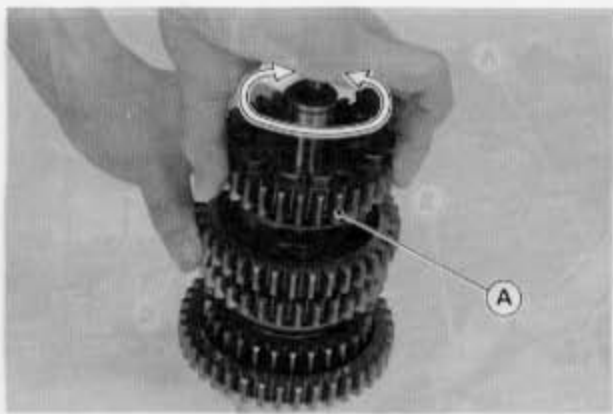


A. No Clearance (both left and right sides)

- Assemble the crankcase.
- Install the engine.

Transmission Shaft Disassembly

- Remove the transmission shafts.
- Using circlip pliers 57001-144 to remove the circlips, disassemble the transmission shafts.
- The 5th gear on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. To remove this gear from the shaft, quickly spin the shaft in a vertical position while holding the 3rd gear, and pull off the 5th gear upwards.

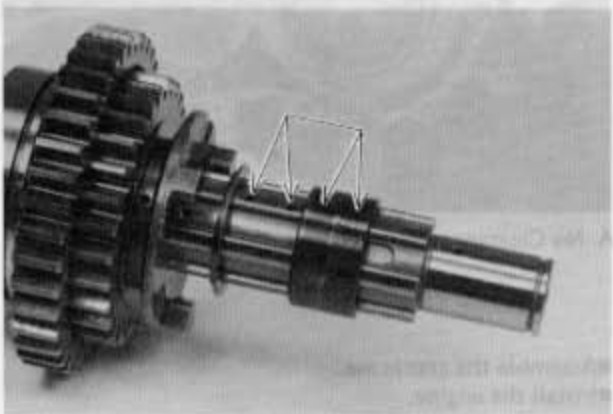


A. 5th Gear

- The ball bearings are press-fit on the transmission shafts. To remove the bearings, use bearing puller 57001-158 and adapter 57001-317.

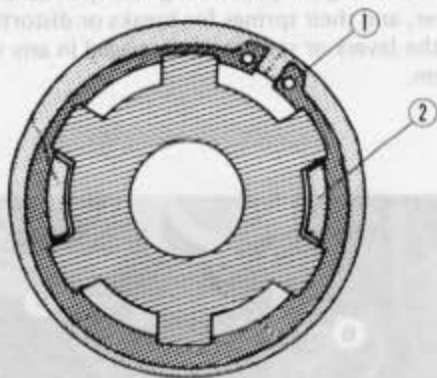
Transmission Shaft Assembly

- Assembly is the reverse of disassembly. Note the following.
- When installing the 5th gear and steel balls on the output shaft, do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.
- When assembling the drive shaft 6th gear bushing and output shaft 3rd/4th gear bushing to the shaft, align their oil holes with the holes in the shaft.



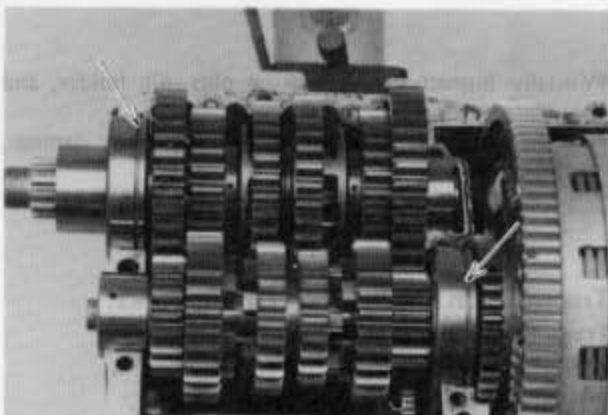
- Replace any circlip that were removed with new ones.
- Always install circlips so that the opening is aligned with a spline groove, and install toothed washers so that the teeth are not aligned with the circlip opening.
- The transmission gears can be identified by size; Drive shaft gears — the smallest diameter gear is 1st gear, and the largest is 6th. Output shaft gears — the largest diameter gear is 1st gear, and the smallest is 6th.

Circlip and Toothed Washer Installation



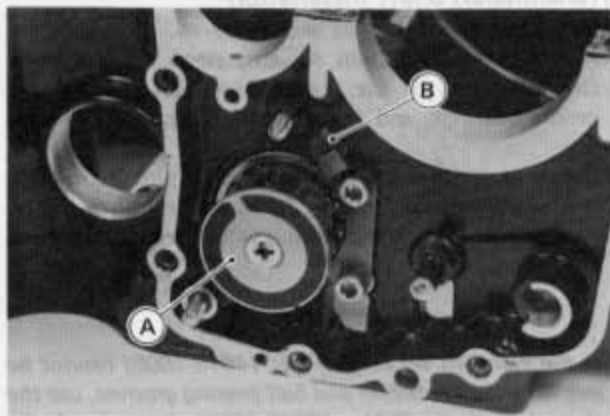
1. Circlip
2. Toothed Washer

- Using driver 57001-137, install the ball bearings and collar. The ball bearing for the drive shaft must be pressed on with the set ring groove toward the clutch side. The bearing for the output shaft must be pressed on with the set ring groove toward the opposite side of the engine sprocket.



Shift Drum and Fork Removal

- Remove the external shift mechanism.
- Remove the oil pump and bracket.
- Unscrew the Allen bolts holding the shift drum ball bearing holder.



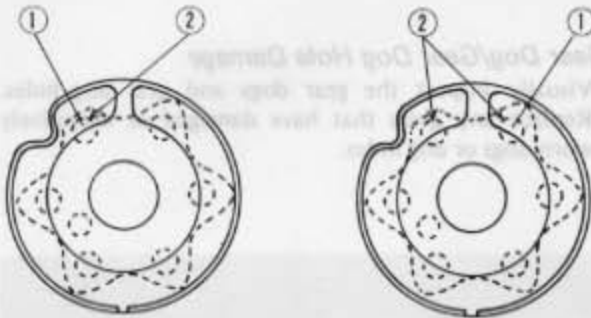
A. Shift Drum B. Shift Rod

- Pull out the shift rod, and take off the shift forks.
- Pull out the shift drum.

Shift Drum and Fork Installation

- Installation is the reverse of removal. Note the following.
- If the shift drum pin plate was removed, install it as following.
- One of the six pins is longer than the others. The long shift drum pin must be installed in the correct position, and must be fit into the correct hole in the back of the pin plate. If these parts are assembled in the wrong position, the neutral indicator light will not light when the gears are in neutral.

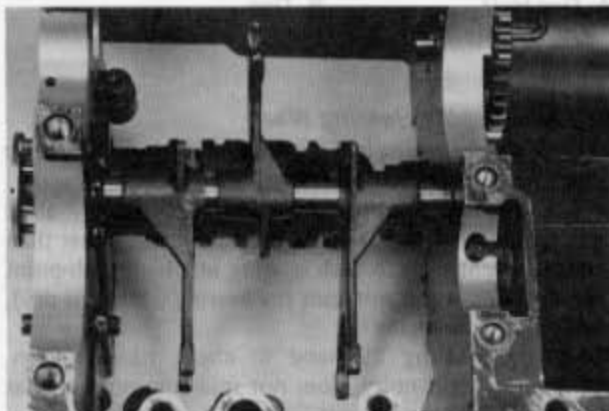
Shift Drum Pin Plate



1. Long Pin
2. Recess in Pin Plate

If the pin plate has two recesses, the long pin should be installed as shown above.

- Apply a non-permanent locking agent to the pin plate screw.
- The shift forks can be identified by their shape. Install them as following.



Transmission Maintenance:

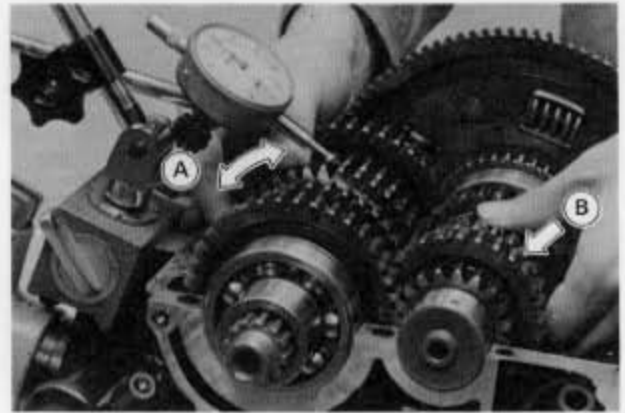
Gear Backlash

- Split the crankcase leaving the transmission in place.
- Set a dial gauge against the teeth on one gear, and move the gear back and forth while holding the other gear steady. The difference between the highest and the lowest gauge readings is the amount of backlash.

- ★ Replace both gears if the amount of backlash exceeds the service limit.

Gear Backlash

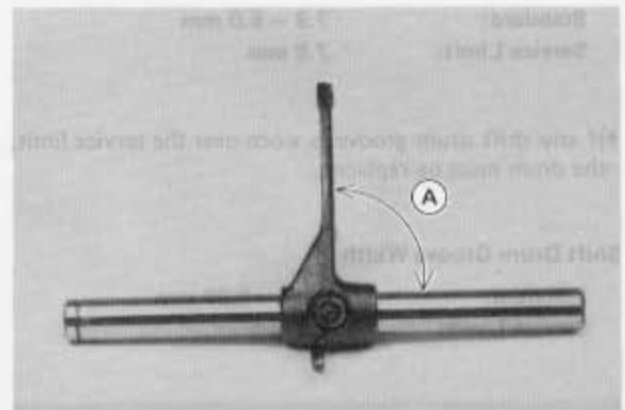
Standard:	0.06 – 0.23 mm
Service Limit:	0.3 mm



- A. Move back and forth lightly.
- B. Hold steady.

Shift Fork Bending

- Visually inspect the shift forks, and 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.



- A. 90°

Shift Fork/Gear Groove Wear

- Measure the thickness of the shift fork ears, and measure the width of the shift fork grooves on the transmission gears.
- ★ If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness

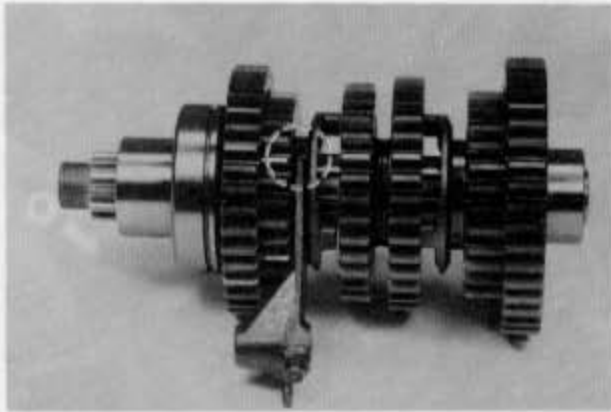
Standard:	4.9 – 5.0 mm
Service Limit:	4.8 mm

8-22 CRANKSHAFT/TRANSMISSION

★If a gear shift fork groove is worn over the service limit, the gear must be replaced.

Gear Shift Fork Groove Width

Standard: 5.05 – 5.15 mm
Service Limit: 5.3 mm



Shift Fork Guide Pin/Shift Drum Groove Wear

- Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove.
- ★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

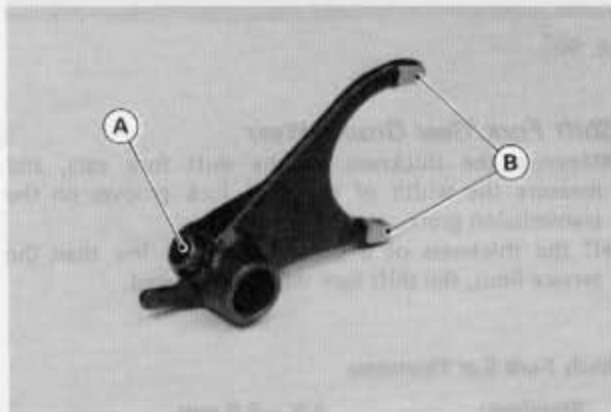
Shift Fork Guide Pin Diameter

Standard: 7.9 – 8.0 mm
Service Limit: 7.8 mm

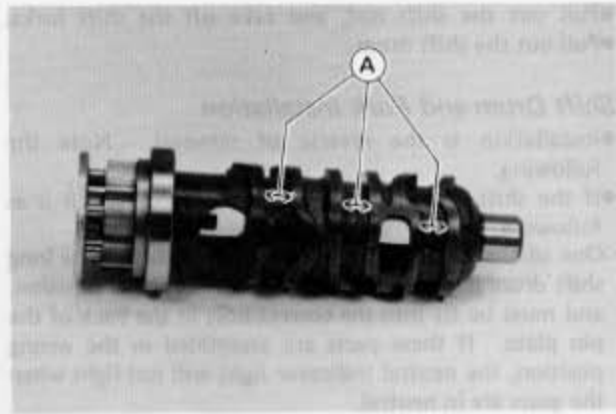
★If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width

Standard: 8.05 – 8.20 mm
Service Limit: 8.3 mm



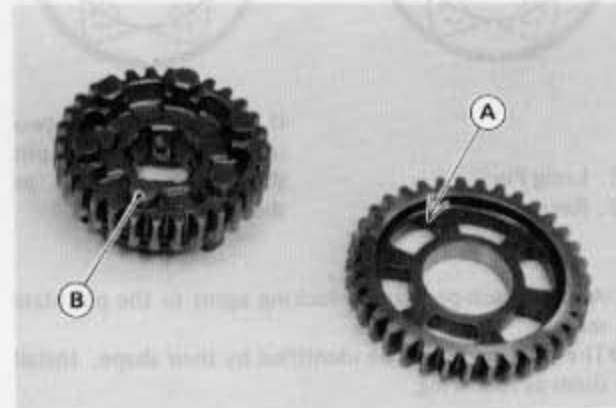
A. Shift Fork Guide Pin B. Shift Fork Ears



A. Shift Drum Grooves

Gear Dog/Gear Dog Hole Damage

- Visually inspect the gear dogs and gear dog holes.
- ★Replace any gears that have damaged or excessively worn dogs or dog holes.



A. Dog Hole

B. Dog

Ball and Needle Bearing Wear

- Check the following ball bearings: shift drum LH, drive shaft RH, and output shaft LH.
- Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.
- Spin the bearing by hand to check its condition.
- ★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.
- Check the following needle bearing: drive shaft LH and output shaft RH.
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.
- ★If there is any doubt as to the condition of a needle bearing, replace it.

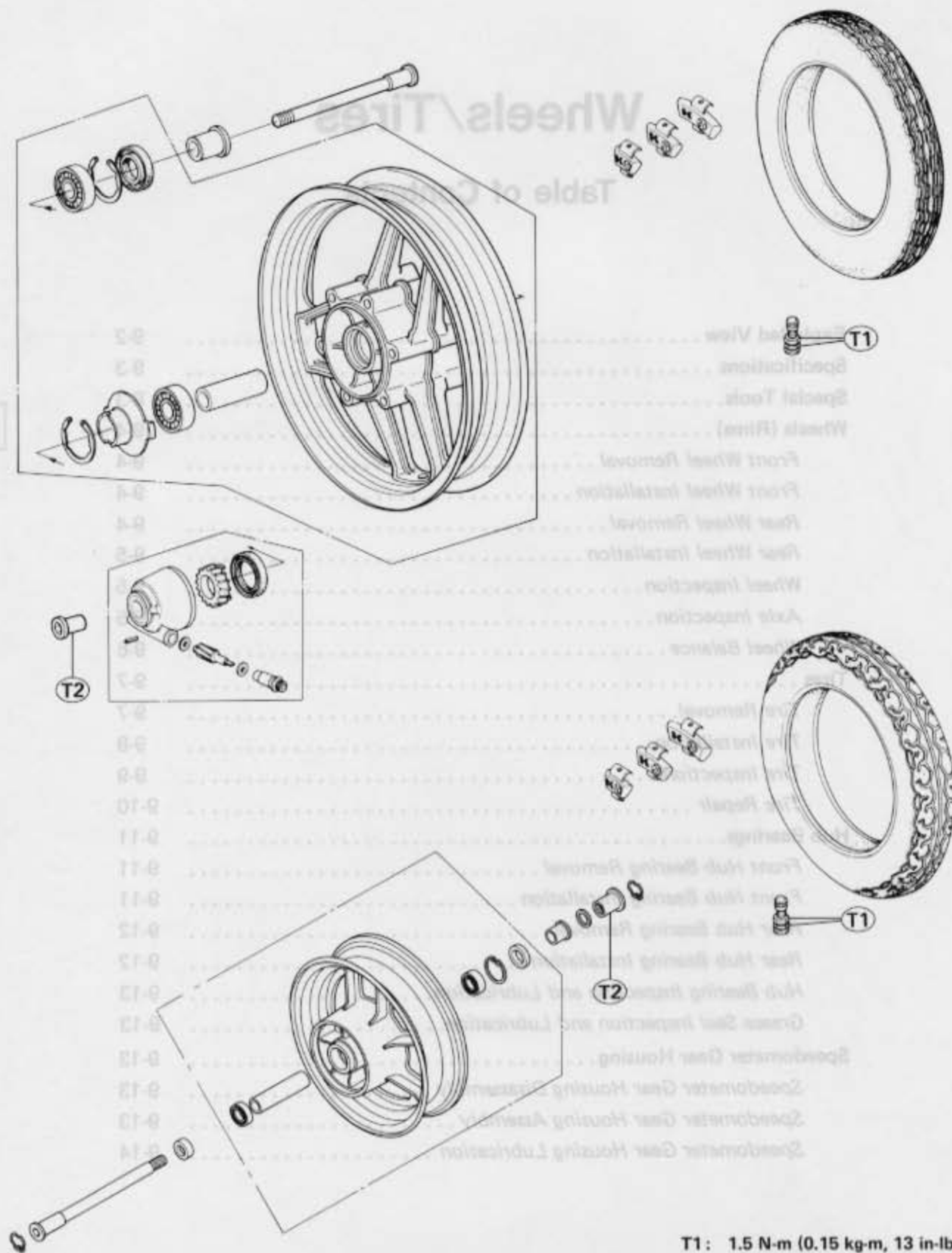
Wheels/Tires

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9-2 WHEELS/TIRES

Exploded View



T1: 1.5 N-m (0.15 kg-m, 13 in-lb)
T2: 88 N-m (9.0 kg-m, 65 ft-lb)

Specifications

Item		Standard		Service Limit	
Wheels:					
Tire tread depth:	Front	4.4 mm		1 mm	
	Rear	7.0 mm		2 mm (Under 130 km/h) 3 mm (Over 130 km/h)	
Standard tire:	Front	120/80 V 16-V250 TUBELESS DUNLOP F-17		---	
	Rear	130/80 V 18-V250 TUBELESS DUNLOP K727		---	
		Load	Air Pressure (when cold)		
			Under 210 km/h (Under 130 mph)	Over 210 km/h (Over 130 mph)	
Tire air pressure	US and Canadian Model	Front	Up to 956 N (97.5 kg, 215 lb)	225 kPa (2.25 kg/cm ² , 32 psi)	
			956 – 1,770 N (97.5 – 180 kg, 215 – 397 lb)	250 kPa (2.50 kg/cm ² , 36 psi)	
		Rear	Up to 1,770 N (180 kg, 397 lb)	250 kPa (2.50 kg/cm ² , 36 psi)	
	Other than US and Canadian Model	Front	Up to 956 N (97.5 kg, 215 lb)	225 kPa (2.25 kg/cm ² , 32 psi)	250 kPa (2.5 kg/cm ² , 36 psi)
			956 – 1,775 N (97.5 – 181 kg, 215 – 399 lb)	250 kPa (2.5 kg/cm ² , 36 psi)	
		Rear	Up to 1,775 N (181 kg, 399 lb)	250 kPa (2.5 kg/cm ² , 36 psi)	290 kPa (2.9 kg/cm ² , 41 psi)
Rim runout:	Axial	---		0.5 mm	
	Radial	---		0.8 mm	
Axle runout/100 mm:		Under 0.05 mm		0.2 mm (0.7 mm : RL)	

Special Tools

Bearing Driver Set: 57001-1129

Use the following tools in the set.

Bearing Driver Holder: 57001-1132

Bearing Driver: 57001-1135

Bearing Driver: 57001-1136

Bearing Driver: 57001-1145

Bearing Driver: 57001-1146

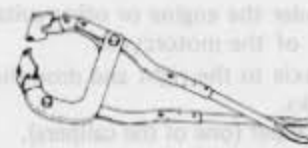
Circlip Pliers: 57001-143



Rim Protector: 57001-1063



Bead Breaker Ass'y: 57001-1072



Tire Iron: 57001-1073

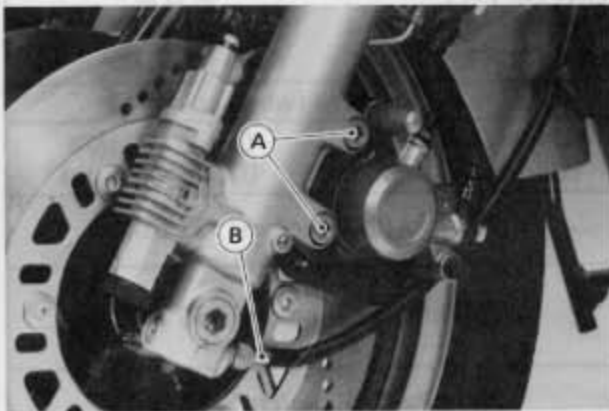


9-4 WHEELS/TIRES

Wheels (Rims)

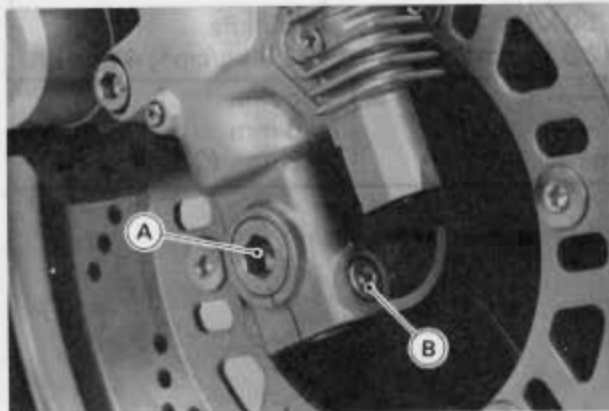
Front Wheel Removal

- Remove the following parts before front wheel removal.
 - Lower fairing
 - Speedometer cable lower end
 - Brake caliper mounting bolts (one of the calipers)



A. Caliper Mounting Bolts B. Speedometer Cable

- Right side axle clamp bolt loosened



A. Axle B. Axle Clamp Bolt

- Axle loosened
- Use a jack under the engine or other suitable means to lift the front of the motorcycle.
- Pull out the axle to the right and drop the front wheel out of the forks.
- Remove the caliper (one of the calipers).
- Remove the front wheel.

CAUTION

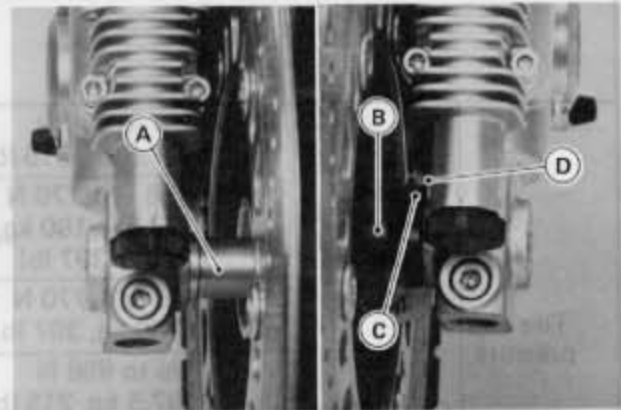
- Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the discs do not touch the ground.

Front Wheel Installation

- Installation is the reverse of removal. Note the following.

NOTE

- Install the speedometer gear housing so that it fits in the speedometer gear drive notches.
- Fit the speedometer gear housing stop to the fork leg stop, and check that the collar is on the right hand side of the hub.



A. Collar
B. Speedometer Gear Housing
C. Housing Stop
D. Fork Leg Stop

- Tighten the axle nut to the specified torque.
- Tighten the axle clamp bolts to the specified torque.
- Tighten the caliper mounting bolts to the specified torque.
- Check the front brake.

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 brakes will not function on the first application of the lever if this is not done.

Rear Wheel Removal

- Remove or loosen the following parts before rear wheel removal.
 - Axle clamp bolts (loosen)
 - Caliper fixing bolt and collar fixing bolt (loosen)
 - Drive chain (fully loosen)
 - Axle nut and axle (remove)
 - Caliper (remove)
- Pull the drive chain toward the left, and remove the rear wheel.

CAUTION

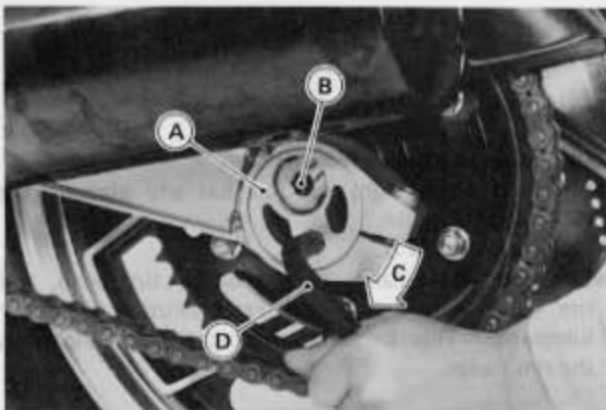
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.

Rear Wheel Installation

- Installation is the reverse of removal. Note the following.
- Adjust the drive chain after installation (see Drive Chain Adjustment in Final Drive chapter).

NOTE

When adjusting the drive chain, turn the chain adjuster against the wheel rotation.



A. Chain Adjuster
 B. Axle Nut
 C. Rotation
 D. Allen Wrench

Tighten the axle nut and axle clamp bolts to the specified torque.

Wheel Inspection

If there is any doubt as to the condition of the wheel, or if the wheel has received a heavy impact, check the rim runout as follows:

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

Set the dial gauge against the outer 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, check the wheel bearings first. Replace them if they are damaged. If the problem is not due to the bearings, the wheel must be replaced. Do not attempt to repair a damaged wheel.

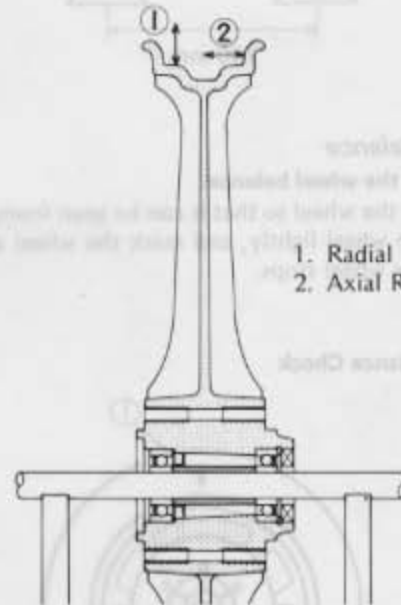
Axial Runout

Service Limit: 0.5 mm

Radial Runout

Service Limit: 0.8 mm

Rim Runout



1. Radial Runout
 2. Axial Runout

Carefully inspect the wheel for small cracks, dents, bending, or warping. If there is any damage to the wheel, it must be replaced.

WARNING

Never attempt to repair a damaged wheel. If there is any damage besides wheel bearings, the wheel must be replaced to insure safe operational condition.

If the rim has a scratch deeper than 0.5 mm and/or across the rim sealing surface, replace the wheel.

Axle Inspection

To measure wheel runout, remove the axle, place it in V blocks that are 100 mm apart, and set a dial gauge on the axle at a point halfway between the blocks. Turn the axle to measure the runout. The amount of runout is the amount of dial variation.

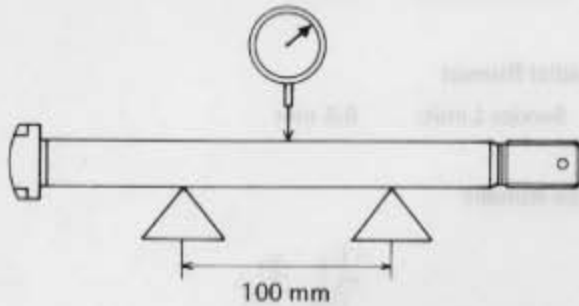
If runout exceeds the service limit, straighten the axle or replace it. If the axle cannot be straightened to within service limit, or if runout exceeds the repair limit, replace the axle.

Axle Runout/100 mm

Service Limit: 0.2 mm
 Repair Limit: 0.7 mm

9-6 WHEELS/TIRES

Axle Runout



Wheel Balance

To check the wheel balance:

- Support the wheel so that it can be spun freely
- Spin the wheel lightly, and mark the wheel at the top when the wheel stops.

Wheel Balance Check



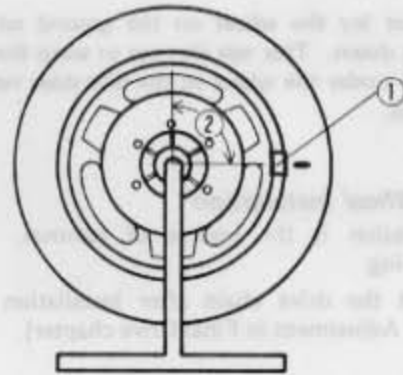
1. Mark

- Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

To balance the wheel:

- If the wheel always stops in one position, provisionally attach a balance weight on the rim at the marking using adhesive tape.
- Rotate the wheel $\frac{1}{4}$ turn, and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.
- ★ If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated $\frac{1}{4}$ turn.
- Rotate the wheel another $\frac{1}{4}$ turn and then another $\frac{1}{4}$ turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.

Wheel Balance Adjust



1. Balance Weight
2. $\frac{1}{4}$ Turn

Installation of Balance Weight:

- Check if the weight portion has any play on the blade-and-clip plate.
- ★ If it does, discard it.
- Lubricate the balance weight blade, tire bead, and rim flange with a soap and water solution or rubber lubricant. This helps the balance weight slip onto the rim flange.

CAUTION

- Do not lubricate the tire bead with engine oil or gasoline because they will deteriorate the tire.

- Install the balance weight on the rim.
- Slip the weight onto the rim flange by pushing or lightly hammering the weight in the direction shown in the figure.
- Check that the blade and weight seat fully on the rim flange, and that the clip is hooked over the rim ridge and reaches the flat portion of the rim.

WARNING

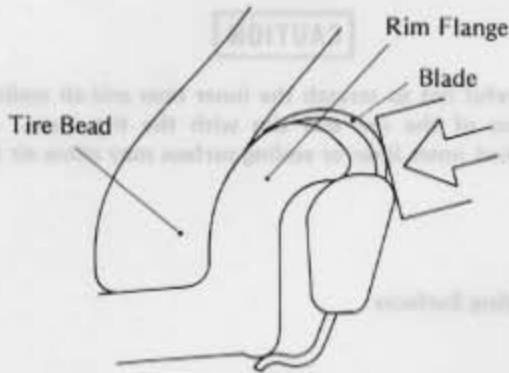
- If the balance weight has any play on the rim flange, the blade and/or the clip have been stretched. Replace the loose balance weight.
- Do not reuse balance weights.

Balance Weight

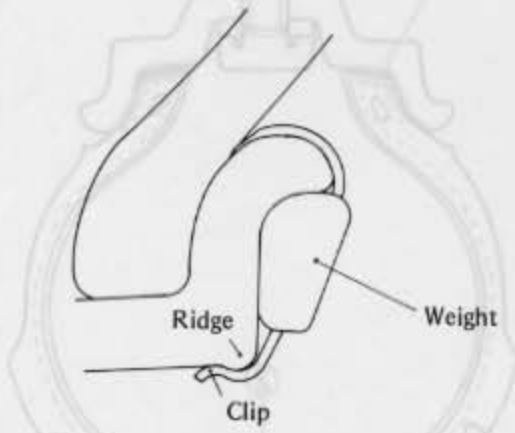
Part Number	Weight (grams)
41075-1014	10
41075-1015	20
41075-1016	30

Installing Balance Weight

(a) Press or lightly hammer the weight in.



(b) Installation completed.

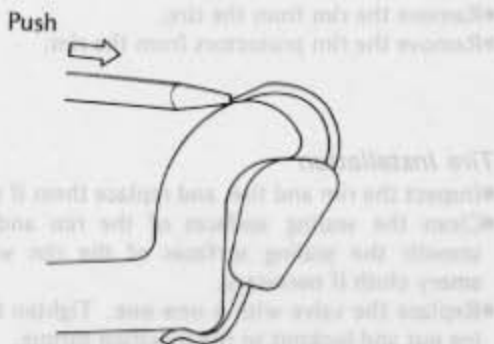


Removal of Balance Weight:

(a) When the tire is not on the rim.

- Push the blade portion toward the outside with a regular tip screw driver, and slip the weight off the rim flange.
- Discard the used balance weight.

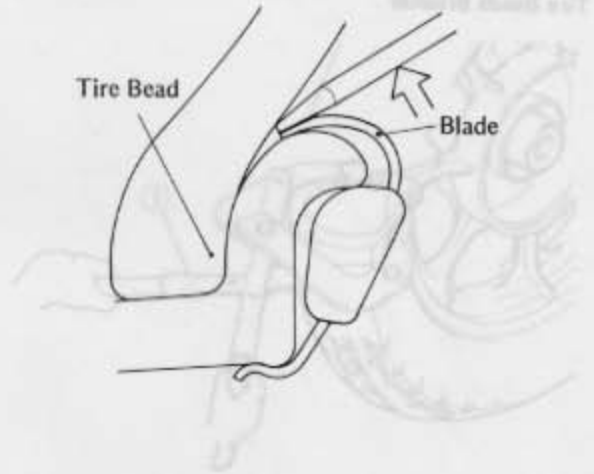
Removing Balance Weight (without tire on rim)



(b) When the tire is on the rim.

- Pry the balance weight off the rim flange using a regular tip screw driver as shown in the figure.
- Insert the tip of the screw driver between the tire bead and the weight blade until the end of the tip reaches the end of the weight blade.
- Push the screw driver grip toward the tire so that the balance weight slips off the rim flange.
- Discard the used balance weight.

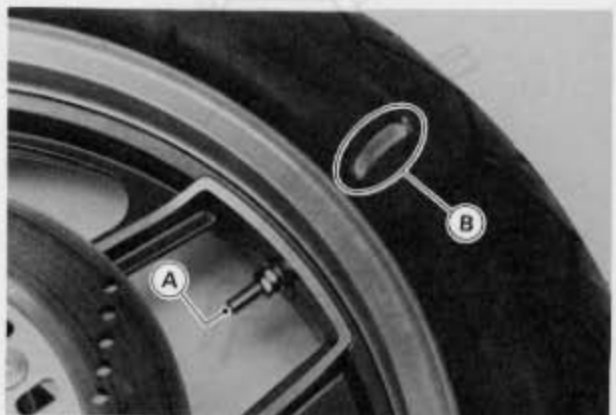
Removing Balance Weight (with tire on rim)



Tires

Tire Removal

- Remove the wheel from the motorcycle (see Front Wheel Removal or Rear Wheel Removal), and remove the disc(s) from the hub.
- 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. Valve Core

B. Chalk Mark

9-8 WHEELS/TIRES

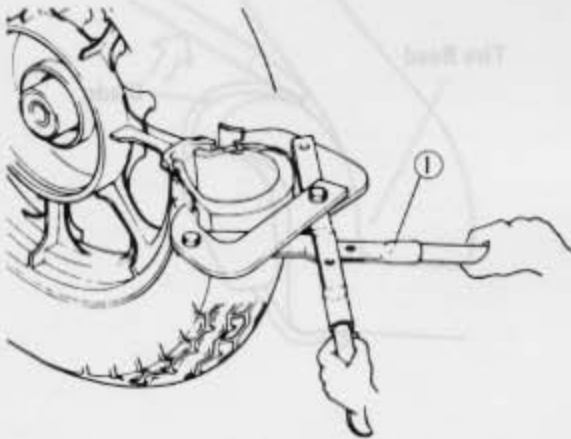
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

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 the rim with the bead breaker (special tool).

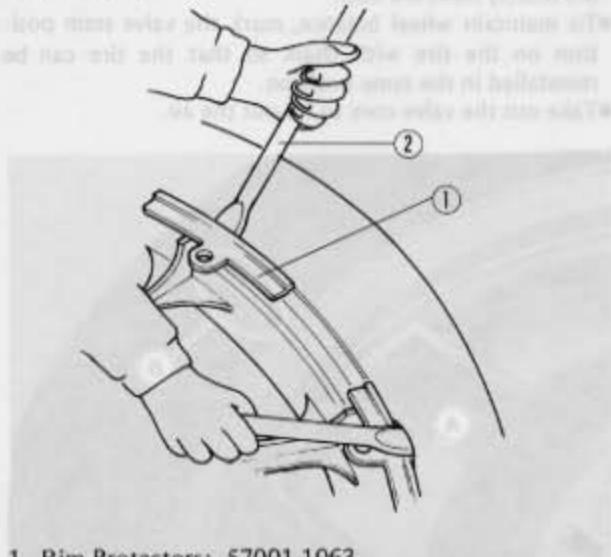
Tire Beads Breaker



1. Bead Breaker: 57001-1072

- Install the rim protectors (special tools) around the valve stem. Lubricate the tire irons and rim protectors with a soap and water solution, or rubber lubricant.
- Step on the side of the tire opposite the valve stem, and start prying the tire off the rim near the valve stem with tire irons (special tools).

Tire Removal



1. Rim Protectors: 57001-1063
2. Tire Irons: 57001-1073

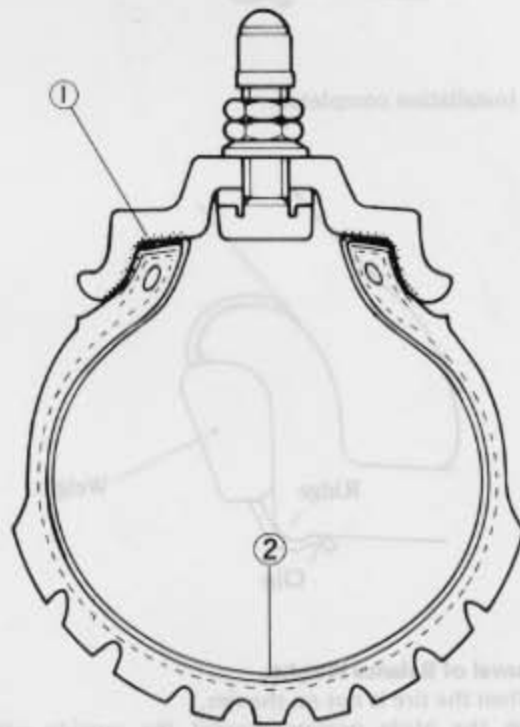
NOTE

- For easier removal, always position the tire bead opposite the valve stem in the rim well, and pry the tire bead a little at a time.

CAUTION

- Be careful not to scratch the inner liner and air sealing surfaces of the rim and tire with the tire irons. A scratched inner liner or sealing surface may allow air to leak.

Air Sealing Surfaces



1. Air Sealing Surfaces
2. Inner Liner

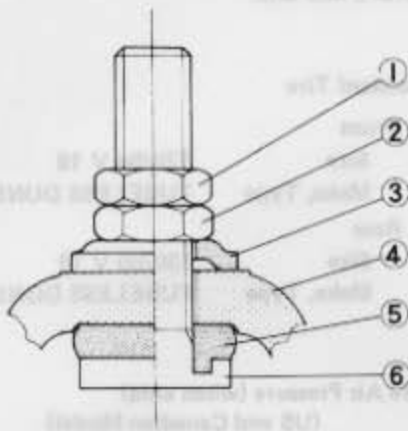
- After removing the bead on one side, remove the other bead from the same side.
- Remove the rim from the tire.
- Remove the rim protectors from the rim.

Tire Installation

- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Replace the valve with a new one. Tighten the mounting nut and locknut to the specified torque.

Air Valve

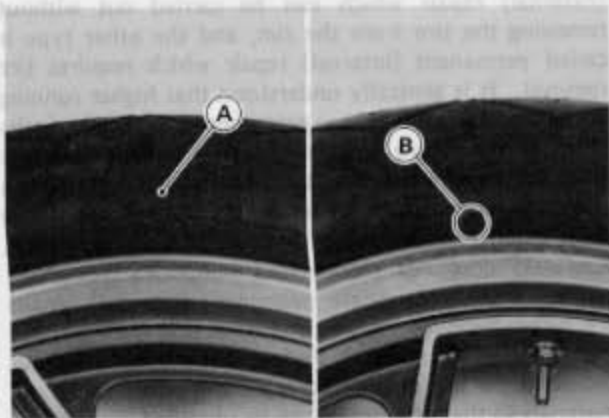
1. Locknut
2. Nut
3. Washer
4. Cast Wheel
5. Grommet
6. Valve Stem



- Apply a soap and water solution, or rubber lubricant to the rim flanges, rim protectors, tire beads, and tire irons.
- Check the tire rotation mark on the rear tire and install it on the rim accordingly.

NOTE

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



A. Rotation Mark (Arrow)
B. Balance Mark (Yellow Paint)

- 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).
- Fit the rim protectors and tire irons to install the remaining part of the tire bead which cannot be installed by hand. For easy tire installation, position the part of the bead which is already over the rim flange in the rim well.
- By hand, slide as much as possible of the lower side of the tire bead over the rim flange, starting at the side opposite the valve.

NOTE

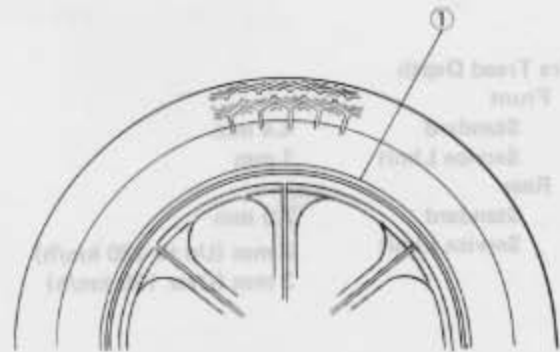
○ To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.

- Install the other side of the tire bead onto the rim in the same manner.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.

WARNING

- Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 390 kPa (4.0 kg/cm², 57 psi). Overinflation can explode the tire with possibility of injury and loss of life.
- Check to see that the rim lines on both sides of the tire sidewalls are parallel with the rim flanges.

Rim Line



1. Rim line

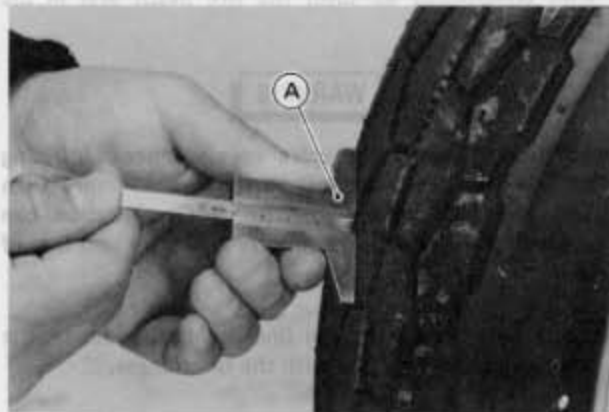
- If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core. Lubricate the rim flanges and tire beads. Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leaks. Inflate the tire slightly above standard inflation. Use a soap and water solution or submerge it, and check for bubbles that would indicate leakage.
- Adjust the air pressure to the specified pressure (see Tire Inspection).
- Install the brake disc(s).
- Adjust the wheel balance (see Wheel Balance).

Tire Inspection

As the tire tread wears down, the tire becomes more susceptible the 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.

9-10 WHEELS/TIRES

- 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. Depth Gauge

Tire Tread Depth

Front

Standard	4.4 mm
Service Limit	1 mm

Rear

Standard	7.0 mm
Service Limit	2 mm (Up to 130 km/h) 3 mm (Over 130 km/h)

WARNING

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

Tire Air Pressure (when cold)

(Other than US and Canadian Model)

	Load	Air Pressure (when cold)	
		Under 210 km/h (130 mph)	Over 210 km/h (130 mph)
Front	Up to 956 N (97.5 kg, 215 lb)	225 kPa (2.25 kg/cm ² , 32 psi)	250 kPa (2.5 kg/cm ² , 36 psi)
	956 – 1,775 N (97.5 – 181 kg, 215 – 399 lb)	250 kPa (2.5 kg/cm ² , 36 psi)	
Rear	Up to 1,775 N (181 kg, 399 lb)	250 kPa (2.5 kg/cm ² , 36 psi)	290 kPa (2.90 kg/cm ² , 41 psi)

NOTE

○ Check and balance the wheel when a tire is replaced with a new one.

Standard Tire

Front

Size	120/80 V 16
Make, Type	TUBELESS DUNLOP F17

Rear

Size	130/80 V 18
Make, Type	TUBELESS DUNLOP K727

Tire Air Pressure (when cold)

(US and Canadian Model)

Front	Up to 956 N (97.5 kg, 215 lb)	225 kPa (2.25 kg/cm ² , 32 psi)
	956 – 1,770 N (97.5 – 180 kg, 215 – 397 lb)	250 kPa (2.50 kg/cm ² , 36 psi)
Rear	Up to 1,770 N (180 kg, 397 lb)	250 kPa (2.50 kg/cm ² , 36 psi)

Tire repair

Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs also have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

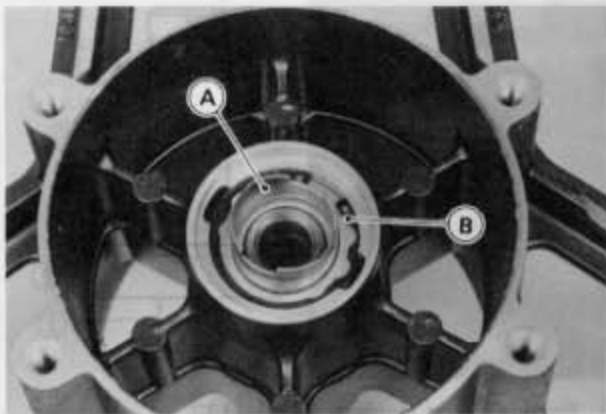
Hub Bearings

Front Hub Bearing Removal

CAUTION

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

- Remove the front wheel.
- Remove the speedometer gear housing, and collar(s) from the wheel.
- Remove the disc mounting Allen bolts and take off the discs.
- Remove the circlip and speedometer gear drive.



A. Speedometer Gear Drive B. Circlip

- Remove the grease seal using a hook, and remove the circlip.

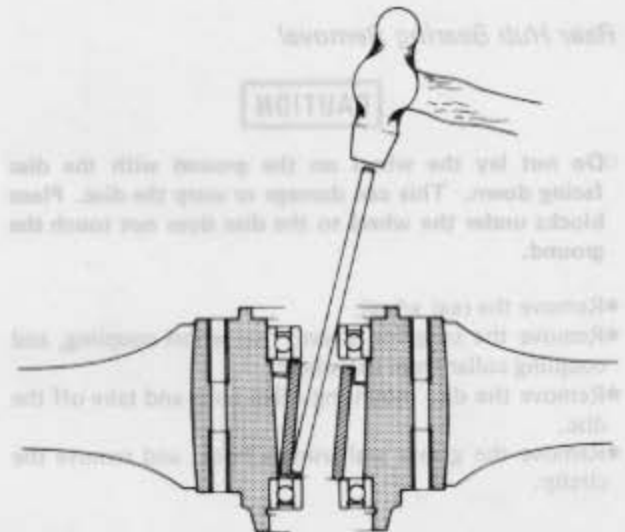


A. Grease Seal

- Insert a metal rod into the hub from the left side, and remove the right side bearing by tapping evenly around the bearing inner race.

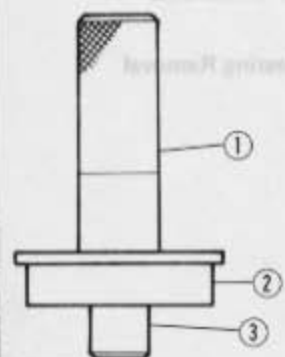
- Remove the remaining bearing by tapping evenly around the bearing inner race. The distance collar comes out with the bearing.

Bearing Removal



Front Hub Bearing Installation

- When installing the front hub bearings, be careful of the following items.
- Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Inspect the bearings and replace them if necessary. Lubricate them and install them using the bearing driver and the bearing driver holder (special tools) so that the marked or shielded sides face out.



1. Bearing Driver Holder: 57001-1132
2. Bearing Driver: 57001-1145
3. Bearing Driver: 57001-1135

- Inspect the grease seal and replace if necessary. Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.

9-12 WHEELS/TIRES

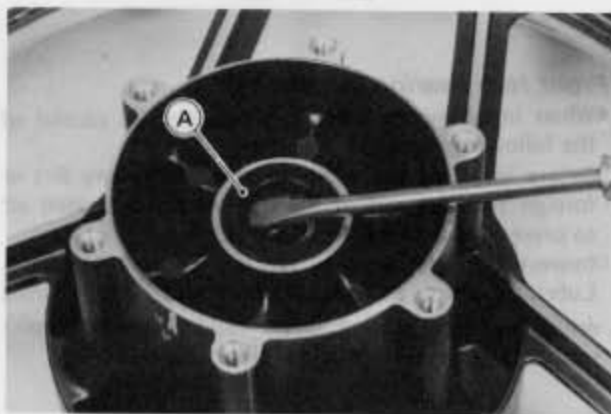
○Tighten the disc mounting Allen bolts to the specified torque. The disc must be installed with the chamfered hole side facing toward the wheel. After installing the disc check the disc runout. Completely clean off any grease that has gotten on either side of the disc with a high flash-point solvent. Do not use one which will leave an oily residue.

Rear Hub Bearing Removal

CAUTION

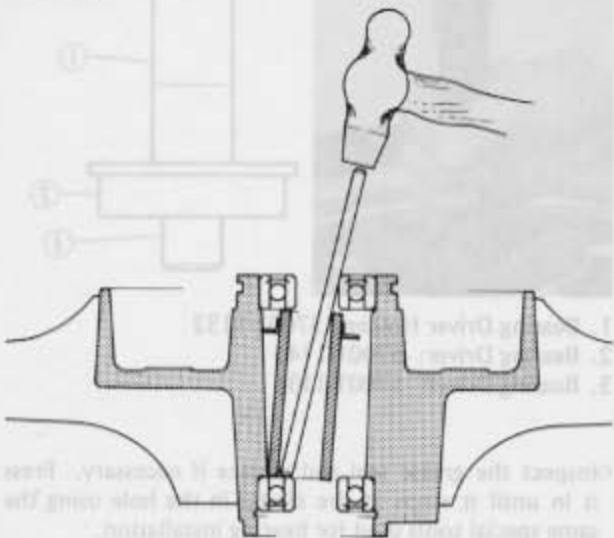
○Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.

- Remove the rear wheel.
- Remove the coupling sleeve, rear wheel coupling, and coupling collar from the wheel.
- Remove the disc mounting Allen bolts and take off the disc.
- Remove the grease seal using a hook, and remove the circlip.



A. Grease Seal

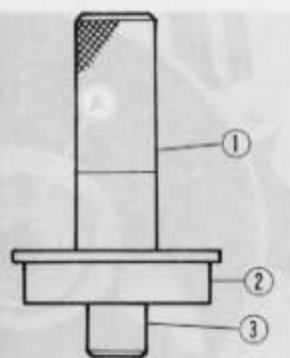
Bearing Removal



- Insert a metal rod into the hub from the left side, and remove the right side bearing by tapping evenly around the bearing inner race.
- Remove the remaining bearing by tapping evenly around the bearing inner race. The distance collar comes out with the bearing.

Rear Hub Bearing Installation

- When installing the rear hub bearings, be careful of the following items.
- Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Inspect the bearings and replace them if necessary (see Hub Bearing Inspection). Install them using the bearing driver and the bearing driver holder (special tools) so that the marked or shielded sides face out.

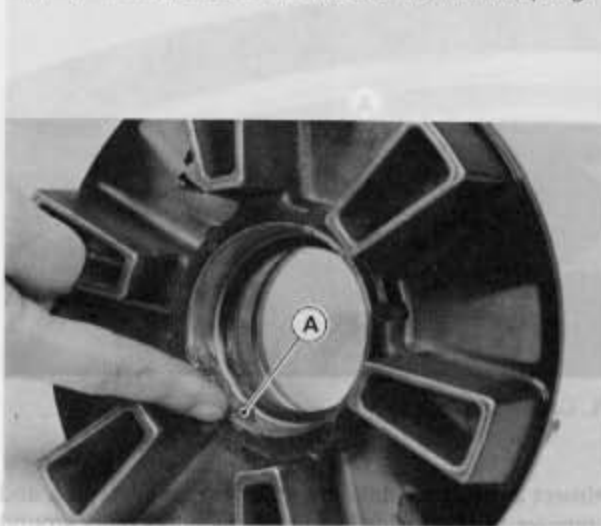


1. Bearing Driver Holder: 57001-1132

2. Bearing Driver: 57001-1146

3. Bearing Driver: 57001-1136

- Inspect the grease seal and replace if necessary (see Grease Seal inspection). Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.
- Apply a little grease to the inside of the rear coupling.



A. Grease.

- Tighten the disc mounting Allen bolts to the specified torque. The disc must be installed with the chamfered hole side facing toward the wheel. After installing the disc, check the disc runout (see Disc Wear in Brake chapter).
- Completely clean off any grease that has gotten on either side of the disc with a high flash-point solvent. Do not use one which will leave an oily residue.

Hub Bearing Inspection and Lubrication

- Since the hub bearings are made to extremely close tolerances, the clearance cannot normally be measured.
- For rear hub bearing, turn each bearing back and forth while checking for roughness or binding.
 - ★If roughness or binding is found, replace the bearing.
 - For front hub bearing, wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it 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 bearing is to be used again, rewash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease before installation. Turn the bearing by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the hub before bearing installation.

NOTE

- Since the bearings on the rear wheel hub are packed with grease and shielded, they are not required to be removed for lubrication.



A. Grease.

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

Grease Seal Inspection and Lubrication

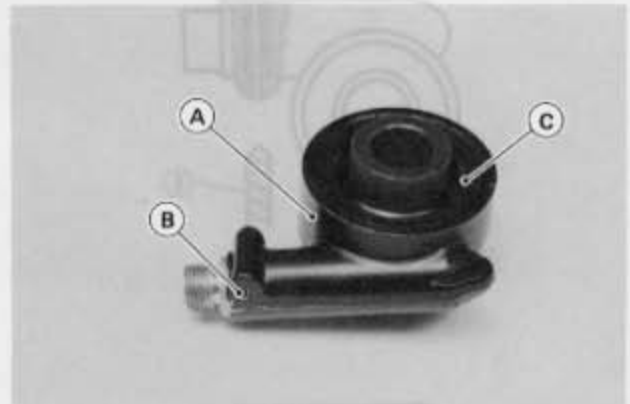
If the grease seals are examined without removing the seals themselves, look for discoloration (indicating the rubber has deteriorated), hardening, damage to the

internal ribbing, or other damage. If the seal or internal ribbing has hardened, the clearance between the seal and the axle sleeve will not be taken up, which will allow dirt and moisture to enter and reach the bearing. If in doubt as to its condition and whenever the seal is removed for greasing the bearing, the seal should be replaced. The seals are generally damaged upon removal.

Speedometer Gear Housing

Speedometer Gear Housing Disassembly

- Pull the speedometer gear housing and collar off the front wheel.
- Pull out the grease seal using a hook.



A. Speedometer Gear Housing C. Grease Seal
B. Pin

- Pull out the speedometer gear.
- If the speedometer cable bushing or speedometer pinion needs to be removed, first drill the housing through the pin using a 1.0 to 1.5 mm drill bit. Drill the housing from the under side using a 3.0 to 3.5 mm drill bit. Using a suitable 3 mm rod, tap out the pin, and then pull out the speedometer cable bushing, pinion, and washers.

NOTE

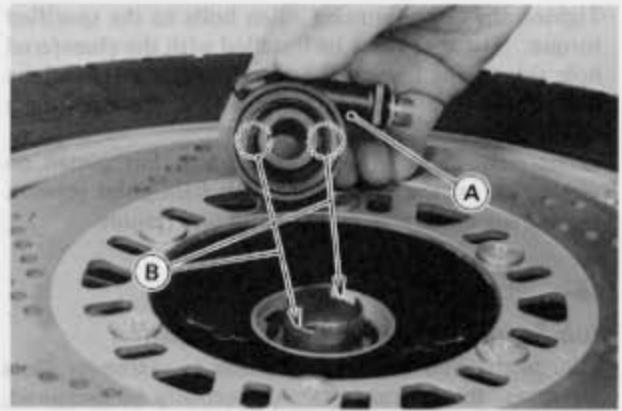
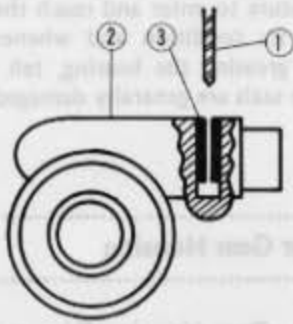
- It is recommended that the assembly be replaced rather than attempting to repair the components.

Speedometer Gear Housing Assembly

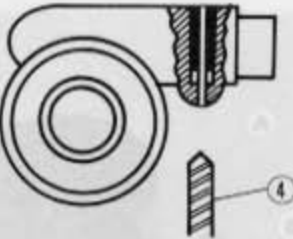
- When assembling the speedometer gear housing, be careful of the following items.
- After inserting a new pin, stake the housing hole to secure the pin in place.
- Replace the grease seal with a new one. Apply a little grease to the seal. Install it using a press or a suitable driver so that the face of the seal is level with the surface of the housing.
- Regrease the speedometer gear.
- Install the speedometer gear housing so that it fits in the speedometer gear drive notches.

9-14 WHEELS/TIRES

Speedometer Gear Housing Pin Removal

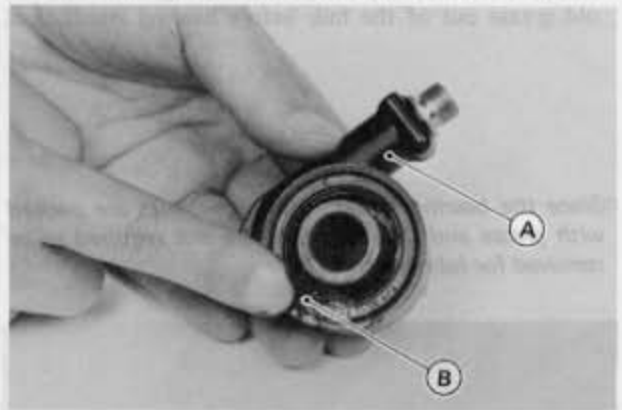
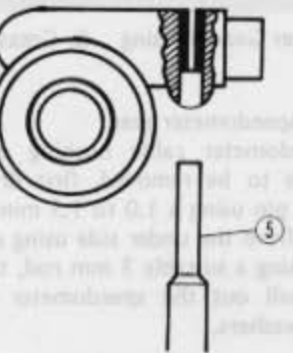


A. Speedometer Gear Housing
B. Fit in the gear drive notches.



Speedometer Gear Housing Lubrication

Clean and grease the speedometer gear housing.



A. Speedometer Gear Housing
B. Grease.

NOTE

It is recommended that this assembly be replaced rather than attempting to repair the components.

1. 1 ~ 1.5 mm bit
2. Housing
3. Pin
4. 3 ~ 3.5 mm bit
5. 3 mm Rod

When assembling the speedometer gear housing, be careful of the following items:
 After inserting a new pin, make the housing secure the pin in place.
 Replace the grease seal with a new one. Apply a little grease to the seal. Install it using a press or a suitable driver so that the lip of the seal is level with the surface of the housing.
 Disassemble the speedometer gear.
 Install the speedometer gear housing so that it fits in the speedometer gear drive housing.

Grease Seal Inspection and Lubrication
 If the grease seal is examined without removing the seal housing, look for deterioration (including the lip) for dirt, oil, or other damage to the seal.

Examine the bearing seal for signs of leakage.
 If the seal is torn or is leaking, replace the bearing.

A. Grease

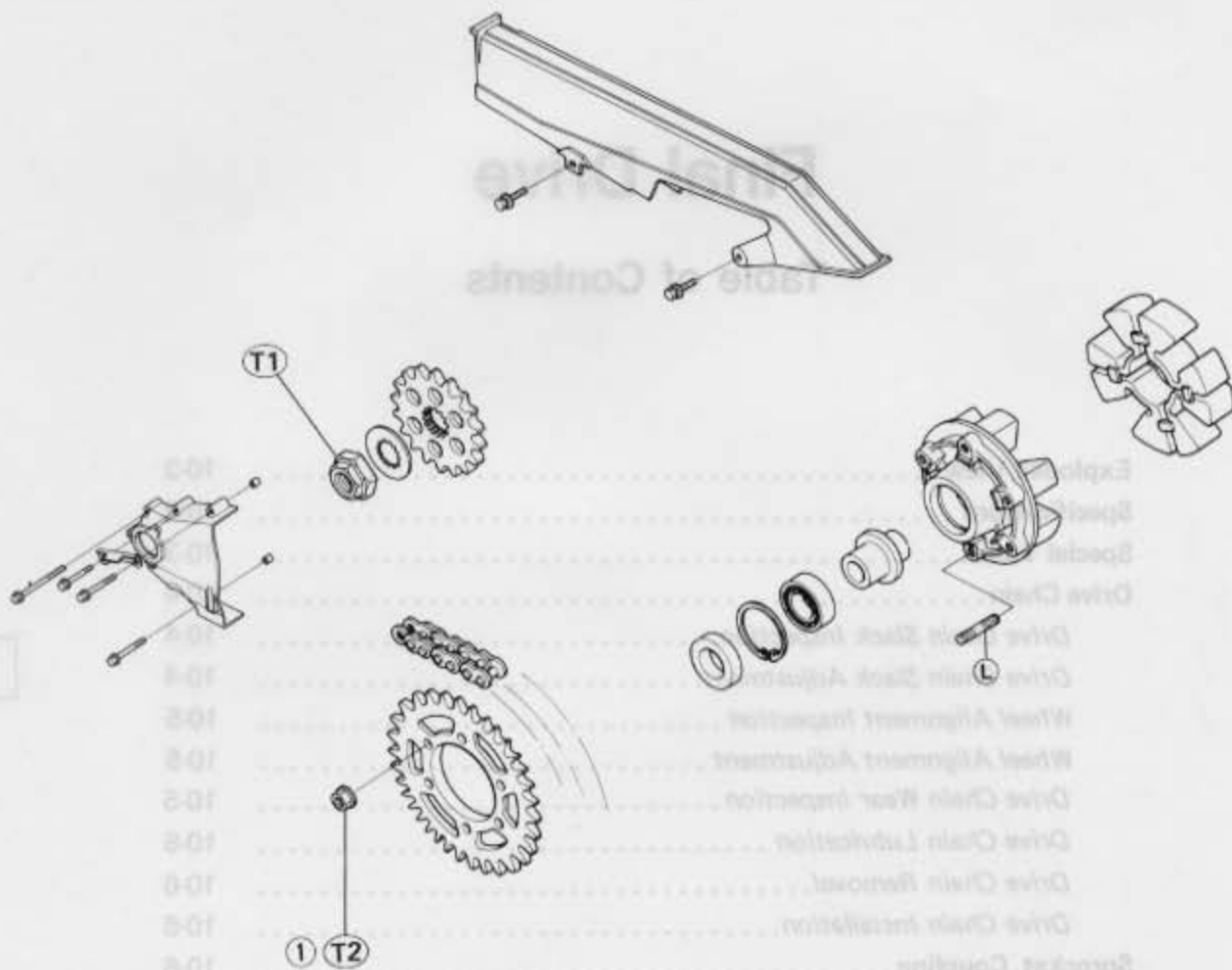
Final Drive

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10-2 FINAL DRIVE

Exploded View



1 : Rear Sprocket Nuts (see Rear Sprocket, Coupling Installation)

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

T1: 98 N·m (10.0 kg·m, 72 ft·lb)

T2:	Frame No.	
	Before JKAZX2A1□EA016130 ZX900A-016130	69 N·m (7.0 kg·m, 51 ft·lb)
	After JKAZX2A1□EA016131 ZX900A-016131	74 N·m (7.5 kg·m, 54 ft·lb)

Specifications

Item	Standard	Service Limit
Drive Chain:		
Make and type	Enuma Endless EK530 KVDO	--- ---
Chain slack	35 – 40 mm	Less than 35 mm, or more than 45 mm
20-Link length	317.5 – 318.4 mm	323 mm
Sprockets:		
Engine sprocket diameter	75.67 – 75.87 mm/17T	75.0 mm
Rear sprocket diameter	233.07 – 233.12 mm/48T 237.54 – 238.04 mm/49T 242.72 – 243.22 mm/50T	232.8 mm 237.2 mm 242.4 mm
Rear sprocket warp	Under 0.4 mm	0.5 mm

Special Tools

Bearing Driver Set: 57001-1129

Use following tools in the set.

Bearing Driver Holder: 57001-1132

Bearing Driver: 57001-1140

Bearing Driver: 57001-1146

Bearing Driver: 57001-1148



Circlip Pliers: 57001-143



10-4 FINAL DRIVE

Drive Chain

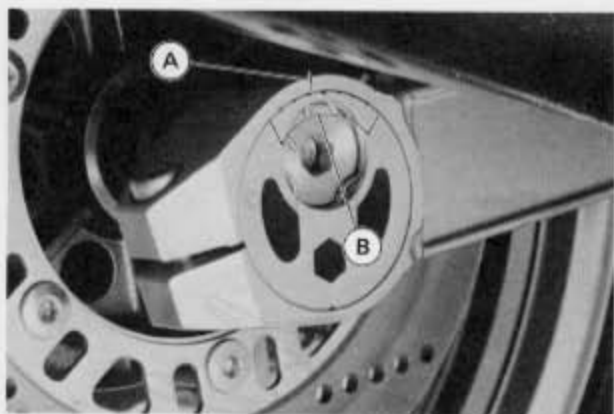
The drive chain must be checked, adjusted, and lubricated in accordance with the Periodic Maintenance Chart for safety and to prevent excessive wear. If the chain becomes badly worn or maladjusted — either too loose or too tight — the chain could jump off the sprocket or break.

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.

Drive Chain Slack Inspection

- Set the motorcycle up on its center stand.
- Check to see if wheel alignment is properly adjusted. The left and right notches on the swing arm should point to the same marks or positions on the left and right chain adjusters. If they do not, adjust wheel alignment as described in the later paragraph—Wheel Alignment Adjustment.



A. Swing Arm Notch B. Marks

NOTE

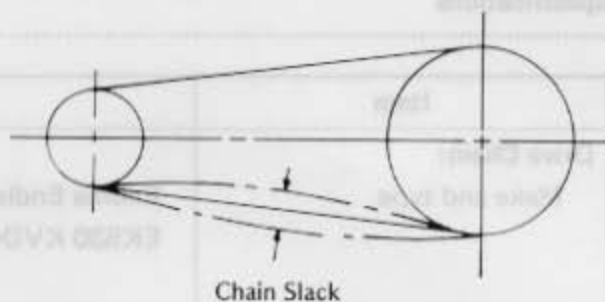
ⓘ Wheel alignment can also be checked using the straight-edge or string method.

