

Kawasaki

ZXR 400



Motorcycle Service Manual

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.

General Information

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

Especially note the following:

(1) Dirt

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

(2) Battery Ground

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

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

(3) Tightening Sequence

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

(4) Torque

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

(5) Force

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

(6) Edges

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

(7) High-Flash Point Solvent

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

(8) Gasket, O-Ring

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

(9) Liquid Gasket, Non-Permanent Locking Agent

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

(10) Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

(11) Ball Bearing

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

(12) Oil Seal and Grease Seal

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

When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be pressed into place using a suitable driver, which 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 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) Cotter Pin

Replace any cotter pins that were removed with new ones, as removal deforms and breaks them.

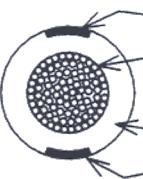
(16) Lubrication

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

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulfide grease (MoS_2) in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(17) Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed to make red the main color.

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

(18) 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.

(19) Inspection

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

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

(20) Specifications

Specification terms are defined as follows.

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

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

1-4 GENERAL INFORMATION

Model Identification

ZX400-H2 Left Side View:



ZX400-H2 Right Side View:



General Specifications

Items	ZX400-H2	
Dimensions:		
Overall length		2 035 mm, (l) 2 050 mm,
Overall width		705 mm
Overall height		1 125mm
Wheelbase		1 395 mm
Road clearance		120 mm
Seat height		765 mm
Dry weight		163 kg
Curb weight:	Front	95 kg
	Rear	94 kg
Fuel tank capacity		16.0 L
Performance:		
Braking distance		13.5 m from 50 km/h
Minimum turning radius		3.2 m
Engine:		
Type		4-stroke, DOHC, 4-cylinder
Cooling system		Liquid-cooled
Bore and stroke		57.0 x 39.0 mm
Displacement		398 mL
Compression ratio		12.1
Maximum horsepower		45.6 kW (62 PS) @12 500 r/min (rpm), (F) 44.2 kW (- PS) @12 500 r/min (rpm) (UTAC's norm)
Maximum torque		39.2 N·m (4.0 kg-m, 29.0 ft-lb) @10 000 r/min (rpm)
Carburetion system		Carburetors, Keihin CVK-D32 x 4
Starting system		Electric starter
Ignition system		Battery and coil (transistorized)
Timing advance		Electronically advanced
Ignition timing		From 12.5° BTDC @1 200 r/min (rpm) to 45° BTDC @6 000 r/min (rpm)
Spark plug		NGK CR9EK or ND U27ETR
Cylinder numbering method		Left to right, 1-2-3-4
Firing order		1-2-4-3
Valve timing:		
Inlet	Open	23° (BTDC)
	Close	65° (ABDC)
	Duration	268°
Exhaust	Open	57.5° (BBDC)
	Close	27.5° (ATDC)
	Duration	265°
Lubrication system		Forced lubrication (wet sump with cooler)
Engine oil:	Grade	SE or SF class
	Viscosity	SAE10W-40
	Capacity	3.0 L
Drive Train:		
Primary reduction system:		
Type		Gear
Reduction ratio		2.195 (90/41)

1-6 GENERAL INFORMATION

Items	ZX400-H2	
Clutch type		Wet multi disc
Transmission:	Type	6-speed, constant mesh, return shift
	Gear ratios:	1st 2.846 (37/13) 2nd 2.055 (37/18) 3rd 1.631 (31/19) 4th 1.380 (29/21) 5th 1.240 (31/25) 6th 1.111 (30/27)
Final drive system:		Chain drive
	Type	Reduction ratio
		Overall drive ratio
Frame:		
Type		Tubular, diamond
Caster (rake angle)		24°
Trail		85 mm
Front tire:	Size, type	120/60 VR17 TUBELESS
	Mark	DUNLOP K510F
Rear tire:	Size, type	160/60 VR17 TUBELESS
	Mark	DUNLOP K510
Front suspension:	Type	BRIDGESTONE CYROX-17
	Wheel travel	120 mm
Rear suspension:	Type	Swing arm (uni-trak)
	Wheel travel	140 mm
Brake type:	Front	Dual discs
	Rear	Single disc
Electrical Equipment:		
Battery		12 V 10 Ah
Headlight:	Type	Semi-sealed beam
	Bulb	Quartz-halogen 12 V 60/55 W x 2,
Tail/brake light		12 V 5/21 W x 2
Alternator:	Type	Three-phase AC
	Rated output	23 A @10 000 r/min (rpm), 14 V

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

(F) France Model

(I) Italy Model

Torque and Locking Agent

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

Letters used in the "Remarks" column mean:

- L** : Apply a non-permanent locking agent to the threads.
- LG** : Apply liquid gasket to the threads.
- M** : Apply molybdenum disulfide grease.
- O** : Apply an oil to the threads and seating surface.
- S** : Tighten the fasteners following the specified sequence.
- SS** : Apply silicone sealant.
- St** : Stake the fasteners to prevent loosening.
- R** : Replace the part.

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

Basic Torque for General Fasteners

Threads dia. (mm)	Torque		
	N-m	kg-m	ft-lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in-lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in-lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Cooling System:				
Coolant Drain Plugs (Cylinder)	8.8	0.90	78 in-lb	
Thermostatic Housing Bolt (cylinder head)	8.8	0.90	78 in-lb	L
Thermostatic Fan Switch	18	1.8	13	
Water Temperature Sensor	7.8	0.80	69 in-lb	SS
Water Pump Mounting Bolt	8.8	0.90	78 in-lb	
Water Pump Pipe Mounting Bolt	8.8	0.90	78 in-lb	
Radiator Hose Clamp Bolts	2.0	0.2	17 in-lb	
Radiator Hose Fitting Mounting Bolt (cylinder)	8.8	0.90	78 in-lb	L
Radiator Fan Mounting Bolt	3.4	0.35	30 in-lb	
Engine Top End:				
Cylinder Head Cover Bolts	9.8	1.0	7.0	
Cylinder Head Cover Woodruff Plug Mounting	-	-	-	SS
Camshaft Chain Guide Bolt (Rear)	25	2.5	18.0	
Chain Tensioner Mounting Bolt	8.8	0.90	78 in-lb	L
Rocker Shaft Plug	9.8	1.0	7.0	
Upper Chain Guide Bolt	12	1.2	8.5	
Inlet Pipe Mounting Bolt (carburetor holder)	8.8	0.90	78 in-lb	
Outlet Pipe Mounting Bolt (cylinder head)	8.8	0.90	78 in-lb	
Camshaft Cap Bolts	12	1.2	8.5	
Cylinder Head Bolts: 8 mm	25	2.5	18.0	
6 mm	12	1.2	8.5	
Clutch				
Clutch Cover Mating Surfaces	-	-	-	SS
Clutch Cover Bolts	9.8	0.90	78 in-lb	L (two bolts)
Clutch Cover Damper Bolts	9.8	1.0	7.0	L
Clutch Hub Nut	130	13.5	98	R
Clutch Spring Bolts	12	1.2	8.5	
Engine Lubrication System:				
Engine Drain Plug	20	2.0	14.5	
Oil Hose Mounting Bolt (cylinder head, crankcase)	8.8	0.90	78 in-lb	
Oil Filter	9.8	1.0 or hand-tight	7.0	R
Oil Filter Mounting Bolt	29	3.0	22	
Oil Pressure Relief Valve	15	1.5	11.0	L

1-10 GENERAL INFORMATION

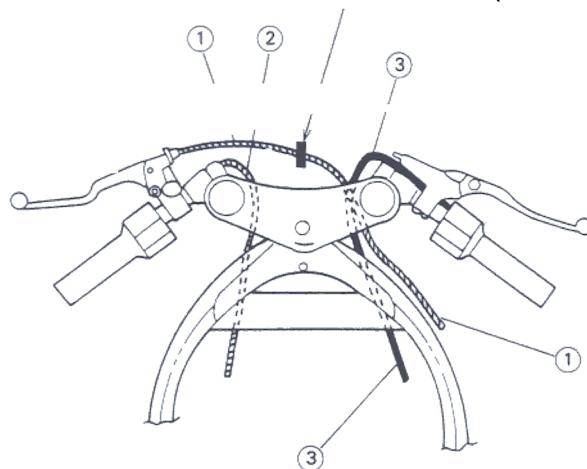
Fastener	Torque			Remarks
	N·m	kg·m	ft-lb	
Oil Pressure Switch Terminal	1.5	0.15	13 in-lb	
Oil Pressure Switch	15	1.5	11.0	SS
Oil Pump Cover Screws	4.4	0.45	39 in-lb	
Oil Plug (Right, M18)	15	1.5	11.0	
Oil Plug (Left, PT%)	17	1.75	12.5	SS
Oil Cooler Pipe Fitting Bolt	12	1.2	8.5	
Oil Pan Bolts	12	1.2	8.5	
Engine Removal/Installation:				
Engine Mounting Bracket Bolt	30	3.1	22	
Engine Mounting Bolts	36	3.7	27	
Crankshaft/Transmission:				
Shift Drum Cam Mounting Bolts	12	1.2	8.5	L
Shift Drum Set Lever Bolt	8.8	0.90	78 in-lb	
Shift Drum Bearing Retainer Bolt	8.8	0.90	78 in-lb	
Shift Return Spring Bolt	20	2.0	14.5	L
Neutral Switch	15	1.5	11.0	
Breather Plate Mating Surfaces	-	-	-	SS
Breather Plate Bolt	9.8	1.0	7.0	L
Crankcase Bolts φ6	12	1.2	8.5	
φ8	27	2.8	20	S
Crankcase Mating Surfaces	-	-	-	LG, SS (one portion only)
Connecting Rod Big End Cap Nuts	25	2.6	19	
Shift Pedal Mounting Bolt	25	2.5	18	
Wheels/Tires:				
Front Axle Clamp Bolts	20	2.0	14.5	
Front Axle Nut	110	11.0	80	
Rear Axle Nut	110	11.0	80	
Final Drive:				
Engine Sprocket Cover Bolts	-	-	-	L (one bolt only)
Engine Sprocket Plate Bolt	9.8	1.0	7.0	
Rear Sprocket Nuts	74	7.5	54	
Rear Sprocket Studs	-	-	-	L
Brakes:				
Bleed Valves	7.8	0.80	69 in-lb	
Caliper Mounting Bolts (Front)	34	3.5	25	
Caliper Assembly Bolts: Front	21	2.1	15	
Rear	32	3.3	24	
Pad Spring Screws	2.9	0.30	26 in-lb	
Disk Mounting Bolt (Front)	27	2.8	20	
Brake Hose Banjo Bolts	25	2.5	18.0	
Brake Lever Pivot Bolt	1.0	0.10	9 in-lb	
Brake Lever Pivot Locknut	5.9	0.60	52 in-lb	
Front Brake Light Switch Mounting Screw	1.2	0.12	10 in-lb	
Brake Pedal Mounting Bolt	25	2.5	18.0	
Rear Master Cylinder Rod Locknut	18	1.8	13.0	
Caliper Mounting Bolts (Rear)	25	2.5	18.0	
Rear Master Cylinder Mounting Bolts	23	2.3	16.5	
Torque Link Nut: Front	34	3.5	25	
Rear	25	2.5	18.0	
Suspensions:				
Front Fork Clamp Bolts (Upper, Lower)	20	2.0	14.5	
Front Fork Top Bolt	23	2.3	16.5	
Piston Rod Nut	15	1.5	11.0	
Front Fork Bottom Allen Bolts	39	4.0	29	
Rear Shock Absorber Spring Adjuster Locknut	88	9.0	65	
Rear Shock Absorber Mounting Nuts	49	5.0	36	
Swing Arm Pivot Shaft Nut	110	11.0	80	
Rocker Arm Nuts	49	5.0	36	

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Tie-Rod Nuts	49	5.0	36	
Steering:				
Steering Stem Head Nut	39	4.0	29	
Handlebar Mounting Bolts	25	2.6	19.0	
Handlebar Holder Allen Bolts	9.8	1.0	7.0	
Handle Holder Clamp Bolt	23	2.3	16.5	
Frame:				
Fairing Inner Cover Mounting Screws	-	-	-	L (engine side)
Side Stand Bracket Bolts	31	3.2	23	L
Electrical System:				
Spark Plugs	13	1.3	113 in-lb	
Pickup Coil Cover Bolts	8.8	0.90	78 in-lb	L (one bolt only)
Pickup Coil Bolt	6.4	0.65	56 in-lb	
Timing Rotor Allen Bolts	25	2.5	18.0	
Alternator				
Alternator Cover Bolts	8.8	0.90	73 in-lb	
Alternator Rotor Bolt	78	8.0	58	
Alternator Stator Allen Bolt	8.3	0.85	74 in-lb	
Alternator Stator Lead Clamp Bolt	8.3	0.85	74 in-lb	
Alternator Cover Mating Surfaces	-	-	-	SS (three portions)
Starter Motor Mounting Bolts	8.8	0.90	78 in-lb	
Starter Motor Clutch Allen Bolt	34	3.5	25	L
Battery Ground Lead Bolt (Crankcase)	8.8	0.90	78 in-lb	

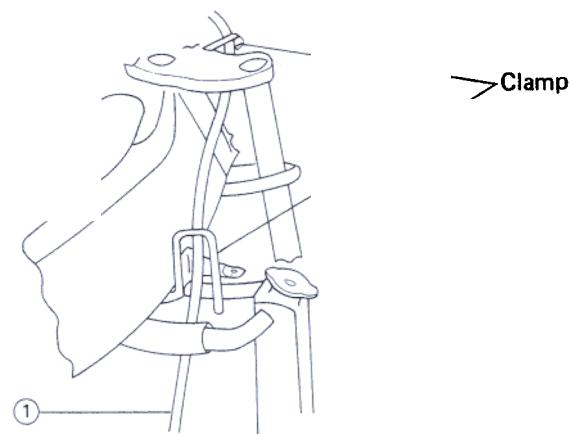
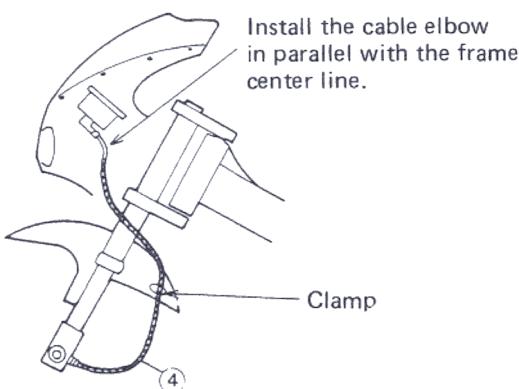
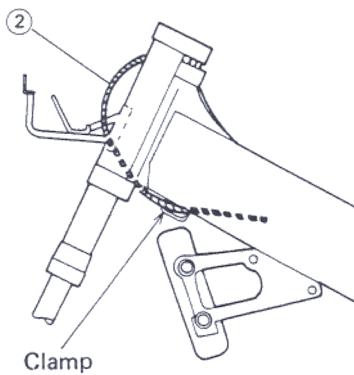
1-12 GENERAL INFORMATION

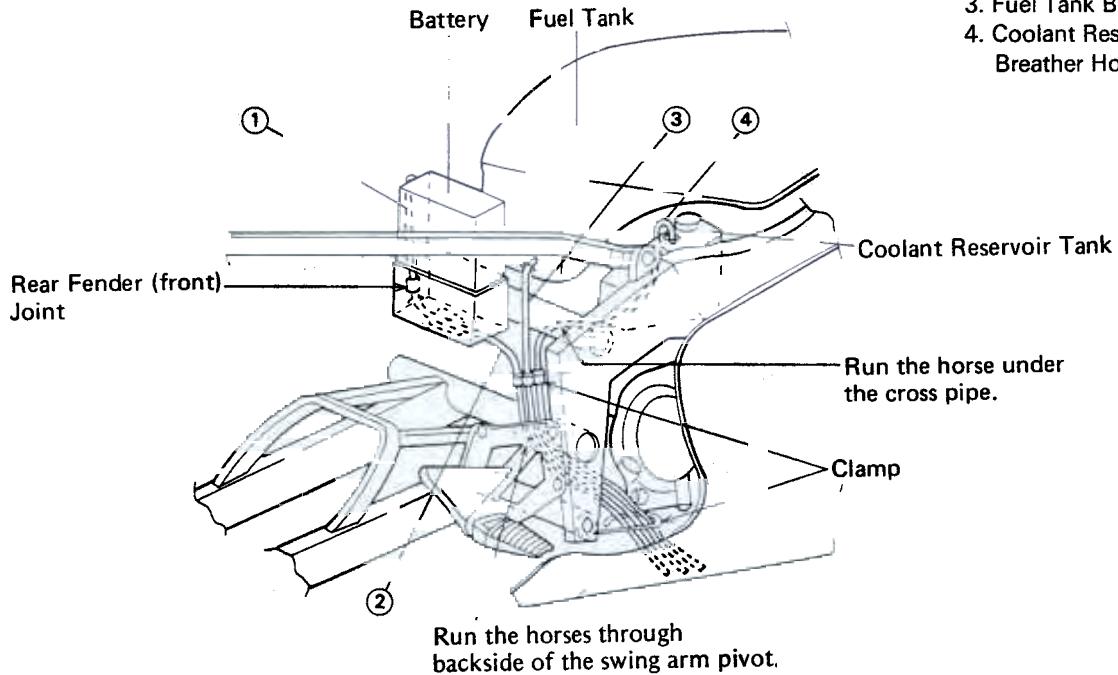
Cable, Wire, and Hose Routing

Run the cable into the clamp.

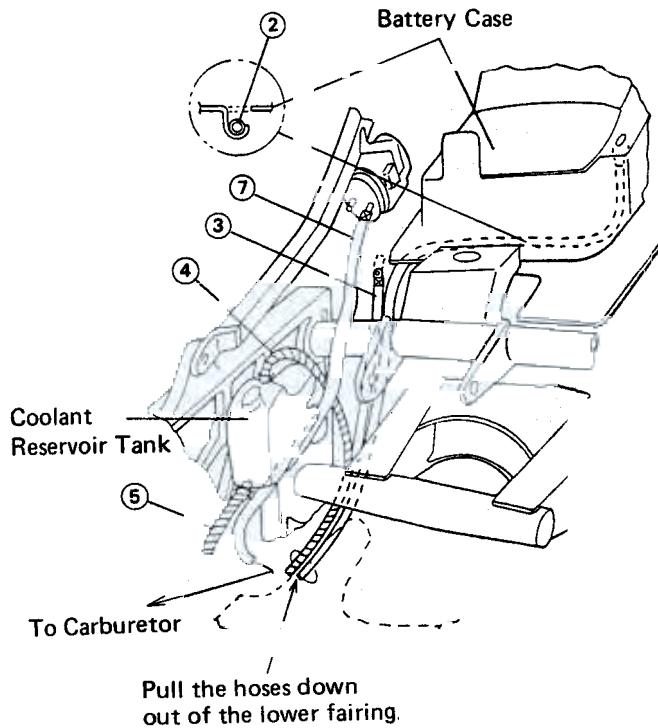
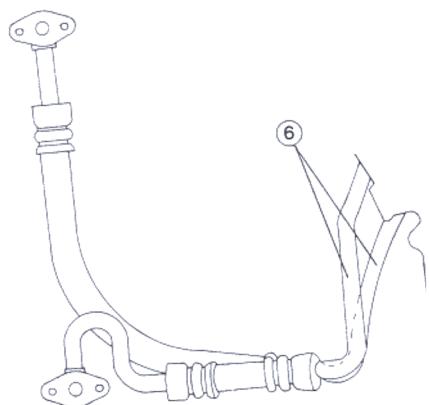


1. Clutch Cable
2. Choke Cable
3. Throttle Cable
4. Speedometer Cable





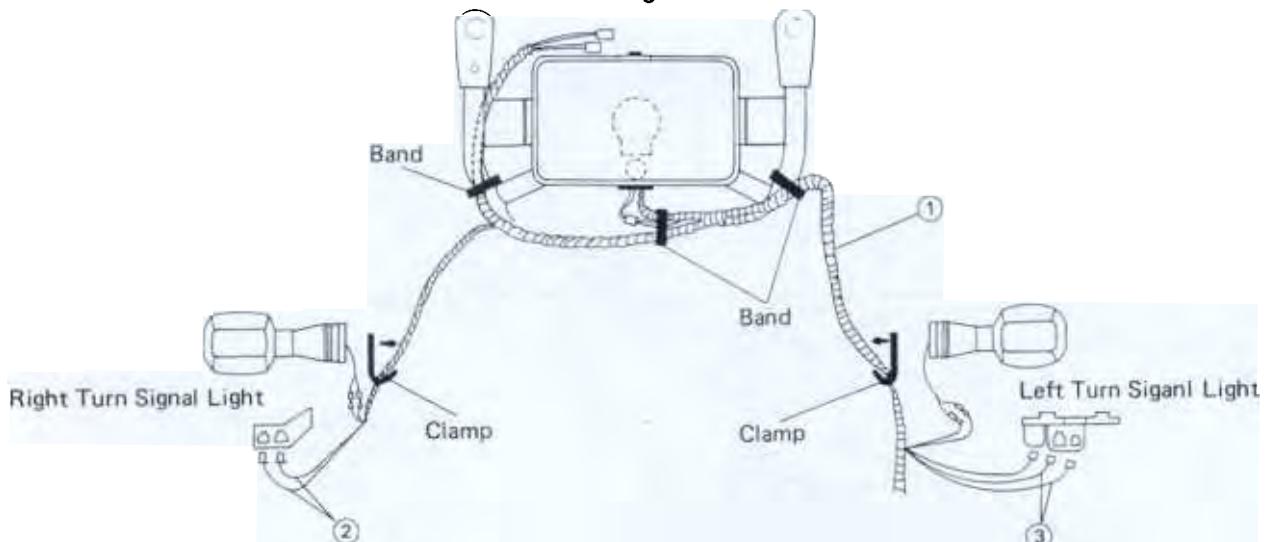
View Looking at Top



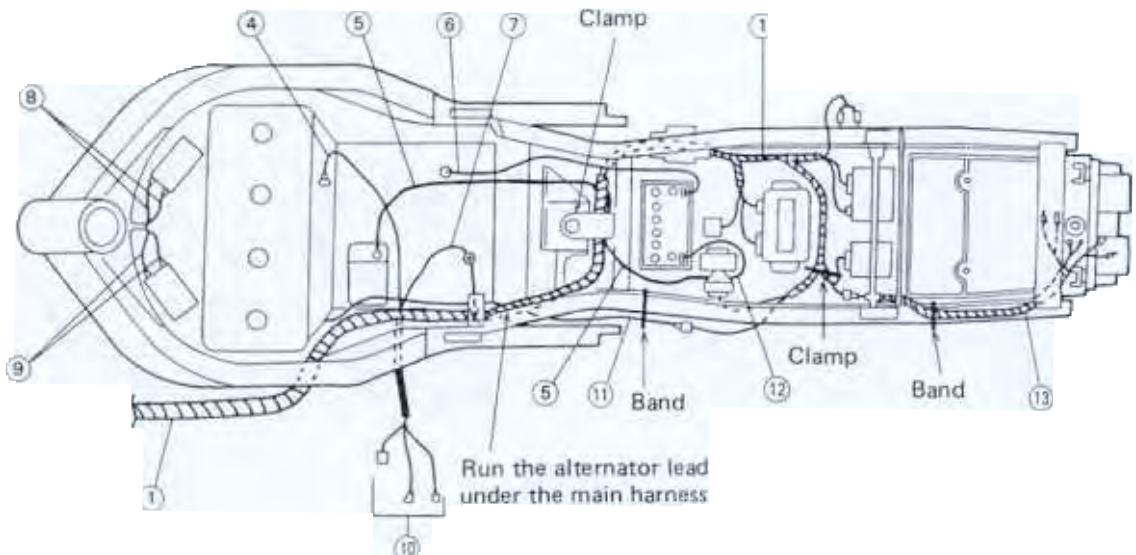
5. Coolant Reservoir Hose
6. Oil Cooler Pipe
7. Fuel Hose (from Fuel Pump to Carburetor)

1-14 GENERAL INFORMATION

View Looking at Front

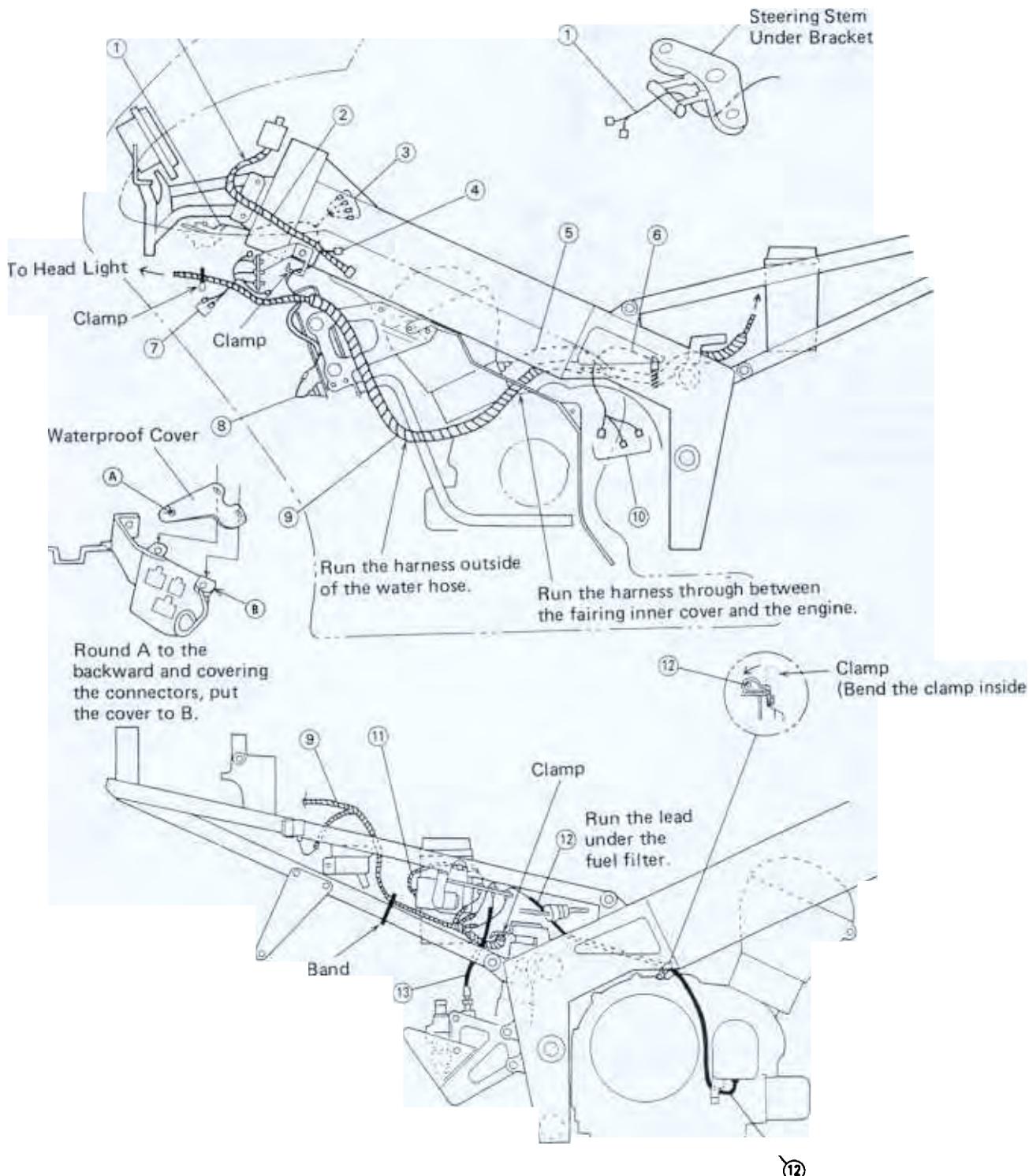


- | | |
|--------------------------------|------------------------------|
| 1. Main Harness | 6. Battery (-) Lead |
| 2. To Right Grip Switch | 7. Ground Lead |
| 3. To Left Grip Switch | 8. To Ignition Coil (#1, #4) |
| 4. To Water Temperature Sensor | 9. To Ignition Coil (#2, #3) |
| 5. Starter Motor lead | |



- | |
|------------------------------------------------------------------------|
| 10. To Oil Pressure Switch,
Neutral Switch and
Side Stand Switch |
| 11. Alternator Lead |
| 12. Battery (+) Lead |
| 13. Rear Harness |

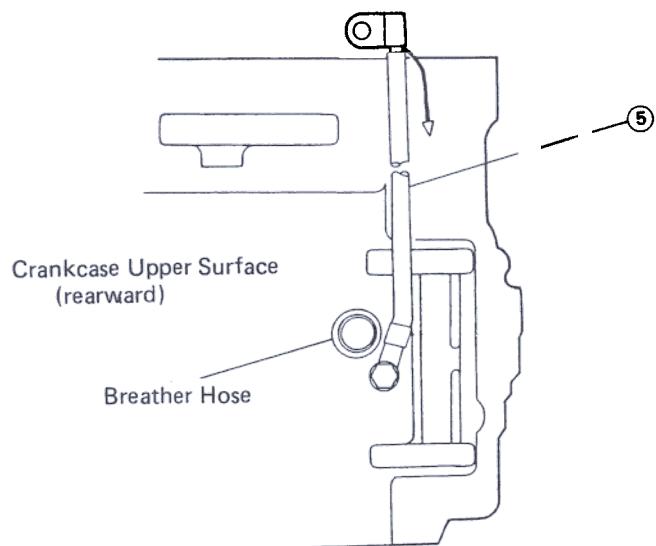
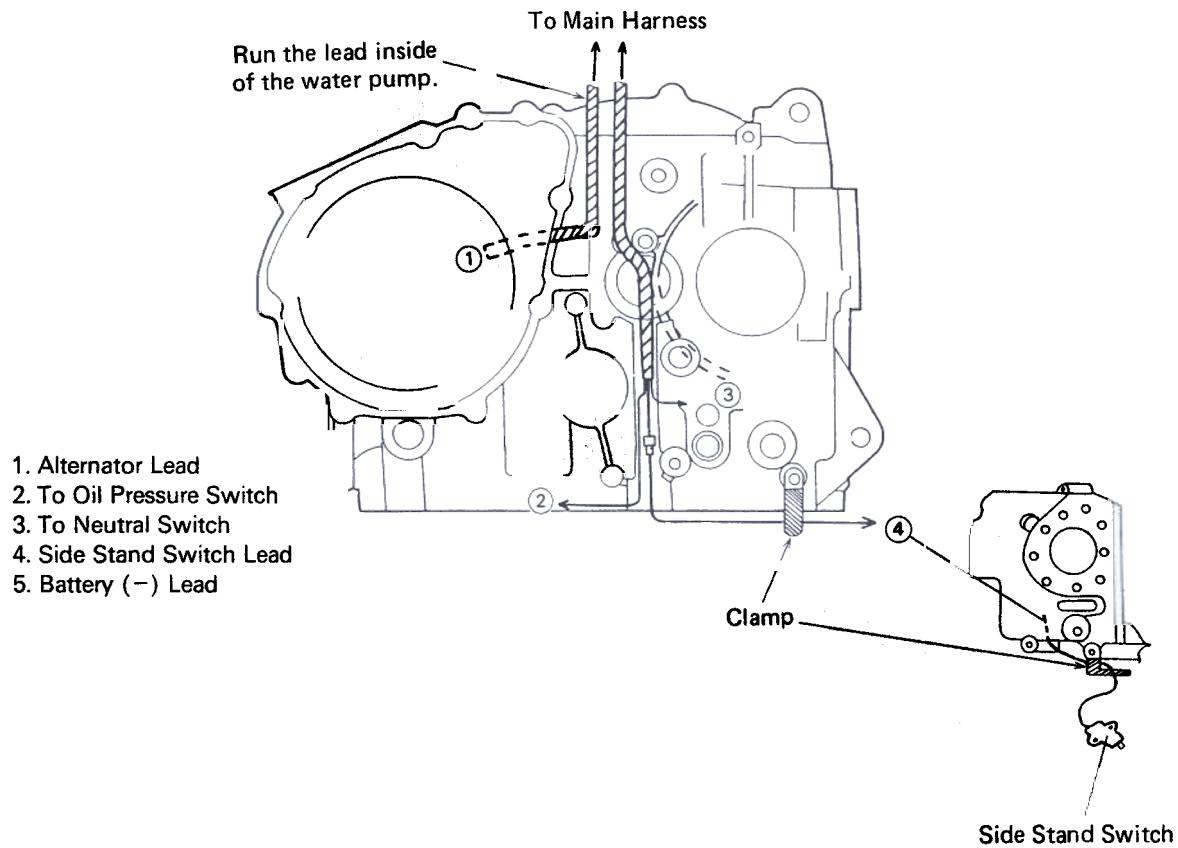
Run the lead over the fairing stay.