WARNING

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

- Turn the rear wheel to find the position where the chain is tightest, and 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 will be within the standard value.

Chain Slack Inspection

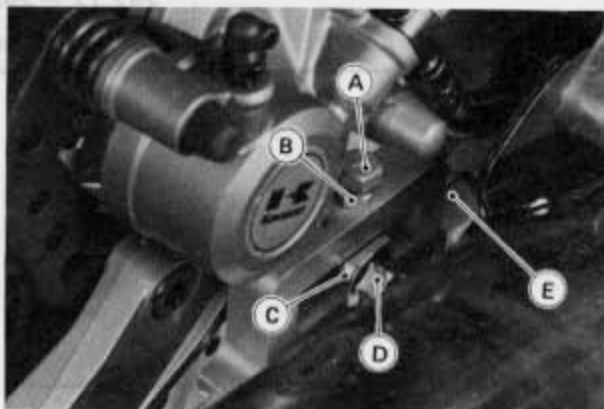


Drive Chain Slack

Standard:	35 – 40 mm
Too Tight:	Less than 35 mm
Too Loose:	More than 45 mm

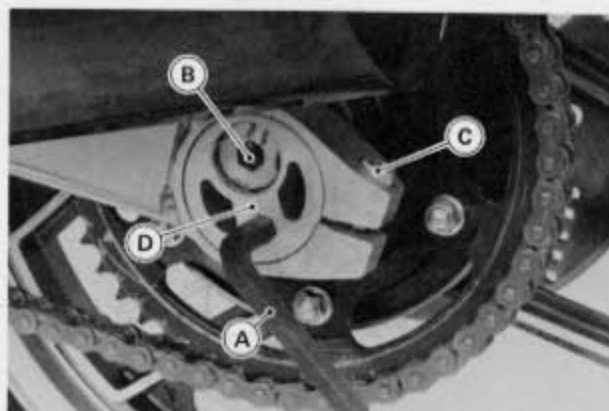
Drive Chain Slack Adjustment

- Loosen the locknut and collar fixing bolt.
- Loosen the caliper fixing bolt.



A. Collar Fixing Bolt D. Caliper Fixing Bolt
B. Locknut E. Swing Arm
C. Collar

- Loosen the left and right chain adjuster clamp bolts.
- Insert an Allen wrench into the hexagonal hole on the chain adjuster and turn the chain adjusters forward or rearward until the drive chain has the correct amount of chain slack.



A. Allen Wrench C. Adjuster Clamp Bolt
B. Rear Axle D. Chain Adjuster

- Tighten the chain adjuster clamp bolts to the specified torque.

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.
- Tighten the caliper fixing bolt, collar fixing bolts and locknut securely.

NOTE

- After chain adjustment check that the collar is under the collar fixing bolt. If it is not, move the fixing bolt to another hole in the swing arm.
- Check the rear brake effectiveness.

Wheel Alignment Inspection

- Set the motorcycle up on its center stand.
- Check to see if wheel alignment is properly adjusted. The left and right notches on the swing arm should point to the same marks or positions on the left and right adjusters.
- ★If they do not, adjust the wheel alignment.

NOTE

- Wheel alignment can also be checked using the straight-edge or string method.

WARNING

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

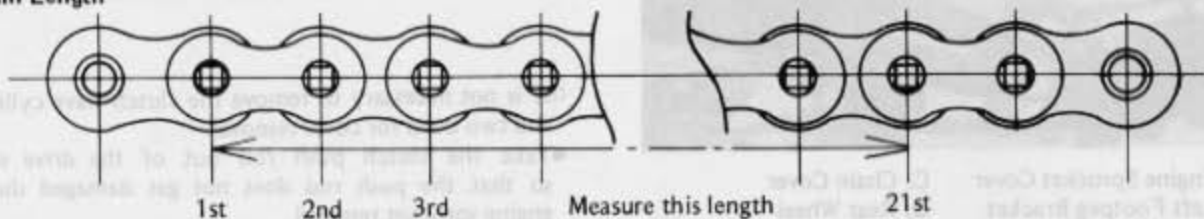
Wheel Alignment Adjustment

- Remove the left or right retaining ring.
- Loosen the axle nut.
- Loosen the collar and caliper fixing bolts.
- Loosen the left or right chain adjuster clamp bolt, and turn the chain adjuster so that the left and right notches on the swing arm point to the same marks or positions on the left and right adjusters.
- Inspect the chain slack.
- Tighten the collar and caliper fixing bolts.
- Tighten the clamp bolt and axle nut to the specified torque.
- Insert the retaining ring to secure the axle shaft.

WARNING

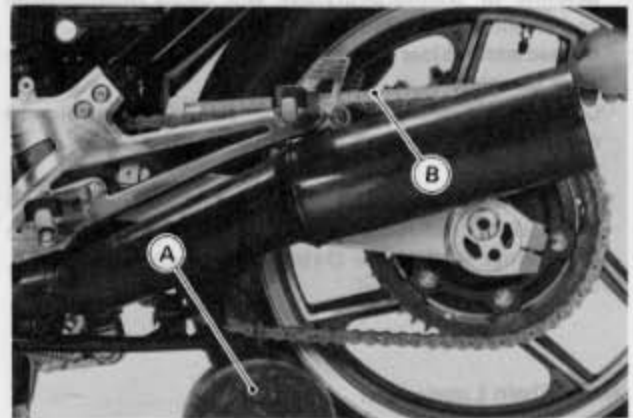
- If the axle nut or clamp bolts are not securely tightened or the retaining ring is not installed, an unsafe riding condition may result.

Chain Length



Drive Chain 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.
- Stretch the chain taut hanging a 98 N (10 kg, 20 lb) 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

Drive Chain 20-Link Length

Standard:	317.5 – 318.4 mm
Service Limit:	323 mm

- ★If any measurement exceeds the service limit, replace the chain. Also, replace the engine and rear sprockets when the drive chain is replaced.

WARNING

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

Drive Chain Lubrication

The chain should be lubricated with a lubricant which will both prevent the exterior from rusting and also absorb shock and reduce friction in the interior of the chain. An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication.

10-6 FINAL DRIVE

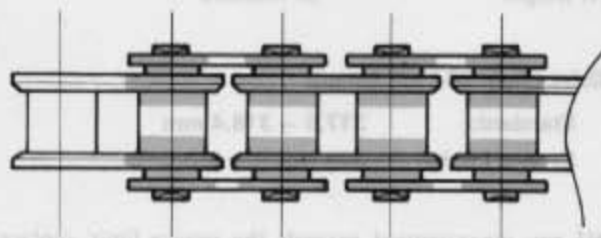
If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.

- If the chain appears especially dirty, it should be cleaned before lubrication.

CAUTION

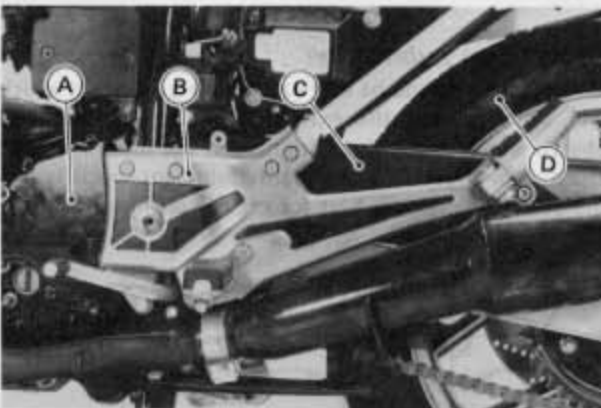
- The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.
- Use only kerosene or diesel oil for cleaning an O-ring drive chain. Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-rings.
- Immediately blow the chain dry with compressed air after cleaning.
- Complete cleaning and drying the chain within 10 minutes.
- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.

Drive Chain Lubrication



Drive Chain Removal

- Remove the engine sprocket (see Engine Sprocket Removal).



A. Engine Sprocket Cover
B. Left Footpeg Bracket
C. Chain Cover
D. Rear Wheel

- Remove the left footpeg bracket (see Footpeg Bracket Removal in Frame chapter).
- Remove the chain cover.
- Remove the rear wheel (see Rear Wheel Removal in Wheels and Tires chapter).
- Remove the drive chain toward the left side.

Drive Chain Installation

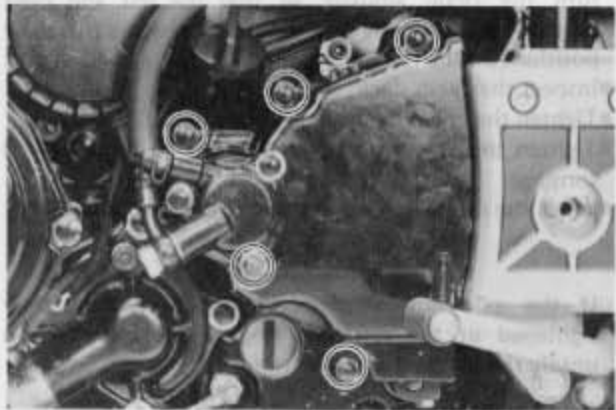
- Installation is the reverse of removal. Note the following.
- Adjust the drive chain after installation.
- Tighten the axle clamp bolts to the specified torque.

NOTE

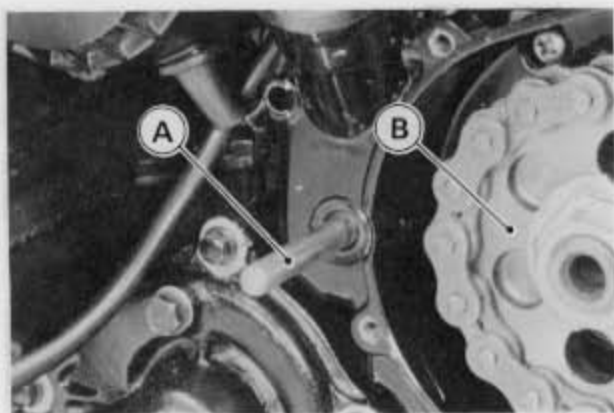
Sprocket, Coupling

Engine Sprocket Removal

- Remove the engine sprocket cover.

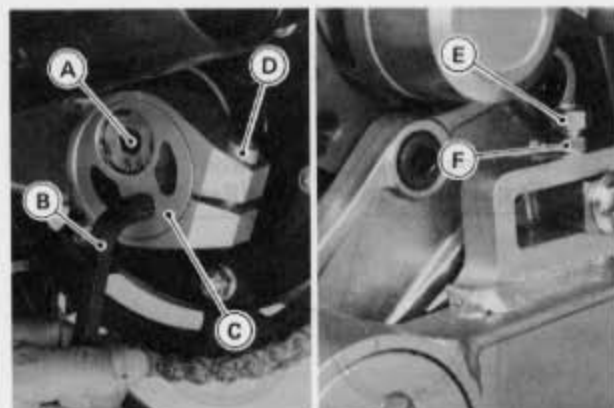


- It is not necessary to remove the clutch slave cylinder and two bolts for cover removal.
- Take the clutch push rod out of the drive shaft so that the push rod does not get damaged during engine sprocket removal.



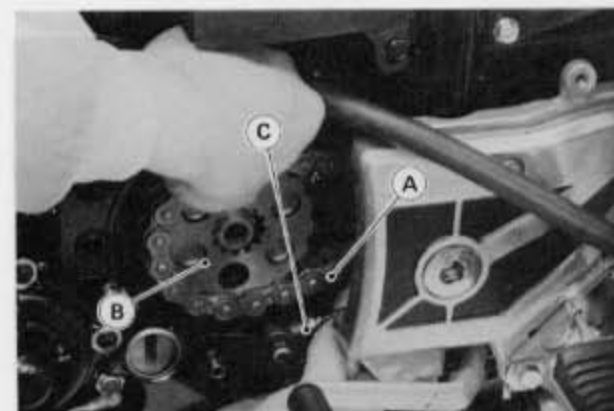
A. Push Rod B. Sprocket

- Loosen the engine sprocket nut while applying the rear brake.
- Loosen the locknut and collar fixing bolt.
- Loosen the left and right chain adjuster clamp bolts.
- Turn the chain adjusters so that the chain is loose.



A. Rear Axle B. Allen Wrench C. Chain Adjuster D. Adjuster Clamp Bolt E. Collar Fixing Bolt F. Locknut

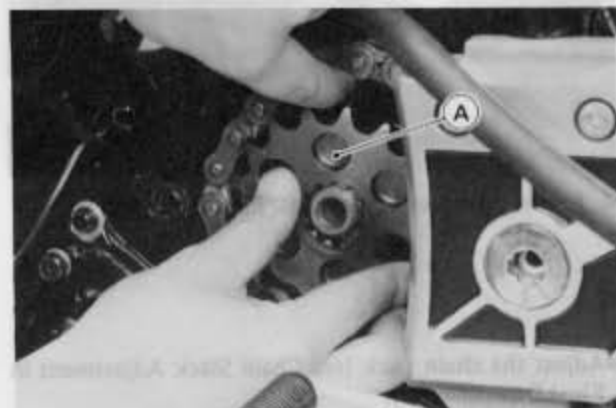
- Remove the drive chain from the rear sprocket with the rear wheel installed.
- Remove the washer and pull the engine sprocket off the output shaft with the drive chain. When this time, push up the chain to clear the shift pedal linkage.



A. Drive Chain B. Engine Sprocket C. Shift Pedal Linkage

Engine Sprocket Installation

- Engage the sprocket with the drive chain so that the recess faces outwards.
- Fit the sprocket onto the output shaft.

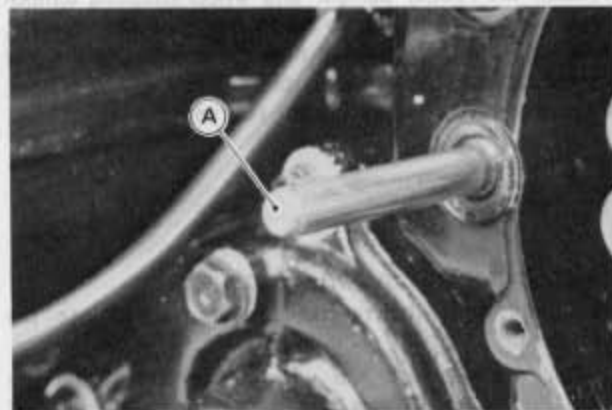


A. Recess Face

- Discard the used lockwasher and install a new one, and finger-tighten the sprocket nut.
- Install the drive chain on the rear sprocket. Temporarily, adjust the chain to remove all slack.
- Tighten the sprocket nut to the specified torque (see Exploded View), while applying the rear brake.
- Using pliers, bend the lockwasher to hold the nut.

CAUTION

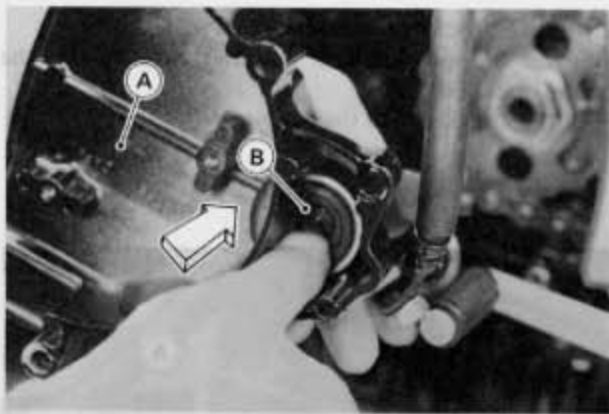
- Do not use a screwdriver, chisel or any other tool having a sharp edge.
- Install the clutch push rod so that the round end faces outwards.



A. Push Rod Round End

- Push the slave cylinder piston in by hand as far as it will go and install the engine sprocket cover.

10-8 FINAL DRIVE



A. Engine Sprocket Cover B. Push the piston in.

- Adjust the chain slack (see Chain Slack Adjustment in Final Drive chapter).

Rear Sprocket, Coupling Removal

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

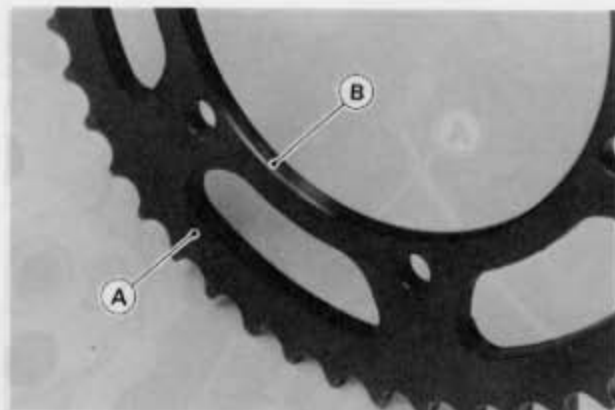
CAUTION

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

- Remove the coupling from the wheel.
- Pull out the coupling collar from the left, and the coupling sleeve from the right.
- Install the rubber damper and wheel coupling temporarily on the rear hub to aid in rear sprocket removal.
- Remove the rear sprocket nuts (6) to separate the rear sprocket from the wheel coupling.
- Remove the coupling from the rear wheel.

Rear Sprocket, Coupling Installation

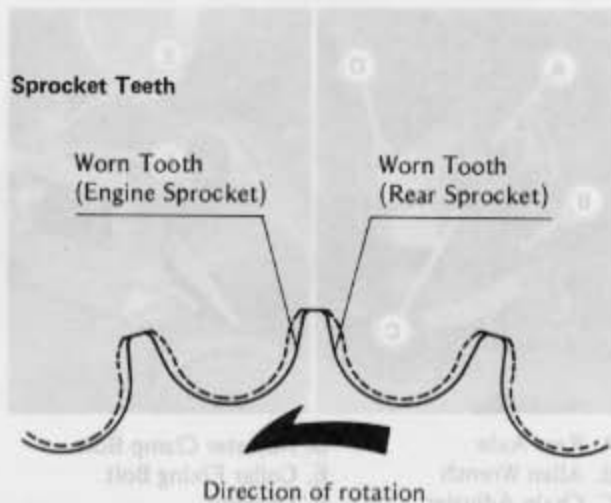
- Installation is the reverse of removal. Note the following.
- Replace the grease seal with a new one using the suitable driver. Press the seal in until the face of the seal is level with the end of the grease seal hole. Apply a little grease to the grease seal lip.
- Install the rear sprocket with the chamfered side facing toward the hub. Tighten the sprocket nuts to the specified torque. After torquing the nuts, loosen them about a quarter of turn and then tighten them to the specified torque again.



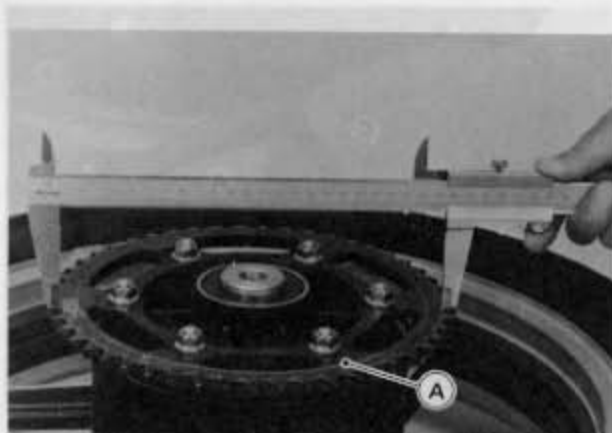
A. Rear Sprocket B. Chamfered Side

Sprocket Wear

Visually inspect the sprocket teeth. If they are worn as illustrated, replace the sprocket.



Measure the diameter of the sprocket at the base of the teeth. If the sprocket is worn down to less than the service limit, replace the sprocket.



A. Rear Sprocket

Sprocket Diameter**Engine Sprocket**

Standard	75.67 – 75.87 mm
Service Limit	75.0 mm

Rear Sprocket

48T	Standard	233.07 – 233.12 mm
	Service Limit	232.8 mm
49T	Standard	237.54 – 238.04 mm
	Service Limit	237.2 mm
50T	Standard	242.72 – 243.22 mm
	Service Limit	242.4 mm

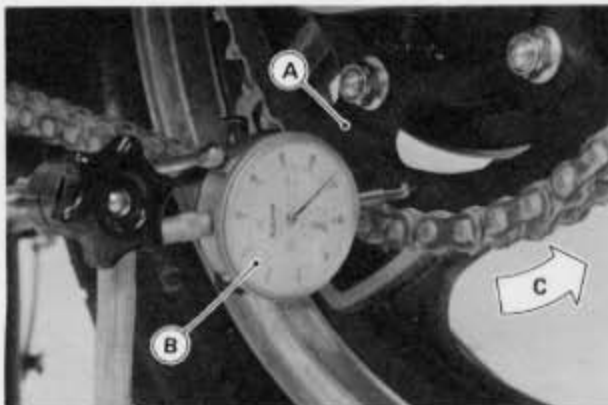
NOTE

○If a sprocket requires replacement, the chain is probably worn also. Upon replacing a sprocket, inspect the chain.

Sprocket Warp

Elevate the rear wheel so that it will turn freely, and set a dial gauge against the rear sprocket near the teeth as shown. Rotate the rear wheel. The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

If the runout exceeds the service limit, replace the rear sprocket.



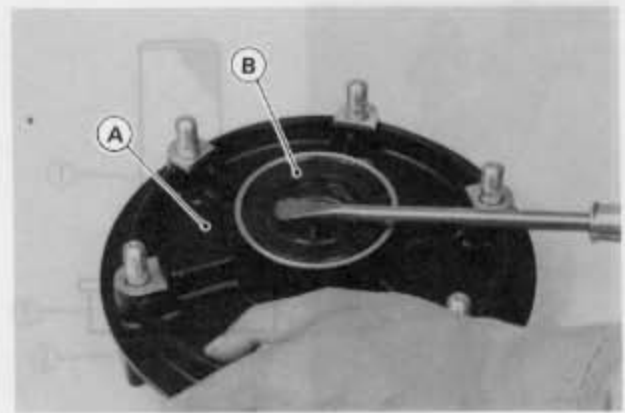
A. Rear Sprocket B. Dial Gauge C. Turn.

Rear Sprocket Warp

Standard	Under 0.4 mm
Service Limit	0.5 mm

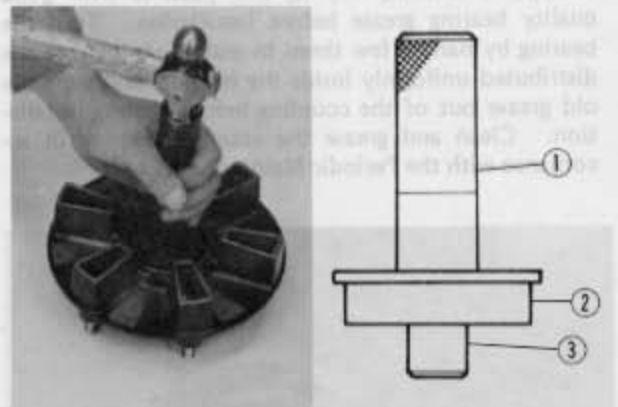
Coupling Bearing Removal

●Using a hook, pull out the grease seal and remove the circlip.



A. Wheel Coupling B. Grease Seal

●Using the bearing driver and driver holder (special tools) or some other suitable tool, remove the bearing by tapping from the wheel side.

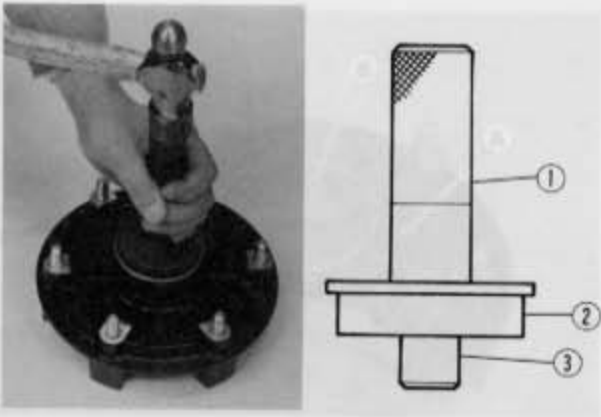


1. Bearing Driver Holder: 57001-1132
2. Bearing Driver: 57001-1146
3. Bearing Driver: 57001-1140

Coupling Bearing Installation

●Installation is the reverse of removal. Note the following.
○Inspect the bearing, and replace it if necessary (see Coupling Bearing Inspection). Lubricate it, and then install it using the wheel bearing driver and the bearing driver holder (special tools).

10-10 FINAL DRIVE



1. Bearing Driver Holder: 57001-1132
2. Bearing Driver: 57001-1148
3. Bearing Driver: 57001-1140

Coupling Bearing Inspection and Lubrication

Since the coupling bearing is made to extremely close tolerances, the clearance cannot normally be measured.

- Wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it 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 bearing is to be used again, rewash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease before installation. Turn the bearing by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the coupling before bearing installation. Clean and grease the coupling bearing in accordance with the Periodic Maintenance Chart.



A. Grease.

Grease Seal Inspection and Lubrication

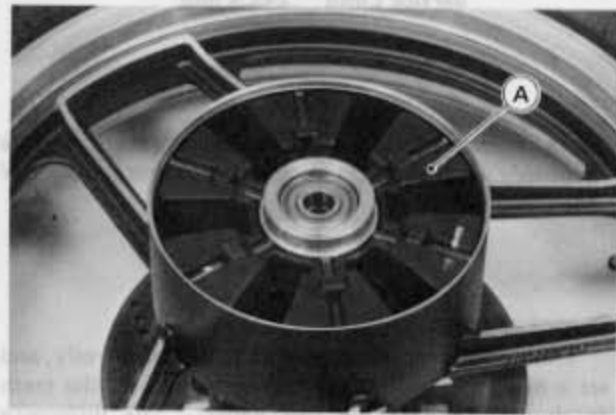
If the grease seals are examined without removing the seals themselves, look for discoloration (indicating the rubber has deteriorated), hardening, damage to the internal ribbing, or other damage. If the seal or internal ribbing has hardened, the clearance between the seal and the axle sleeve will not be taken up, which will allow dirt and moisture to enter and reach the bearing. If in

doubt as to its condition and whenever the seal is removed for greasing the bearing, the seal should be replaced. The seals are generally damaged upon removal.

Damper Inspection

Remove the rear wheel coupling, and inspect the rubber damper.

Replace the damper if it appears damaged or deteriorated.



A. Rubber Damper



A. Rubber Damper B. Axle Sleeve

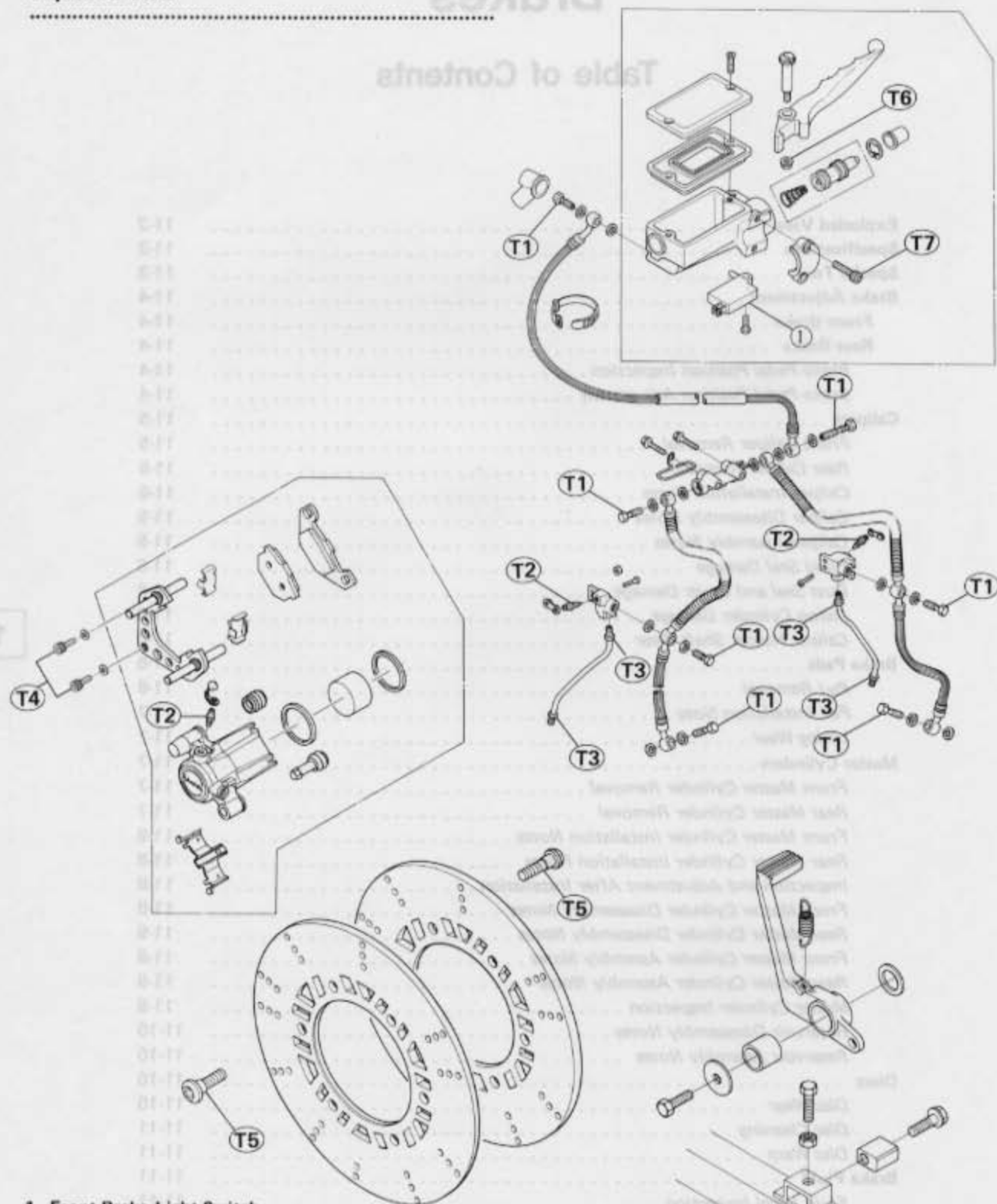
Brakes

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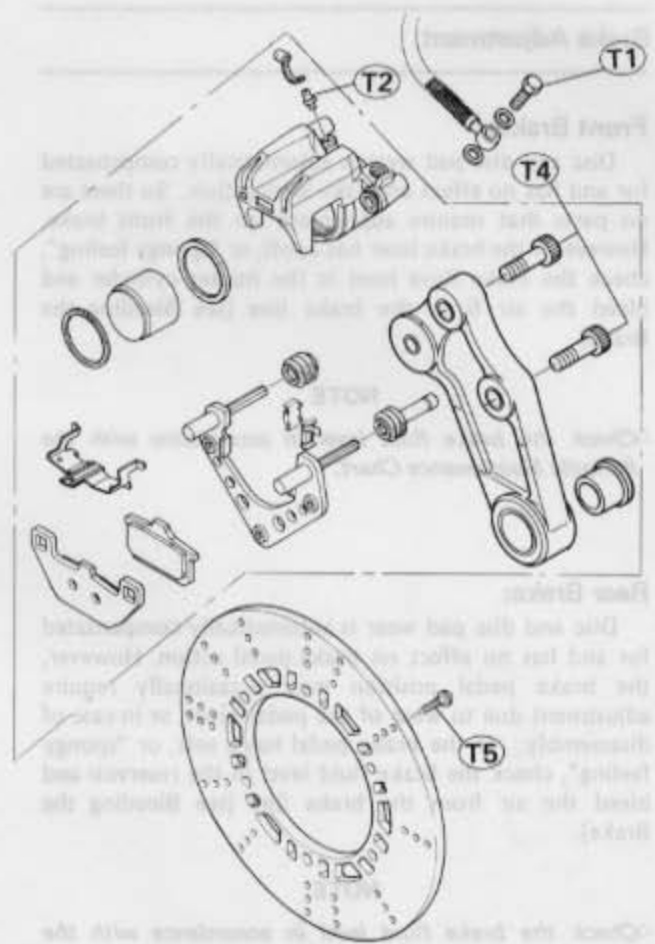
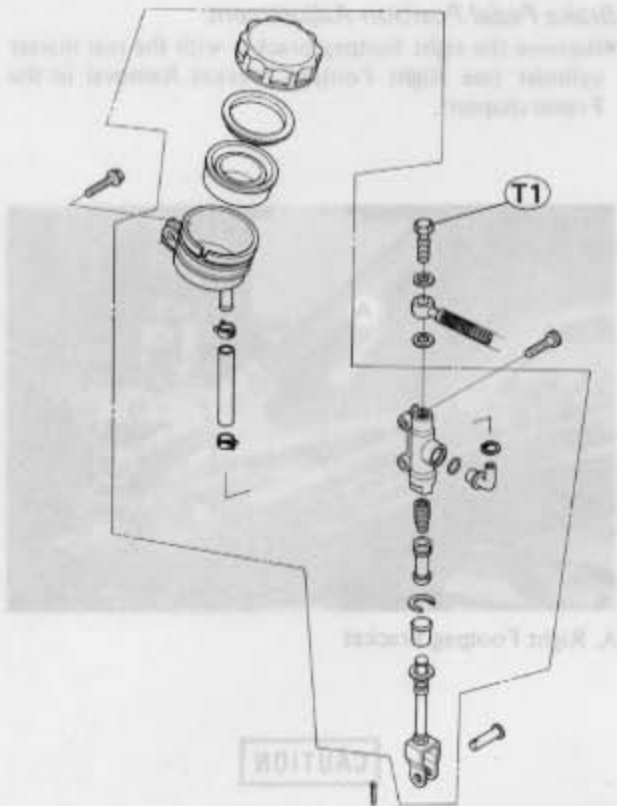
11-2 BRAKES

Exploded View



1. Front Brake Light Switch

- T1: 25 N-m (2.5 kg-m, 18.0 ft-lb)
- T2: 7.8 N-m (0.80 kg-m, 69 in-lb)
- T3: 15 N-m (1.5 kg-m, 11.0 ft-lb)
- T4: 32 N-m (3.3 kg-m, 24 ft-lb)
- T5: 23 N-m (2.3 kg-m, 16.5 ft-lb)
- T6: 5.9 N-m (0.60 kg-m, 52 in-lb)
- T7: 8.8 N-m (0.90 kg-m, 78 in-lb)



Specifications

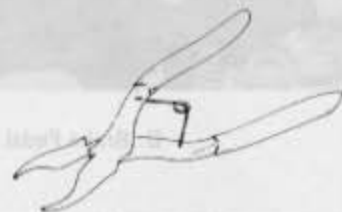
Item		Standard	Service Limit
Brakes:			
Pad lining thickness:	Front and Rear	4.85 mm	1 mm
Brake fluid grade		D.O.T.4	---
Brake pedal position		29 - 39 mm	---
Disc runout:	Front	Under 0.15 mm	0.3 mm
	Rear	Under 0.15 mm	0.3 mm
Disc thickness:	Front	4.8 - 5.1 mm	4.5 mm
	Rear	6.8 - 7.1 mm	6.0 mm

Recommended Brake Fluid

- Castrol Girling-Universal
- Castrol GT (LMA)
- Castrol Disc Brake Fluid
- Check Shock Premium Heavy Duty

Special Tool

Circlip Pliers: 57001-143



11-4 BRAKES

Brake Adjustment

Front Brake:

Disc and disc pad wear is automatically compensated for and has no effect on brake lever action. So there are no parts that require adjustment on the front brake. However if the brake lever has a soft, or "spongy feeling", check the brake fluid level in the master cylinder and bleed the air from the brake line (see Bleeding the Brake).

NOTE

○Check the brake fluid level in accordance with the Periodic Maintenance Chart.

Rear Brake:

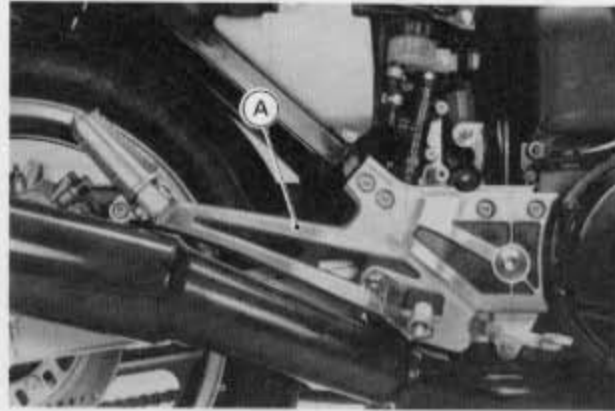
Disc and disc pad wear is automatically compensated for and has no effect on brake pedal action. However, the brake pedal position may occasionally require adjustment due to wear of the pedal pivot, or in case of disassembly. If the brake pedal has a soft, or "spongy feeling", check the brake fluid level in the reservoir and bleed the air from the brake line (see Bleeding the Brake).

NOTE

○Check the brake fluid level in accordance with the Periodic Maintenance Chart.

Brake Pedal Position Adjustment

●Remove the right footpeg bracket with the rear master cylinder (see Right Footpeg Bracket Removal in the Frame chapter).



A. Right Footpeg Bracket

CAUTION

○Take care not to damage the brake hose. Damage the brake line greatly reduces the brake line strength and brake fluid leakage, resulting in the loss of brake control.

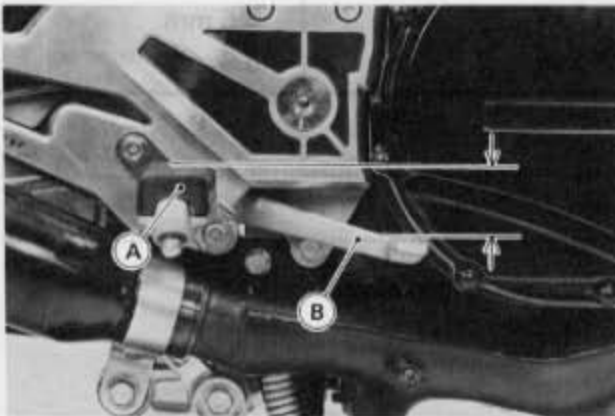
●Loosen the locknut, and turn in or turn out the adjusting nut to adjust the brake pedal position.

Brake Pedal Position Inspection

●When the brake pedal is in its rest position, it should be at the position specified.

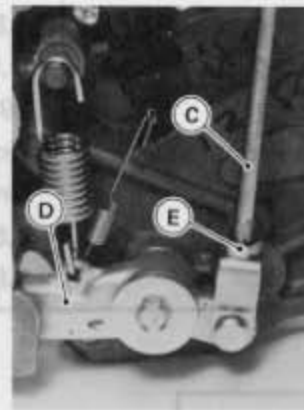
Pedal Position

Standard 29 – 39 mm below top of footpeg

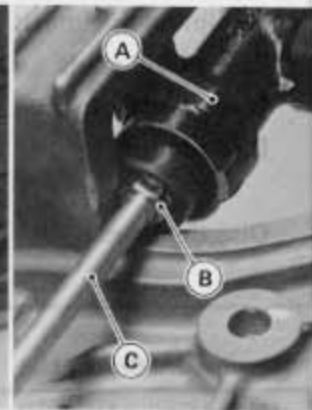


A. Footpeg

B. Brake Pedal



A. Master Cylinder
B. Adjusting Nut
C. Push Rod



D. Brake Pedal
E. Locknut

NOTE

○If the pedal position cannot be adjusted by turning the push rod, the brake pedal may be deformed or incorrectly installed.

●Reinstall the footpeg bracket, and check the brake pedal position.

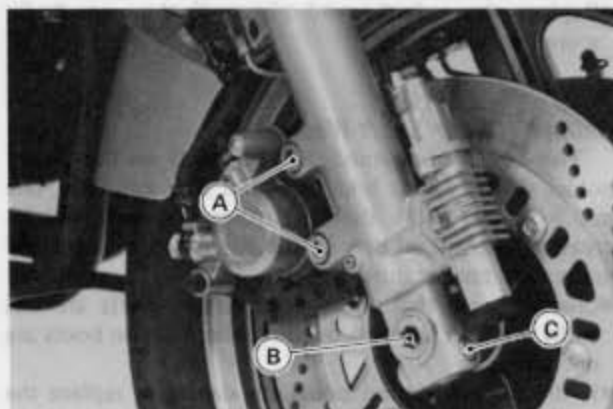
●Adjust the brake light switch if necessary.

●If it is not, adjust the brake pedal position as follows.

Calipers

Front Caliper Removal

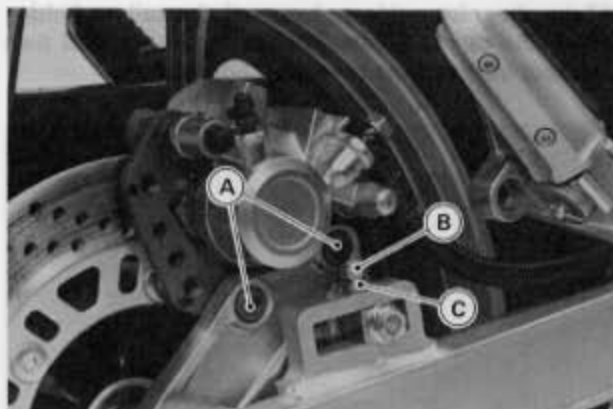
- Put the motorcycle on its center stand, remove lower fairing and support motorcycle with a jack under the engine or other suitable means.
- Loosen the caliper mounting bolts
- Loosen the right side axle clamp bolt
- Remove the axle and drop the front wheel.
- Push the front wheel toward the rear, then remove the caliper with caliper holder from the front fork.
- Disconnect the brake hose from the caliper.



A. Caliper Mounting Bolts C. Axle Clamp Bolt
B. Axle

Rear Caliper Removal

- Remove the right side muffler.
- Remove the caliper mounting bolts, and take off the caliper body with caliper holder. Loosen the locknut and remove the collar fixing bolt if necessary.



A. Mounting Bolts C. Locknut
B. Collar Fixing Bolt

- Remove the brake hose from the caliper.

- 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 or pedal to remove the caliper piston.
- Immediately wipe up any brake fluid that spills.

Caliper Installation Notes

- Connect the brake hose to the caliper putting a new flat washer on each side of the brake hose fitting.
- Check the fluid level in the master cylinder, and bleed the brake line (see Bleeding the Brake).
- Check the brake for weak braking power, brake drag, and fluid leakage.

Caliper Disassembly Notes

- 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 Notes

- 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.
- 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.

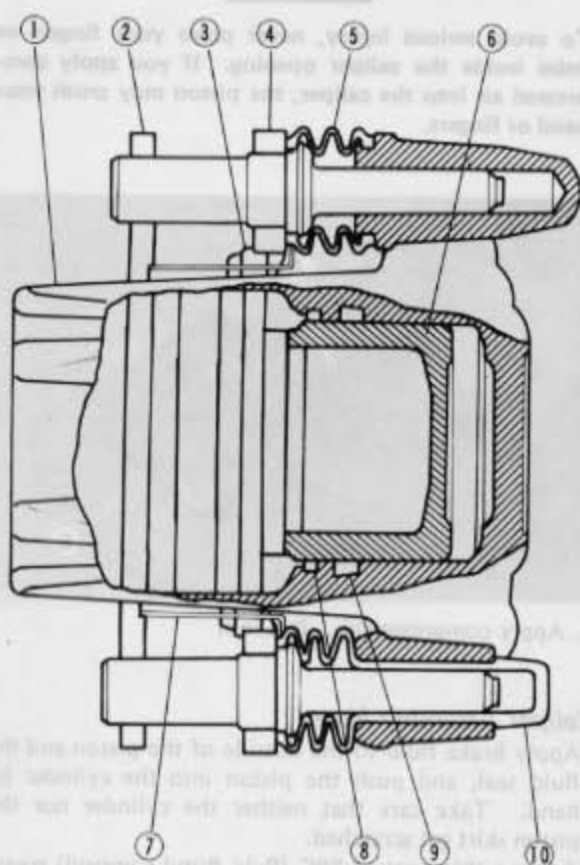


A. Anti-rattle Spring

Fluid Seal Damage

The fluid seal around the piston maintains the proper pad/disc clearance. If this seal is not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

Caliper



- | | |
|-------------------|-----------------------|
| 1. Caliper | 6. Piston |
| 2. Brake Pad | 7. Anti-Rattle Spring |
| 3. Brake Pad | 8. Dust Seal |
| 4. Caliper Holder | 9. Fluid Seal |
| 5. Dust Cover | 10. Friction Boot |

Replace the fluid seals under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in left and right pad wear; (d) the seal is stuck to the piston. If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.

Dust Seal and Cover Damage

- Check that the dust seals and covers are not cracked, worn, swollen, or otherwise damaged.
- ★ If they show any damage, replace them.

Piston Cylinder Damage

- Visually inspect the piston and cylinder surfaces.
- ★ Replace the cylinder and piston if they are badly scored or rusty.

Caliper Holder Shaft Wear

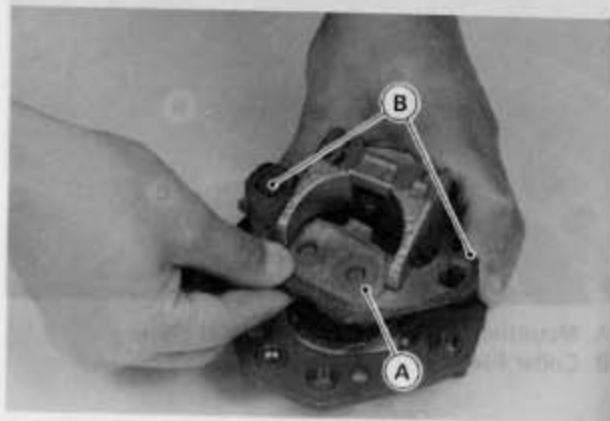
The caliper body must slide smoothly on the caliper holder shafts. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder shafts are not badly worn or stepped, or the rubber friction boots are not damaged.
- ★ If the rubber friction boots are damaged, replace the rubber friction boots, and the caliper holder.

Brake Pads

Pad Removal

- Remove the caliper (see Front or Rear Caliper Removal).
- Take the piston-side pad out of the caliper holder.
- Push the caliper holder forward the piston, and then remove the pad from the caliper holder shaft.



A. Pad

B. Caliper Holder

Pad Installation Note

- Push the caliper piston in by hand as far as it will go.

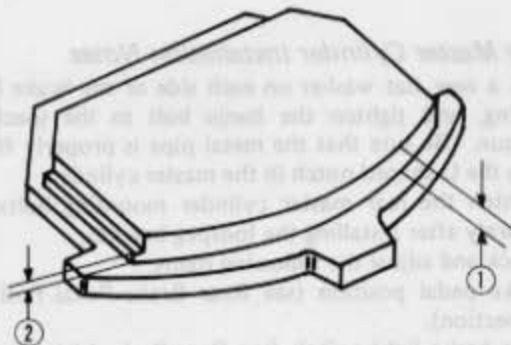
WARNING

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

Lining Wear

In accordance with the Periodic Maintenance Chart, inspect the front and rear brakes for wear.

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

Brake Pad

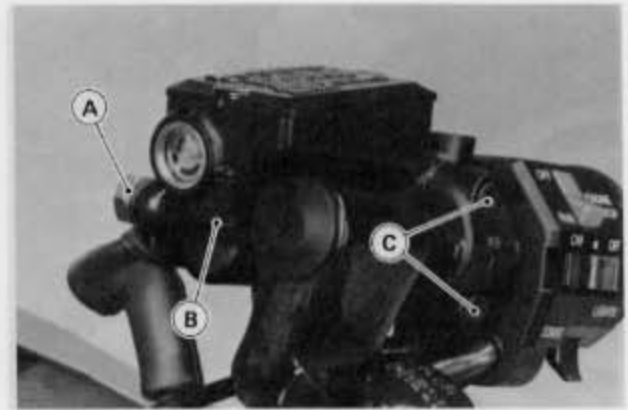
1. Lining Thickness
2. Service Limit

Pad Lining Thickness

Standard	4.85 mm
Service Limit	1 mm

Master Cylinders**Front Master Cylinder Removal**

- Pull back the dust cover, and remove the banjo bolt to disconnect the upper brake hose from the master cylinder. There is a flat washer on each side of the hose fitting.



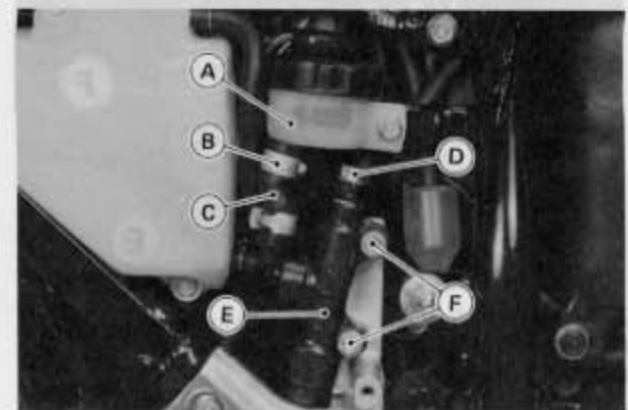
- A. Banjo Bolt
B. Master Cylinder

- C. Clamp Bolts

- Remove the clamp bolts and take off the master cylinder. Immediately wipe up any brake fluid that spills.

Rear Master Cylinder Removal

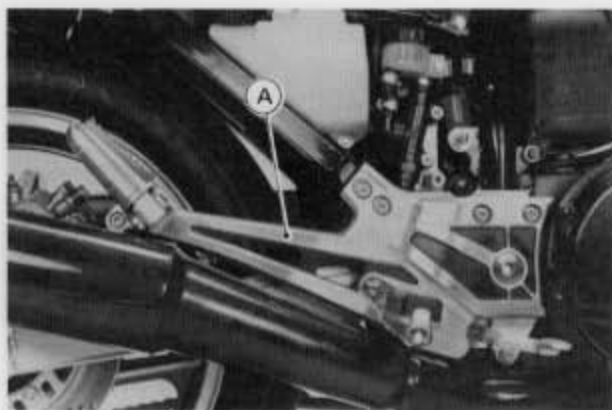
- Remove the reservoir mounting bolt and slide the clamp out of its place. Disconnect the brake hose from the reservoir. Immediately wipe up any brake fluid that spills.
- Remove the banjo bolt to disconnect the brake hose from the master cylinder, and temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum. There is a flat washer on each side of the hose fitting.



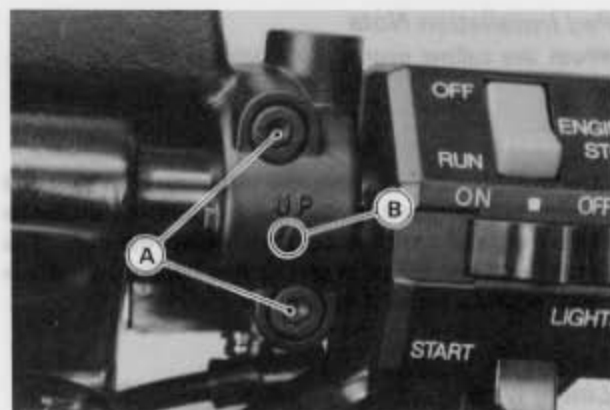
- A. Reservoir
B. Hose Clamp
C. Brake Hose

- D. Banjo Bolt
E. Master Cylinder
F. Mounting Bolts

- Remove the right footpeg bracket with the rear master cylinder (see Right Footpeg Bracket Removal in the Frame chapter).

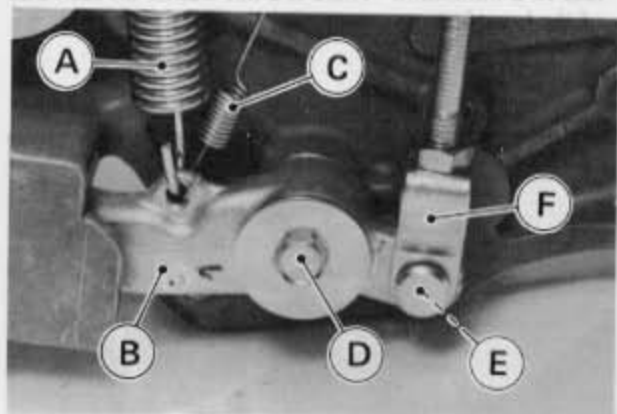


A. Right Footpeg Bracket



A. Tighten upper clamp bolts first. B. Arrow Mark

- Remove the master cylinder with the brake pedal. When the master cylinder is removed, the brake pedal spring, brake light switch spring, brake pedal mounting bolt, washer and master cylinder mounting bolts should be removed from the footpeg bracket.
- Remove the cotter pin from the clevis and remove the pedal.



A. Brake Pedal Spring D. Pedal Mounting Bolt
 B. Brake Pedal E. Cotter Pin
 C. Light Switch Spring F. Clevis

Front Master Cylinder Installation Notes

- Master Cylinder Clamp Installation:
 - The master cylinder clamp must be installed with the arrow mark upward.
 - 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.

Rear Master Cylinder Installation Notes

- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque. Be sure that the metal pipe is properly fitted into the U-shaped notch in the master cylinder.
- Tighten the rear master cylinder mounting bolts (2) securely after installing the footpeg bracket.
- Check and adjust the following items.
 - Brake pedal position (see Rear Brake Pedal Position Inspection).
 - Rear brake light switch (see Rear Brake Light Switch Adjustment in the Electrical System chapter).

Inspection and Adjustment After Installation

- Bleed the brake line after master cylinder installation.
- Check the brake for weak braking power, brake drag, and fluid leakage.

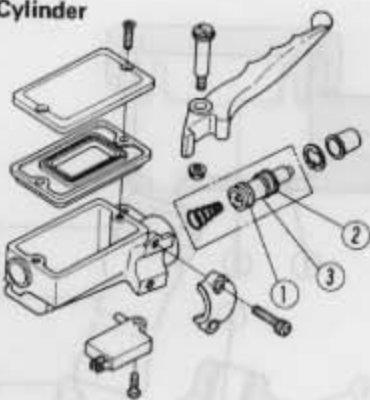
Front Master Cylinder Disassembly Notes

- Remove the front master cylinder from the handlebar.
- Remove the reservoir cap and diaphragm, and empty out the brake fluid.
- Remove the locknut and pivot bolt, and remove the brake lever.
- Slide the dust cover out of place.
- Remove the retainer with circlip pliers and pull out the piston with the secondary cup, and take off the primary cup and spring.

CAUTION

- Do not remove the secondary cup from the piston since removal will damage it.

Front Master Cylinder



1. Primary Cup
2. Secondary Cup
3. Piston

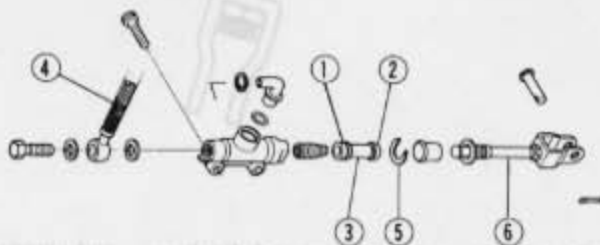
Rear Master Cylinder Disassembly Notes

- Remove the rear master cylinder from the right footpeg bracket.
- Remove the retainer with circlip pliers, and pull out the piston stop and push rod, as a set. Then remove the piston and secondary cup, and the spring and primary cup.

CAUTION

- Do not remove the secondary cup from the piston since removal will damage it.

Rear Master Cylinder



1. Primary Cup
2. Secondary Cup
3. Piston
4. Brake Hose
5. Retainer
6. Push Rod

- Remove the retainer with circlip pliers and pull out the brake hose connector and O-ring from the master cylinder.

Front Master Cylinder Assembly Notes

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

CAUTION

- Except for the disc pads and discs; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning

brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

- Apply brake fluid to the parts removed and to the inner wall of the cylinder.
- Tighten the brake lever pivot bolt and tighten the locknut to the specified torque.

Rear Master Cylinder Assembly Notes

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol, and apply brake fluid to the parts removed and to the inner wall of the cylinder.

CAUTION

- Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

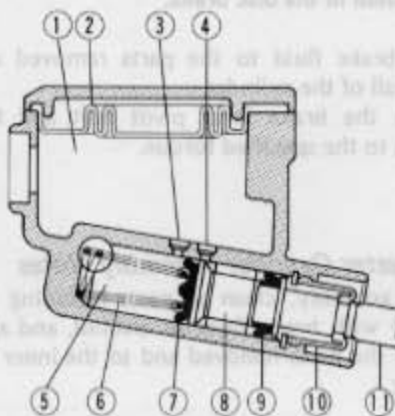
- Take care not to scratch the piston or the inner wall of the cylinder.

*Master Cylinder Inspection
(Visual Inspection)*

- Disassemble the front and rear master cylinders.
- Check that there are no scratches, rust or pitting on the inside of the master cylinder and on the outside of the piston.
- ★ If the master cylinder or piston shows any damage, replace them.
- Inspect the primary cups and secondary cups.
- ★ If a cup is worn, damaged, softened (rotted), or swollen, replace it.
- ★ If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cup.
- Check the dust covers for damage.
- ★ If they are damaged, replace them.
- Check that the relief and supply ports are not plugged.
- ★ If the small relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.
- Check the piston return springs for any damage.
- ★ If the spring is damaged, replace it.

11-10 BRAKES

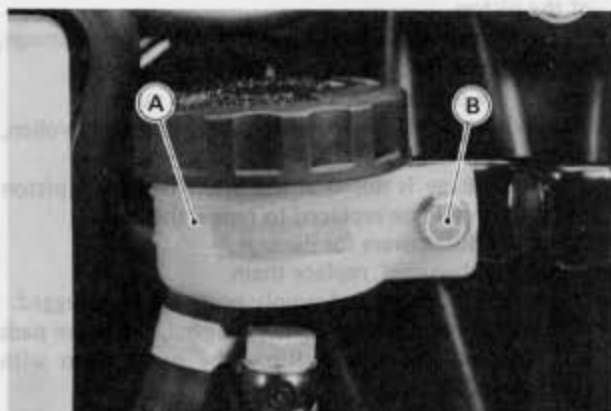
Front and Rear Master Cylinders



1. Reservoir
2. Diaphragm
3. Relief Port
4. Supply Port
5. Cylinder
6. Return Spring
7. Primary Cup
8. Piston
9. Secondary Cup
10. Dust Cover
11. Brake Lever

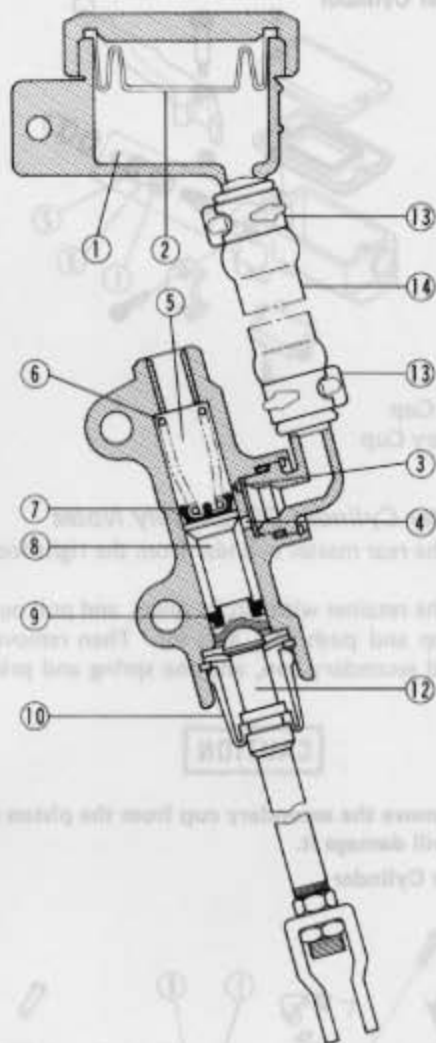
Reservoir Disassembly Notes

- Remove the rear brake reservoir mounting bolt, and take the reservoir off the frame.



A. Reservoir

B. Mounting Bolt



- Take off the reservoir cap and diaphragm, and empty the brake fluid into a suitable container.
- Slide the hose clamps, and pull the brake hose off the reservoir. Immediately wipe up any brake fluid that spills.

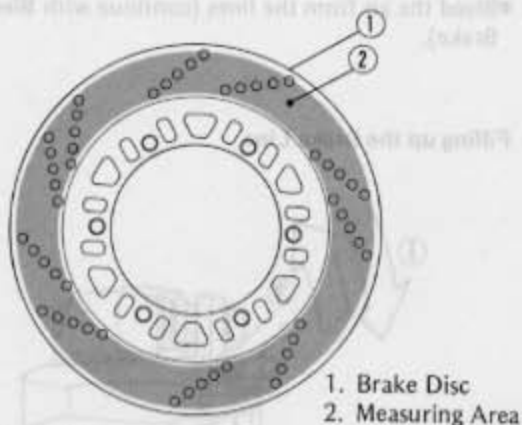
Reservoir Assembly Notes

- Install the clamps for the brake hose ends.
- Fill the reservoir with fresh brake fluid, and bleed the brake line (see Bleeding the Brake).

Discs

Disc wear

Measure the thickness of each disc at the point where it has worn the most. Replace the disc if it has worn past the service limit.



1. Brake Disc
2. Measuring Area

Front Disc Thickness

Standard	4.8 – 5.1 mm
Service Limit	4.5 mm

Rear Disc Thickness

Standard	6.8 – 7.1 mm
Service Limit	6.0 mm

Disc Cleaning

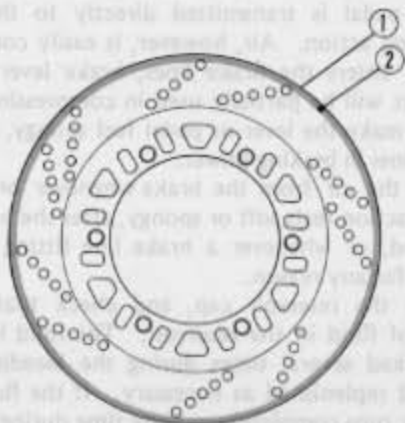
Poor braking can be caused by oil on the disc. Oil on the disc must be cleaned off with an oil-less cleaning fluid such as trichloroethylene or acetone.

WARNING

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

Disc Warp

Jack up the motorcycle so that the front wheel is off the ground, and turn the handlebar fully to one side. Set up a dial gauge against the front disc as illustrated, and measure disc runout. Remove the jack, set the motorcycle up on its center stand, and then measure the rear disc runout. If runout exceeds the service limit, replace the disc.



1. Brake Disc
2. Measuring Area

Disc Runout

Standard	Under 0.15 mm
Service Limit	0.3 mm

Brake Fluid

Fluid Level Inspection

In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the front and rear brake fluid reservoirs.

- Check the brake fluid level in the reservoir.

NOTE

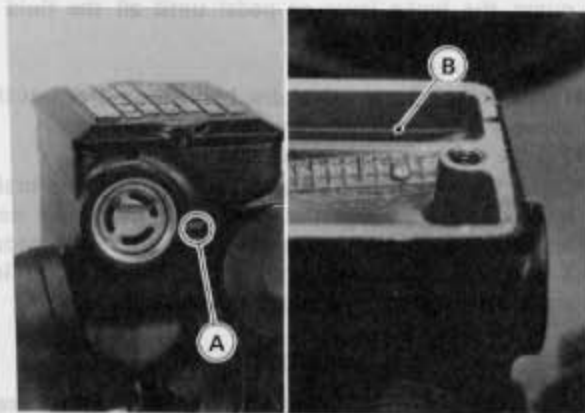
- Hold the reservoir horizontal when checking brake fluid level.

- The fluid level must be kept above the lower level lines. If the fluid level is lower than the lower level line, fill the reservoir to the upper level line of the reservoir.

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. Mixing different types and brands of brake fluid lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.

Front Brake Fluid Reservoir



A. Lower Level Line

B. Upper Level Line

11-12 BRAKES

Rear Brake Fluid Reservoir



A. Lower Level Line

B. Upper Level Line

Brake Fluid Change

In accordance with the Periodic Maintenance Chart, change the brake fluid. The brake fluid should also be changed if it becomes contaminated with dirt or water.

Brake Fluid Requirement:

Recommended fluids are given in the table below. If none of the recommended brake fluids are available, use extra heavy-duty brake fluid only from a container marked D.O.T.4.

Recommended Brake Fluid

Type	D.O.T.4
Brand	Check Shock Premium Heavy Duty Castrol Girling-Universal Castrol GT (LMA) Castrol Disc Brake Fluid

Changing Brake Fluid:

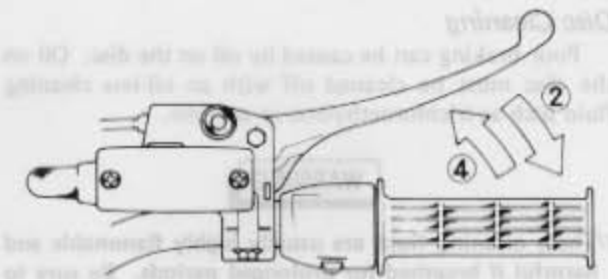
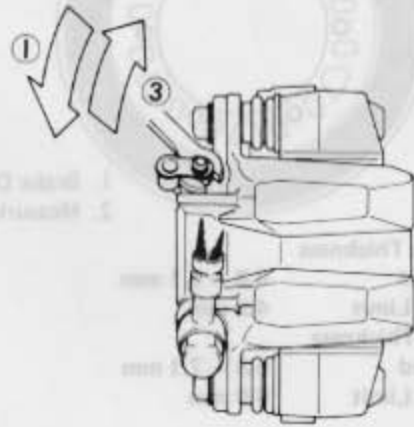
- Remove the reservoir cap, and remove the rubber cap on the bleed valve.
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Open the bleed valve (counterclockwise to open), and pump the brake lever or pedal until all the fluid is drained from the line.
- Close the bleed valve.
- Front brake: Since a dual disc brake is used, repeat the above 4 steps one more time for the other side.
- Fill the reservoir with fresh brake fluid.
- Open the bleed valve, apply the brake by the brake lever or pedal, close the valve with the brake held applied, and then quickly release the lever or pedal. 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.

- Front brake: Repeat the above 2 steps one more time for the other side.
- Bleed the air from the lines (continue with Bleeding the Brake).

Filling up the Brake Line



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

Bleeding the Brake Line

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

Bleed the air from the brake whenever brake lever or pedal action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

- Remove the reservoir cap, and check that there is plenty of fluid in the reservoir. 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.

- With the reservoir cap off, slowly pump the brake lever or pedal several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.

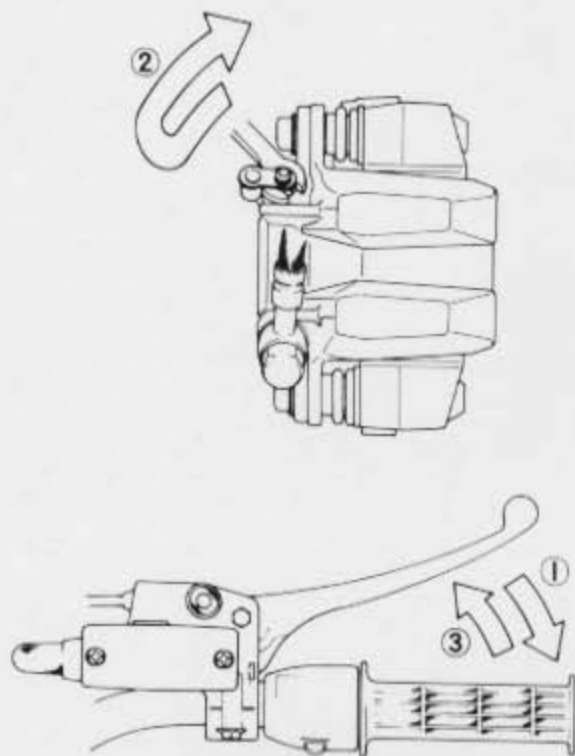
Bleeding the rear brake line:

- Install the reservoir cap, and connect a clear plastic hose to the bleed valve at the caliper, running the other end of the hose into a container. Pump the brake pedal a few times until it becomes hard and then, holding the pedal pushed down, quickly open (turn counterclockwise) and close the bleed valve. Then release the pedal. Repeat this operation until no more air can be seen coming out into the plastic hose. Check the fluid level in the reservoir every so often, replenishing it as necessary.

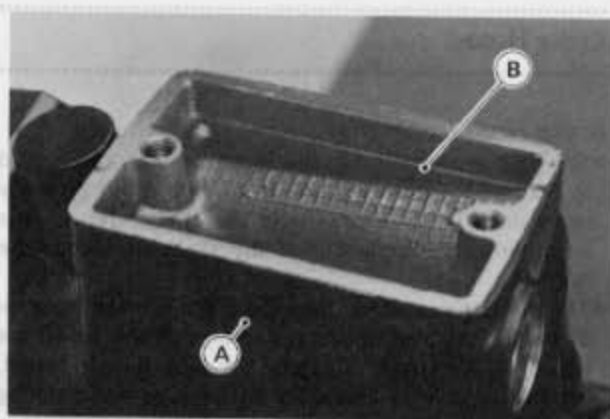
Bleeding the front brake line:

- Bleed the air from the front brake line, first using the bleed valves on the brake calipers and the anti-dive units, and then using the bleed valves on the junction blocks.
- Repeat the previous step one more time for the other side.
- When air bleeding is finished, install the rubber cap(s) on the bleed valve, and check that the brake fluid is filled to the upper level line marked in the reservoir (handlebar turned so that the reservoir is level).

Bleeding the Brake Line



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



A. Front Brake Reservoir B. Upper Level Line

WARNING

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

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

11-14 BRAKES

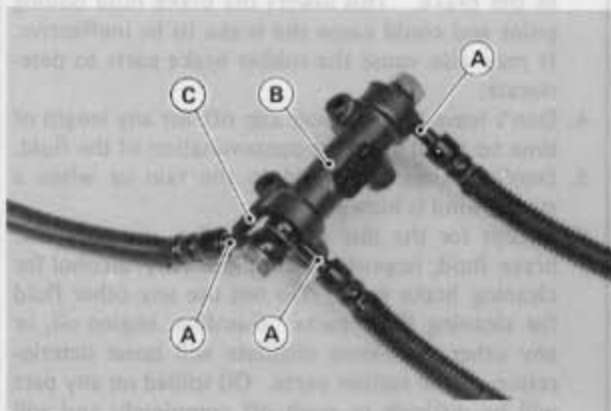
Brake Hoses

Brake Hose Inspection

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it. Replace it if any cracks or bulges are noticed.
- The metal pipes which feed the brake fluid to the anti-diver units are made of plated steel, and will rust if the plating is damaged. Replace the pipe if it is rusted, cracked (especially check the fittings), or if the plating is badly scratched.

Brake Hose Replacement

- Pump the brake fluid out of the line as explained in the Brake Fluid Change in Brake Fluid Section.
 - Remove the banjo bolts at both ends of the brake hose, and pull the hose off the motorcycle. Especially, for the brake hose between the rear master cylinder and the reservoir, loosen the clamps at both ends of the hose, and take off the hose.
 - Install the new brake hose in its place, and tighten the banjo bolts to the specified torque, noting the following.
- Use a new flat washer for each side of the fittings.

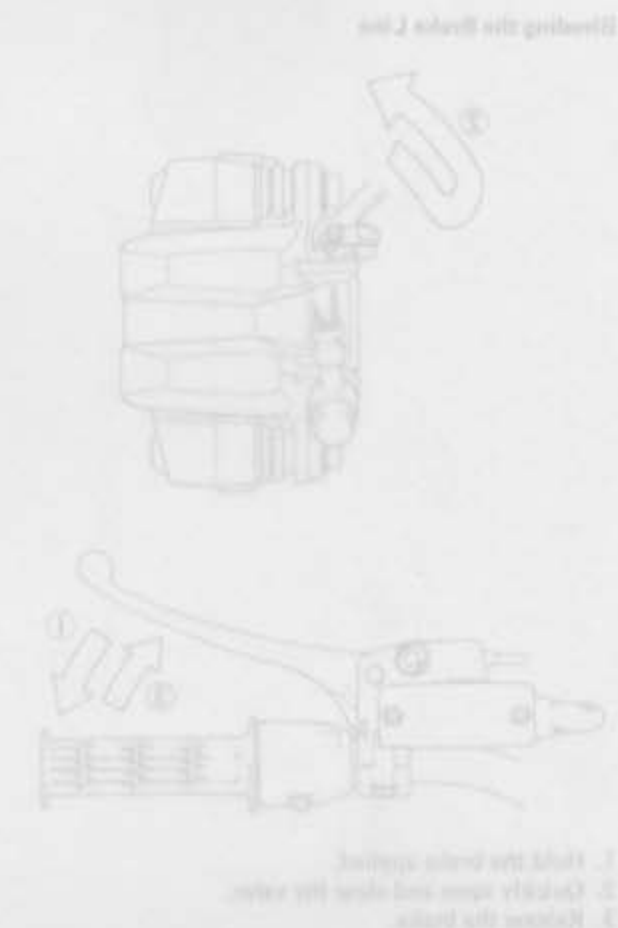


A. Metal Pipe
B. Joint
C. Notch

With the reservoir cap off, slowly pump the brake lever or pedal several times until no bubbles can be seen rising up through the fluid from the hole at the bottom of the reservoir. This means the air from the master cylinder out of the line.

Blowing the new brake line:
Install the reservoir cap and connect a clean plastic hose to the bleed valve of the caliper, turning the other end of the hose into a container. Pump the brake pedal a few times until it becomes hard and then, holding the pedal pressed down, slowly open (turn counter-clockwise) and close the bleed valve. Then release the pedal. Repeat this operation until no more air can be seen coming out into the plastic hose. Check the fluid level in the reservoir every so often, replenishing it as necessary.

Blowing the front brake line:
Attach the air from the front brake line that was the bleed valve on the brake caliper and the anti-diver unit, but then close the bleed valves on the junction blocks.
• Repeat the procedure with the master and the other side.
When air blowing is finished, install the rubber caps on the bleed valve, and check that the brake fluid is filled to the upper level line marked in the reservoir. (Indicated turned so that the reservoir is level.)



Suspension

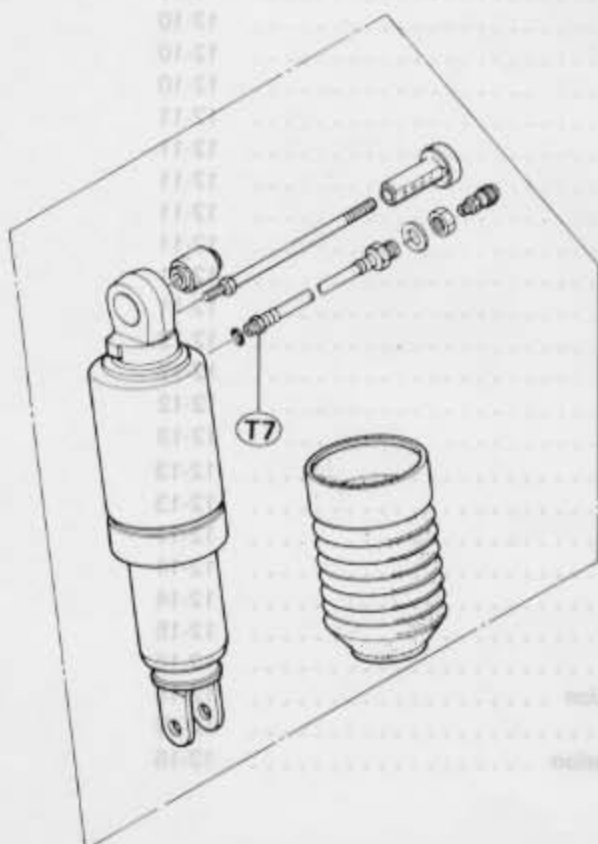
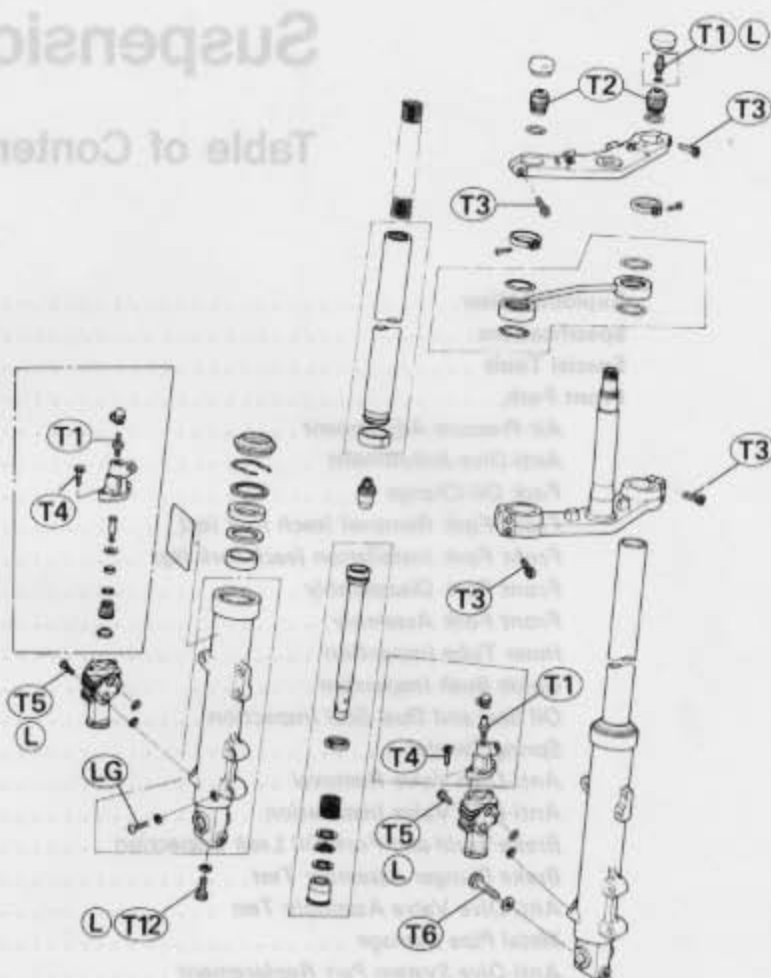
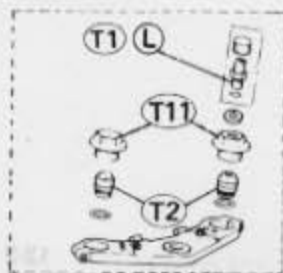
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12-2 SUSPENSION

Exploded View

'85 Model



- L : Apply a non-permanent locking agent to the threads.
- LG : Apply liquid gasket.
- M : Apply molybdenum disulfide grease.

- T1 : 7.8 N-m (0.80 kg-m, 69 in-lb)
- T2 : 23 N-m (2.3 kg-m, 16.5 ft-lb)
- T3 : 21 N-m (2.1 kg-m, 15.0 ft-lb)
- T4 : 4.4 N-m (0.45 kg-m, 39 in-lb)
- T5 : 6.9 N-m (0.70 kg-m, 69 in-lb)
- T6 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
- T7 : 12 N-m (1.2 kg-m, 104 in-lb)
- T8 : 24 N-m (2.4 kg-m, 17.5 ft-lb)
- T9 : 59 N-m (6.0 kg-m, 43 ft-lb)
- T10 : 88 N-m (9.0 kg-m, 65 ft-lb)
- T11 : 25 N-m (2.5 kg-m, 18.0 ft-lb)
- T12 : 29 N-m (3.0 kg-m, 22 ft-lb)
- T13 : 39 N-m (4.0 kg-m, 29 ft-lb)

12-4 SUSPENSION

Specifications

Item	Standard	Service Limit
Front Fork:		
Oil type	SAE 10W	---
Oil capacity	318 ± 4 mL (approx. 270 mL at oil change)	---
Oil level	357 ± 2 mm (Fully Extended)	---
Air pressure	39 – 59 kPa (0.4 – 0.6 kg/cm ² , 5.7 – 8.5 psi)	---
Fork spring free length	522 mm	511 mm
Rear Shock Absorbers:		
Air pressure	49 – 147 kPa (0.5 – 1.5 kg/cm ² , 7.1 – 21 psi)	---

Special Tools

Air Pressure Gauge: 52005-1003



Front Fork Cylinder Holder Adapter: 57001-1057



Front Fork Cylinder Holder Handle: 57001-183



Front Fork Oil Seal Driver: 57001-1104



Front Fork

Air Pressure Adjustment

- Put the motorcycle on its center stand, and raise the front wheel off the ground using a jack or other suitable stand under the engine.
- Use the air pressure gauge (special tool: P/N 52005-1003) specially made for air suspensions.
- Check and adjust the air pressure when the front fork is cold (room temperature).

NOTE

- Do not use tire gauges for checking the air suspension's air pressure. They may not indicate the correct pressure because of air leaks that occur when the gauge is applied to the valve.
- Lower air pressure is for comfortable riding, but it should be increased for high speed riding, or riding on bad roads.

CAUTION

- Inject air little by little so that air pressure does not rise rapidly. Air pressure exceeding 245 kPa (2.50 kg/cm², 36 psi) may damage the oil seal.

WARNING

- Be sure to adjust the air pressure within the usable range. Pressure too high or too low can produce a hazardous riding condition.
- Only air or nitrogen gas can be used. Never inject oxygen or any kind of explosive gas.
- Do not incinerate the front fork.
- Do not remove the springs and rely on compressed air only. Correct springs must be used in this suspension system. Use without springs can lead to a condition causing accident and injury.



A. Air Valve

Front Fork Air Pressure

Standard	49 kPa (0.5 kg/cm ² , 7.1 psi)
Usable range:	39 – 59 kPa (0.4 – 0.6 kg/cm ² , 5.7 – 8.5 psi)

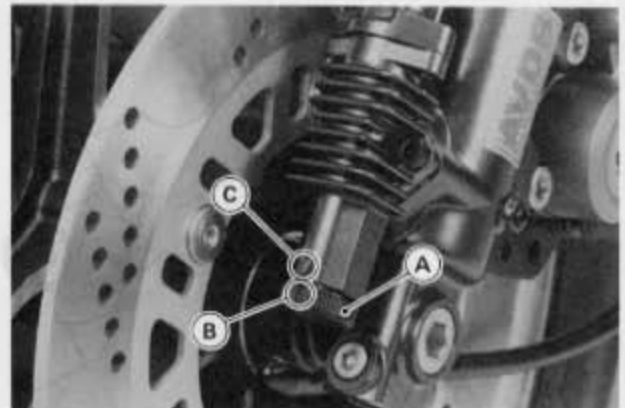
Anti-Dive Adjustment

The anti-dive adjuster on each front fork leg has 3 positions so that the anti-dive system can be adjusted for different road and loading conditions. The numbers on the adjuster show the setting position of the anti-dive system.

- Turn the anti-dive adjuster until you feel a click so that the desired position number aligns with the triangular mark.
- Check to see that both adjusters are turned to the same relative position.

WARNING

- If both anti-dive adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result.



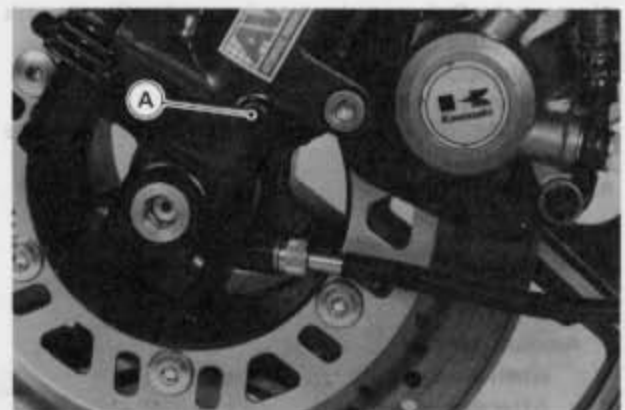
A. Anti-Dive Adjuster C. Triangular Mark
B. Position Number

Anti-Dive Adjustment

Position 1	Weak
Position 2	Moderate
Position 3	Strong

Fork Oil Change

- Release the air in both fork legs through the air valve at the top of the fork leg.
- Unscrew the drain screw and top plug from one fork leg, and pull out the fork spring and spring seat.



A. Drain Screw

- Stick a piece of tape over the air hole to keep the oil from running out of the fork.

Front Fork Installation (each fork leg)

- When installing the fork leg, be careful of the following items.
- If the fork leg was disassembled, check the fork oil level. Then inject air through the air valve after installation.
- Route the brake and clutch hoses and the cables correctly.
- Connecting pipe and clamps between the stem base and stem head.
- Tighten the lower and upper clamp bolts to the specified torque (see Exploded View).
- Set the connecting pipe on the steering stem.
- Clamp screws tightening.
- Tighten the handlebar mounting bolts to the specified torque (see Exploded View in the Controls chapter).
- Tighten the caliper mounting bolts to the specified torque (see Exploded View in the Brakes chapter).
- Check the front brake after installation.

Front Fork Disassembly

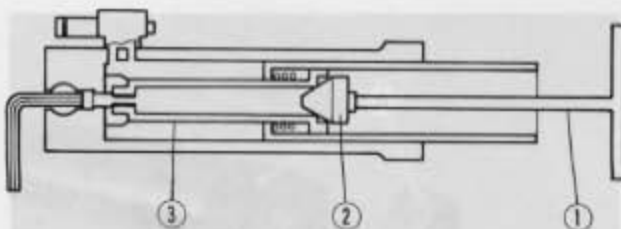
- Remove the front fork leg.
- Remove the axle clamp bolt(s).
- Remove the top plug, washer, and spring.

NOTE

- The top plug should be loosened before the fork is removed.

- Pour out the fork oil, and take off the TCV (Travel Control Valve).
- Stop the cylinder from turning by using the front fork cylinder holder handle and adapter (special tools). Unscrew the Allen bolt and take the bolt, and gasket out of the bottom of the outer tube.

Front Fork Cylinder Removal



- 1. Front Fork Cylinder Holder Handle: 57001-183
- 2. Adapter: 57001-1057
- 3. Front Fork Cylinder

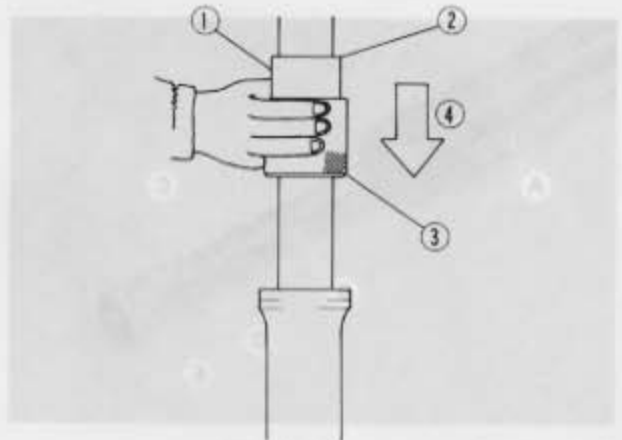
- Remove the piston and cylinder unit and the short spring from the top of the front fork tube.

- Separate the inner tube from the outer tube as follows.
 - Remove the dust seal from the outer tube.
 - Remove the retainer and washer from the outer tube.
 - 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 if the fork leg is horizontal on a work bench.

Front Fork Outer Tube Removal



- 1. Driver: 57001-1104
- 2. Small End
- 3. Big End
- 4. Tap

- Remove the oil seal, washer and outer tube guide bush, from the inner tube.



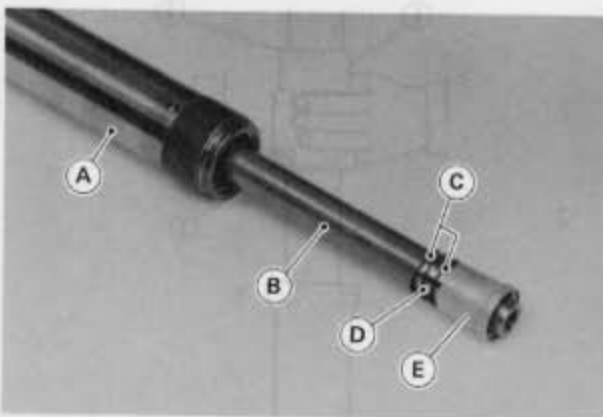
- A. Inner Tube Guide Bush
- B. Outer Tube Guide Bush
- C. Washer
- D. Oil Seal

12-8 SUSPENSION

- Remove the cylinder base, spring washers and washer from the bottom of the outer tube.

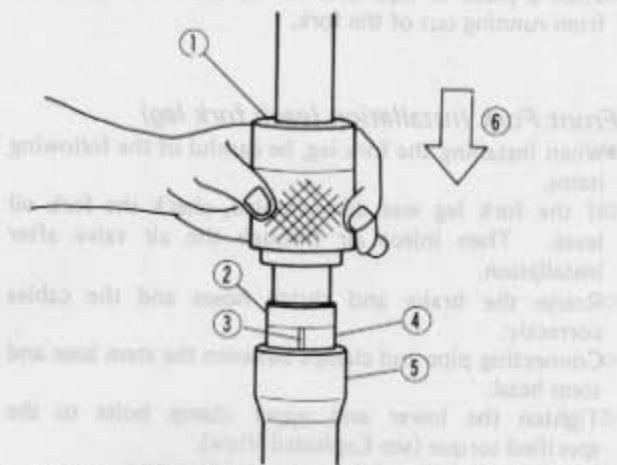
Front Fork Assembly

- Fork assembly is the reverse of disassembly. Pay attention to the following items.
- Check the top plug O-ring for damage. Replace it with new one if damaged.
- Replace the oil seal removed with a new one.
- Inspect the guide bushes (see Guide Bush Inspection), and replace them with new ones if necessary.
- Insert the piston and cylinder unit and the short spring in the inner tube, and put on the spring washers and washer and the cylinder base.



A. Inner Tube
B. Cylinder
C. Spring Washers
D. Washer
E. Cylinder Base

Guide Bush Installation



1. Driver: 57001-1104
2. Used Guide Bush
3. Slit
4. New Guide Bush
5. Outer Tube
6. Tap

Inner Tube Inspection

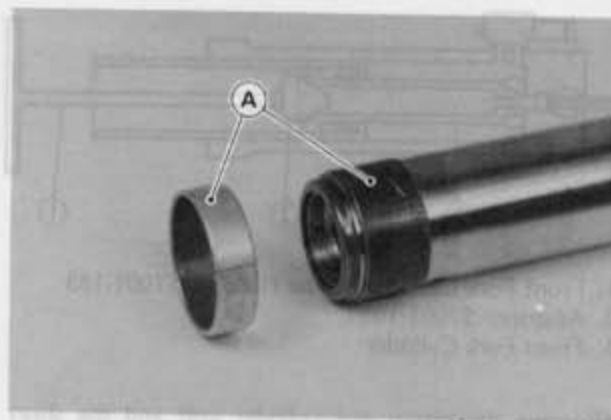
- Visually inspect the inner tube, and repair any damage.
- Nicks or rust damage can sometimes be repaired by using a wetstone to remove sharp edges or raised areas which cause seal damage.
- ★ If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.
- 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 badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

Guide Bush Inspection

- Visually inspect the guide bushes, and replace them if necessary.



A. Guide Bushes

- Insert the inner tube and cylinder unit as a set into the outer tube.
- Apply a non-permanent locking agent to the Allen bolt. Tighten the Allen bolt to the specified torque, using the front fork cylinder holder handle and holder adapter (special tools) to stop the cylinder from turning.
- Install the guide bush (with a used guide bush on it) by tapping the used guide bush with the driver (special tool) until it stops. The slit of the bush must be faced toward the left or right.
- Install the oil seal with the driver (special tool).
- If the drain screw was removed, check the gasket for damage. Replace the damaged gasket with a new one. Before installing the drain screw, apply a liquid gasket to the threads of the screw, and tighten the screw securely.
- Pour in the type and amount of fork oil specified (see Specifications), and adjust the oil level.
- Tighten the top plug to the specified torque after fork installation.

Oil Seal and Dust Seal Inspection

- Inspect the oil seal and dust seal for any signs of deterioration or damage.
- ★ Replace them if necessary. Replace the oil seal with a new one whenever it has been removed.



A. Oil Seal

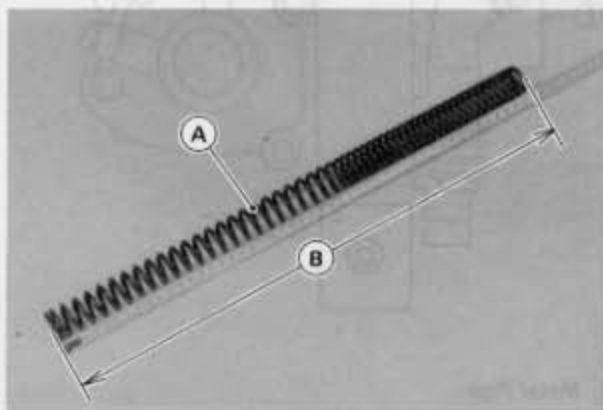
B. Dust Seal

Spring Tension

- Since the spring becomes shorter as it weakens, check its free length to determine its condition.
- ★ If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Fork Spring Free Length

Standard:	522 mm
Service Limit:	511 mm



A. Fork Spring

B. Free Length

Anti-Dive Valve Removal

- Remove the bolts and separate the brake plunger from the anti-dive valve.
- Unscrew the brake pipe nipple and remove the metal pipe and brake plunger.
- Remove the mounting bolts, and take off the anti-dive valve from the outer tube.

NOTE

- Do not disassemble the anti-dive valve and brake plunger assemblies for repair or replacement of internal parts. Always replace them as assemblies.

Anti-Dive Valve Installation

- Reinstall the anti-dive valve and brake plunger assembly, and metal pipe.

NOTE

- Bleed the anti-dive and brake line after anti-dive valve installation.

Brake Fluid and Fork Oil Leak Inspection

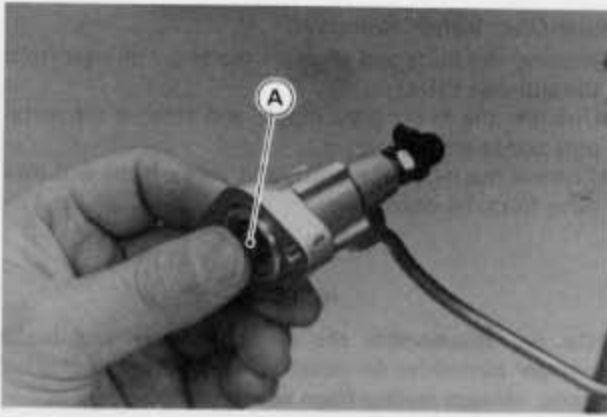
- Visually inspect the anti-dive unit for brake fluid and fork oil leakage.
- ★ If the brake fluid leaks, replace the brake plunger assembly.
- ★ If the fork oil leaks, replace the O-rings or anti-dive valve assembly.

Brake Plunger Assembly Test

The brake plunger assembly can be tested by separating it from the anti-dive valve assembly with the brake line connected to the brake plunger assembly.

- Separate the plunger assembly from the anti-dive valve assembly.
- Unbolt the brake line junction from the fork leg to prevent the metal pipe from being deformed.
- Check to see if the plunger in the brake plunger assembly comes out 2 mm when the front brake is lightly applied, and check to see if the plunger goes in smoothly when it is pushed in with your finger.
- ★ If the plunger does not move lightly or is stuck in the body, replace the brake plunger assembly.

12-10 SUSPENSION



A. Brake Plunger

Anti-Dive Valve Assembly Test

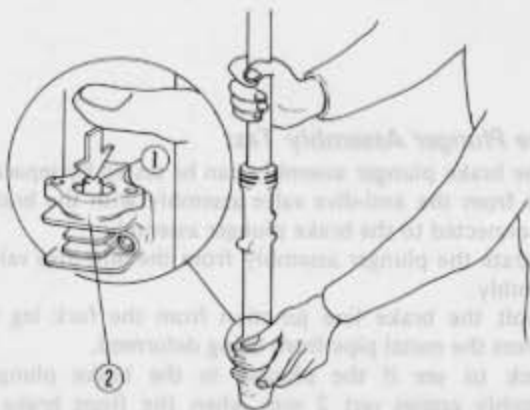
The operation of the anti-dive valve assembly can be checked by removing the front fork leg from the motorcycle.

- Separate the brake plunger assembly from the anti-dive valve assembly with the brake line connected.
- Unscrew the top plug, and take the fork spring out of the fork tube.
- Remove the front wheel, disc brake caliper, front fender and brake line junction from the fork leg.
- Remove the front fork leg with its anti-dive valve assembly installed and tape the equalizing hole in the fork inner tube to prevent the fork oil from running out during the anti-dive valve assembly test.
- With the fork leg held upright, compress the fork leg, and see that the compression stroke is light and smooth when the valve rod is not pushed in and that there is notable damping when the valve rod is pushed in with your finger.

NOTE

- The extension stroke should be smooth with notable damping regardless of valve rod positions.

Anti-Dive Assembly Test



1. Valve Rod
2. Valve Assy

- ★ If the fork leg has a heavy compression stroke when the valve rod is left released, or if it has a light compression stroke when the rod is pushed in; the anti-dive valve assembly does not operate properly. Replace the anti-dive assembly.

Metal Pipe Damage

- The metal pipes which feed the brake fluid to the anti-dive units are made of plated steel, and will rust if the plating is damaged. Replace the pipe if it is rusted, cracked (especially check the fitting), or if the plating is badly scratched.

Anti-Dive System Part Replacement

In accordance with the Periodic Maintenance Chart, replace the following anti-dive system parts.

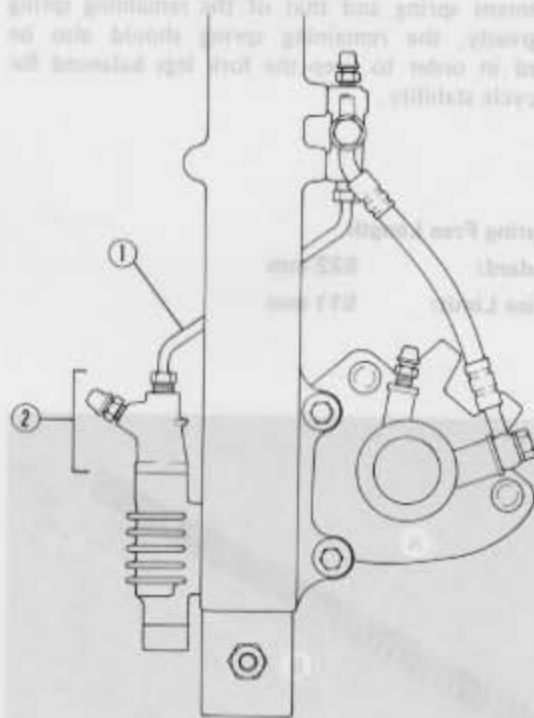
Periodic Replacement Parts of Anti-Dive System

Brake plunger assembly

Metal pipe (between anti-dive unit and junction block)

- Be sure to bleed the air from the brake line after replacement.

Periodic Replacement Parts of Anti-Dive System



1. Metal Pipe
2. Brake Plunger Assembly

AVDS (Automatic Variable Damping System) :

TCV (Travel Control Valve) Removal

- Remove the front fork leg.
- Remove the top plug, O-ring, spring, and pour out the fork oil.
- Take off the TCV with the fork upside down.

NOTE

○ Do not disassemble the TCV assembly for repair or replacement of parts. Always replace them as assemblies.

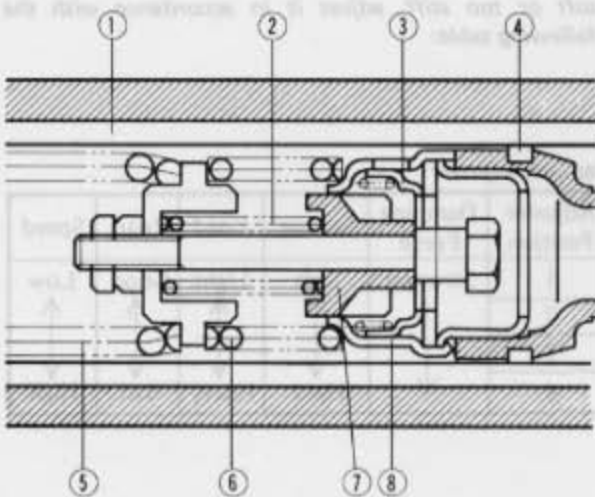


A. Top End

TCV Installation Notes

- Install the TCV with the nuts upward.
- Installation is the reverse of removal.

TCV

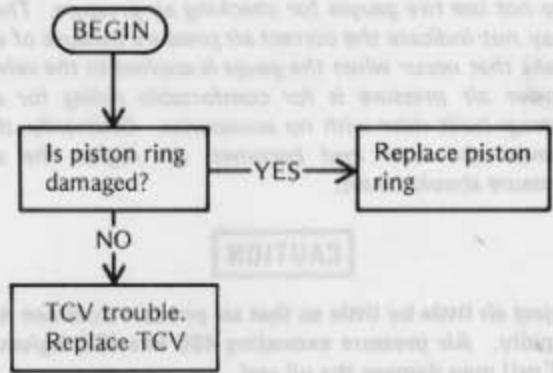


- | | |
|-------------------------|-----------------|
| 1. Inner Tube | 5. Fork Spring |
| 2. Spring (Check Valve) | 6. Spring (TCV) |
| 3. Valve | 7. Spool |
| 4. Piston Ring | 8. Valve Case |

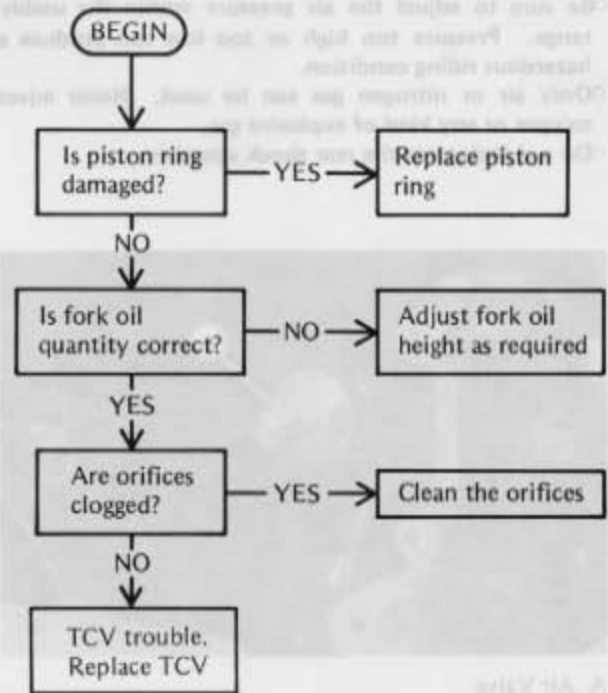
TCV Troubleshooting

If the unit is not working, inspect the TCV according to this troubleshooting guide.

No damping force during compression stroke



No damping force during extension stroke



Rear Suspension (Uni-Trak)

Rear Shock Absorber:

Rear Shock Absorber Adjustment

The rear shock absorber can be adjusted by changing the air pressure and damping force to suit various riding and loading conditions.

12-12 SUSPENSION

Air Pressure Inspection

- Put the motorcycle up on its center stand to raise the rear wheel off the ground.
- Use air pressure gauge 52005-1003 which is specially made for air suspensions.
- Check and adjust the air pressure when the rear shock absorber is cold (room temperature).

NOTE

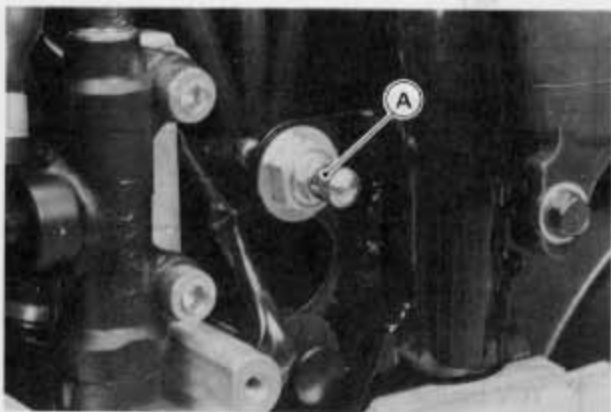
- Do not use tire gauges for checking air pressure. They may not indicate the correct air pressure because of air leaks that occur when the gauge is applied to the valve.
- Lower air pressure is for comfortable riding for an average-built rider with no accessories. Ordinarily, the heavier the total load becomes, the higher the air pressure should be set.

CAUTION

- Inject air little by little so that air pressure does not rise rapidly. Air pressure exceeding 490 kPa (5.0 kg/cm², 71 psi) may damage the oil seal.

WARNING

- Be sure to adjust the air pressure within the usable range. Pressure too high or too low can produce a hazardous riding condition.
- Only air or nitrogen gas can be used. Never inject oxygen or any kind of explosive gas.
- Do not incinerate the rear shock absorber.



A. Air Valve

Rear Shock Absorber Air Pressure

Air Pressure Usable Range kPa (kg/cm ² , psi)	Setting	Load	Road
49 (0.5, 7.9)	Soft	Light	Good
↕	↕	↕	↕
147 (1.5, 21)	Hard	Heavy	Bad

NOTE

- The recommended air pressure is 78 kPa (0.8 kg/cm², 11 psi) for average rider with no accessories.

Damping Force Adjustment

- Push and pull the adjusting stick to the desired number until you feel a click. The numbers on the adjusting stick show the setting position.



A. Adjusting Stick

NOTE

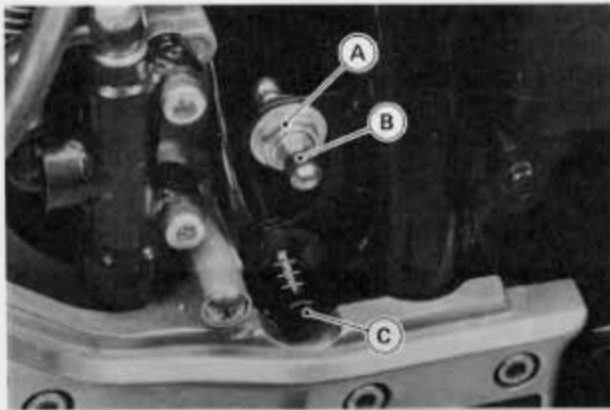
- The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding, or riding with a passenger. If the damping feels too soft or too stiff, adjust it in accordance with the following table:

Damper Adjuster

Adjuster Position	Damping Force	Setting	Load	Road	Speed
1	Stronger	Soft	Light	Good	Low
2	↓	↑	↑	↑	↑
3	↓	↓	↓	↓	↓
4	↓	Hard	Heavy	Bad	High

Rear Shock Absorber Removal

- Remove the following parts before rear shock absorber removal.
 - Side covers
 - Coolant reserve tank
- Remove the air valve mounting nut and free the air hose.



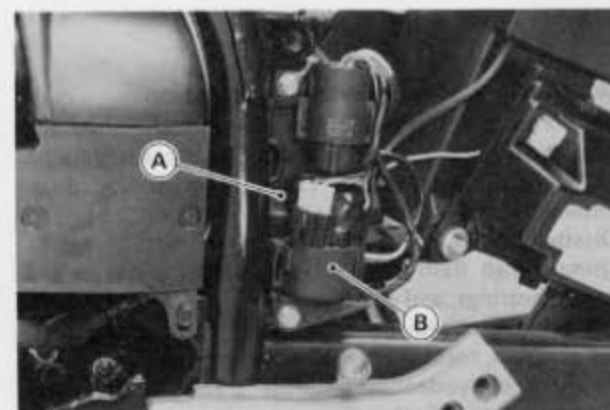
A. Mounting Nut
B. Air Valve
C. Damper Adjusting Stick

- Loosen the locknut and unscrew the damper adjusting stick and take it with the rod.



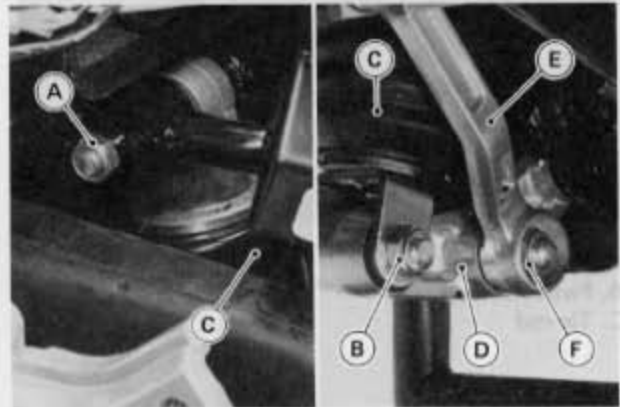
A. Rear Shock Absorber
B. Locknut
C. Rod

- Remove the relay bracket mounting bolts and free the bracket.



A. Relay Bracket
B. Starter Relay

- Loosen the upper shock absorber nut. Do not remove it yet.
- Remove the lower shock absorber bolt, and the tie rod lower bolt.



A. Upper Shock Absorber Nut
B. Lower Shock Absorber Nut
C. Shock Absorber
D. Uni-trak Rocker Arm
E. Uni-trak Tie Rod
F. Tie Rod Bolt

- Remove the upper shock absorber nut and bolt, then take off the rear shock absorber unit toward the ground.

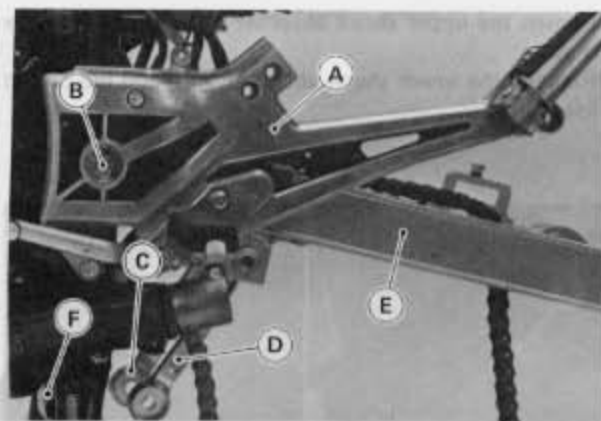
Rear Shock Absorber Installation

- Installation is the reverse of removal. Note the following.
 - Tighten the upper and lower shock absorber nuts to the specified torque.

**Swing Arm:
Swing Arm Removal**

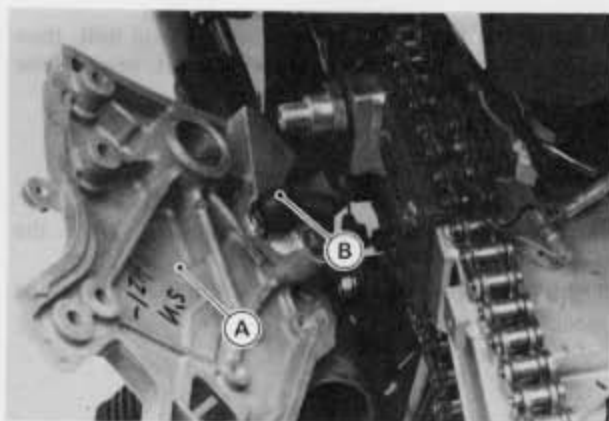
- Remove the following parts before swing arm removal.
 - Seat
 - Side Covers
 - Mufflers
 - Rear Wheel
 - Rear Shock Absorber
- Remove the swing arm pivot nuts.
- Remove the right side footpeg bracket bolts and rear brake reservoir mounting bolt, then take off the bracket with rear master cylinder and rear caliper.

12-14 SUSPENSION



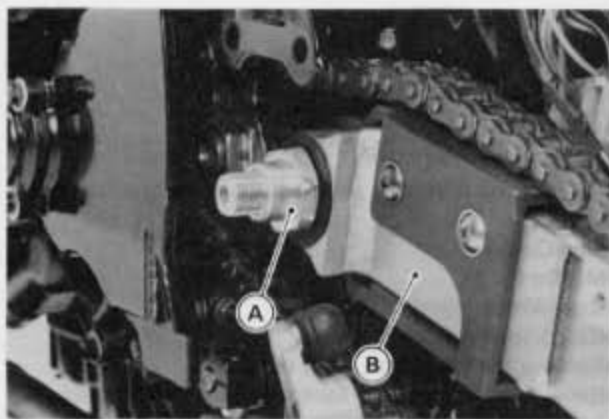
A. Footpeg Bracket
B. Pivot Nut
C. Tie-rod
D. Tie-rod
E. Swing Arm
F. Rocker Arm

- Remove the circlip and washer, then separate the left footpeg bracket and shift pedal.



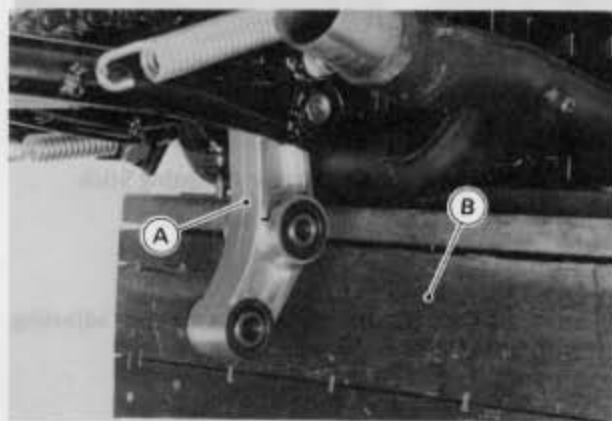
A. Footpeg Bracket
B. Shift Pedal

- Remove the pivot nut and pull the pivot shaft toward the right.



A. Pivot Nut
B. Swing Arm

- Remove the swing arm with tie-rod, and then separate them.
- Put a suitable stand under the engine.
- Retract the center stand, and pull out the bolt and remove the rocker arm from the bottom side of the main frame.



A. Rocker Arm
B. Box

Swing Arm Sleeve Inspection

- ★ If there is visible damage, replace the sleeve and needle bearing as a set.

Swing Arm 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.

Swing Arm Needle Bearing Lubrication

In order for the swing arm to function safely and wear slowly, it should be lubricated in accordance with the Periodic Maintenance Chart or whenever disassembled.

- Disassemble the swing arm.
- 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 grease to the outer circumference of the sleeves, and pack the needle bearings with the same grease.

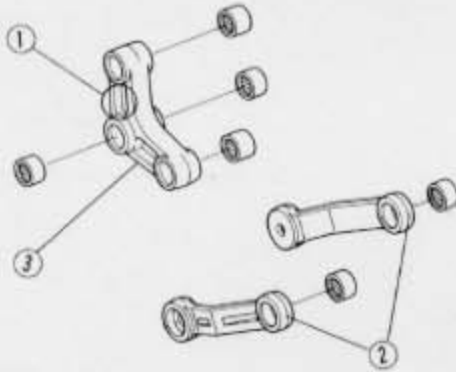
Tie-Rod, Rocker Arm:

Tie-Rod, Rocker Arm Installation Notes

- Installation is the reverse of removal. Note the following.
- Apply Molybdenum Disulfide Grease to the inside of the needle bearings as shown.

- Disassemble the tie-rod and rocker arm.
- 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 grease to the outer circumference of the sleeves, and pack the needle bearings with the same grease.

Uni-trak Needle Bearing



- 1. Arrow Mark
- 2. Tie-rod
- 3. Rocker Arm

- Install the rocker arm so that the arrow mark on the rocker arm points to the front.

Tie-Rod, Rocker Arm 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.

Tie-Rod, Rocker Arm Sleeve Inspection

- ★ If there is visible damage, replace the sleeve and needle bearing as a set.

Tie-Rod, Rocker Arm Needle Bearing Lubrication

In order for the tie-rod and rocker arm to function safely and wear slowly, it should be lubricated in accordance with the Periodic Maintenance Chart or whenever disassembled.

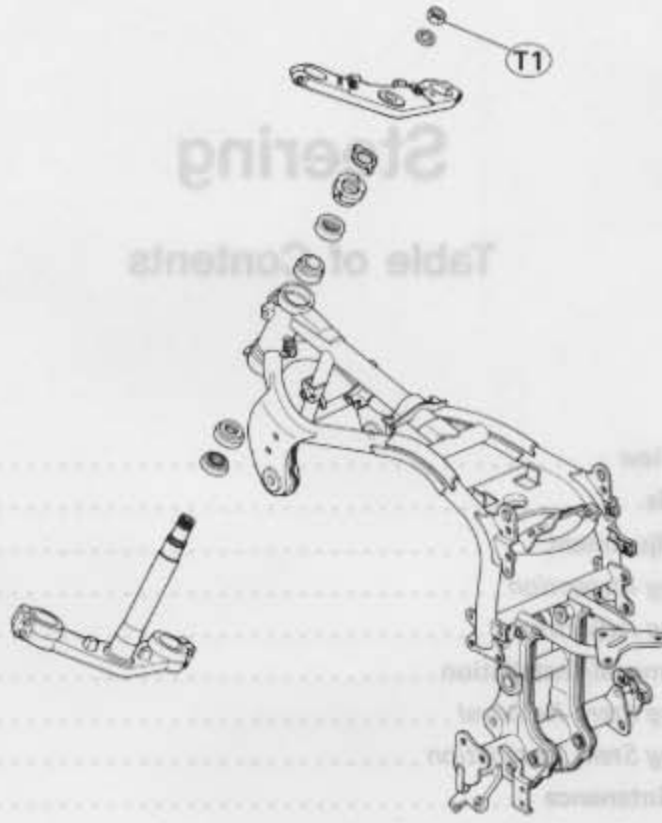
Steering

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13-2 STEERING

Exploded View



T1 : 39 N-m (4.0 kg-m, 29 ft-lb)

13-4 STEERING

Steering Adjustment

When the steering bearings are properly adjusted, the handlebar will turn freely from side to side with no looseness of the steering stem within the frame. In other words, the bearings will have little or no free play and absolutely no preload. Inspect the steering according to the Periodic Maintenance Chart or if the following symptoms are noticed.

Symptoms:

Tight

1. The motorcycle wanders while being ridden.
2. The steering feels tight.
3. The bearing races becomes notched.

Loose

1. The forks "clunk" or "click" when the brake is applied or when the motorcycle is ridden over a pothole.
2. The handlebars seem to vibrate more than normal.

Steering Inspection

- Set the motorcycle on its center stand or other suitable stand.
- Remove the lower fairing. Use a jack under the engine to lift the front wheel off the ground.

Checking for Steering Too Tight:

- With the front wheel pointing straight ahead, alternately nudge each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.
- ★If the wheel binds or catches before the stop, the steering is too tight.

NOTE

- The cables and wiring will have some effect on the motion of the fork which must be taken into account. Be sure the wires and cables are properly routed.
- The bearings must be in good condition and properly lubricated in order for any test to be valid.

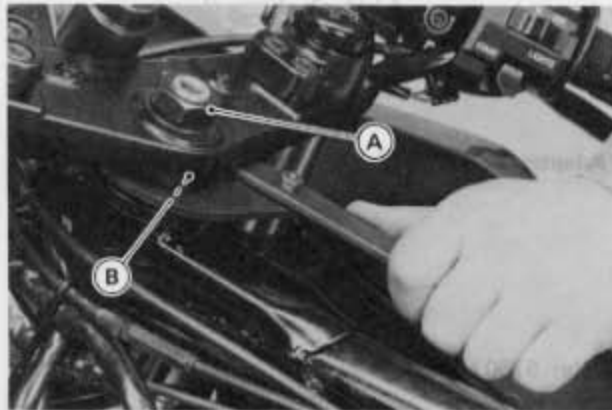
Checking for Steering Too Loose:

- Stand in front of the motorcycle and grasp the lower ends of the fork near the axle.
- Feel for steering looseness by pushing and pulling the forks.
- ★If you feel looseness, the steering is too loose.



Steering Adjustment

- Set the motorcycle up on its center stand.
- Remove the fairing.
- Remove the fuel tank to avoid damaging the painted surface.
- Remove the screws, and take off the stem head cover.
- Loosen the front fork lower clamp bolts and stem head nut.
- Using a jack under the engine, lift the front wheel off the ground.
- Loosen the stem locknut all the way with the stem nut wrench (special tool).



A. Stem Head Nut

B. Stem Locknut

- If the steering is too tight, loosen the stem locknut a fraction of a turn; if the steering is too loose, tighten the locknut a fraction of a turn. Turn the locknut 1/8 turn at a time maximum.
- Tighten the steering stem head nut to the specified torque.
- Tighten the front fork lower clamp bolts to the specified torque.
- Check the steering again.
- ★If the steering is still too tight or too loose, repeat the adjustment.
- Install the removed parts.

Steering Removal/Installation

Steering Stem Removal

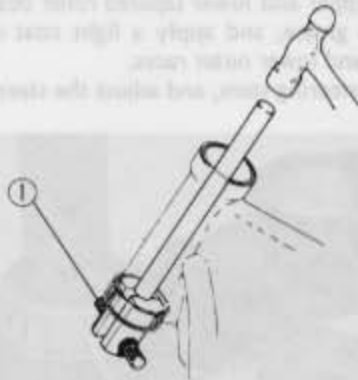
- Remove the following parts.
 - Fuel tank
 - Front wheel
 - Fairing, fairing stay
 - Handlebars
 - Front fork legs
- Remove the mounting bolts (2), free the brake hose joint from the stem base, and remove the front brake assembly as a set.

- Remove the stem head nut and flat washer.
- Remove the steering stem head.
- Take off the lockwasher.
- Push up on the stem base, and remove the steering stem locknut with the stem nut wrench (special tool), then remove the steering stem and stem base (single unit).
- Remove the steering stem cap and upper tapered roller bearing inner race.
- To remove the outer races pressed into the head pipe, install the stem bearing remover (special tool) as shown below, and hammer the stem bearing remover to drive it out.

NOTE

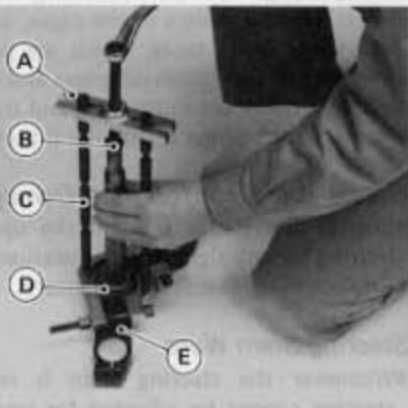
○ If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.

Outer Race Removal



1. Stem Bearing Remover: 57001-1107

- Remove the lower inner race (with its grease seal) which is pressed onto the steering stem, with the steering stem bearing puller and adapters (special tools).



A. Bearing Puller: 57001-158
 B. Adapter: 57001-317
 C. Pole: 57001-1190
 D. Bearing Inner Race
 E. Stem Base

Steering Stem Installation

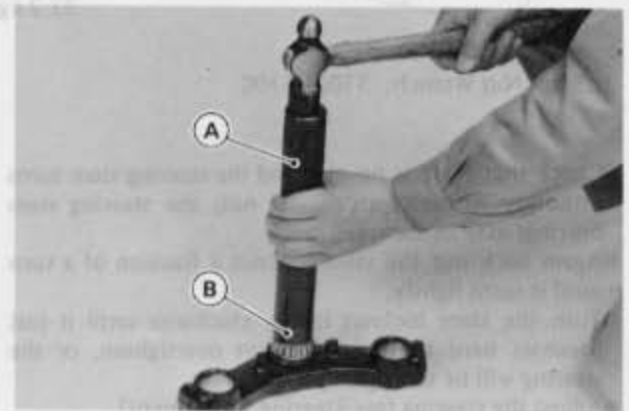
- Apply grease to the outer races, and then drive them into the head pipe using the drivers and the driver press shaft (special tools).

Outer Race Installation



1. Driver Press Shaft: 57001-1075
 2. Driver: 57001-1106
 3. Driver: 57001-1076

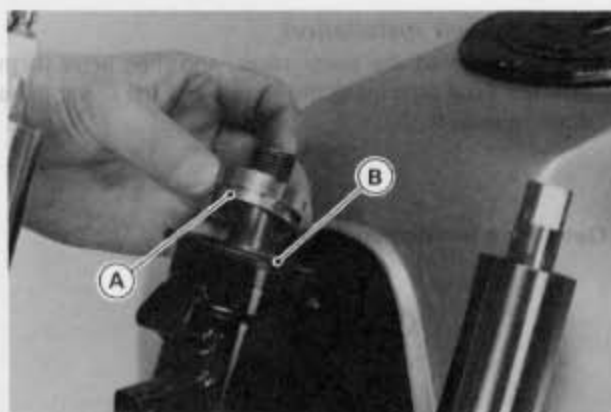
- Apply grease to the tapered roller bearing, and drive it onto the steering stem using the stem bearing driver and adapter (special tools).



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

- Lubricate the steering stem bearings with grease.
- Install the stem locknut so that the notched side faces down.
- Install the lockwasher, steering stem head, washer, and nut. Loosely install the nut at this time.

13-6 STEERING



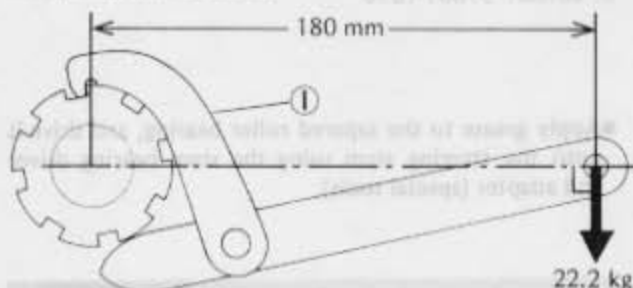
A. Notch Side

B. Cap

The following four steps should be performed after steering bearing installation. This procedure settles the bearings in place.

- Using the stem nut wrench, tighten the stem locknut to 39 N·m (4.0 kg·m, 29 ft·lb) of torque. (To tighten the steering stem locknut to the specified torque, hook the wrench on the stem locknut, and pull the wrench at the hole by 22.2 kg force in the direction shown.)

Torquing Stem Locknut



1. Stem Nut Wrench: 57001-1100

- Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.
- Again back out the stem locknut a fraction of a turn until it turns lightly.
- Turn the stem locknut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.
- Adjust the steering (see Steering Adjustment).
- Reinstall the following parts:
 - Front fork legs
 - Handlebars
 - Fairing stay, fairing
 - Front wheel
 - Fuel tank
- Route the cables and harnesses correctly. The cables and wiring harnesses must not hinder handlebar movement.
- Check and adjust the following items.

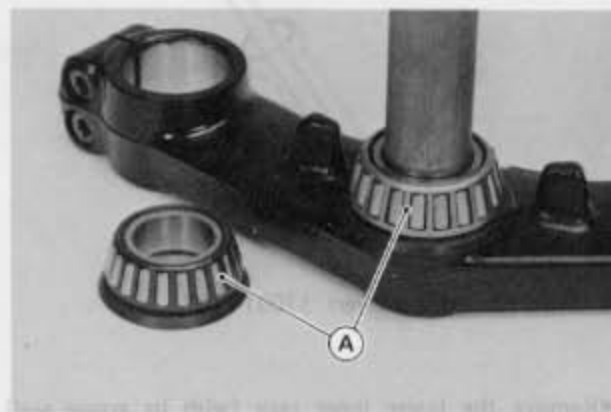
- Front brake
- Clutch
- Throttle cable
- Rear view mirrors
- Headlight aim

Steering Maintenance

Steering Stem Bearing Lubrication

In accordance with the Periodic Maintenance Chart, lubricate the steering stem bearings.

- Remove the steering stem.
- Using a high flash-point solvent, wash the upper and lower tapered roller bearings in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean of grease and dirt.
- Visually check the outer races and the rollers.
- ★ Replace the bearing assemblies if they show wear or damage.
- Pack the upper and lower tapered roller bearings in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem, and adjust the steering.



A. Steering Stem Bearings

Bearing Wear, Damage

- Using a high flash-point solvent, wash the upper and lower tapered rollers in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean of grease and dirt.
- Visually check the outer races and the rollers.
- ★ Replace the bearing assemblies if they show damage.

Grease Seal Deterioration, Damage

- Inspect the grease seal on the upper tapered roller bearing for any signs of deterioration or damage.
- ★ Replace the grease seal if necessary.

Steering Stem Warp

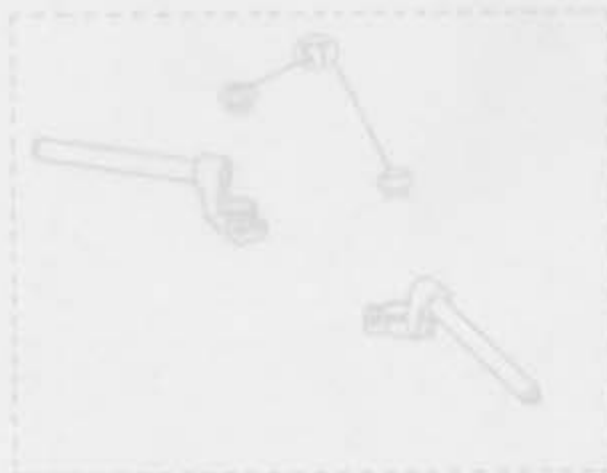
- Whenever the steering stem is removed, or if the steering cannot be adjusted for smooth action, check the steering stem for straightness.
- ★ If the steering stem shaft is bent, replace the steering stem.

Controls

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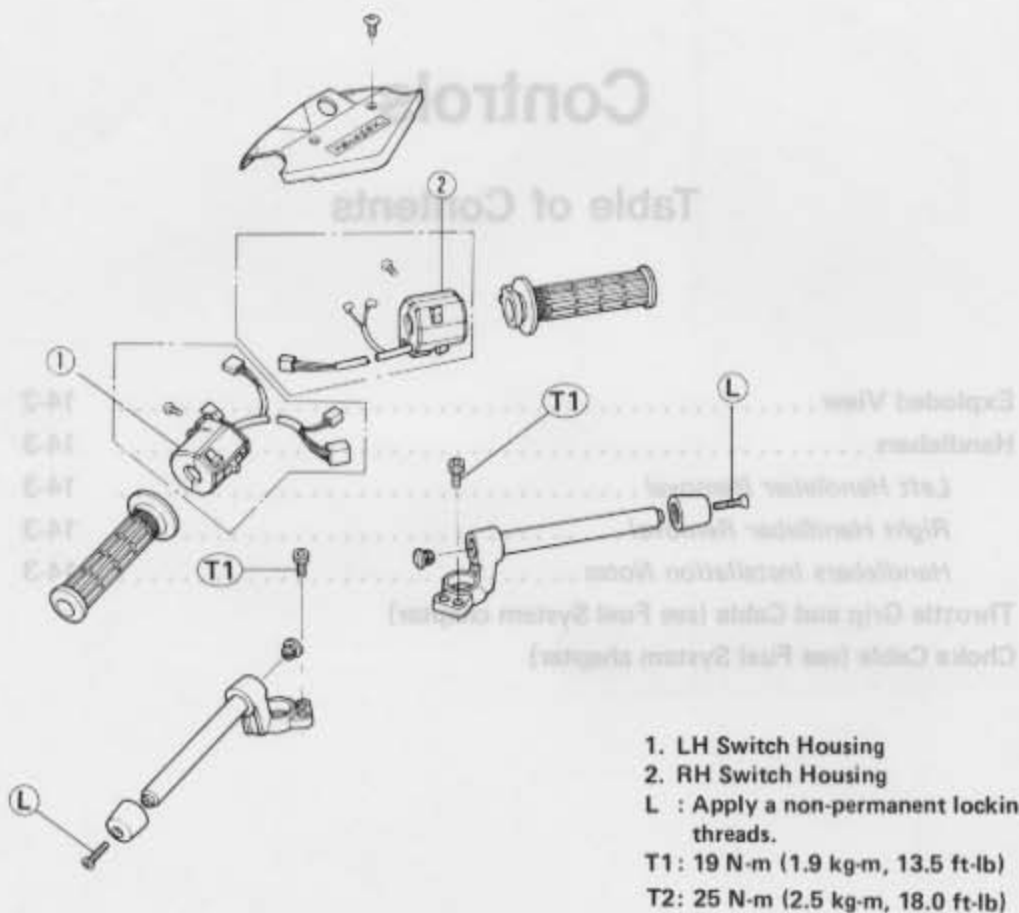
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1. LH Switch Housing
 2. RH Switch Housing
 3. Apply a nut/washer to the
 handlebar
 TT: 12 N·m (10.5 ft·lb)
 ST: 20 N·m (15.0 ft·lb)

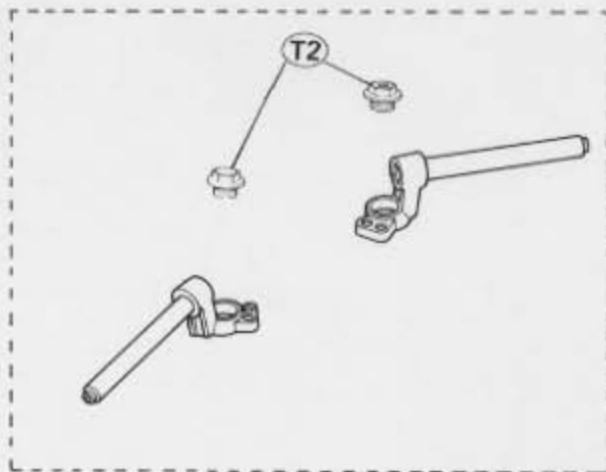


14-2 CONTROLS

Exploded View



'85 Model



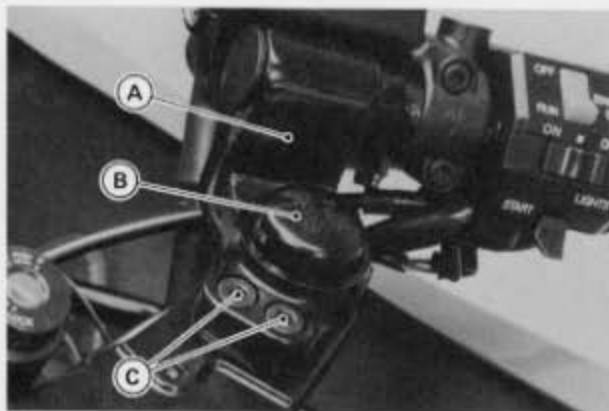
Handlebars

Left Handlebar Removal

- Remove the stem head cover.
- Remove the clutch master cylinder.
- Remove the screws, and open the left switch housing.
- Remove the handlebar mounting bolts and take off the handlebar.