1. To Horn
2. Ignition Switch Lead
3. To Ignition Coil
4. To Radiator Fan
5. Water Temperature Sensor

6. Ground Lead
7. To Left Turn Signal Light
8. Radiator Fan Switch Lead
9. Main Harness
10. To Oil Pressure Switch, Neutral Switch and Side Stand Switch
11. Fuel Pump Lead
12. Pickup Coil Lead
13. Rear Brake Light Switch Lead

1-16 GENERAL INFORMATION



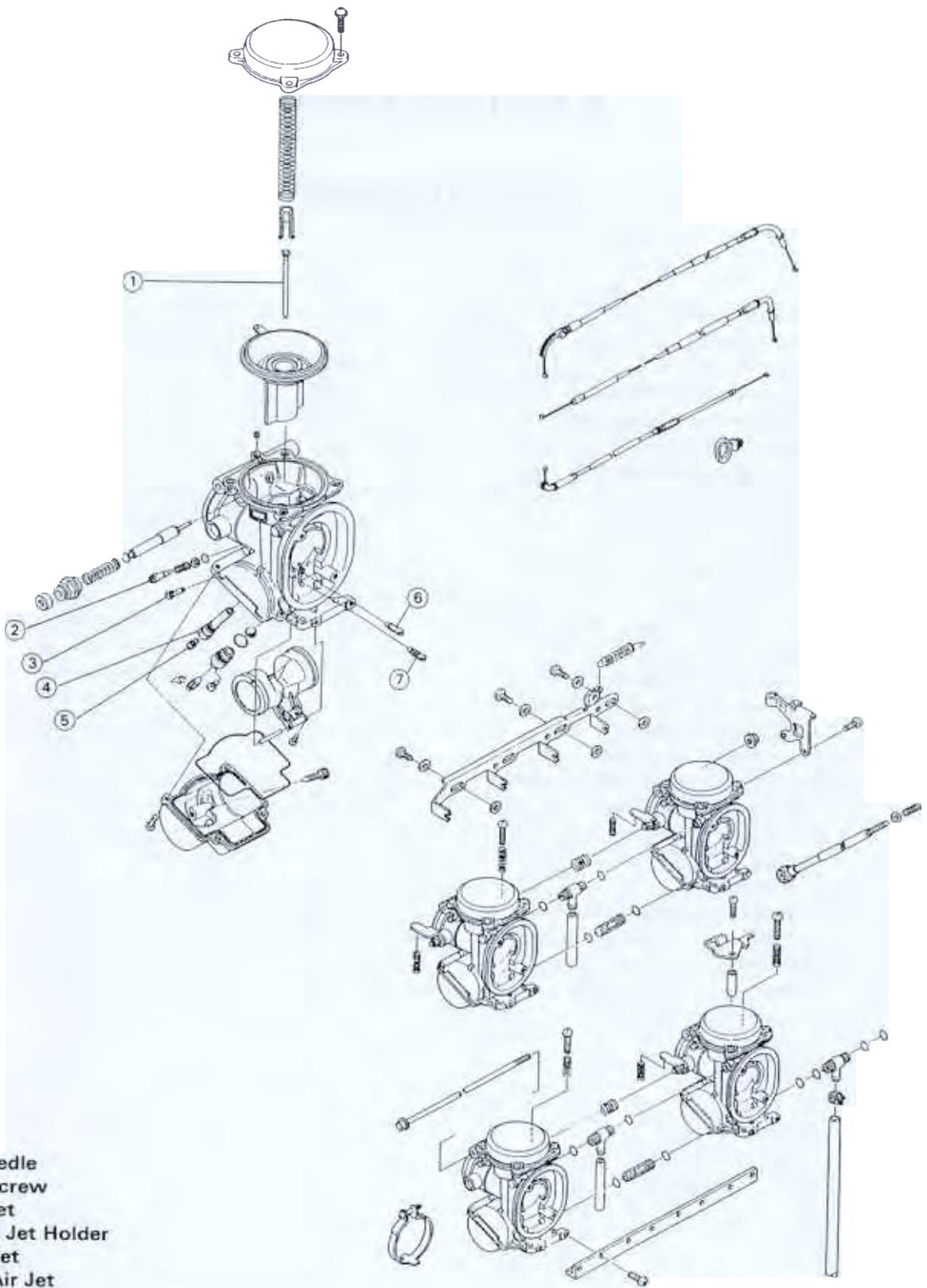
Fuel System

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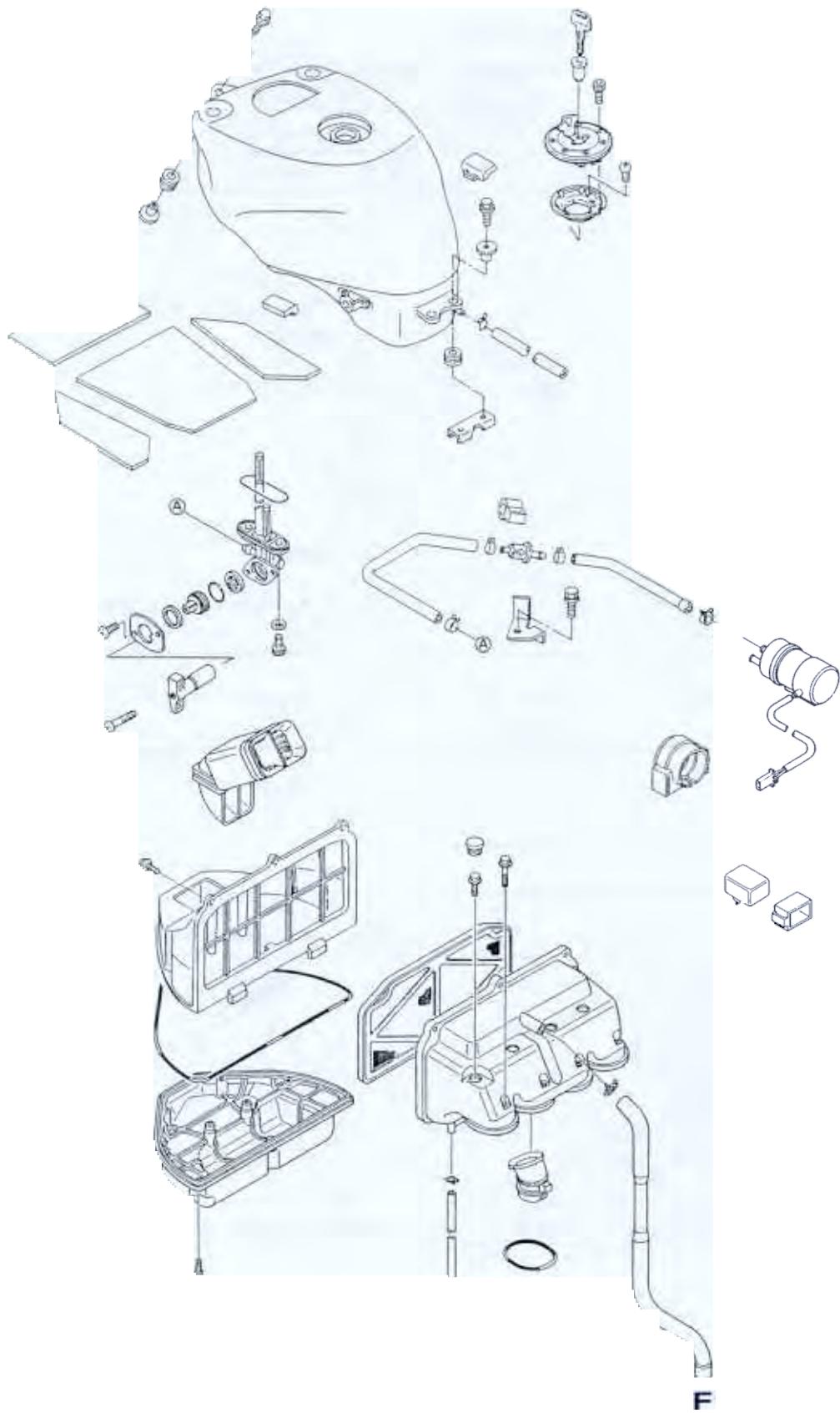
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2-2 FUEL SYSTEM

Exploded View



1. Jet Needle
2. Pilot Screw
3. Pilot Jet
4. Needle Jet Holder
5. Main Jet
6. Main Air Jet
7. Pilot Air Jet



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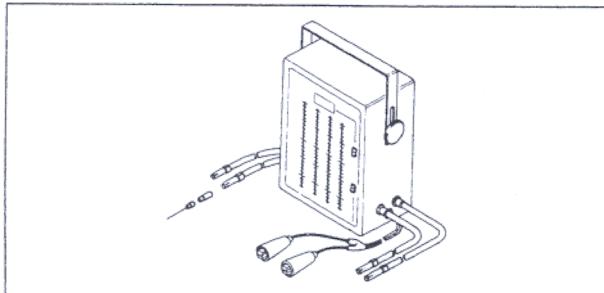
2-4 FUEL SYSTEM

Specifications

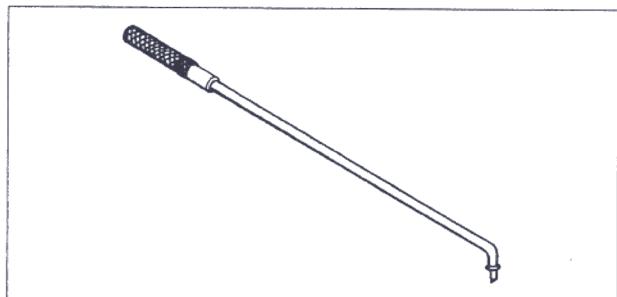
Item	Standard
Throttle Grip Free Play	2 ~ 3mm
Choke Cable Free Play	2 ~ 3mm
Idle Speed	1 200 ± 50 r/min (rpm)
Carburetor Specifications:	
Make/type	Keihin/CVK-D32
Synchronization vacuum	2.7 kPa (2 cm Hg) or less difference between two cylinders
Main jet	Standard Option
Main air jet	#98
Needle jet	#92, 95, 100, 102
Jet needle mark	#100
Pilot jet (slow jet)	#6
Pilot air jet	N77C
Pilot screw	#35
Starter jet	#120
Service fuel level	2½ (turns out)
Float height	#45
8 ± 1 mm below the mark	
11 ± 2 mm	
Air Cleaner:	
Air cleaner element oil:	Grade Viscosity
	SE or SF class SAE 30

Special Tools

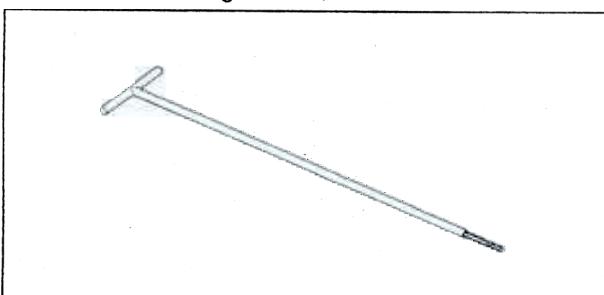
Vacuum Gauge & Tachometer: 57001-1291



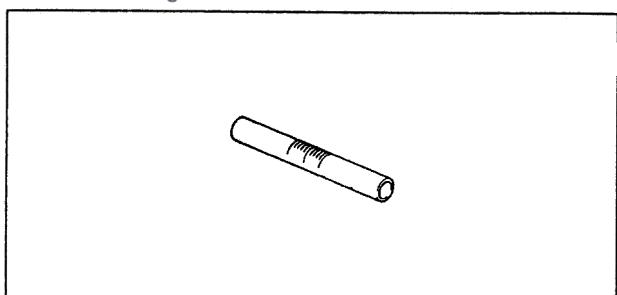
Pilot Screw Adjuster, A: 57001-1239



Carburetor Drain Plug Wrench, Hex 3: 57001-1269



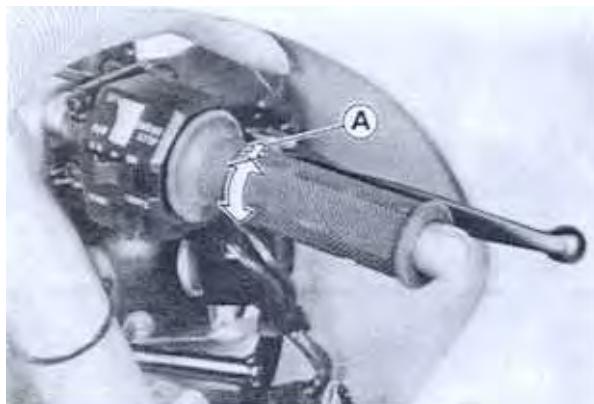
Fuel Level Gauge: 57001-1017



Throttle Grip and Cables

Throttle Cable Adjustment

- Check throttle grip free play.

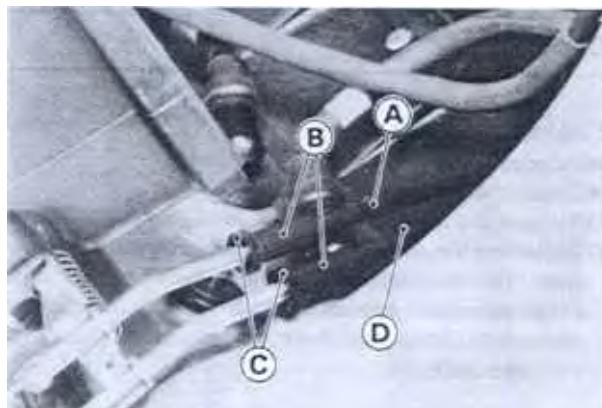


A. Throttle Grip Free Play

Throttle Grip Free Play

Standard: 2 ~ 3 mm

- ★ If the free play is incorrect, loosen the locknut and turn the adjuster of the accelerator cable until the proper amount of throttle grip play is obtained.



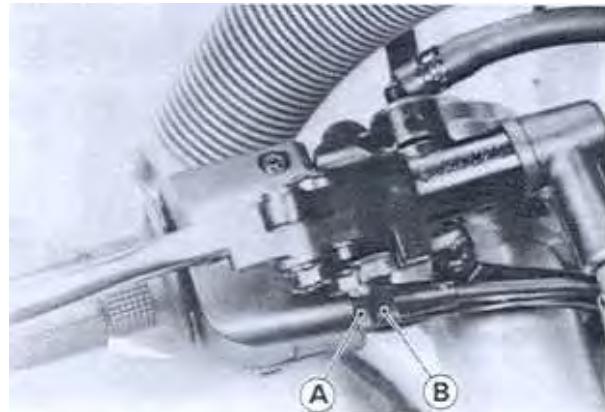
A. Accelerator Cable

B. Adjuster

C. Locknut

D. Decelerator Cable

- Loosen all the adjuster and slide both throttle cables at the carburetor to obtain the specified free play.
- Tighten the locknuts.
- Check that the throttle linkage lever stops against the idle adjusting screw with the throttle grip released and stops against the carburetor stopper with the throttle grip opened.



A. Locknut

B. Adjuster

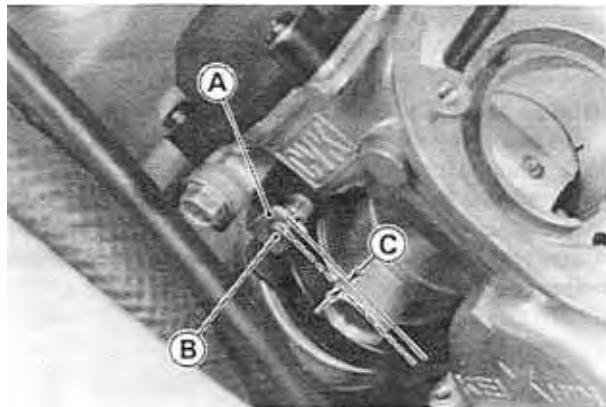
- Tighten the locknut against the adjuster securely.
- ★ If the play can not be adjusted by using the adjuster at the throttle grip, use the adjusters at the carburetors.
- Remove the fuel tank (see Fuel Tank Removal).
- Remove the surge tank (see Surge Tank Removal).
- Screw in the adjuster fully at the throttle grip and tighten the locknut.

2-6 FUEL SYSTEM

Choke Cable

Choke Cable Adjustment

- Remove surge tank (see this chapter).
- Check choke cable free play.
- Remove the fuel tank (see Fuel Tank Removal).
- Determine the amount of choke cable play at the choke lever. Pull the choke lever until the starter plunger lever at the carburetor contacts with the starter plunger; the amount of choke lever lower end travel is the amount of choke cable play.

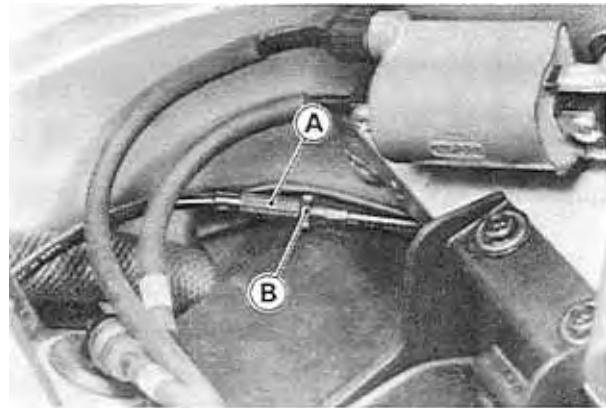


A. Starter Plunger Lever C. Play
B. Starter Plunger

Choke Cable Play

Standard: $2 \sim 3$ mm

★ If the play is incorrect, loosen the locknut and turn the adjuster at the middle of the cable until the proper amount of choke cable play is obtained.



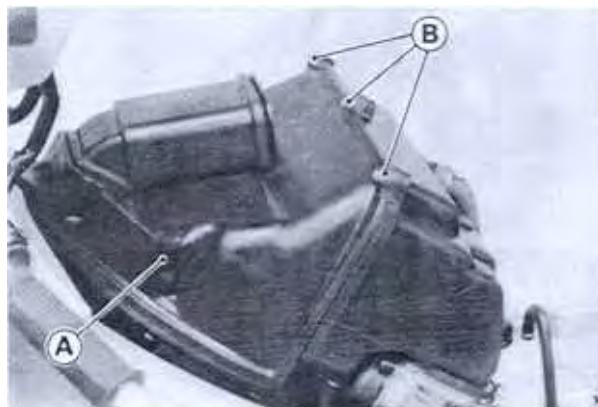
A. Adjuster B. Locknut

- Tighten the locknut against the adjuster securely.

Surge Tank

Surge Tank Removal

- Remove the fuel tank (this chapter).
- Remove the surge tank.



A. Surge Tank B. Mounting Bolt

- Install the air cleaner element so that the mesh side faces the carburetor.



A. Air Cleaner Element B. Mesh Side

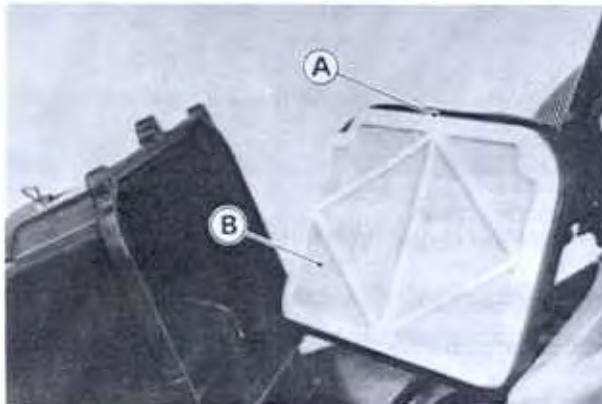
Air Cleaner

Element Cleaning

WARNING

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

- Remove the surge tank (see this chapter)
- Take out the air cleaner element.



A. Air Cleaner Element

B. Element Mesh

WARNING

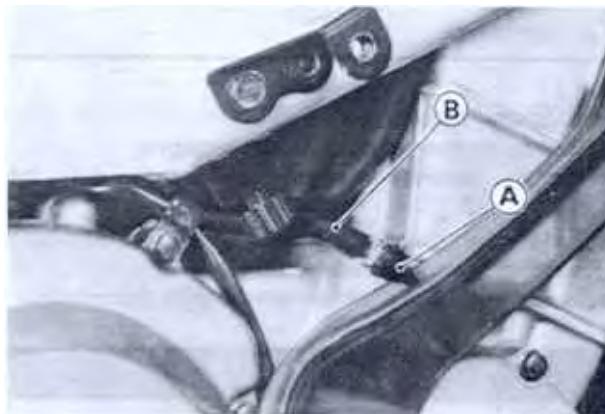
If dirt or dust is allowed to pass through into the carburetors, the throttle may become stuck, possibly causing accident.

- Wash the element in a bath of high-flash point solvent and then dry it with compressed air or by shaking it.
- After cleaning, saturate a clean, lint-free towel with SE or SF class SAE30 oil and apply the oil to the element by tapping the foam side of the element with the towel.
- Install the element so that the mesh side faces the carburetor.

Oil Draining

A drain hose is connected to the bottom of the air cleaner housing, to drain oil accumulated at the bottom of the housing.

- Drain oil by taking off the plug at the lower end of the drain hose.

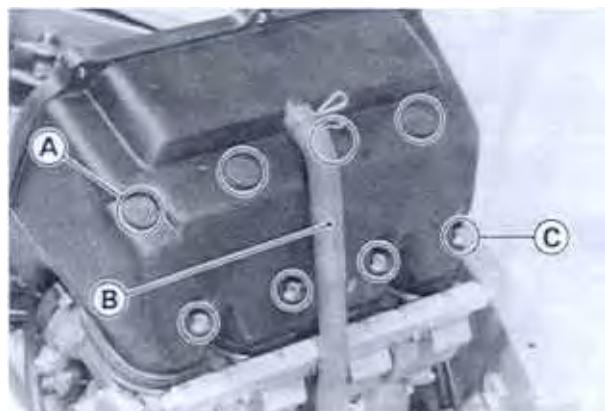


A. Plug

B. Drain Hose

Air Cleaner Housing Removal

- Remove the following.
 - Fuel Tank (see Fuel Tank Removal)
 - Serge Tank
 - Air Cleaner Element (see Element Cleaning)
 - Crankcase Breather Hose
- Remove the air cleaner housing.



A. Plugs and Bolts

B. Crankcase Breather Hose

C. Bolts

2-8 FUEL SYSTEM

Carburetors

Idle Speed Adjustment

- Start the engine and warm it up thoroughly.
- Turn the handlebar from side to side while idling the engine.
- ★ If idle speed varies, the throttle cables may be poorly routed or they 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.

- Check idle speed.

Idle Speed

Standard: 1200 ±50 r/min (rpm)

- Turn the idle adjusting screw until idle speed is correct.



A. Idle Adjusting Screw

Service Fuel Level Adjustment

WARNING

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

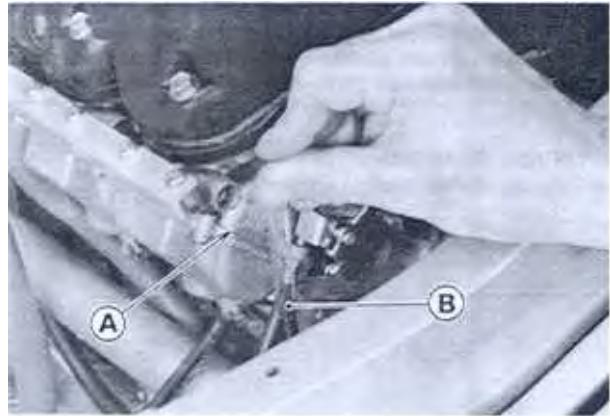
- Remove the fuel tank and air cleaner housing (see this chapter).
- Connect a fuel tank to the carburetors with a suitable hose.
- Prepare a fuel hose (6 mm in diameter and 300 mm in length).
- Connect the fuel level gauge (special tool) to the carburetor float bowl with the fuel hose.
- Situate the motorcycle so that it is perpendicular to the ground.

- Check the fuel level as shown.

- Turn out the carburetor drain plug a few turns. Wait until the fuel level in the gauge settles.

NOTE

- Keeping the gauge vertical, align the top line with the mark on the carburetor body right side. Then turn out the drain plug to feed fuel to the gauge.



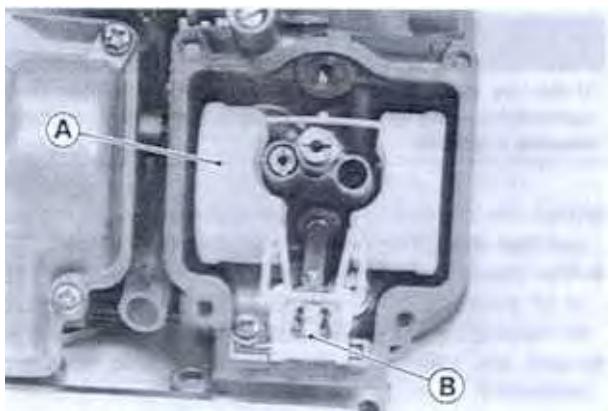
A. Fuel Level Mark

B. Fuel Level Gauge: 57001-1017

Service Fuel Level

8 ±1 mm below the mark on the carburetor body

- To adjust the fuel level, remove the float bowl, and bend the tang on the float arm to change the float height.

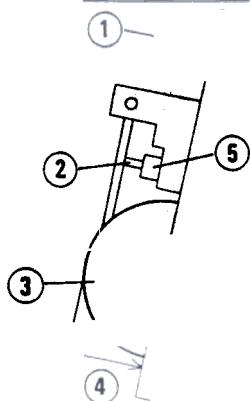


A. Float

B. Tang

- Measure the float height tilting the carburetor so that the tang on the float just touches the needle rod in the float valve.

- Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.



1. Bottom Edge of Carburetor Body
2. Needle Rod
3. Float
4. Float Height
5. Float Valve

Float Height

Standard: 11 ± 2 mm

NOTE

Do not push the needle rod in during the float height measurement.

Carburetor Removal

WARNING

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

- Remove the following.
 - Fuel Tank (see Fuel Tank Removal)
 - Surge Tank (see Surge Tank Removal)
 - Air Cleaner Housing (see Air Cleaner Housing Removal)
 - Idle Adjuster
 - Fuel Hoses
- Loosen the carburetor clamps and remove the carburetors.

Carburetor Installation

- Install the holder clamps as shown being careful of the screw position and the screw head direction (see Engine Top End chapter).

WARNING

Be sure to install the holder clamp screws in the direction shown. Or, the screws could come in contact with the throttle linkage resulting in an unsafe riding condition.

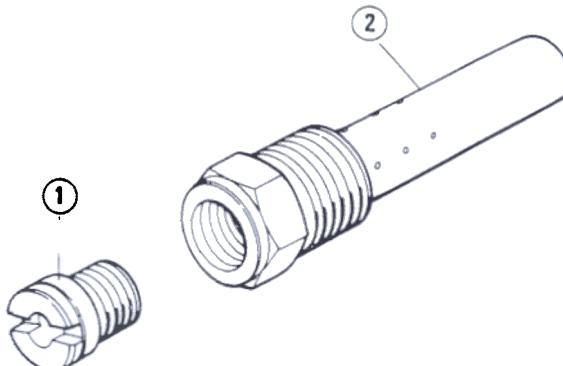
Carburetor Disassembly/Assembly

WARNING

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

CAUTION

During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp edge to remove the diaphragm.
Do not force the needle jet holder (air bleed pipe) and main jet or overtighten them. They could be damaged requiring replacement.



1. Main Jet

2. Needle Jet Holder

★ If the needle jet is damaged, replace the carburetor.

Carburetor Inspection

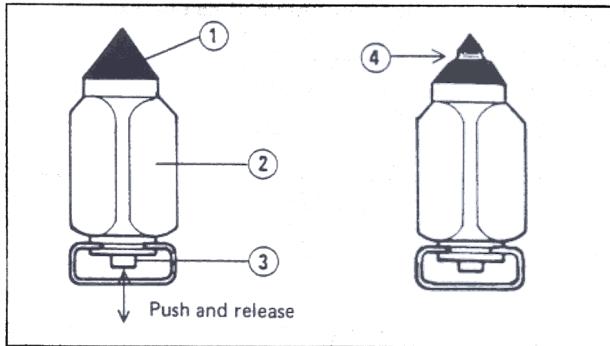
WARNING

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.

- Slide the starter plunger lever right to left to check that the starter plungers move smoothly and return with spring tension.
- ★ If the starter plungers do not work properly, replace the carburetors.

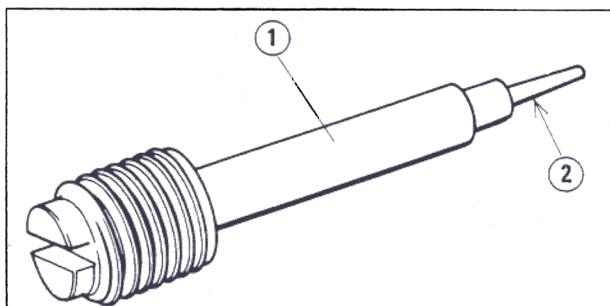
2-10 FUEL SYSTEM

- Turn the throttle cable lever 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.
- Check that the O-rings on the float bowl and pilot screws 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.



1. Plastic Tip 3. Rod
2. Valve Needle 4. Valve Needle Wear

- ★ If the plastic tip is damaged, replace the needle.
- Check the tapered portion of the pilot screw for wear or damage.



1. Pilot Screw 2. Tapered Portion

- ★ If the pilot screw is worn or damaged on the tapered portion, it will prevent the engine from idling smoothly. Replace it.

Fuel Pump and Filter

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. Be prepared for fuel spillage.

Removal

- Remove the following.
Right Side Cover (see Frame chapter)
Fuel Hoses
- Disconnect the pump lead connector.
- Remove the fuel pump and filter.

Installation

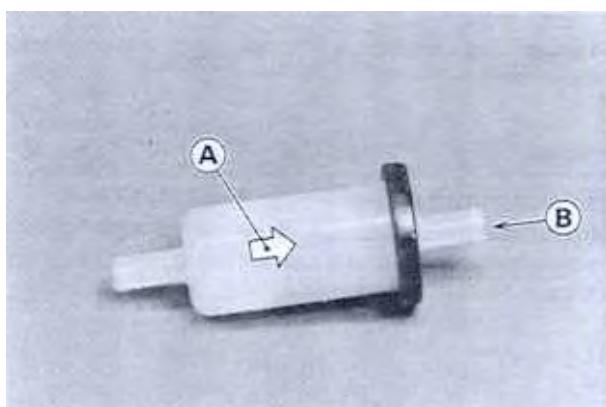
- Connect the fuel hoses.
- Install the fuel filter so that the arrow on it shows the fuel flow from the fuel tank to the fuel pump.
- Be sure to route the hoses so that they will not be kinked or stretched.

Fuel Pump Inspection

Refer to the Electrical System chapter.

Fuel Filter Inspection

- Visually inspect the fuel filter according to the Periodic Maintenance Chart (see General Information chapter).
- ★ If the filter is clear with no signs of dirt or other contamination, it is OK and need not be replaced.
- ★ If the filter is dark or looks dirty, replace it. Also, check the rest of the fuel system for contamination.



A. Arrow Mark B. Blow

Fuel Tank**Removal**

- Turn the fuel tap to the OFF position to stop the fuel flow.

WARNING

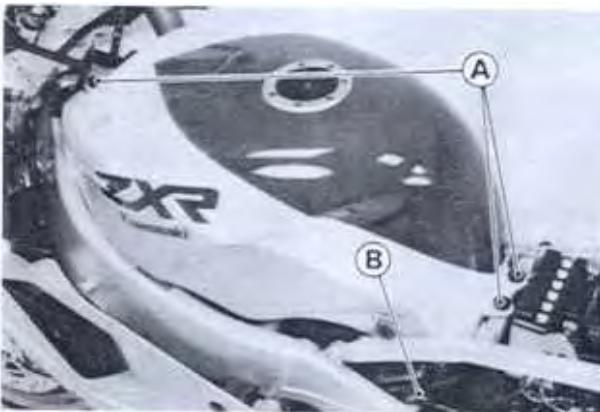
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

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.

● Remove the following.

- Front Seat (see Frame chapter)
- Side Cover Assembly
- Fuel Tank Mounting Bolts
- Fuel Tap with Fuel Hoses left installed and Fuel Hose to the carburetor removed
- Air Duct Clamp



A. Mounting Bolts

B. Fuel Tap

NOTE

- To take the air ducts out, remove the duct pawls from the inside of the fuel tank.

- Remove the fuel tank.

Installation

- Install the fuel tank hoses.

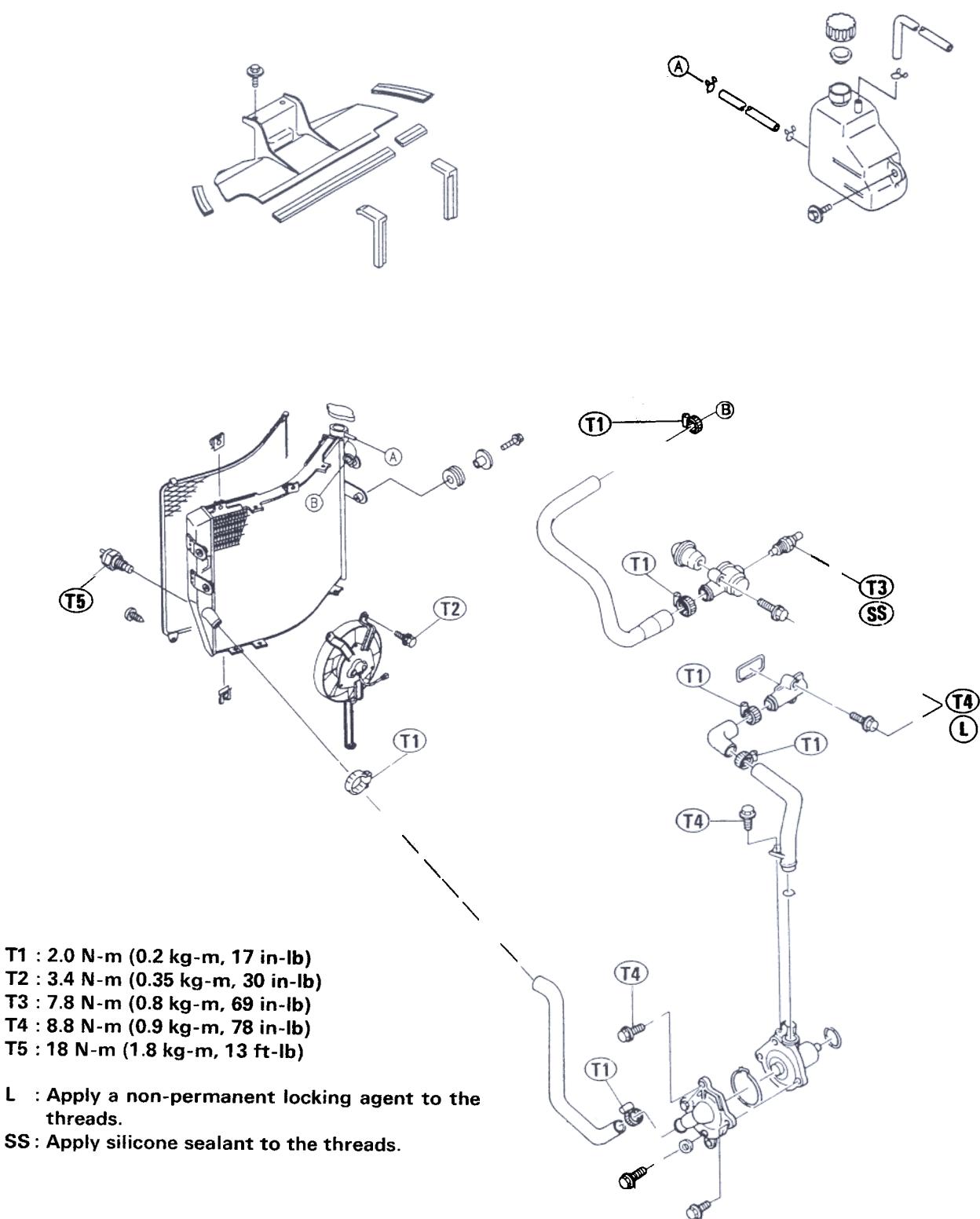
Cooling System

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3-2 COOLING SYSTEM

Exploded View

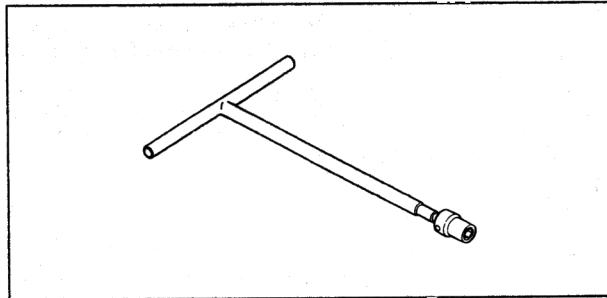


Specifications

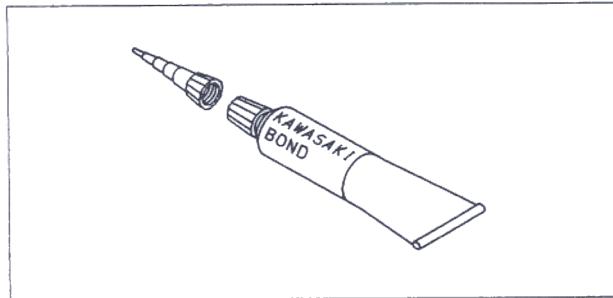
Items	Standard
Coolant:	
Type	Permanent type of antifreeze for aluminum engines and radiators
Color	Green
Mixed ratio	Soft water 50%, coolant 50%
Freezing point	-35°C (-31°F)
Total amount	2.3 L (reservoir tank full level)
Radiator:	
Cap relief pressure	93 ~ 123 kPa (0.95 ~ 1.25 kg/cm ² , 14 ~ 18 psi)
Thermostat:	
Valve opening temperature	80.0 ~ 84.0°C (176 ~ 183°F)
Valve full opening lift	Not less than 6 mm @95°C (203°F)

Special Tool

Socket Wrench, Hex 8: 57001-1268

**Sealant**

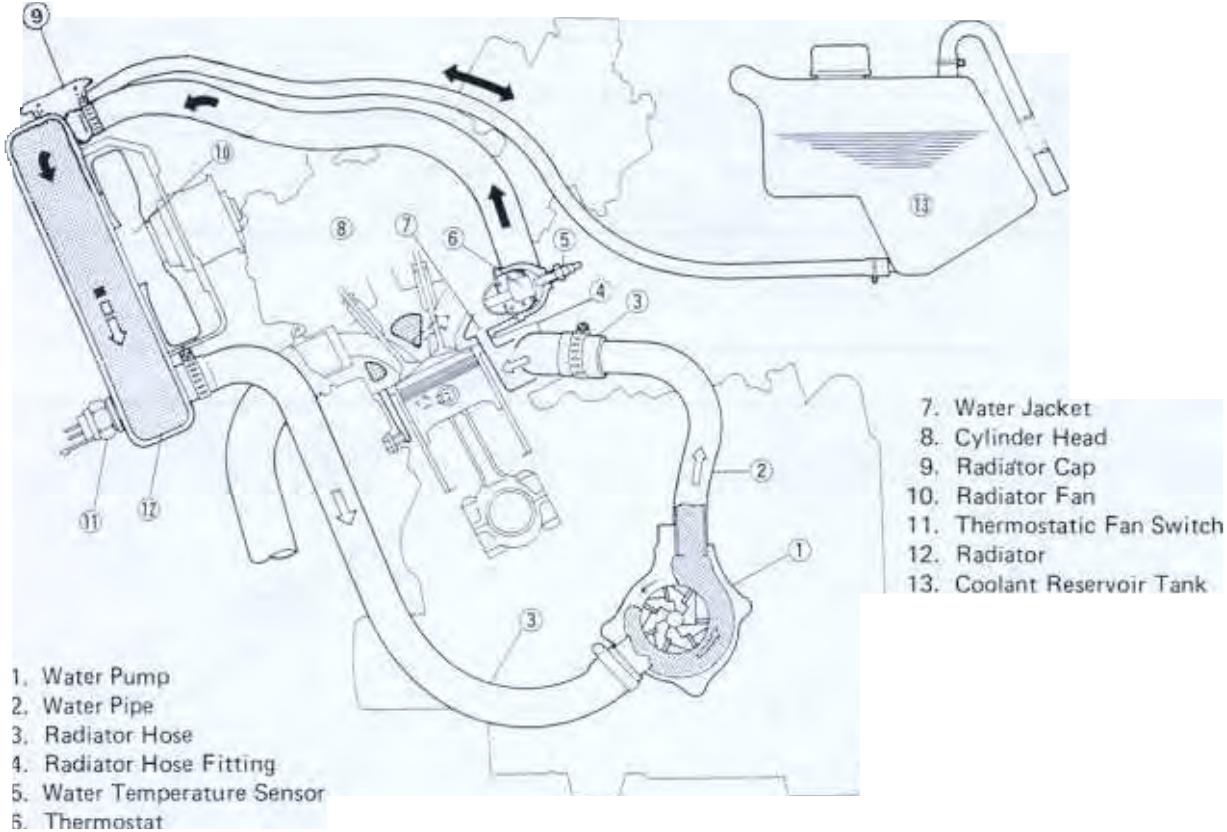
Kawasaki Bond (Silicone Sealant): 56019-120



3-4 COOLING SYSTEM

Coolant Flow Chart

When the engine is cold, the thermostat is closed so that the coolant flow is restricted through the small hole (air hole) on the thermostat, causing the engine to warm up more quickly.

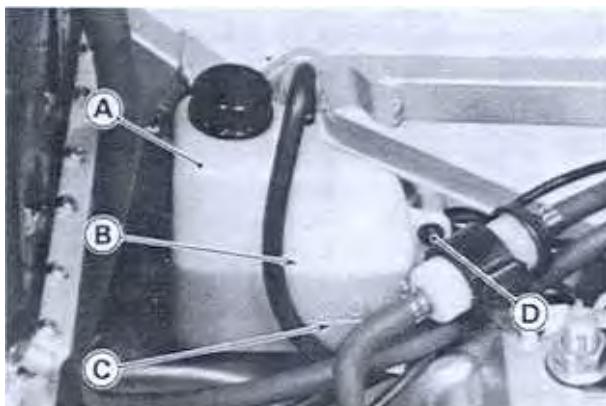


Coolant

Coolant Level Inspection

NOTE

- Check the level when the engine is cold (room or ambient temperature).
- Check the coolant level in the reservoir tank with the motorcycle held perpendicularly.
- Check the coolant level from between the fuel tank and the flame at the left side.
- ★ If the coolant level is lower than the lower level line, add coolant to the upper level line.



A. Reservoir Tank
B. Upper Level

C. Lower Level
D. Mounting Bolt

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.

- To remove the reservoir tank, remove the fuel tank.

Coolant Draining

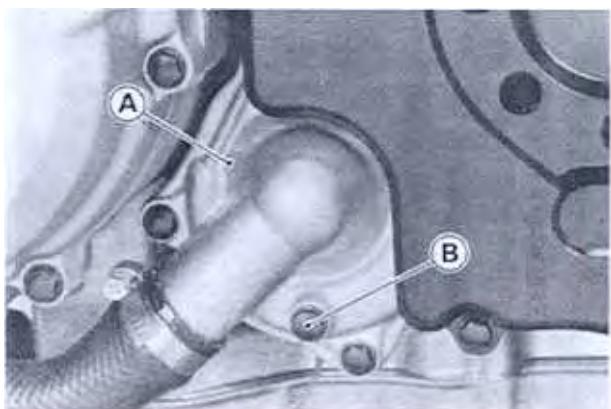
⚠ WARNING

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 wheels.

Since coolant is harmful to the human body, do not use for drinking.

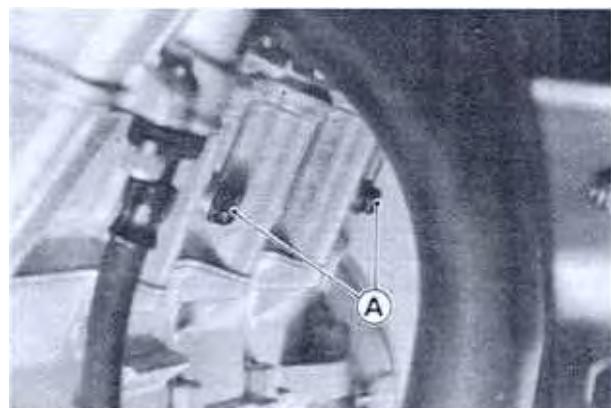
- Remove the fairings.
- Place a container under the engine.
- Remove the drain plug.



A. Water Pump

B. Drain Plug

- Remove the following.
- Radiator Cap
- Cylinder Drain Plugs



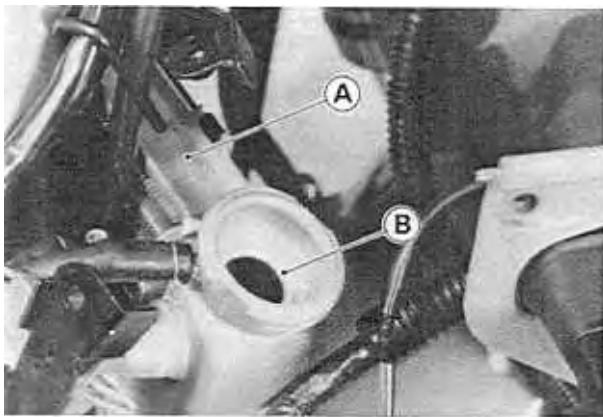
A. Cylinder Drain Plugs

- The coolant will drain from the radiator and engine.

Coolant Filling

- Tighten the drain plugs to the specified torque (see Exploded View).
- Fill the radiator up to the thermostat housing filler neck with coolant.

3-6 COOLING SYSTEM



A. Radiator

B. Filler Neck

- Fill the reservoir tank up to the upper level line with coolant.

NOTE

- *Pour in the coolant slowly so that it can expel the air from the engine and radiator.*

CAUTION

Soft or distilled water must be used with the antifreeze (see Specifications in this chapter) 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.

Water and Coolant Mixture Ratio (Recommended)

Soft Water	:	50%
Coolant	:	50%
Freezing Point	:	-35°C (-31°F)
Total Amount	:	2.3 L

NOTE

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

- Start the engine with the radiator cap removed and run it until no more air bubbles can be seen in the coolant.
- Tap the radiator hoses to force any air bubbles caught inside.
- Stop the engine and add coolant up to the radiator filler neck.
- Install the radiator cap.
- Fill the reservoir tank up to the upper level line with coolant and install the cap.

CAUTION

Do not add more coolant above the upper level line.

Pressure Testing

- Remove the radiator cap, and install a cooling system pressure tester on the radiator filler neck.

NOTE

- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.

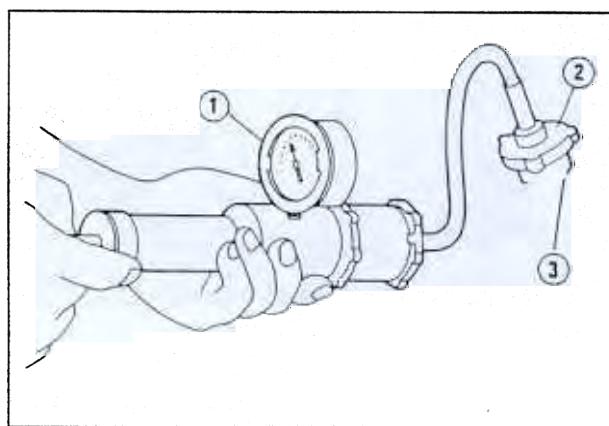
- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kg/cm², 18 psi).

CAUTION

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kg/cm², 18 psi).

- Watch the gauge for at least 6 seconds.

- ★ If the pressure holds steady, the system is all right.



1. Pressure Tester
2. Adapter

3. Radiator Filler Neck

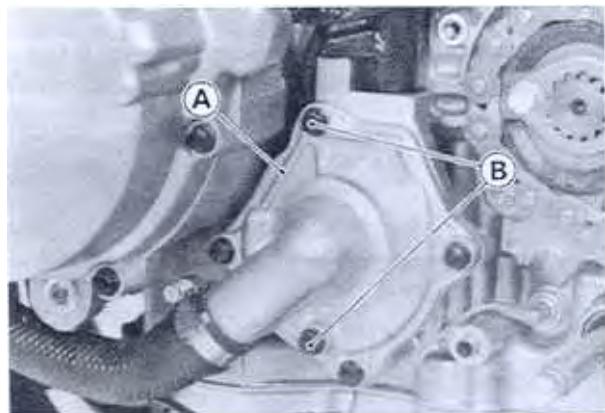
- ★ If the pressure drops soon, check for leaks.

Water Pump

Removal

- Remove the fairings.
- Drain the coolant by removing the water pump drain plug.
- Remove the following.

Shift Lever
Engine Sprocket Cover
Radiator Hose Clamp on Water Pump
Water Pipe
Water Pump Mounting Bolts(2)



A. Water Pump

B. Mounting Bolts

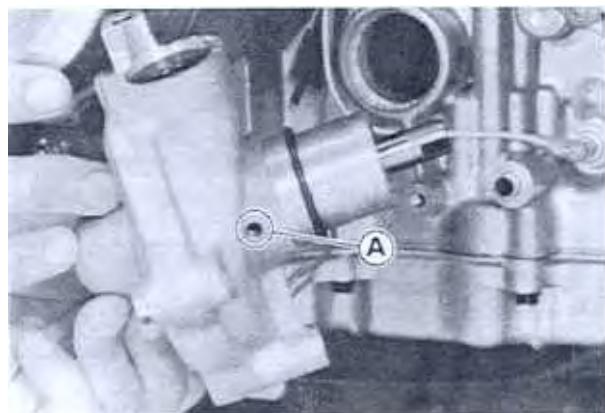
- Pull the water pump out of the crankcase and the radiator hose.

Water Pump Pipe Mounting Bolt
Radiator Hose Clamp Bolt

- Apply a non-permanent locking agent to the engine sprocket cover bolt (one bolt only – see Final Drive chapter).
- Install the water pump cover.
- Fill the coolant (see Coolant Filling).

Water Pump Inspection

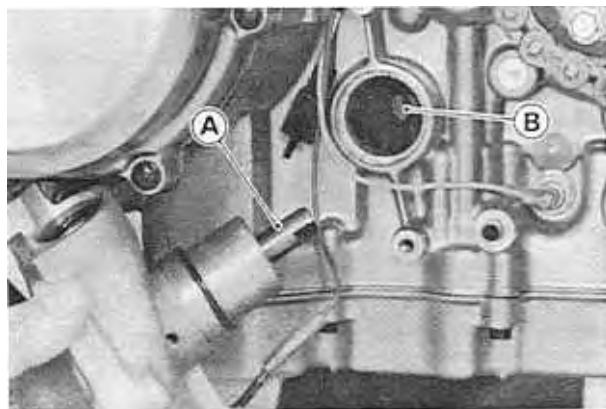
- Check the drainage outlet passage at the bottom of the water pump body for coolant leaks.
- ★ If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the water pump unit.



A. Drainage Outlet Passage
(at the bottom of the pump body)

Installation

- Install the water pump with the water pump cover removed.
- Turn the water pump impeller so that the water pump shaft slot fits the oil pump shaft projection.



A. Water Pump Shaft

B. Oil Pump Shaft

- Install the water pipe.
 - Tighten the following bolts to the specified torque (see Exploded View).
- Water Pump Mounting Bolts

3-8 COOLING SYSTEM

Radiator and Radiator Fan

Removal

⚠WARNING

The radiator fan is connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE RADIATOR FAN CONNECTOR IS DISCONNECTED. TOUCHING THE FAN BEFORE THE CONNECTOR IS DISCONNECTED COULD CAUSE INJURY FROM THE FAN BLADES.

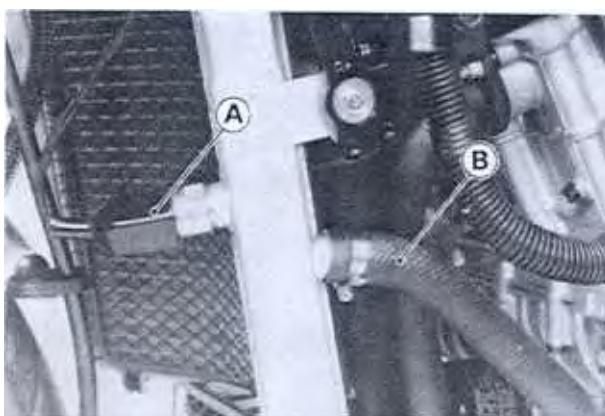
- Remove the following.

Fairings
Fuel Tank (see Fuel System chapter)
Coolant (drain: see Water Pump Removal)
Baffle Plate
Radiator Fan Connector

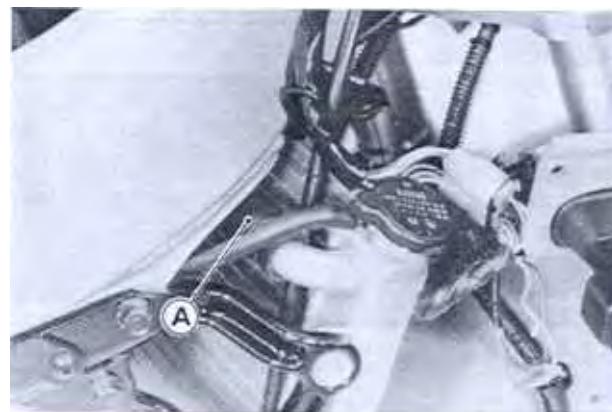


A. Radiator Fan Connector

Radiator Fan Switch Connector
Radiator Hoses

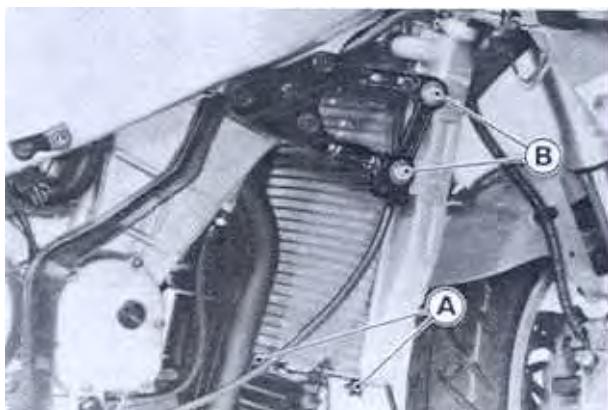


A. Radiator Fan Switch Connector B. Radiator Hose



A. Radiator Hose

Radiator Lower Mounting Bolts
Radiator Side Mounting Bolts



A. Lower Mounting Bolts
B. Side Mounting Bolts

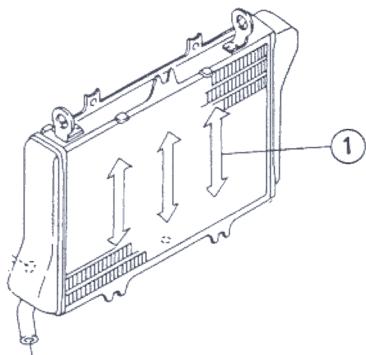
- Remove the radiator

Radiator Inspection

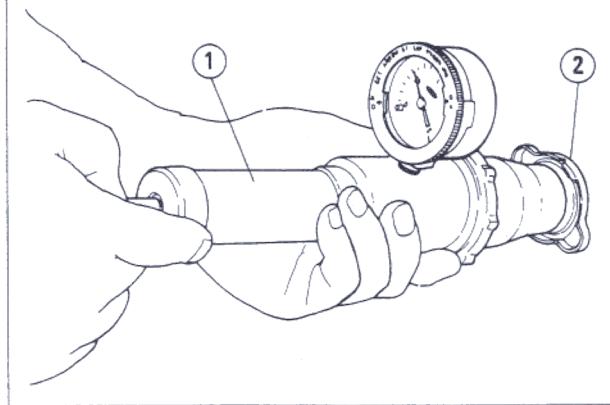
- Check the radiator core.
 - ★ If there are obstructions to air flow, remove them.
 - ★ If the corrugated fins are deformed, carefully straighten them.
 - ★ If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.

CAUTION

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage. Keep the steam gun away more than 0.5 m from the radiator core. Hold the steam gun perpendicular to the core surface. Run the steam gun following the core fin direction.



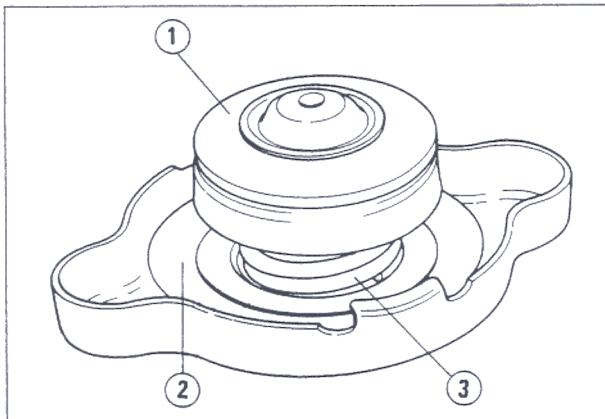
1. Steam Gun Running Direction



1. Pressure Tester 2. Radiator Cap

Radiator Cap Inspection

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

1. Bottom Valve Seal
2. Top Valve Seal

3. Valve Spring

- Install the cap on a cooling system pressure tester.

NOTE

- Wet the cap sealing surfaces with water or coolant to prevent pressure leakage.

● Watching the pressure gauge, pump the pressure tester to build up the pressure. The cap must open at the relief pressure (the gauge pointer flicks down). Also the cap must hold any pressure less than the relief pressure for at least 6 seconds.

Radiator Cap Relief Pressure

Standard: 93 ~ 123 kPa
(0.95 ~ 1.25 kg/cm², 14 ~ 18 psi)

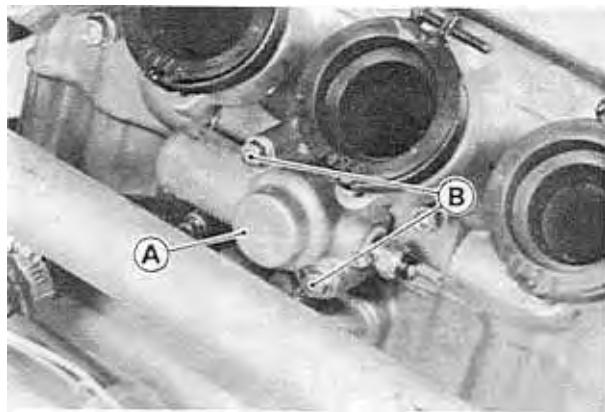
- ★ If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.

3-10 COOLING SYSTEM

Thermostat

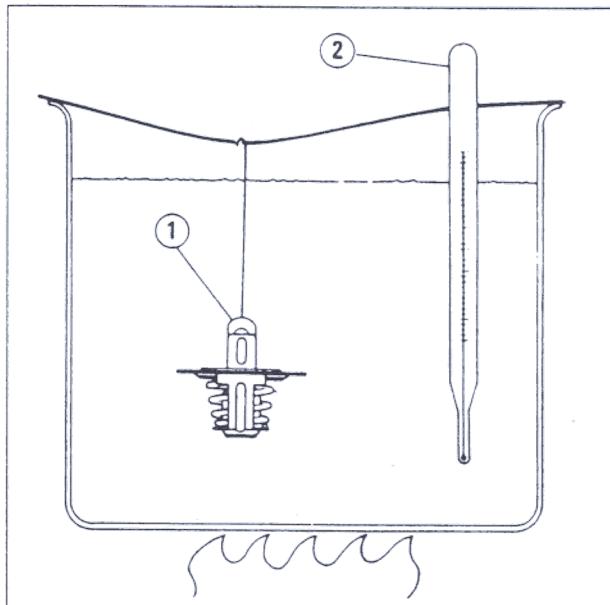
Removal

- Remove the fairing and the side cover assembly.
- Drain coolant (cylinder head, cylinder).
- Remove the following.
 - Carburetor (see Fuel System chapter)
 - Hose (Thermostat Housing)
 - Mounting Bolts
 - Water Temperature Sensor Connector
- Remove the thermostat housing on the cylinder.
- Remove the thermostat from the housing.



A. Housing

B. Mounting Bolt



1. Thermostat

2. Thermometer

★ If the measurement is out of the specified range, replace the thermostat.

Thermostat Valve Opening Temperature

80 ~ 84°C (176 ~ 183°F)

Installation

- Install the thermostat noting the following.
- Install the thermostat so that the stay faces outside.
- Be sure to install the O-ring on the housing.
- Add coolant (see Coolant Filling).

Inspection

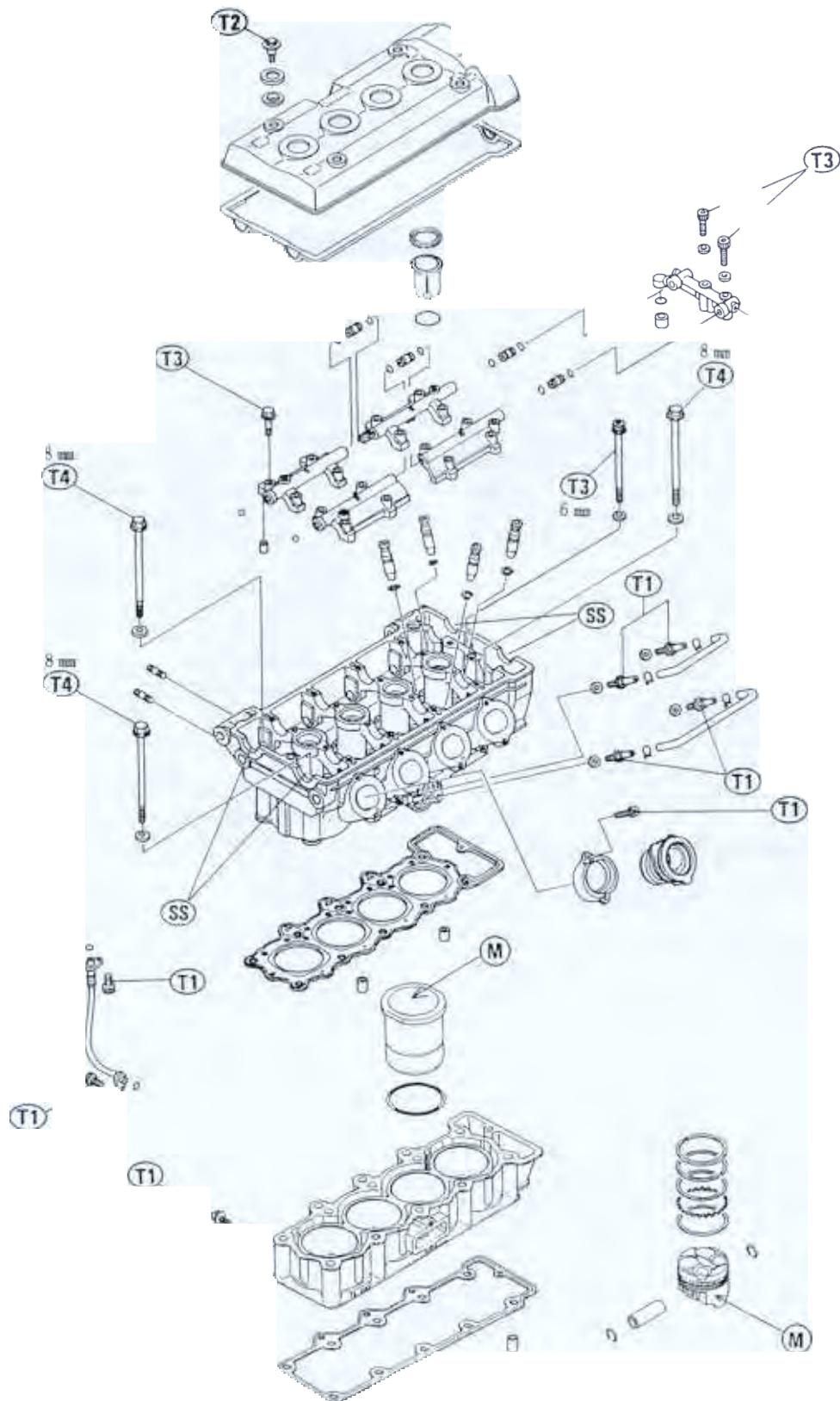
- Remove the thermostat, and inspect the thermostat valve at room temperature.
- ★ If the valve is open, replace the valve with a new one.
- To check valve opening temperature, suspend the thermostat in a container of water and raise the temperature of the water.

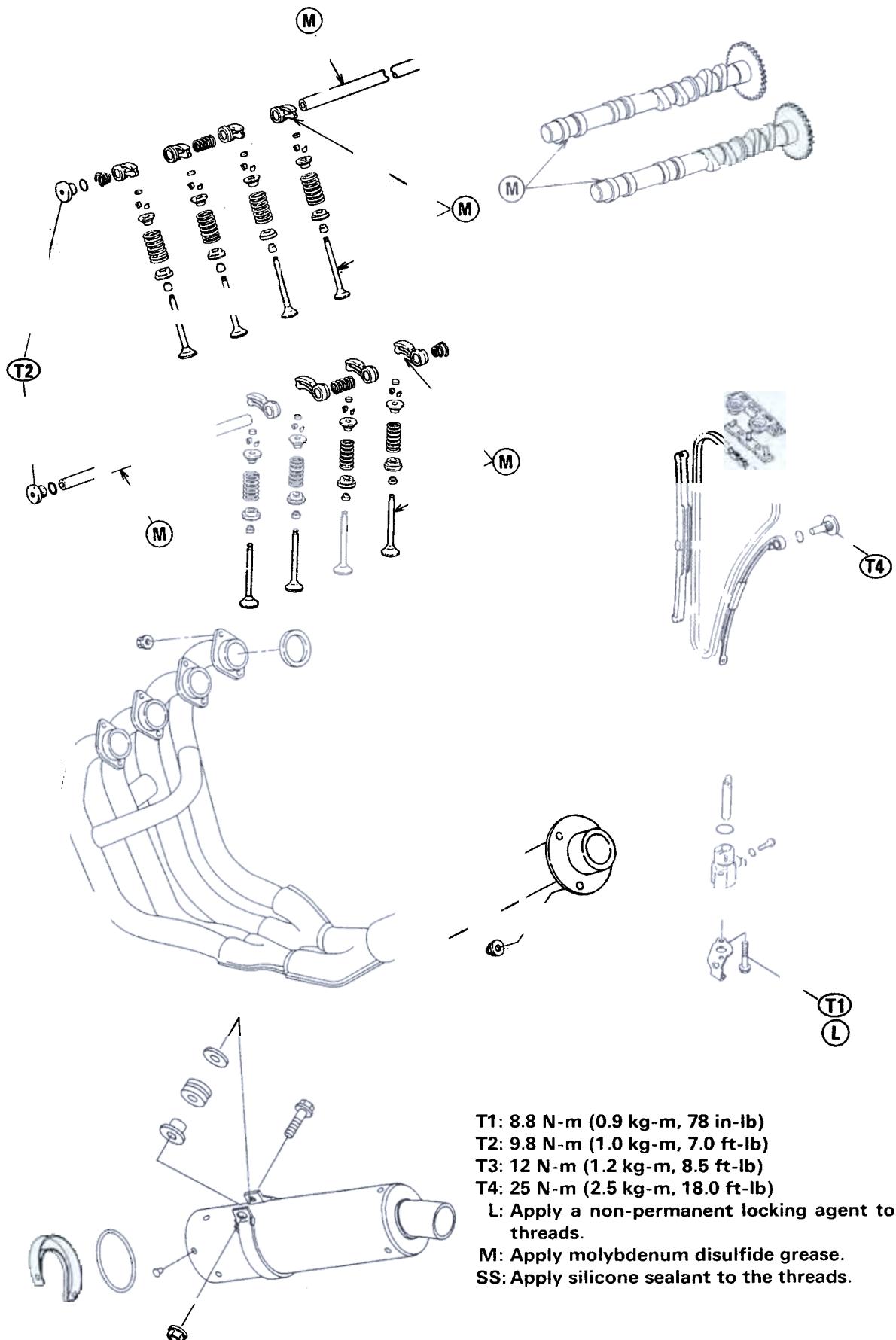
Engine Top End

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Exploded View





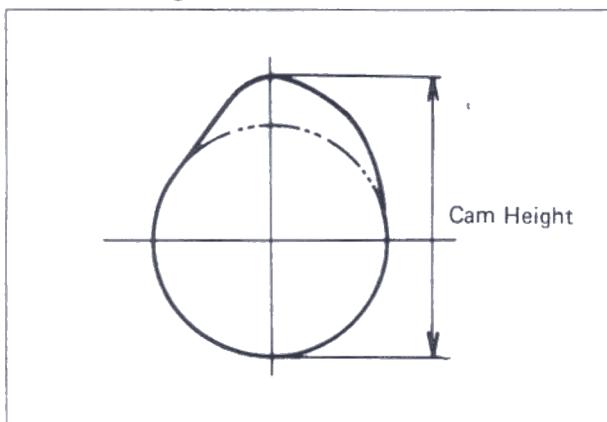
- T1:** 8.8 N·m (0.9 kg·m, 78 in-lb)
T2: 9.8 N·m (1.0 kg·m, 7.0 ft-lb)
T3: 12 N·m (1.2 kg·m, 8.5 ft-lb)
T4: 25 N·m (2.5 kg·m, 18.0 ft-lb)
L: Apply a non-permanent locking agent to the threads.
M: Apply molybdenum disulfide grease.
SS: Apply silicone sealant to the threads.