Right Handlebar Removal

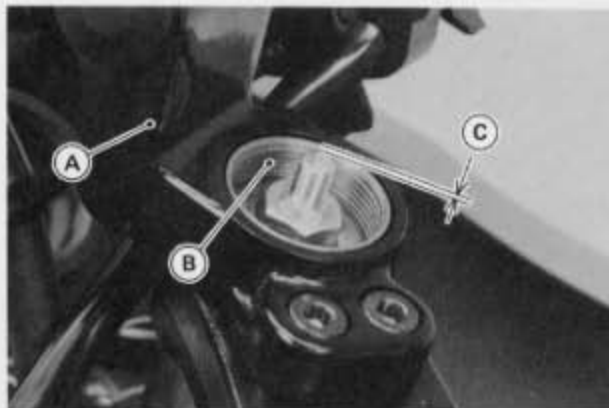
- Remove the front master cylinder.
- Remove the screws, open the right switch housing, and take off the throttle grip.
- Remove the handlebar mounting bolts and take off the handlebar.



A. Handlebar C. Mounting Bolts
B. Cap

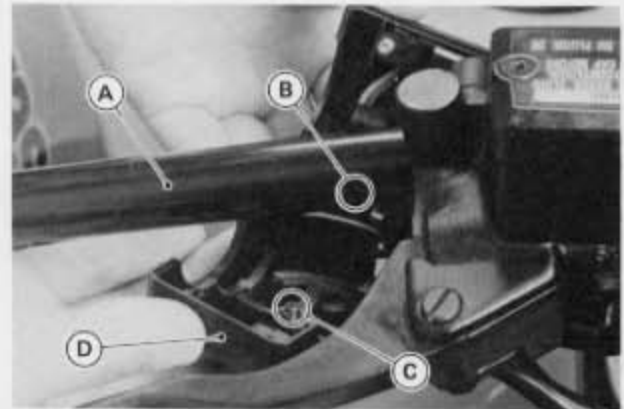
Handlebars Installation Notes

- Position the handlebar on the stem head, and tighten the mounting bolts to the specified torque.
- The handlebar must fit squarely on the fork inner tube top without any clearance.



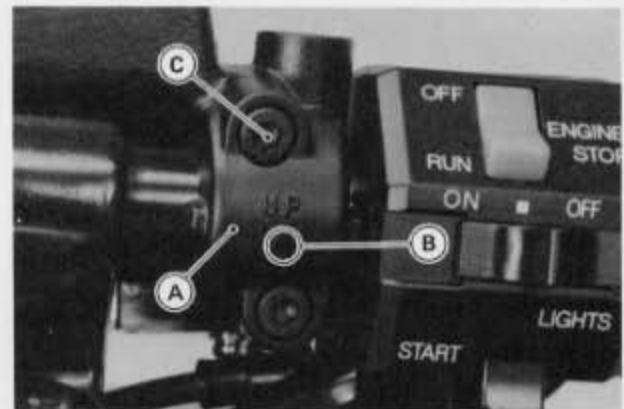
A. Handlebar C. Clearance
B. Fork Inner Tube

- The front half of both the left and right switch housings has a small projection. Fit the projection into a small hole in the handlebar.



A. Handlebar C. Projection
B. Small Hole D. Front Half of Switch Housing

- The front brake and clutch master cylinder clamp must be installed with the arrow mark upward. Tighten the upper clamp bolt first, and then the lower clamp bolt both to the specified torque. There will be a gap at the lower part of the clamp after tightening.



A. Clamp C. Tighten upper clamp bolt first
B. Arrow Mark

- Check and adjust the following items:
 - Throttle grip
 - Clutch
 - Front brake



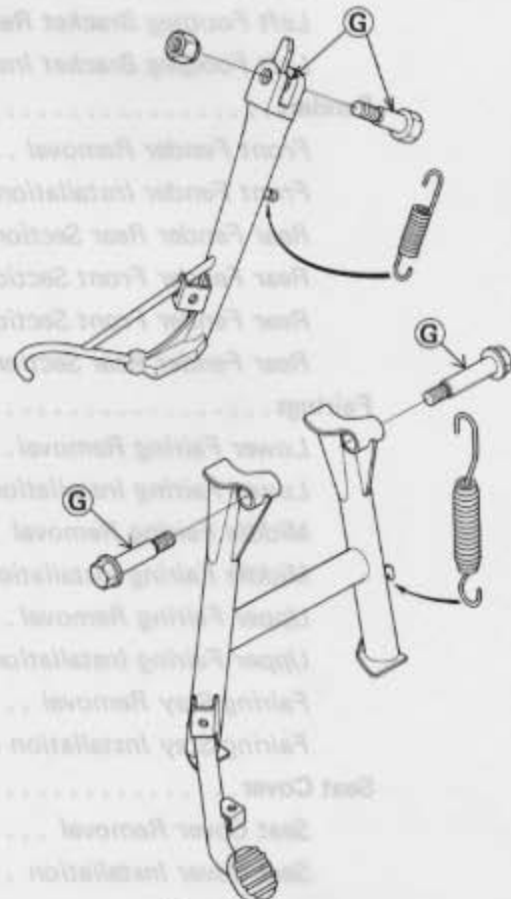
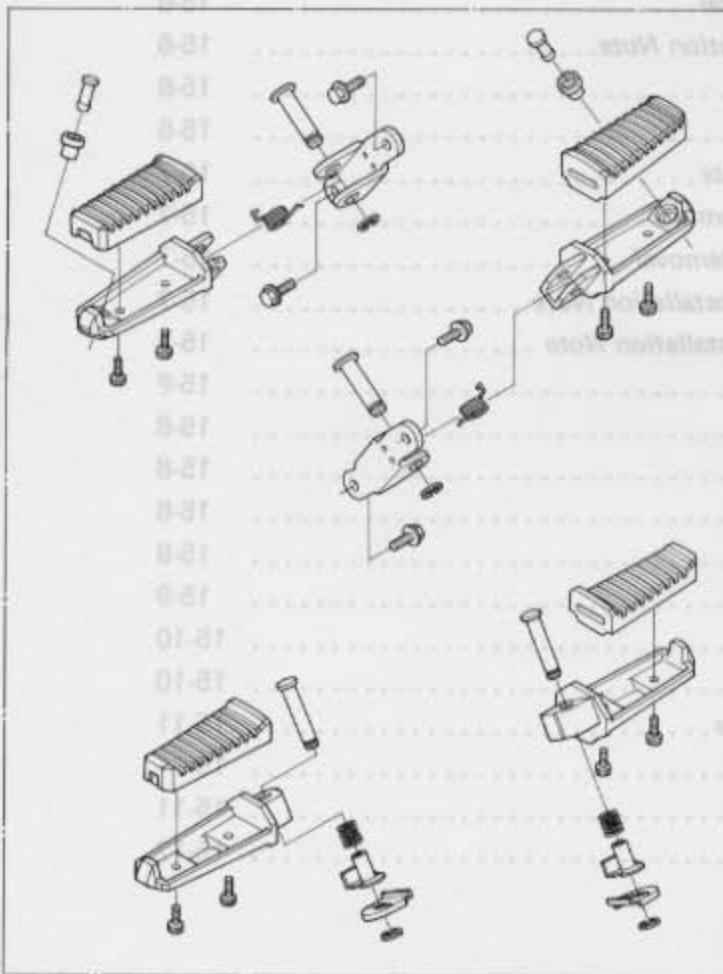
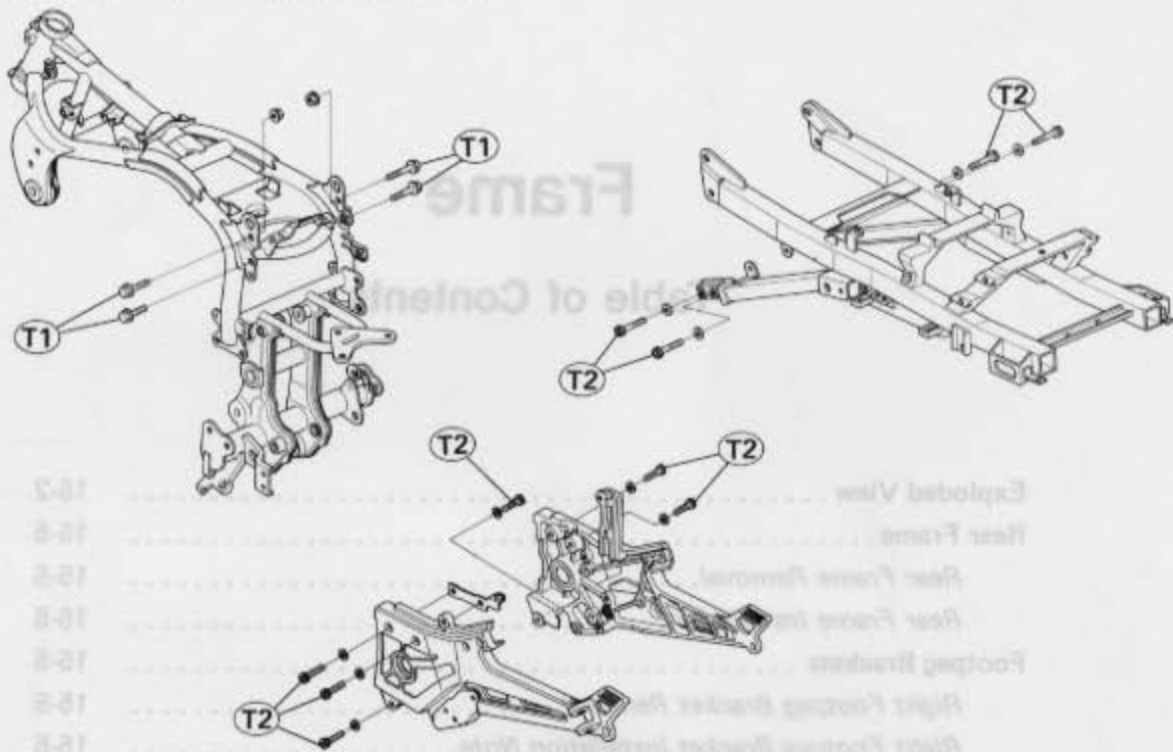
Frame

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15-2 FRAME

Exploded View



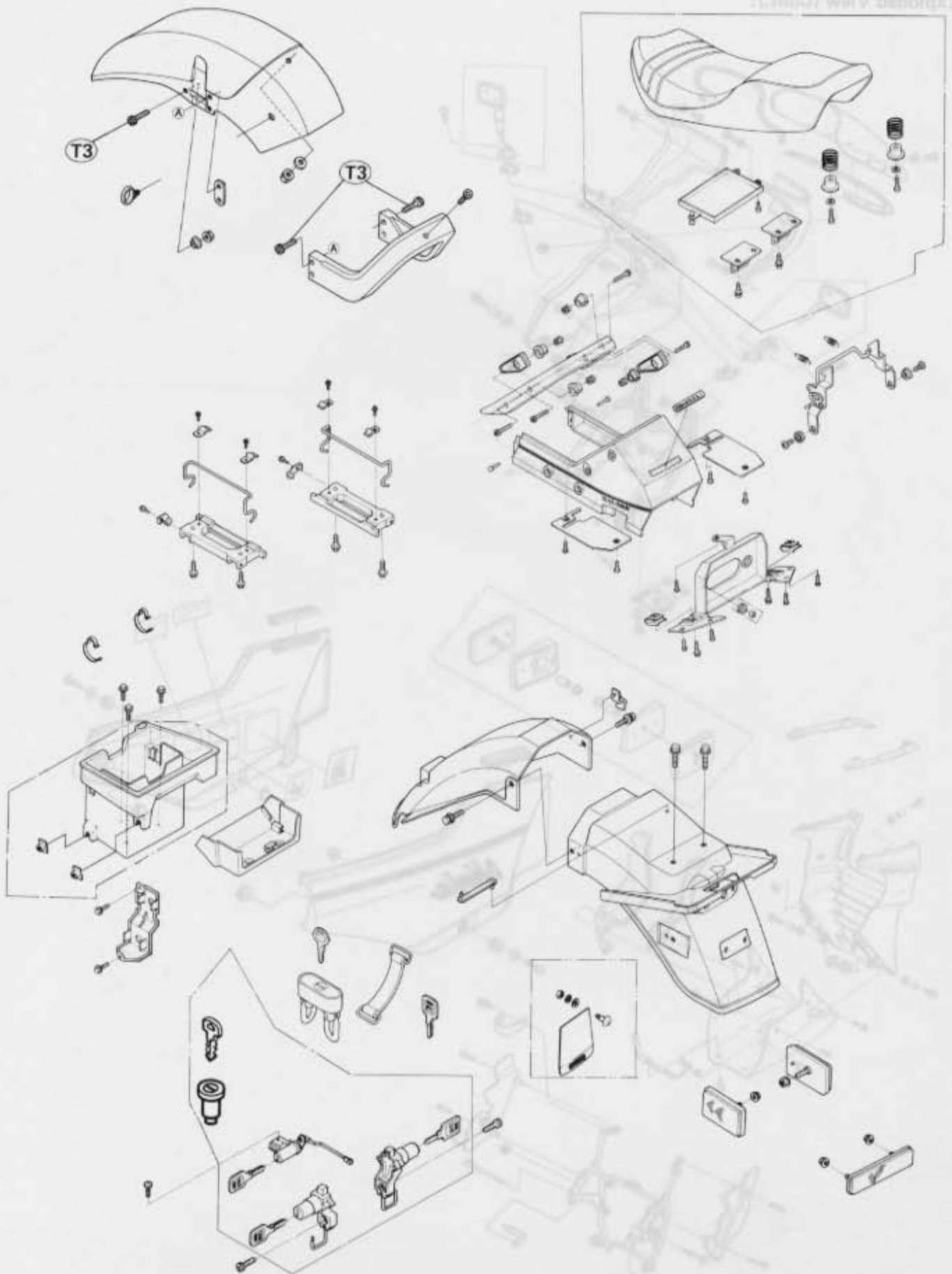
G : Apply grease.

T1 : 19 N·m (1.9 kg·m, 14.0 ft·lb)

T2 : 27 N·m (2.8 kg·m, 20 ft·lb)

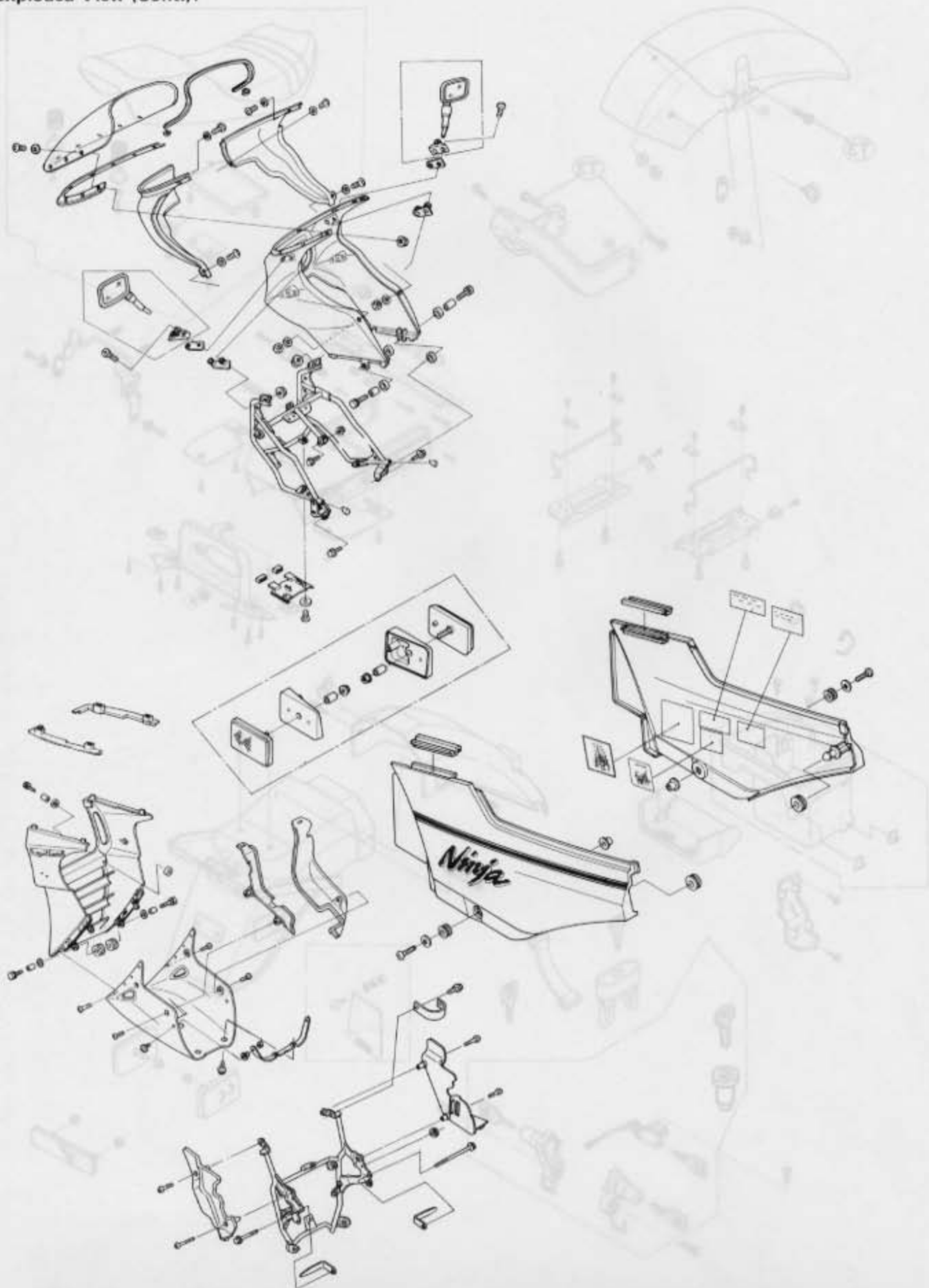
T3 : 8.8 N·m (0.90 kg·m, 78 in·lb)

(Exploded View (Cont.))



15-4 FRAME

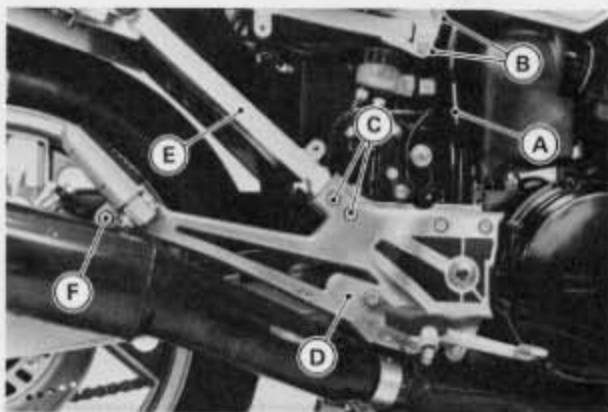
Exploded View (Cont.):



Rear Frame

Rear Frame Removal

- Remove the following parts before rear frame removal.
 - Seat
 - Fuel tank
 - Side cover
 - Coolant reserve tank
 - Battery
 - Junction box and its wirings, connectors.
 - Starter relay terminals
- Disconnect the brake, tail, and licence light connectors.
- Remove the battery case mounting bolts and take the wiring harness from the rear side of the battery case.
- Loosen the rear frame upper bolts and remove the rear frame lower bolts.
- Remove the upper bolts and tilt the rear frame toward the rear.



A. Main Frame D. Footpeg Bracket
 B. Rear Frame Upper Bolts E. Rear Frame
 C. Rear Frame Lower Bolts F. Muffler Mounting Bolt

- Remove the grab rail and seat cover from the rear frame.

Rear Frame Installation

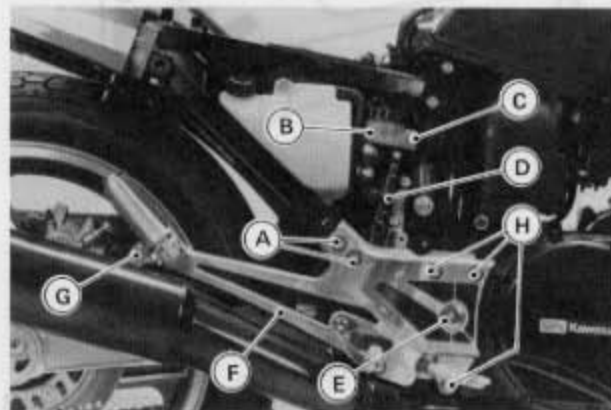
- Rear frame installation is the reverse of removal. Note the following.
 - Tighten the rear frame upper and lower bolts to the specified torque (see Exploded View).

Footpeg Brackets

Right Footpeg Bracket Removal

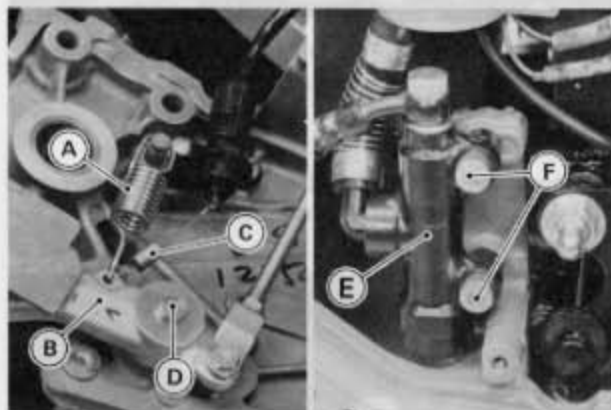
- Remove the right side cover.
- Disconnect the rear brake light switch leads.

- Remove the rear brake fluid reservoir mounting bolt.
- Remove the swing arm pivot nut.
- Remove the rear frame lower bolts, footpeg bracket bolts and washers, then take off the bracket with rear master cylinder.



A. Rear Frame Lower Bolts F. Footpeg Bracket
 B. Rear Brake Fluid Reservoir G. Muffler Mounting Bolt
 C. Mounting Bolt H. Footpeg Bracket Bolts
 D. Rear Master Cylinder
 E. Swing Arm Pivot Nut

- Remove the brake pedal spring and rear brake light switch spring from the footpeg bracket.
- Remove the rear master cylinder mounting bolts and brake pedal pivot bolt and then take off the rear master cylinder and brake pedal as a set.



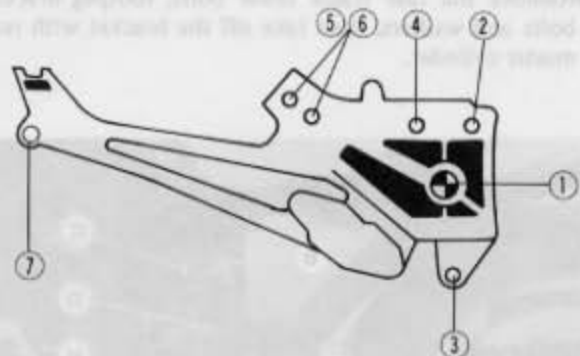
A. Brake Pedal Spring D. Brake Pedal Pivot Bolt
 B. Brake Pedal E. Rear Master Cylinder
 C. Brake Light Spring F. Mounting Bolts

Right Footpeg Bracket Installation Note

- Loosely tighten the swing arm pivot nut first, to seat the footpeg bracket. Loosely tighten all the bolts, and then tighten them to the specified torque following the tightening sequence as shown.

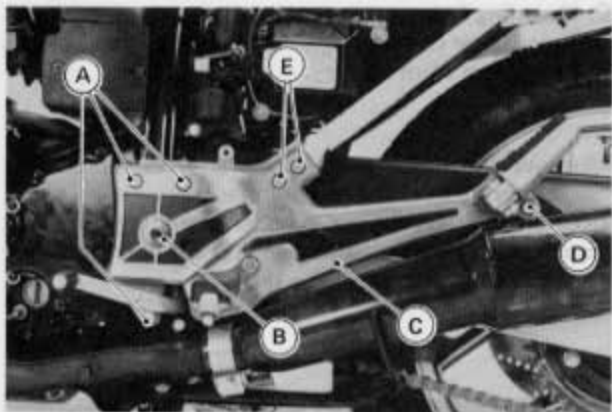
15-6 FRAME

Right Footpeg Mounting



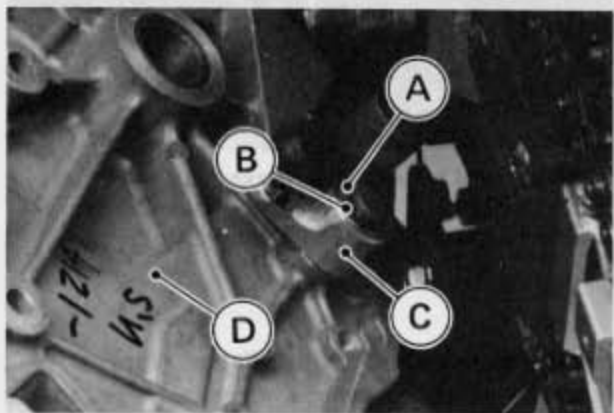
Left Footpeg Bracket Removal

- Remove the left side cover.
- Remove the swing arm pivot nut.
- Remove the rear frame lower bolts, footpeg bracket bolts and washers, and take off the bracket with shift pedal.



- A. Bracket Bolt
B. Pivot Nut
C. Footpeg Bracket
D. Muffler Mounting Bolt
E. Rear Frame Lower Bolts

- Remove the shift pedal pivot circlip and washer, and take the shift pedal from the bracket.

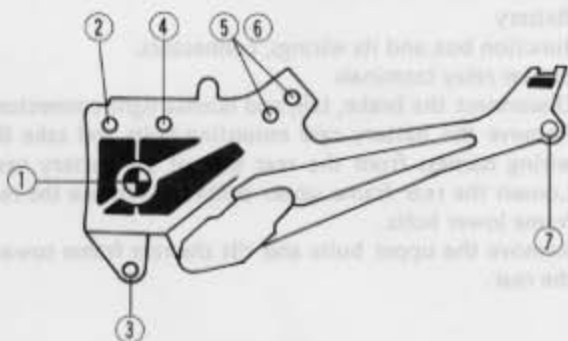


- A. Washer
B. Circlip
C. Shift Pedal
D. Footpeg Bracket

Left Footpeg Bracket Installation Note

- Loosely tighten the swing arm pivot nut first, to seat the footpeg bracket. Loosely tighten all the bolts, and then tighten them to the specified torque following the tightening sequence as shown.

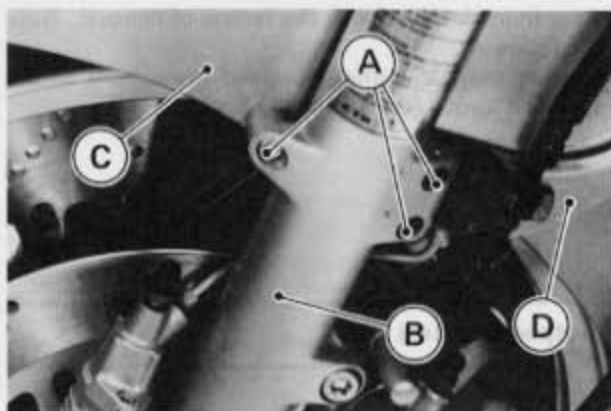
Left Footpeg Mounting



Fenders

Front Fender Removal

- Remove the speedometer cable lower end.
- Remove the front fender mounting bolts (left and right) and take off the nuts inside the fender.
- Remove the fender with brace and then separate them.



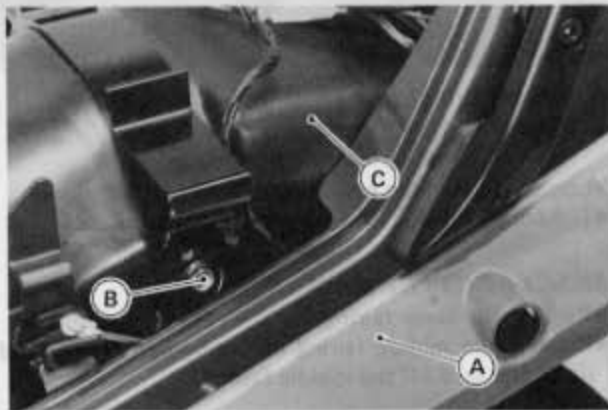
- A. Fender Mounting Bolts
B. Fork
C. Front Fender
D. Brace

Front Fender Installation Note

- Front fender installation is the reverse of removal.

Rear Fender Rear Section Removal

- Remove the seat.
- Remove the mounting bolts from the front of the rear fender rear section.



A. Seat Cover C. Rear Fender Rear Section
B. Mounting Bolts

- Disconnect the license light connector.
- Remove the mounting bolts from the rear of the rear fender rear section.

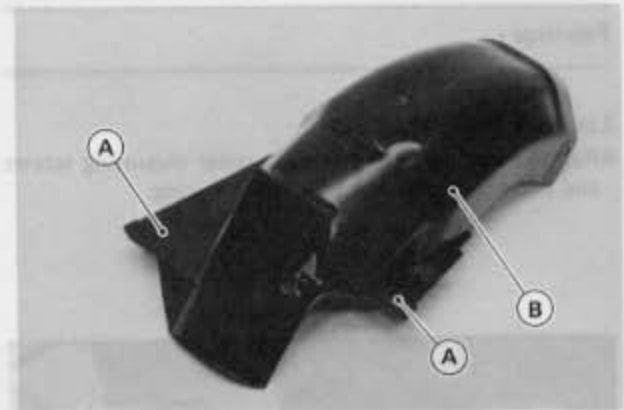


A. Mounting Bolts C. License Light Connector
B. Seat Cover

- Take off the rear fender rear section toward the rear.

Rear Fender Front Section Removal

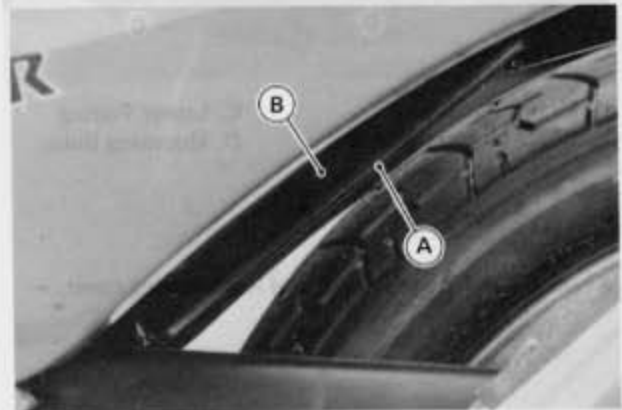
- Remove the rear fender rear section.
- Push the left and right flaps in, and free the rear fender front section from the slit in the frame.



A. Flaps B. Rear Fender Front Section

Rear Fender Front Section Installation Note

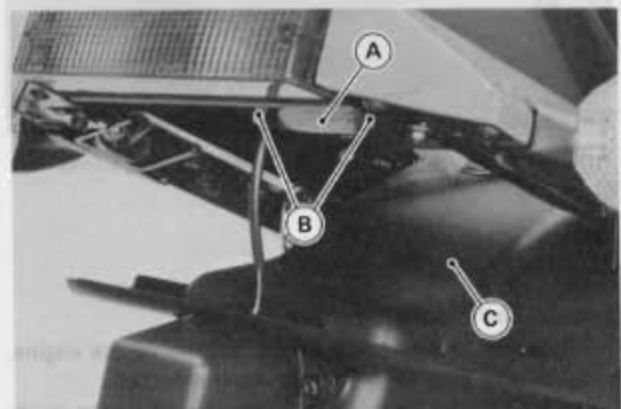
- When installing the rear fender front section, fit the flaps into the slot in the rear frame.



A. Slot B. Rear Frame

Rear Fender Rear Section Installation Note

- When installing the rear fender rear section, fit the rear fender cover into the seat cover, and attach the rear fender rear section to the bottom of the fender cover.

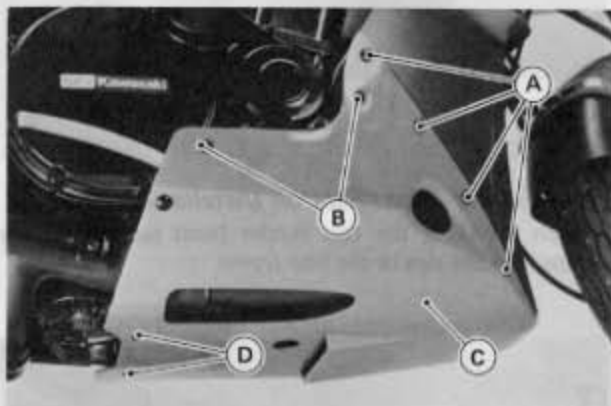


A. Rear Fender Cover C. Rear Fender Rear Section
B. Mounting Bolts

Fairings

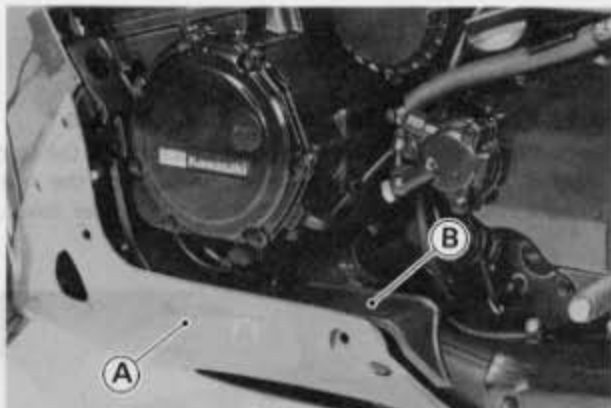
Lower Fairing Removal

- Remove the mounting screws, cover mounting screws and bolts (bottom) from the lower fairing.



A. Mounting Screws
B. Cover Mounting Screws
C. Lower Fairing
D. Mounting Bolts

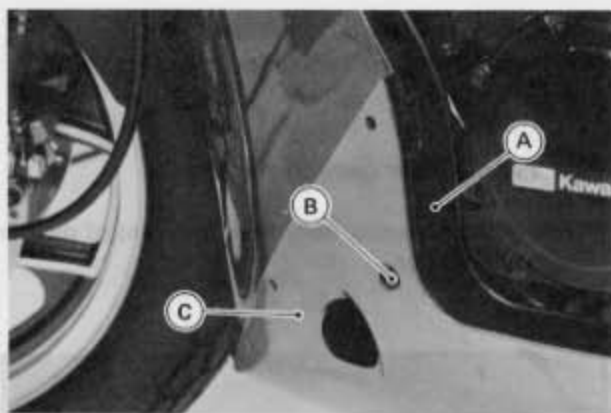
- Take off the lower fairing, and lower fairing cover.



A. Lower Fairing
B. Lower Fairing Cover

Lower Fairing Installation

- Attach the lower fairing to the bottom of the engine, and loosely tighten the bottom mounting bolt.
- Fit the left and right lower fairing covers to the inside of the lower fairing, and loosely tighten the cover mounting screws.

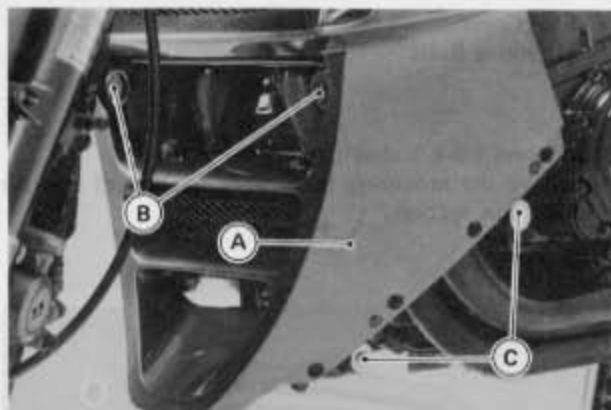


A. Lower Fairing Cover
B. Mounting Screw
C. Lower Fairing

- Loosely tighten the mounting screws.
- Tighten all the bolts and screws securely.

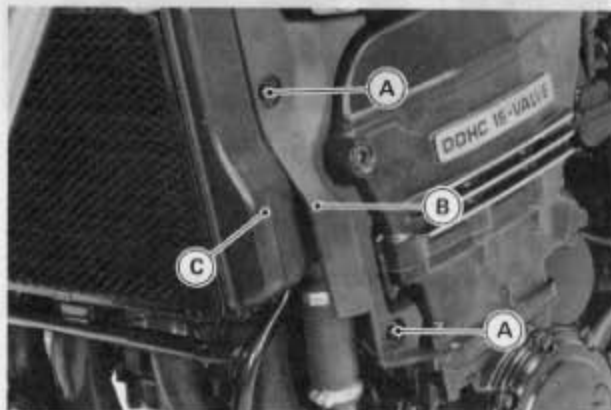
Middle Fairing Removal

- Remove the lower fairing.
- Remove the middle fairing mounting bolts (front and side), and take off the middle fairing.



A. Middle Fairing
B. Mounting Bolts
C. Mounting Bolts

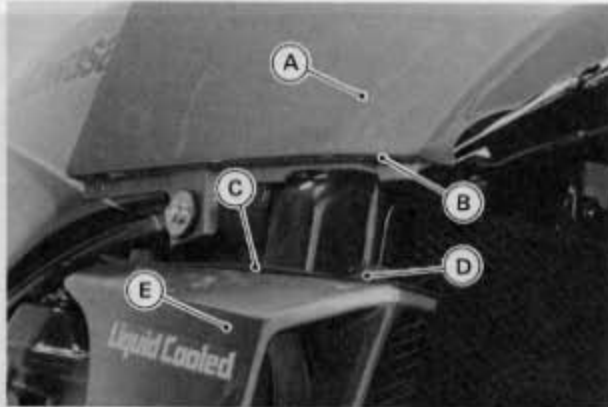
- Remove the middle fairing cover screws, and take off the left and right covers.



A. Cover Screws
B. Middle Fairing Cover
C. Radiator

Middle Fairing Installation

- Install the left and right middle fairing cover.
- Attach the damper rubber to the top of the middle fairing. Then fit the tang into the hole in the upper fairing.

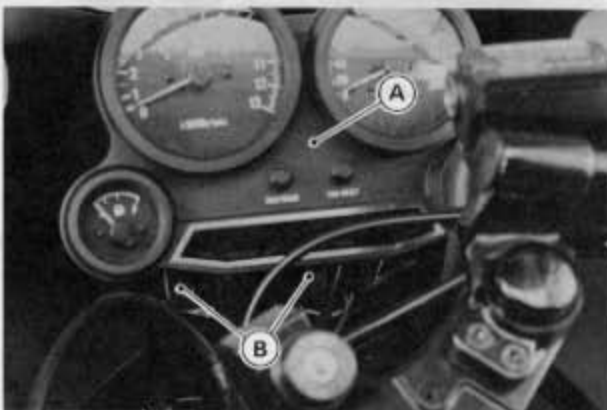


A. Upper Fairing
B. Hole
C. Damper Rubber
D. Tang
E. Middle Fairing

- Install the middle fairing, and tighten the mounting bolts.
- Install the lower fairing.

Upper Fairing Removal

- Remove the lower fairing.
- Remove the middle fairing.
- Remove the speedometer cable lower end.
- Remove the ignition switch cover screws and take off the cover.
- Remove the meter mounting bolts, and pull the meter assembly to the rear.



A. Meter Assembly
B. Meter Mounting Bolts

- Rest the meter assembly on the fuel tank.

NOTE

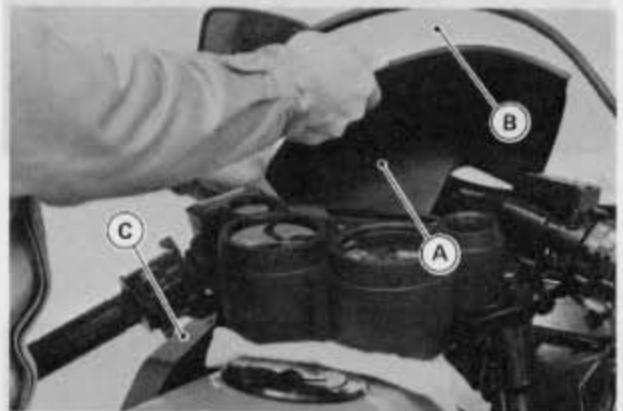
- Cover the fuel tank with a thick cloth to avoid damaging the painted surface.

CAUTION

- Place the meters so that they are upright. If a meter is left upside down or sideways for any length of time it will malfunction.
- Remove the inner fairing mounting screws, and remove the inner fairing.



A. Screws (Left and Right)
B. Screw (Center)
C. Screws (Left and Right)
D. Upper Fairing

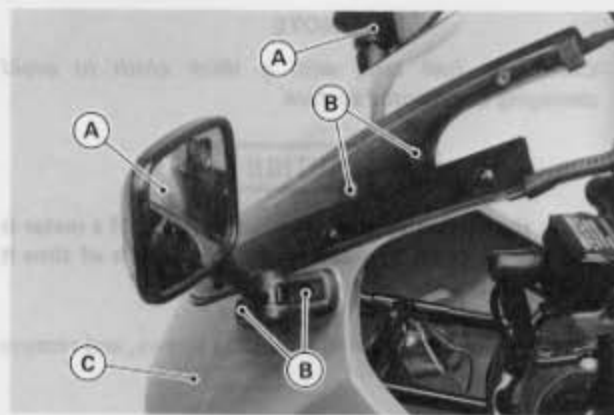


A. Inner Fairing half
B. Windshield
C. Upper Fairing

NOTE

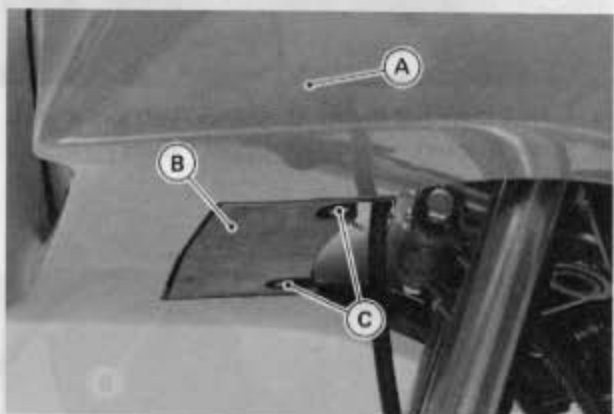
- When removing the inner fairing half, be careful not to damage the inside surface of the windshield.
- Remove the rear view mirror mounting screws, and take off the mirrors and rubber dampers.

15-10 FRAME

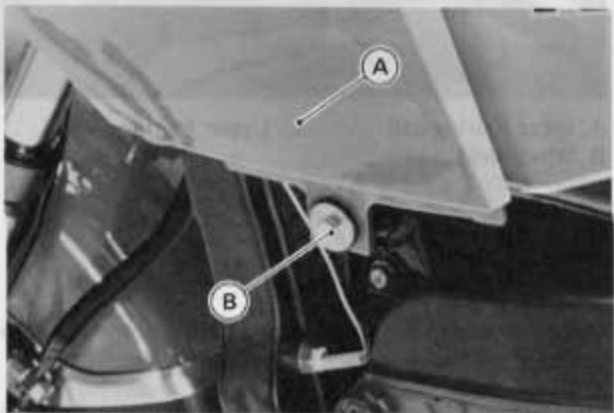


A. Rear View Mirrors
B. Mounting Screws
C. Upper Fairing

- Disconnect the front turn signal light lead connectors.
- Remove the headlight cover bolts, and take off the cover. Remove the upper fairing mounting bolts, and remove the upper fairing toward the front, clearing the fairing stays.



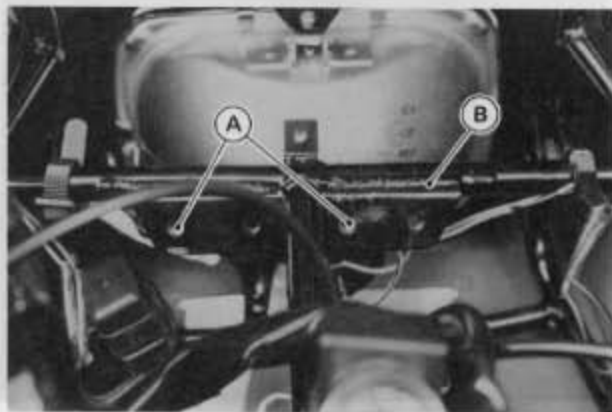
A. Upper Fairing
B. Headlight Cover
C. Cover Bolts



A. Upper Fairing
B. Mounting Bolts

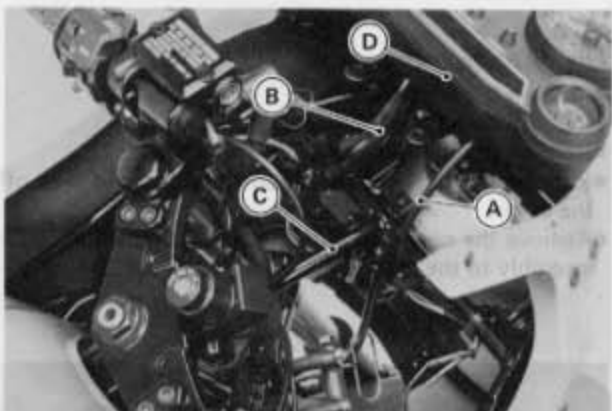
Upper Fairing Installation

- Upper fairing installation is the reverse of removal. Pay attention to the following items.
- When installing the meter assembly, use the the thread holes as shown.



A. Use thread holes
B. Fairing Stay

- Route the speedometer cable and meter wiring as shown in the figure.

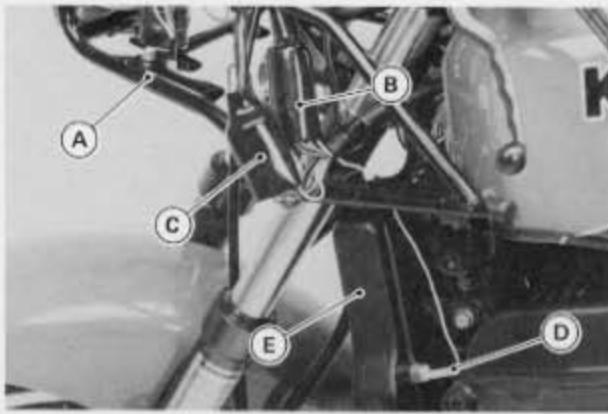


A. Speedometer Cable
B. Meter Wiring
C. Fairing Stay
D. Meter Assembly

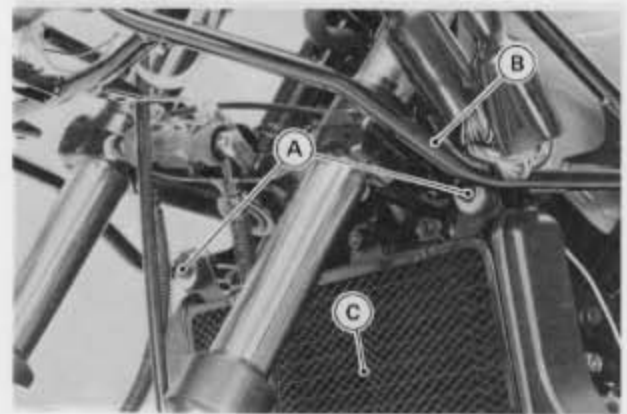
- Do not forget to install the speedometer cable lower end to the speedometer gear housing.

Fairing Stay Removal

- Remove the lower fairing.
- Remove the middle fairing.
- Remove the upper fairing.
- Disconnect the wiring harness connectors or wiring lead of the radiator.



A. Fairing Stay
 B. Wiring Connector
 C. Wiring Connector
 D. Wiring Lead
 E. Radiator



A. Mounting Bolt
 B. Fairing Stay
 C. Radiator

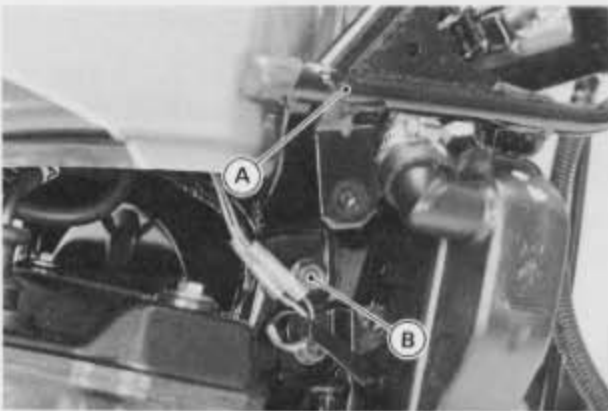
- Remove the fairing stay mounting bolts and nut. Remove the fairing stay toward the front.

NOTE

○ If the fuel tank interferes with the fairing stay, remove the fuel tank first.

Fairing Stay Installation Notes

- When installing the fairing stay, be careful not to damage the radiator and radiator hose.



A. Fairing Stay
 B. Mounting Bolt



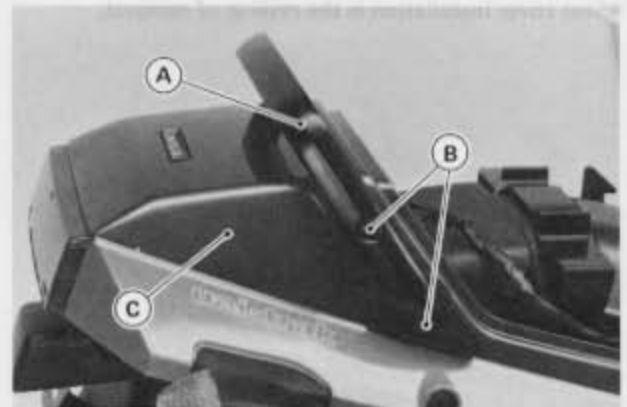
A. Mounting Nut
 B. Stem Head Pipe
 C. Fairing Stay



Seat Cover

Seat Cover Removal

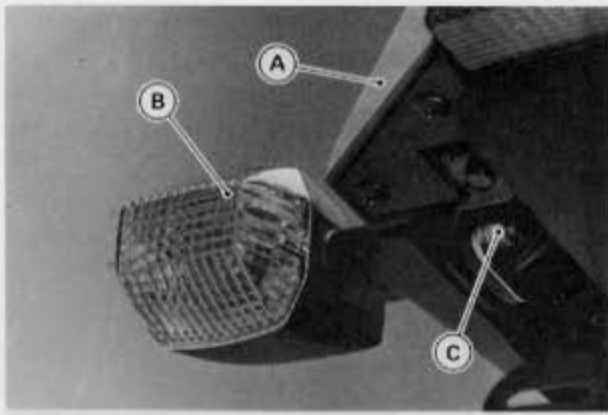
- Remove the seat.
- Remove both side covers.
- Disconnect the tail light wiring connector.
- Remove the grab rail mounting bolts and take off the grab rail.



A. Grab Rail
 B. Mounting Bolts
 C. Seat Cover

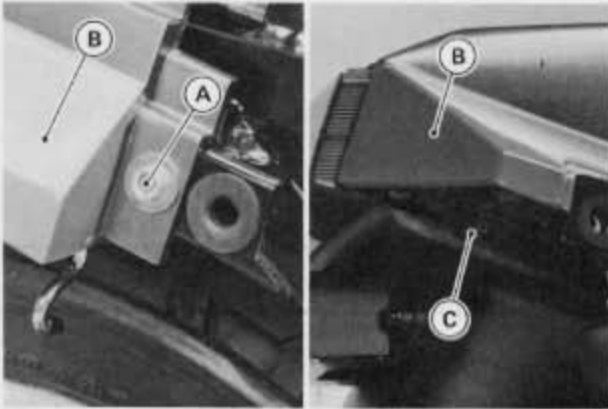
- Remove the left and right rear turn signal mounting bolts and let them hang free.

15-12 FRAME



A. Seat Cover
B. Rear Turn Signal
C. Mounting Bolt

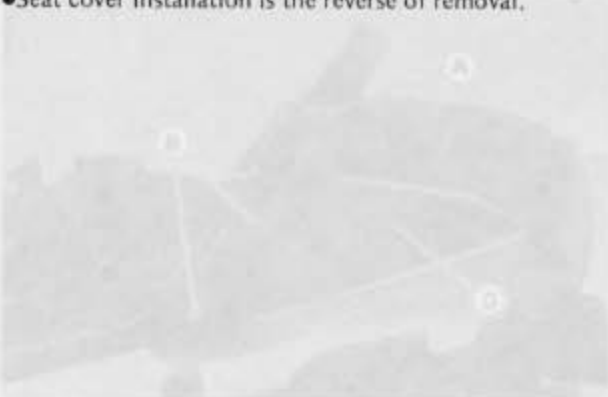
●Remove the seat cover bolts and take off the seat cover.



A. Seat Cover Bolt
B. Seat Cover
C. Seat Cover Bolt

Seat Cover Installation

●Seat cover installation is the reverse of removal.



A. Gap Rail
B. Mounting Bolt
C. Seat Cover

Remove the left and right rear turn signal mounting bolts and set them aside.



A. Seat Cover
B. Rear Turn Signal
C. Mounting Bolt

Remove the left and right rear turn signal mounting bolts and set them aside.

NOTE

On the left side, remove the front edge of the seat cover.



A. Seat Cover
B. Mounting Bolt



A. Mounting Bolt
B. Seat Cover

Electrical System

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16-2 ELECTRICAL SYSTEM

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Precautions

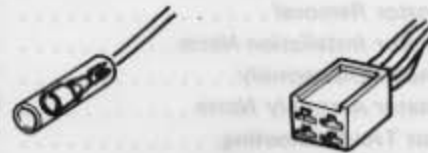
There are numbers of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter switch pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Do not use a meter illumination bulb rated for other than voltage or wattage specified in the wiring diagram, as the meter or gauge panel could be warped by excessive heat radiated from the bulb.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was brought 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, fraying, etc. Poor wires and bad connections will affect electrical system operation.

Inspection	16-37
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Electrical Connectors

Female Connectors



Male Connectors

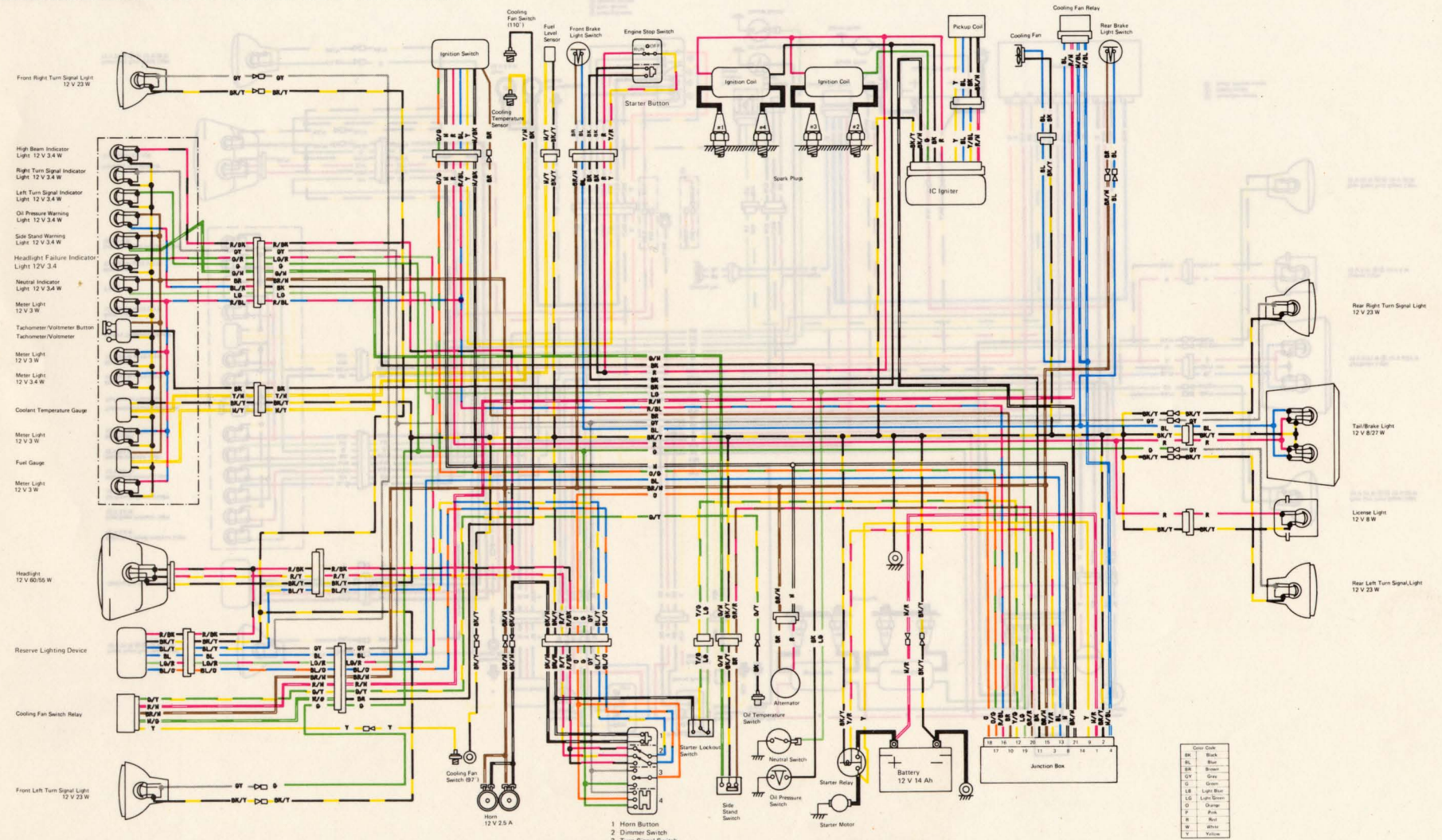


Color Codes:

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

- Measure coil and winding resistance when the part is cold (at room temperature).

ZX900-A1, A2 Wiring Diagram (US and Canada)



- 1 Horn Button
- 2 Dimmer Switch
- 3 Turn Signal Switch
- 4 Hazard Switch

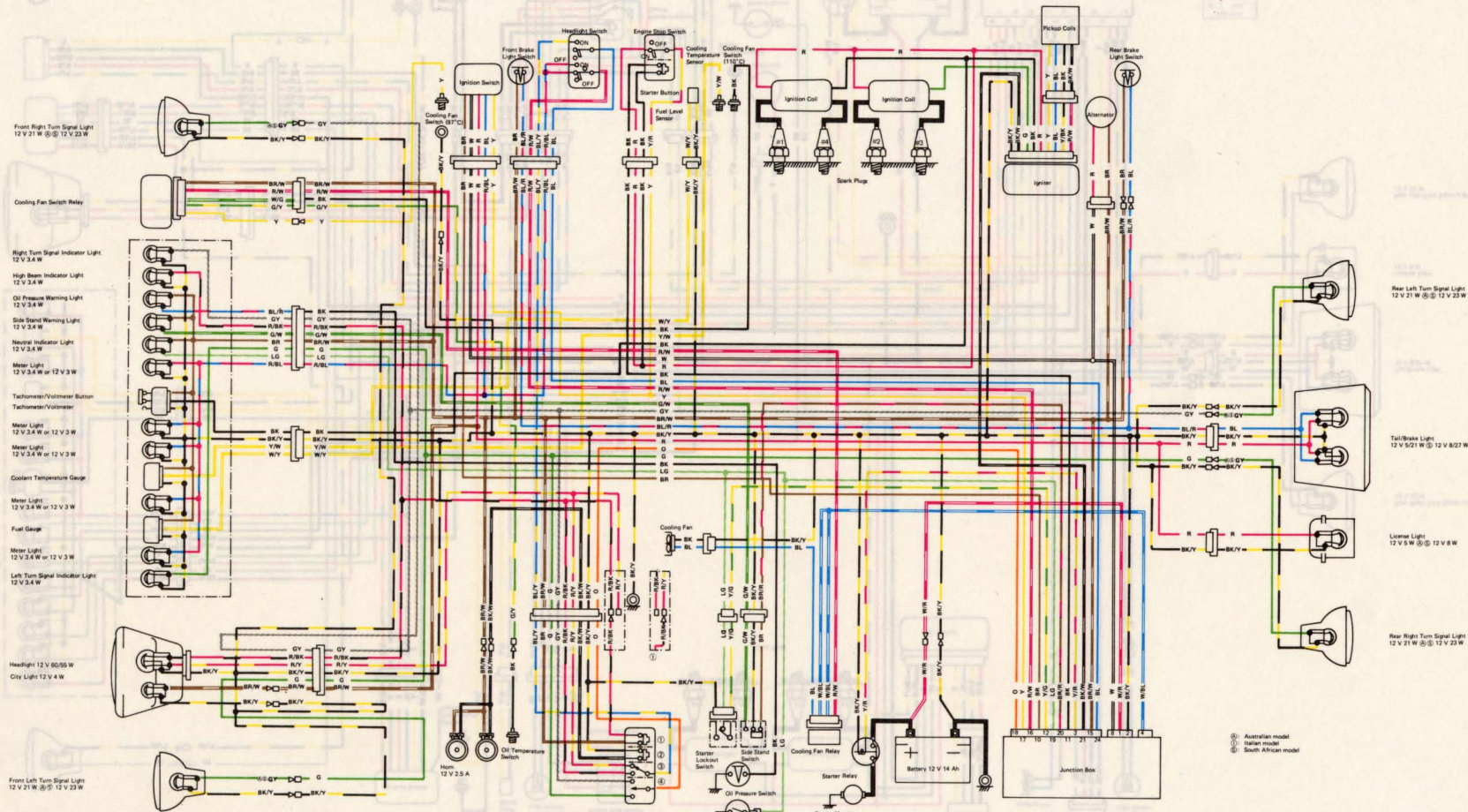
Switch	Color	Wiring
Starter Lockout Switch	Black	Ignition Switch
Horn Button	Black	Ignition Switch
Dimmer Switch	Black	Ignition Switch
Turn Signal Switch	Black	Ignition Switch
Hazard Switch	Black	Ignition Switch

Color	IGN	BATT	W	Y	BL	R	W/BK	Gr/D
OFF LOCK	ON	ON	ON	ON	ON	ON	ON	ON
ON	ON	ON	ON	ON	ON	ON	ON	ON
PI/PARK	ON	ON	ON	ON	ON	ON	ON	ON

Color	Y/R	R	Color	BK	BK
OFF	ON	ON	ON	ON	ON
RUN	ON	ON	ON	ON	ON

BK	Black
BL	Blue
BR	Brown
BU	Blue
GN	Green
GR	Green
LG	Light Green
LB	Light Blue
LD	Light Blue
OR	Orange
P	Pink
R	Red
WH	White
Y	Yellow

ZX900-A1, A2 Wiring Diagram (Other than US and Canada)



- Front Right Turn Signal Light
12 V 21 W (S) 12 V 23 W
- Cooling Fan Switch Relay
- Right Turn Signal Indicator Light
12 V 3.4 W
- High Beam Indicator Light
12 V 3.4 W
- Oil Pressure Warning Light
12 V 3.4 W
- Side Stand Warning Light
12 V 3.4 W
- Neutral Indicator Light
12 V 3.4 W
- Master Light
12 V 3.4 W or 12 V 3 W
- Tachometer/Voltmeter Button
Tachometer/Voltmeter
- Master Light
12 V 3.4 W or 12 V 3 W
- Master Light
12 V 3.4 W or 12 V 3 W
- Coolant Temperature Gauge
- Master Light
12 V 3.4 W or 12 V 3 W
- Fuel Gauge
- Master Light
12 V 3.4 W or 12 V 3 W
- Left Turn Signal Indicator Light
12 V 3.4 W
- Headlight 12 V 60/55 W
City Light 12 V 4 W
- Front Left Turn Signal Light
12 V 21 W (S) 12 V 23 W

- Rear Left Turn Signal Light
12 V 21 W (S) 12 V 23 W
- Tail Brake Light
12 V 5/21 W (S) 12 V 8/27 W
- License Light
12 V 5 W (S) 12 V 8 W
- Rear Right Turn Signal Light
12 V 21 W (S) 12 V 23 W

- ① Parking Button
- ② Horn Button
- ③ Dimmer Switch
- ④ Turn Signal Switch

- ⊙ Australian model
- ⊙ Italian model
- ⊙ South African model

LEFT HANDLEBAR SWITCH CONNECTIONS

Starter Lockout Switch		Horn Button		Dimmer Switch		Turn Signal Switch		Parking Button	
Color	Wiring	Color	Wiring	Color	Wiring	Color	Wiring	Color	Wiring
Release	BK/Y	On	W/W	On	W/W	Turn Signal	W/W	Turn Signal	W/W
Locked	W/W	Off	W/W	Off	W/W	Turn Signal	W/W	Turn Signal	W/W

IGNITION SWITCH CONNECTIONS

Color	Wiring	Color	Wiring	Color	Wiring	Color	Wiring
OFF	W/W	ON	W/W	ON	W/W	ON	W/W
IGN	W/W	IGN	W/W	IGN	W/W	IGN	W/W
STOP	W/W	STOP	W/W	STOP	W/W	STOP	W/W

RIGHT HANDLEBAR SWITCH CONNECTIONS

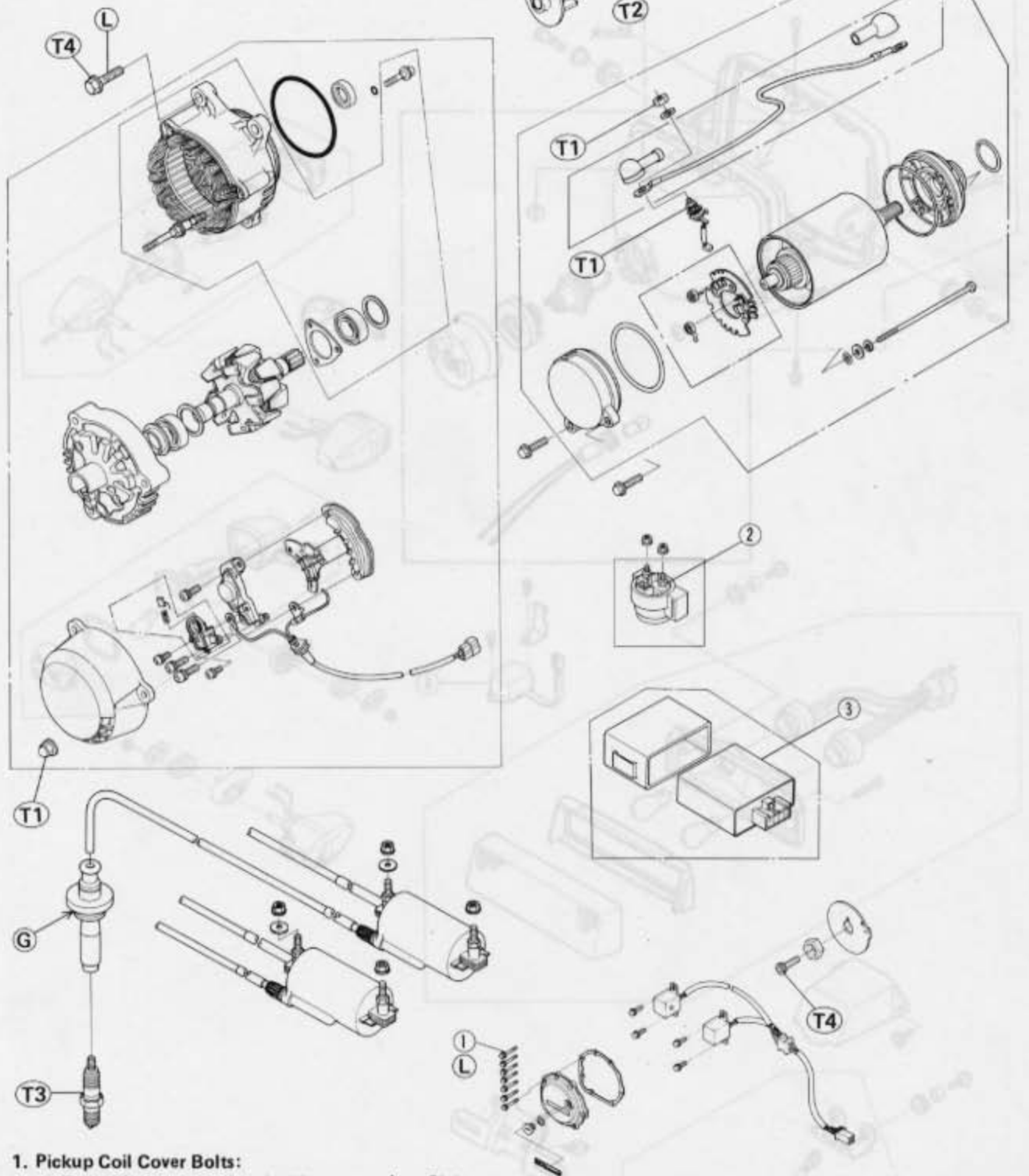
Color	Wiring	Color	Wiring	Color	Wiring	Color	Wiring
Engine Stop Switch	W/W	Headlight Switch	W/W	Headlight Switch	W/W	Headlight Switch	W/W
Ignition	W/W	Ignition	W/W	Ignition	W/W	Ignition	W/W
Ignition	W/W	Ignition	W/W	Ignition	W/W	Ignition	W/W

Color Code

BK	Black
BL	Blue
BR	Brown
GY	Gray
GR	Green
LG	Light Green
LY	Light Yellow
P	Pink
R	Red
W	White
W/W	Yellow

(1196C, 1396B, 1696B, 1897B)

.....
Exploded View

**1. Pickup Coil Cover Bolts:**

Two of them require locking agent (see Pickup Coil Removal/Installation Notes)

2. Starter Relay**3. IC Igniter**

G : Apply grease.