4-4 ENGINE TOP END

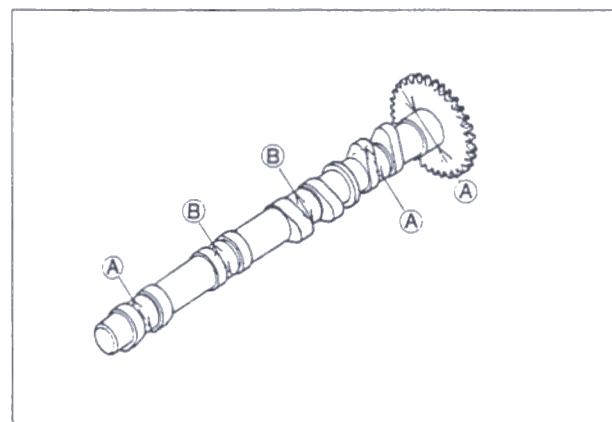
Specifications

Item	Standard	Service Limit
Camshaft:		
Cam height:		
Inlet	31.778 ~ 31.918 mm	31.68 mm
Exhaust	31.469 ~ 31.609 mm	31.37 mm
Camshaft, camshaft cap clearance:		
A	0.028 ~ 0.071 mm	0.16 mm
B	0.078 ~ 0.121 mm	0.21 mm
Camshaft journal diameter:		
A	23.950 ~ 23.972 mm	23.92 mm
B	23.900 ~ 23.922 mm	23.87 mm
Camshaft bearing inside diameter	24.000 ~ 24.021 mm	24.08 mm
Camshaft runout	---	0.1 mm TIR
Camshaft chain 20-link length	127.0 ~ 127.4 mm	128.9 mm
Cylinder Head:		
Cylinder compression (Usable range)	686 ~ 1 079 kPa (7.0 ~ 11.0 kg/cm ² , 99 ~ 156 psi) @330 r/min (rpm)	
Cylinder head warp	---	0.05 mm
Valves:		
Valve clearance:	Inlet Exhaust	0.12 ~ 0.17 mm 0.16 ~ 0.21 mm
Valve spring free length:		38.2 mm
Valve head thickness:	Inlet Exhaust	0.5 mm 0.7 mm
Valve stem bend		0.02 TIR or under
Valve seat cutting angle		45°, 32°, 60°
Valve seat surface:		
Width:	Inlet Exhaust	0.5 ~ 1.0 mm 0.5 ~ 1.0 mm
Outside diameter:	Inlet Exhaust	21.5 ~ 21.7 mm 18.5 ~ 18.7 mm

Camshaft Height Measurement

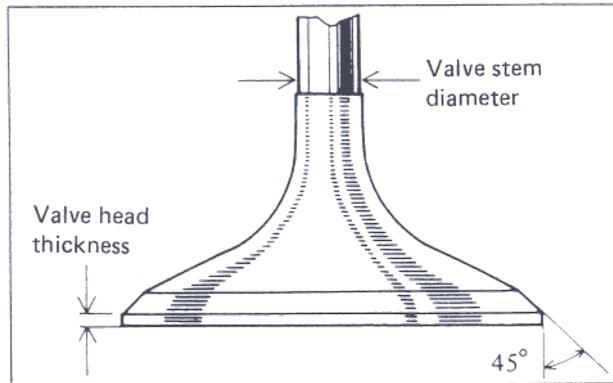


Camshaft Journal Diameter

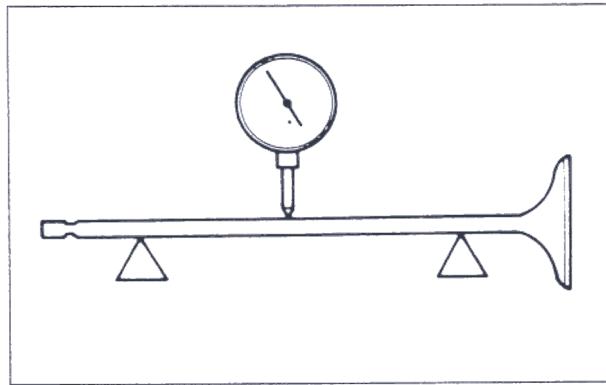


Item	Standard	Service Limit
Valve/valve guide clearance (wobble method):		
Inlet	0.031 ~ 0.140 mm	0.34 mm
Exhaust	0.085 ~ 0.180 mm	0.41 mm
Valve stem diameter:		
Inlet	3.975 ~ 3.990 mm	3.96 mm
Exhaust	3.955 ~ 3.970 mm	3.94 mm
Valve guide inside diameter	4.000 ~ 4.012 mm	4.08 mm
Cylinder, Piston:		
Cylinder inside diameter	57.000 ~ 57.012 mm	57.10 mm
Piston diameter	56.942 ~ 56.957 mm	56.79 mm
Piston/cylinder clearance	0.043 ~ 0.070 mm	---
Oversize piston and rings	+ 0.5 mm	---
Piston ring/groove clearance	0.030 ~ 0.070 mm	0.17 mm
Piston ring end gap:		
Top	0.20 ~ 0.40 mm	0.70 mm
Second	0.35 ~ 0.50 mm	0.80 mm

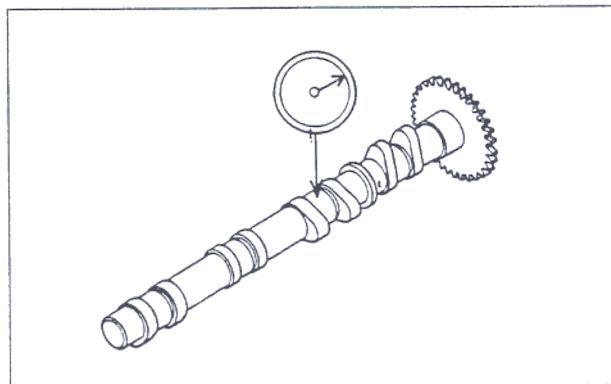
Valve Head



Valve Stem Bend



Camshaft Runout



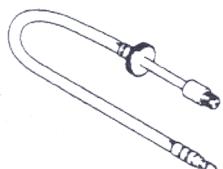
4-6 ENGINE TOP END

Special Tools

Compression Gauge: 57001-221



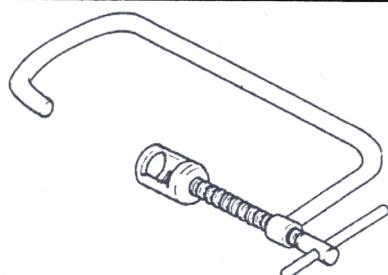
Compression Gauge Adapter, M10 X 1.0: 57001-1311



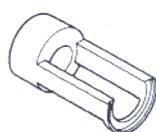
Rocker Arm Holder: 57001-1270



Valve Spring Compressor Assembly: 57001-241



Valve Spring Compressor Adapter, φ21: 57001-1272



Valve Spring Compressor Joint: 57001-1271



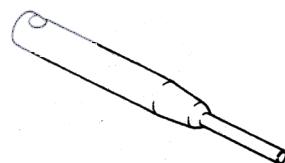
Valve Guide Arbor, φ4: 57001-1273



Valve Guide Reamer, φ4: 57001-1274



Valve Seat Cutter Holder, φ4: 57001-1275



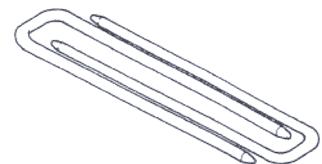
Valve Seat Cutter, 45° – φ24.5: 57001-1113



Valve Seat Cutter, 32° – ϕ 25: 57001-1118



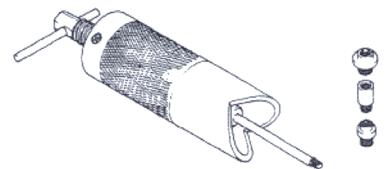
Piston Base, ϕ 8: 57001-147



Valve Seat Cutter Holder Bar: 57001-1128



Piston Pin Puller Assembly: 57001-910



Valve Seat Cutter, 60° – ϕ 30: 57001-1123



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120



Valve Seat Cutter, 45° – ϕ 22: 57001-1205



Valve Seat Cutter, 32° – ϕ 22: 57001-1206



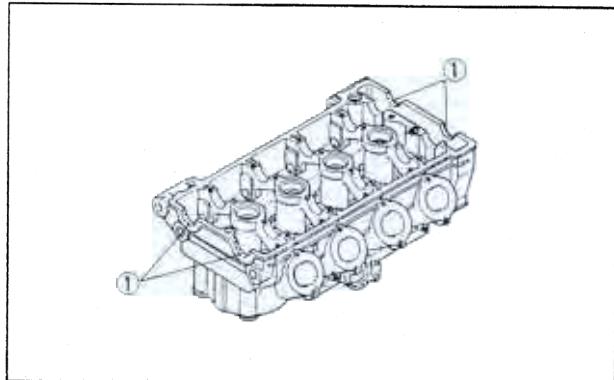
4-8 ENGINE TOP END

Cylinder Head Cover

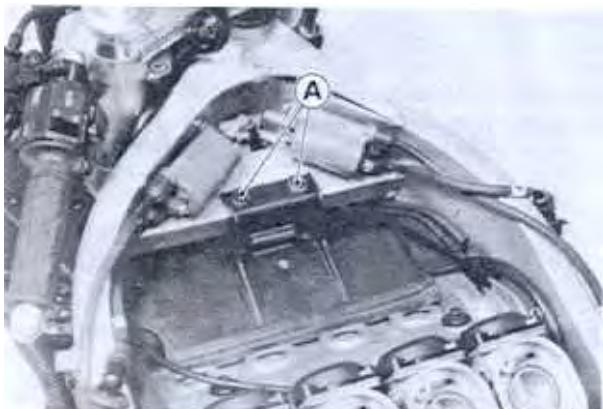
Removal

- Remove the following.

Fuel Tank (see Fuel System chapter)
Air Cleaner Housing (see Fuel System chapter)
Ignition Coils
Throttle Cable
Choke Cable
Baffle Plate

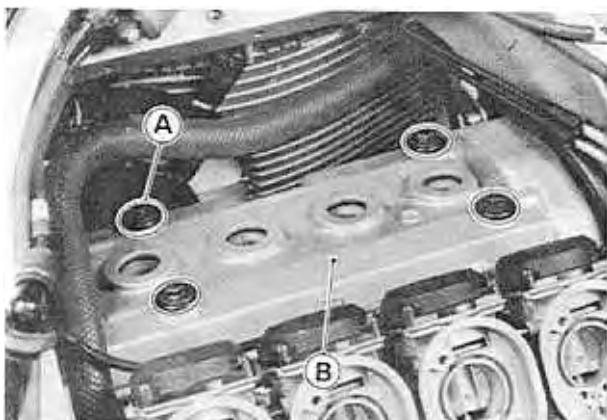


1. Silicone Sealant Applied Areas



A. Baffle Plate Bolt

- Remove the cylinder head cover bolts and take off the cover.



A. Bolts

B. Cylinder Head Cover

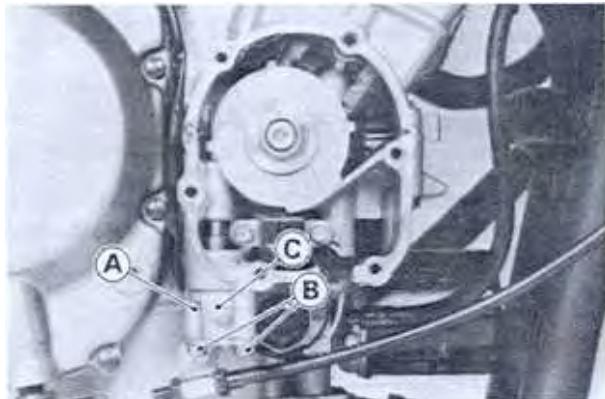
Installation

- Replace the head cover gasket with new one if it is damaged.
- Apply silicone sealant to the cylinder head as shown.
- Tighten the cover bolts to the specified torque (see Exploded View).

Camshaft Chain Tensioner

Removal

- Remove the pickup coil cover.
- Remove the mounting bolts and take off the camshaft chain tensioner.



A. Camshaft Chain Tensioner C. Lock Bolt
B. Mounting Bolts

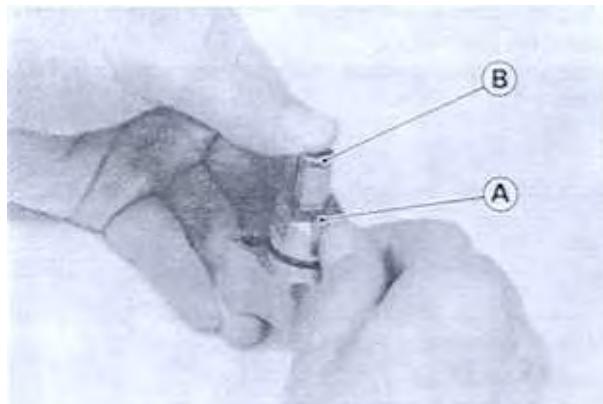
- Pull out the rod from the cam chain guide (rear side).

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:

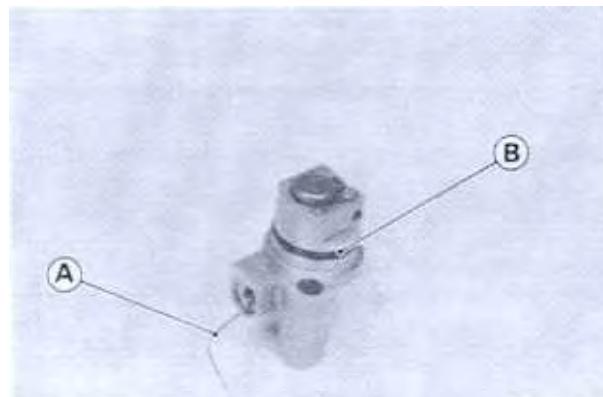
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Chain Tensioner Installation."

Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.



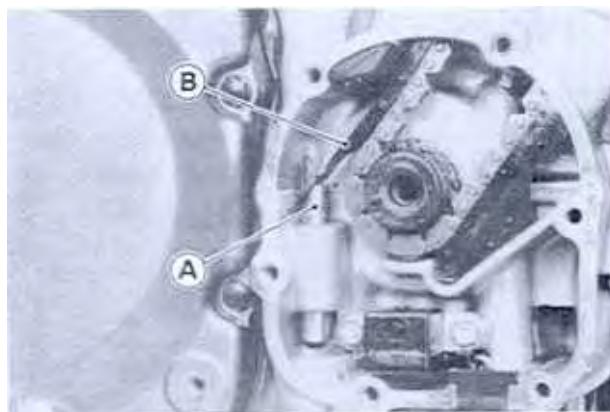
A. Taper Part (Stopper) B. Push Rod

- Compressing the spring against the push rod head, insert a thin wire through the hole in the push rod to keep the spring in place.



A. Wire B. O-ring

- Apply grease to the O-ring.
- Install the top end of a extension rod into a hole of the chain guide.



A. Extension Rod B. Chain Guide

- Install the tensioner body on the engine.
- Apply a non-permanent locking agent to the mounting bolts and tighten them to the specified torque (see Exploded View).
- Pull the wire out and tighten the lock bolt.
- Install the pickup coil cover.

4-10 ENGINE TOP END

- Apply silicone sealant to the crankcase parting line and grommet (see 4-12).
- Apply a non-permanent locking agent to only one bolt (see 4-12).

Camshaft

Camshaft Removal

- Remove the following.

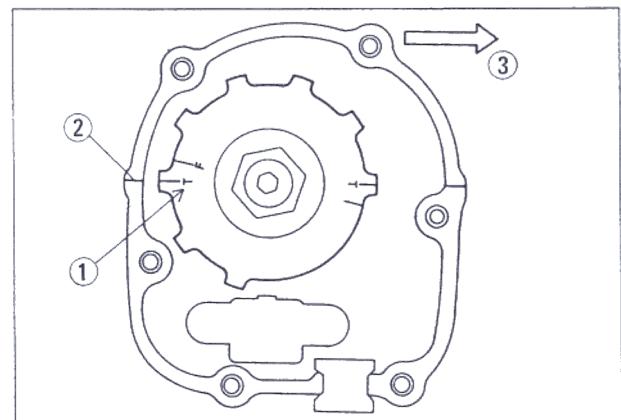
Lower Fairings (see Frame chapter)
Pickup Coil Cover
Damper Rubber (from Rear Cam Chain Guide)

- Remove the following.

Carburetor (see Fuel System chapter)
Cylinder Head Cover (this chapter)
Spark Plug Retainer
Camshaft Chain Tensioner (this chapter)

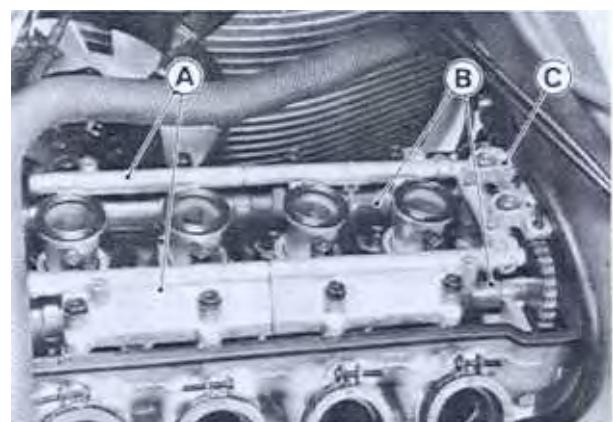
NOTE

- Before removing the chain tensioner, position the crankshaft at #1, 4 piston TDC.



- 1. TDC Mark
- 2. Timing Mark (Crankcase Parting Line)
- 3. Front

- Remove the camshaft cap bolts and take off the camshaft caps, camshafts and upper chain guide.



- A. Camshaft Caps
- B. Camshafts
- C. Upper Chain Guide

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

CAUTION

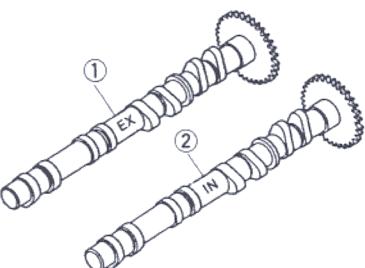
The crankshaft may be turned, while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

Camshaft Installation

- Installation is the reverse of removal. Note the following.
- 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 molybdenum disulfide grease to the new cam part surfaces.

NOTE

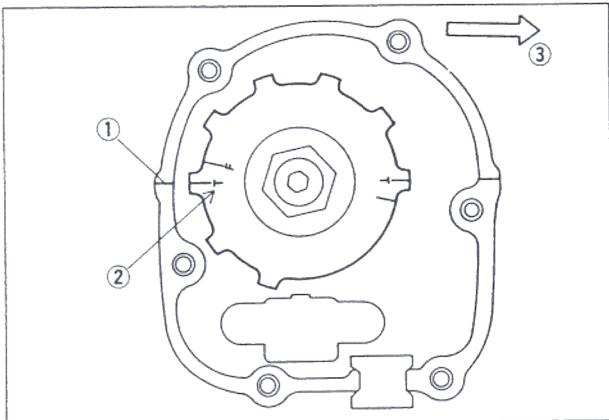
- The exhaust camshaft has an EX mark and the inlet camshaft has an IN mark. Be careful not to mix up these shafts.



1. EX Mark

2. IN Mark

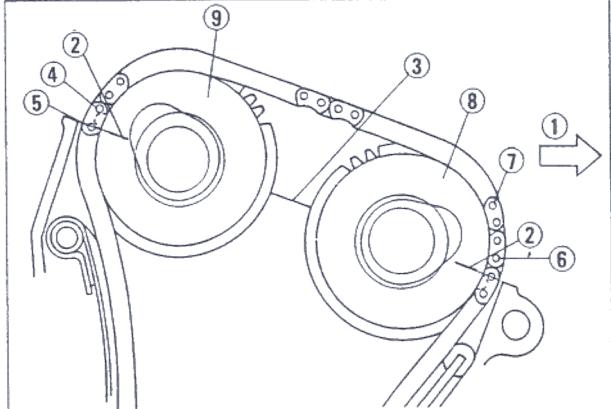
- Position the crankshaft at TDC for the #1 and #4 pistons, engage the cam chain with the camshaft sprockets as shown.



1. Timing Mark (Crankcase Parting Line)
2. TDC Mark for #1 and #4 Pistons (Near to F Mark)
3. Front

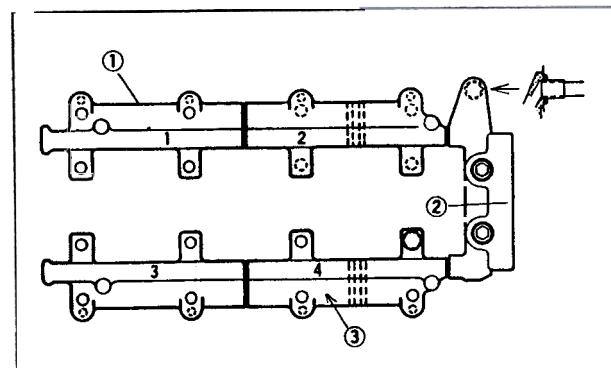
- Pull the tension side (exhaust side) of the chain taut to install the chain.
- The timing marks must be aligned with the cylinder head upper surface and positioned respectively as shown, after the camshaft chain slack is taken up by the tensioner.

Camshaft Chain Timing (right side view)



1. Front	6. 1st
2. Timing Mark	7. 2nd
3. Cylinder Head Upper Surface	8. Exhaust Camshaft
4. 29th	9. Inlet Camshaft
5. 30th	

- The camshaft cap locations are numbered. Install the caps in the positions as shown.



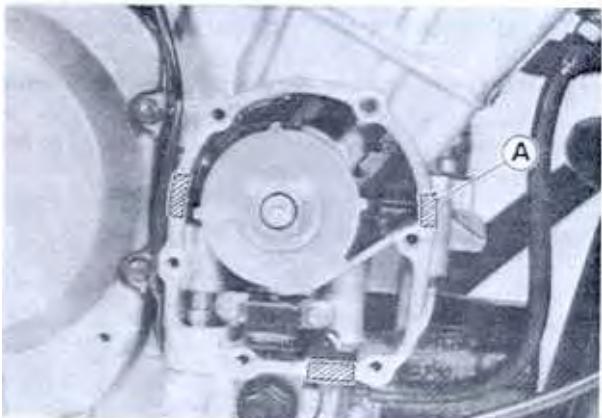
1. Camshaft Cap	3. Location Number
2. Upper Chain Guide	

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.

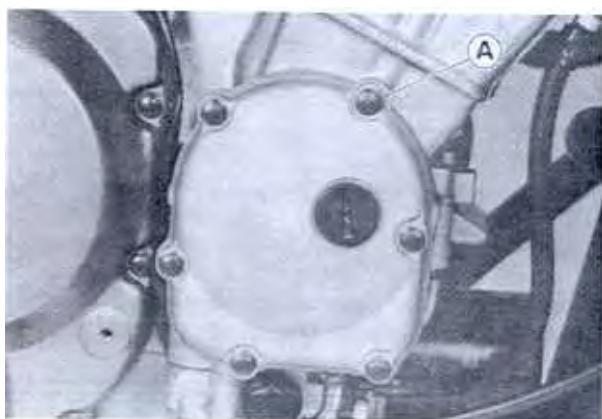
- Tighten the camshaft cap bolts to the specified torque (see Exploded View).
- Install the camshaft chain tensioner.
- Install the pickup coil cover, noting the following.
- Apply silicone sealant to the following.
Crankcase Parting Line
Grommet

4-12 ENGINE TOP END



A. Apply silicone sealant.

- Apply a non-permanent locking agent to the following bolt only.



A. Apply a non-permanent locking agent.

Camshaft, Camshaft Cap Wear

- Measure each clearance between the camshaft and the camshaft cap using plastigage (press gauge).

NOTE

- Tighten the camshaft cap bolts to the specified torque (see Exploded View).



A. Plastigage Width

NOTE

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

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

Camshaft, Camshaft Cap Clearance

#1, #4 Journals

Standard: 0.028 ~ 0.071 mm
Service Limit: 0.16 mm

#2, #3 Journals

Standard: 0.078 ~ 0.121 mm
Service Limit: 0.21 mm

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

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

Camshaft Chain Wear

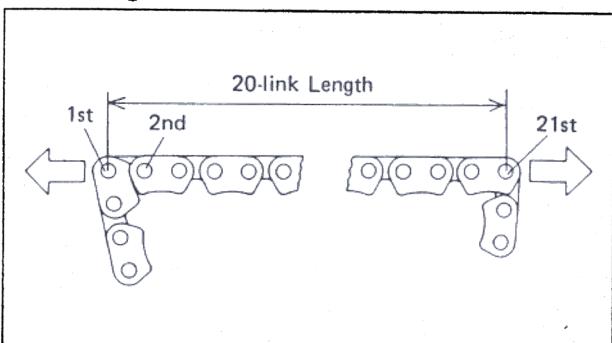
● Hold the chain taut with a force of about 5 kg in some manner, and measure a 20-link length. Since the chain may wear unevenly, take measurement at several places.

★ If any measurement exceeds the service limit, replace the chain.

Camshaft Chain 20-Link Length

Standard: 127.0 ~ 127.4 mm
Service Limit: 128.9 mm

Chain Length Measurement



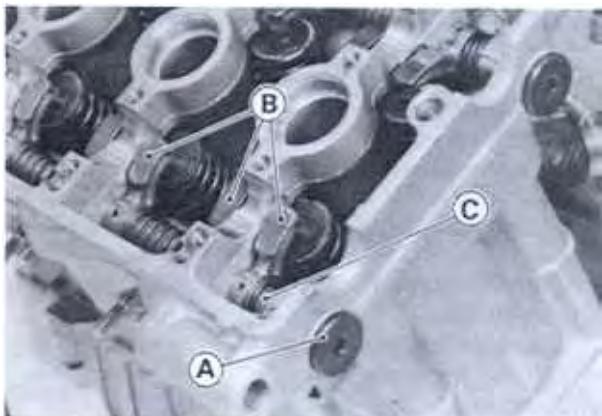
Rocker Arm, Rocker Shaft

Rocker Arm and Rocker Shaft Removal

- Remove the camshafts (this chapter).

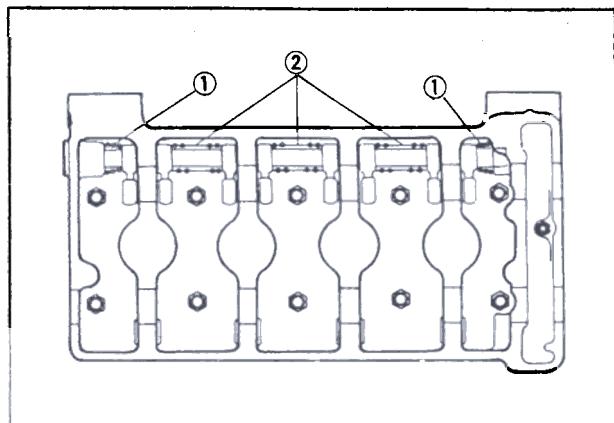
NOTE

- Mark the rocker arms so they may be put back in the same position.
- Remove the rocker shaft plug and rocker shaft, and take off the rocker arms.



A. Plug
B. Rocker Arms

C. Rocker Shaft



1. Springs (conical)
2. Springs

- Tighten the following to the specified torque (see Exploded View).
 - Upper Chain Guide Bolts
 - Camshaft Cap Bolts
 - Rocker Shaft Plug

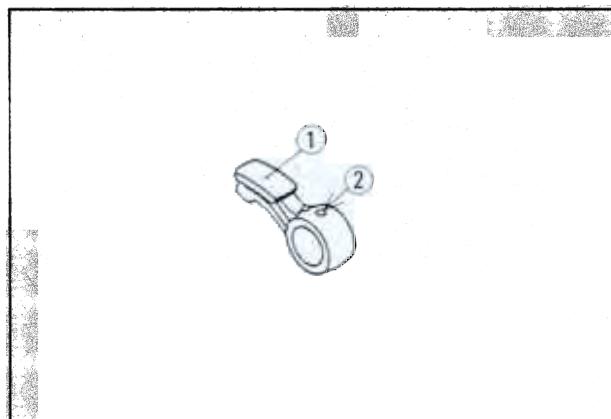
Rocker Arm and Rocker Shaft Inspection Note

- Inspect the rocker arms and rocker shafts.
- ★ If they are badly worn, replace them.

Rocker Arm and Rocker Shaft

Installation Notes

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



1. Rocker Arm 2. Oil Pressure

- Apply engine oil to the rocker shaft, and insert the shaft running it through the cylinder head, the rocker arms and springs.
- Install the retainer spring on each rocker arm as shown.

4-14 ENGINE TOP END

Cylinder Head

Cylinder Compression Measurement

NOTE

- Use the battery which is fully charged.

- Warm up the engine thoroughly.

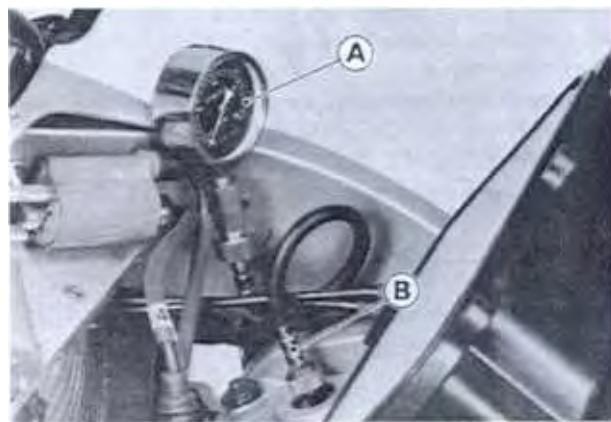
- Remove the following.

Fuel Tank (see Fuel System chapter)

Surge Tank (see Fuel System chapter)

Spark Plugs

- Attach the compression gauge and adapter (special tools) firmly into the spark plug hole.



A. Compression Gauge: 57001-221

B. Adapter: 57001-1317

- Hold the throttle wide open and crank the engine with the starter.
- When the gauge stops rising, stop cranking and read the gauge.

Cylinder Compression

Usable Range:

686 ~ 1 079 kPa @330 r/min (rpm)
(7.0 ~ 11.0 kg/cm², 99 ~ 156 psi)

- ★ If cylinder compression is higher than the specified range, check the following.
 - Carbon build-up on the cylinder head combustion chamber
 - Carbon build-up on the piston head
- ★ If cylinder compression is lower than the specified range, check the following.
 - Valve not seating properly
 - Piston/cylinder clearance excessive
 - Gas leakage around the cylinder head gasket
 - Valve clearance too small
 - Piston ring/piston ring groove clearance

Removal

- Drain coolant (see Cooling System chapter)

- Remove the following.

Radiator (see Cooling System chapter)

Muffler

Camshafts (see this chapter)

Oil Hose (Cylinder Head)

Engine Mounting Bracket Bolts, Nuts (Cylinder Head)

- Remove the cylinder head bolts and take off the cylinder head.

Installation

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

- Install the new cylinder head gasket with a new one.

- When the engine is mounted on the frame, install the chain guide (rear side) into the cylinder head, and tighten the mounting bolt to the specified torque (see Exploded View).

- Beforehand install the chain guide into the cylinder head.

- Tighten the following bolts to the specified torque (see Exploded View).

Camshaft Chain Guide Bolt (rear side)

Cylinder Head Bolts

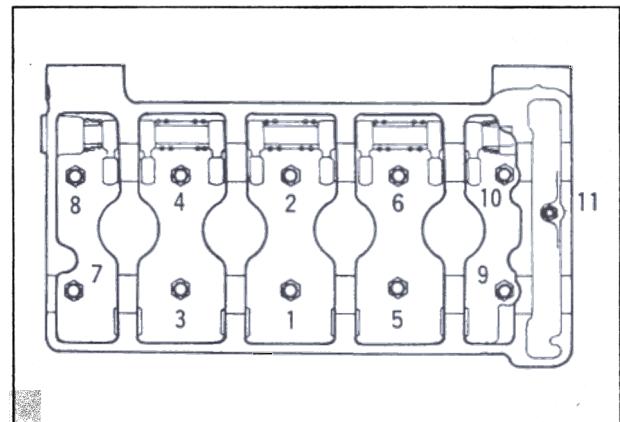
Camshaft Cap Bolts

Upper Chain Guide Bolts

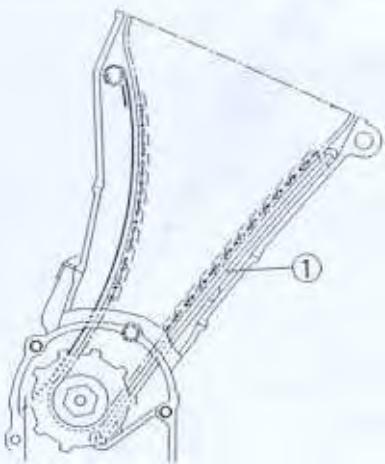
Oil Hose Mounting Bolts

Engine Mounting Bolts

- Tighten the cylinder head bolts following the tightening sequence.



- Install the chain guide (front side).



1. Chain Guide (front side)

Valves

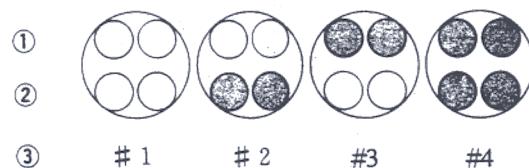
Valve Clearance Adjustment

NOTE

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

- Remove the following.
Cylinder Head Cover
Spark Plug Retainer
- Using a thickness gauge, measure the valve clearance between the rocker arm and the cam.
- When positioning #4 piston TDC at the end of the compression stroke:
inlet valve clearance of #2 and #4 cylinders
exhaust valve clearance of #3 and #4 cylinders (see Camshaft Removal)

Measuring Valves

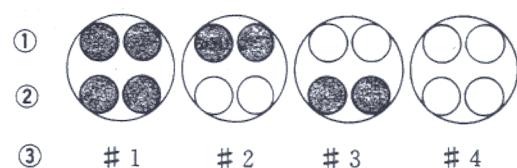


1. Exhaust Valves
2. Inlet Valves

3. Cylinder Numbers

- When positioning #1 piston TDC at the end of the compression stroke:
inlet valve clearance of #1 and #3 cylinders
exhaust valve clearance of #1 and #2 cylinders

Measuring Valves



1. Exhaust Valves
2. Inlet Valves

3. Cylinder Numbers

Valve Clearance (between Cam and Rocker Arm)

Standard:	Inlet:	0.12 ~ 0.17 mm
	Exhaust:	0.16 ~ 0.21 mm

4-16 ENGINE TOP END

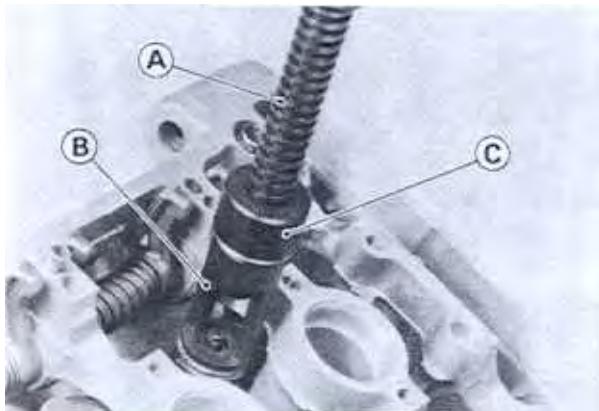
- Apply engine oil to the O-ring, install the spark plug retainer.
- ★ If the valve clearance is not within the specified range, first record the clearance, and then adjust it.
- To change the valve clearance, replace the shim with one of a different thickness.

NOTE

- Mark and record shim locations so they can be reinstalled in their original positions.
- To select a new shim which brings the valve clearance within the specified range.
- Remeasure any valve clearance that was adjusted. Readjust if necessary.

Valve Removal

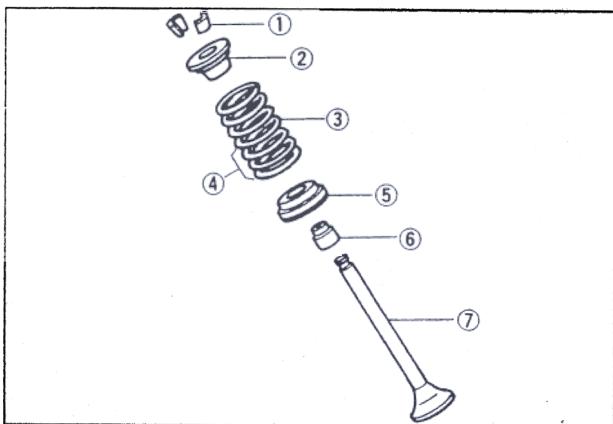
- Perform the following.
- Using the valve spring compressor assembly (special tool), remove the valve.



A. Valve Spring Compressor Assembly: 57001-241
B. Adapter: 57001-1272
C. Valve Spring Compressor Joint: 57001-1271

Valve Installation

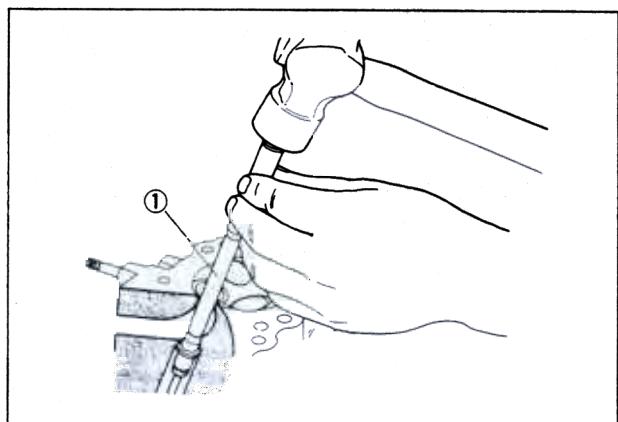
- Replace the oil seal with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the springs so that the closed coil end faces downwards.



1. Split Keeper 5. Spring Seat
2. Retainer 6. Oil Seal
3. Valve Spring 7. Valve Stem
4. Closed Coil End

Valve Guide Removal

- Using the valve guide arbor (special tool), tap out the valve guide.



1. Valve Guide Arbor: 57001-1273

NOTE

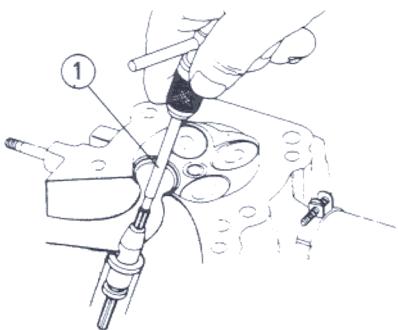
- Heat the area around the valve guide to 120 ~ 150 °C (248 ~ 302°F).

Valve Guide Installation

- Using the valve guide arbor (special tool), drive the valve guide until its flange touches the cylinder head.

NOTE

- Heat the area around the valve guide hole to 120 ~ 150°C (248 ~ 302°F).
- Apply oil to the valve guide outer surface before valve guide installation.
- Using the valve guide reamer (special tool), ream the valve guide.



1. Valve Guide Reamer: 57001-1274

Valve Seat Outside Diameter

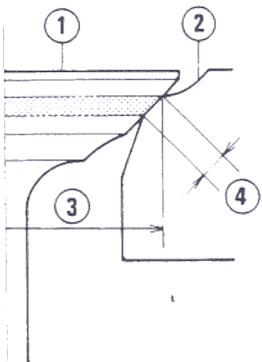
- If the outside diameter of the seating pattern on the valve seat is too large or too small, repair the valve seat.

Valve Seat Outside Diameter

Standard: Inlet : 21.5 ~ 21.7 mm
Exhaust : 18.5 ~ 18.7 mm

Valve Seat Width Inspection

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

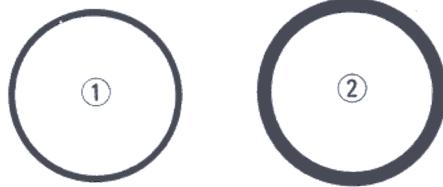


1. Valve
2. Valve Seat
3. Seating Surface Outside Diameter
4. Valve Seat Width

Valve Seat Width (IN and EX)

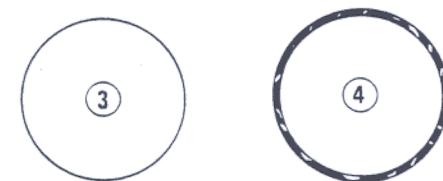
Standard: 0.5 ~ 1.0 mm

- ★ If the valve seat width is not within the specified range, repair the valve seat.



1. Good

2. Too wide



3. Too narrow

4. Uneven

Valve Seat Repair (Valve Lapping)

- Using the valve seat cutters (special tools), repair the valve seat.

Valve Seat Cutters

Inlet Valves:	45° - ϕ 24.5	57001-1113
	32° - ϕ 25	57001-1118
	60° - ϕ 30	57001-1123
Exhaust Valves:	45° - ϕ 22	57001-1205
	32° - ϕ 22	57001-1206
	60° - ϕ 30	57001-1123

Holder and Bar

Holder: 57001-1275
Bar: 57001-1128

- ★ If the manufacturer's instructions are not available, use the following procedure.

Seat Cutter Operating Care:

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

4-18 ENGINE TOP END

NOTE

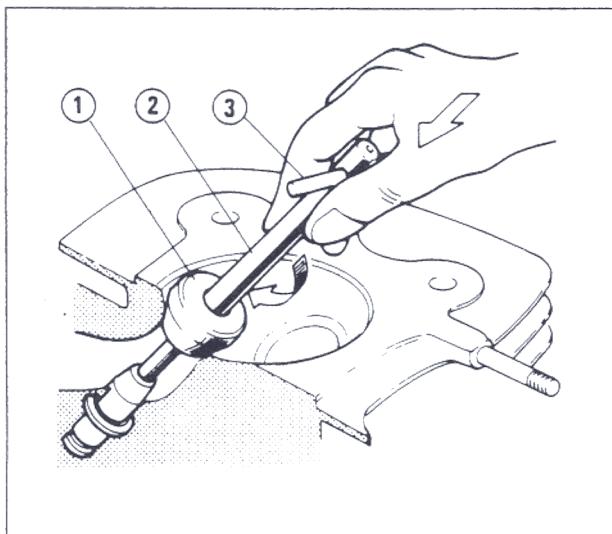
○Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.

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.

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



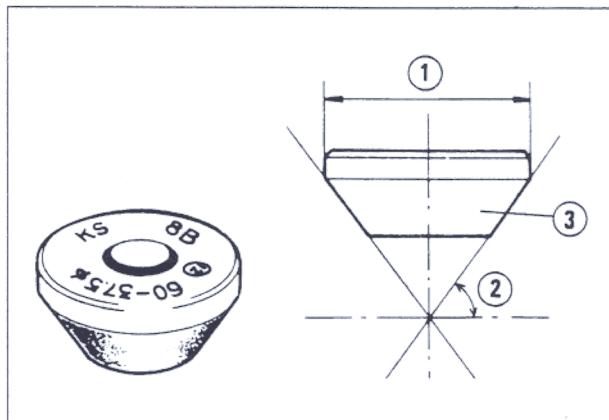
1. Cutter
2. Cutter Holder
3. Bar

Marks Stamped on the Cutter:

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

45°Cutter angle

24.5Φ.....Outer diameter of cutter



1. Outer Diameter of Cutter
2. Angle of Cutter
3. Cutter

Operating Procedures:

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

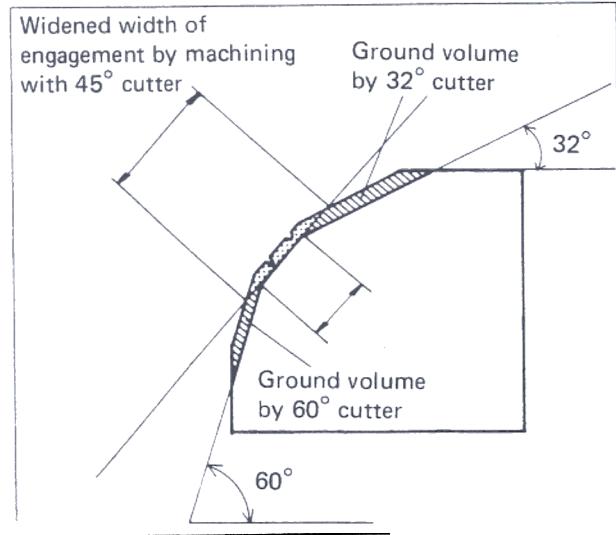
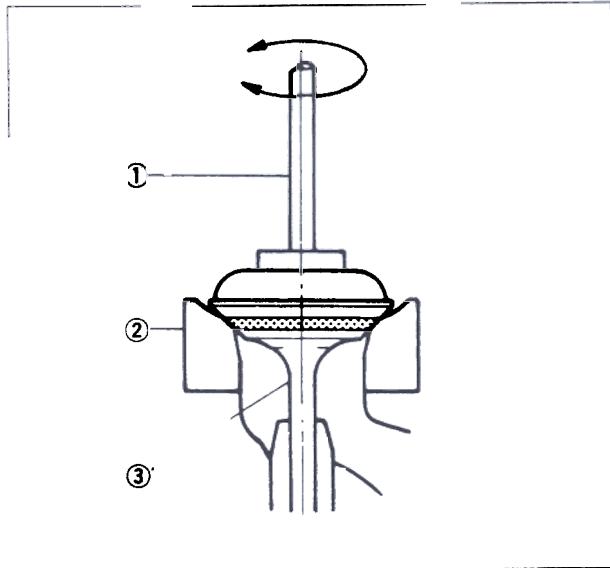
CAUTION

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

- Measure the outside diameter 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 into the holder, and slide it into the valve guide.
- Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

CAUTION

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

Valve Seat Repair**Valve Lapping**

- After making the 32° grind, return to the seat O.D. measurement step above.
- To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
- ★ If the seat width is too narrow, repeat the 45° grind until the seat O.D. measurement step above.
- ★ If the seat width is too wide, make the 60° grind described below.
- Grind the seat at a 60° angle until the seat width is within the specified range.
- To make the 60° grind, fit 60° cutter into 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.
- ★ If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Adjustment).

1. Lapper
2. Valve Seat

3. Valve

Measure 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.

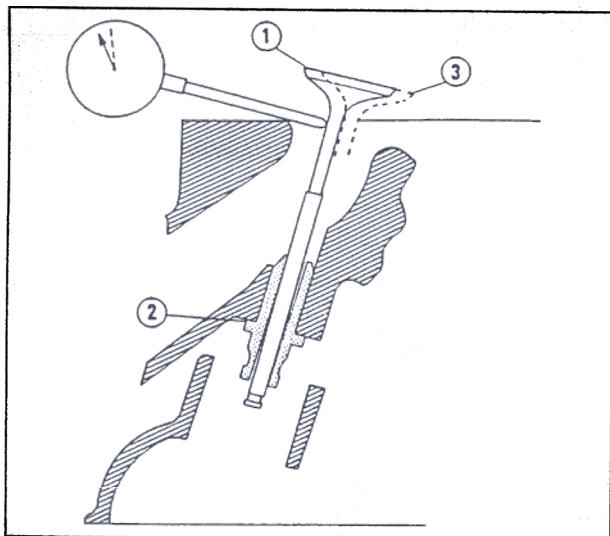
- Insert a new valve into the guide and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.
- ★ If the reading exceeds the service limit, replace the guide.

NOTE

O 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	0.031 ~ 0.140 mm	0.34 mm
Exhaust	0.085 ~ 0.180 mm	0.41 mm



- 1. New Valve
- 2. Valve Guide
- 3. Move the Valve.

Cylinder, Pistons

Cylinder Removal

- Remove the following.
 - Cylinder Head (see Cylinder Head Removal)
 - Camshaft Chain Guide (exhaust side)
 - Water Pipe
- Remove the cylinder.

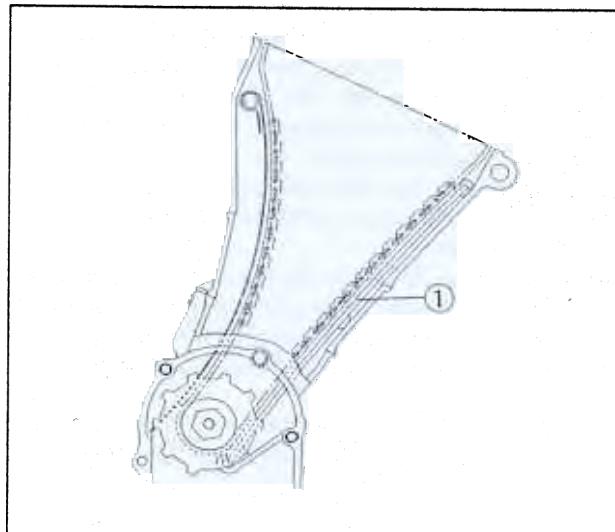
Cylinder Installation

- Install the new cylinder gasket.
- Apply engine oil to the cylinder bore.
- Using the piston base (special tools), install the cylinder block.



A. Piston Base: 57001-147

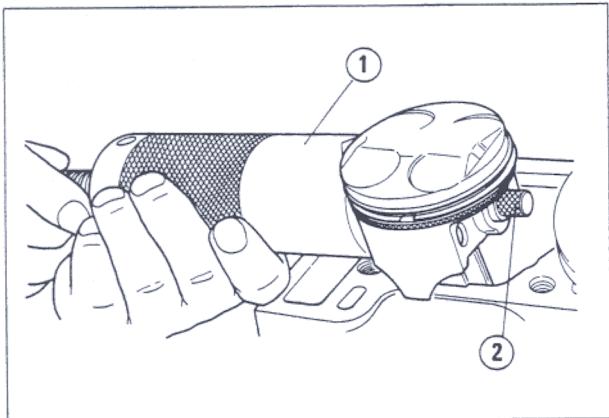
- Install the cylinder and the chain guide (exhaust side) as shown.



1. Chain Guide

Piston Removal

- Remove the cylinder (see this chapter).
- Place a clean cloth under the pistons and remove the piston pin snap rings from the outside of each piston.
- Using the piston pin puller assembly (special tool), remove the piston pins.

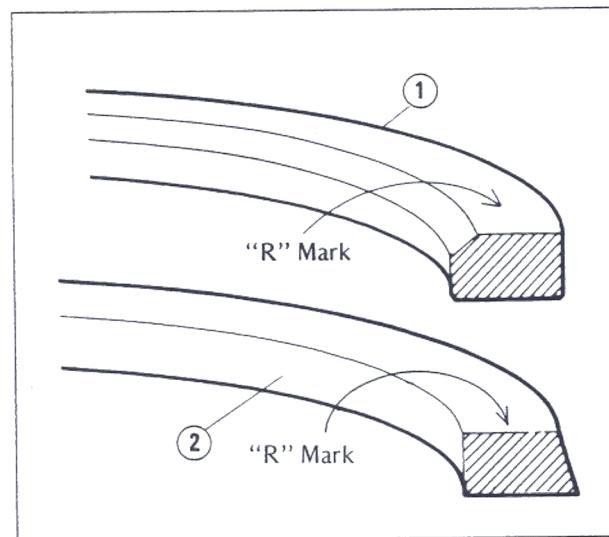


1. Piston Pin Puller Assembly: 57001-910

2. Adapter

Piston Installation

- The top and second rings must be installed with the R marks on the rings facing up.

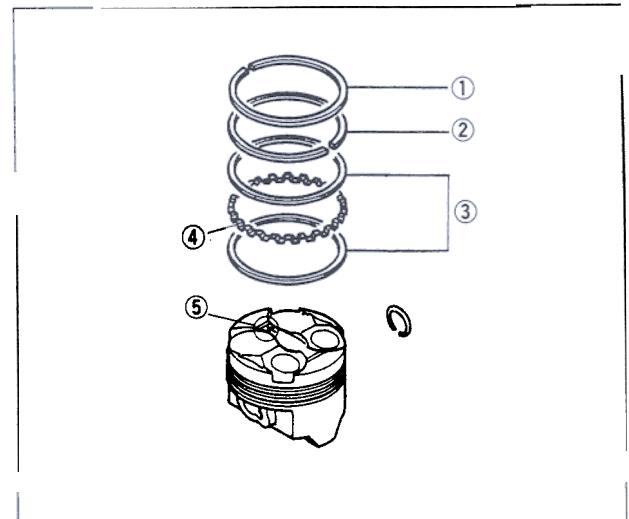


1. Top Ring

2. Second Ring

- The arrow on the piston head must point toward the front of the engine.

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



1. Top Ring
2. Second Ring
3. Oil Ring Steel Rails

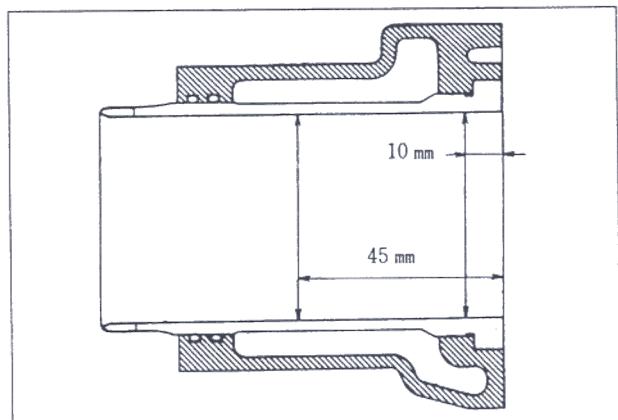
4. Oil Ring Expander
5. Arrow

CAUTION

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

Cylinder Wear

- Measure the cylinder inside diameter taking a side-to-side and a front-to back measurement at each of the two positions (total of four measurements) shown below.

**Cylinder Inside Diameter:**

Standard: 57.000 ~ 57.012 mm

Service Limit: 57.10 mm

4-22 ENGINE TOP END

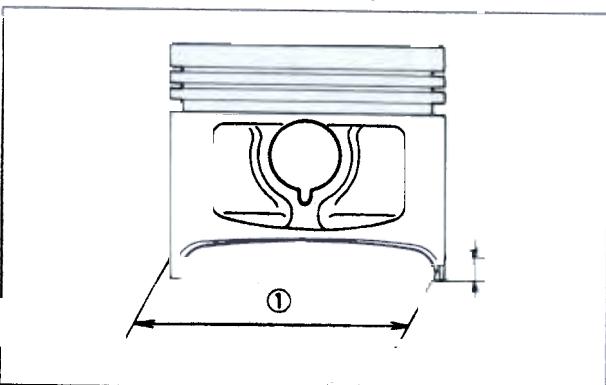
Piston Wear

- Measure the piston outside diameter 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.

Piston Outside Diameter

Standard: 56.942 ~ 56.957 mm
Service Limit: 56.79 mm

Piston Diameter Measurement



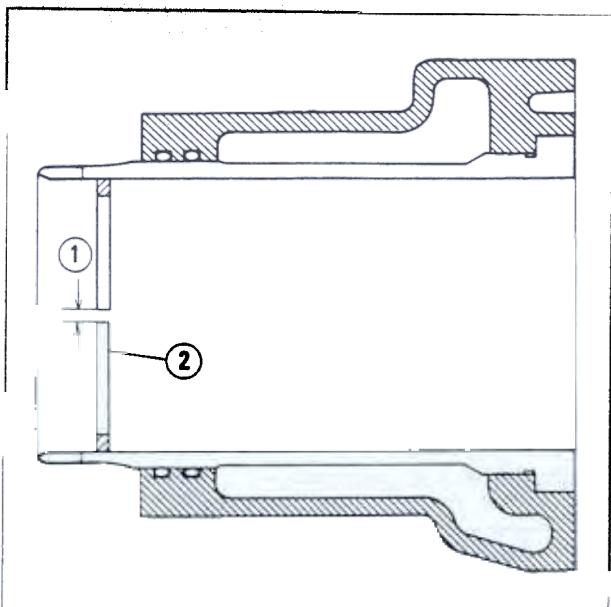
1. Piston Outside Diameter
2. 5mm up from bottom

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.

Piston Ring End Gap

	Standard	Service Limit
Top	0.20 ~ 0.40 mm	0.7 mm
Second	0.35 ~ 0.50 mm	0.8 mm



1. Gap

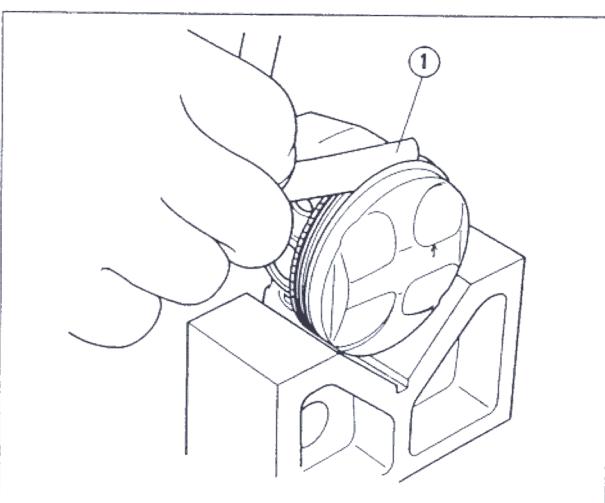
2. Piston Ring

Piston Ring, Piston Ring Groove Wear

- Check for uneven groove wear by inspecting the ring seats.
- ★ 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: 0.03 ~ 0.07 mm
Service Limit: 0.17 mm

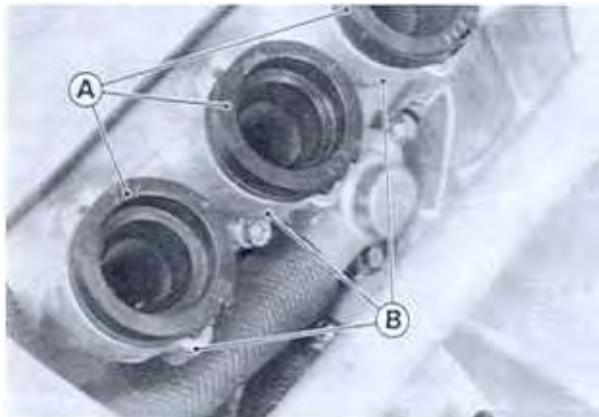


1. Thickness Gauge

Carburetor Holders

Removal

- Remove the following.
 - Clamps
 - Allen Bolts
- Remove the inlet pipes.



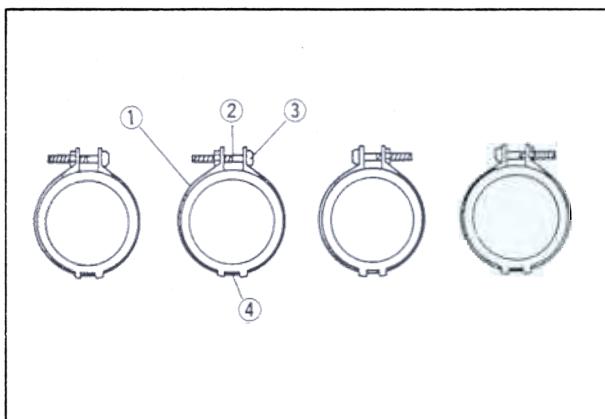
A. Carburetor Holders

B. Inlet Pipes

- Take off the holders from the inlet pipes.

Installation

- Install the carburetor holder so that the pipe is upward.
- Install the holder clamps as shown being careful of the screw position and the screw head direction.

1. Holder Clamp
2. Screw3. Screw Head
4. Stopper

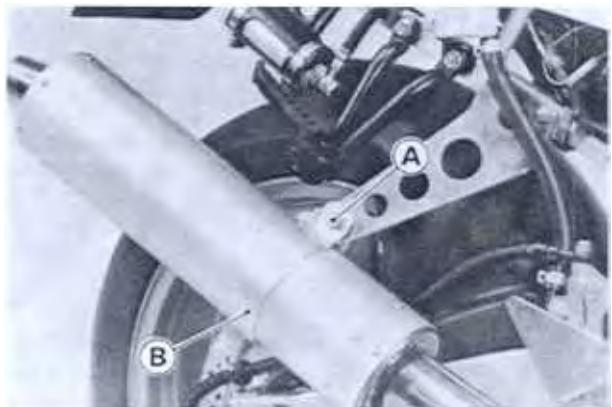
WARNING

Be sure to install the holder clamp screws in the direction shown. Or, the screws could come in contact with the throttle linkage resulting in an unsafe riding condition.

Muffler

Removal

- Remove the following.
 - Lower Fairing
 - Radiator (Do not remove the hoses and not drain coolant.)
- Remove the nuts and take off the exhaust pipe holders.



A. Nuts

B. Holder

- Remove the muffler mounting bolt and nut (rear step bracket).
- Remove the muffler.

Installation

- Installation is the reverse of removal.
- Replace the exhaust gaskets.

Clutch

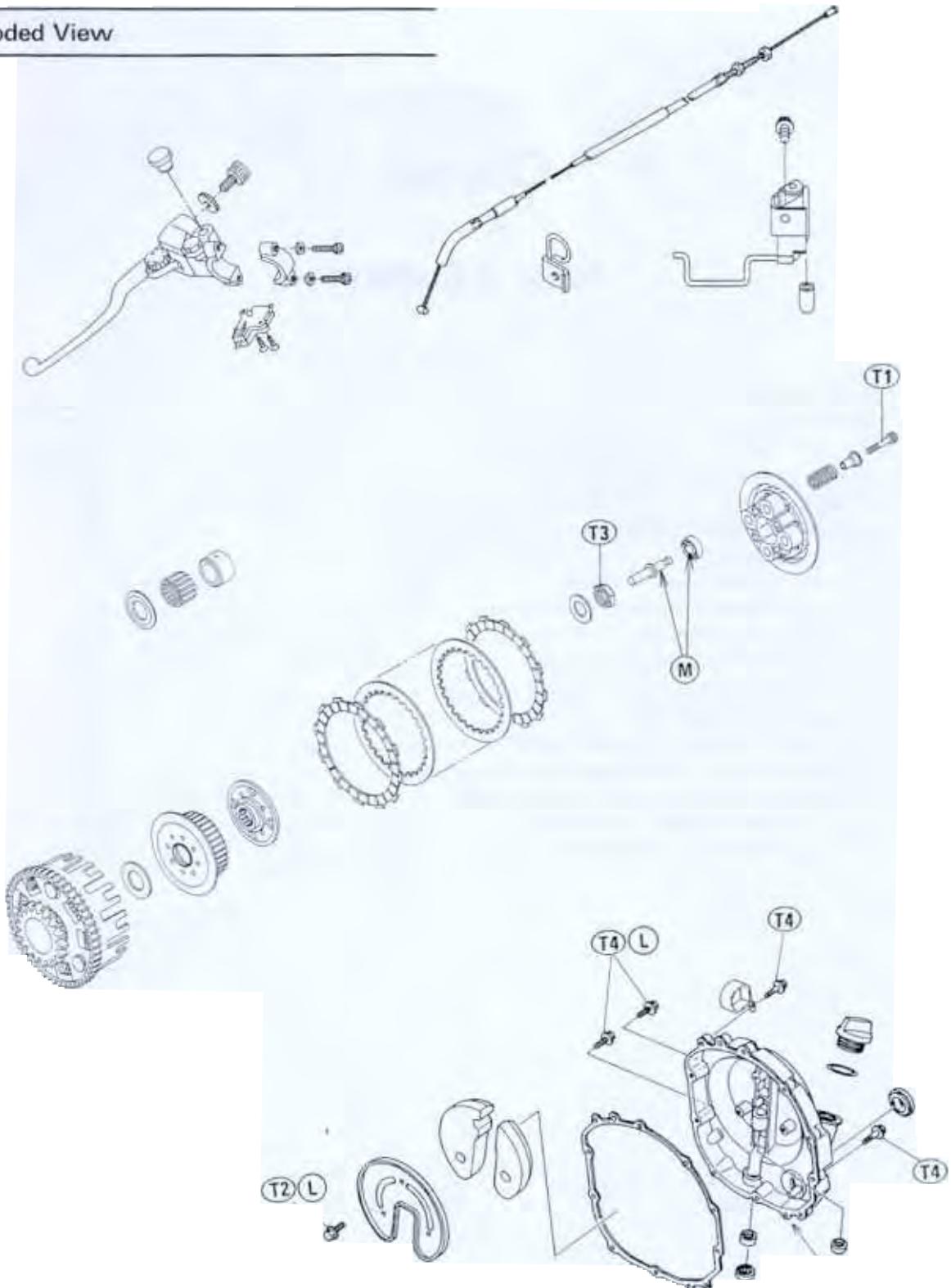
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5-2 CLUTCH

Exploded View



T1: 12 N·m (1.2 kg·m, 8.5 ft·lb)

T2: 9.8 N·m (1.0 kg·m, 7.0 ft·lb)

T3: 130 N·m (13.5 kg·m, 98 ft·lb)

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

M : Apply a thin coat of a molybdenum disulfide grease.

SS: Apply silicone sealant to the threads.

(SS)

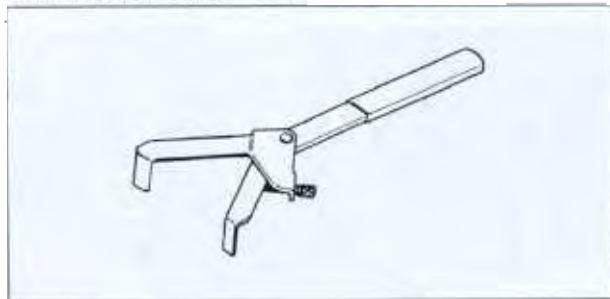
see 5-5

Specifications

Item	Standard	Service Limit
Clutch:		
Clutch lever free play	2 ~ 3 mm	---
Friction plate thickness	2.7 ~ 2.9 mm	2.5 mm
Friction and steel plate warp	0.2 mm or under	0.3 mm
Clutch spring free length	33.6 mm	32.6 mm

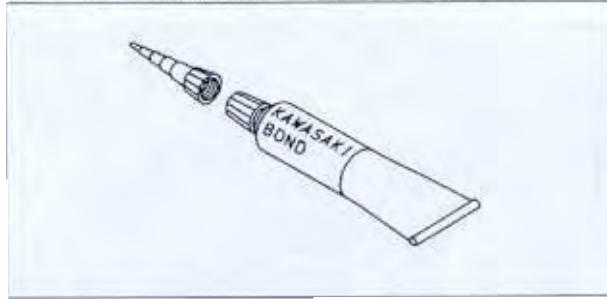
Special Tools

Clutch Holder: 57001-1243



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120



5-4 CLUTCH

Clutch

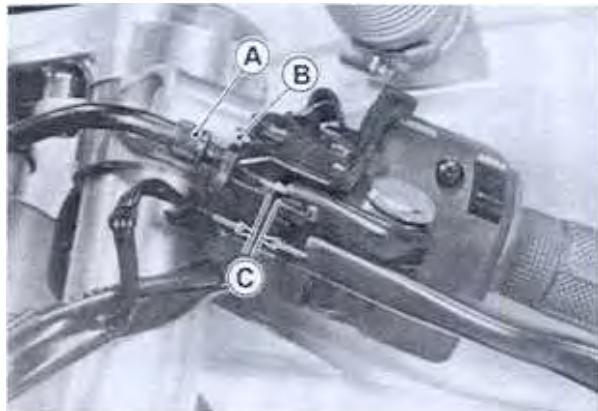
Due to the friction plate wear and clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart.