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

T1: 4.9 N-m (0.50 kg-m, 43 in-lb)

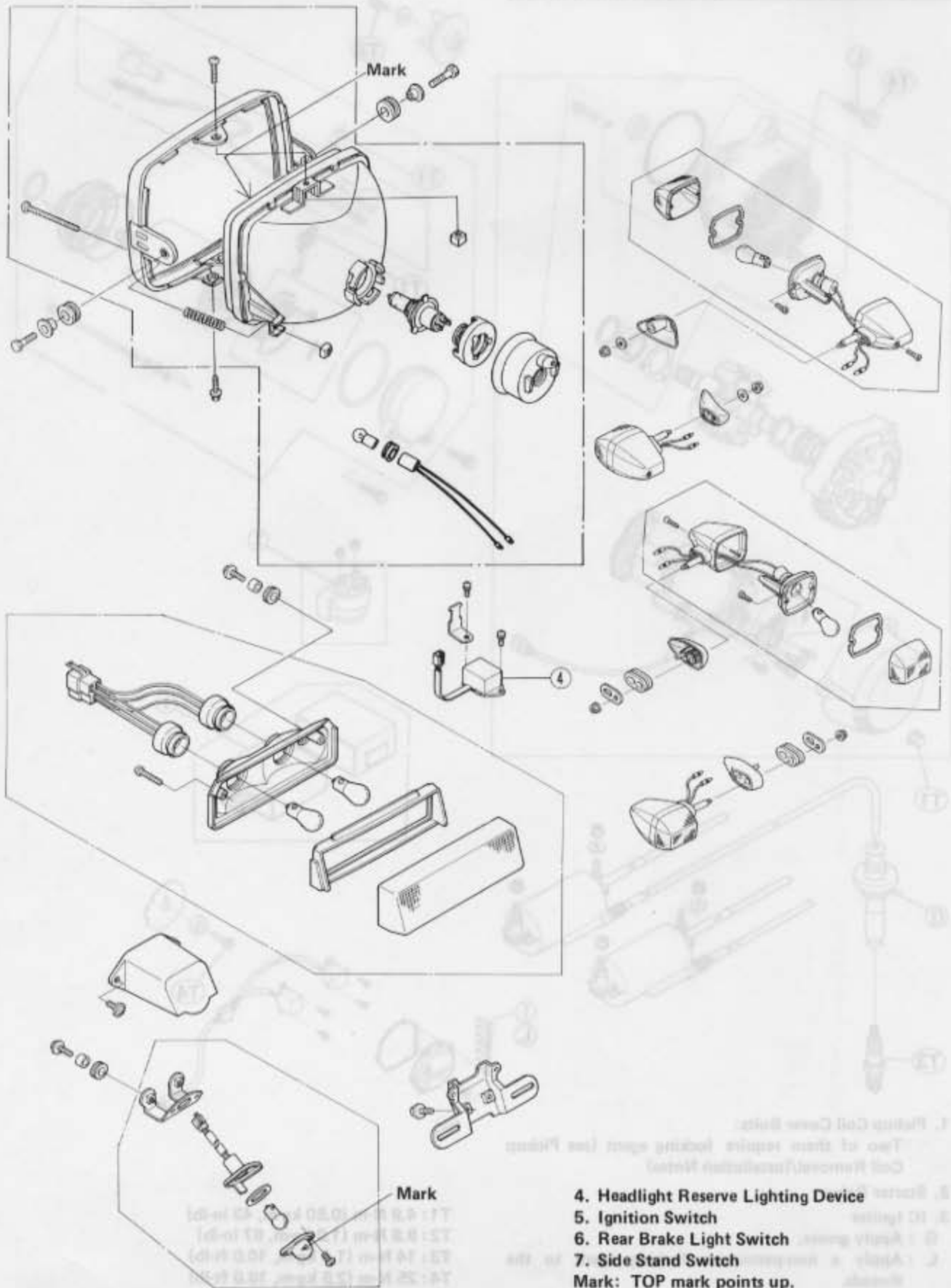
T2: 9.8 N-m (1.0 kg-m, 87 in-lb)

T3: 14 N-m (1.4 kg-m, 10.0 ft-lb)

T4: 25 N-m (2.5 kg-m, 18.0 ft-lb)

16-6 ELECTRICAL SYSTEM

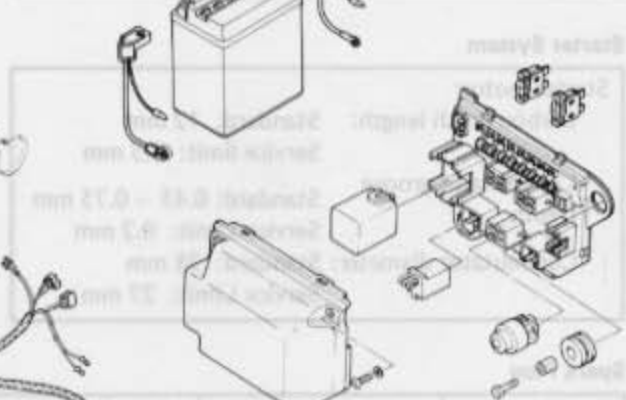
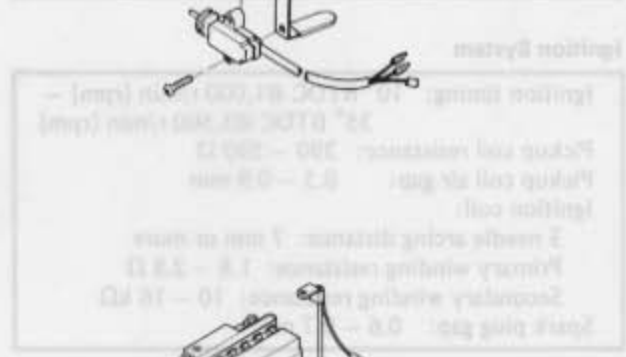
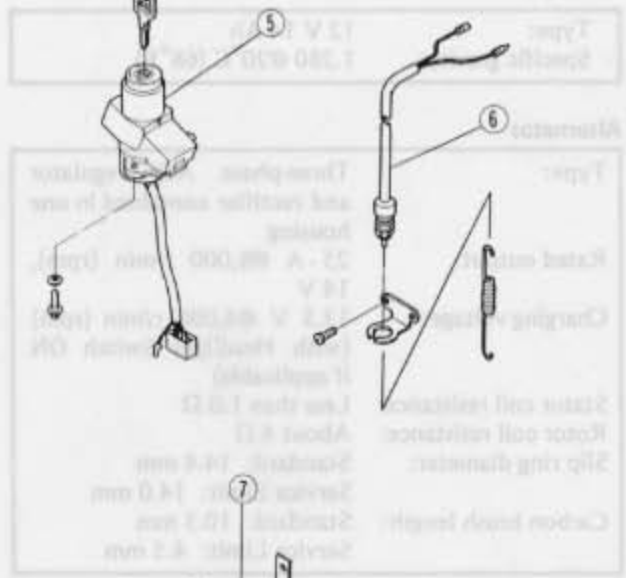
Exploded View (Cont.):



- 4. Headlight Reserve Lighting Device
 - 5. Ignition Switch
 - 6. Rear Brake Light Switch
 - 7. Side Stand Switch
- Mark: TOP mark points up.

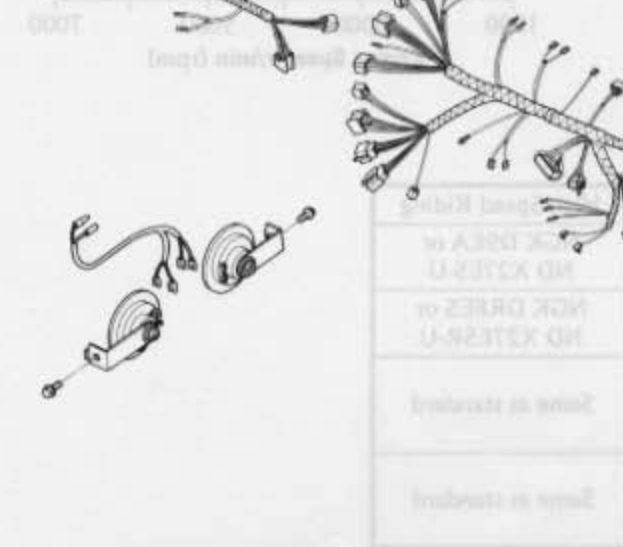
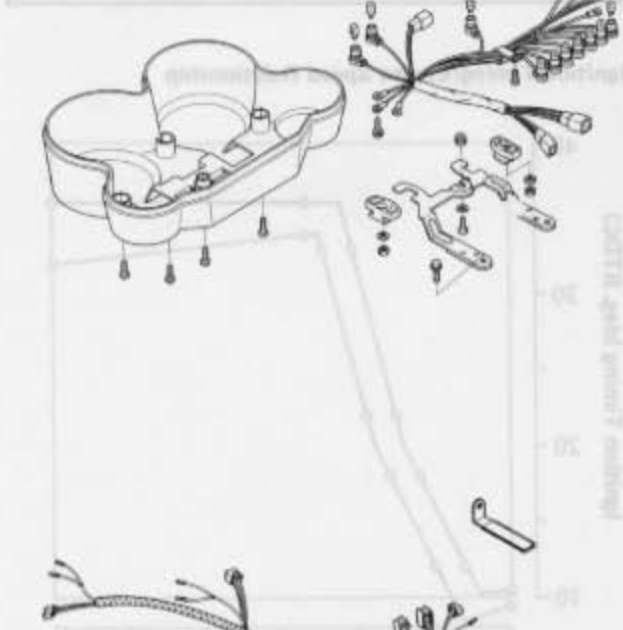
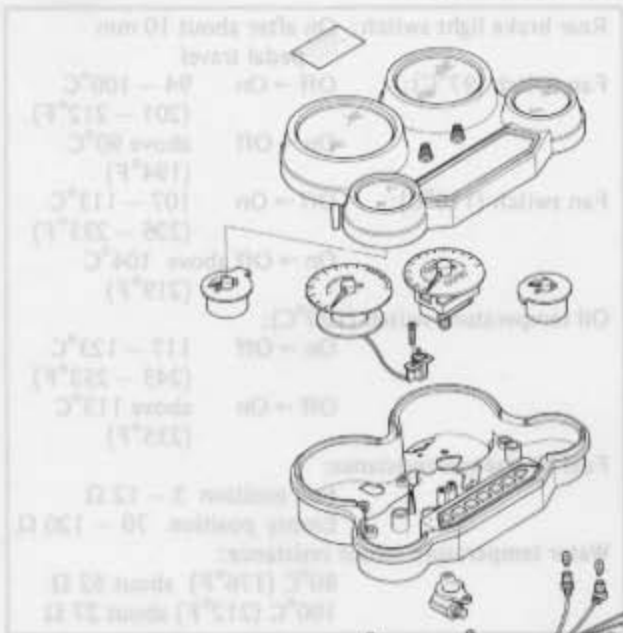
Specifications

Battery



1/2"	NK DREB or ND X3E2-U	Standard	Low 2nd Rtd. Rld. or NK DREB or ND X3E2-U
Canada	NK DREB-L or ND X3E2-R-U	Standard	NK DREB-L or ND X3E2-R-U
Europe except Japan	NK DREB or ND X3E2-R-U	Standard	Same as standard
Other areas	NK DREB or ND X3E2-R-U	Standard	Same as standard

Switches and Sensors



16-8 ELECTRICAL SYSTEM

Specifications

Battery

Type: 12 V 14 Ah
 Specific gravity: 1.280 @20°C (68°F)

Alternator

Type: Three-phase AC, regulator and rectifier contained in one housing
 Rated output: 25 A @6,000 r/min (rpm), 14 V
 Charging voltage: 13.5 V @4,000 r/min (rpm) (with Headlight Switch ON if applicable)
 Stator coil resistance: Less than 1.0 Ω
 Rotor coil resistance: About 4 Ω
 Slip ring diameter: Standard: 14.4 mm
 Service Limit: 14.0 mm
 Carbon brush length: Standard: 10.5 mm
 Service Limit: 4.5 mm

Ignition System

Ignition timing: 10° BTDC @1,000 r/min (rpm) – 35° BTDC @3,500 r/min (rpm)
 Pickup coil resistance: 390 – 590 Ω
 Pickup coil air gap: 0.5 – 0.9 mm
 Ignition coil:
 3 needle arcing distance: 7 mm or more
 Primary winding resistance: 1.8 – 2.8 Ω
 Secondary winding resistance: 10 – 16 kΩ
 Spark plug gap: 0.6 – 0.7 mm

Starter System

Starter motor:
 Carbon brush length: Standard: 12 mm
 Service limit: 8.5 mm
 Commutator groove Depth: Standard: 0.45 – 0.75 mm
 Service Limit: 0.2 mm
 Commutator diameter: Standard: 28 mm
 Service Limit: 27 mm

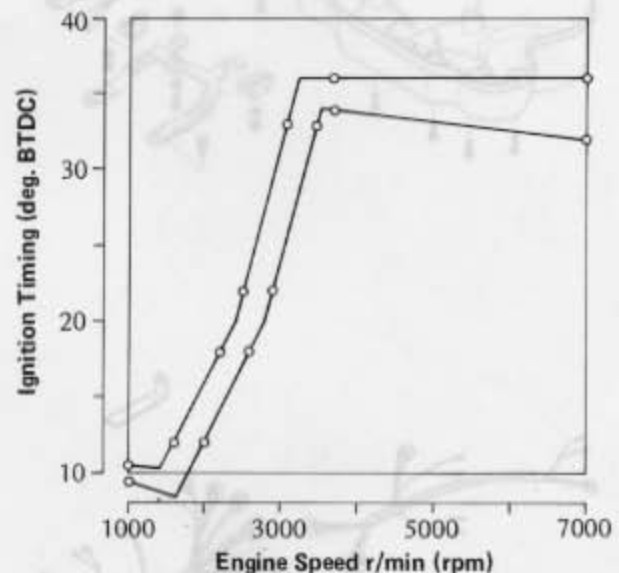
Spark Plug

	Standard	Low Speed Riding	High Speed Riding
US	NGK D8EA or ND X24ES-U	NGK D7EA or ND X22 ES-U	NGK D9EA or ND X27ES-U
Canada	NGK DR8ES-L or ND X24ESR-U	NGK DR7ES or ND X22ESR-U	NGK DR8ES or ND X27ESR-U
Europe except below	NGK DR8ES or ND X27ESR-U	Same as standard	Same as standard
Italy and Other than above	NGK D9EA or ND X27ES-U	Same as standard	Same as standard

Switches and Sensors

Rear brake light switch: On after about 10 mm pedal travel
 Fan switch (97°C): Off → On 94 – 100°C (201 – 212°F)
 On → Off above 90°C (194°F)
 Fan switch (110°C): Off → On 107 – 113°C (225 – 235°F)
 On → Off above 104°C (219°F)
 Oil temperature switch (120°C): On → Off 117 – 123°C (243 – 253°F)
 Off → On above 113°C (235°F)
 Fuel level sensor resistance:
 Full position 3 – 12 Ω
 Empty position 70 – 120 Ω
 Water temperature sensor resistance:
 80°C (176°F) about 52 Ω
 100°C (212°F) about 27 Ω

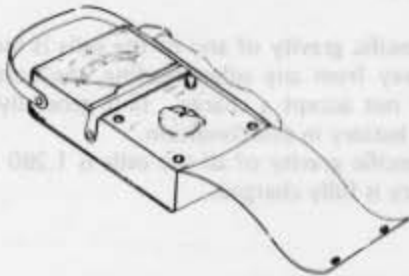
Ignition Timing/Engine Speed Relationship



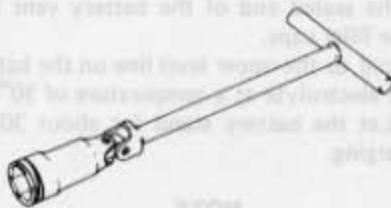
Special Tools

Along with common hand tools, the following more specialized tools are required for complete electrical system servicing.

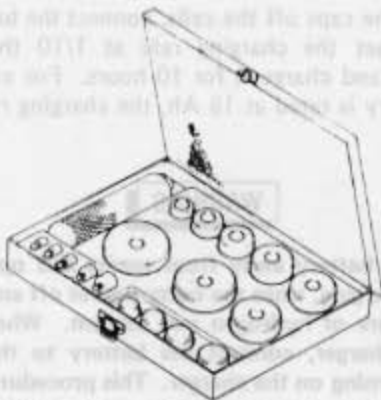
Hand Tester: 57001-983



Spark Plug Wrench: 57001-1024



Bearing Driver Set: 57001-1129



CAUTION

Battery

Precautions:

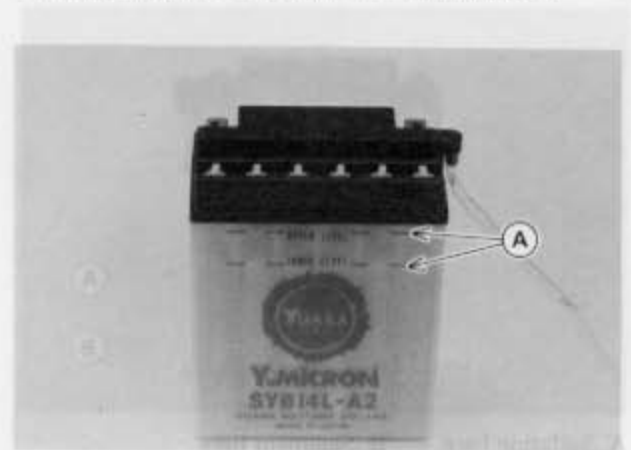
Following a few simple rules will greatly extend the life of the battery.

- When the level of the electrolyte in the battery is low, add only distilled water to each cell, until the level is at the upper level line marked on the outside of the battery. Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.
- Never add sulphuric acid solution to the battery. This will make the electrolyte solution too strong and will ruin the battery within a very short time.
- Avoid quick-charging the battery. A quick-charge will damage the battery plates.
- Never let a good battery stand for more than 30 days without giving it a supplemental charge, and never let a discharged battery stand without charging it. If a battery stands for any length of time, it slowly self-discharges. Once it is discharged, the plates sulphate (turn white), and the battery will no longer take a charge.
- Keep the battery well-charged during cold weather so that the electrolyte does not freeze and crack open the battery. The more discharged the battery becomes, the more easily it freezes.
- Always keep the battery vent hose free of obstruction, and make sure it does not get pinched, crimped, or melted shut by contact with the hot muffler. If battery gases cannot escape through this hose, they will explode the battery.
- DON'T INSTALL THE BATTERY BACKWARDS. The negative side is grounded.

Electrolyte:

Electrolyte Level Inspection

- Remove the battery.
- Visually check the electrolyte level in the battery.



A. Level Lines

- ★If the level of electrolyte in any cell is below the lower level line on the battery case, add distilled water only to that cell.
- Install the battery.

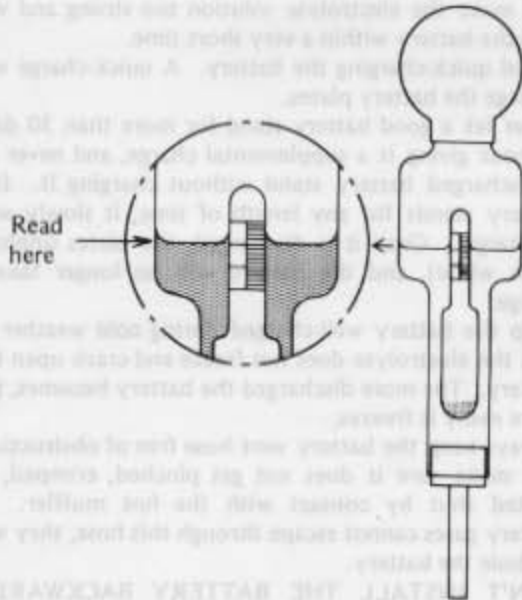
16-10 ELECTRICAL SYSTEM

Battery Charging:

Battery Condition

- Before charging, check battery condition by testing the specific gravity of the electrolyte in each cell.
- Draw a little fluid from the cell with a hydrometer.
- Read the level of the electrolyte on the floating scale. This is the specific gravity of the electrolyte.

Hydrometer



- Look for sediment and white sulfation inside the cells on the bottom of the plates.



A. Sulfation here B. Sediment here

- See the Battery Troubleshooting Guide in Battery Test Charging.
- ★ If the specific gravity is below 1.20 the battery needs to be charged.

NOTE

- The specific gravity of the electrolyte varies with changes in temperature, so the specific gravity reading must be corrected for the temperature of the electrolyte.
- Celsius: Add 0.007 points to reading for each 10°C above 20°C or subtract 0.007 points for each 10°C below 20°C.
- Fahrenheit: Add 0.004 points to reading for each 10°F above 68°F or subtract 0.004 points for each 10°F below 68°F.
- ★ If the specific gravity of any of the cells is more than 0.050 away from any other reading, the battery will probably not accept a charge. It is generally best to replace a battery in this condition.
- ★ If the specific gravity of all the cells is 1.280 or more the battery is fully charged.

Battery Initial Charging

Before being placed in service, a new battery should be given an initial charging.

- Cut off the sealed end of the battery vent hose and remove the filler caps.
- Fill each cell to the upper level line on the battery case with fresh electrolyte at a temperature of 30°C (86°F) or less. Let the battery stand for about 30 minutes before charging.

NOTE

○ If the electrolyte level drops, add electrolyte to the upper level line before charging.

- Leaving the caps off the cells, connect the battery to a charger, set the charging rate at 1/10 the battery capacity, and charge it for 10 hours. For example, if the battery is rated at 18 Ah, the charging rate would be 1.8 A.

WARNING

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

CAUTION

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

○If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.

- Turn the charger off, then disconnect it from the battery.
- Check battery voltage. Battery voltage should be 12–13 V.
- Check the specific gravity of each cell with a hydrometer (see Battery Condition).
- ★If the voltmeter or hydrometer readings are below those specified, additional charging is necessary before the battery can be installed.

Battery Ordinary Charging

- Remove the battery from the motorcycle.

CAUTION

○Always remove the battery from the motorcycle for charging. If the battery is charged while still installed, battery electrolyte may spill and corrode the frame or other parts of the motorcycle.

- Clean off the battery using a baking soda-and-water solution.
- Mix one heaping tablespoon of baking soda in one cup of water.
- Be careful not to get any of the cleaning solution in the battery.
- The terminals must be especially clean.
- If any of the cells are low, fill them to the LOWER level line with distilled water only. The electrolyte will expand during charging, and the level will rise.
- Connect a charger to the battery BEFORE plugging it in or turning it on.

WARNING

- Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.
- Set the charge rate and time according to the battery condition previously determined (see Battery Condition), using the table.

CAUTION

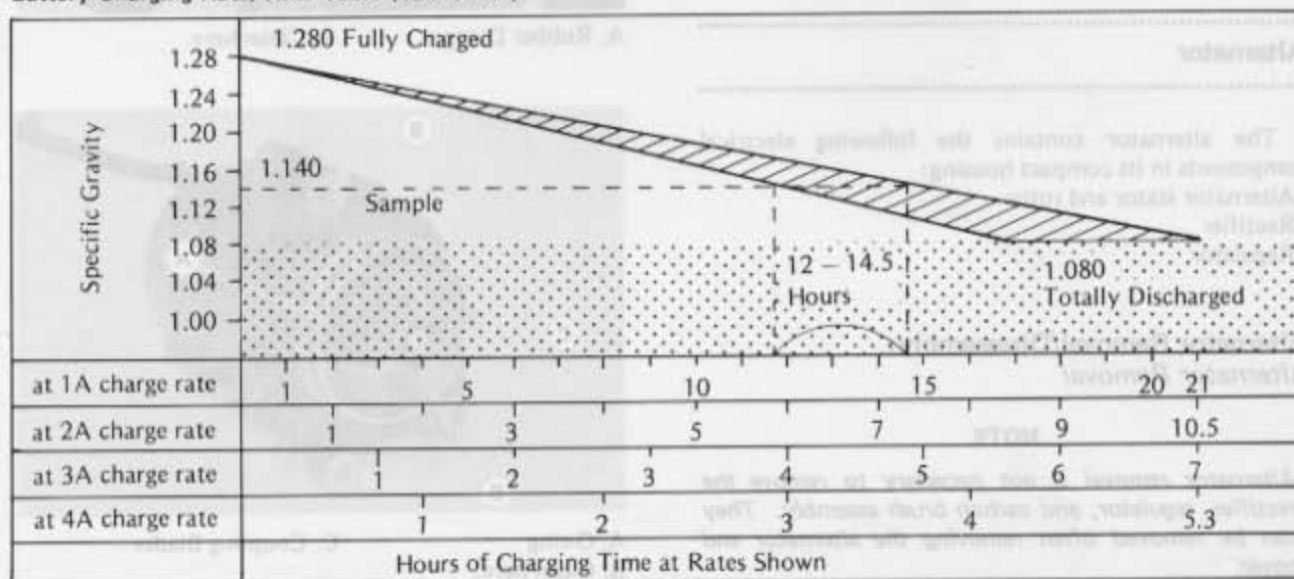
- Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.
- If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.

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

Battery Test Charging

- If the battery is suspected of being defective, sulfated, or unable to take a charge, consult the table.

Battery Charging Rate/Time Table (12V 14Ah)



16-12 ELECTRICAL SYSTEM

Battery Troubleshooting Guide

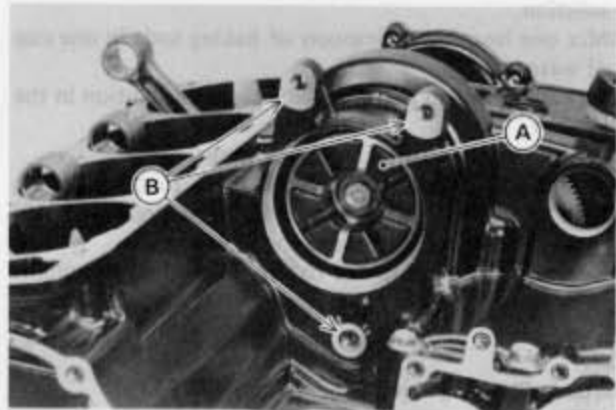
	Good Battery	Suspect Battery	Action
Plates	(+) chocolate color (-) gray	white (sulphated); + plates broken or corroded	Replace
Sediment	none, or small amount	sediment up to plates, causing short	Replace
Voltage	above 12 V	below 12 V	Test charge
Electrolyte Level	above plates	below top of plates	Fill and test charge
Specific Gravity	above 1.200 in all cells; no two cells more than 0.020 different	below 1.100, or difference of more than 0.020 between two cells	Test charge

- To test charge a battery, perform the ordinary charging procedure and monitor the battery voltage and other signs as mentioned below.
- ★ If the battery voltage suddenly jumps to over 13 V just after the start of charging, the plates are probably sulfated. A good battery will rise to 12 V immediately and then gradually go up to 12.5 or 13 V in about 30 min to an hour after the start of charging.
- ★ If one cell produces no gas bubbles or has a very low specific gravity, it is probably shorted.
- ★ If there does not appear to be enough sediment in a cell to short the plates, but that cell has a very low specific gravity after the battery is fully charged, the trouble may be that there is not enough acid in that one cell. In this case only, sulfuric acid solution may be added to correct the specific gravity.
- ★ If a fully charged battery not in 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.

- Disconnect the alternator lead connector.
- Unscrew the alternator mounting bolts and pull the alternator out of the engine. Do not lose the alternator coupling dampers.

Alternator Installation Notes

- Check that the rubber dampers are in place before installing the alternator.
- Clean the alternator legs and crankcase where the alternator is grounded.
- Install the alternator.
- Apply a small amount of engine oil to the rubber dampers and the O-ring.



A. Rubber Damper B. Clean here.

Alternator

The alternator contains the following electrical components in its compact housing:

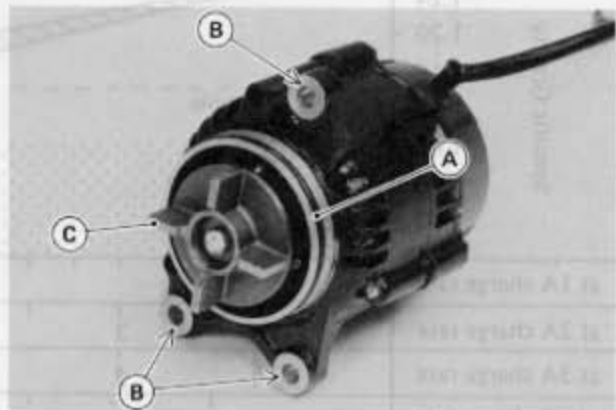
- Alternator stator and rotor
- Rectifier
- Regulator

Alternator Removal/Disassembly:

Alternator Removal

NOTE

- Alternator removal is not necessary to remove the rectifier, regulator, and carbon brush assembly. They can be removed often removing the alternator end cover.



A. O-ring C. Coupling Blades
B. Clean here.

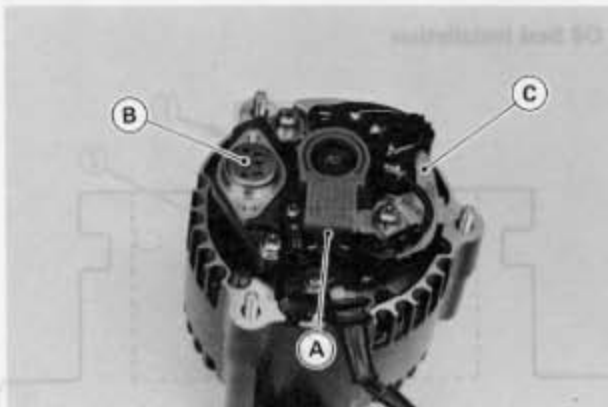
- Align the blades of the alternator coupling with the slots in the rubber dampers, and temporarily install the alternator with the mounting bolts finger tight.
- Apply a non-permanent locking agent to the threads of the alternator mounting bolts.
- Screw in the mounting bolts evenly to engage the coupling with the rubber dampers.
- Tighten the bolts to the specified torque (see Exploded View)

CAUTION

- If any resistance is felt when tightening the mounting bolts, stop immediately, and check the alignment of the coupling blades with the slots in the rubber dampers.

Alternator Disassembly

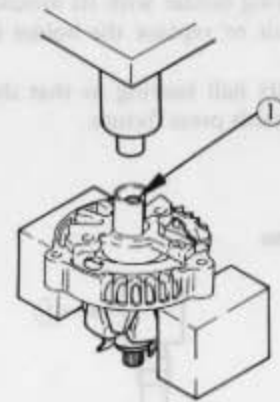
- Remove the cap nuts and take off the end cover. The following parts can be removed.



A. Brush Assembly C. Rectifier
B. Regulator

- Carbon brush assembly and rubber seal with mounting screws removed.
- Regulator with mounting screws removed.
- Rectifier and cover with stator coil windings unsoldered.
- The alternator lead assembly can be separated from the rectifier by unsoldering the connections.
- Unscrew the bolt holding the alternator coupling, and take off the coupling.
- Cover the splined portion of the rotor shaft with a thin tape to prevent damaging the oil seal lip.
- Unscrew the bearing holder screws, and pull off the RH housing half with the oil seal and stator.
- Press out the rotor shaft from the LH housing half, and remove the rotor with the bearings.

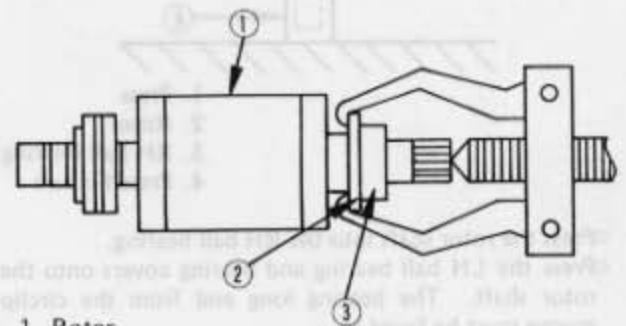
Rotor Removal



1. Rotor Shaft

- To remove the ball bearings, use a suitable puller.
- Pull out the RH ball bearing with the bearing holder.

Bearing Removal

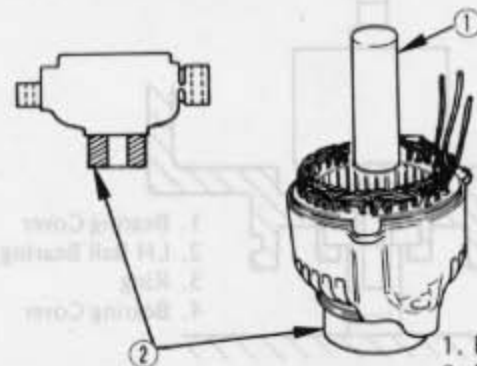


1. Rotor
2. Bearing Holder
3. RH Ball Bearing

Alternator Assembly Notes

- Assembly the parts in the following sequence.
- Position the RH housing half so that the RH bearing housing is seated on a suitable press fixture.

RH Bearing Installation

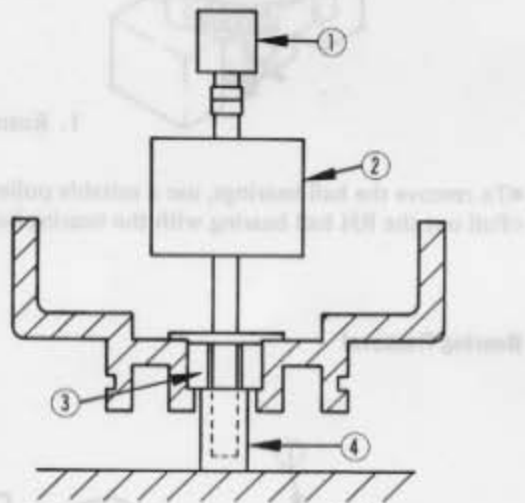


1. Press
2. Press Fixture

16-14 ELECTRICAL SYSTEM

- Press the RH ball bearing into the RH housing half with bearing driver set 57001-1129.
- Install the bearing holder with its mounting screws. If necessary, repair or replace the holder before installation.
- Position the RH ball bearing so that the inner race is seated on a suitable press fixture.

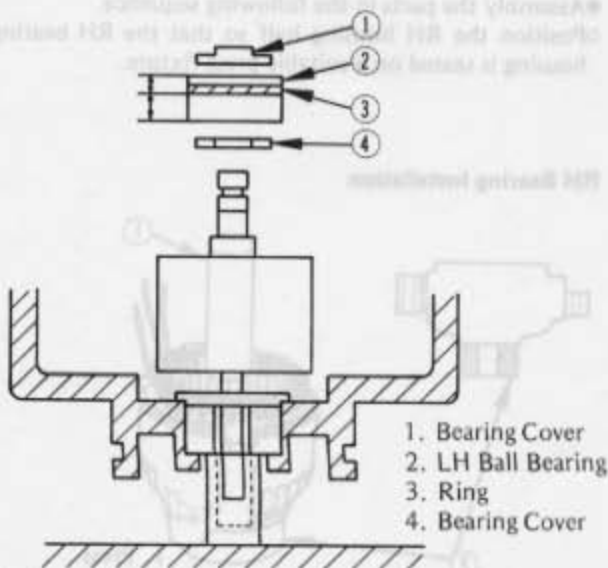
Rotor Installation



1. Press
2. Rotor
3. RH Ball Bearing
4. Press Fixture

- Press the rotor shaft into the RH ball bearing.
- Press the LH ball bearing and bearing covers onto the rotor shaft. The bearing long end from the circlip groove must be faced in.

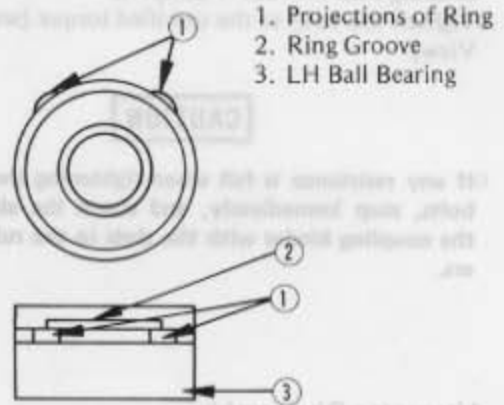
LH Bearing Installation



1. Bearing Cover
2. LH Ball Bearing
3. Ring
4. Bearing Cover

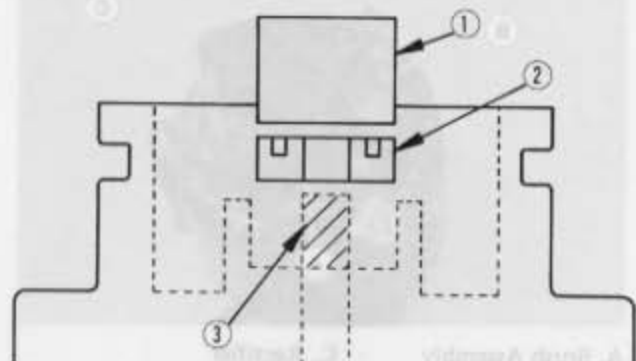
- Position the LH ball bearing ring so that the projections of it are aligned with the ring positioning groove, and install the LH housing half.

Ball Bearing Ring



- Install the oil seal to the RH housing half so that the spring band side of it faces out. Before inserting the rotor shaft right end into the oil seal, splined portion of the shaft must be covered with a thin tape to prevent damaging the oil seal lip.

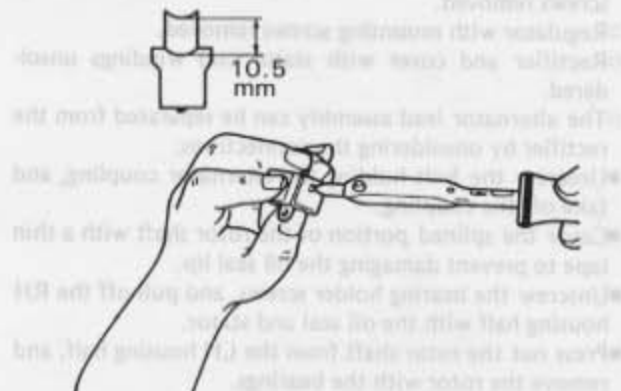
Oil Seal Installation



1. Press
2. Oil Seal
3. Shaft covered with tape

- Solder the carbon brush lead with the brush holder if they were disassembled.

Carbon Brush Installation



16-16 ELECTRICAL SYSTEM

Test No.2-Battery Overcharged

- Check the regulator and/or rotor.
- ★Repair or replace the damaged parts.

Test No.3-Noise

- Check the ball bearings, stator coil, and/or rectifier if the alternator makes a noise.
- ★Repair or replace the damaged parts.

Alternator Inspection:

Ball Bearing Inspection

- Turn each bearing back and forth while checking for roughness or binding

Bearing Inspection

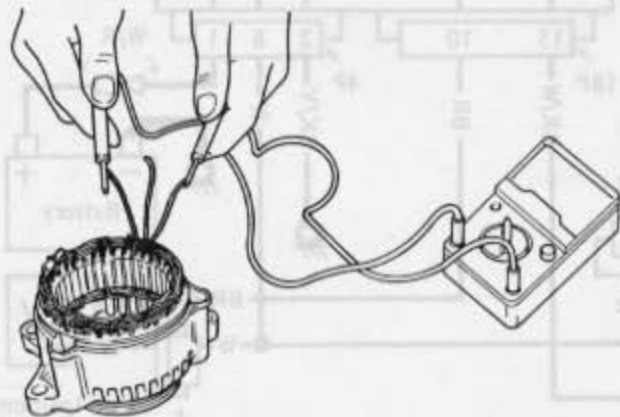


- ★If roughness or binding is found, replace the bearing.
- Examine the bearing seal for tears or leakage.
- ★If the seal is torn or is leaking, replace the bearing

Stator Coil Inspection

- Measure the stator coil resistance.
- Connect an ohmmeter between the coil wirings.
- Set the meter to the $\times 1 \Omega$ range, and read the meter.

Stator Coil Resistance



- ★If the meter does not read as specified, replace the stator coil.

Stator Coil Resistance

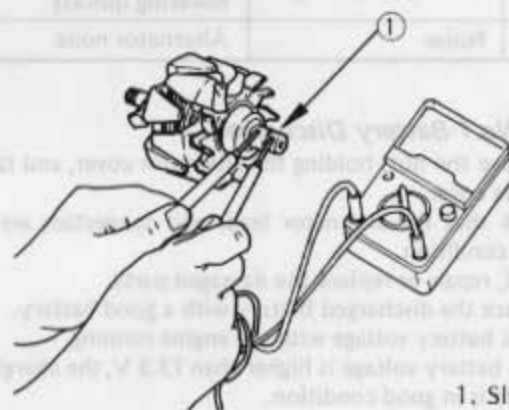
Less than 1.0Ω

- Using the highest ohmmeter range, measure the resistance between the stator coil core and each of the coil windings.
- ★If there is any reading at all, the stator coil winding has a short and must be replaced.

Rotor Coil Inspection

- Measure the rotor coil resistance.
- Connect an ohmmeter between the slip rings.
- Set the meter to the $\times 1 \Omega$ range, and read the meter.

Rotor Coil Resistance



- ★If the meter does not read as specified, replace the rotor.

Rotor Coil Resistance

About 4Ω

- Using the highest ohmmeter range, measure the resistance between the rotor shaft and each of the slip rings.
- ★If there is any reading at all, the rotor coil has a short and must be replaced.

Slip Ring Cleaning

- Visually inspect the slip ring for dirt or pitting.
- ★If necessary, smooth the slip ring with No. 300 – No. 500 emery cloth.

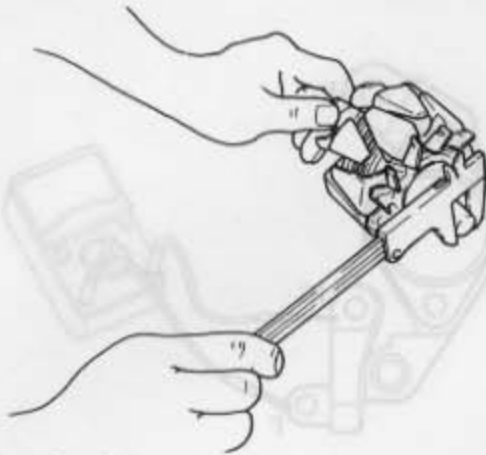
Slip Ring Diameter

- Measure the diameter of the slip ring.
- ★If the measurement is less than the service limit, replace the rotor.

Slip Ring Diameter

Standard: 14.4 mm
Service Limit: 14.0 mm

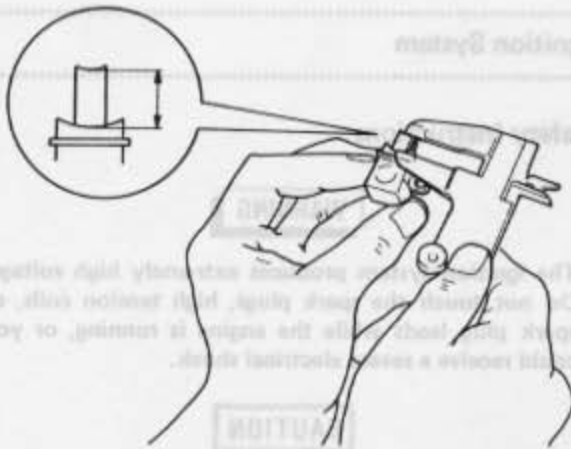
Slip Ring Diameter



Carbon Brush Length

- Measure the length of both carbon brushes that stick out of the housing.
- ★ If either one is worn down to less than the service limit, replace it.

Carbon Brush Length Measurement



Carbon Brush Length (projected portion)

- Standard: 10.5 mm
- Service Limit: 4.5 mm

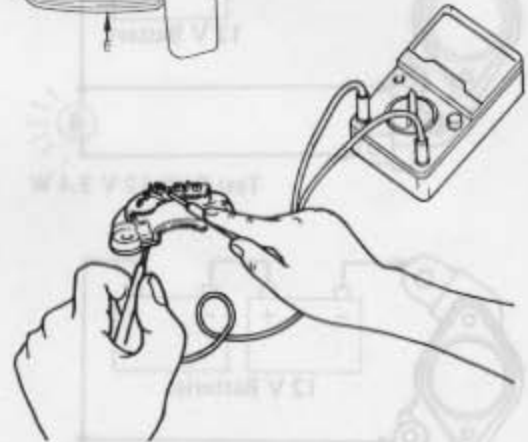
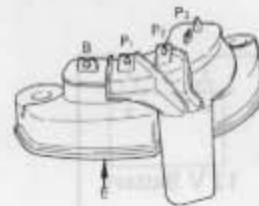
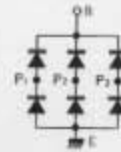
Rectifier Inspection

- Set an ohmmeter to the x 1 kΩ range.
- Connect the ohmmeter to the ends of each diode, and check the resistance in both direction. The resistance should be low in one direction and more than ten times as much in the other direction.
- ★ If any diode shows low or high in both directions, the diode is defective and the rectifier 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 1/2 of the scale.

Rectifier Inspection



CAUTION

○ If a megger or a meter with a large-capacity battery is used, the rectifier will be damaged.

Regulator Inspection

- Prepare testing tools.
 - Test light: Bulb rated 12 V 3.4 W
 - Batteries: Two 12 V batteries
 - Test wires: Three auxiliary wires

CAUTION

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

● Connect the test light and the 12 V battery to the regulator as shown. The test light should go on at this time.

CAUTION

○ Do not contact the regulator metal case with the wires from the battery (+) or (-) terminal during the test.

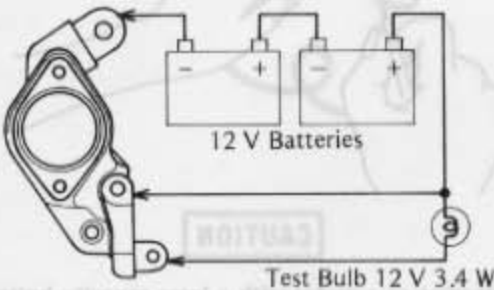
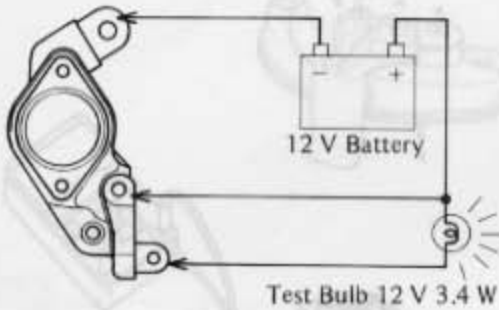
★ If the test light does not go on, the regulator is damaged and must be replaced.

● Connect the test light and two 12 V batteries to the regulator as shown. The test light should not go on at this time.

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★If the test light goes on, the regulator is damaged and must be replaced.

Regulator Inspection



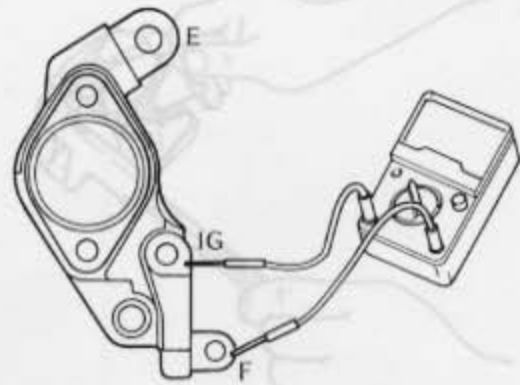
●Check the resistance in both directions between the terminals of the regulator with an ohmmeter as shown.

Regulator Internal Resistance

Meter Range	Connections		Reading
	Meter (+) to	Meter (-) to	
x 100 Ω	F	E	170 Ω
x 1 k Ω	E	F	4 k Ω
x 100 Ω	IG	E	800 Ω
x 1 k Ω	E	IG	2 k Ω
x 1 k Ω	F	IG	2 k Ω
x 100 Ω	IG	F	150 Ω

★Meter readings should be nearly values shown in the table. If the resistance is infinity (no reading) or 0 Ω , the regulator is damaged and must be replaced.

Regulator Inspection



Ignition System

Safety Instructions:

WARNING

- The ignition system produces extremely high voltage. Do not touch the spark plugs, high tension coils, or spark plug leads while the engine is running, or you could receive a severe electrical shock.

CAUTION

- Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent IC igniter damage.
- Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and IC igniter.

Parts Removal:

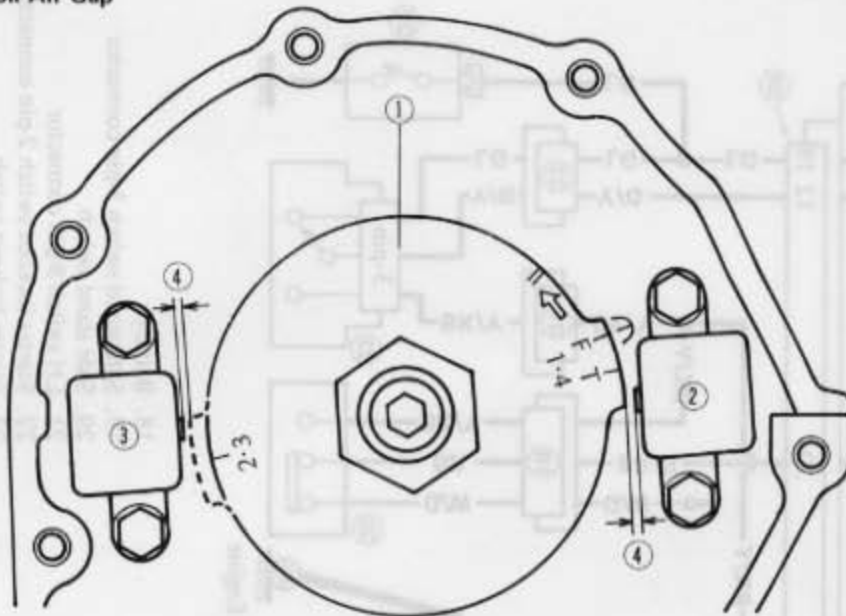
Pickup Coil Removal/Installation Notes

- Install the pickup coils so that the air gaps (clearance between the timing rotor projection and the pickup coil core) of both pickup coils are equal.

Pickup Coil Air Gap

0.5 – 0.9 mm

Pickup Coil Air Gap



1. Timing Rotor
2. #1 & 4 Pickup Coil
3. #2 & 3 Pickup Coil
4. Air Gap

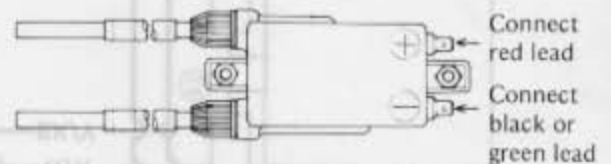
- Apply a non-permanent locking agent to the threads of two bolts holding the pickup coil cover.



A. Bolts requiring locking agent

Polarity of Ignition Coil

(-) #1 or #2 spark plug lead



(+) #4 or #3 spark plug lead

- Apply grease to the neck under the flange of the spark plug cap, and put it on the spark plug.



A. Apply grease.

Ignition Coil Removal/Installation Notes

- Connect the primary wires to the primary coil terminals as follows:

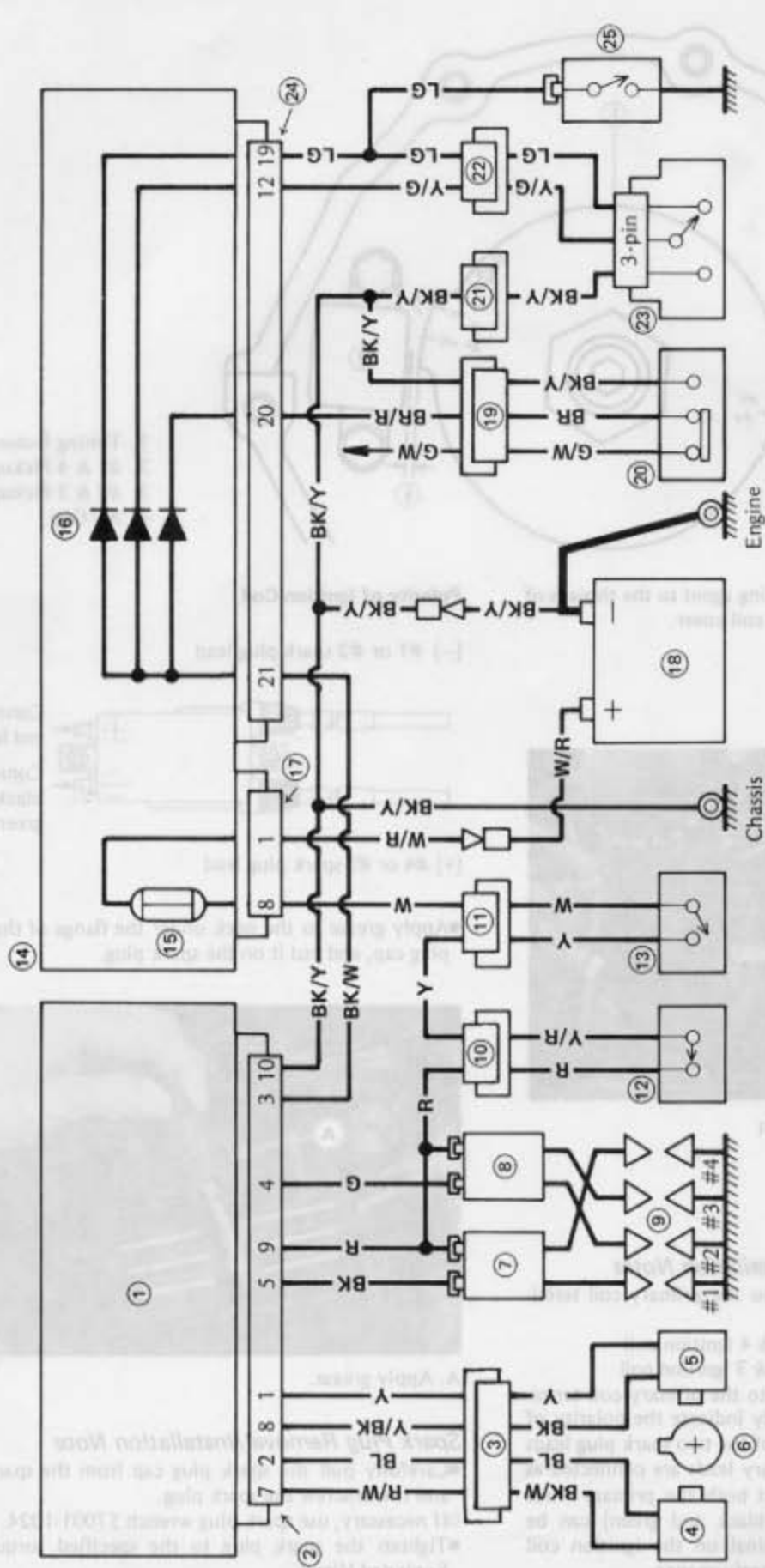
- Black and red wires → No. 1 & 4 ignition coil
- Green and red wires → No. 2 & 3 ignition coil

- The + and - markings next to the primary coil terminals on the ignition coil body indicate the polarity of the terminals. The polarity of the two spark plug leads are as shown when the primary leads are connected as indicated in the figure. But both the primary wires (positive red, and negative black and green) can be connected with either terminal on the ignition coil without changing the engine performance.

Spark Plug Removal/Installation Note

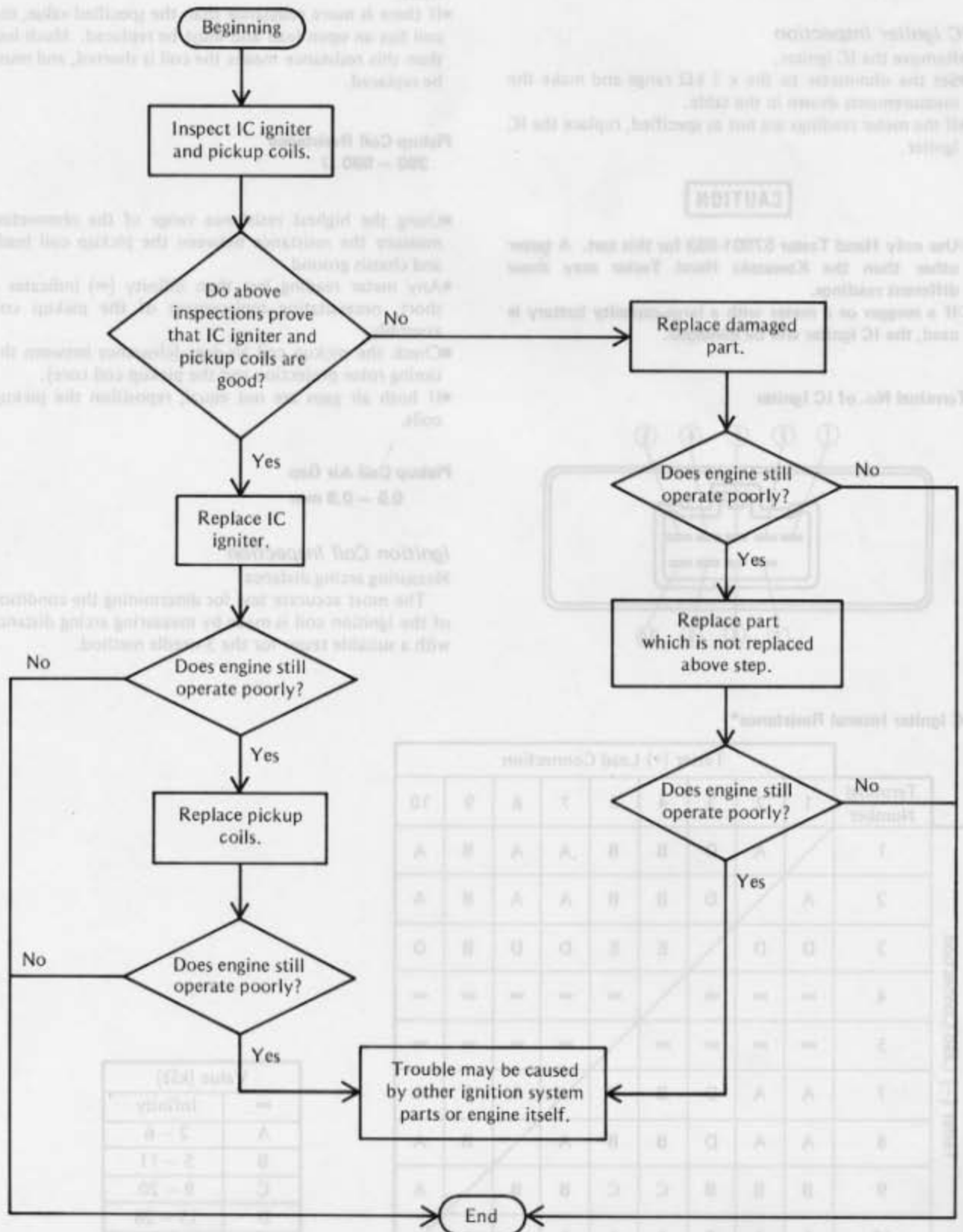
- Carefully pull the spark plug cap from the spark plug and unscrew the spark plug.
- If necessary, use spark plug wrench 57001-1024.
- Tighten the spark plug to the specified torque (see Exploded View).

Ignition System Wiring Diagram



- 1. IC igniter
- 2. IC igniter 10-pin connector
- 3. Pickup coil 4-pin connector
- 4. Pickup coil for #2 and #3 cylinder
- 5. Pickup coil for #1 and #4 cylinder
- 6. Timing rotor
- 7. Ignition coil for #1 and #4 cylinders
- 8. Ignition coil for #2 and #3 cylinders
- 9. Spark Plugs
- 10. Engine stop switch 4-pin connector (US model: 6-pin connector)
- 11. Ignition switch 6-pin connector
- 12. Engine stop switch
- 13. Ignition switch
- 14. Junction box
- 15. 30A fuse
- 16. Diodes
- 17. Junction box 4-pin connector
- 18. Battery
- 19. Side stand switch 3-pin connector
- 20. Side stand switch
- 21. LH switch 9-pin connector
- 22. Starter lockout switch 2-pin connector
- 23. Starter lockout switch
- 24. Junction box 18-pin connector
- 25. Neutral switch

Ignition System Troubleshooting:



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Ignition System Inspection:

For any ignition system problems, always check the ignition system wiring first (see Wiring Inspection).

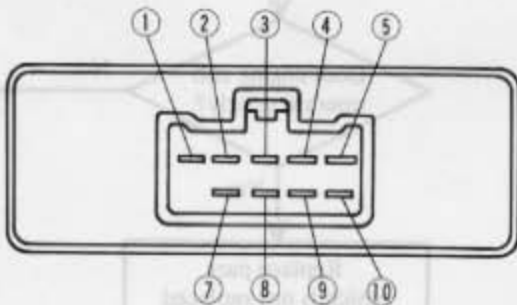
IC Igniter Inspection

- Remove the IC igniter.
- Set the ohmmeter to the x 1 k Ω range and make the measurements shown in the table.
- ★ If the meter readings are not as specified, replace the IC igniter.

CAUTION

- Use only Hand Tester 57001-983 for this test. A tester other than the Kawasaki Hand Tester may show different readings.
- If a megger or a meter with a large-capacity battery is used, the IC igniter will be damaged.

Terminal No. of IC Igniter



IC Igniter Internal Resistance*

Terminal Number	Tester (+) Lead Connection								
	1	2	3	4	5	7	8	9	10
1		A	D	B	B	A	A	B	A
2	A		D	B	B	A	A	B	A
3	D	D		E	E	D	D	B	D
4	∞	∞	∞		∞	∞	∞	∞	∞
5	∞	∞	∞	∞		∞	∞	∞	∞
7	A	A	D	B	B		A	B	A
8	A	A	D	B	B	A		B	A
9	B	B	B	C	C	B	B		A
10	A	A	C	A	A	A	A	A	

Pickup Coil Inspection

- Disconnect the pickup coil connector.
- Zero the ohmmeter, and connect it to pickup coil leads.
- ★ If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

Pickup Coil Resistance 390 – 590 Ω

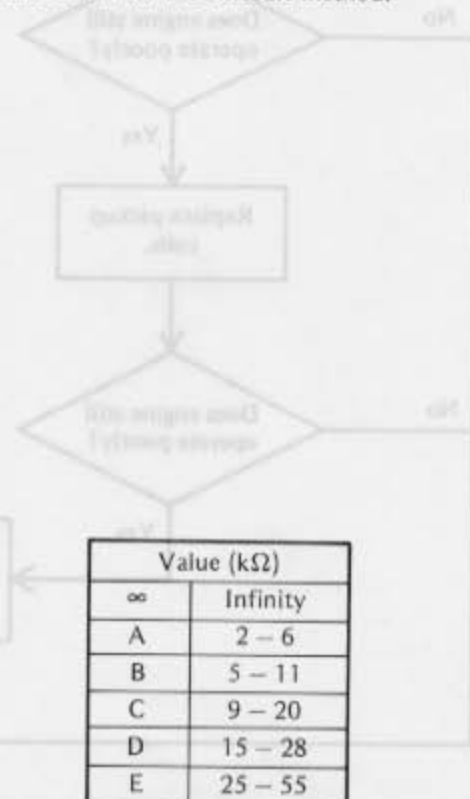
- Using the highest resistance range of the ohmmeter, measure the resistance between the pickup coil leads and chassis ground.
- ★ Any meter reading less than infinity (∞) indicates a short, necessitating replacement of the pickup coil assembly.
- Check the pickup coil air gaps (clearance between the timing rotor projection and the pickup coil core).
- ★ If both air gaps are not equal, reposition the pickup coils.

Pickup Coil Air Gap 0.5 – 0.9 mm

Ignition Coil Inspection

Measuring arcing distance:

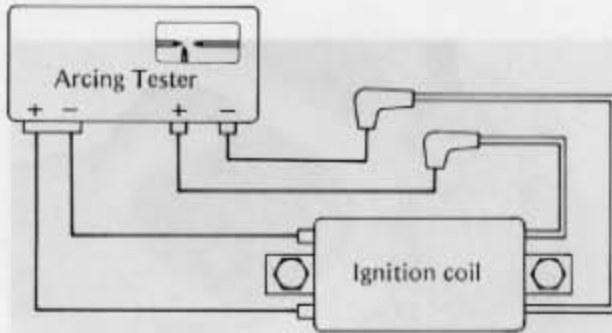
The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with a suitable tester for the 3-needle method.



*Measured with hand tester 57001-983. A tester other than the Kawasaki Hand Tester may show different readings.

- Remove the ignition coil.
- Connect the ignition coil (with the spark plug cap left installed at each of the spark plug leads) to the tester, and measure the arcing distance.

Ignition Coil Test



WARNING

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

★ If the distance reading is less than the specified value, the ignition coil or spark plug caps are defective.

Ignition Coil Arcing Distance 7 mm or more

- To determine which part is defective, measure the arcing distance again with the spark plug caps 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 caps.

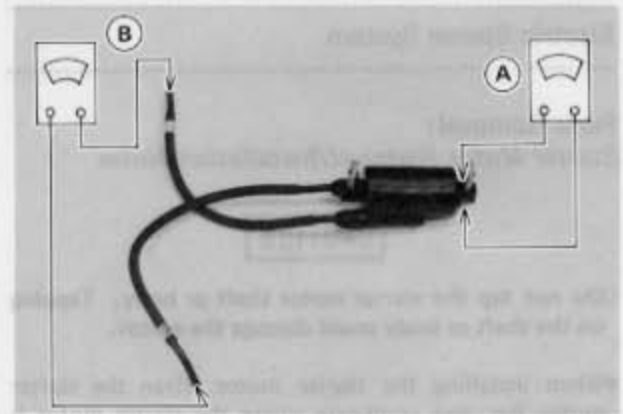
Measuring coil resistance:

If the arcing tester 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.

- Disconnect the primary leads from the coil terminals.
- Measure the primary winding resistance.
 - Connect an ohmmeter between the coil terminals.
 - Set the meter to the $\times 1 \Omega$ range, and read the meter.
- Measure the secondary winding resistance.
 - Pull the spark plug cap off each lead.
 - Connect an ohmmeter between the spark plug leads.
 - Set the meter to the $\times 1 \text{ k}\Omega$ range, and read the meter.
- ★ If the meter does not read as specified, replace the coil.

Ignition Coil Winding Resistance

Primary windings: 1.8 – 2.8 Ω
Secondary windings: 10 – 16 $\text{k}\Omega$



A. Measure primary winding resistance.
B. Measure secondary winding resistance.

★ If the meter reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.

- Check the spark plug leads for visible damage.
- ★ If any spark plug lead is damaged, replace the coil.

Spark Plug Cleaning and Inspection

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

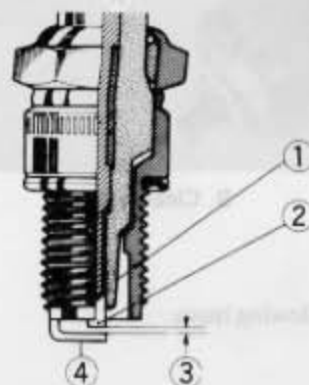
Spark Plug Gap

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

Spark Plug Gap

0.6 – 0.7 mm

Spark Plug Gap



1. Insulator
2. Center Electrode
3. Plug Gap
4. Side Electrode

Electric Starter System

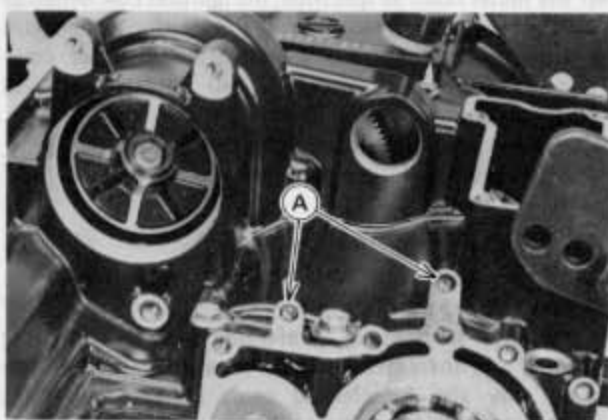
Parts Removal:

Starter Motor Removal/Installation Notes

CAUTION

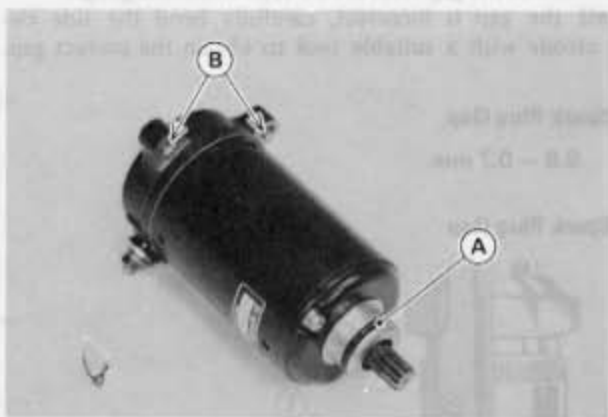
Do not tap the starter motor shaft or body. Tapping on the shaft or body could damage the motor.

When installing the starter motor, clean the starter motor legs and crankcase where the starter motor is grounded.



A. Clean here.

Apply a small amount of engine oil to the O-ring.



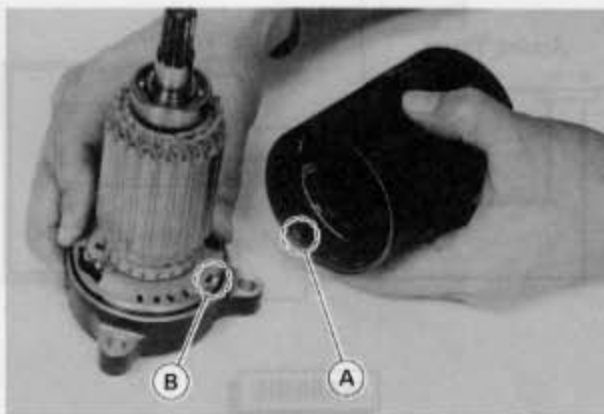
A. O-ring

B. Clean here.

Check and adjust the following items.
 Engine Oil
 Drive Chain Slack

Starter Motor Disassembly/Assembly Notes

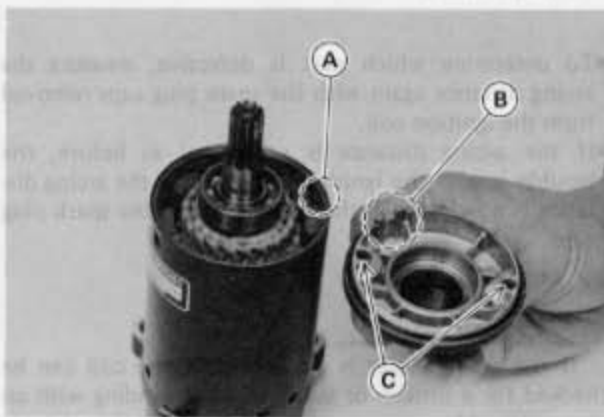
- Before removing or installing the RH end cover, cover the teeth of pinion with a thin tape to prevent the damaging the oil seal.
- Fit the alignment projection of the yoke into the notches of the brush plate and the LH end cover.



A. Projection

B. Notches

Fit one of the projections on the yoke into the groove of the RH end cover, and at the same time align the holes for the end cover screws.



A. Projection

C. End Cover Screw Holes

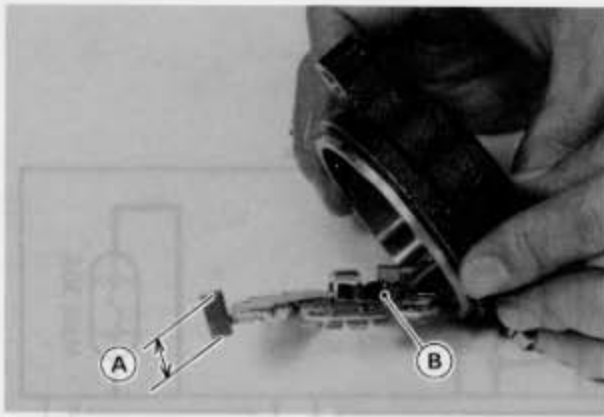
B. Groove

Inspection:

For any electrical starter system problems, always check the electrical starter system wiring first (see Wiring Inspection).

CAUTION

Because of the large amount of current, never keep the starter switch pushed any time that the starter motor will not turn over, or the current may burn out the starter motor windings.



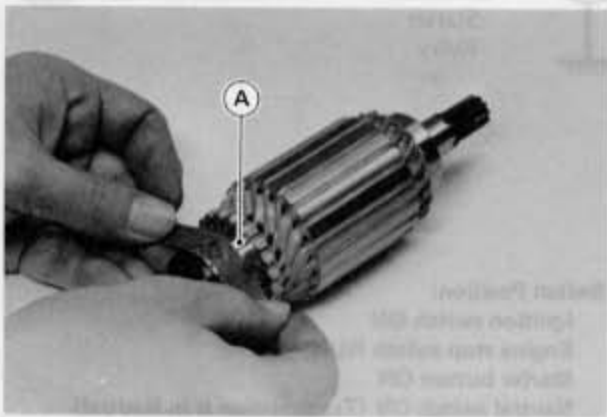
A. Measure brush length. B. Brush Spring

Brush Spring Inspection

- Check that the brush springs are in place and snap the brushes firmly into place.
- ★ If not, reinstall or replace the spring.

Commutator Cleaning and Inspection

- Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves as illustrated.



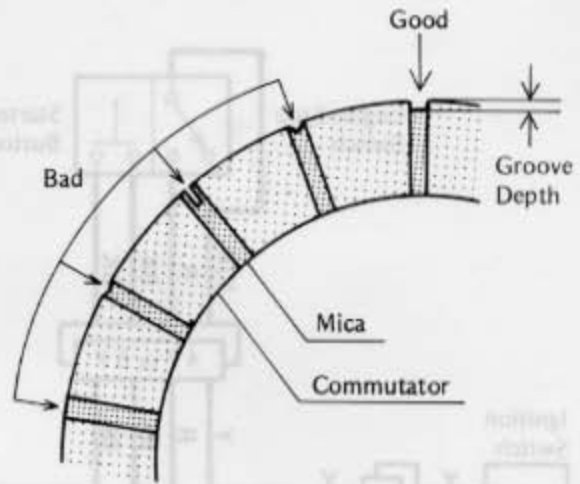
A. Commutator

- Determine as accurately as possible the depth of the grooves between commutator segments.
- ★ Replace the starter motor with a new one if the groove depth is less than the service limit.

Commutator Groove Depth

Standard: 0.45 – 0.75 mm
 Service Limit: 0.2 mm

Commutator



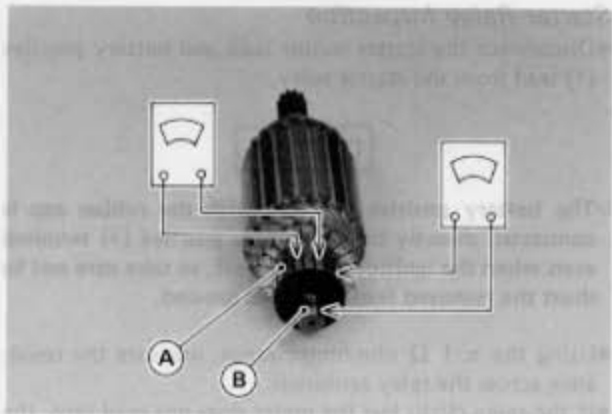
- Measure the diameter of the commutator.
- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.

Commutator Diameter

Standard: 28 mm
 Service Limit: 27 mm

Armature Inspection

- Using the x 1 Ω ohmmeter range, measure the resistance between any two commutator segments.
- ★ If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.



A. Segment B. Shaft

- Using the highest ohmmeter range, measure the resistance between the commutator and the shaft.

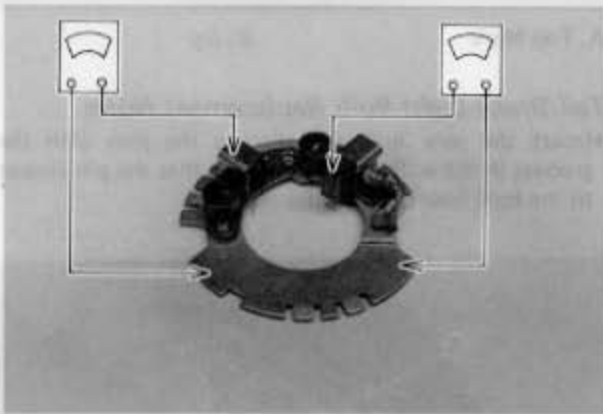
★If there is any reading at all, the armature has a short and the starter motor must be replaced.

Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with an ohmmeter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

Brush Plate Inspection

●Using the $\times 1 \Omega$ ohmmeter range, measure the resistance between the brush and the plate.

★If there is not close to zero ohms, the brush plate has an open and it must be replaced.



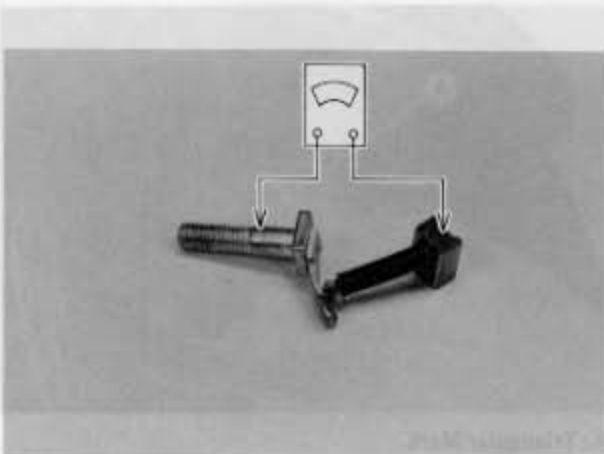
●Using the highest ohmmeter range, measure the resistance between the metal plate and the brush holders.

★If there is any reading at all, the brush holder has a short and the brush plate must be replaced.

Brush and Lead Assembly Inspection

●Using the $\times 1 \Omega$ ohmmeter range, measure the resistance between the brush and the terminal bolt.

★If there is a high resistance or no reading (∞), a lead is open and the brush and lead assembly must be replaced.

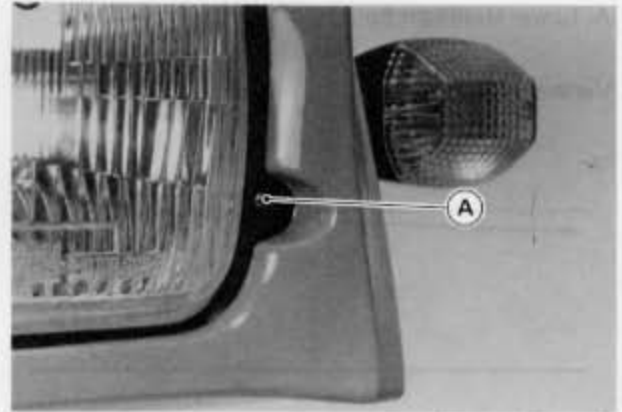


Lighting System

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.

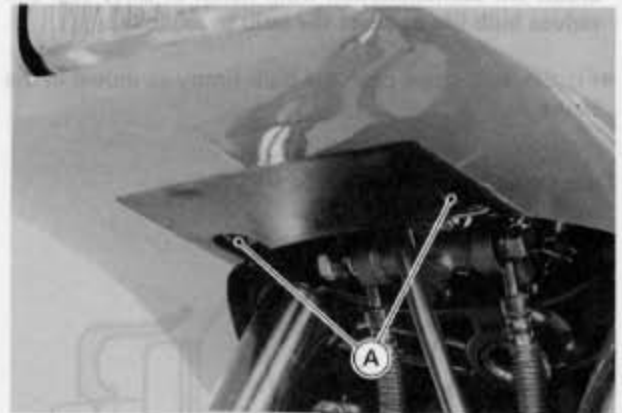
Headlight Beam Horizontal Adjustment



A. Adjusting screw for horizontal adjustment

Headlight Beam Vertical Adjustment

●Remove the bolts holding the cover under the headlight.

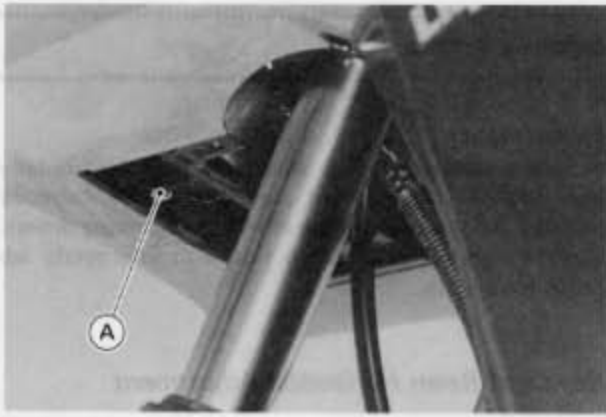


A. Cover Bolts

●Loosen the lower headlight bolt, and adjust the headlight vertically.

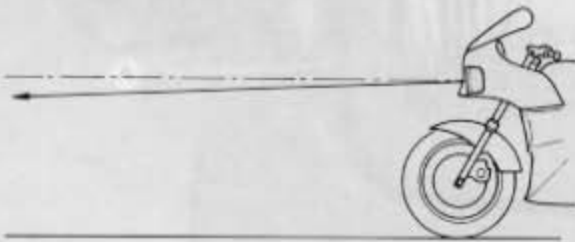
NOTE

○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.



A. Lower Headlight Bolt

Vertical Adjustment



Parts Removal:

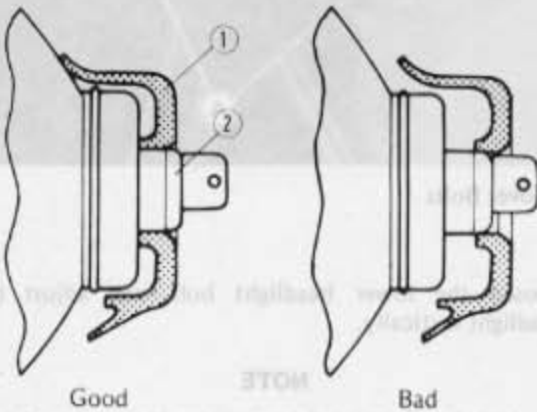
Headlight Bulb Replacement Notes

CAUTION

When handling the quartz-halogen bulbs, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

Fit the dust cover onto the bulb firmly as shown in the figure.

Dust Cover Installation



Good

Bad

1. Dust Cover
2. Headlight Bulb

Headlight Unit Removal/Installation Note

Install the headlight unit so that the "TOP" mark on the lens points up.

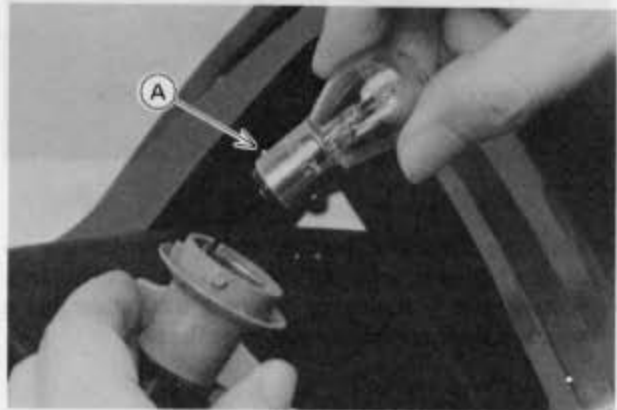


A. Top Mark

B. Up

Tail/Brake Light Bulb Replacement Notes

Insert the new bulb by aligning the pins with the grooves in the walls of the socket so that the pin closest to the bulb base is to the upper right.



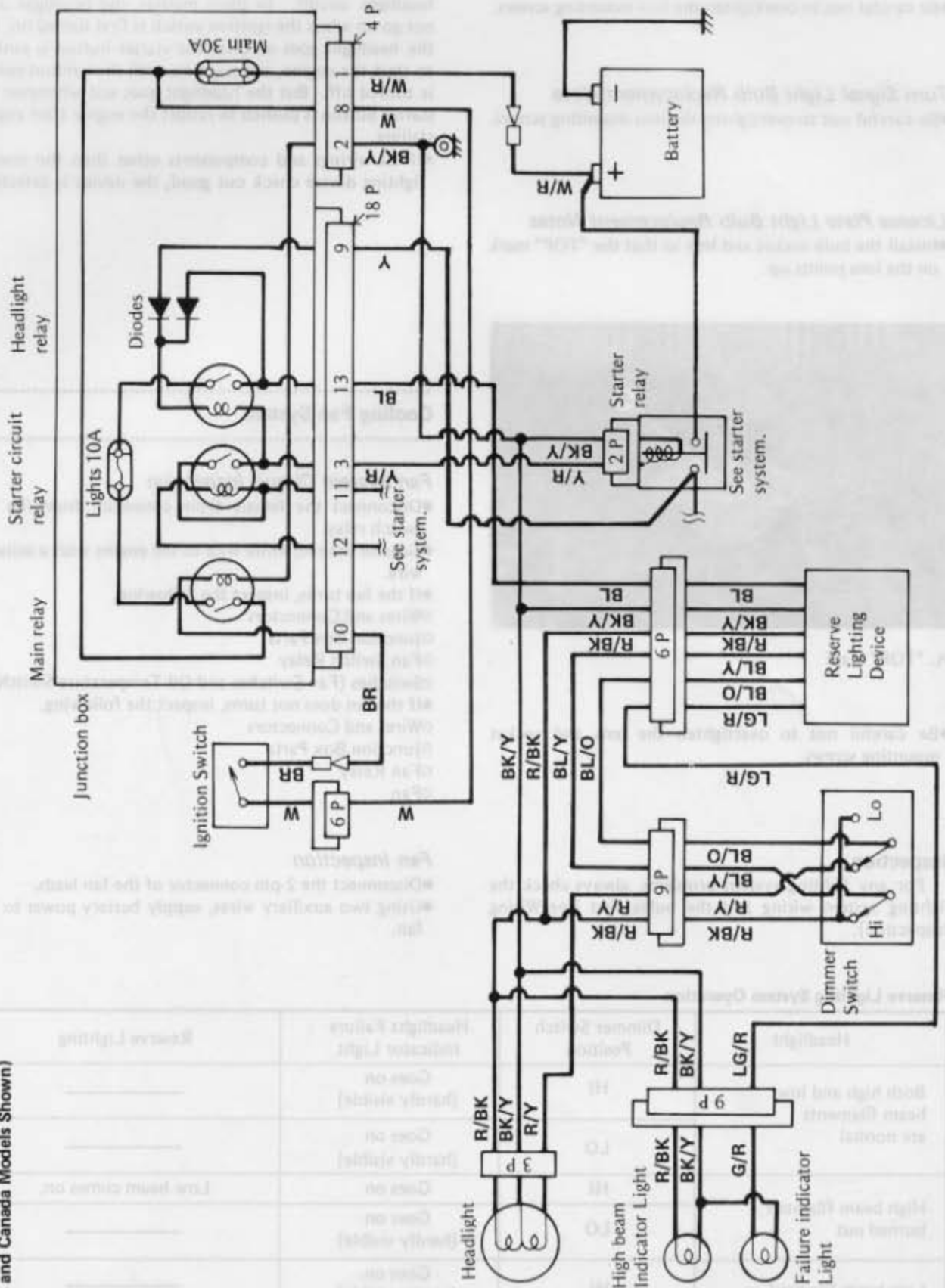
A. Pin Closest to Base

Insert the socket by aligning the tangs with the catches in the housing so that the triangular mark points up, and turn it clockwise.



A. Triangular Mark

Headlight Circuit
(US and Canada Models Shown)



16-30 ELECTRICAL SYSTEM

Tail/Brake Light Lens

Removal/Installation Note

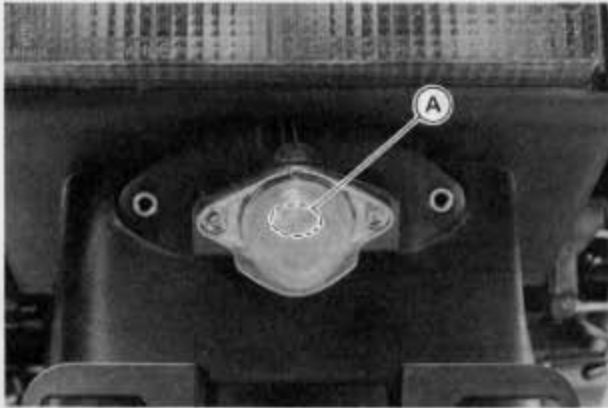
- Be careful not to overtighten the lens mounting screws.

Turn Signal Light Bulb Replacement Note

- Be careful not to overtighten the lens mounting screws.

License Plate Light Bulb Replacement Notes

- Install the bulb socket and lens so that the "TOP" mark on the lens points up.



A. "TOP" Mark

- Be careful not to overtighten the lens and socket mounting screws.

Inspection:

For any lighting system problems, always check the lighting system wiring and the bulbs first (see Wiring Inspection).

Headlight Reserve Lighting System Inspection

The US and Canadian models contain a relay in the headlight circuit. In these models, the headlight does not go on when the ignition switch is first turned on, but the headlight goes on once the starter button is pushed to start the engine, and stays on until the ignition switch is turned off. But the headlight goes out whenever the starter button is pushed to restart the engine after engine stalling.

- ★If all wirings and components other than the reserve lighting device check out good, the device is defective.

Cooling Fan System

Fan System Circuit Inspection

- Disconnect the female 6-pin connector from the fan switch relay.
- Ground the red/white wire to the engine with a suitable wire.
- ★If the fan turns, inspect the following.
 - Wires and Connectors
 - Junction Box Parts
 - Fan Switch Relay
 - Switches (Fan Switches and Oil Temperature Switch)
- ★If the fan does not turn, inspect the following.
 - Wires and Connectors
 - Junction Box Parts
 - Fan Relay
 - Fan

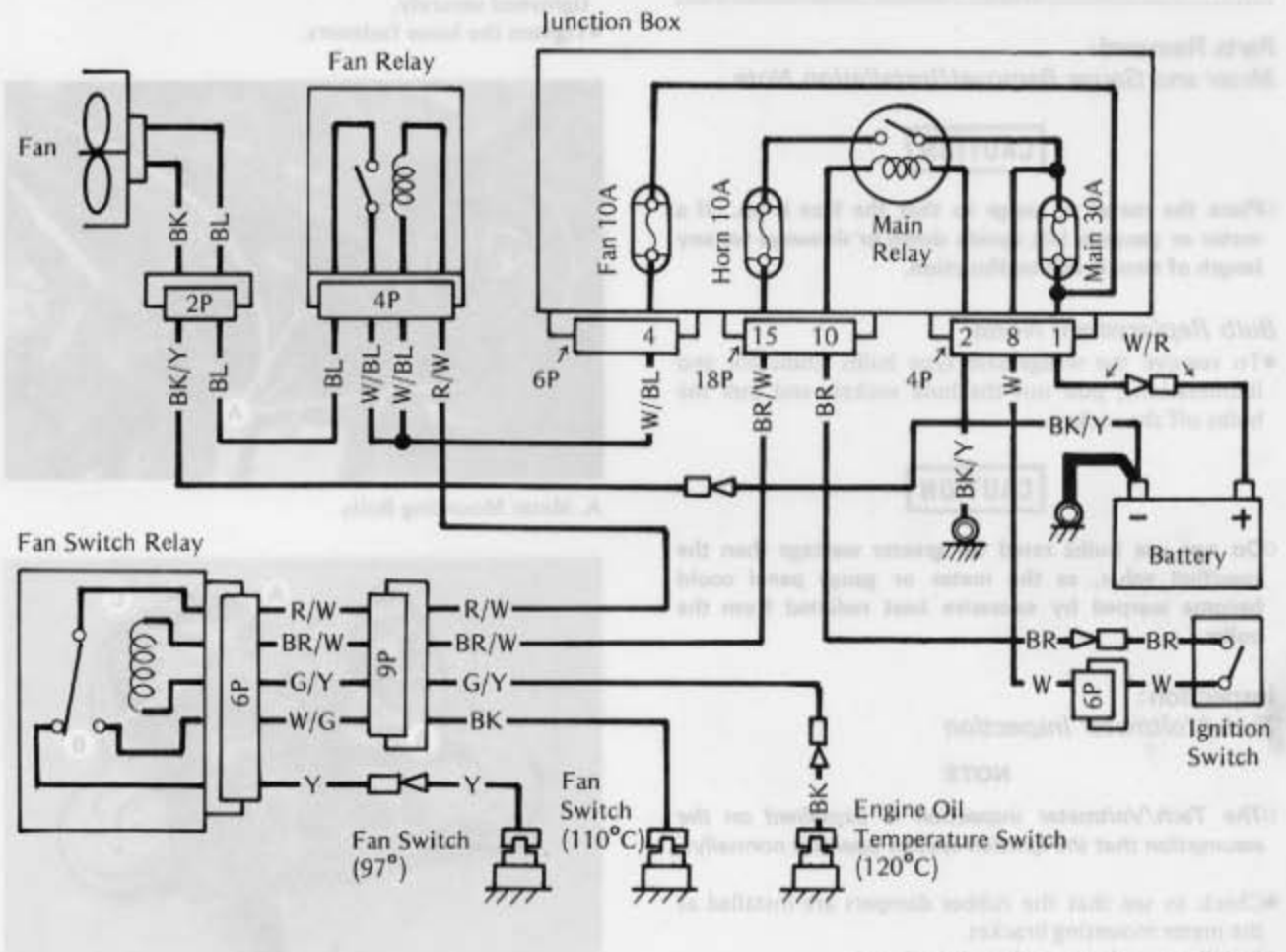
Fan Inspection

- Disconnect the 2-pin connector of the fan leads.
- Using two auxiliary wires, supply battery power to the fan.

Reserve Lighting System Operation

Headlight	Dimmer Switch Position	Headlight Failure Indicator Light	Reserve Lighting
Both high and low beam filaments are normal	HI	Goes on (hardly visible)	—————
	LO	Goes on (hardly visible)	—————
High beam filament burned out	HI	Goes on	Low beam comes on.
	LO	Goes on (hardly visible)	—————
Low beam filament burned out	HI	Goes on (hardly visible)	—————
	LO	Goes on	High beam comes on dimly.

Cooling Fan Circuit



Wire Connections

- Blue Lead ↔ Battery (+)
- Black/Yellow Lead ↔ Battery (-)

★If the fan does not turn at this time, the fan is defective and must be replaced.

Fan Relay Inspection

Refer to the Main, Starter Circuit, and Headlight Relay Inspection in the Junction Box section.

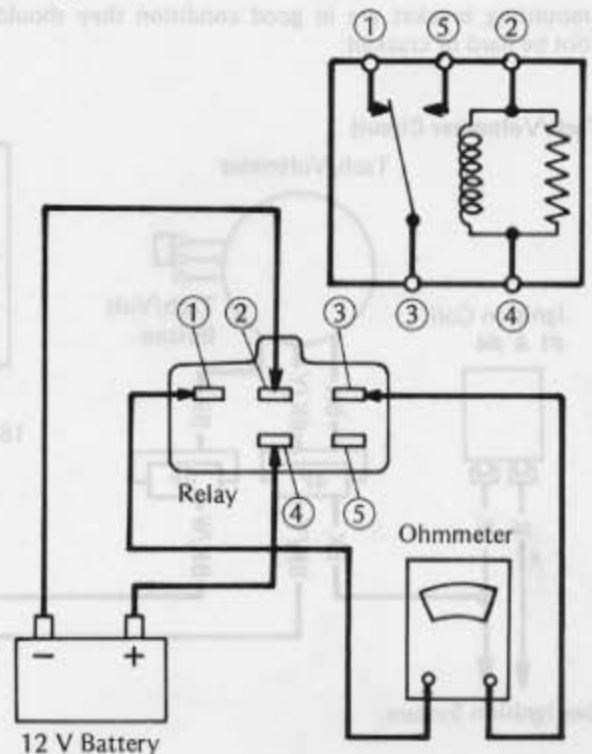
Fan Switch Relay Inspection

- Remove the relay from the motorcycle.
- Connect an ohmmeter and one 12 V battery to the relay as shown.
- ★If the relay does not work as specified, the relay is defective.

Testing Relay

	①	③	⑤
	Y	R/W	W/G
When battery is connected		○—○	○
When battery is disconnected	○—○		

Testing Relay



- Check the tach/voltmeter circuit wiring (see Wiring Inspection).
- ★ If all wiring and components other than the tach/voltmeter unit check out good, the unit is defective.

Fuel Gauge Operation Inspection

- Prepare an auxiliary wire, and check the operation of the gauge.

Fuel Gauge Operation Check

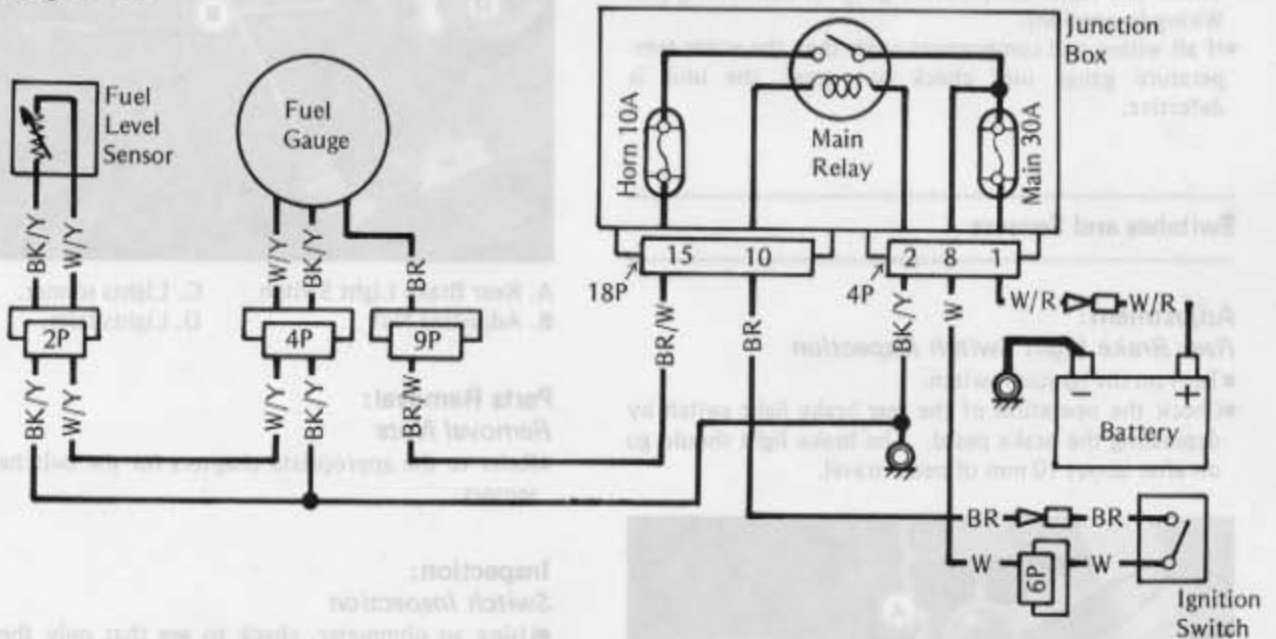
Ignition Switch Position: ON

Wire Location: Female 2-pin sensor connector (disconnected)

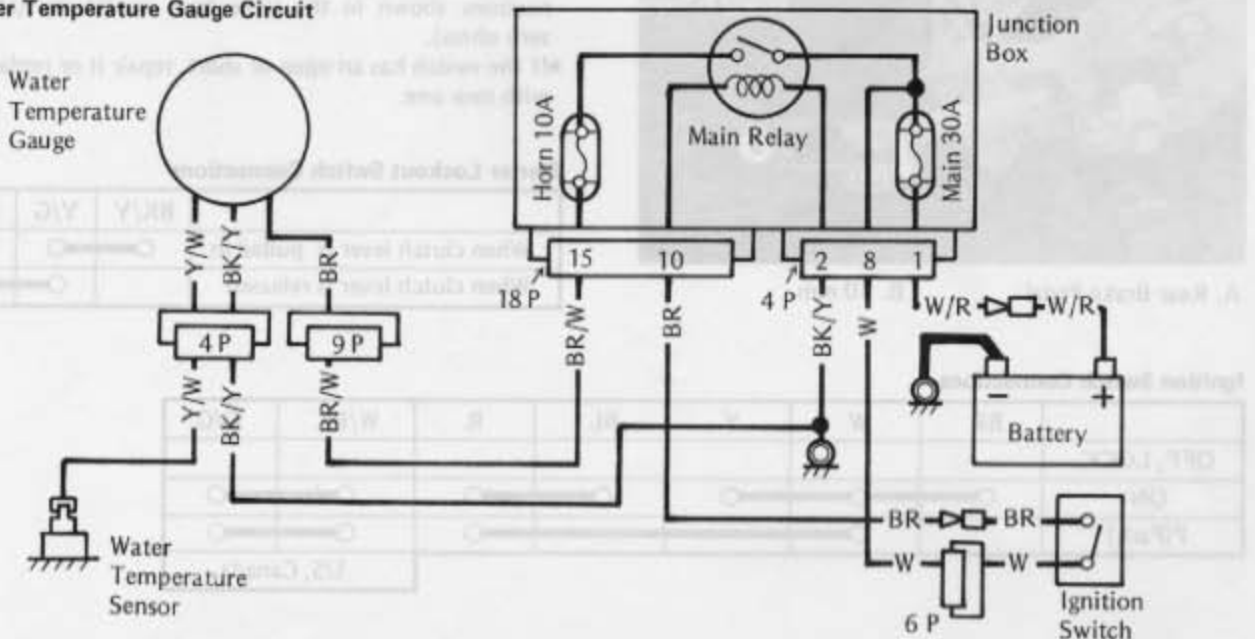
- Results:** Gauge should read E when connector wires are opened.
 Gauge should read F when connector wires are shorted.

- ★ If the gauge readings are correct, the fuel level sensor is bad. If these readings are not obtained, the trouble is with the gauge and/or wiring.
- Check the fuel gauge circuit wiring (see Wiring Inspection).
- ★ If all wiring and components other than the fuel gauge unit check out good, the unit is defective.

Fuel Gauge Circuit



Water Temperature Gauge Circuit



Water Temperature Gauge Operation Inspection

- Prepare an auxiliary wire, and check the operation of the gauge.

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Gauge Operation Test

Ignition Switch Position: ON

Wire Location: Female, Sensor Connector
(disconnected)

Results: Gauge should read C when connector wire is opened.
Gauge should read H when connector wire is grounded to engine.

CAUTION

Do not ground the wiring longer than necessary. After the needle swings to the H position, stop the test. Otherwise the gauge could be damaged.

If the gauge readings are correct, the water temperature sensor is bad. If these readings are not obtained, the trouble is with the gauge and/or wiring.

Check the water temperature gauge circuit wiring (see Wiring Inspection).

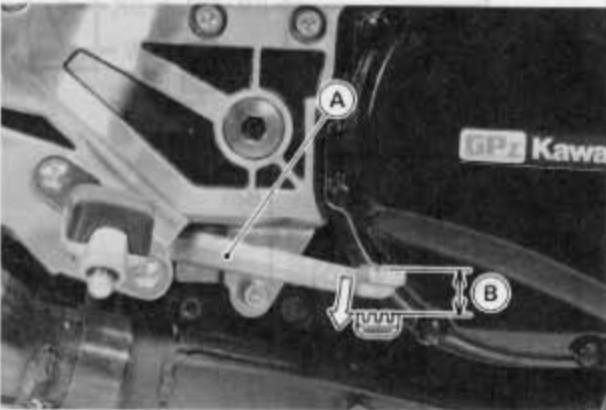
If all wiring and components other than the water temperature gauge unit check out good, the unit is defective.

Switches and Sensors

Adjustment:

Rear 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 10 mm of pedal travel.



A. Rear Brake Pedal

B. 10 mm

Ignition Switch Connections

	BR	W	Y	BL	R	W/BK	O/G	
OFF, LOCK								
ON	○ ——— ○ ——— ○			○ ——— ○		○ ——— ○		
P(Park)		○ ——— ○ ——— ○ ——— ○					○ ——— ○	
	US, Canada							

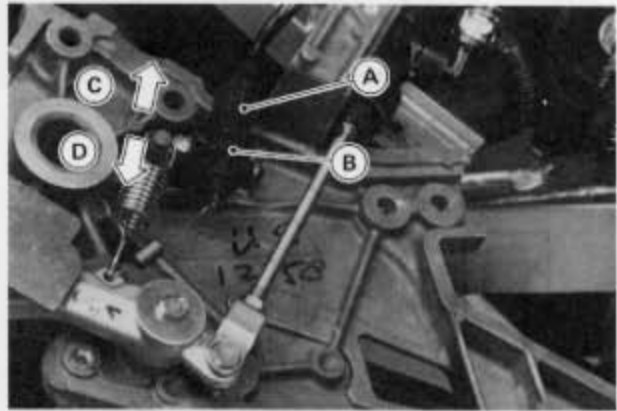
If it does not, adjust the brake light switch.

Rear Brake Light Switch Adjustment

- Remove the RH footpeg bracket from the frame (see Footpeg Bracket Removal in the Frame chapter).
- Turn the adjusting nut to adjust the switch.

CAUTION

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.

Parts Removal:

Removal Note

- Refer to the appropriate chapters for the switches and sensors.

Inspection:

Switch Inspection

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

Starter Lockout Switch Connections

	BK/Y	Y/G	LG
When clutch lever is pulled in	○ ——— ○		
When clutch lever is released		○ ——— ○	

Dimmer Switch Connections (US, Canada)

	BL/Y	BL/O	R/Y	R/BK
HI				
LO				

Dimmer Switch Connections (Other than US, Canada)

	R/BK	BL/Y	R/Y
HI			
LO			

Turn Signal Switch Connections

	GY	O	G
R			
N			
L			

Hazard Switch Connections

	GY	O	G
Off			
On			

Passing Button Connections

	BR	R/BK
Free		
Push on		

Horn Button Connections

	BK/W	BK/Y
Free		
Push on		

Engine Stop Switch Connections

	R	Y/R
OFF		
RUN		

Starter Button Connections

	BK	BK
Free		
Push on		

Headlight Switch Connections

	R/W	R/BL	BL	BL/Y
OFF				
■				
ON				

Front Brake Light Switch Connections

	BR	BL
When brake lever is pulled in		

Rear Brake Light Switch Connections

	BR	BL
When brake pedal is pushed down		

Side Stand Switch Connections

	BR	BK/Y	G/W
When side stand is up			
When side stand is down			

Neutral Switch Connections

	LG	
When transmission is in neutral		
When transmission is not in neutral		

Oil Pressure Switch Connections*

	SW. Terminal	
When engine is stopped		
When engine is running		

* : Engine lubrication system is in good condition.

Engine Oil Temperature Switch Connections

- Rising temperature: From ON to OFF at 117 – 123°C (243 – 253°F)
- Falling temperature: From OFF to ON above 113°C (235°F)

- ON: Less than 0.5 Ω
- OFF: More than 1 MΩ

Fan Switch (97°C) Connections

- Rising temperature: From OFF to ON at 94 – 100°C (201 – 212°F)
- Falling temperature: From ON to OFF above 90°C (194°F)

- ON: Less than 0.5 Ω
- OFF: More than 1 MΩ

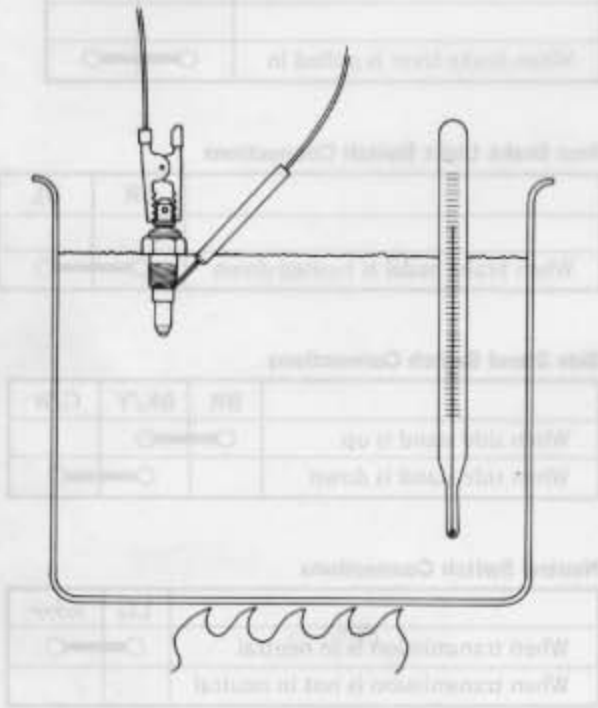
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Fan Switch (110°C) Connections

- Rising temperature: From OFF to ON at 107 – 113°C (225 – 235°F)
- Falling temperature: From ON to OFF above 104°C (219°F)

ON: Less than 0.5 Ω
OFF: More than 1 M Ω

Oil Temperature and Fan Switch Inspection



- Suspend the switch in a container of water so that the temperature-sensing projection and threaded portion are submerged.

NOTE

- Use oil for the oil temperature switch, and coolant for the 110°C Fan Switch.

- Suspend an accurate thermometer in the water.

NOTE

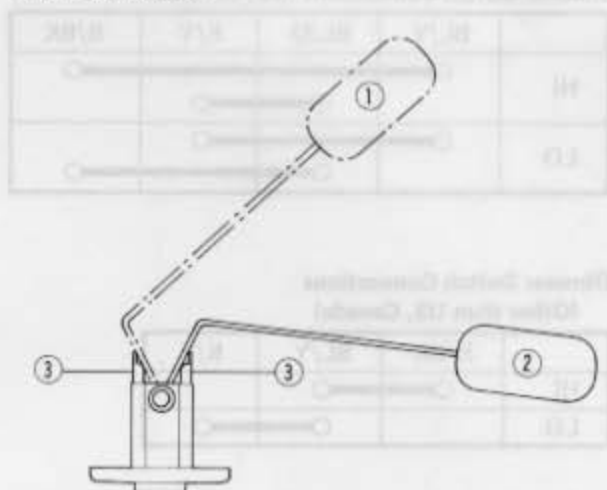
- The switch and thermometer must not touch the container sides or bottom.

- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.

Fuel Level Sensor Inspection

- Remove the fuel level sensor.
- Check that the float moves up and down smoothly without binding. It should go down under its own weight.
- ★If the float does not move smoothly, replace the sensor.

Fuel Level Sensor



1. Float in full position
2. Float in empty position
3. Float arm stop

- Measure the resistance of the fuel level sensor with an ohmmeter.
- ★If the ohmmeter does not show the specified values, or the readings do not change smoothly as the float moves up and down, replace the sensor.

Fuel Level Sensor Resistance

Full Position: 3 – 12 Ω
Empty Position: 70 – 120 Ω

- Inspect the leads and 2-pin connector.
- ★If they show any signs of damage, replace the sensor.

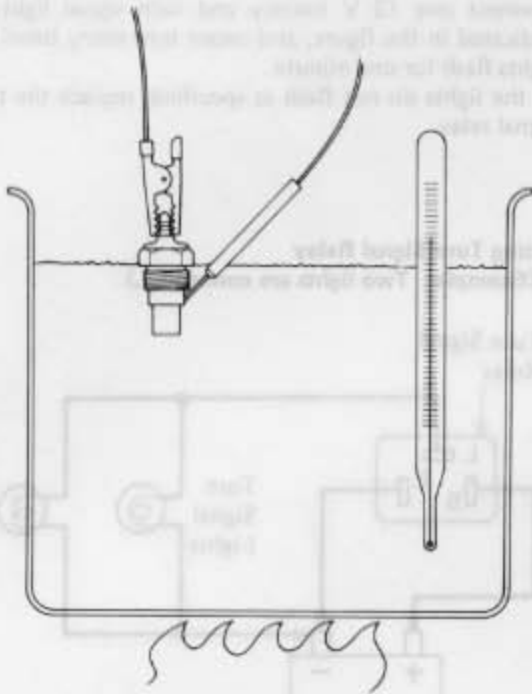
Water Temperature Sensor Inspection

- Remove the water temperature sensor.
- Suspend the sensor in a container of water so that the temperature-sensing projection and threaded portion are submerged. The sensor must not touch the container sides or bottom.
- Suspend an accurate thermometer in the water. It must not touch the container, either.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.
- Using an ohmmeter, measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.
- ★If the ohmmeter does not show the specified values, replace the sensor.

Internal Resistance of Water Temperature Sensor

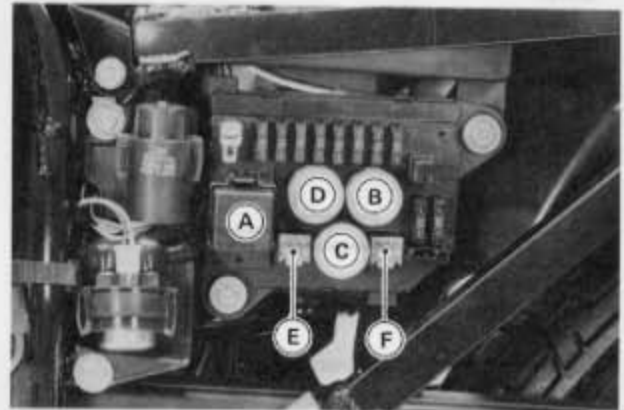
80°C (176°F): About 52 Ω
100°C (212°F): About 27 Ω

Water Temperature Sensor Inspection



Junction Box Parts Installation Notes

- Orient the relays and connectors correctly.
- Push the relays and connectors all the way in place until you feel a click.



- A. Turn Signal Relay
- B. Main Relay
- C. Starter Circuit Relay
- D. Headlight Relay
- E. Diode Assembly for Headlight Relay
- F. Diode Assembly for Starter Circuit Relay

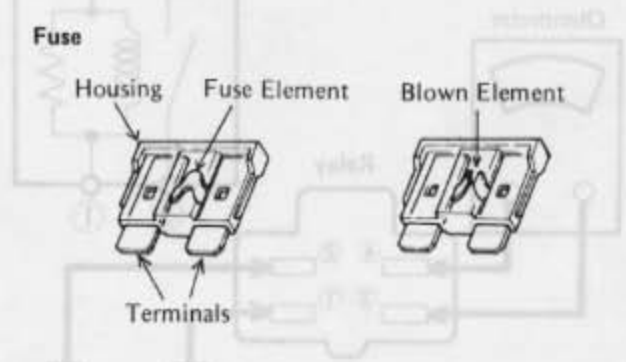
Inspection:

Fuse Inspection

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

CAUTION

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



Diode Inspection

- Disconnect the diode assembly from the junction box.
- Zero the ohmmeter, and connect it to each diode lead to check the resistance in both directions.
- ★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the diode assembly must be replaced.

Junction Box

The junction box contains the following electrical components:

- Fuses
- Relays
- Diodes
- ACC 2-Pin Connector

Parts Removal:

Junction Box Parts Removal Note

- Unlock the locking arm(s), and pull the relays and connectors straight off the junction box.



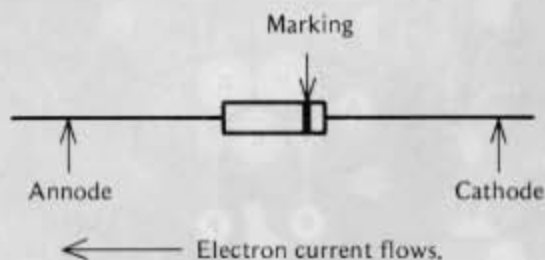
A. Unlock the locking arm(s)

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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 $\frac{1}{4}$ of the scale.

Polarity of Diode



Main, Starter Circuit, and Headlight Relay Inspection

- Remove the relay from the junction box.
- Connect an ohmmeter and one 12 V battery to the relay as shown.
- ★If the relay does not work as specified, the relay is defective.

Testing Relay

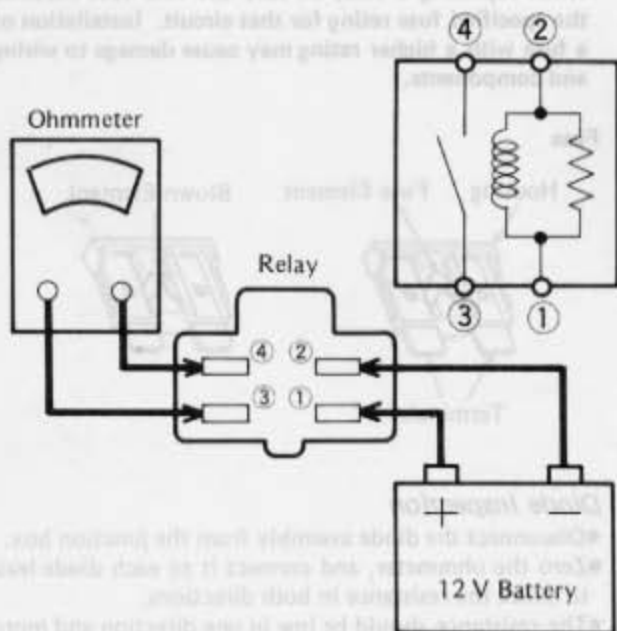
Meter range: 1 Ω range

Criteria:

When battery is connected $\rightarrow 0 \Omega$

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

Testing Relay



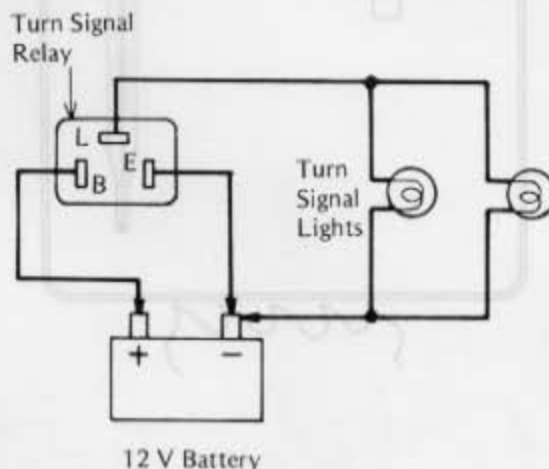
- ① and ② : Relay Coil Terminals
③ and ④ : Relay Switch Terminals

Turn Signal Relay Inspection

- Remove the turn signal relay from the junction box.
- Connect one 12 V battery and turn signal lights as indicated in the figure, and count how many times the lights flash for one minute.
- ★If the lights do not flash as specified, replace the turn signal relay.

Testing Turn Signal Relay

(Example: Two lights are connected.)



Testing Turn Signal

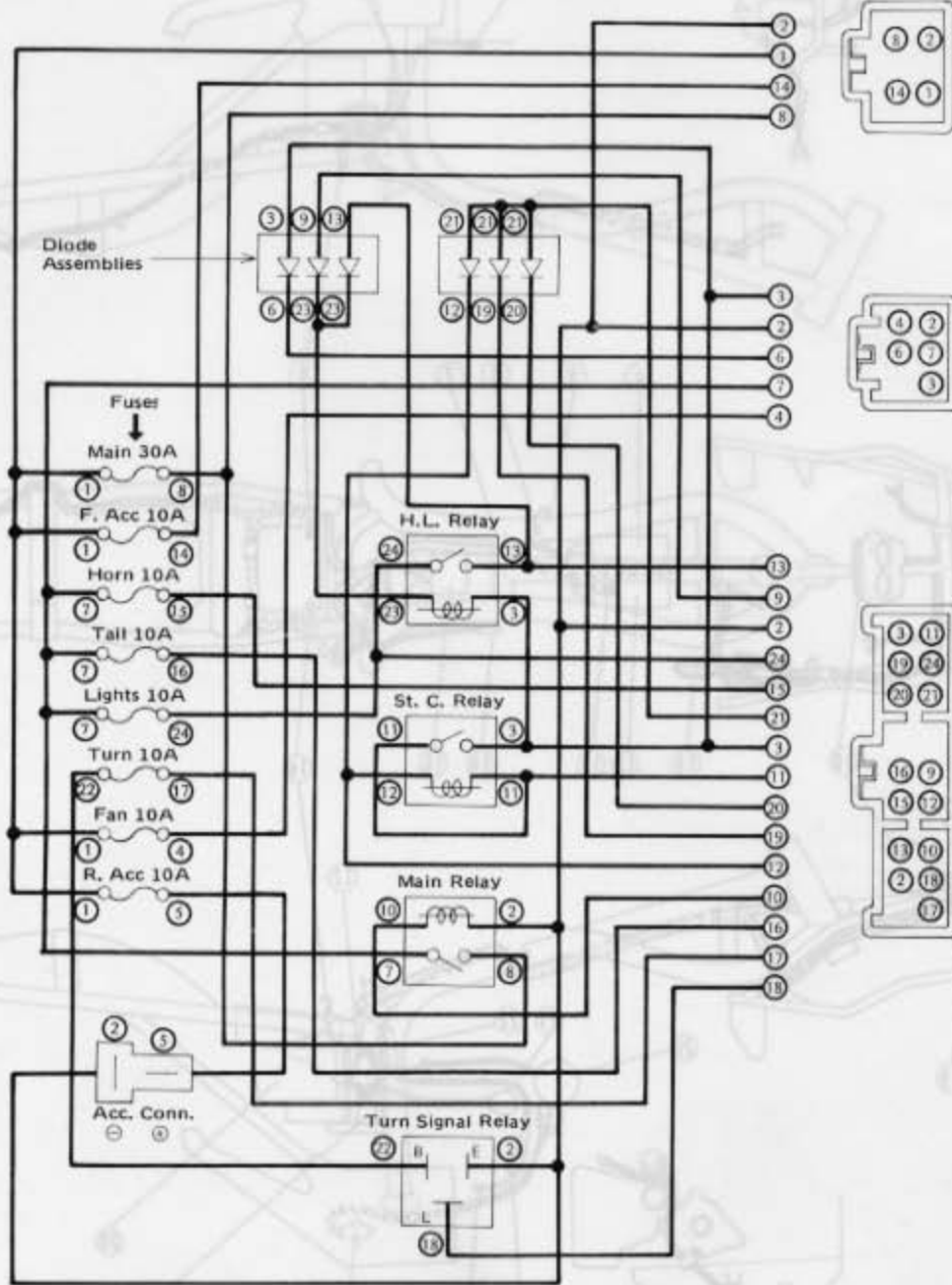
The Number of Turn Signal Lights	Load		Flashing Times (c/m*)
		Wattage (W)	
1		21 - 23	More than 150
2		42 - 46	75 - 95
3		63 - 69	
4		84 - 92	

* : Cycle(s) per minute

Junction Box Internal Circuit Inspection

- Remove the junction box from the motorcycle.
- Disconnect all the fuses, relays, diode assemblies, and connectors from the junction box.
- Make sure all connector terminals are clean and tight, and none of them have been bent.
- ★Clean the dirty terminals, and straighten slightly-bent terminals.
- Check conductivity of the internal circuit. Both terminals of the same number should conduct, and the differently numbered terminals should not conduct.
- ★If there are any open or short circuits, replace the junction box.

Junction Box Internal Circuit



Electrical Wiring

★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

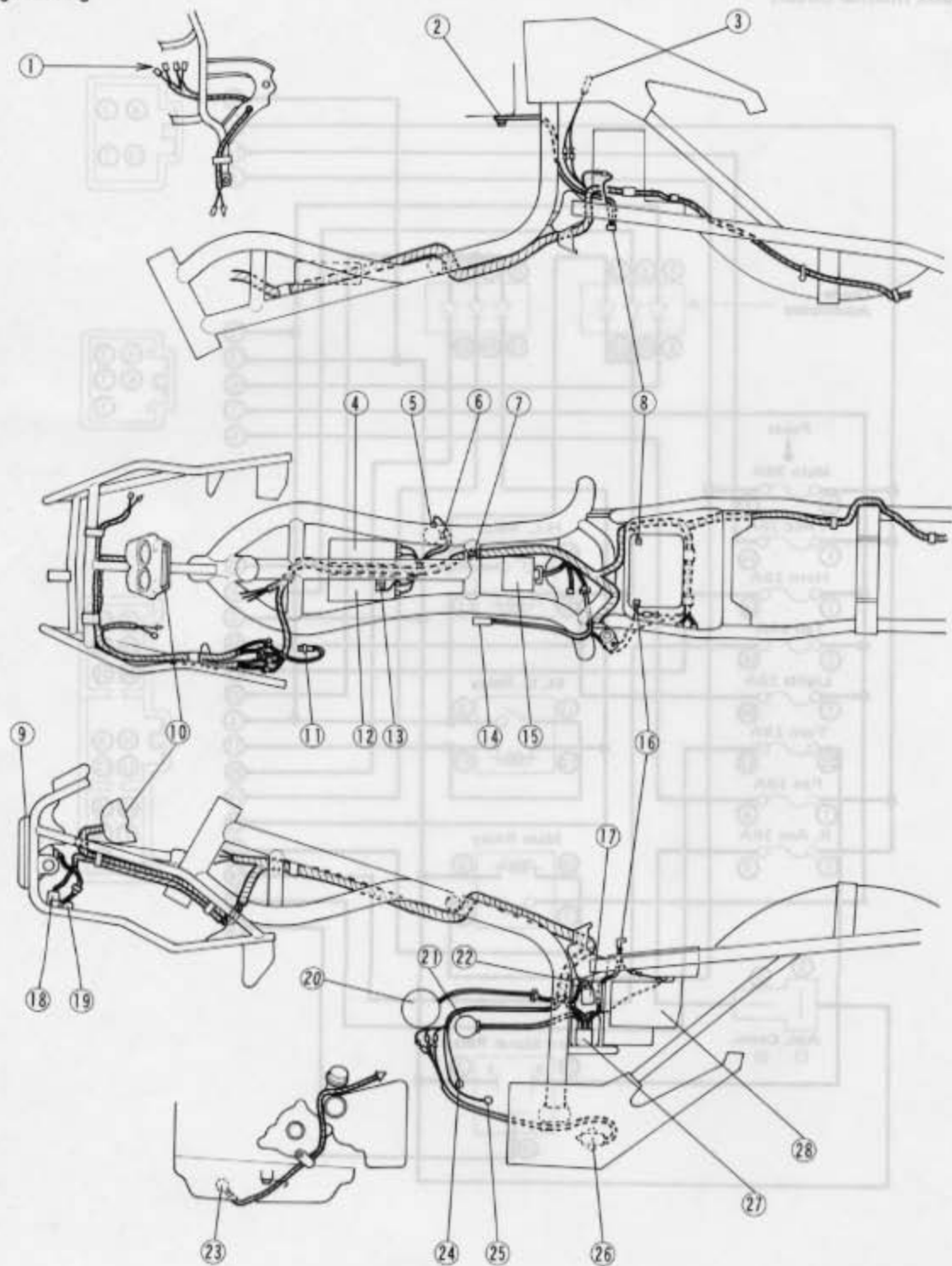
Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★If any wiring is poor, replace the damaged wiring.
- Pull each connector apart and inspect it for corrosion, dirt, and damage.

- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect an ohmmeter between the ends of the leads.
- Set the meter to the x 1 Ω range, and read the meter.
- ★If the meter does not read 0 Ω, the lead is defective. Replace the lead or the wiring loom if necessary.

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Wiring Routing

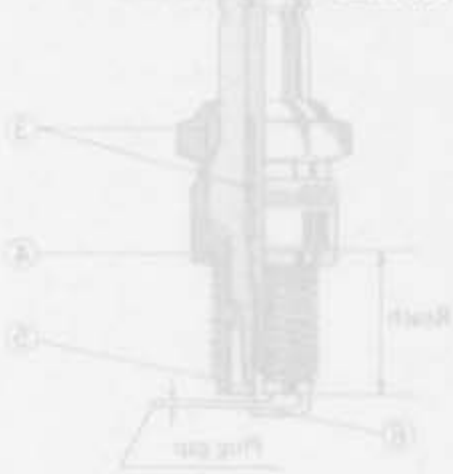


- | | | |
|--------------------------------|-----------------------------|----------------------------|
| 1. Horns | 11. Fan Switch (97°C) | 21. Starter Motor |
| 2. Ground (Battery -) | 12. Ignition Coil (#1 & 4) | 22. Ground (Main Harness) |
| 3. Rear Brake Light Switch | 13. Ground (Main Harness) | 23. Oil Temperature Switch |
| 4. Ignition Coil (#2 & 3) | 14. Pickup Coils | 24. Neutral Switch |
| 5. Fan Switch (110°C) | 15. IC Igniter | 25. Oil Pressure Switch |
| 6. Water Temperature Sensor | 16. Battery (+) | 26. Side Stand Switch |
| 7. Position Mark (White Tape) | 17. Fan Relay | 27. Starter Relay |
| 8. Battery (-) | 18. Fan Switch Relay | 28. Junction Box |
| 9. Headlight | 19. Reserve Lighting Device | |
| 10. Meters and Gauges Assembly | 20. Alternator | |

Appendix

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Spark Plug Inspection
 Remove the spark plug and inspect the terminal area.

1. Terminal
 2. Insulator
 3. Center
 4. Side electrode

Additional Considerations for Racing

The manufacturer has been manufacturing for over 40 years and is a leader in the industry. However, some may wish to adjust the carburetor to suit their own racing needs. The carburetor is a complex device and should be adjusted by a professional. The carburetor is a complex device and should be adjusted by a professional. The carburetor is a complex device and should be adjusted by a professional.

Carburetor

Some racers may wish to adjust the carburetor to suit their own racing needs. The carburetor is a complex device and should be adjusted by a professional. The carburetor is a complex device and should be adjusted by a professional.

Spark Plug

Spark Plug Inspection

The spark plug is a critical component of the engine. It should be inspected regularly for wear and tear. The spark plug is a critical component of the engine. It should be inspected regularly for wear and tear.

Troubleshooting Guide

The following information is provided for your reference. The following information is provided for your reference. The following information is provided for your reference.

General Lubrication

Lubrication

The engine oil should be changed regularly. The engine oil should be changed regularly. The engine oil should be changed regularly.

Nut, Bolt, and Fastener Tightness

Tightness Inspection

All nuts, bolts, and fasteners should be checked for tightness. All nuts, bolts, and fasteners should be checked for tightness. All nuts, bolts, and fasteners should be checked for tightness.

Standard Torque Table

Unit Conversion Table

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 desirable for improved performance under special conditions when proper mixture is not obtained after the carburetor has been properly adjusted, and all parts cleaned and found to be functioning properly.

If the engine still exhibits symptoms of overly 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 "Electrical System" chapter to be the best plug for general use.

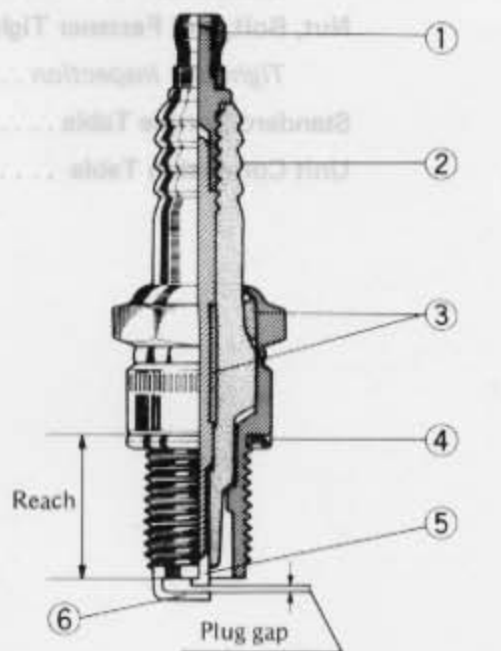
Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of a correct heat range is used should be determined by removing and inspecting the plug.

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



- | | |
|--------------|---------------------|
| 1. Terminal | 4. Gasket |
| 2. Insulator | 5. Center electrode |
| 3. Cement | 6. Side electrode |

Spark Plug Inspection

- Remove the spark plug and inspect the ceramic insulator.

Spark Plug Condition



Carbon fouling



Oil fouling



Normal operation



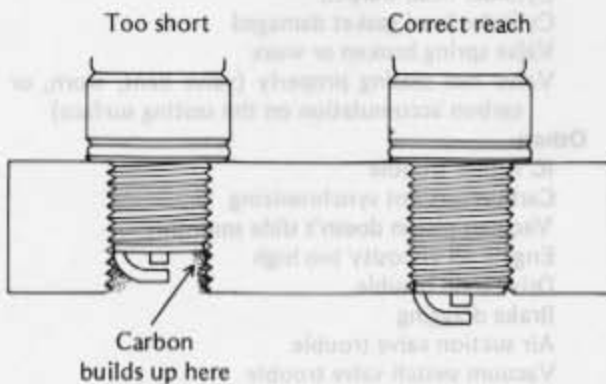
Overheating

★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 white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

CAUTION

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

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).