WARNING

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

Clutch Adjustment Check

- Pull the clutch lever just enough to take up the free play.
- Measure the gap between the lever and the lever bracket.



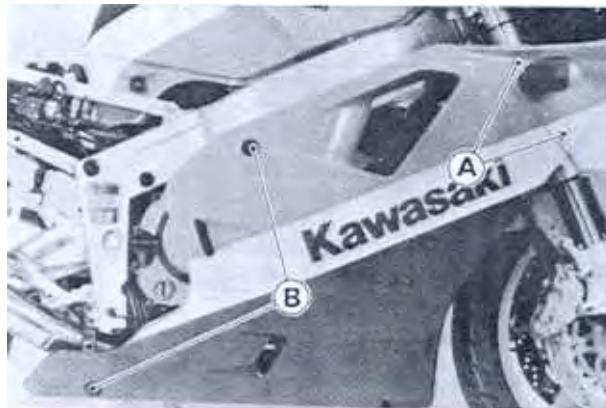
A. Adjuster
B. Locknut

C. Clutch Lever Free Play 2 ~ 3 mm

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

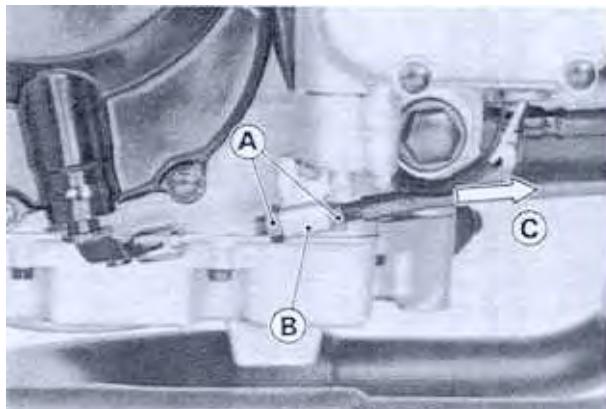
Clutch Adjustment

- Loosen the knurled locknut at the clutch lever.
- Turn the adjuster so that the clutch lever will have 2 ~ 3 mm of play.
- Tighten the locknut.
- ★ If it cannot be done, use the adjusting nuts at the lower end of the cable.
- Remove the fairings.



A. Fairing Mounting Screws
B. Fairing Mounting Bolts

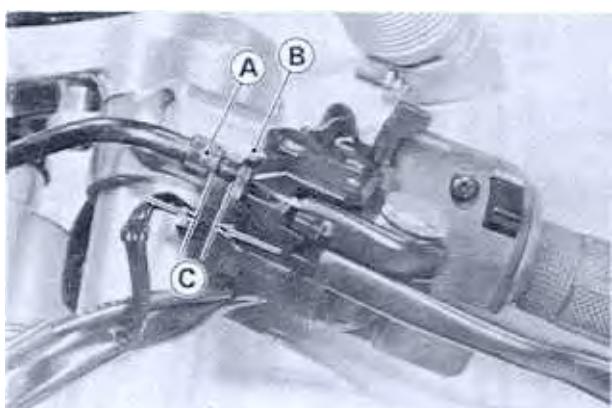
- Loosen the lower cable adjusting nuts at the clutch cover as far as they will go.



A. Adjusting Nuts
B. Bracket

C. Pull Outer Cable.

- Loosen the knurled locknut at the clutch lever.
- Turn the adjuster so that 5 ~ 6 mm of threads are visible.

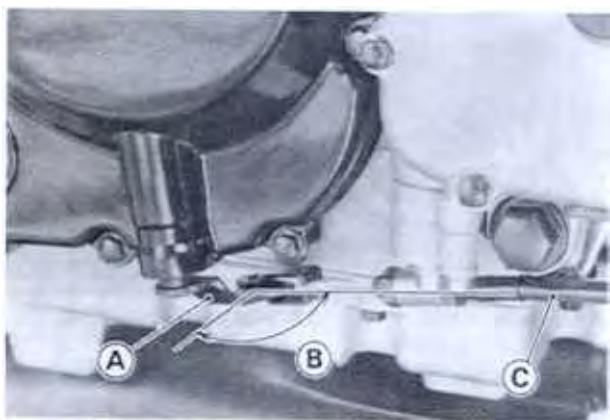


A. Adjuster
B. Locknut

C. 5 ~ 6 mm

- Pull the clutch cable tight and tighten the lower cable adjusting nuts against the bracket.

- Turn the adjuster at the clutch lever until the free play is correct. At this time, check that the clutch release lever to clutch cable angle is 80 ~ 90°.



A. Release Lever C. Clutch Cable
B. 80 ~ 90°

- ★ If the clutch cannot be adjusted by this method, inspect the clutch parts.
- Tighten the knurled locknut at the clutch lever.

NOTE

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

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

Clutch Release Lever Removal

CAUTION

Do not remove the clutch release shaft unless it is absolutely necessary. If removed, you must replace the oil seal with a new one.

- Place a suitable container under the clutch cover.
- Remove the clutch cover (see this chapter).
- Turn the release lever counter clockwise, and then pull out the release lever with its shaft.

Clutch Release Lever Installation Notes

- Visually inspect the oil seal, and replace it if necessary.
- Install the release lever, and turn it clockwise until it stops.

Clutch Cover Removal

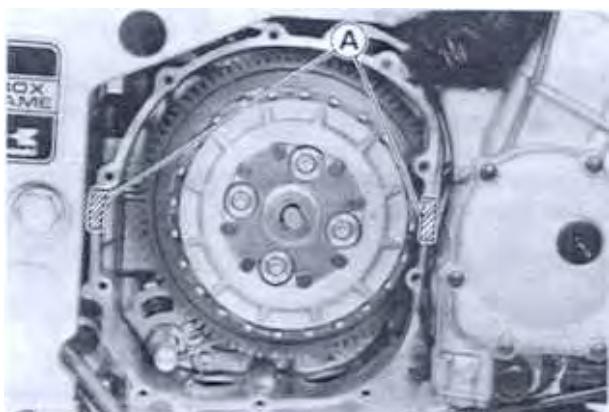
- Drain the engine oil (see Engine Oil Change in Engine Lubrication System chapter).
- Remove the lower fairing (see Lower Fairing Removal in Frame chapter).
- Remove the inner cover.
- Remove the clutch cable lower and from the clutch cover.
- Remove the clutch cover bolts and take off the cover.

CAUTION

Do not remove the clutch release shaft for clutch cover removal. Clutch release shaft removal damages the oil seal in the clutch cover necessitating the oil seal replacement.

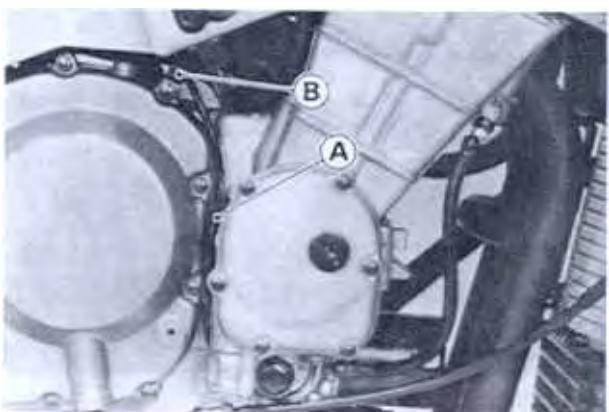
Clutch Cover Installation Note

- Replace the clutch cover gasket with a new one.
- Apply silicone sealant to the mating surface as shown.



A. Silicone Sealant (Kawasaki Bond: 56019-120)

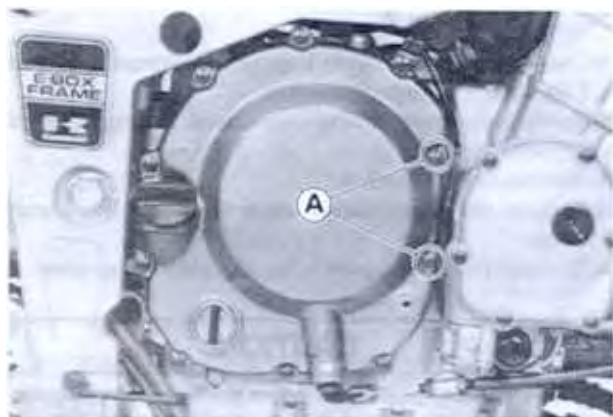
- Clamp the pick-up coil wire as shown.



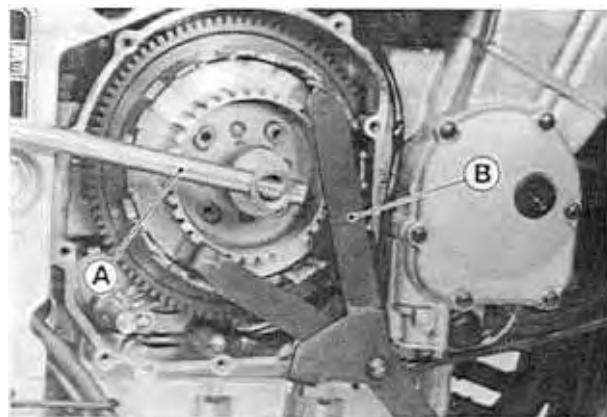
A. Pick-up Coil Lead B. Clamp

- Apply a non-permanent locking agent to the following bolts and screw.

5-6 CLUTCH

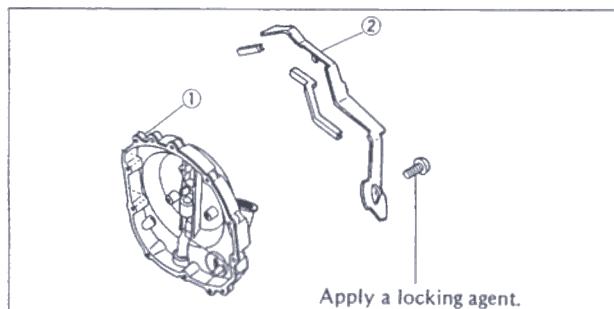


A. Cover Bolt



A. Wrench

B. Holder: 57001-1243



1. Clutch Cover

2. Right Inner Cover

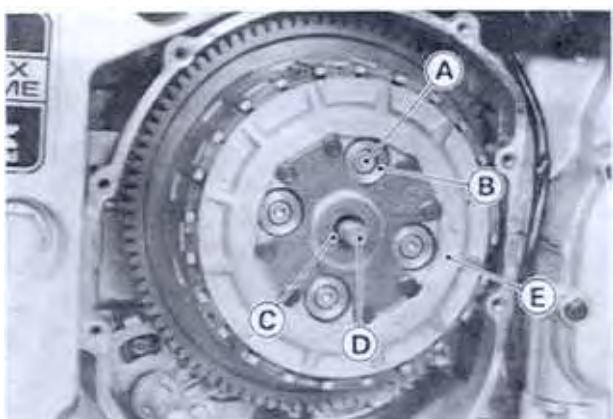
- Tighten the clutch cover bolts to the specified torque (see Exploded View).

Clutch Installation Notes

- Clutch installation is the reverse of removal. Pay attention to the following items.

Clutch Removal

- Remove the clutch cover.
- Remove the clutch spring bolts, retainers, and springs; then take off the clutch spring plate with the bearing and pusher.



A. Clutch Spring Bolt

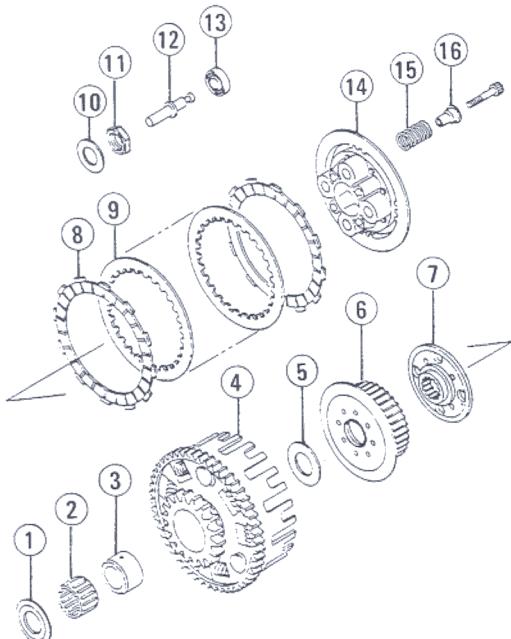
B. Retainer

C. Bearing

D. Pusher

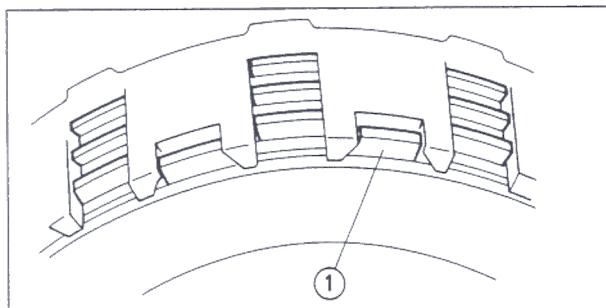
E. Clutch Spring Plate

- Remove the friction plates and steel plates as a set.
- Remove the clutch hub nut. When loosening the hub nut, use the clutch holder (special tool) to keep the clutch hub from turning as shown.



- | | |
|-------------------|-------------------|
| 1. Spacer | 9. Steel Plate |
| 2. Needle Bearing | 10. Washer |
| 3. Collar | 11. Hub Nut |
| 4. Clutch Housing | 12. Pusher |
| 5. Washer | 13. Bearing |
| 6. Clutch Hub | 14. Spring Plate |
| 7. Clutch Cam | 15. Clutch Spring |
| 8. Friction Plate | 16. Retainer |

- Install the spacer with the chamfered side facing inwards.
- Install the clutch cam on the clutch hub.
- Discard the used hub nut, and install a new nut.
- Install the clutch holder (special tool: 57001-1243) to keep the clutch hub from turning and tighten the clutch hub nut to the specified torque (see Exploded View).
- Install the friction plates and steel plates, starting with a friction plate and alternating them.
- Install the last friction plate fitting the tangs in the groove on the housing as shown.



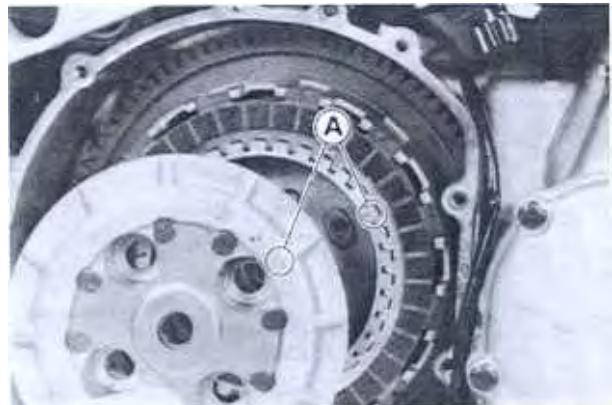
1. Last Friction Plate

- Apply molybdenum disulfide grease to the pusher end and ball bearing.

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.

- When install the spring plate, align the marks on the hub and the plate.

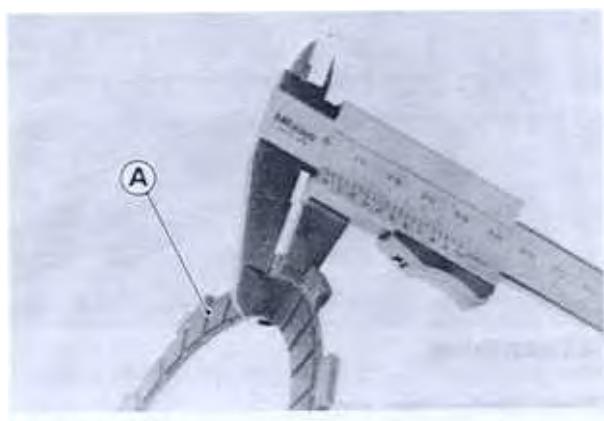


A. Marks

- Tighten the clutch spring bolts to the specified torque (see Exploded View).

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.
- Measure the thickness of the friction plates at several points (see Specifications).
- ★ If any of the measurements is less than the service limit, replace the friction plate.



A. Friction Plate

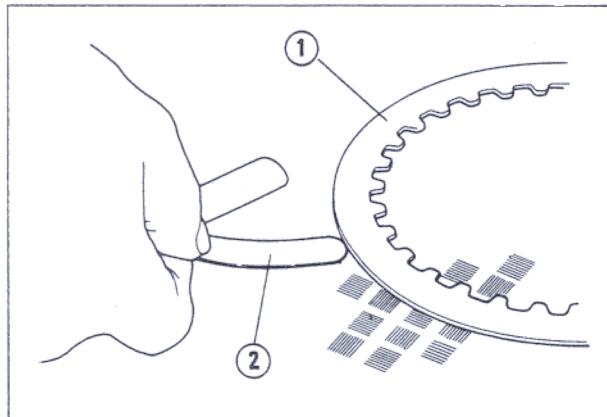
Friction Plate Thickness

Standard: 2.7 ~ 2.9 mm
Service Limit: 2.5 mm

5-8 CLUTCH

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.



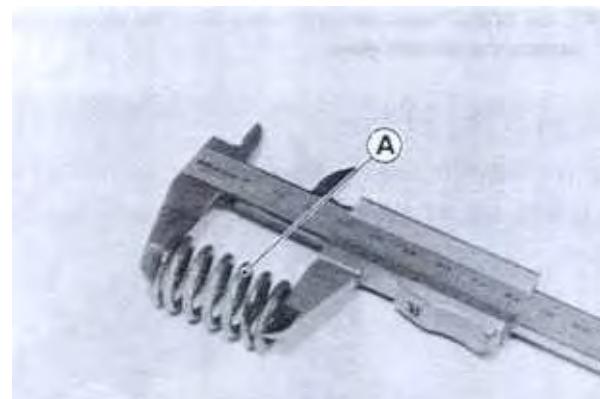
1. Friction or Steel Plate 2. Thickness Gauge

Friction and Steel Plate Warp

Standard: less than 0.2 mm
Service Limit: 0.3mm

Clutch Spring Free Length Measurement

- Since the spring becomes shorter as it weakens, check its free length to determine its condition.
- ★ If any of the springs is shorter than the service limit, it must be replaced.



A. Clutch Spring

Clutch Spring Free Length

Standard: 33.6 mm
Service Limit: 32.6 mm

Clutch Housing Finger Inspection

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



A. Clutch Housing Finger B. Friction Plate Tang

Clutch Hub Spline Inspection

- Visually inspect where the teeth on the steel plates wear against the splines of the clutch hub.
- ★ If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



A. Clutch Hub Spline

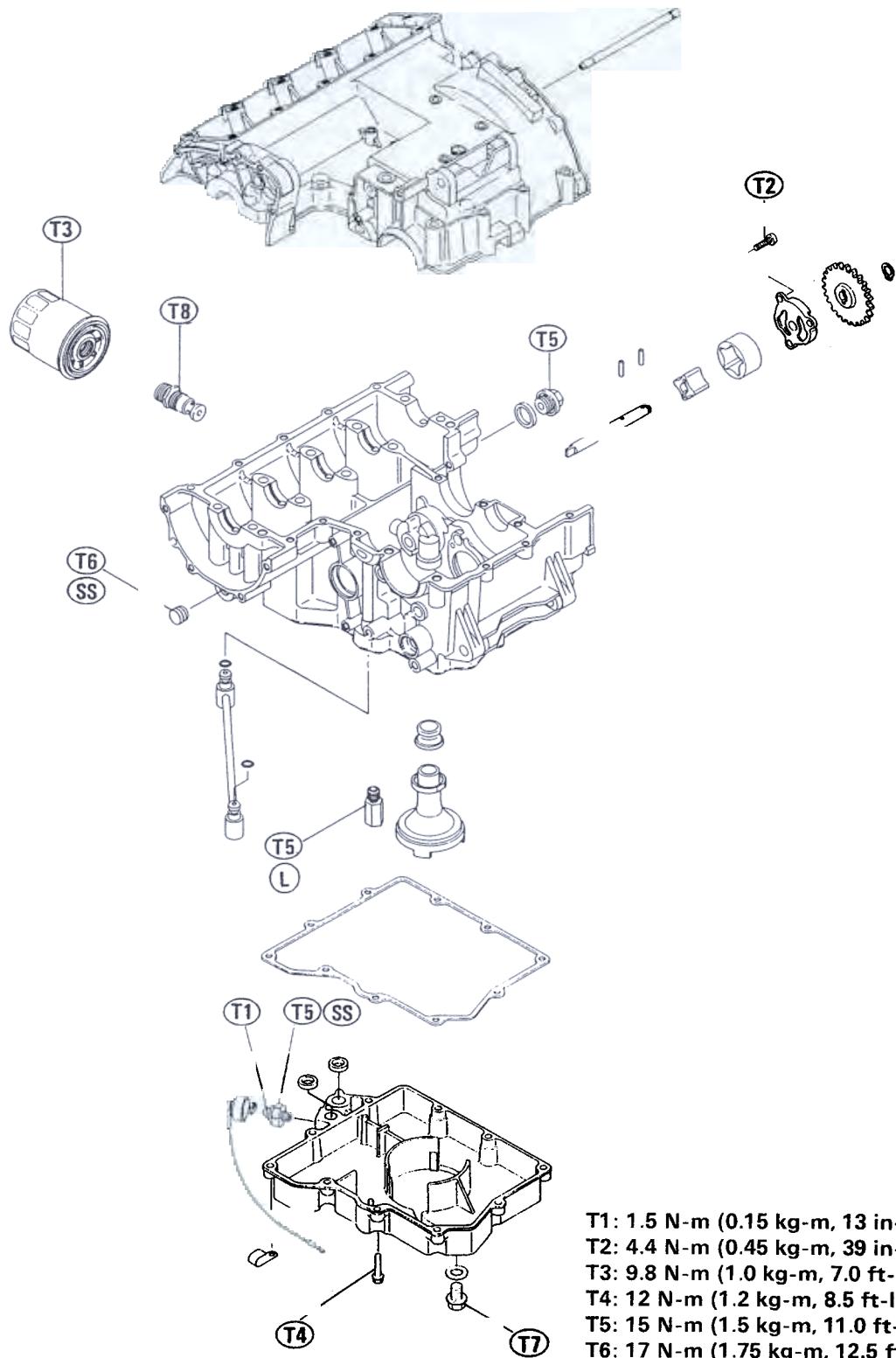
Engine Lubrication System

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6-2 ENGINE LUBRICATION SYSTEM

Exploded View



T1: 1.5 N·m (0.15 kg·m, 13 in·lb)

T2: 4.4 N·m (0.45 kg·m, 39 in·lb)

T3: 9.8 N·m (1.0 kg·m, 7.0 ft·lb)

T4: 12 N·m (1.2 kg·m, 8.5 ft·lb)

T5: 15 N·m (1.5 kg·m, 11.0 ft·lb)

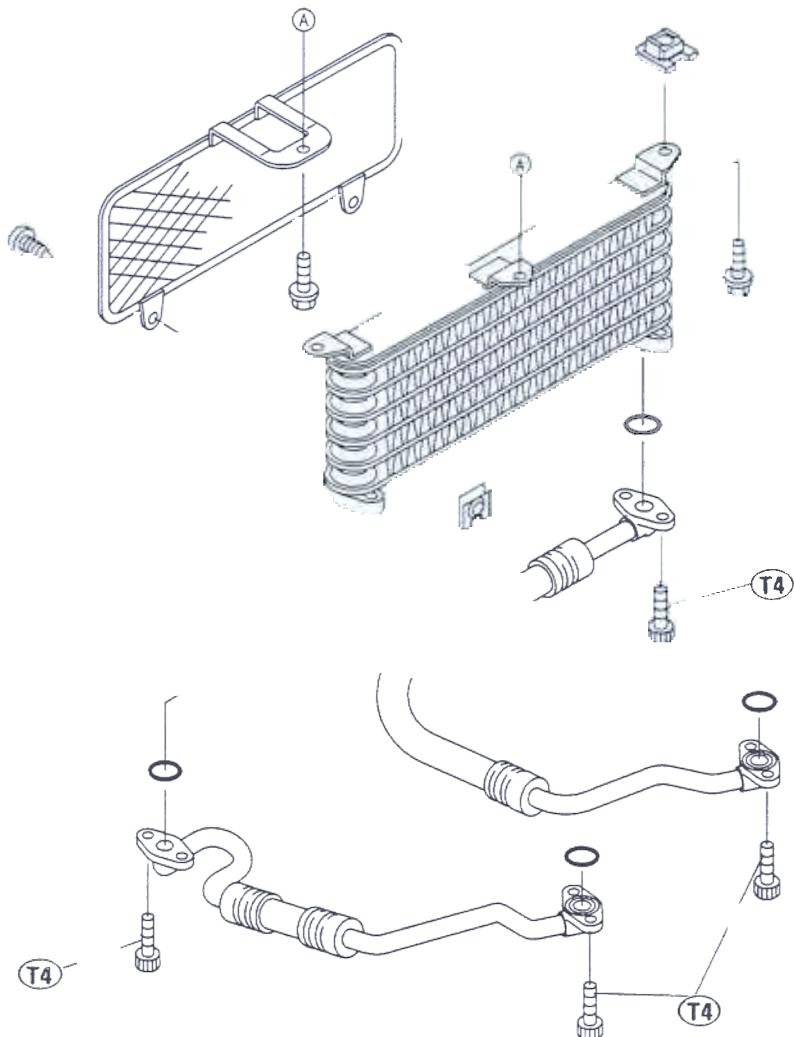
T6: 17 N·m (1.75 kg·m, 12.5 ft·lb)

T7: 20 N·m (2.0 kg·m, 14.5 ft·lb)

T8: 29 N·m (3.0 kg·m, 22 ft·lb)

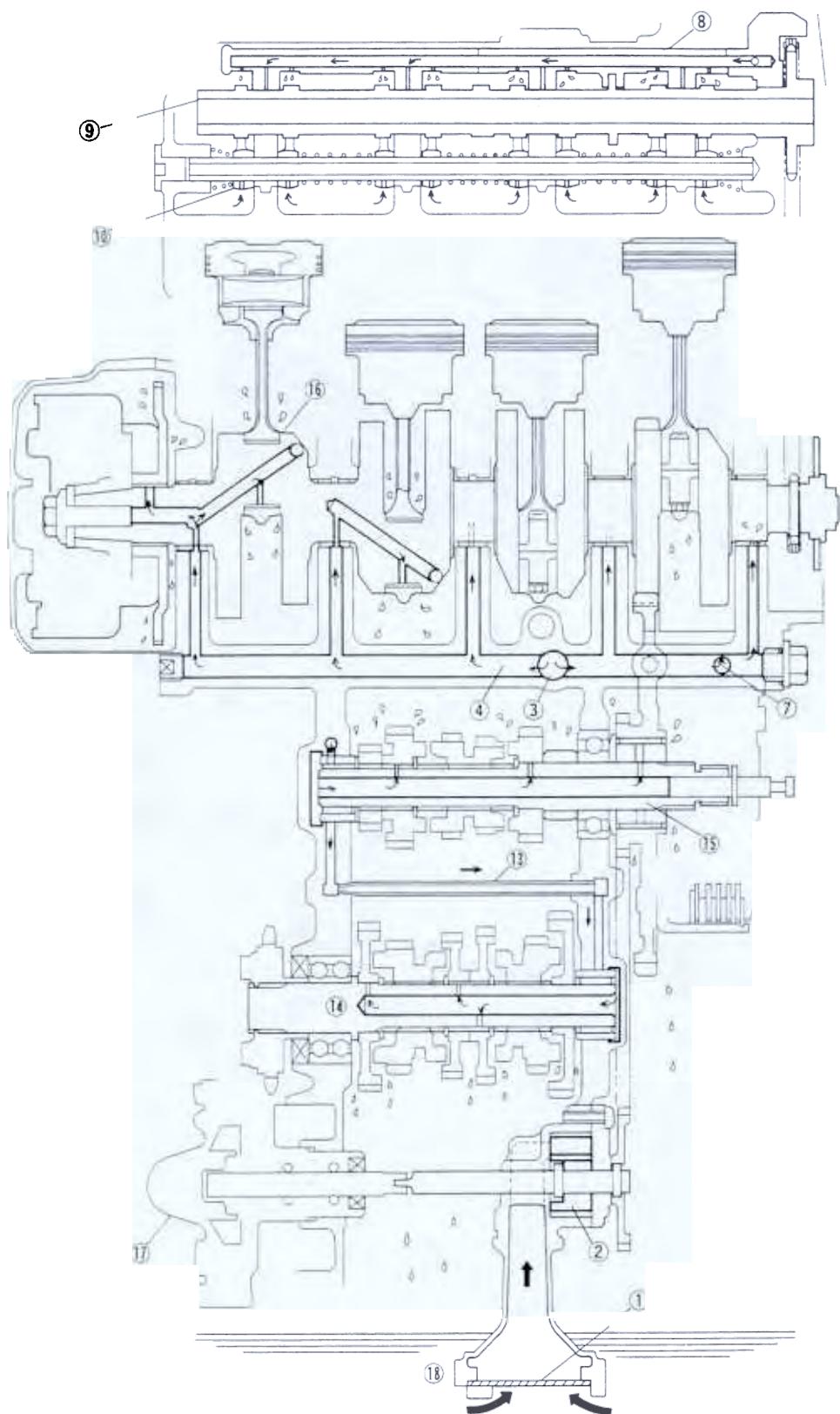
L : Apply a non-permanent locking agent to the threads.

SS: Apply silicone sealant to the threads.

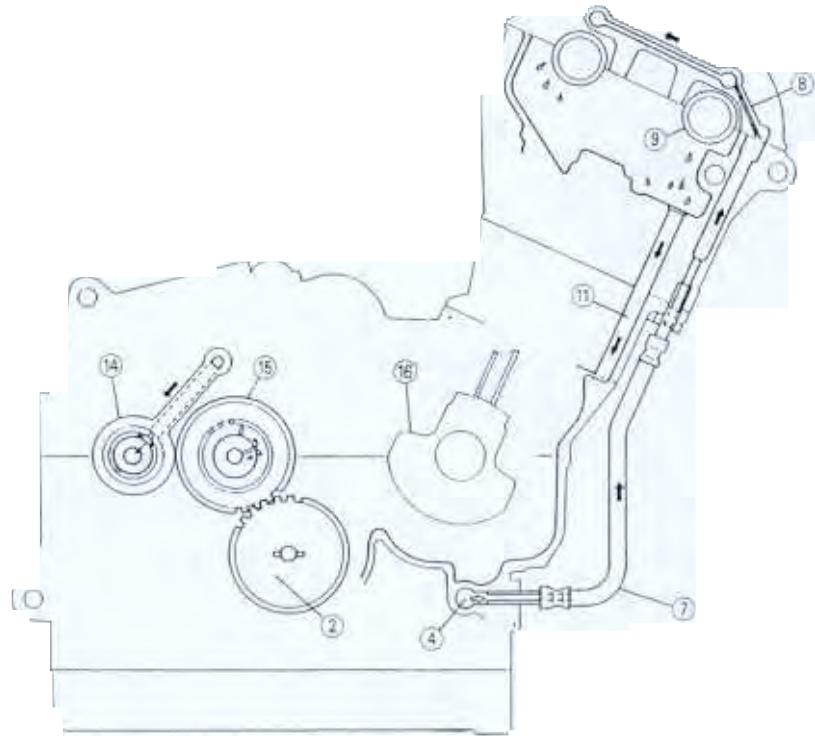
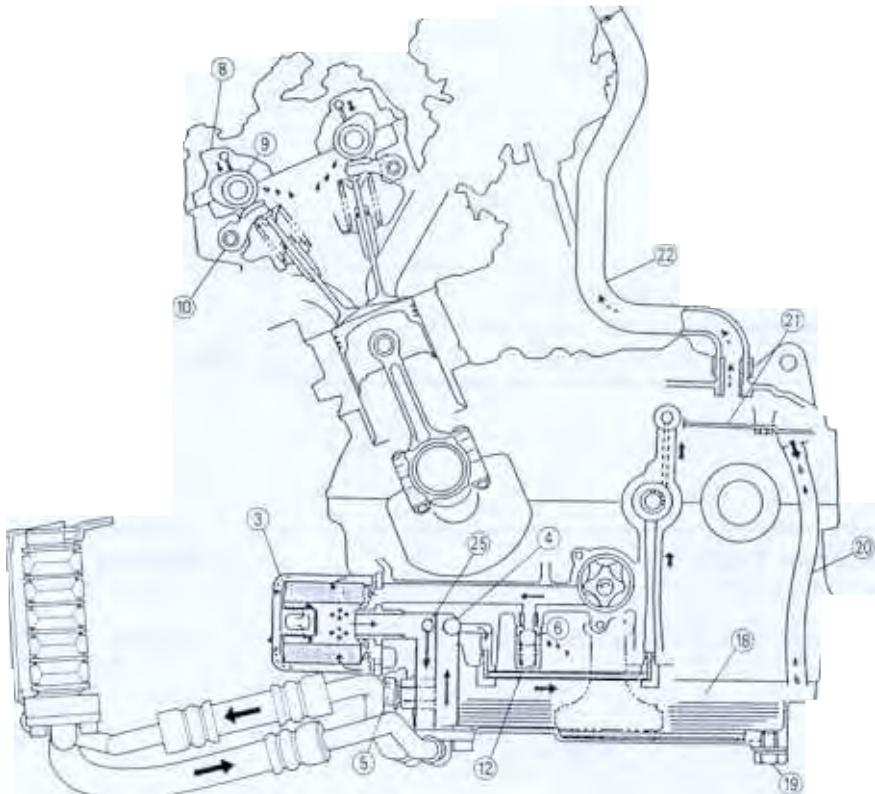


6-4 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



1. Oil Pump Filter
2. Oil Pump
3. Oil Filter
4. Oil Passage
5. Oil Pressure Switch
6. Relief Valve
7. Oil Hose
8. Camshaft Bracket
9. Camshaft
10. Rocker Arm
11. Oil Return Passage
12. Oil Pipe (to Mission)
13. Oil Pipe (to Output Shaft)
14. Output Shaft
15. Drive Shaft
16. Crankshaft
17. Water Pump
18. Oil Pan
19. Oil Drain Plug
20. Oil Return Hose
21. Breather Plate
22. Breather Hose
23. Oil Cooler
24. Oil Cooler Hose
25. Bypass Hole



6-6 ENGINE LUBRICATION SYSTEM

Specifications

Item	Standard
Engine Oil: Grade Viscosity Capacity	SE or SF class SAE 10W-40 2.8 L (when filter is not removed) 3.0 L (when filter is removed)
Oil Pressure Measurement: Oil Pressure @4,000 r/min (rpm), oil temp. 90°C (194°F)	216 ~ 275 kPa (2.2 ~ 2.8 kg/cm ² , 31 ~ 40 psi)

Special Tools

Oil Pressure Gauge, 10 kg/cm²: 57001-164

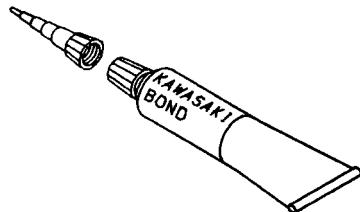


Oil Pressure Gauge Adapter, M18 x 1.5: 57001-1278



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120



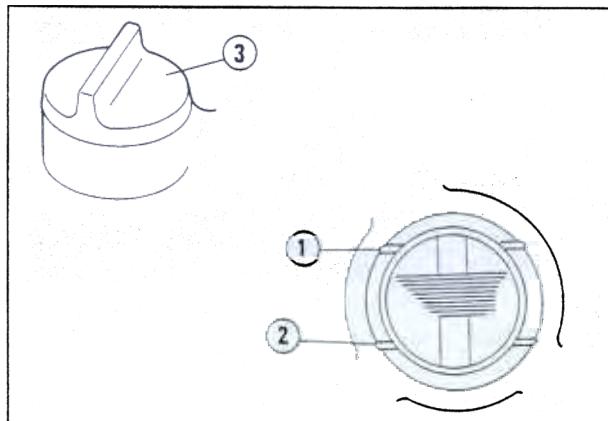
Engine Oil and Oil Filter

WARNING

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

Oil Level Inspection

- Support the motorcycle perpendicular to the ground.
- Check that the engine oil level is between the upper and lower levels in the gauge.



1. Upper Level
2. Lower Level

3.Oil Filler Opening Plug

NOTE

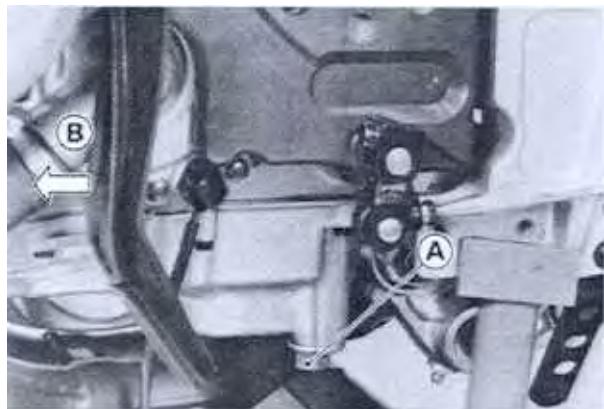
- Situate the motorcycle so that it is perpendicular to the ground.
- If the motorcycle has just been used, wait several minutes for all the oil to drain down.
- If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the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

CAUTION

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

Engine Oil Change

- Support the motorcycle perpendicular to the ground after warming up the engine.
- Remove the engine drain plug to drain the oil.



A. Drain Plug

B. Front

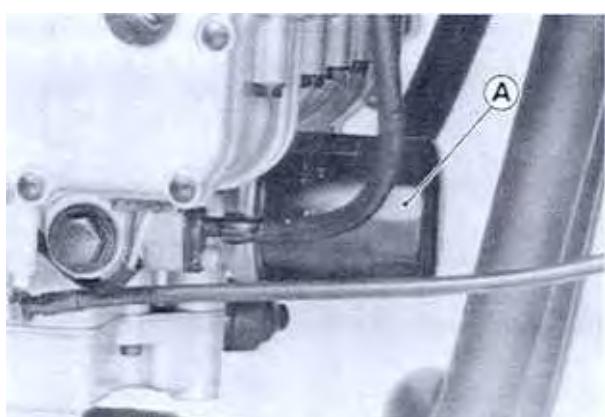
- The oil in the filter can be drained by removing the filter (see Oil Filter Change).
- ★ Replace the drain plug gasket with a new one if it is damaged.
- Tighten the drain plug to the specified torque (see Exploded View).
- Pour in the specified type and amount of oil.

Engine Oil

Grade: SE or SF class
Viscosity: SAE 10W-40
Amount: 3.0 L (filter is removed)
2.8 L (filter is not removed)

Oil Filter Change

- Remove the lower fairing.
- Drain the engine oil (see this chapter).
- Remove the oil filter with the oil filter wrench.



A. Oil Filter

- Replace the filter with a new one.
- When installing the oil filter, be careful of the following.
- Apply oil to the gasket before installation.

6-8 ENGINE LUBRICATION SYSTEM

○ Tighten the filter with the oil filter wrench to the specified torque (see Exploded View) or tighten it with hands about $\frac{1}{4}$ turns after gasket contacts the mounting surface of engine.

○ Pour in the specified type and amount of oil.

Oil Pan

Removal

● Set the motorcycle on its side stand.

● Remove the following.

Lower Fairings (see Frame chapter)

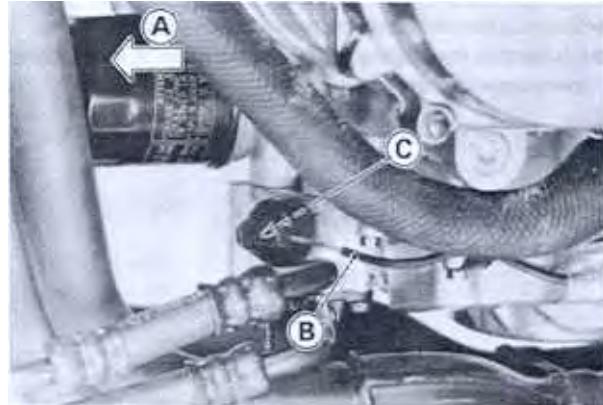
Muffler (see Engine Top End)

Engine Oil (Drain, see this chapter)

Oil Pressure Switch Lead

Oil Pressure Switch (as necessary)

Oil Pipes



A. Front

B. Switch Lead

C. Oil Pressure Switch

● Remove the oil pan bolts and take off the oil pan.

Installation

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

● Apply silicone sealant to the threads of the oil pressure switch and tighten it to the specified torque (see Exploded View).

● Replace the gasket with a new one.

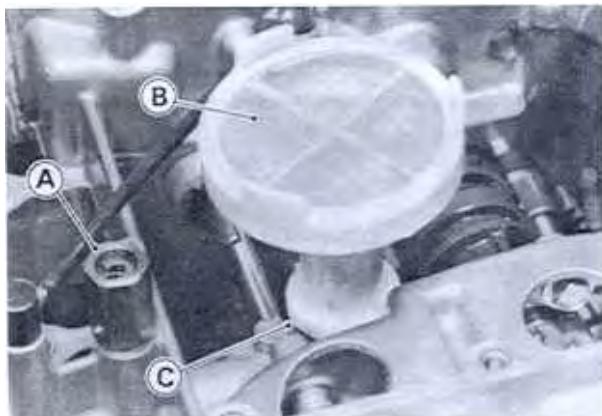
● Replace the O-rings with new ones if they are damaged.

● Tighten the oil pan bolts to the specified torque (see Exploded View).

Relief Valve, Oil Pump Filter

Removal

- Remove the oil pan.
- Unscrew the oil pressure relief valve from the engine.
- Pull out the oil pump filter and the oil pipe.



A. Relief Valve

B. Oil Pump Filter

C. Unround Portion

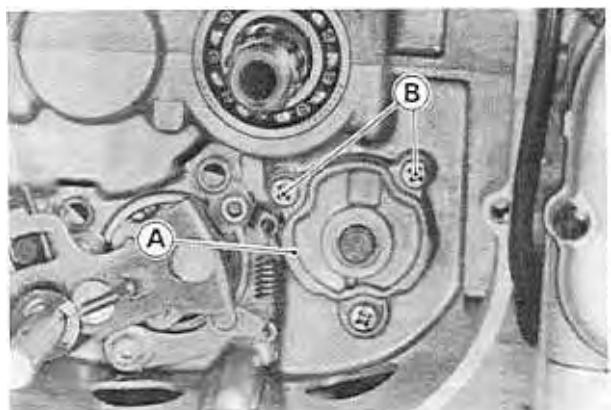
Installation

- Installation is the reverse of removal. Note the following.
- Apply a non-permanent locking agent to the thread of the relief valve and tighten it to the specified torque (see Exploded View).
- Replace the oil pipe O-ring if it is damaged.
- When installing the oil pump filter, note the position of its unround portion.

Oil Pump

Removal

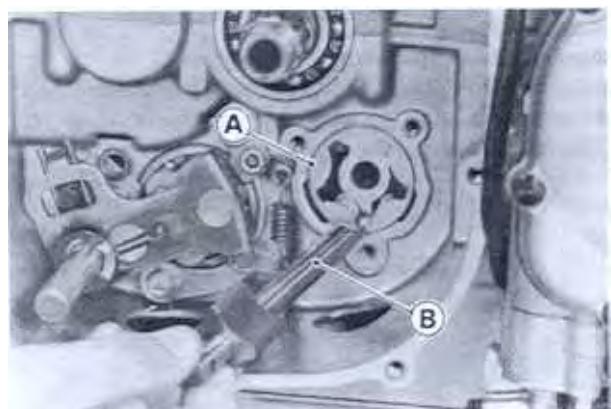
- Remove the following.
- Clutch (see Clutch chapter)
- Circlip
- Oil Pump Gear
- Oil Pump Cover



A. Pump Cover

B. Pump Cover Screw

- Remove the oil pump shaft and pump rotor.



A. Pump Rotor

B. Pump Shaft

Installation

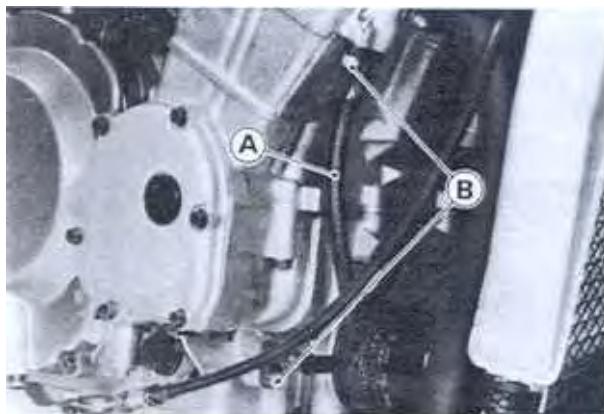
- Installation is the reverse of removal. Note the following.
- When installing the oil pump, note the position of the water pump shaft slot and turn the oil pump shaft so that the projection fits into the slot.
- Tighten the oil pump cover screw to the specified torque (see the Exploded view).
- Replace the pump gear circlip with a new one.

6-10 ENGINE LUBRICATION SYSTEM

Oil Hose

Removal

- Drain the engine oil.
- Remove the lower fairing (see Frame chapter).
- Remove the Allen bolts from the cylinder head and the crankcase.
- Take out the oil hose.



A. Oil Hose

B. Allen Bolt

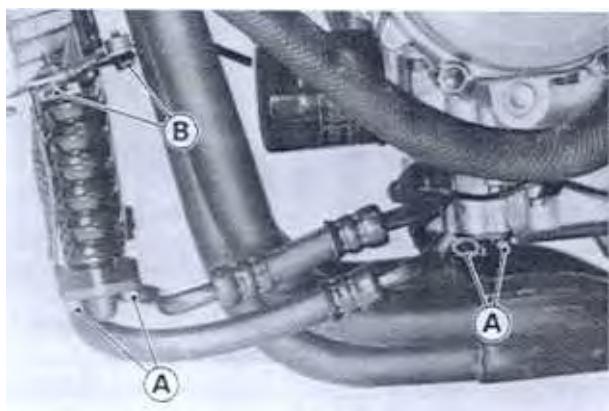
Installation

- Installation is the reverse of removal.
- Replace the O-rings with new ones if they are damaged.
- Tighten the Allen bolts to the specified torque (see Exploded View).

Oil Cooler

Removal

- Remove the following.
- Engine Oil (Drain, see this chapter)
Lower Fairings (see Frame chapter)
Muffler (see Engine Top chapter)
Oil Cooler Pipe Fitting Bolts
Oil Cooler Mounting Bolts



A. Fitting Bolts

B. Mounting Bolts

- Remove the oil cooler.

Installation

- Installation is the reverse of removal. Note the following.
- Replace the O-rings with new ones.
- Tighten the oil cooler pipe fitting bolts to the specified torque (see Exploded View).

Oil Pressure Measurement

Oil Pressure Measurement

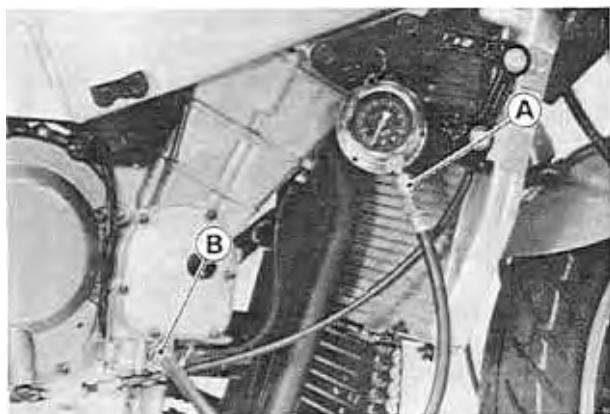
NOTE

○ Measure the oil pressure after the engine is warmed up.

● Remove the following.

Right Lower Fairing (see Frame chapter)
Oil Passage Plug

● Attach the oil pressure gauge and adapter (special tools) to the plug hole.



A. Oil Pressure Gauge: 57001-164

B. Adapter: 57001-1278

Oil Pressure

Standard 216 ~ 275 kPa
(2.2 ~ 2.8 kg/cm², 31 ~ 40 psi)
@4000 r/min (rpm), 90°C (194°F)
of oil temp.

★ If the oil pressure is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.

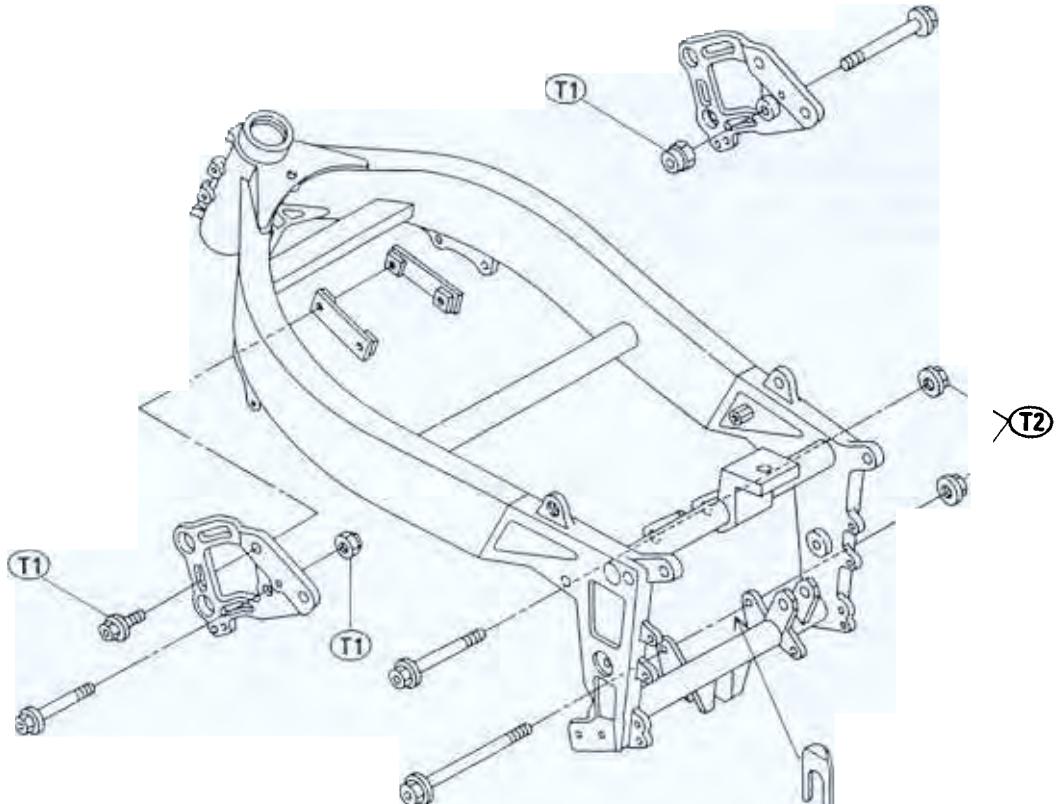
Engine Removal / Installation

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7-2 ENGINE REMOVAL / INSTALLATION

Exploded View



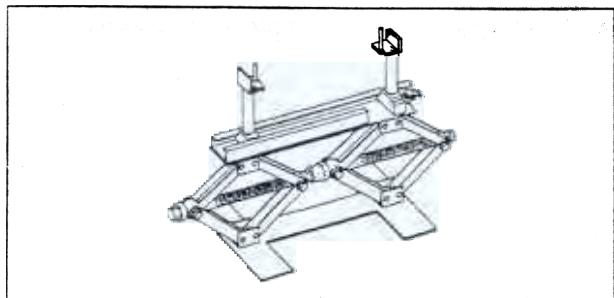
T1: 30 N·m (3.1 kg·m, 22 ft·lb)

T2: 36 N·m (3.7 kg·m, 27 ft·lb)

Install a shim (thickness 0.5 mm) between the lower part of the crankcase and the frame bracket.

Special Tool

Jack: 57001-1238



Engine Removal/Installation

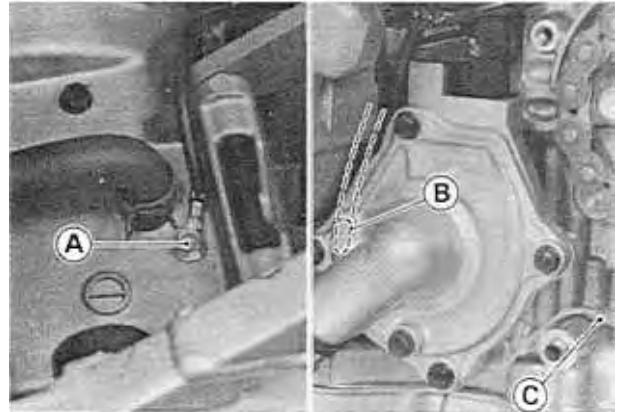
Removal

- Remove the following.

Fairings (see Frame chapter)
 Engine Oil (Drain, see Engine Lubrication System chapter)
 Coolant (Drain, see Cooling System chapter)
 Fuel Tank (see Fuel System chapter)
 Air Cleaner Housing (see Fuel System chapter)
 Carburetors (see Fuel System chapter)
 Baffle Plate
 Oil Cooler and Oil Pipes (see Engine Lubrication System chapter)
 Radiator (see Cooling System chapter)
 Muffler (see Engine Top End chapter)
 Engine Sprocket (see Final Drive chapter)

- Disconnect wiring from the engine and free them from the clamps.

Clutch Cable
 Spark Plug Caps
 Pickup Coil Lead Connector
 Battery Ground Lead Terminal
 Starter Motor Lead Terminal
 Water Temperature Sensor Lead Connector
 Oil Pressure Switch Connector
 Side Stand Switch Connector
 Alternator Leads Connector
 Neutral Switch Connector



A. Battery Ground Lead Terminal

B. Side Stand Switch Connector

C. Neutral Switch Connector

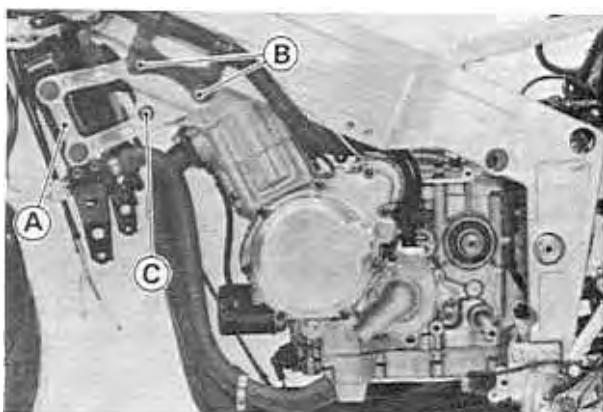
- If the crankshaft is to be removed after engine removal, you may remove the following parts at this time.

Cylinder
 Alternator

- In case of the transmission, you may remove the clutch.

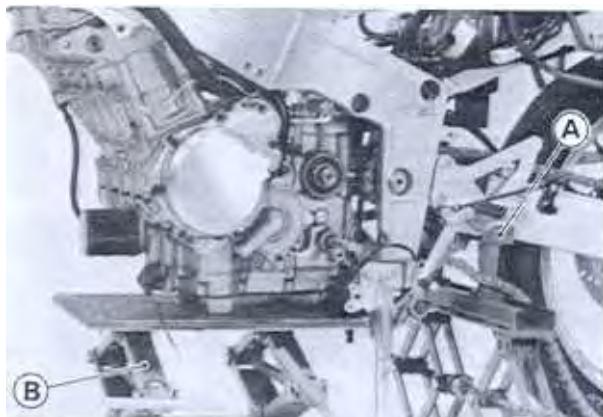
- Remove the engine mounting nuts and the bracket nuts but do not remove the bolt as yet.

7-4 ENGINE REMOVAL / INSTALLATION



A. Bracket
B. Bracket Bolts and Nuts
C. Engine Mounting Bolts and Nuts

- Place the jack (special tool) under the swing arm to steady the motorcycle.
- Place the suitable stand or the jack under the engine.
- Remove the engine mounting bolts. Support the engine before sliding out the engine mounting bolts.



A. Jack: 57001-1238
B. Suitable Stand

Installation

- Installation is the reverse of removal. Note the following.
 - Install a shim (thickness 0.5 mm) between the lower part of the crankcase and the frame bracket (see Exploded View).
 - Supporting the engine, first insert the upper bolts, and then the lower bolts.
 - Tighten the following fasteners to the specified torque (see Exploded View).
 - Engine Mounting Bolts
 - Engine Bracket Bolts
 - Run the wires, cables, and hoses as shown in the Wiring, Cables, and Hose Routing section of the General Information chapter.
 - Adjust the following.
 - Throttle Cables (see Fuel System chapter)
 - Choke Cable (see Fuel System chapter)
 - Clutch Cable (see Clutch chapter)

- Drive Chain (see Final Drive chapter)
- Fill the engine with engine oil (see Engine Lubrication System chapter).
- Fill the engine with coolant and bleed the air from the cooling system (see Cooling System chapter).
- Adjust the carburetor synchronization and idling.

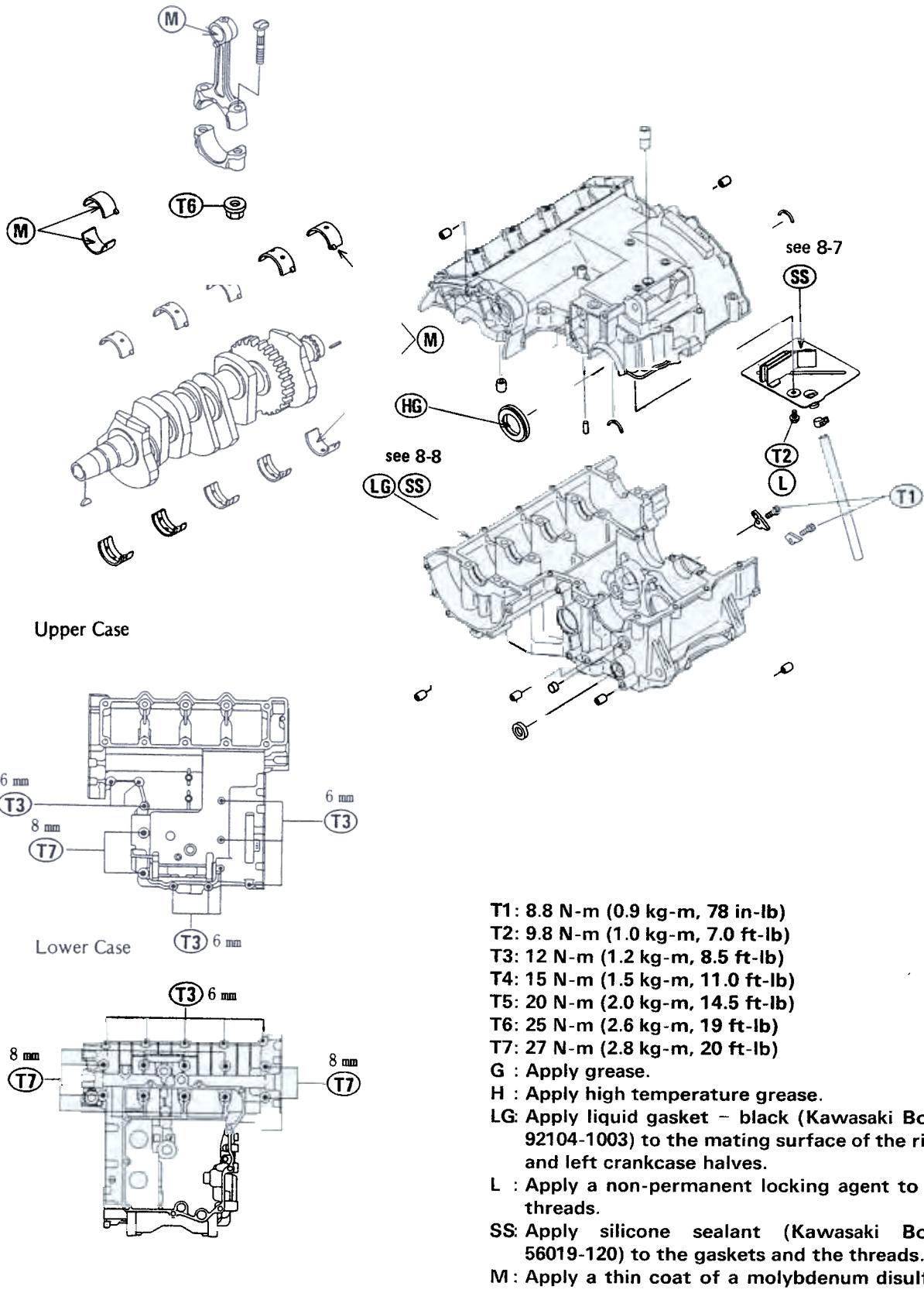
Crankshaft / Transmission

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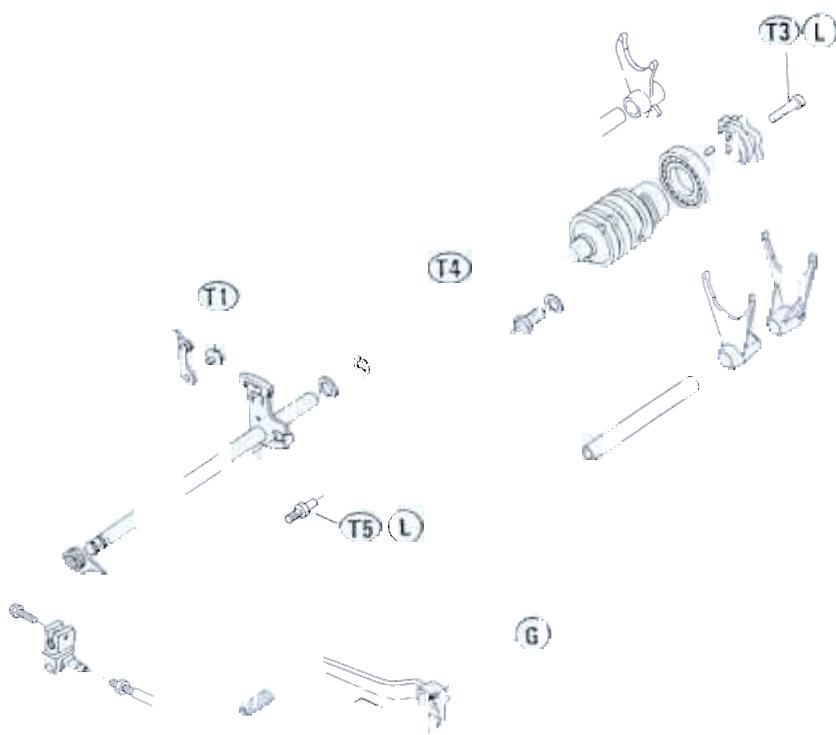
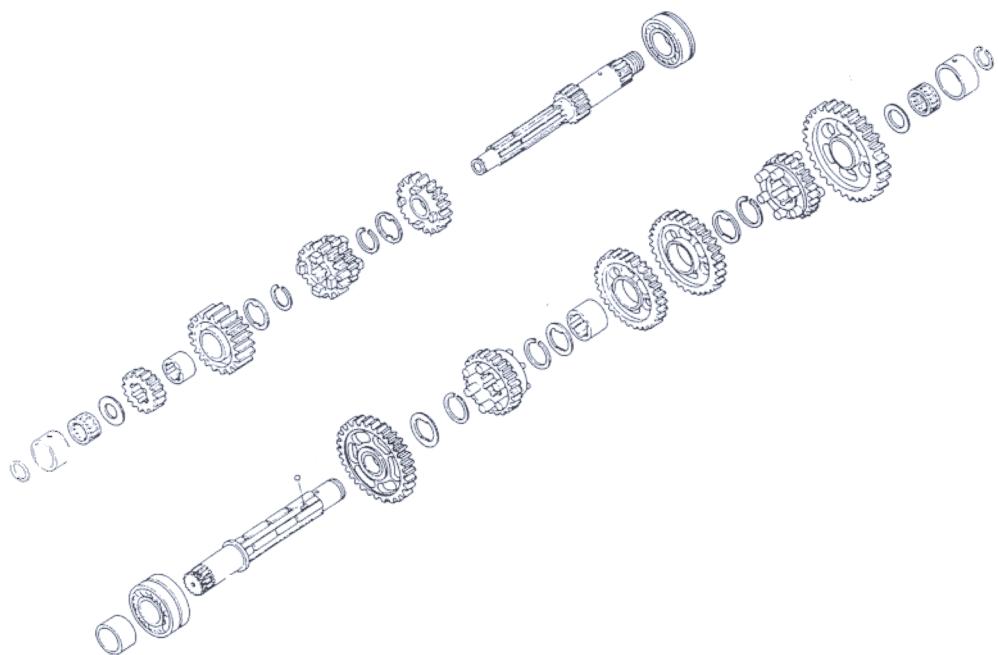
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8-2 CRANKSHAFT / TRANSMISSION

Exploded View



CRANK HAFT TRANSMISSON 8-3



8-4 CRANKSHAFT / TRANSMISSION

Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rods:		
Connecting rod big end side clearance	0.13 ~ 0.38 mm	0.60 mm
Connecting rod big end bearing insert/crankpin clearance	0.031 ~ 0.059 mm	0.10mm
Crankpin diameter:	29.984 ~ 30.000 mm	29.97 mm
Marking None	29.984 ~ 29.994 mm	---
○	29.995 ~ 30.000 mm	---
Connecting rod big end bore diameter:	33.000 ~ 33.016 mm	---
Marking None	33.000 ~ 33.008 mm	---
○	33.009 ~ 33.016 mm	---
Connecting rod big end bearing insert thickness:		
Blue	1.480 ~ 1.485 mm	---
Black	1.485 ~ 1.490 mm	---
Brown	1.490 ~ 1.494 mm	---

Connecting rod big end bearing insert selection:

Con-Rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	None	Blue	92028-1492
None	None	Black	92028-1493
○	○		
None	○	Brown	92028-1494

Crankshaft side clearance	0.05 ~ 0.20 mm	0.40 mm
Crankshaft runout	0.02 mm or less	0.05 mm TIR
Crankshaft main bearing insert, journal clearance	0.014 ~ 0.038 mm	0.08 mm
Crankshaft main journal diameter:	29.984 ~ 30.000 mm	29.96 mm
Marking None	29.984 ~ 29.992 mm	---
1	29.993 ~ 30.000 mm	---
Crankcase main bearing bore diameter:	33.000 ~ 33.016 mm	---
Marking ○	33.000 ~ 33.008 mm	---
None	33.009 ~ 33.016 mm	---
Crankshaft main bearing insert thickness:		
Brown	1.491 ~ 1.495 mm	---
Black	1.495 ~ 1.499 mm	---
Blue	1.499 ~ 1.503 mm	---

Item		Standard	Service Limit
Crankshaft main bearing insert selection:			
Crankcase Main Bearing Bore Diameter Mark	Crankshaft Main Journal Diameter Mark	Bearing Insert*	
O	1	Brown	92028-1418
			92028-1421
O	None	Black	92028-1417
None	1		92028-1420
None	None	Blue	92028-1416
			92028-1419

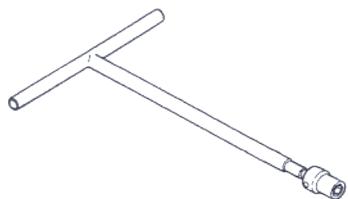
*The bearing inserts for No. 5 has no oil groove.