Troubleshooting Guide

NOTE

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

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:

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

Starter motor rotating but engine doesn't turn over:

- Starter motor clutch trouble

Engine won't turn over:

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

No fuel flow:

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

Engine flooded:

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

No spark; spark weak:

- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- IC igniter trouble
- Neutral, starter lockout, or side stand switch trouble
- Pickup coil trouble
- Ignition coil trouble
- Ignition or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

Compression Low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/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)

Poor Running at Low Speed:

Spark weak:

- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark Plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble
- Pickup coil trouble
- Ignition coil trouble

Fuel/air mixture incorrect:

- Pilot screw maladjusted
- Pilot jet, or air passage clogged
- Air bleed pipe bleed holes clogged
- Pilot passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter plunger stuck open
- Fuel level in carburetor float bowl too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Air cleaner duct loose

Compression low:

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

Other:

- IC igniter trouble
- Carburetors not synchronizing
- Vacuum piston doesn't slide smoothly
- Engine oil viscosity too high
- Drive train trouble
- Brake dragging
- Air suction valve trouble
- Vacuum switch valve trouble

Poor Running or No Power at High Speed:

Firing incorrect:

- Spark plug dirty, broken, or maladjusted
- Spark plug cap shorted or not in good contact

- Spark plug incorrect
- IC igniter trouble
- Pickup coil trouble
- Ignition coil trouble

Fuel/air mixture incorrect:

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

Compression low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring 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.)

Knocking:

- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- IC igniter trouble

Miscellaneous:

- Throttle valve won't fully open
- Vaccum piston doesn't slide smoothly
- Brake dragging
- Clutch slipping
- Overheating
- Engine oil level too high
- Engine oil viscosity too high
- Drive train trouble
- Air suction valve trouble
- Vacuum switch valve trouble

Overheating:**Firing incorrect:**

- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- IC igniter trouble

Fuel/air mixture incorrect:

- Main jet clogged or wrong size
- Fuel level in carburetor float bowl too low
- Carburetor holder loose
- Air cleaner poorly sealed, or missing
- Air cleaner duct poorly sealed
- Air cleaner clogged

Compression high:

- Carbon built up in combustion chamber

Engine load faulty:

- Clutch slipping
- Engine oil level too high
- Engine oil viscosity too high
- Drive train trouble
- Brake dragging

Lubrication inadequate:

- Engine oil level too low
- Engine oil poor quality or incorrect

Gauge incorrect:

- Water temperature gauge broken
- Water temperature sensor 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 sensor broken

Cooling system component incorrect:

- Thermostatic fan switch trouble
- Thermostat trouble

Clutch Operation Faulty:**Clutch slipping:**

- Friction plate worn or warped
- Steel plate worn or warped
- Clutch spring broken or weak
- Clutch release mechanism trouble
- Clutch hub or housing unevenly worn

Clutch not disengaging properly:

- Clutch plate 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
- Clutch hub locknut loose
- Air in the clutch fluid line
- Clutch fluid leak
- Clutch fluid deteriorated
- Primary or secondary cup damaged
- Master cylinder scratched inside

Gear Shifting Faulty:**Doesn't go into gear; shift pedal doesn't return:**

- Clutch not disengaging
- Shift fork bent or seized
- Gear stuck on the shaft

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- Gear positioning lever binding
- Neutral positioning lever binding
- Shift return spring weak or broken
- Shift return spring pin loose
- Shift mechanism arm spring broken
- Shift mechanism arm broken
- Shift pawl broken

Jumps out of gear:

- Shift fork worn
- Gear groove worn
- Gear dogs and/or dog holes worn
- Shift drum groove worn
- Gear positioning lever spring weak or broken
- Shift fork pin worn
- Drive shaft, output shaft, and/or gear splines worn

Overshifts:

- Gear positioning lever spring weak or broken
- Shift mechanism arm spring broken

Abnormal Engine Noise:

Knocking:

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

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 bearing worn

Other noise:

- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring worn, broken or stuck
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive
- Engine mounts loose
- Crankshaft bearing worn
- Primary gear worn or chipped
- Camshaft chain tensioner trouble
- Camshaft chain, sprocket, guide worn
- Air suction valve damaged
- Vacuum switch valve damaged
- Balancer gear worn or chipped
- Balancer shaft position maladjusted
- Balancer bearing worn
- Balancer or alternator shaft coupling rubber damper damaged
- Alternator shaft chain tensioner trouble
- Alternator shaft chain, sprocket, guide worn

Abnormal Drive Train Noise:

Clutch noise:

- Weak or damaged rubber damper

- Clutch housing/friction plate clearance excessive
- Clutch housing gear worn

Transmission noise:

- Bearings worn
- Transmission gears worn or chipped
- Metal chips jammed in gear teeth
- Engine oil insufficient

Drive chain noise:

- Drive chain adjusted improperly
- Chain worn
- Rear and/or engine sprocket 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 damaged

Disc brake noise:

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

Other noise:

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

Oil Pressure Warning Light Goes On:

- Engine oil pump damaged
- Engine oil screen clogged
- Engine oil level too low
- Engine oil viscosity too low
- Camshaft bearings worn
- Crankshaft bearings worn
- Oil pressure switch damaged
- Wiring damaged
- Relief valve stuck open
- O-ring at the oil pipe in the crankcase damaged

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 in carburetor float bowl too high

Brown smoke:

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

Handling and/or Stability Unsatisfactory:

Handlebar hard to turn:

- Steering stem locknut too tight
- Bearing damaged
- Steering bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

Handlebar shakes or excessively vibrates:

- Tire worn
- Swing arm pivot bearing worn
- Rim warped, or not balanced
- Wheel bearing worn
- Handlebar clamp loose
- Steering stem head nut loose

Handlebar pulls to one side:

- Frame bent
- Wheel misalignment
- Swing arm bent or twisted
- Steering maladjusted
- Right/left fork legs unbalanced (oil level, air pressure, anti-dive setting)

Shock absorption unsatisfactory:

- (Too hard)
 - Front fork oil excessive
 - Front fork oil viscosity too high
 - Front fork air pressure too high
 - Rear shock absorber air pressure too high
 - Tire air pressure too high
 - Front fork anti-dive mechanism trouble
- (Too soft)
 - Front fork oil insufficient and/or leaking
 - Front fork oil viscosity too low
 - Front fork air pressure too low
 - Rear shock absorber air pressure too low
 - Front fork, rear shock absorber spring weak
 - Rear shock absorber oil leaking
 - Front fork anti-dive mechanism trouble

Brake Doesn't Hold:

- Air in the brake line
- Pad or disc worn
- Brake fluid leak
- Disc warped
- Contaminated pad
- 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
- Alternator trouble
- Wiring faulty

Battery Overcharged:

Alternator trouble

NOTE

Whenever the vehicle has been damaged while wet or only condition or repaired after being a dip, pressure gear water, perform the general lubrication

- Front: Lubricate with Motor Oil
- Control Valve
- Side Stand
- Clutch Lever
- Brake Lever
- Brake Pedal
- Rear Brake Shock Joint
- Points: Lubricate with Grease
- Front Fork Cable Lower End
- Shockwater Inner Cable*
- *Grease the joint part of the inner cable spring.
- Cable: Lubricate with Motor Oil
- Clutch Cable
- Throttle Cable
- Cable Lubrication



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.*

Pivots: Lubricate with Motor Oil.

Center Stand
Side Stand
Clutch Lever
Brake Lever
Brake Pedal
Rear Brake Rod Joint

Points: Lubricate with Grease.

Throttle Inner Cable Lower End
Speedometer Inner Cable*

*Grease the lower part of the inner cable sparingly.

Cables: Lubricate with Motor Oil.

Choke Cable
Throttle Cable

Cable Lubrication

Nut, Bolt, and Fastener Tightness

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

○ *For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

- ★ If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by ½ turn, then tighten it.
- ★ If cotter pins are damaged, replace them with new ones.

Nut, Bolt, and Fastener to be checked**Wheels:**

Front Axle Nut
Front Axle Clamp Bolts
Rear Axle Nut
Chain Adjuster Clamp Bolts

Brakes:

Front Master Cylinder Clamp Bolts
Front Caliper Mounting Bolts
Rear Master Cylinder Mounting Bolt
Rear Caliper Holder Fixing Bolt
Rear Caliper Holder Collar Bolt
Brake Lever Pivot Nut
Brake Pedal Bolt
Brake Rod Joint Cotter Pin

Suspension:

Front Fork Clamp Bolts
Front Fender Mounting Bolts
Rear Shock Absorber Mounting Bolts
Swing Arm Pivot Shaft Nuts
Uni-trak Link Nuts

Steering:

Stem Head Nut
Handlebar Mounting Bolts

Engine:

Engine Mounting Bolts
Cylinder Head Bolts
Muffler Mounting Nuts
Muffler Mounting Bolts
Muffler Connecting Clamp Bolts
Clutch Master Cylinder Clamp Bolts
Clutch Lever Pivot Nut

Others:

Center Stand Bolts
Side Stand Bolt
Front Footpeg Mounting Bolts
Rear Frame Mounting Bolts
Footpeg Bracket Mounting Bolts

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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
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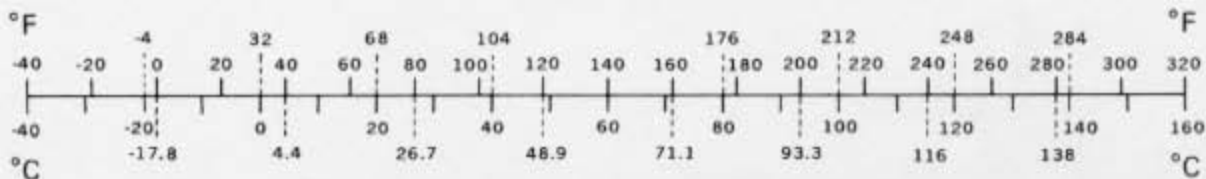
Units of Power:

kW	x	1.360	=	PS
kW	x	1.341	=	HP
PS	x	0.7355	=	kW
PS	x	0.9863	=	HP

Units of Temperature:

$$\frac{9 (^{\circ}\text{C} + 40)}{5} - 40 = ^{\circ}\text{F}$$

$$\frac{5 (^{\circ}\text{F} + 40)}{9} - 40 = ^{\circ}\text{C}$$



Supplement-1986 Model

This "Supplement — 1986 Model" chapter is designed to be used in conjunction with the front part of this manual (up to the end of the "Appendix" chapter). The maintenance and repair procedures described in this chapter are only those that are unique to the 1986 ZX900-A3 motorcycle. Most service operations for these models remain identical to those described in front of this chapter. Complete and proper servicing of the 1986 ZX900-A3 motorcycle, therefore requires mechanics to read both this chapter and the text in front of this chapter.

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General Information

General Specifications

Items	ZX900-A3
Dimensions:	
Overall length	2,200 mm, (C) (SA) (U) 2,150 mm
Overall width	750 mm
Overall height	1,215 mm
Wheelbase	1,495 mm, (A) 1,500 mm
Road clearance	140 mm
Seat height	780 mm
Dry weight	2,240 N (228 kg), (Cal) 2,240 N (228.5 kg)
Curb weight:	
Front	1,210 N (123 kg), (Cal) 1,210 N (123.5 kg)
Rear	1,240 N (126 kg)
Fuel tank capacity	22.0 L
Performance:	
Climbing ability	30°
Braking distance	12.5 m from 50 km/h
Minimum turning radius	2.7 m
Engine:	
Type	4-stroke, DOHC, 4-cylinder
Cooling system	Liquid-cooled
Bore and stroke	72.5 x 55.0 mm
Displacement	908 mL
Compression ratio	11.0
Maximum horsepower	Max. 84.6 kW (115 PS) @9,500 r/min (rpm), (C) (U) 80.9 kW (110 PS) @9,500 r/min (rpm), (F) 55.2 kW (—) @9,500 r/min (rpm) (UTAC's norms), (S) 50.7 kW (69 PS) @6,000 r/min (rpm), (Swe) (WG) 73.6 kW (100 PS) @9,500 r/min (rpm)
Maximum torque	85.3 N-m (8.7 kg-m, 62.9 ft-lb) @8,500 r/min (rpm), (F) —, (S) 85.3 N-m (8.7 kg-m, 62.9 ft-lb) @5,000 r/min (rpm), (Swe) (WG) 78.5 N-m (8.0 kg-m, 57.8 ft-lb) @8,500 r/min (rpm) (DIN)
Carburetion system	Carburetors, Keihin CVK34 x 4
Starting system	Electric starter
Ignition system	Battery and coil (transistorized)
Timing advance	Electronically advanced

Item	ZX900-A3
Ignition timing	From 10° BTDC @1,000 r/min (rpm) to 35° BTDC @3,500 r/min (rpm)
Spark plug	NGK DR8ES or ND X27ESR-U Ⓒ NGK DR8ES-L or ND X24ESR-U Ⓐ Ⓢ Ⓡ NGK D9EA or ND X27ES-U Ⓡ NGK D8EA or ND X24ES-U
Cylinder numbering method	Left to right, 1-2-3-4
Firing order	1-2-4-3
Valve timing: Inlet	45° BTDC
	Close 65° ABDC
	Duration 290°
Exhaust	Open 65° BBDC
	Close 45° ATDC
	Duration 290°
Lubrication system	Forced lubrication (wet sump with cooler)
Engine oil: Grade	SE or SF class
Viscosity	SAE10W40, 10W50, 20W40, or 20W50
Capacity	4.0 L
Drive Train:	
Primary reduction system:	
Type	Gear
Reduction ratio	1.732 (97/56)
Clutch type	Wet multi disc
Transmission: Type	6-speed, constant mesh, return shift
Gear ratios: 1st	2.800 (42/15)
2nd	2.000 (38/19)
3rd	1.590 (35/22)
4th	1.333 (32/24)
5th	1.153 (30/26)
6th	1.035 (29/28)
Final drive system: Type	Chain drive
Reduction ratio	2.882 (49/17), Ⓐ 2.823 (48/17), Ⓒ Ⓡ 2.941 (50/17)
Overall drive ratio	5.170, Ⓐ 5.065, Ⓒ Ⓡ 5.276 @Top gear
Frame:	
Type	Tubular, diamond
Caster (rake angle)	29°
Trail	114 mm

(Continued on next page.)

18-4 SUPPLEMENT – 1986 MODEL

Item	ZX900-A3
Front tire: Type	Tubeless
Size	120/80V16-V250, (C) (U) 120/80V16
Rear tire: Type	Tubeless
Size	130/80V18-V250, (C) (U) 130/80V18
Front suspension: Type	Telescopic fork (pneumatic)
Wheel travel	140 mm
Rear suspension: Type	Swing arm (uni-trak)
Wheel travel	115 mm
Brake type: Front	Dual disc
Rear	Single disc
Electrical Equipment:	
Battery	12 V 14 Ah
Headlight: Type	Semi-sealed beam
Bulb	12 V 60/55 W (quartz-halogen)
Tail/brake light	12 V 5/21 W x2, (C) (SA) (U) 12 V 8/27 W x2
Alternator: Type	Three-phase AC
Rated output	25 A @6,000 r/min (rpm), 14 V
Voltage regulator: Type	Short-circuit

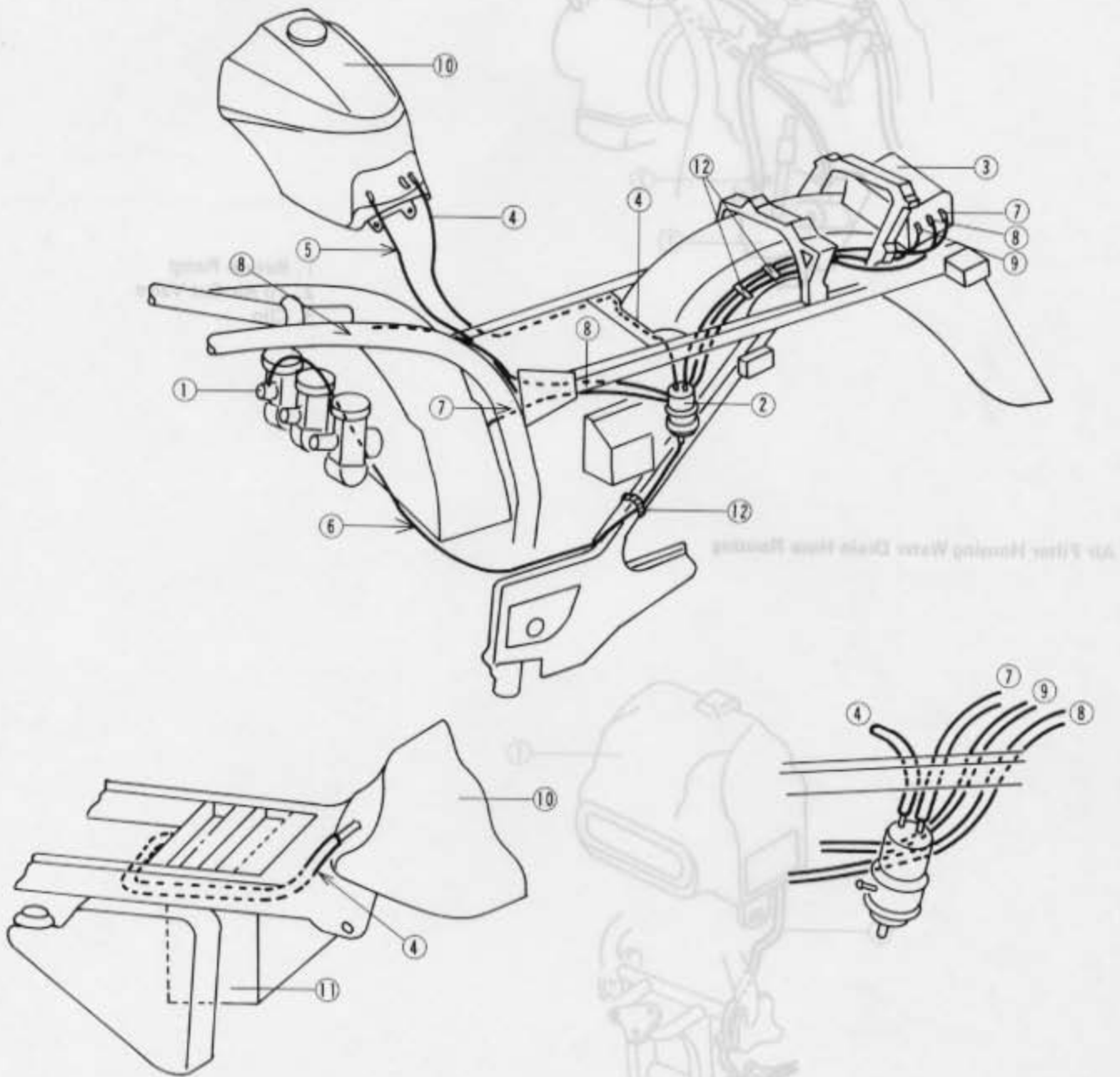
Specifications subject to change without notice, and may not apply to every country.

- (A) : Australian Model
- (C) : Canadian Model
- (Cal) : California Model
- (F) : French Model
- (I) : Italian Model
- (S) : Swiss Model
- (SA) : South African Model
- (Swe) : Swedish Model
- (U) : US Model
- (WG) : West German Model

Cable Routing

The following cable routings are only those that are unique to the ZX900-A3 model. For all other routings refer to the front part of this manual (up to 17-10).

**Evaporative Emission Control System Hose Routing
(US California only)**



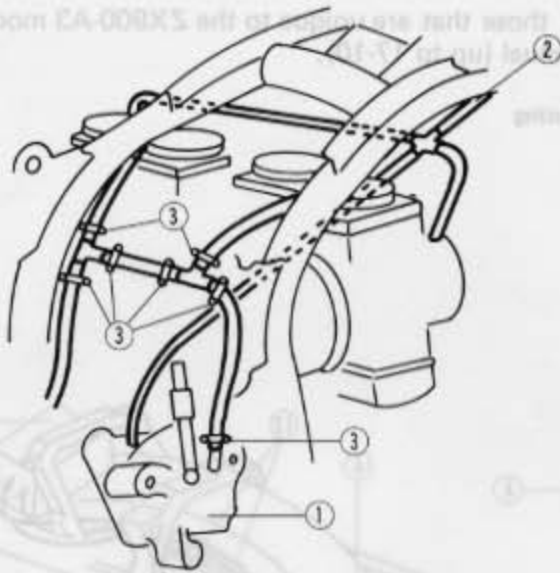
- 1. #3 Carburetor
- 2. Separator
- 3. Canister
- 4. Breather Hose (Blue)

- 5. Fuel Return Hose (Red)
- 6. Vacuum Hose (White)
- 7. Breather Hose (Blue)
- 8. Purge Hose (Green)

- 9. Breather Hose (Yellow)
- 10. Fuel Tank
- 11. Battery Box
- 12. Clamps

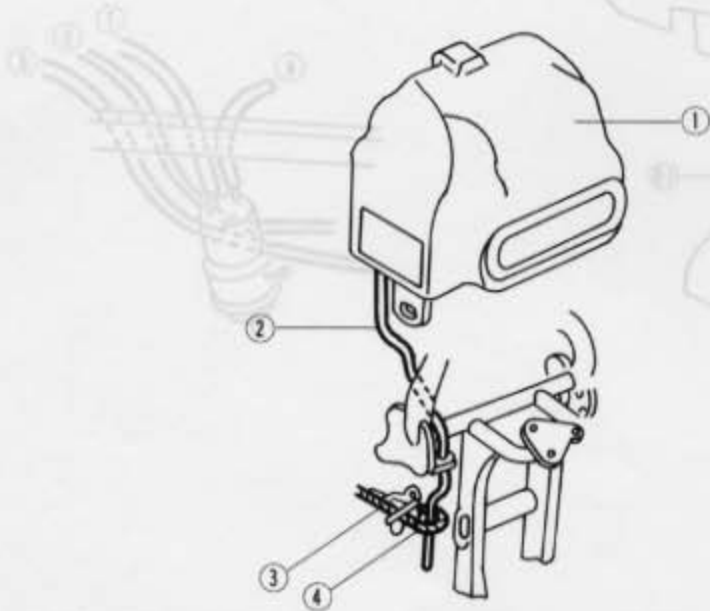
Cable Routing

The following cable routings are only those that are unique to the ZX800-A3 model. For all other routings refer to the front part of this manual. (US California only)



- 1. Return Pump
- 2. To Air Cut Valve
- 3. Clip

Air Filter Housing Water Drain Hose Routing



- 1. Air Cleaner
- 2. Drain Hose
- 3. Side Stand Switch
- 4. Side Stand Switch Lead

1. Weather Fleece (Black)
 2. Side Stand
 3. Weather Fleece (Black)
 4. Weather Fleece (Black)
 5. Weather Fleece (Black)
 6. Weather Fleece (Black)
 7. Weather Fleece (Black)
 8. Weather Fleece (Black)
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 13. Weather Fleece (Black)

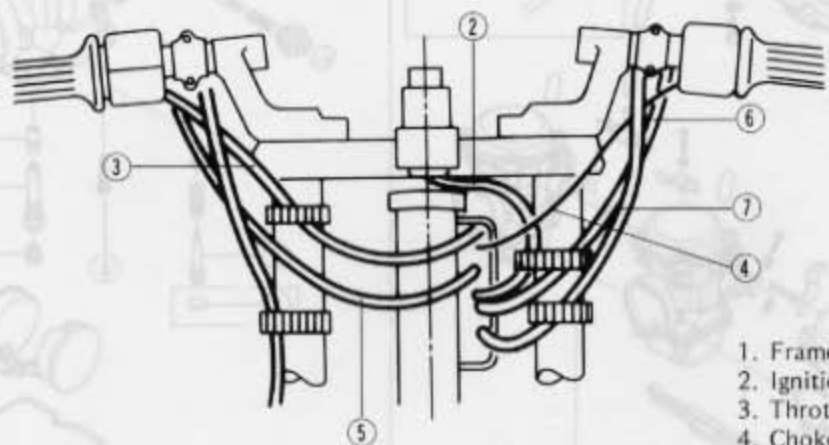
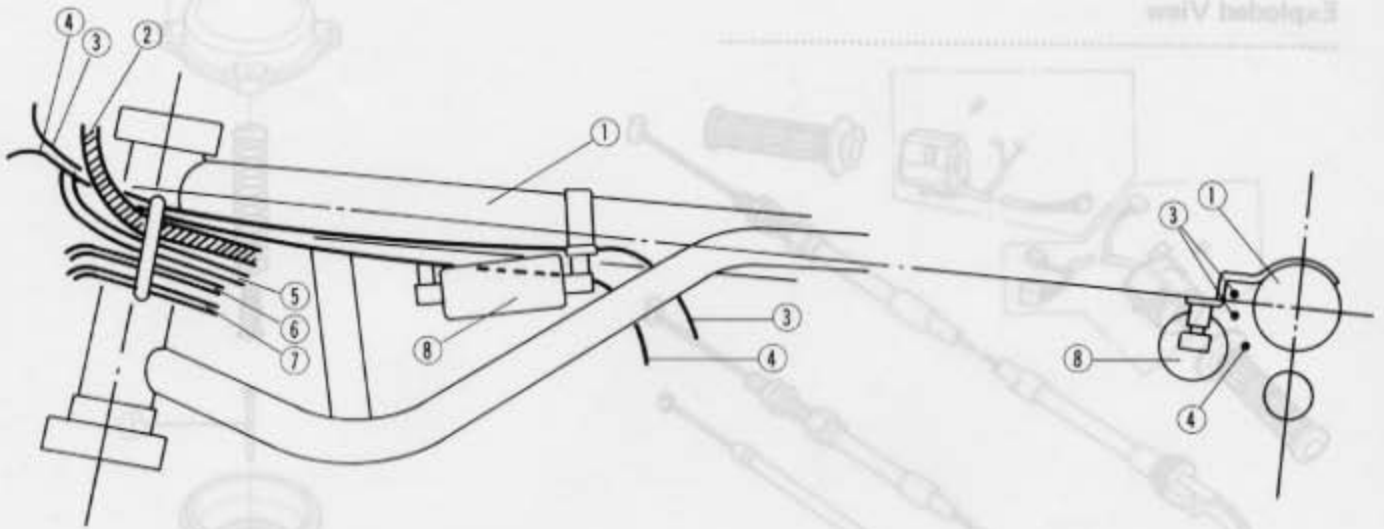
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 12. Weather Fleece (Black)
 13. Weather Fleece (Black)

Cable and Hoses Routing

Fuel System

Exploded View

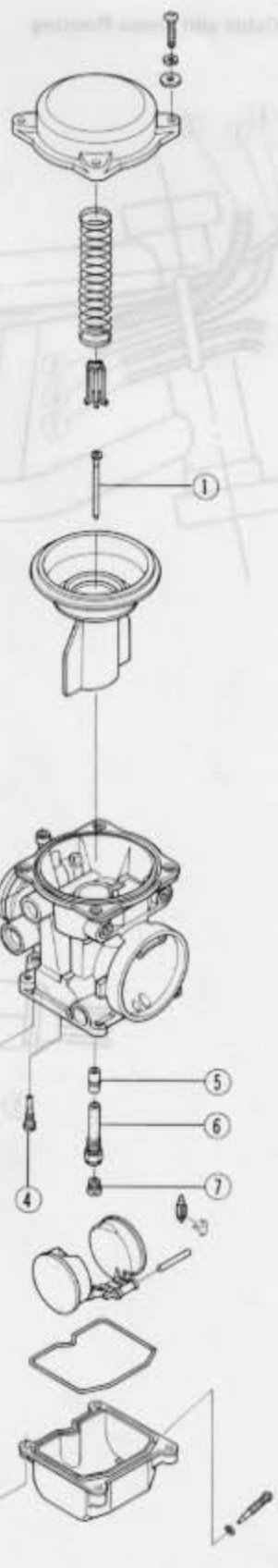
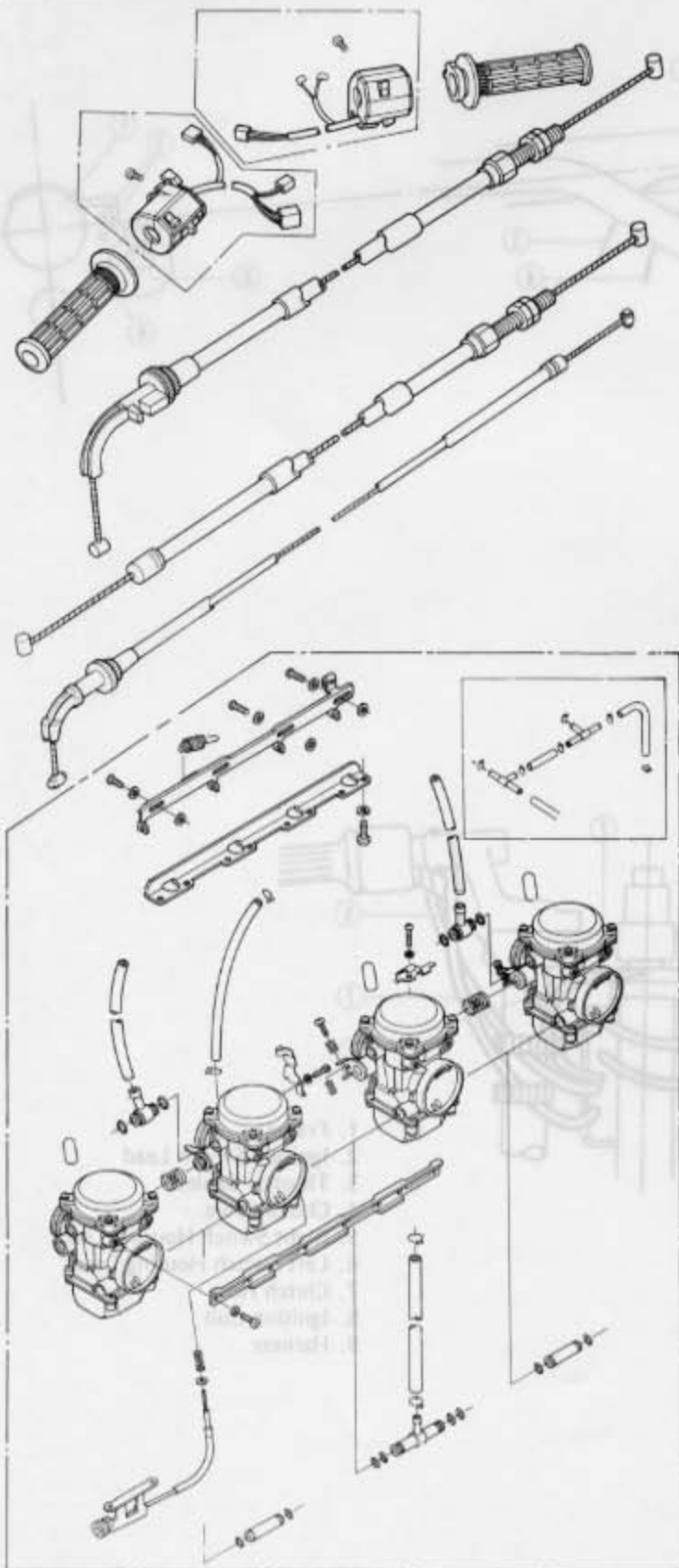


- 1. Frame
- 2. Ignition Switch Lead
- 3. Throttle Cables
- 4. Choke Cable
- 5. Right Switch Housing Lead
- 6. Left Switch Housing Lead
- 7. Clutch Hose
- 8. Ignition Coil
- 9. Harness

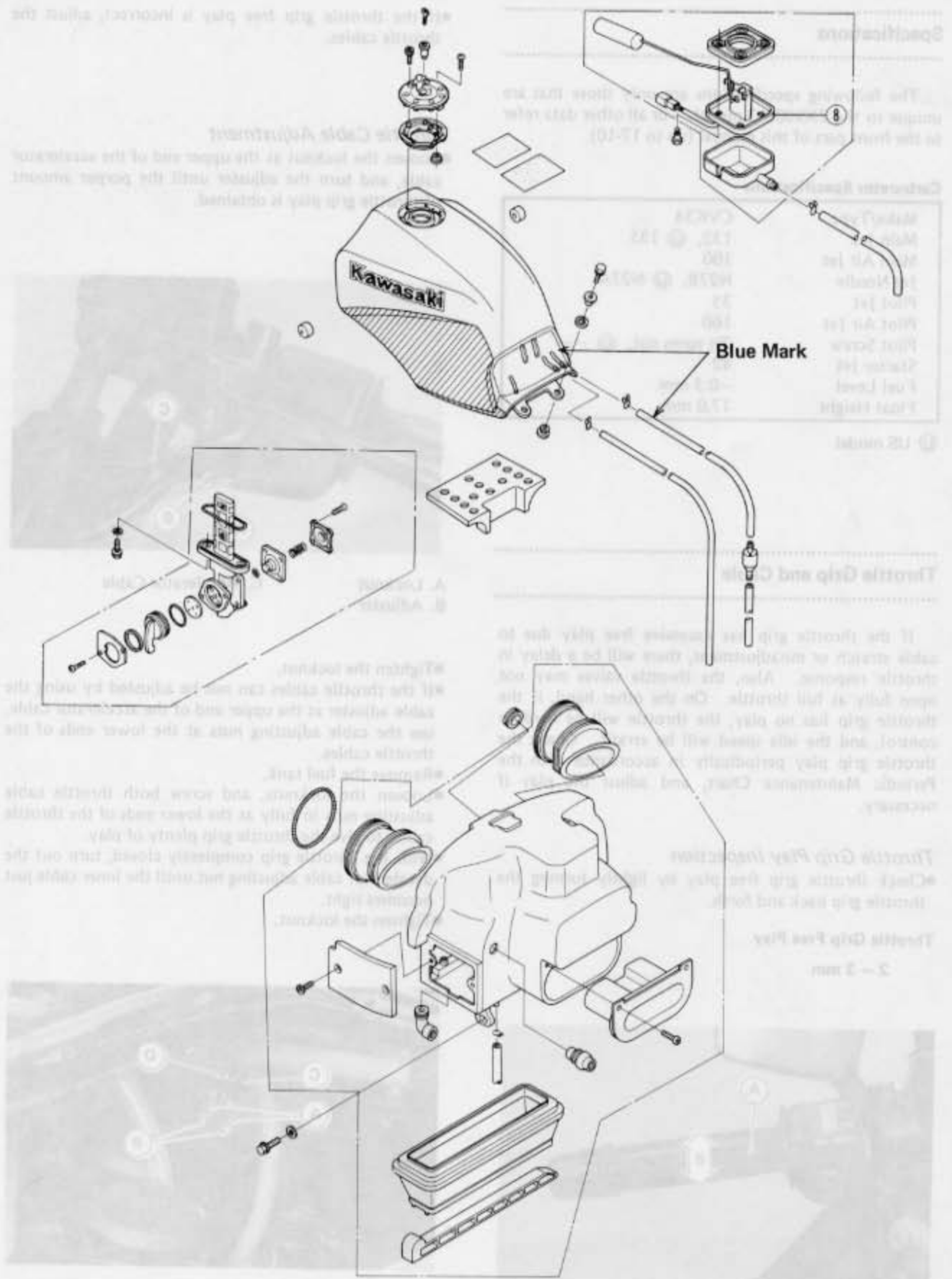
1. Fuel Hose
 2. Fuel Hose
 3. Fuel Hose
 4. Fuel Hose
 5. Fuel Hose
 6. Fuel Hose
 7. Fuel Hose
 8. Fuel Hose
 9. Fuel Hose

Fuel System

.....
Exploded View
.....



- 1. Jet Needle
- 2. Pilot Screw
- 3. Plug (US model only)
- 4. Pilot Jet
- 5. Needle Jet
- 6. Needle Jet Holder
- 7. Main Jet
- 8. Fuel Level Sensor



Specifications

The following specifications apply to the 18-9 outboard motor. For other data refer to the front cover of this manual (17-10).

Customer Name: _____
 Model: _____
 Motor: _____
 Part No. 180 _____
 Part No. 181 _____
 Part No. 182 _____
 Part No. 183 _____
 Part No. 184 _____
 Part No. 185 _____
 Part No. 186 _____
 Part No. 187 _____
 Part No. 188 _____
 Part No. 189 _____
 Part No. 190 _____
 Part No. 191 _____
 Part No. 192 _____
 Part No. 193 _____
 Part No. 194 _____
 Part No. 195 _____
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 Part No. 231 _____
 Part No. 232 _____
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 Part No. 234 _____
 Part No. 235 _____
 Part No. 236 _____
 Part No. 237 _____
 Part No. 238 _____
 Part No. 239 _____
 Part No. 240 _____
 Part No. 241 _____
 Part No. 242 _____
 Part No. 243 _____
 Part No. 244 _____
 Part No. 245 _____
 Part No. 246 _____
 Part No. 247 _____
 Part No. 248 _____
 Part No. 249 _____
 Part No. 250 _____
 Part No. 251 _____
 Part No. 252 _____
 Part No. 253 _____
 Part No. 254 _____
 Part No. 255 _____
 Part No. 256 _____
 Part No. 257 _____
 Part No. 258 _____
 Part No. 259 _____
 Part No. 260 _____
 Part No. 261 _____
 Part No. 262 _____
 Part No. 263 _____
 Part No. 264 _____
 Part No. 265 _____
 Part No. 266 _____
 Part No. 267 _____
 Part No. 268 _____
 Part No. 269 _____
 Part No. 270 _____
 Part No. 271 _____
 Part No. 272 _____
 Part No. 273 _____
 Part No. 274 _____
 Part No. 275 _____
 Part No. 276 _____
 Part No. 277 _____
 Part No. 278 _____
 Part No. 279 _____
 Part No. 280 _____
 Part No. 281 _____
 Part No. 282 _____
 Part No. 283 _____
 Part No. 284 _____
 Part No. 285 _____
 Part No. 286 _____
 Part No. 287 _____
 Part No. 288 _____
 Part No. 289 _____
 Part No. 290 _____
 Part No. 291 _____
 Part No. 292 _____
 Part No. 293 _____
 Part No. 294 _____
 Part No. 295 _____
 Part No. 296 _____
 Part No. 297 _____
 Part No. 298 _____
 Part No. 299 _____
 Part No. 300 _____

- A. Throttle Grip
- B. Grip Pin
- C. Throttle Cable
- D. Adjuster Cable
- E. Locknut
- F. Adjusting Nut
- G. Throttle Cable

18-10 SUPPLEMENT — 1986 MODEL

Specifications

The following specifications are only those that are unique to the ZX900-A3 model. For all other data refer to the front part of this manual (up to 17-10).

Carburetor Specifications

Make/Type	CVK34
Main Jet	132, (U) 135
Main Air Jet	100
Jet Needle	N27B, (U) N27A
Pilot Jet	35
Pilot Air Jet	160
Pilot Screw	2½ turns out, (U) —
Starter Jet	42
Fuel Level	-0.5 mm
Float Height	17.0 mm

(U) US model

Throttle Grip and Cable

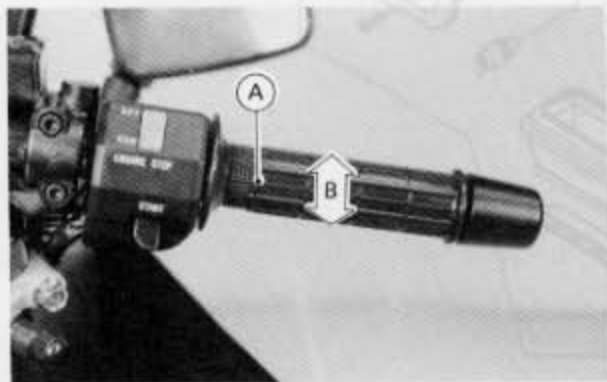
If the throttle grip has excessive free play due to cable stretch or misadjustment, there will be a delay in throttle response. Also, the throttle valves may not open fully at full throttle. On the other hand, if the throttle grip has no play, the throttle will be hard to control, and the idle speed will be erratic. Check the throttle grip play periodically in accordance with the Periodic Maintenance Chart, and adjust the play if necessary.

Throttle Grip Play Inspection

- Check throttle grip free play by lightly turning the throttle grip back and forth.

Throttle Grip Free Play

2 – 3 mm



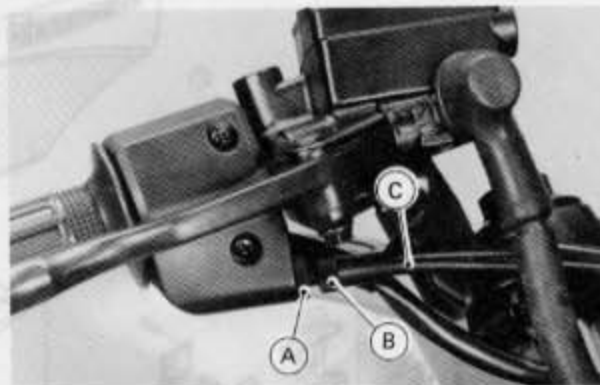
A. Throttle Grip

B. Free Play

- If the throttle grip free play is incorrect, adjust the throttle cables.

Throttle Cable Adjustment

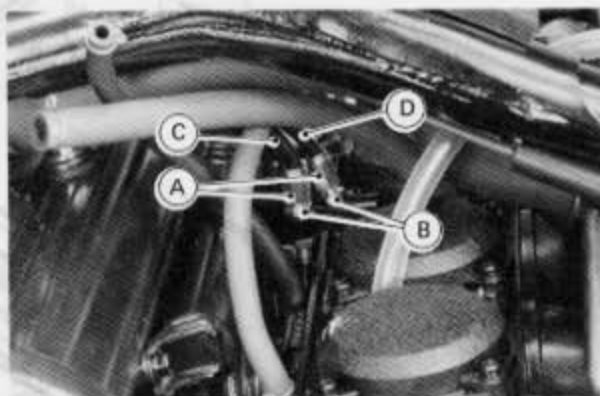
- Loosen the locknut at the upper end of the accelerator cable, and turn the adjuster until the proper amount of throttle grip play is obtained.



A. Locknut
B. Adjuster

C. Accelerator Cable

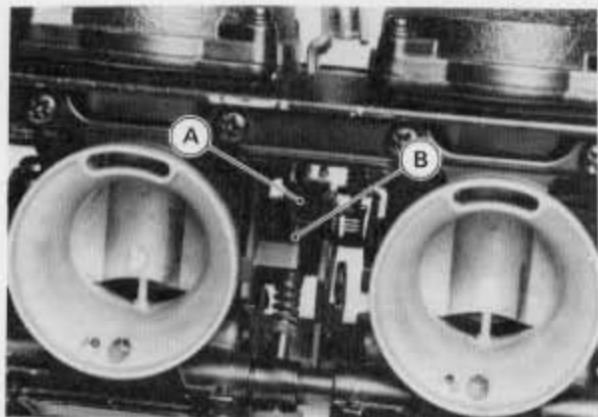
- Tighten the locknut.
- If the throttle cables can not be adjusted by using the cable adjuster at the upper end of the accelerator cable, use the cable adjusting nuts at the lower ends of the throttle cables.
- Remove the fuel tank.
- Loosen the locknuts, and screw both throttle cable adjusting nuts in fully at the lower ends of the throttle cables to give the throttle grip plenty of play.
- With the throttle grip completely closed, turn out the decelerator cable adjusting nut until the inner cable just becomes tight.
- Tighten the locknut.



A. Adjusting Nuts
B. Locknuts

C. Decelerator Cable
D. Accelerator Cable

- Turn the accelerator cable adjusting nut until the correct throttle grip free play is obtained.
- Tighten the locknut.
- Check that the throttle linkage lever stops against the idle adjusting screw with the throttle grip closed.

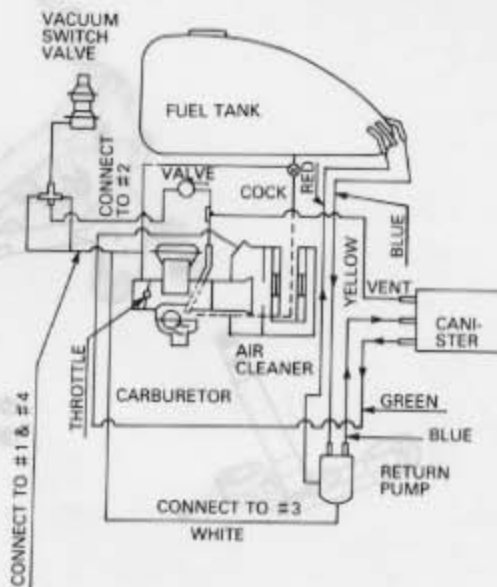


A. Linkage Lever B. Idle Adjusting Screw

**Evaporative Emission Control System
(US California Vehicle only)**

The Evaporative Emission Control System is almost the same as for the ZX900-A2. Refer to the following hose routing diagram.

Vacuum Hose Routing Diagram



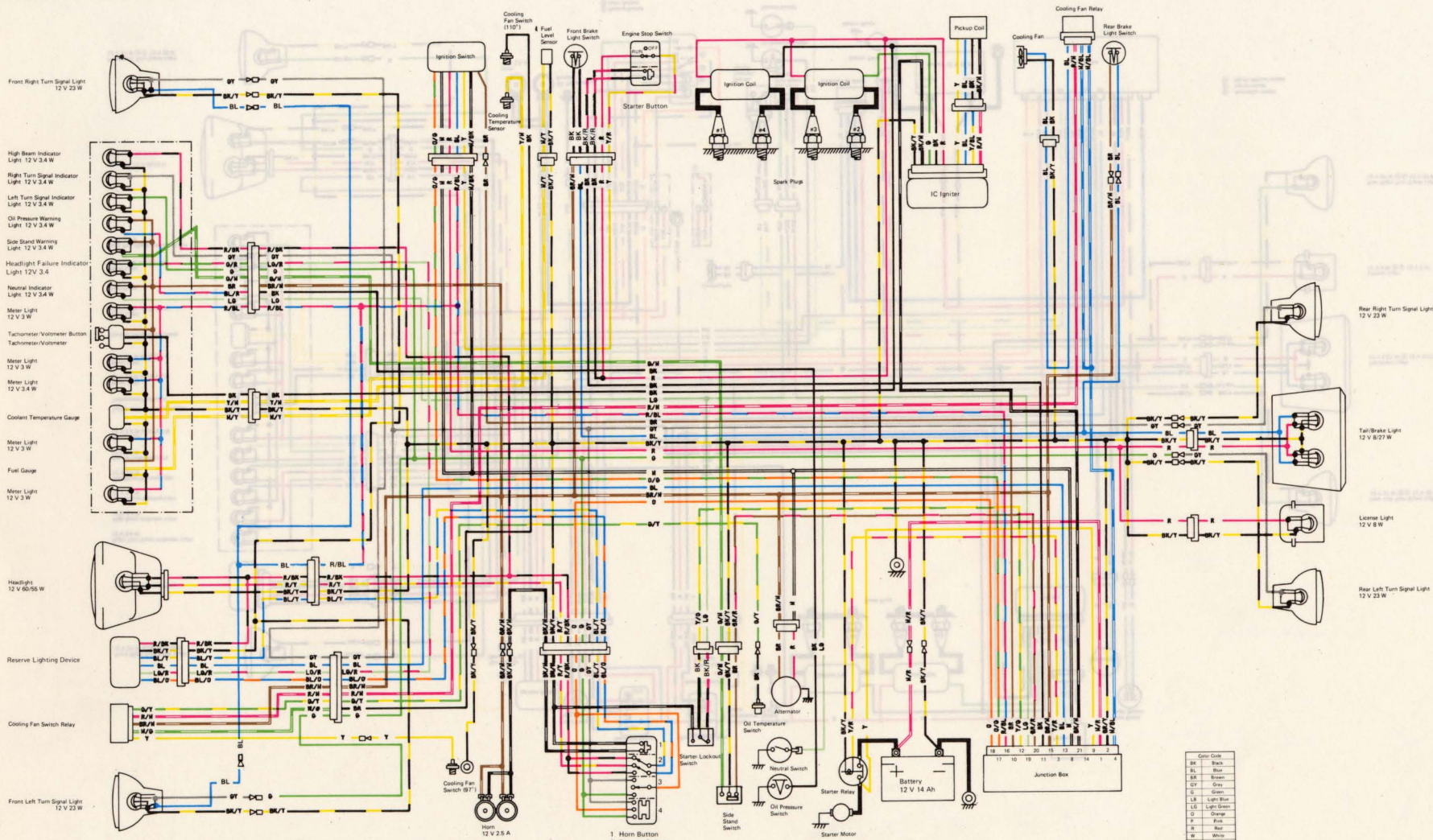
Wheels/Tires

Specifications

The following specifications are only those that are unique to the ZX900-A3 model. For all other data refer to the front part of this manual (up to 17-10).

Item		Standard	
Standard tire	US and Canadian Model	Front	120/80V16 TUBELESS DUNLOP F17
		Rear	130/80V18 TUBELESS DUNLOP K727
	Other than US and Canadian Model	Front	120/80V16-V250 TUBELESS DUNLOP F17, or METZELER ME33 LASER, or AVON SUPER VENOM AM17
		Rear	130/80V18-V250 TUBELESS DUNLOP K727, or METZELER PERFECT ME99A, or AVON SUPER VENOM AM18

ZX900-A3 Wiring Diagram (US and Canada)



LEFT HANDLEBAR SWITCH CONNECTIONS

Starter Lockout Switch	Horn Button	Dimmer Switch	Turn Signal Switch	Hazard Switch
Color: BK/Y, LG, LD	Color: BK/Y, BK/R	Color: BK, BK/L, BK/Y, BK/D	Color: GY, O, G	Color: GY, O, G
Released: ON	ON	ON	ON	ON
Pushed in: ON	ON	ON	ON	ON

IGNITION SWITCH CONNECTIONS

Ignition	Battery	Ignition	Tail 1	Tail 2	Battery	Tail 3
Color: BR, W, Y	Color: BK, Y, BK/Y, BK/D	Color: GY, O, G	Color: BL, R, W/BK	Color: BK, BK/L, BK/Y, BK/D	Color: GY, O, G	Color: GY, O, G
OFF, LOCK	ON	ON	ON	ON	ON	ON
PPARKI	L	L	L	L	L	L

RIGHT HANDLEBAR SWITCH CONNECTIONS

Engine Stop Switch	Starter Button
Color: Y/R, R	Color: BK, BK
OFF	PUSH
RUN	PUSH

Color Code

BK	Black
BL	Blue
BR	Brown
C	Green
D	Orange
LD	Light Blue
LG	Light Green
O	Orange
R	Red
W	White
Y	Yellow

Supplement-1987 Model

In this "Supplement – 1987 Model" chapter described only the additional special tools for 1987 ZX900-A4 motorcycle. See the text in front of this chapter for the maintenance and repair service operations.

Special Tools 19-2



Bearing Remover Shaft: 27001-1343



Bearing Remover Head: 27001-1342



NOTE

The following tools are interchangeable with those on the main text.

Part Number	Old Part No.	Interchangeability	New Part No.
Electroster	2717D-980	←	(Old Text)
Clutch Holder	27001-302	↔	27001-1344

The electroster 2717D-980 is no more part of the motorcycle. It is to be replaced with the newly designed one.



Clutch Holder: 27001-1343



Pressure Cable Lubricator: K0501B-051



Pin Screw Adjuster "A": 27001-1338



19-2 SUPPLEMENT – 1987 MODEL

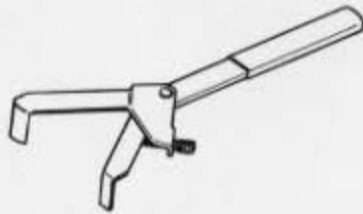
Special Tools

The following special tools are newly available for the ZX900A.

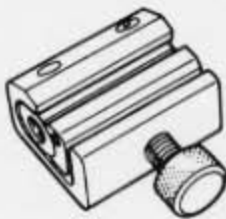
Coil Tester: 57001-1242



Clutch Holder: 57001-1243



Pressure Cable Luber: K56019-021



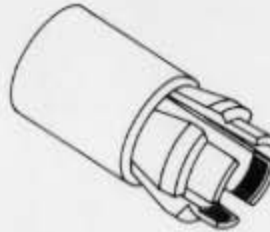
Pilot Screw Adjuster "A": 57001-1239



Fork Outer Tube Weight: 57001-1218



Fork Oil Seal Driver: 57001-1219



Bearing Remover Shaft: 57001-1265



Bearing Remover Head: 57001-1267



NOTE

○The following tools are interchangeable with those on the market.

Part Number	Old Part No.	Interchangeability	New Part No.
Clutch Holder	57001-305	← ⊕ →	57001-1243
Electrotester	57770-980	→	57001-1242 (Coil Tester)

⊕ : Replaceable

○The electrotester (P/N 57001-980) is no more marketed for it is to be replaced with the newly designed coil tester.

Supplement-1988-1989 Models

General Specifications

This "Supplement — 1988 and 1989 Models" chapter is designed to be used in conjunction with the front part of this manual (up to 19-2). The maintenance and repair procedures described in this chapter are only those that are unique to the 1988 ZX900-A5/A5A and 1989 ZX900-A6 motorcycles. Most service operations for these models remain identical to those described in front of this chapter. Complete and proper servicing of the 1988 ZX900-A5/A5A and 1989 ZX900-A6 motorcycles, therefore requires mechanics to read both this chapter and the text in front of this chapter.

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General Specifications	20-2
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Specifications	20-7
Engine Top End	20-8
Clean Air System (Swiss model)	20-8
Wheels/Tires	20-8
Specifications	20-8

General Information

General Specifications

Items	ZX900-A5/A5A, A6
Dimensions:	
Overall length	2,200 mm, (C) (SA) (U) 2,150 mm
Overall width	750 mm
Overall height	1,215 mm
Wheelbase	1,495 mm, (A) 1,500 mm
Road clearance	140 mm
Seat height	780 mm
Dry weight	2,240 N (228 kg), (Cal) 2,240 N (228.5 kg)
Curb weight: Front	1,210 N (123 kg), (Cal) 1,210 N (123.5 kg)
Rear	1,240 N (126 kg)
Fuel tank capacity	22.0 L
Performance:	
Braking distance	12.5 m from 50 km/h
Minimum turning radius	2.7 m
Engine:	
Type	4-stroke, DOHC, 4-cylinder
Cooling system	Liquid-cooled
Bore and stroke	72.5 x 55.0 mm
Displacement	908 mL
Compression ratio	11.0
Maximum horsepower	Max. 84.6 kW (115 PS) @9,500 r/min (rpm), (Ari) (C) (U) 80.9 kW (110 PS) @9,500 r/min (rpm), (F) 55.2 kW (—) @9,500 r/min (rpm), (UTAC's norms), (S) 50.7 kW (69 PS) @6,000 r/min (rpm) (Swe) (WG) 73.6 kW (100 PS) @9,500 r/min (rpm) (A) 77.2 kW (105 PS) @9,200 r/min (rpm)
Maximum torque	85.3 N-m (8.7 kg-m, 62.9 ft-lb) @8,500 r/min (rpm), (F) —, (S) 85.3 N-m (8.7 kg-m, 62.9 ft-lb) @5,000 r/min (rpm), (Swe) (WG) 78.5 N-m (8.0 kg-m, 57.8 ft-lb) @8,500 r/min (rpm) (DIN) (A) 82.4 N-m (8.4 kg-m, 60.8 ft-lb) @8,800 r/min (rpm)
Carburetion system	Carburetors, Keihin CVK34 x 4 (A) CVK32 x 4
Starting system	Electric starter
Ignition system	Battery and coil (transistorized)

Items	ZX900-A5/A5A, A6
Timing advance Ignition timing	Electronically advanced From 10° BTDC @1,000 r/min (rpm) to 35° BTDC @3,500 r/min (rpm)
Spark plug	Ⓢ From 10° BTDC @1,200 r/min (rpm) to 35° BTDC @3,500 r/min (rpm) NGK DR8ES or ND X27ESR-U Ⓒ NGK DR8ES-L or ND X24ESR-U Ⓐ ⓈⒶ Ⓡ NGK D9EA or ND X27ES-U Ⓡ NGK D8EA or ND X24ES-U
Cylinder numbering method	Left to right, 1-2-3-4
Firing order	1-2-4-3
Valve timing: Inlet Open Close Duration Exhaust Open Close Duration	45° BTDC 65° ABDC 290° 65° BBDC 45° ATDC 290°
Lubrication system	Forced lubrication (wet sump with cooler)
Engine oil: Grade Viscosity Capacity	SE or SF class SAE 10W40, 10W50, 20W40, or 20W50 4.0 L
Drive Train:	
Primary reduction system:	
Type Reduction ratio	Gear 1.732 (97/56)
Clutch type	Wet multi disc
Transmission: Type	6-speed, constant mesh, return shift
Gear ratios: 1st 2nd 3rd 4th 5th 6th	2.800 (42/15) 2.000 (38/19) 1.590 (35/22) 1.333 (32/24) 1.153 (30/26) 1.035 (29/28)
Final Drive system: Type Reduction ratio	Chain drive 2.882 (49/17), Ⓐ 2.823 (48/17), Ⓒ Ⓡ 2.941 (50/17)
Overall drive ratio	5.170, Ⓐ 5.065, Ⓒ Ⓡ 5.276 @Top gear
Frame:	
Type Caster (rake angle) Trail	Tubular, diamond 29° 114 mm

20-4 SUPPLEMENT — 1988 - 1989 MODELS

Item		ZX900-A5/A5A, A6
Front tire:	Type	Tubeless
	Size	120/80V16
Rear tire:	Type	Tubeless
	Size	130/80V18
Front suspension:	Type	Telescopic fork (pneumatic)
	Wheel travel	140 mm
Rear suspension:	Type	Swing arm (uni-trak)
	Wheel travel	115 mm
Brake type:	Front	Dual disc
	Rear	Single disc
Electrical Equipment:		
Battery		12 V 14 Ah
Headlight:	Type	Semi-sealed beam
	Bulb	12 V 60/55 W (quartz-halogen)
Tail/brake light		12 V 5/21 W x 2, (C) (SA) (U) 12 V 8/27 W x 2
Alternator:	Type	Three-phase AC
	Rated output	25 A @6,000 r/min (rpm), 14 V
Voltage regulator:	Type	Short-circuit

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

- (Ari) : Austrian Model
- (A) : Australian Model
- (C) : Canadian Model
- (Cal) : California Model
- (F) : French Model
- (I) : Italian Model
- (S) : Swiss Model
- (SA) : South African Model
- (Swe) : Swedish Model
- (U) : US Model
- (WG) : West German Model

20-6 SUPPLEMENT — 1988 · 1989 MODELS

OPERATION	FREQUENCY	*ODOMETER READING							See Page
		800 km	5,000 km	10,000 km	15,000 km	20,000 km	25,000 km	30,000 km	
Anti-dive brake plunger parts: rubber cap, O-ring, seal ring — replace	2 years								12-10
Brake master cylinder cup and dust seal — replace	2 years								11-9
Caliper piston seal and dust seal — replace	2 years								11-6
Brake light switch — check †		•	•	•	•	•	•	•	16-34
Steering — check †		•	•	•	•	•	•	•	13-4
Steering stem bearing — lubricate	2 years					•			13-6
Front fork oil — change							•		12-5
Tire wear — check †			•	•	•	•	•	•	9-9
Swing arm pivot, uni-trak linkage — lubricate				•				•	12-14
Battery electrolyte level — check †	month	•	•	•	•	•	•	•	16-9
General lubrication — perform			•	•	•	•	•	•	17-8
Nut, bolt, and fastener tightness -- check †		•		•		•		•	17-8

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

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

(Cal) : California vehicle only

(US) : US only

(S) : Swiss model

11-14	4 years								Brake hose and pipe — replace
11-12	2 years								Brake fluid — change
11-11	month	•	•	•	•	•	•	•	Brake fluid level — check †
11-7		•	•	•	•	•	•	•	Brake lining wear — check †
10-4									Drive chain slack — check †
10-8	800 km								Drive chain — lubricate
10-8	300 km								Drive chain wear — check †
8-8	2 years								Clutch slave cylinder piston seal — replace
8-7	2 years								Clutch master cylinder cup and dust seal — replace
8-7	4 years								Clutch hose and pipe — replace
8-8	2 years								Clutch fluid — change
8-8	month	•	•	•	•	•	•	•	Clutch fluid level — check †
8-8	4 years								Fuel hose — replace
3-10	year								Radiator hose, connections — check †
8-8	year								Oil filter — replace
8-8	year								Engine oil — change
									— check †
									Evaporative emission control system (Cal)
									Coolant — change
									Cylinder head (Cal)
									Fuel system — check †
									Engine vacuum synchronization — check †

Fuel System

Specifications

The following specifications are only those that are unique to the ZX900-A5/A5A, A6 model. For all other data refer to the front part of this manual (up to 19-2).

Carburetor Specifications

	ZX900-A5/A5A	A6
Make/Type	CVK34 @ CVK32	←
Main Jet	132, @ 95, (W) 135	←
Main Air Jet	100	←
Jet Needle	N27B, @ N27C, (W) N60F	←
Pilot Jet	35	←
Pilot Air Jet	160, @ 130	←
Pilot Screw	2½ turns out, @ 2, (W) 2¼	←
Starter Jet	42, @ 45	←
Fuel Level	-0.5 mm	←
Float Height	17.0 mm	←

(A) : Australian Model

(WG) : West German Model

(W) : Swiss Model

Idle Speed

Standard: 1 000 ±50 r/min (rpm)
 (W) 1 200 ±50 r/min (rpm)

(W) : Swiss Model

Item	Front	Rear
Standard tire		

Engine Top End

Clean Air System (Swiss Model)

•The clean air system for the Swiss model is the same as for the US model. Refer to the Clean Air System (US model), page 4-7.

Wheels/Tires

Specifications

The following specifications are only those that are unique to the ZX900-A5/A5A, A6 model. For all other data refer to the front part of this manual (up to 19-2).

Item	Standard	
Standard tire	Front	120/80V16 TUBELESS DUNLOP F17, METZELER ME33 LASER, or AVON SUPER VENOM AM17
	Rear	130/80V18 TUBELESS DUNLOP K727, METZELER PERFECT ME99A, or AVON SUPER VENOM AM18

Item	Standard	Swiss Model
Front height	110 mm	110 mm
Front fender	-0.2 mm	-0.2 mm
Seat height	43 @ 43	43 @ 43
Pilot screw	2/9 turn out @ 2 @ 2/9	2/9 turn out @ 2 @ 2/9
Pilot Air jet	100 @ 100	100 @ 100
Pilot jet	32	32
Jet needle	KT2L @ H2TC @ H2TC	KT2L @ H2TC @ H2TC
Main Air jet	100	100
Main jet	107 @ 107 @ 107	107 @ 107 @ 107
Jet type	CVK3 @ CVK3	CVK3 @ CVK3

Supplement - 1990 Model

This "Supplement - 1990 Model" chapter is designed to be used in conjunction with the front part of this manual (up to P. 20-8). The maintenance and repair procedures described in this chapter are only those that are unique to the 1990 ZX900-A7 motorcycle. Most service operations for these models remain identical to those described in front of this chapter.

Complete and proper servicing of the 1990 ZX900-A7 motorcycle, therefore requires mechanics to read both this chapter and the text in front of this chapter.

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21-2 SUPPLEMENT - 1990 MODEL

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

▲WARNING

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

▲CAUTION

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

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21-18	Pad Installation	21-7	Camshaft Chain Tension
21-18	Lining Wear	21-7	Camshaft Chain Tension Removal
21-17	Inspection	21-7	Camshaft Chain Tension Installation
21-17	Exploded View	21-8	Engine Lubrication System
21-18	Specifications	21-5	Oil Pan
21-18	Special Tools	21-8	Oil Pan Installation
21-18	Front Fork	21-8	Camshaft/Tension
21-18	Fork Oil Change	21-8	Exploded View (200 Last Model)
21-18	Front Fork Removal (rear fork leg)	21-10	Camshaft Timing (200 Last Model)
21-20	Front Fork Installation (rear fork leg)	21-10	Crankcase Assembly
21-20	Front Fork Assembly	21-11	Washer/Tier
21-21	Front Fork Assembly	21-11	Exploded View
21-21	Lower Tube Inspection	21-12	Specifications
21-21	Oil Seal and Dust Seal Inspection	21-12	Tire
21-21	Spring Tension	21-12	Tire Installation
21-22	Control	21-12	Final Drive
21-22	Exploded View	21-12	Exploded View
21-22	Electrical System	21-12	Blower
21-22	2000-A7 Wiring Diagram	21-12	Exploded View

General Information

General Specifications

Item	ZX900-A7
Dimensions:	
Overall length	2 220 mm, (SA) 2 170 mm
Overall width	730 mm
Overall height	1 220 mm
Wheelbase	1 500 mm
Road clearance	140 mm
Seat height	790 mm
Dry weight	234 kg
Curb weight: Front	125 kg
Rear	130 kg
Fuel tank capacity	22.0 L
Performance:	
Minimum turning radius	2.7 m
Engine:	
Type	4-stroke, DOHC, 4-cylinder
Cooling system	Liquid-cooled
Bore and stroke	72.5 x 55.0 mm
Displacement	908 mL
Compression ratio	11.0
Maximum horsepower	79.4 kW (108 PS) @9 500 r/min (rpm), (SW) 65.5 kW (89 PS) @9 500 r/min (rpm), (W) 73.6 kW (100 PS) @9 500 r/min (rpm) (DIN)
Maximum torque	83.4 N-m (8.5 kg-m, 61.5 ft-lb) @8 500 r/min (rpm), (SW) 71.6 N-m (7.3 kg-m, 52.8 ft-lb) @6 500 r/min (rpm), (W) 78.5 N-m, (8.0 kg-m, 57.8 ft-lb) @8 500 r/min (rpm) (DIN)
Carburetion system	Carburetors, Keihin CVK34 x 4
Starting system	Electric starter
Ignition system	Battery and coil (transistorized)
Timing advance	Electronically advanced
Ignition timing	From 10° BTDC @1 000 r/min (rpm) to 35° BTDC @3 500 r/min (rpm)
Spark plug	NGK DR8ES or ND X27ESR-U
Cylinder numbering method	Left to right, 1-2-3-4
Firing order	1-2-4-3
Valve timing: Inlet: Open	45° BTDC
Close	65° ABDC
Duration	290°
Exhaust: Open	65° BBDC
Close	45° ATDC
Duration	290°
Lubrication system	Forced lubrication (wet sump with cooler)
Engine oil: Grade	SE or SF class
Viscosity	SAE10W-40, 10W-50, 20W-40, or 20W-50
Capacity	4.0 L

21-4 SUPPLEMENT - 1990 MODEL

Item	ZX900-A7
Drive Train:	
Primary reduction system:	
Type	Gear
Reduction ratio	1.732 (97/56)
Clutch type	Wet multi disc
Transmission:	6-speed, constant mesh, return shift
Type	
Gear ratios:	1st 2.800 (42/15)
	2nd 2.000 (38/19)
	3rd 1.590 (35/22)
	4th 1.333 (32/24)
	5th 1.153 (30/26)
	6th 1.035 (29/28)
Final drive system:	Chain drive
Type	
Reduction ratio	2.823 (48/17)
Overall drive ratio	5.065 @Top gear
Frame:	
Type	Tubular, diamond
Caster (rake angle)	29°
Trail	118 mm
Front tire:	Type Tubeless
Type	
Size	120/70V17-V250 or 120/70ZR17, (SA)(W) ---
Rear tire:	Type Tubeless
Type	
Size	150/70V18-V250 or 150/70ZR18, (SA)(W) ---
Front suspension:	Type Telescopic fork
Type	
Wheel travel	140 mm
Rear suspension:	Type Swing arm (uni-trak)
Type	
Wheel travel	115 mm
Brake type:	Front Dual disc
Front	
Rear	Single disc
Electrical Equipment:	
Battery	12 V 14 Ah
Headlight:	Type Semi-sealed beam
Type	
Bulb	12 V 60/55 W (quartz-halogen)
Tail/brake light	12 V 5/21 W x 2, (SA) 12 V 8/27 W x 2
Alternator:	Type Three-phase AC
Type	
Rated output	25 A @6 000 r/min (rpm), 14 V

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

- (SA) : South Africa Model
 (SW) : Sweden Model
 (W) : West Germany Model

21-6 SUPPLEMENT - 1990 MODEL

OPERATION	FREQUENCY	Whichever comes first →						See Page	
		100METER READING							
	Every	800km	5000km	10000km	15000km	20000km	25000km	30000km	
Caliper piston seal and dust seal -- replace	2 years								11-6
Brake light switch -- check*		●	●	●	●	●	●	●	16-34
Steering -- check*		●	●	●	●	●	●	●	13-4
Steering stem bearing -- lubricate	2 years					●			13-6
Front fork oil -- change							●		21-19
Tire wear -- check*			●	●	●	●	●	●	9-9
Swing arm pivot, uni-trak linkage -- lubricate				●	●	●	●		12-14
Battery electrolyte level -- check*	month	●	●	●	●	●	●	●	16-9
General lubrication -- perform			●	●	●	●	●	●	17-8
Nut, bolt, and fastener tightness -- check*		●	●		●		●		17-8

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

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

11-8	●									Brake master cylinder cup and dust seal -- replace
11-14									4 years	Brake hose -- replace
11-12									2 years	Brake fluid -- change
11-11	●	●	●	●	●	●	●	●	month	Brake fluid level -- check*
11-10	●	●	●	●	●	●	●	●	5 years	Brake lining wear -- check*
10-4									500 mi	Drive chain slack -- check*
10-2									500 mi	Drive chain -- lubricate
9-8	●	●	●	●	●	●	●	●	5 years	Drive clutch wear -- check*
8-9									5 years	Clutch slave cylinder piston seal -- replace
8-7									5 years	Clutch master cylinder cup and dust seal -- replace
8-7									4 years	Clutch hose and pipe -- replace
8-6									5 years	Clutch fluid -- change
8-5	●	●	●	●	●	●	●	●	month	Clutch fluid level -- check*
8-4									4 years	Fuel hose -- replace
8-4	●								5 years	Coolant -- change
8-10	●	●	●	●	●	●	●	●	year	Radiator hoses, converters -- check*
8-8	●	●	●	●	●	●	●	●	year	Oil filter -- replace
8-6	●	●	●	●	●	●	●	●	year	Engine oil -- change
8-3	●	●	●	●	●	●	●	●		Cylinder head bolt tightness -- check*
7-8	●	●	●	●	●	●	●	●		Fuel system -- check*

Fuel System

Specifications

Refer to the front part of this manual, noting the following.

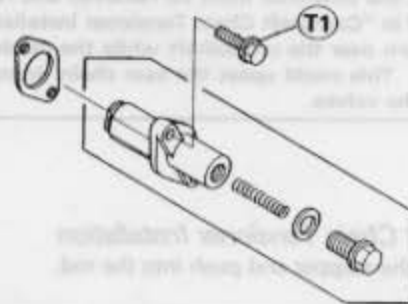
Carburetor Specifications

Make/Type	Keihin/CVK34
Main Jet	#100
Main Air Jet	#100
Jet Needle	N671
Pilot Jet	#35
Pilot Air Jet	#160
Pilot Screw	1 ½ turns out
Starter Jet	#42
Fuel Level	- 0.5 mm
Float Height	17.0 mm

Engine Top End

Exploded View

Refer to the front part of this manual, noting the following.

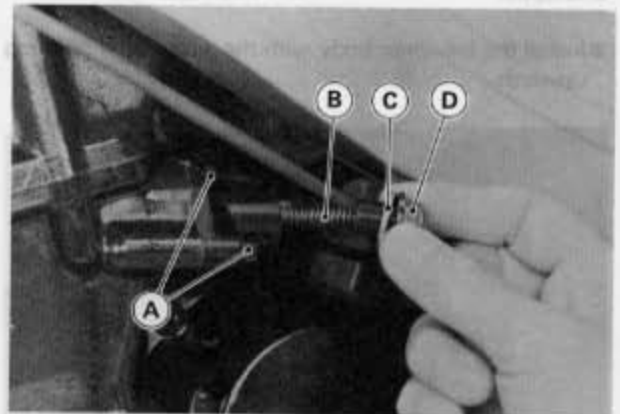


T1 : 9.8 N-m (1.0 kg-m, 87 in-lb)

Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

- Remove the following.
 - Tensioner Cap Bolt
 - Copper Washer
 - Spring
 - Tensioner Mounting Bolts
 - Camshaft Chain Tensioner



A. Mounting Bolts
B. Spring

C. Copper Washer
D. Cap Bolt

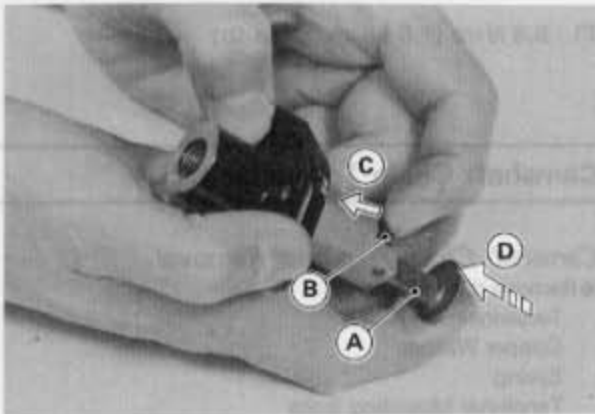
CAUTION

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 "Camshaft 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.

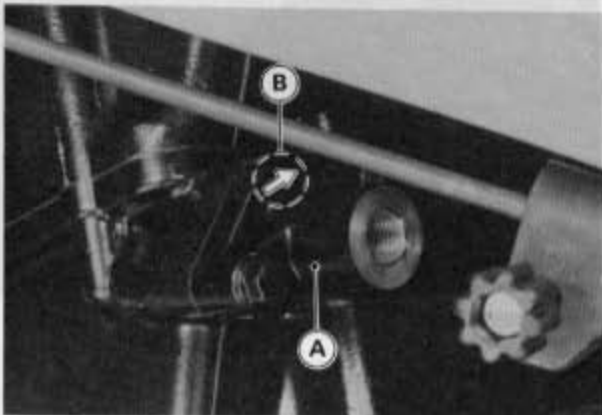
Camshaft Chain Tensioner Installation

- Release the stopper and push into the rod.



- A. Push Rod
- B. Stopper
- C. Push.
- D. Push into the rod.

- Install the tensioner body with the arrow on it pointing upwards.



- A. Tensioner Body
- B. Arrow Mark

- Torque the following (see Exploded View).
Tensioner Mounting Bolts

Engine Lubrication System

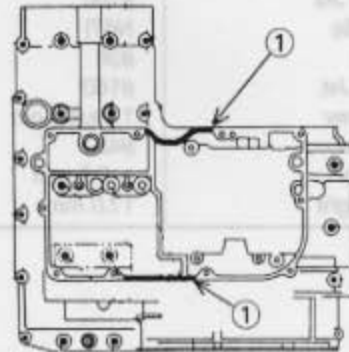
Oil Pan

Oil Pan Installation

Refer to the front part of this manual, noting the following.

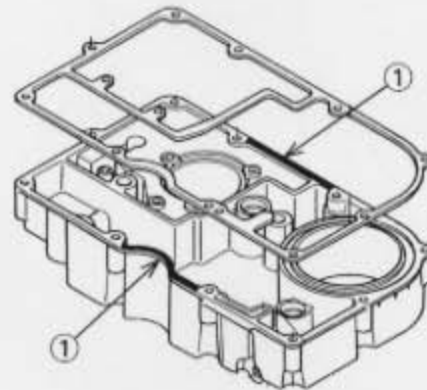
- Apply a silicone sealant to the following.

Crankcase



- 1. Silicone Sealant Applied Area

Oil Pan

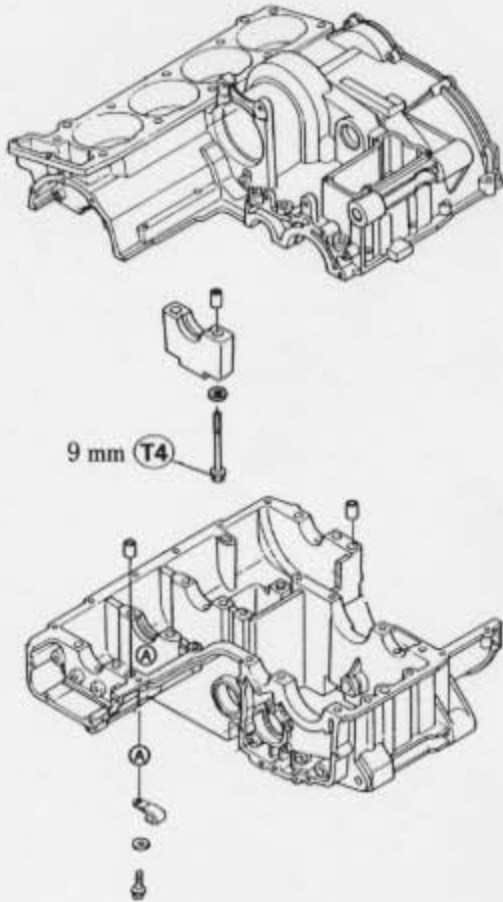


- 1. Silicone Sealant Applied Area

Crankshaft/Transmission

Exploded View ('90 Late Model)

Refer to the front part of this manual, noting the following.



- 1. Washer
- 2. "11" mark on the bolt head.

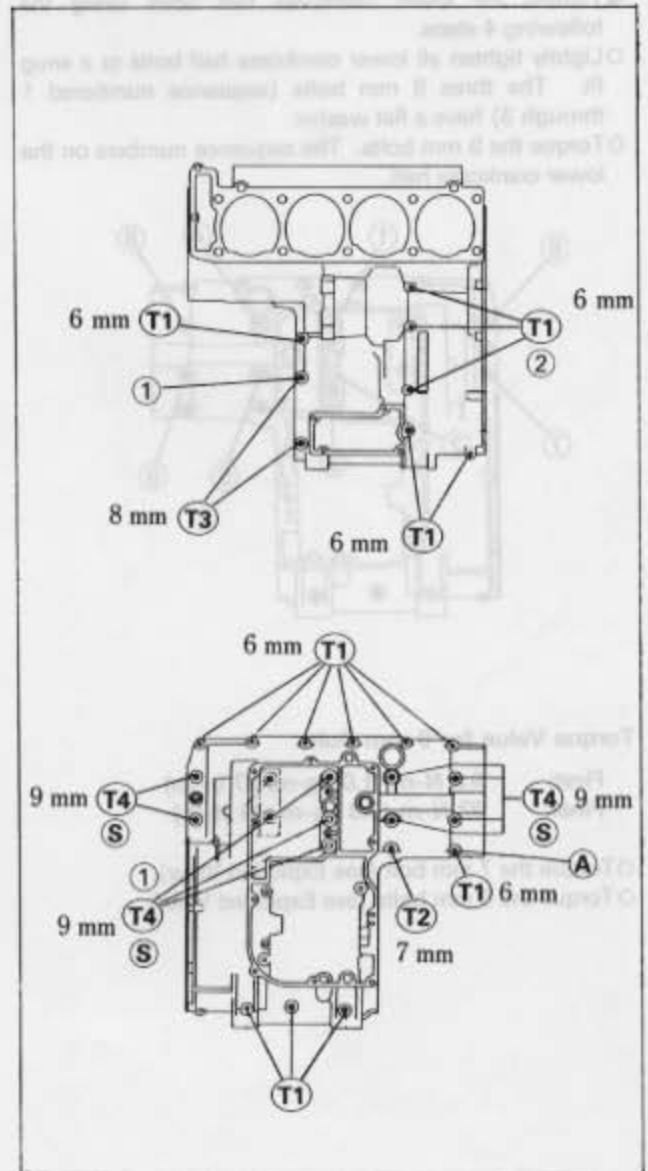
S : Follow the specified tightening sequence.

- T1: 15 N-m (1.5 kg-m, 11.0 ft-lb)
- T2: 18 N-m (1.8 kg-m, 13.0 ft-lb)
- T3: 27 N-m (2.8 kg-m, 20 ft-lb)
- T4: 32 N-m (3.3 kg-m, 24 ft-lb)

NOTE

- The crankcases and crankcase bolts will be modified for larger diameter.
- When using the modified crankcases and crankcase bolts, refer to the following.

Engine No. ZX900AE045786 ~



21-10 SUPPLEMENT - 1990 MODEL

Crankcase Splitting ('90 Late Model)

Crankcase Assembly

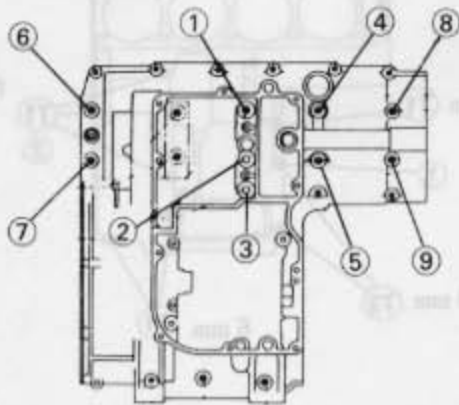
Refer to the front part of this manual, noting the following.

NOTE

- The crankcases and crankcase bolts will be modified for larger diameter.
- When using the modified crankcases and crankcase bolts, refer to the following.

Engine No. ZX900AE056786 ~

- Tighten the lower crankcase half bolts using the following 4 steps.
- Lightly tighten all lower crankcase half bolts to a snug fit. The three 9 mm bolts (sequence numbered 1 through 3) have a flat washer.
- Torque the 9 mm bolts. The sequence numbers on the lower crankcase half.



Torque Value for 9 mm Bolts

First: 9.8 N-m (1.0 kg-m, 87 in-lb)
Final: 32 N-m (3.3 kg-m, 24 ft-lb)

- Torque the 7 mm bolt (see Exploded View).
- Torque the 6 mm bolts (see Exploded View).

Crankcase Transmission

Exploded View ('90 Late Model)

Refer to the front part of this manual, noting the following.



1. Washer
2. 11 mm nut on the bolt head.

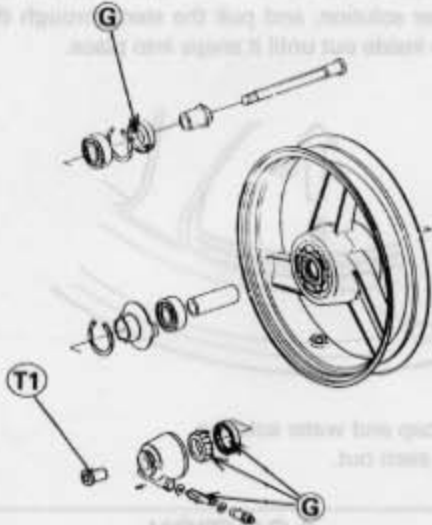
3. Follow the specified tightening sequence.

Torque values for various bolts:
1. 9.8 N-m (1.0 kg-m, 87 in-lb)
2. 9.8 N-m (1.0 kg-m, 87 in-lb)
3. 9.8 N-m (1.0 kg-m, 87 in-lb)
4. 9.8 N-m (1.0 kg-m, 87 in-lb)
5. 9.8 N-m (1.0 kg-m, 87 in-lb)
6. 9.8 N-m (1.0 kg-m, 87 in-lb)
7. 9.8 N-m (1.0 kg-m, 87 in-lb)
8. 9.8 N-m (1.0 kg-m, 87 in-lb)
9. 32 N-m (3.3 kg-m, 24 ft-lb)

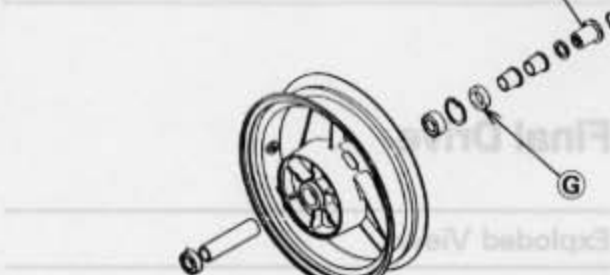
Wheels/Tires

Exploded View

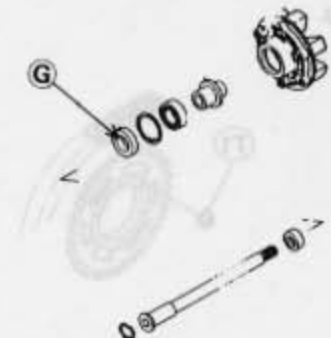
④ Insert a new valve in the tire.
 ⑤ Clean the valve cap, lubricate the stem with a soap
 and water solution, and put the cap through the rim
 from the inside out with a wire and hook.



CAUTION
 Do not angle the air pressure indicator as
 the stem button may be damaged. The
 stem button will be damaged if the
 stem is bent.



Refer to the front part of this manual, noting the
 following:



T1 : 78 N·m (7.8 kg-m, 54 ft-lb)

Refer to the front part of this manual, noting the
 following:

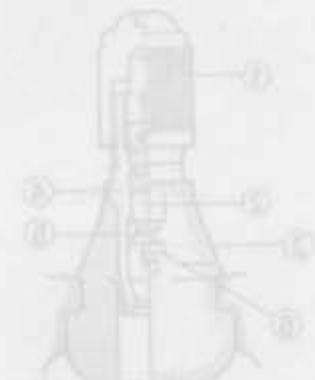
Standard Tire

Front	120/70-13 120/70-13 120/70-13
Rear	120/70-13 120/70-13 120/70-13

The Air Pressure
 Front: Up to 70 psi (500 kPa) (200 psi (1400 kPa))
 Rear: Up to 70 psi (500 kPa) (200 psi (1400 kPa))

Tire

The illustration
 Refer to the front part of this manual, noting the
 following:
 ④ Remove the air valve and check it



G : Apply grease.

T1: 88 N-m (9.0 kg-m, 65 ft-lb)

1. Front View
 2. Rear View
 3. Side View

21-12 SUPPLEMENT - 1990 MODEL

Specifications

Refer to the front part of this manual, noting the following.

Standard Tire

Front	120/70V17-V250 DUNLOP K275F Tubeless or 120/70ZR17 MICHELIN A59X Tubeless (SA)(W) ---
Rear	150/70V18-V250 DUNLOP K275 Tubeless or 150/70ZR18 MICHELIN M59X Tubeless (SA)(W) ---

(SA) : South Africa Model

(W) : West Germany Model

Tire Air Pressure (when cold)

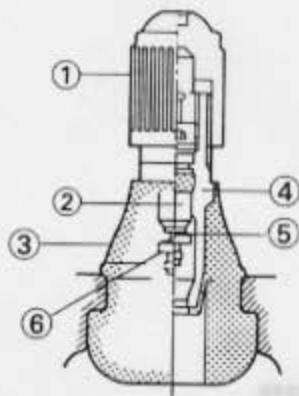
Front	Up to 180 kg (397 lb)	2.5 kg/cm ² (250 kPa, 36 psi)
Rear	Up to 180 kg (397 lb)	2.9 kg/cm ² (290 kPa, 41 psi)

Tires

Tire Installation

Refer to the front part of this manual, noting the following.

- Remove the air valve and discard it.



1. Plastic Cap
2. Valve Core
3. Stem Seal

4. Valve Stem
5. Valve Seat
6. Valve Opened

CAUTION

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

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



1. Apply soap and water solution.
2. Pull the stem out.

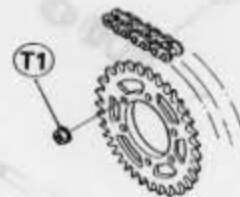
CAUTION

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

Final Drive

Exploded View

Refer to the front part of this manual, noting the following.

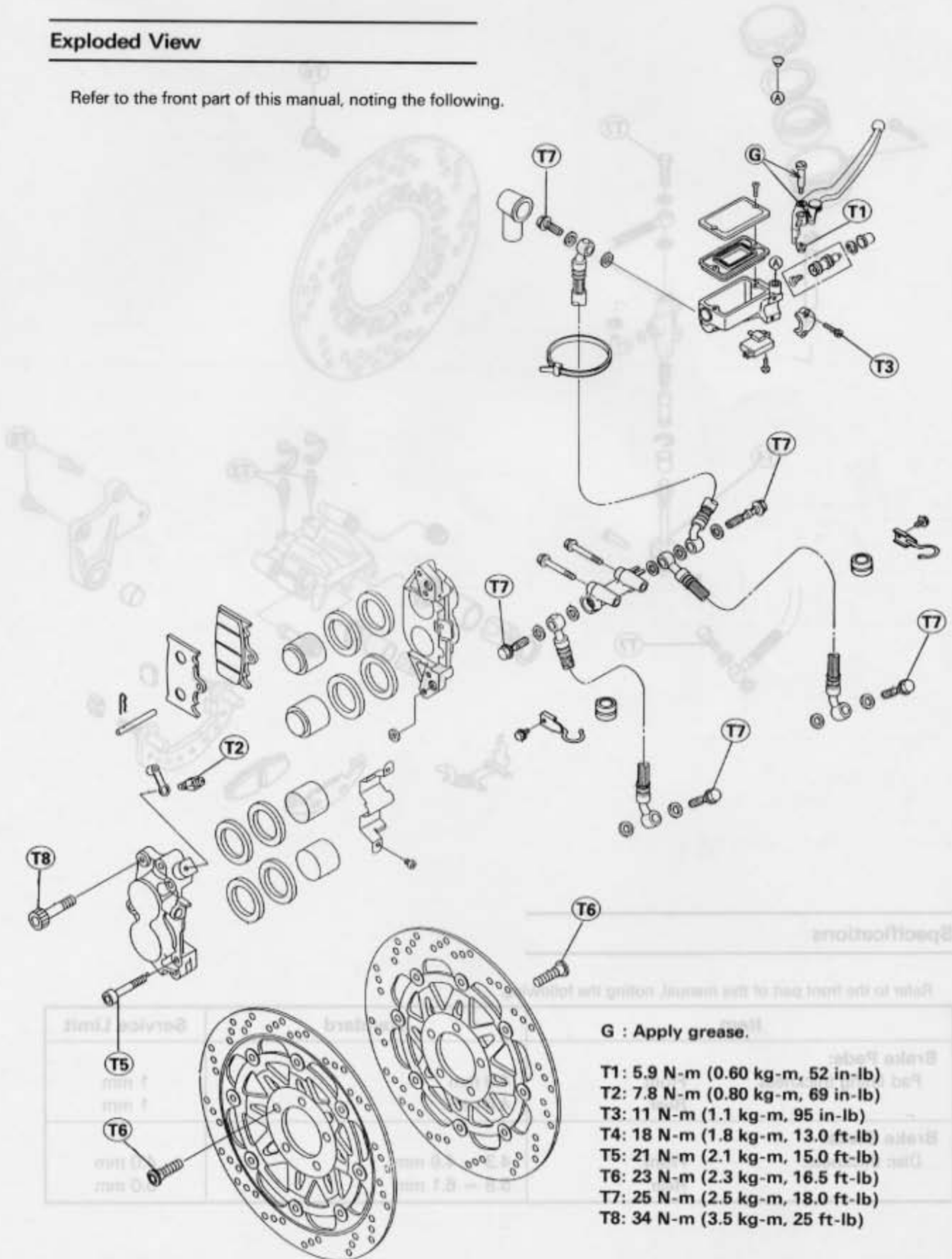


T1 : 74 N·m (7.5 kg·m, 54 ft·lb)

Brakes

Exploded View

Refer to the front part of this manual, noting the following.

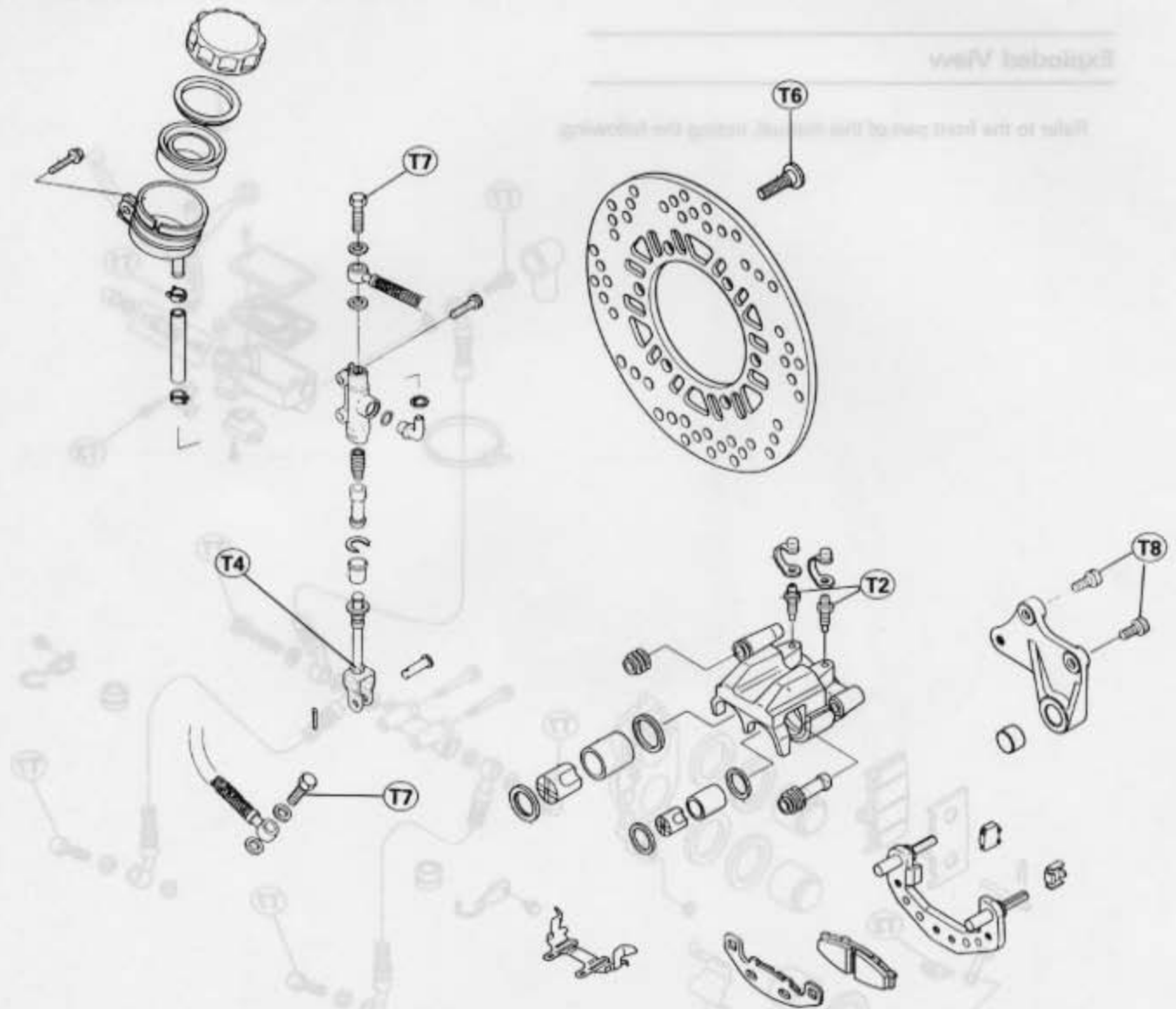


Specifications

G : Apply grease.

- T1: 5.9 N-m (0.60 kg-m, 52 in-lb)
- T2: 7.8 N-m (0.80 kg-m, 69 in-lb)
- T3: 11 N-m (1.1 kg-m, 95 in-lb)
- T4: 18 N-m (1.8 kg-m, 13.0 ft-lb)
- T5: 21 N-m (2.1 kg-m, 15.0 ft-lb)
- T6: 23 N-m (2.3 kg-m, 16.5 ft-lb)
- T7: 25 N-m (2.5 kg-m, 18.0 ft-lb)
- T8: 34 N-m (3.5 kg-m, 25 ft-lb)

Refer to the front part of this manual, noting the following.



Specifications

Refer to the front part of this manual, noting the following.

Item	Standard	Service Limit
Brake Pads:		
Pad lining thickness: Front	4.0 mm	1 mm
Rear	4.5 mm	1 mm
Brake Discs:		
Disc thickness: Front	4.3 ~ 4.6 mm	4.0 mm
Rear	5.8 ~ 6.1 mm	5.0 mm

Calipers

Front Caliper Removal

- Remove the following if the caliper is to be removed from the vehicle completely.
 - Brake Hose Banjo Bolt (at the caliper)

⚠ CAUTION

Immediately wipe up any brake fluid that spills.

- Remove the following.
 - Caliper Mounting Bolts

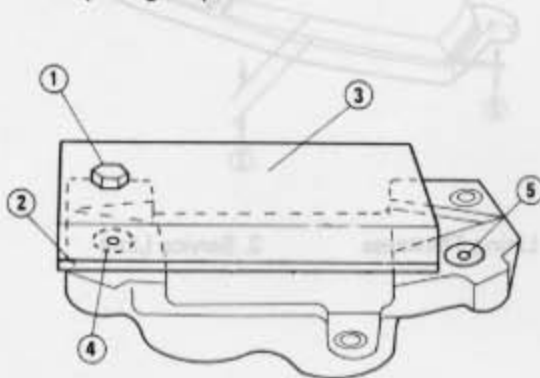
⚠ CAUTION

Do not loosen the caliper bolts. Take out only the caliper mounting bolts for caliper removal. Loosening the caliper bolts will cause brake fluid leakage.

Caliper Disassembly Notes

Refer to the front part of this manual, noting the following.

- To disassemble the front caliper, perform the following.
 - Remove the following.
 - Brake Pads
 - Caliper Bolts
 - Piston Insulators
 - Using compressed air, remove the pistons. One way to remove the pistons is as follows.
 - Install a wooden board more than 10 mm thick and a rubber gasket on the caliper half as shown. Leave one of the oil passages open.



- | | |
|------------------|--|
| 1. Bolt and Nut | 4. Oil Passage sealed by Rubber Gasket |
| 2. Rubber Gasket | 5. Oil Passage |
| 3. Wooden Board | |

- Lightly apply compressed air to the oil passage until the pistons hit the rubber gasket. Block the hose joint opening during this operation if the caliper half has opening.

⚠ 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.

Caliper Assembly Notes

Refer to the front part of this manual, noting the following.

- Torque the following (see Exploded View).
 - Front Caliper Bolts

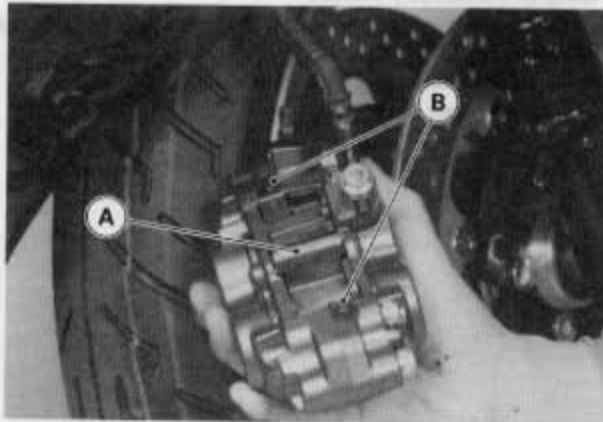


Brake Pads

Pad Removal

Refer to the front part of this manual, noting the following.

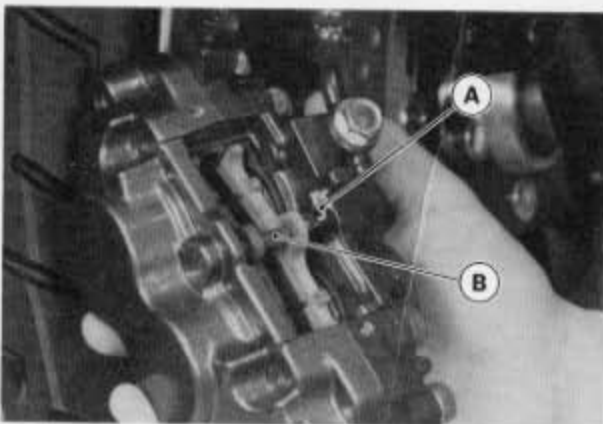
- Remove the following to remove the front caliper pads.
Caliper Mounting Bolts
Pad Spring



A. Pad Spring

B. Screws

- Clip
- Pad Pin
- Pads



A. Clip

B. Pad Pin

Pad Installation Notes

Refer to the front part of this manual, noting the following.

- For the front caliper, the pad pin clip must be "outside" of the pads.

Lining Wear

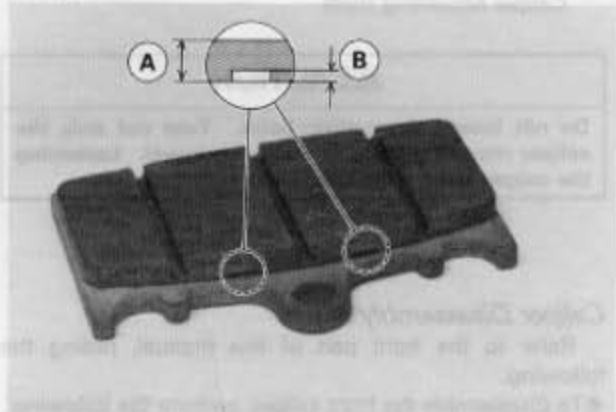
★ If the lining thickness of either pad is less than the service limit, replace both pads in the caliper as a set.

Pad Lining Thickness

Standard:	Front	4.0 mm
	Rear	4.5 mm
Service Limit:	1 mm	



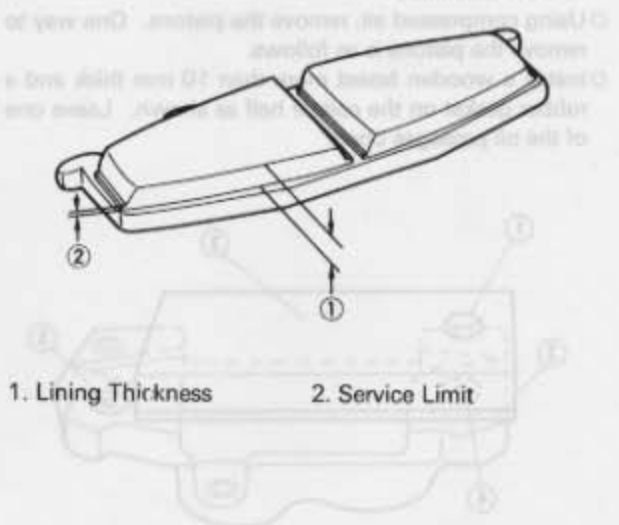
Front:



A. Lining Thickness

B. Service Limit

Rear:



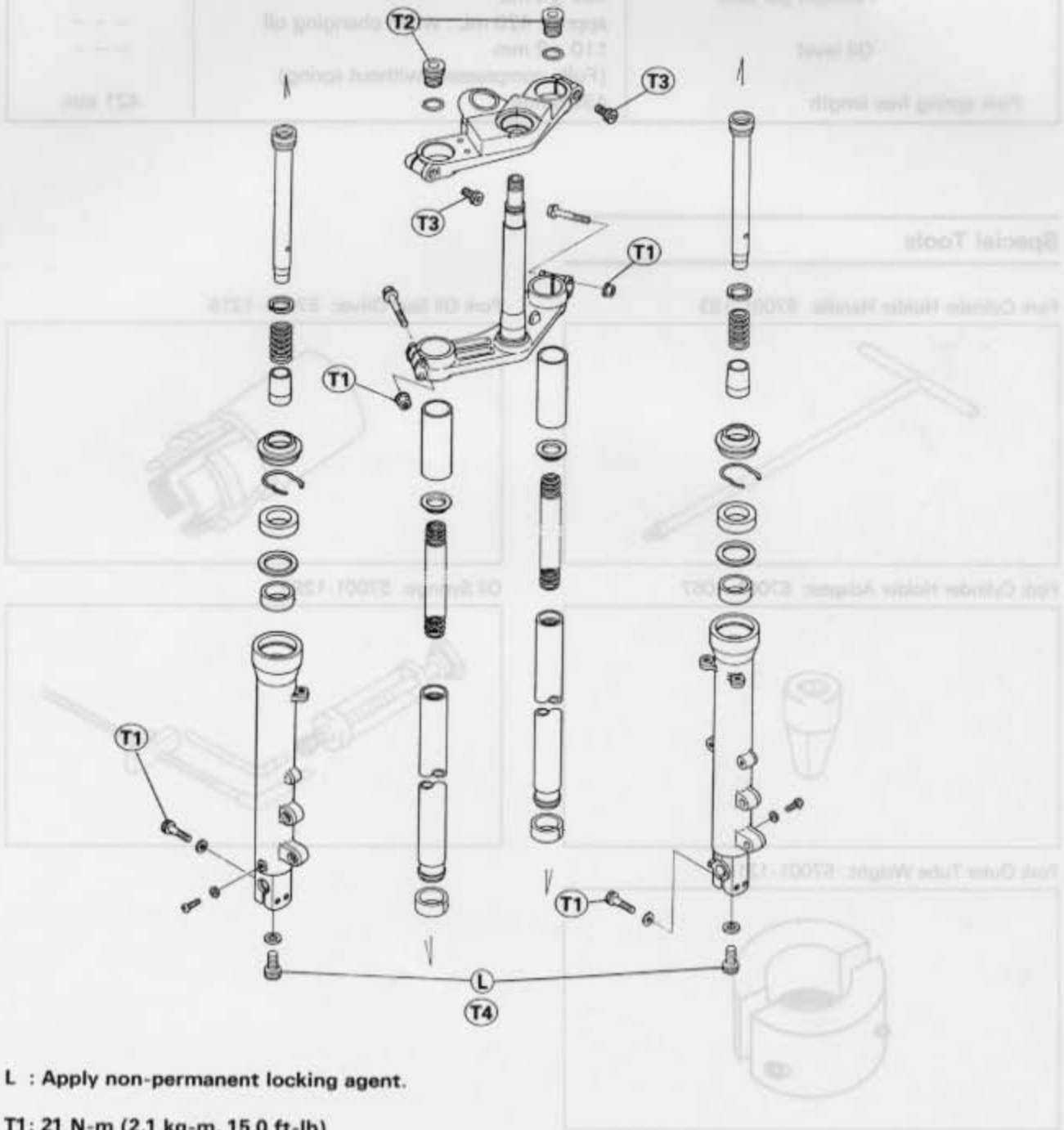
1. Lining Thickness

2. Service Limit

Suspension

Exploded View

Refer to the front part of this manual, noting the following.



L : Apply non-permanent locking agent.

- T1**: 21 N-m (2.1 kg-m, 15.0 ft-lb)
- T2**: 23 N-m (2.3 kg-m, 16.5 ft-lb)
- T3**: 28 N-m (2.9 kg-m, 21 ft-lb)
- T4**: 61 N-m (6.2 kg-m, 45 ft-lb)

21-18 SUPPLEMENT - 1990 MODEL

Specifications

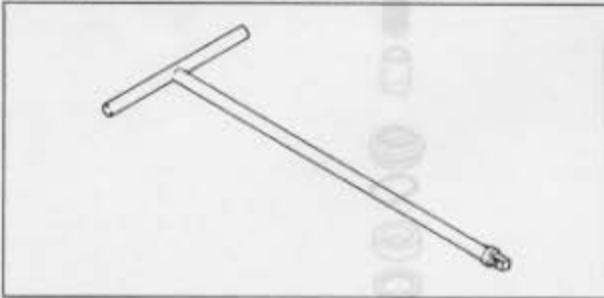
noisenoq2

Refer to the front part of this manual, noting the following.

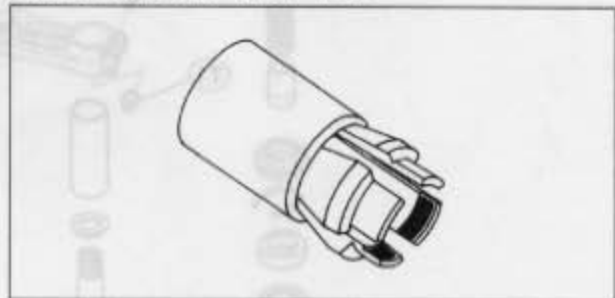
Item	Standard	Service Limit
Front Fork:		
Fork oil:	SAE 10W-20	---
Viscosity	496 ±4 mL	---
Amount per unit	approx. 420 mL : when changing oil	---
Oil level	110 ±2 mm	---
(Fully compressed, without spring)		
Fork spring free length	430.5 mm	421 mm

Special Tools

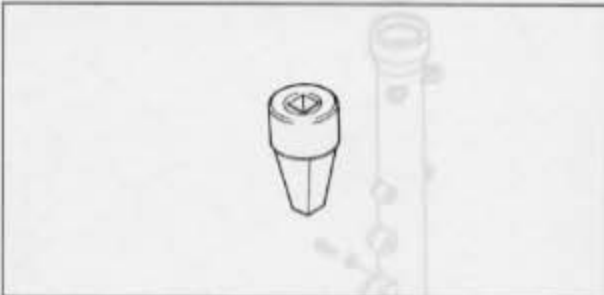
Fork Cylinder Holder Handle: 57001-183



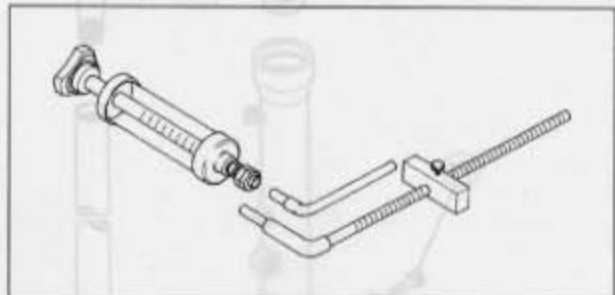
Fork Oil Seal Driver: 57001-1219



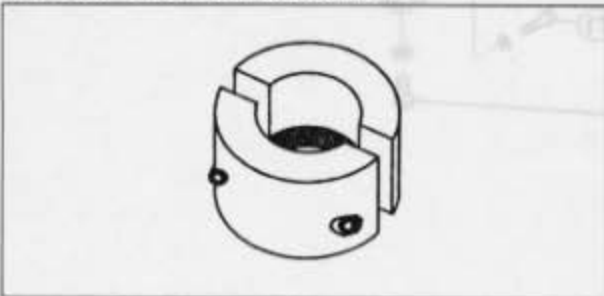
Fork Cylinder Holder Adapter: 57001-1057



Oil Syringe: 57001-1290



Fork Outer Tube Weight: 57001-1218



J : Apply front-wheel locking force

TT : 1.5 kg (3.3 lb)

ST : 1.5 kg (3.3 lb)

ST : 1.5 kg (3.3 lb)

TT : 1.5 kg (3.3 lb)

Front Fork

Fork Oil Change

- Remove the following.
 - Drain Screw (left or right fork leg)
- Allow the oil to drain into a suitable container. If you pump the fork legs to force out the oil, be sure to catch the oil in a container as it squirts out.
- Raise the front wheel off the ground.
- Remove the following.
 - Handlebar Holders
 - Fork Upper Clamp Bolts (loosen)
 - Fork Top Plugs
 - Spacers
 - Spring Seats
 - Main Springs
- Install the drain screw with a new gasket.
- Pour in the type and amount of fork oil specified.

Front Fork Oil

Viscosity: **SAE 10W-20**

Amount per side:

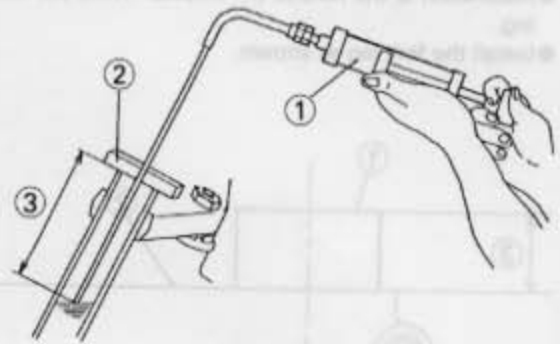
When changing oil: **approx. 420 mL**

After disassembly and completely dry:
496 ± 4 mL

- ★ If necessary, measure the oil level as following.
 - Slowly compress the front fork fully by pushing up the outer tubes using a jack or other suitable means under the front wheel.
 - Wait until the oil level settles.
 - Insert a tape measure or rod into the inner tube, and measure the distance from the top of the inner tube to the oil.

NOTE

- Fork oil level may also be measured using the oil syringe (special tool).
- The tape measure, rod, or oil syringe pipe should be in the middle of the inner tube, or the correct oil level can not be measured.
- Set the oil syringe stopper so that its lower side shows the oil level distance specified.
- Put the gauge tube into the inner tube and position the stopper across the top end of the inner tube.



1. Oil Syringe: 57001-1290

3. Oil Level Distance

2. Stopper

NOTE

- The gauge tube is graduated in 1 cm division.
- The syringe body is graduated in 10 mL divisions, excluding the gauge tube which is about 5 mL capacity.
- Pull the handle slowly to draw out the excess oil until no more oil comes up the tube.
- ★ If no oil is drawn out, there is not enough oil in the inner tube. Pour in some more oil, then draw out the excess.

Fork Oil Level

(Fully compressed without spring)

110 ± 2 mm

- ★ If the oil is above or below the specified level, remove or add oil and recheck the oil level.
- Change the oil of the other fork leg in the same manner.
- Install the parts removed.
- Torque the following (see Exploded View).
 - Fork Top Plugs
 - Fork Upper Clamp Bolts
 - Handlebar Holder Bolts

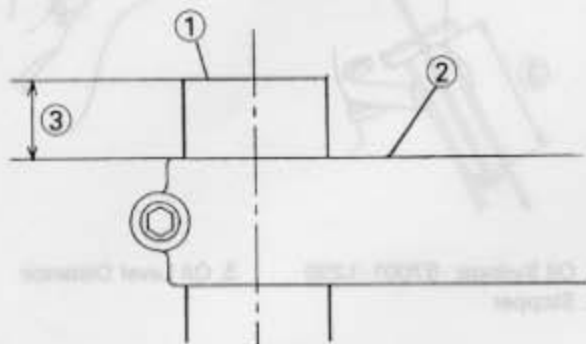
Front Fork Removal (each fork leg)

- Loosen the fork top plug beforehand if the fork leg is to be disassembled.
- Remove the following.
 - Handlebar Holder
 - Brake Calipers
 - Front Wheel
 - Front Fender
 - Fairing
- Remove the clamps and free the electrical wirings, brake hose, clutch hose, or throttle cables from the fork leg.
- Remove the following.
 - Fork Clamp Bolts and Nuts (upper and lower, loosen)
- With a twisting motion, work the fork leg down and out.

21-20 SUPPLEMENT - 1990 MODEL

Front Fork Installation (each fork leg)

- Installation is the reverse of removal. Note the following.
- Install the fork leg as shown.

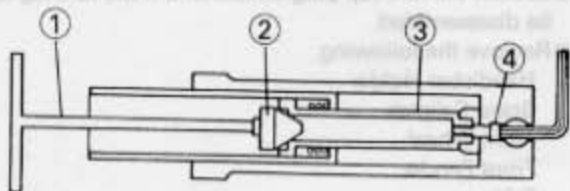


1. Inner Tube Top 3.15 mm
2. Steering Stem Head Surface

- Torque the following (see Exploded View).
Fork Top Plug (if loosened)
Fork Clamp Bolts and Nuts
Handlebar Holder Bolts

Front Fork Disassembly

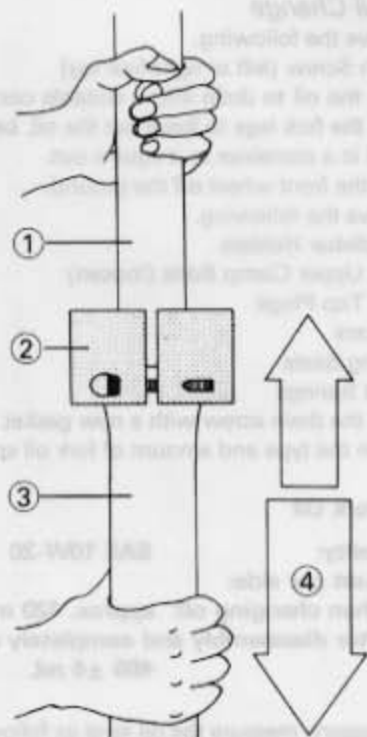
- Remove the following.
Fork Oil (drain)
Fork Leg
Fork Top Plug
Spacer
Spring Seat
Main Spring
Dust Seal
Retainer
- Stop the cylinder from turning by using the front fork cylinder handle and adapter (special tools).
- Unscrew the Allen bolt, then take the bolt and gasket out of the bottom of the outer tube.



1. Cylinder Holder Handle: 57001-183
2. Cylinder Holder Adapter: 57001-1057
3. Cylinder
4. Allen Bolt

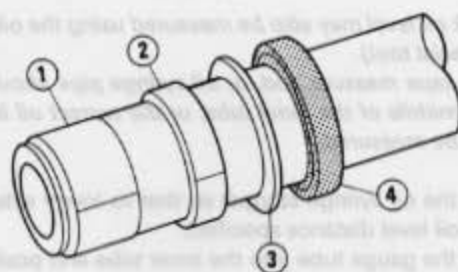
- Use the fork outer tube weight (special tool) to separate the inner tube from the outer tube.

- Holding the inner tube by hand in a vertical position, pull down the outer tube several times to pull out the inner tube.



1. Inner Tube 3. Outer Tube
2. Weight: 57001-1218 4. Pull down.

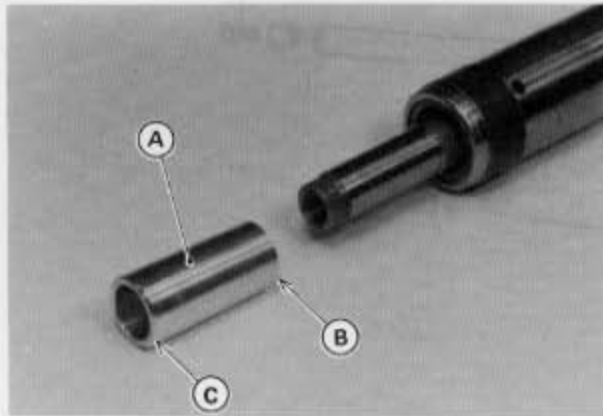
- The oil seal, washer, and guide bushes come off with the inner tube.



1. Inner Tube Guide Bush 3. Washer
2. Outer Tube Guide Bush 4. Oil Seal

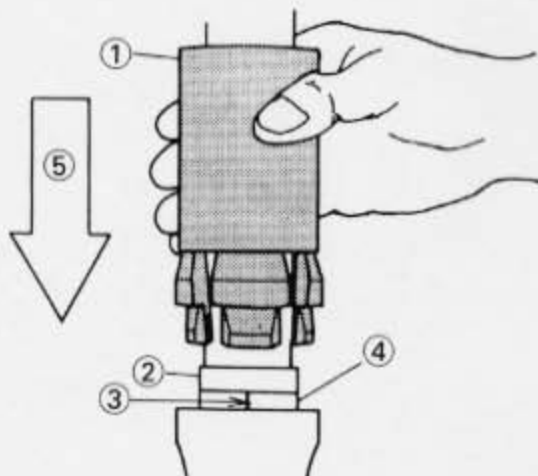
Front Fork Assembly

- Assembly is the reverse of disassembly. Note the following.
- Check the top plug O-ring and replaced it with a new one if necessary.
- Replace the following parts removed with a new one.
 - Guide Bushes
 - Oil Seal
 - Bottom Allen Bolt Gasket
- Install the cylinder base so that the small diameter end of it comes to the cylinder.



A. Cylinder Base C. Large Diameter End
B. Small Diameter End

- Apply a non-permanent locking agent to the following.
 - Bottom Allen Bolt Threads
- Torque the following (see Exploded View).
 - Bottom Allen Bolt
 - Fork Top Plug (after fork leg installation)
- Install the guide bush (with a used guide bush on it) by tapping the used guide bush with the fork oil seal driver (special tool) until it stops. The split of the bush must be faced toward the side of the vehicle.



- 1. Driver: 57001-1219 4. New Guide Bush
- 2. Used Guide Bush 5. Tap.
- 3. Split (toward the right or left)

Inner Tube Inspection

- ★ If the inner tube is damaged, replace it.
- Nicks or rust damage can sometimes be repaired by using a wet-stone to remove sharp edges or raised areas which cause seal damage.
- ★ If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.

CAUTION

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

Oil Seal and Dust Seal Inspection

- ★ If dust seal has any damage or wear, replace it.
- Replace the oil seal with a new one whenever it has been removed.

Spring Tension

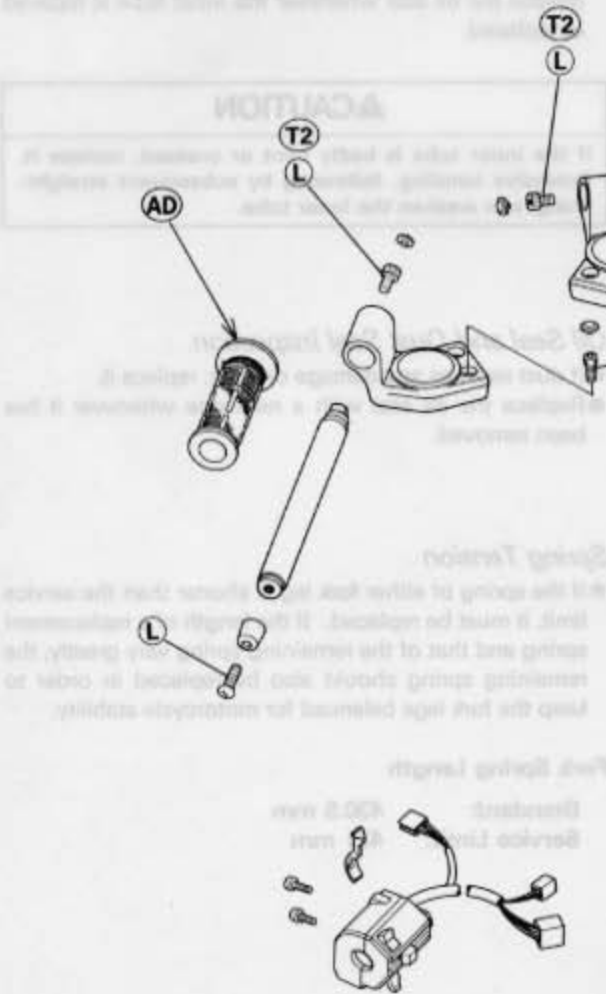
- ★ If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Fork Spring Length

Standard: 430.5 mm
Service Limit: 421 mm

Controls

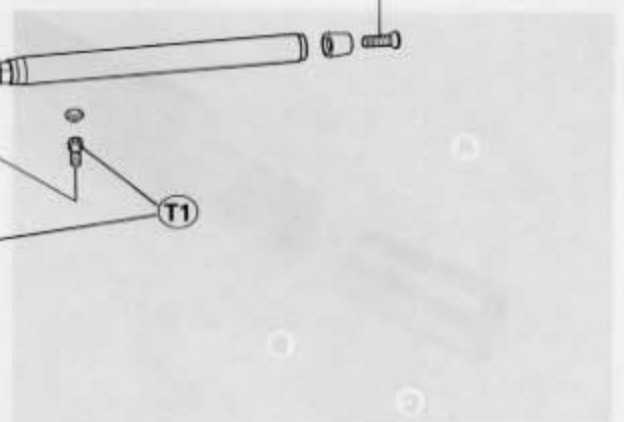
Exploded View



AD : Apply adhesive agent.
L : Apply non-permanent locking agent.

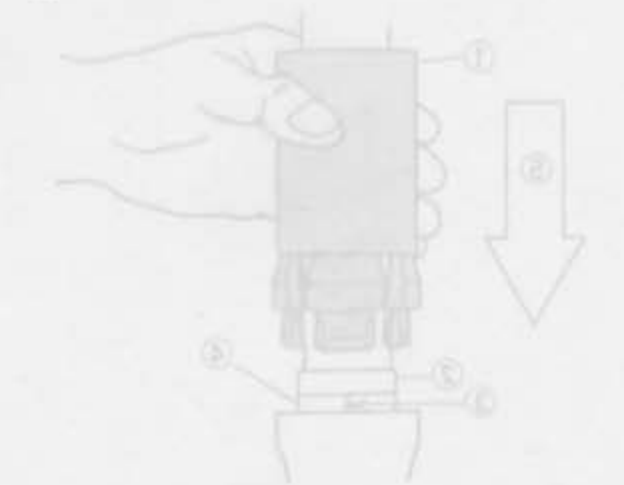
T1 : 19 N-m (1.9 kg-m, 13.5 ft-lb)
T2 : 29 N-m (3.0 kg-m, 22 ft-lb)

Remove the bottom Allen Ball (1) and the bottom Allen Ball Thread (2) from the control. Then the bottom Allen Ball (1) and the bottom Allen Ball Thread (2) can be removed with a new one.



A - Control Base
B - Small Quarter End
C - Large Quarter End

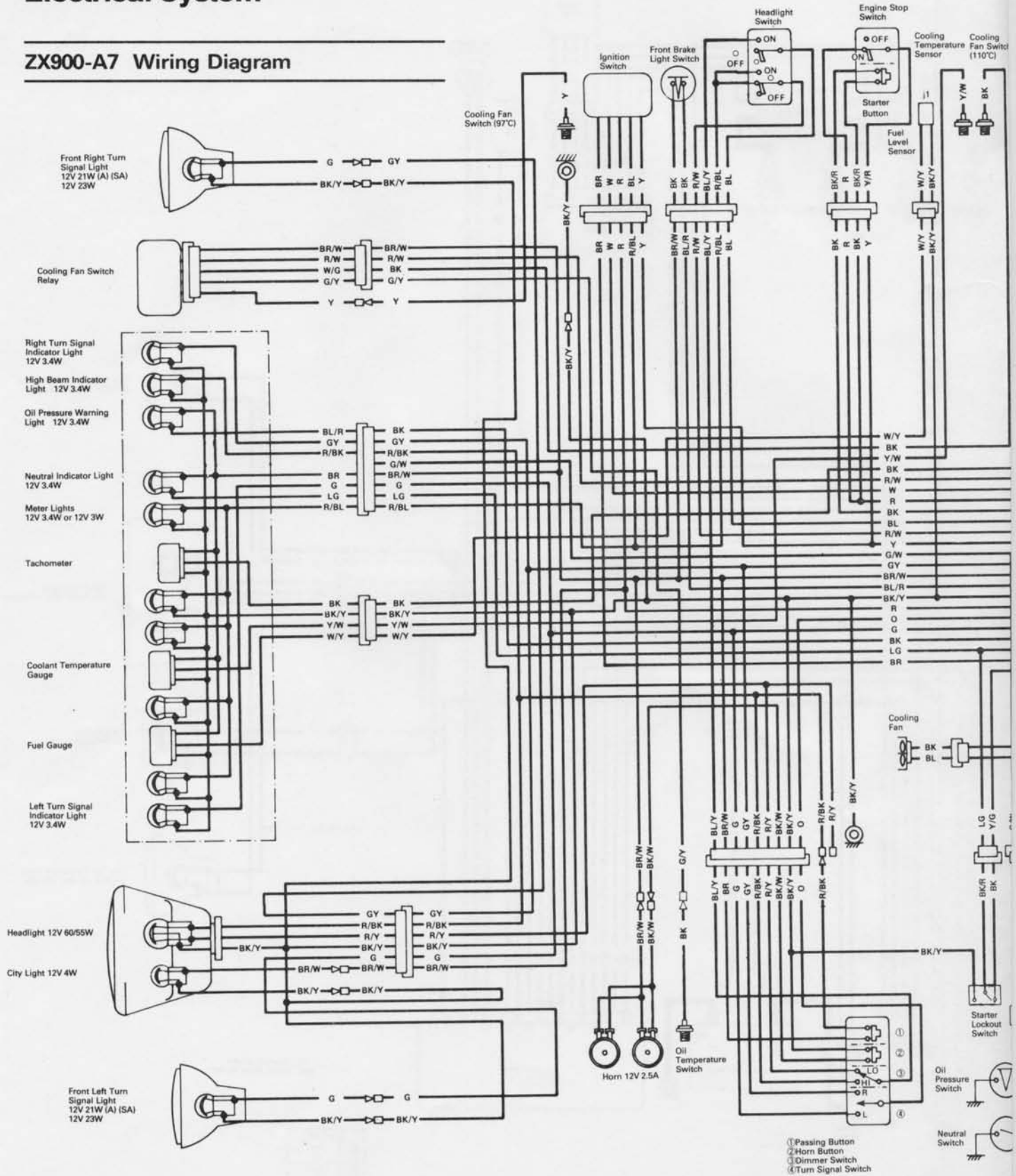
Apply a non-permanent locking agent to the following:
 Bottom Allen Ball Thread
 Bottom Allen Ball



1 - Draw: 87001-131B
2 - Top
3 - Split (toward the right or left)
4 - New Guide Bush
5 - Top

Electrical System

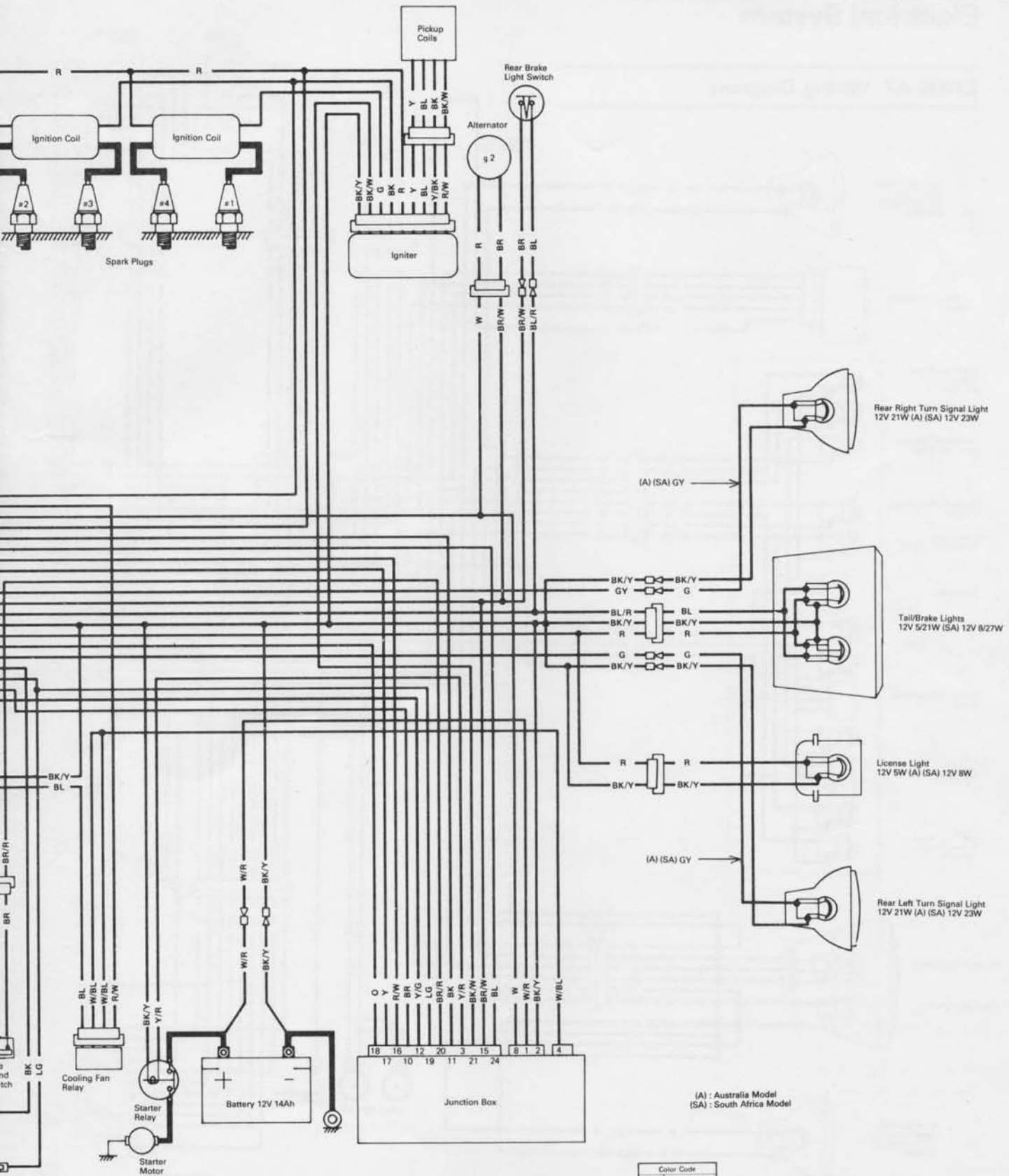
ZX900-A7 Wiring Diagram



- ① Passing Button
- ② Horn Button
- ③ Dimmer Switch
- ④ Turn Signal Switch

LEFT HANDLEBAR SWITCH CONNECTIONS															
Starter Lockout Switch			Horn Button		Dimmer Switch			Turn Signal Switch		Passing Button					
Color	BK/Y	Y/G	LG	Color	BK/Y	BK/W	Color	R/BK	BL/Y	R/Y	Color	G	Color	R/BK	BR
Released		○					HI	○			R	○		DN	○
Pulled in	○			ON	○		LO	○		L		○		(push)	

IGNITION	
Color	Lights
OFF_LOCK	BR
ON	
PI(PARK)	



SWITCH CONNECTIONS

Color	Ignition	Tail 1	Tail 2
Y	Y	BL	R
BL			
R			

RIGHT HANDLEBAR SWITCH CONNECTIONS

Engine Stop Switch			Headlight Switch			Starter Button			
Color	Y/R	R	R/W	R/BL	BL	BL/Y	Color	BK/R	BK/R
OFF	○	OFF	○	○	○				
RUN	○	ON	○	○	○		Push	○	○

Color Code

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

MODEL APPLICATION

Year	Model	Beginning Frame No.
1984	ZX900-A1	JKAZX2A1□EA000001, or JKAZX2A1□EB500001, or ZX900A-000001
1985	ZX900-A2	JKAZX2A1□FA015001, or JKAZX2A1□FB505301, or ZX900A-015001
1986	ZX900-A3	JKAZX2A1□GA031001, or JKAZX2A1□GB512701, or ZX900A-031001
1987	ZX900-A4	ZX900A-035101
1988	ZX900-A5 ZX900-A5A	ZX900A-038501
1989	ZX900-A6	JKAZX2A1□KA042001, or ZX900A-042001
1990	ZX900-A7	JKAZX2A1□LA048001, or ZX900A-048001

□ : This digit in the frame number changes from one machine to another.

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CONSUMER PRODUCTS & COMPONENTS GROUP