Transmission: Shift fork ear thickness Gear shift fork groove width Shift fork guide pin diameter Shift drum groove width	4.9 ~ 5.0 mm 5.05 ~ 5.15 mm 5.9 ~ 6.0 mm 6.05 ~ 6.20 mm	4.8 mm 5.3 mm 5.8 mm 6.3 mm
----------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------	--------------------------------------

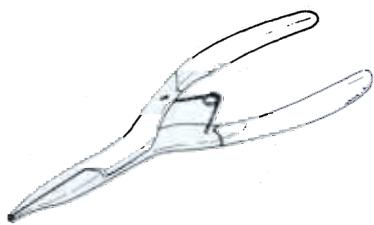
8-6 CRANKSHAFT / TRANSMISSION

Special Tools

Socket Wrench, Hex 8: 57001-1268



Outside Circlip Pliers: 57001-144

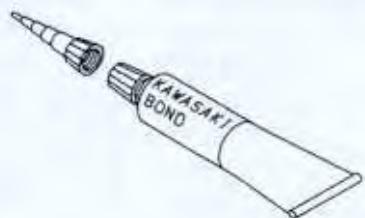


Bearing Driver Set: 57001-1129



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120



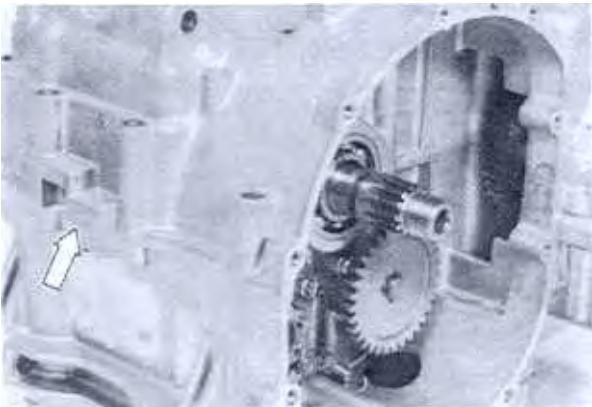
Kawasaki Bond (Liquid Gasket – Silver): 92104-002



Crankcase

Crankcase Splitting

- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove the following.
 - Cylinder Head (if the crankshaft is to be removed, see Engine Top End chapter)
 - Cylinder, Piston (if the crankshaft is to be removed, see Engine Top End chapter)
 - Starter Motor (see Electrical System chapter)
 - Crankcase Bolt (upper and lower)
- If necessary, remove the following.
 - Clutch (see Clutch chapter)
 - External Shift Mechanism (see this chapter)
 - Timing Rotor (see this chapter)
 - Oil Pump (see Engine Lubrication System chapter)
 - Alternator Rotor (see Electrical System chapter)
 - Water Pump (see Cooling System chapter)
 - Oil Filter Mounting Bolt
 - Oil Pan
 - Oil Pump Filter
 - Oil Pipe
- Gently tap the crankcase half with a plastic mallet, and separate the crankcase halves.



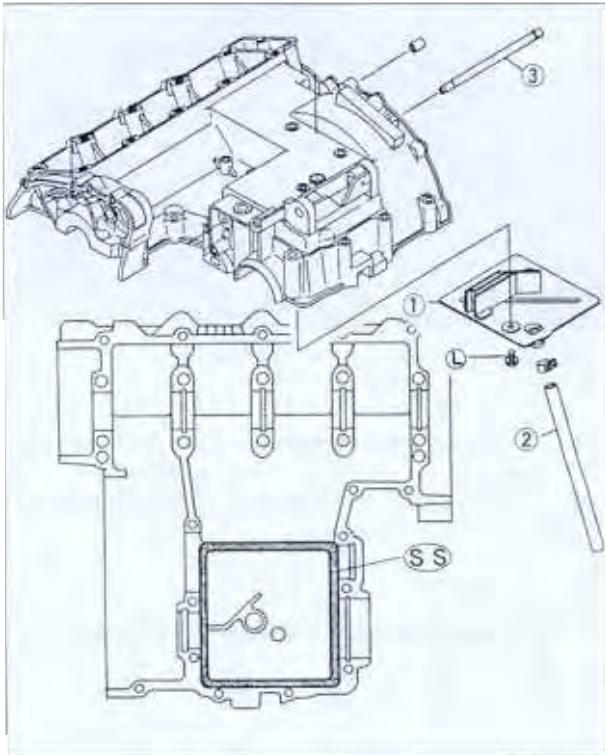
Crankcase Assembly

CAUTION

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

- With a high-flash point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
- Using compressed air, blow out the oil passages in the crankcase halves.
- Install the oil pipe.
- Apply silicone sealant to the breather plate mating surface on the upper crankcase and then install the breather plate.

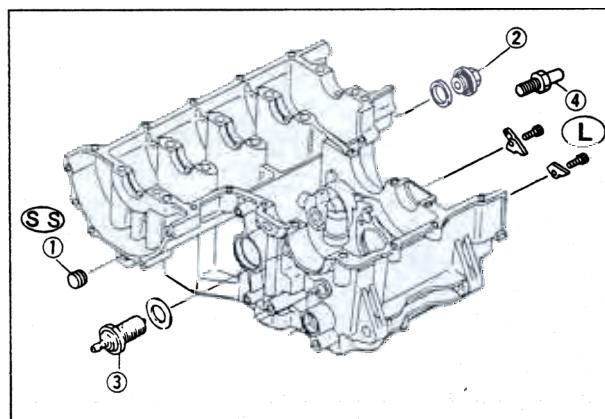
- Apply a non-permanent locking agent to the plate mounting bolt (see Exploded View).



SS: Apply silicone sealant

L: Apply a non-permanent locking agent

1. Breather Plate
2. Oil Return Hose
3. Oil Pipe



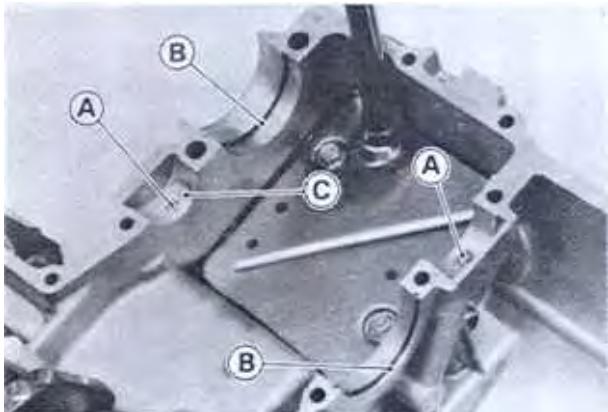
SS: Apply silicone sealant

L: Apply a non-permanent locking agent

1. Left Oil Plug
2. Right Oil Plug
3. Neutral Switch
4. Return Spring Bolt

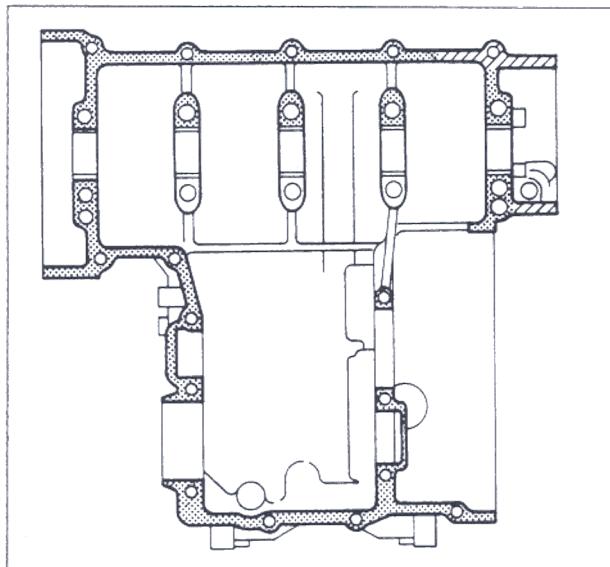
- Install the set pins and rings.

8-8 CRANKSHAFT / TRANSMISSION

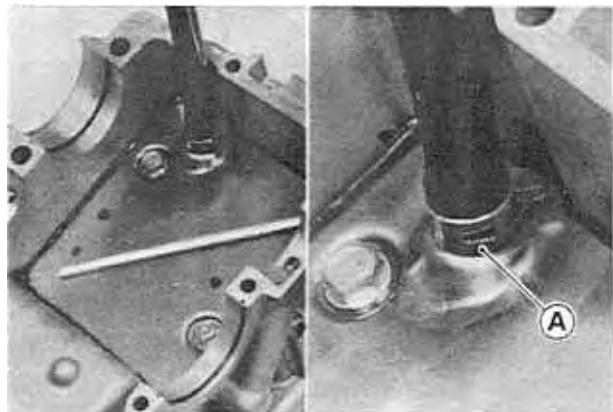


A. Set Pin
B. Set Rings
C. Oil Passage

- Apply engine oil to the transmission gears, ball bearings, shift drum, and crankshaft main bearing inserts.
- Apply liquid gasket – black and silicone sealant as shown in the figure below.



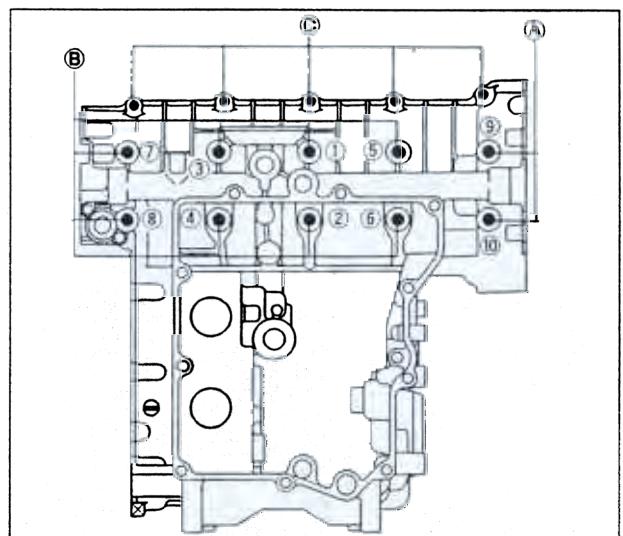
: Liquid Gasket – Silver (Kawasaki Bond: 92014-002)
: Silicone Sealant (Kawasaki Bond: 56019-120)
Apply silicone sealant upon liquid gasket.



A. Oil Return Hose Clamp

- Tighten the crankcase mounting bolts following the tightening sequence to the specified torque (see Exploded View).
- Following the tightening sequence, tighten the 8 mm bolts first to about one half of the specified torque, and finally to the specified torque.
- Tighten the 6 mm bolts to the specified torque.

Lower Crankcase

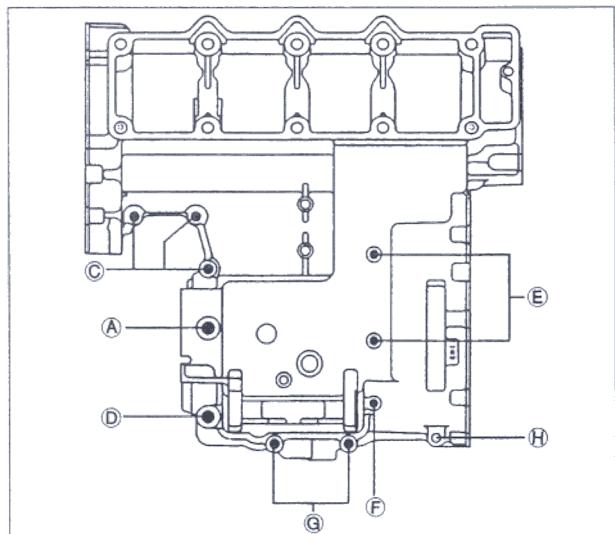


A. $\Phi 8 \times L95$ mm
B. $\Phi 8 \times L90$ mm
C. $\Phi 6 \times L40$ mm

CAUTION

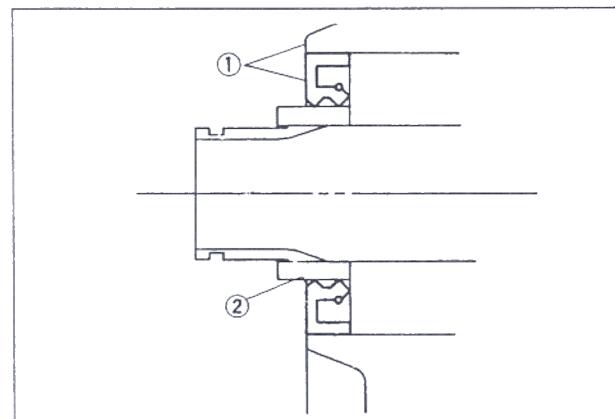
If liquid gasket and silicone sealant adheres to any areas not indicated, the engine oil passages may be obstructed, causing engine seizure.

- Install the crankshaft, shift drum and transmission.
- Set the grip of clamp backward at the crankcase.

Upper Crankcase

D. $\phi 8 \times L72$ mm G. $\phi 6 \times L65$ mm
 E. $\phi 6 \times L95$ mm H. $\phi \times L50$ mm
 F. $\phi 6 \times L85$ mm

- Apply high temperature grease to the output shaft oil seal lips and press the oil seal in the crankcase until the seal is even with the end of the hole.
- Install the collar.



1. Oil seal is even with end of hole.
2. Collar

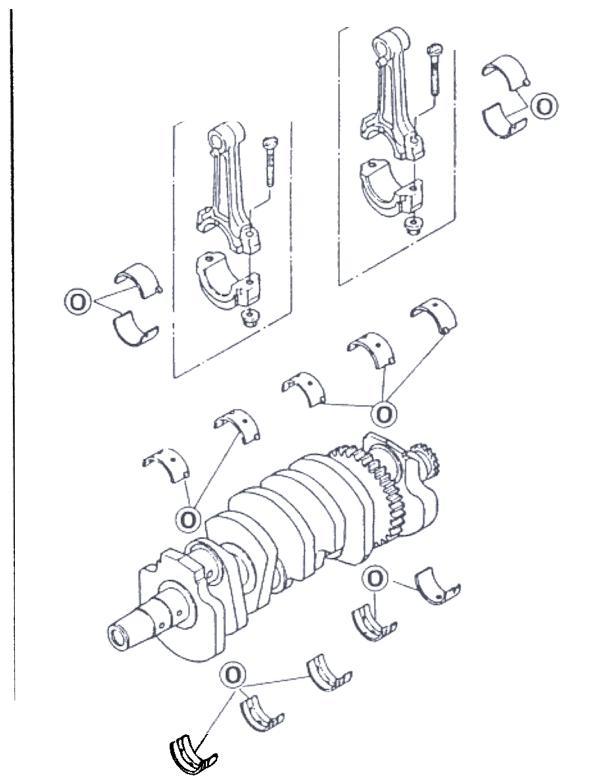
- Check the following.
- Shift drum is in the neutral position.
- The #1 and 4 pistons are at TDC.
- Drive shaft and output shaft turn freely.
- Neutral finder operates properly (while spinning the output shaft, gears can be shifted from 1st to 2nd).

Crankshaft/Connecting Rods**Crankshaft Removal**

- Remove the engine.
- Remove the cylinder head, cylinder and pistons.
- Split the crankcase (see Crankcase Splitting).
- Take the crankshaft out of the upper crankcase.

Crankshaft Installation**CAUTION**

If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage before assembling engine to be sure the correct bearing inserts are installed.



- O. Apply engine oil.

- Apply engine oil to the crankshaft main bearing inserts.

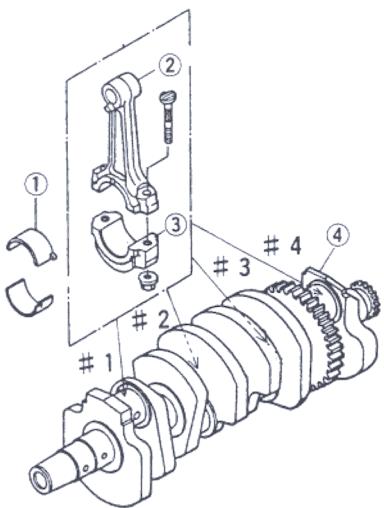
8-10 CRANKSHAFT / TRANSMISSION

Connecting Rod Removal

- Remove the crankshaft.
 - Remove the connecting rods from the crankshaft.

NOTE

- *Mark and record the locations of the connecting rods and their big end caps so that they can be reassembled in their original positions.*

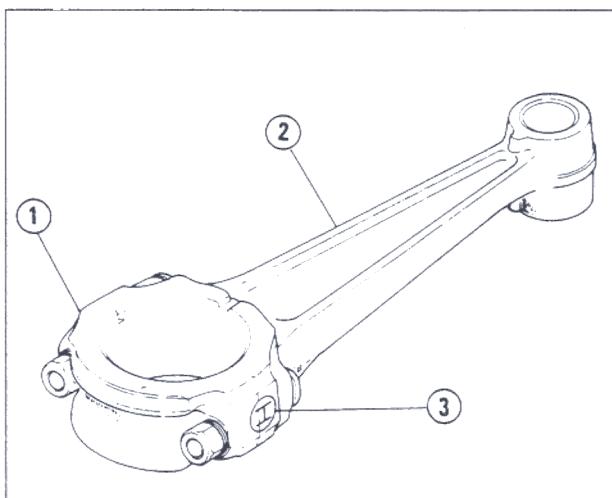


1. Main Bearing Inserts	3. Big End Cap
2. Connecting Rod	4. Crankshaft

Connecting Rod Installation

CAUTION

To minimize vibration, a pair of connecting rods (left two rods or right two) should have the same weight mark.



1. Big End Cap	3. Weight Mark, Alphabet
2. Connecting Rod	

CAUTION

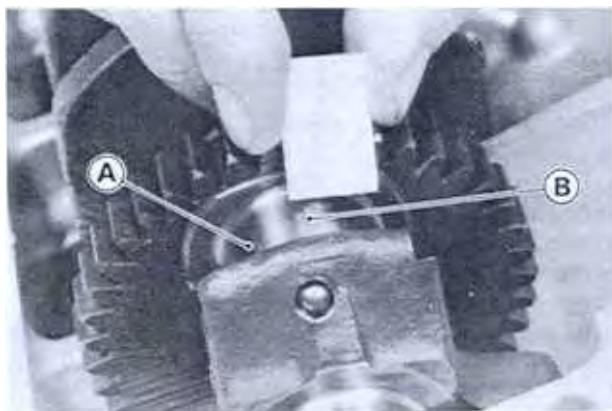
If the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage before assembling engine to be sure the correct bearing inserts are installed.

- Apply engine oil to the big end bearing inserts.
 - Tighten the big end cap nuts to the specified torque (see Exploded View).

Connecting Rod Big End Bearing

Insert/Crankpin Wear

- Measure the bearing insert/crankpin clearance with a plastigage.



A. Crankpin

B. Plastigage

NOTE

- *Tighten the big end cap nuts to the specified torque (see Exploded View).*
 - *Do not move the connecting rod and crankshaft during clearance measurement.*

Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: 0.031 ~ 0.059 mm
Service Limit: 0.10 mm

- ★ If clearance is within the standard, no bearing replacement is required.
- ★ If clearance is between 0.059 mm and the service limit (0.10 mm), replace the bearing inserts with inserts painted blue. Check insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★ If clearance exceeds the service limit, measure the diameter of the crankpins.

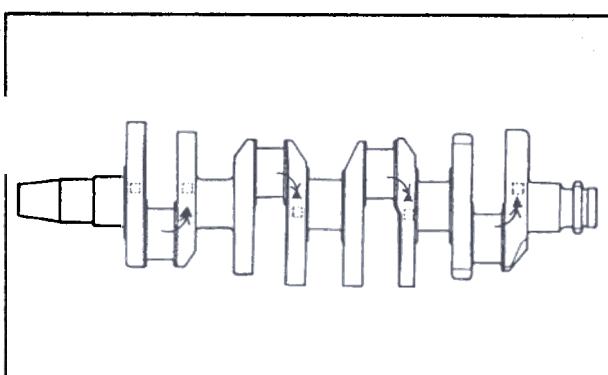
Crankpin Diameter

Standard: 29.984 ~ 30.000 mm
Service Limit: 29.97 mm

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

Crankpin Diameter Marks

None: 29.984 ~ 29.994 mm
O: 29.995 ~ 30.000 mm



▲ Crankpin Diameter Marks, "O" mark or no mark

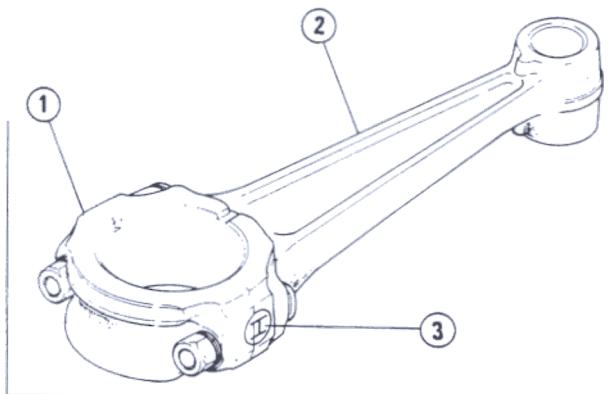
- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.

NOTE

- Tighten the nuts to the specified torque (see Exploded View).
- The mark already on the big end should almost coincide with the measurement.

Connecting Rod Big End Inside Diameter Marks

None: 33.000 ~ 33.008 mm
O: 33.009 ~ 33.016 mm

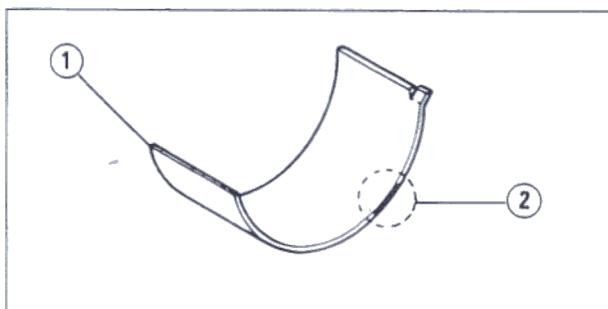


1. Big End Cap
2. Connecting Rod
3. Diameter Mark, "O" mark or no mark

- Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft coding.

Big End Bearing Insert Selection

Con-Rod Big End Bore Diameter Marking	Crankpin Diameter Mark	Bearing Insert	
		Size Color	Part Number
O	None	Blue	92028-1492
None	None	Black	92028-1493
O	O		
None	O	Brown	92028-1494

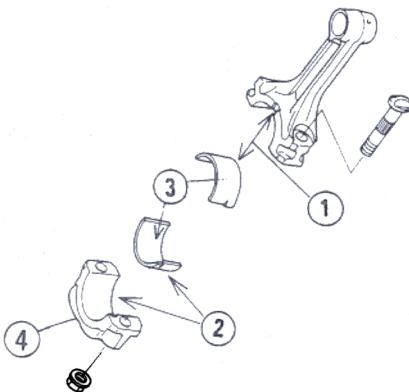


1. Bearing Insert
2. Color Size Mark

- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.
- Apply molybdenum disulfide grease to the upper inner surface of the connecting rod big end (between the connecting rod big end and the bearing insert).

CAUTION
Do not apply molybdenum disulfide grease to the inner surface of the big end cap (between the big end cap and the bearing insert).

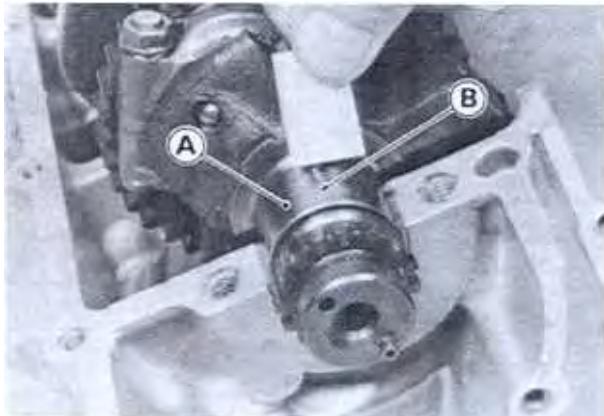
8-12 CRANKSHAFT / TRANSMISSION



1. Apply molybdenum disulfide grease. 3. Oil.
2. Do not apply grease. 4. Big End Cap

Crankshaft Main Bearing/Journal Wear

- Measure the bearing insert/crankshaft main journal clearance with a plastigage.



A. Crankshaft Main Journal B. Plastigage

NOTE

- Tighten the crankcase bolts to the specified torque (see Exploded View).
- Do not turn the crankshaft during clearance measurement.
- Journal clearance less than 0.025 mm can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.

Crankshaft Main Bearing Insert/Journal Clearance

Standard: 0.014 ~ 0.038 mm
Service Limit: 0.08 mm

- ★ If clearance is within the standard, no bearing replacement is required.
- ★ If clearance is between 0.038 mm and the service limit (0.08 mm), replace the bearing inserts with inserts painted blue. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

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

Crankshaft Main Journal Diameter

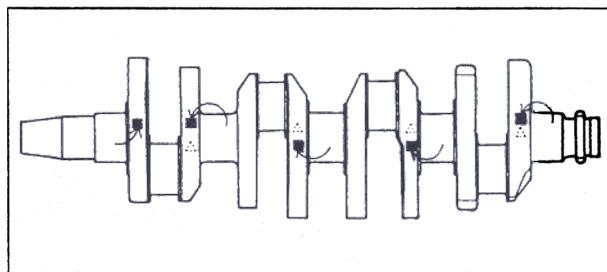
Standard: 29.984 ~ 30.000 mm
Service Limit: 29.96 mm

★ If any journal has worn past the service limit, replace the crankshaft with a new one.

★ If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

Crankshaft Main Journal Diameter Marks

None: 29.984 ~ 29.992 mm
1: 29.993 ~ 30.000 mm



■ Crankshaft Main Journal Diameter Marks, "1" mark or no mark

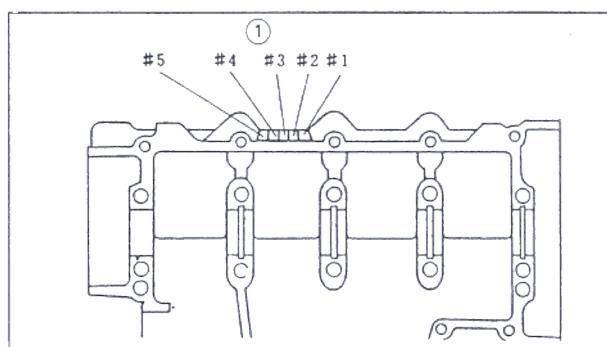
● Measure the main bearing bore diameter, and mark the upper crankcase half in accordance with the bore diameter.

NOTE

- Tighten the crankcase bolts to the specified torque (see Exploded View).
- The mark already on the upper crankcase half should almost coincide with the measurement.

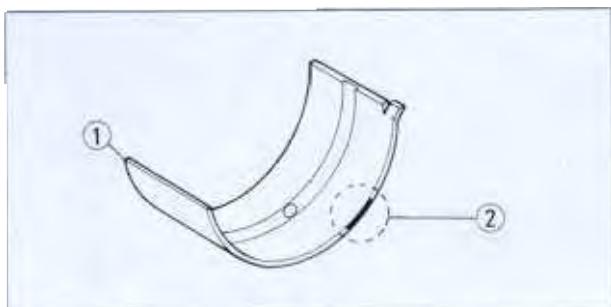
Crankcase Main Bearing Bore Diameter Marks

○: 33.000 ~ 33.008 mm
None: 33.009 ~ 33.016 mm



1. Crankcase Main Bearing Bore Diameter Marks, "○" mark or no mark

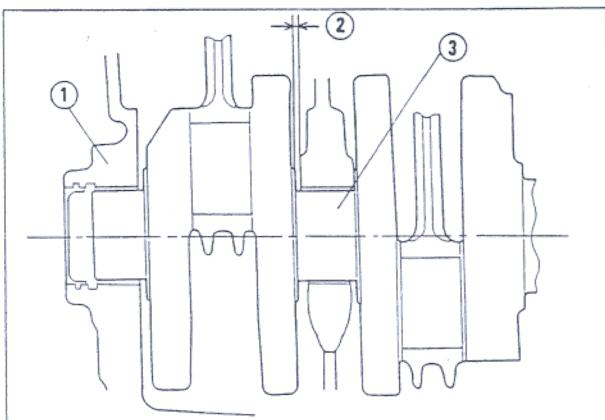
- Select the proper bearing insert in accordance with the combination of the crankcase and crankshaft coding.



1. Bearing Insert

2. Size Color Mark

- Install the new inserts in the crankcase halves and check insert/journal clearance with plastigage.



1. Crankcase

2. Measure here.

3. No. 2 Journal

Crankshaft Side Clearance

- Insert a thickness gauge between the crankcase and the crankweb at the No. 2 journal to determine clearance.
- If the clearance exceeds the service limit, replace the crankcase halves as a set.

Crankshaft Side Clearance

Standard: 0.05 ~ 0.20 mm

Service Limit: 0.40 mm

Main Bearing Insert Selection

Crankcase Main Bearing Bore Diameter Mark	Crankshaft Main Journal Diameter Mark	Crankshaft Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1418	5
			92028-1421	1, 2, 3, 4
○	None	Black	92028-1417	5
			92028-1420	1, 2, 3, 4
None	1	Blue	92028-1416	5
			92028-1419	1, 2, 3, 4

*The bearing inserts for No. 5 has no oil groove.

Transmission

Shift Pedal Removal

- Remove the left lower fairing (see Frame chapter).
- Mark the position of the shift lever on the shift shaft so that it can be installed later in the same position.
- Remove the shift lever and shift pedal.

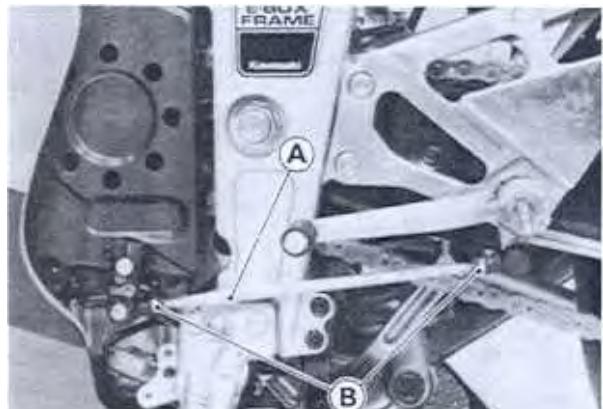
Shift Pedal Installation

- Apply grease to the shift pedal pivot.
- Tighten the shift pedal mounting bolt to the specified torque.
- ★ If necessary, adjust the pedal position from the standard position to suit you as follows.
- Loosen the front and rear rod locknuts.

NOTE

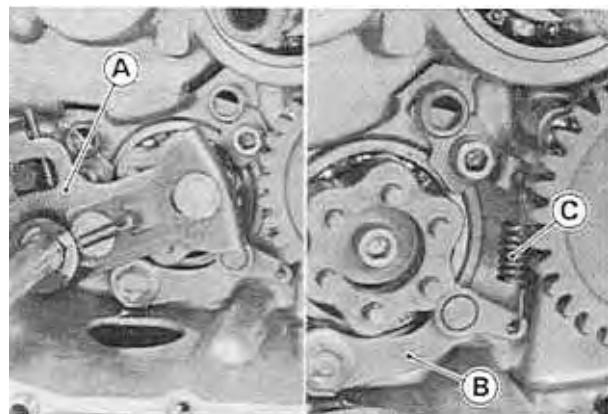
○ The locknut next to the knurled portion of the rod has left-hand threads.

- Turn the rod to adjust the pedal position.
- Tighten the locknuts securely.



A. Rod

B. Locknut



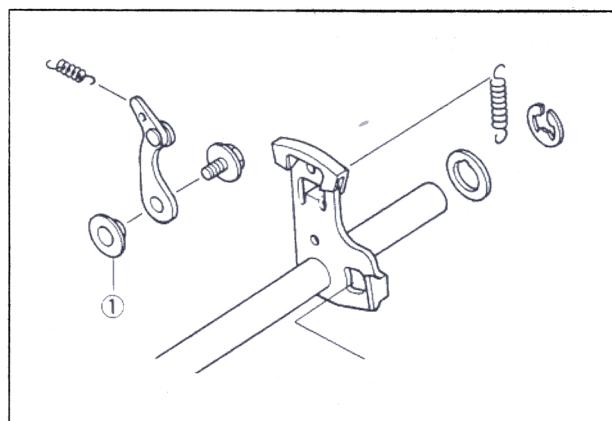
A. Shift Mechanism Arm

B. Shift Drum Set Lever

C. Set Lever Spring

External Shift Mechanism Installation

- Be careful of the direction of the shift drum set lever bolt collar.



1. Collar

- Tighten the shift drum set lever bolt to the specified torque (see Exploded View).
- Install the shift drum set lever spring.

External Shift Mechanism Removal

- Remove the following.
 - Engine Oil (see Engine Lubrication System chapter)
 - Clutch
 - Shift Pedal
- Pull out the shift mechanism arm with the shift shaft.
- Remove the shift drum set lever spring and them remove set lever.

Transmission Shaft Removal

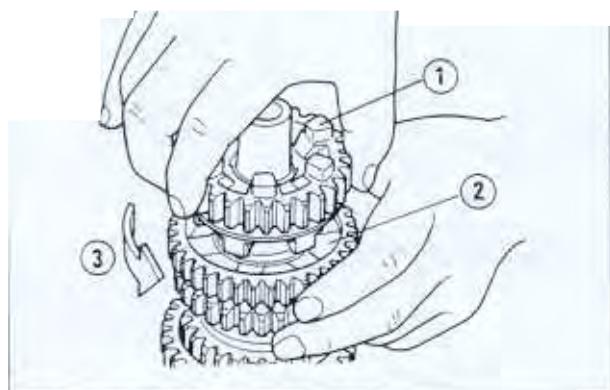
- Remove the clutch (see Clutch chapter).
- Remove the engine (see Engine Removal/Installation chapter).
- Split the crankcase (see this chapter).
- Remove the drive shaft and output shaft.

Transmission Shaft Installation

- Be careful of the following.
 - Apply engine oil to the sliding portion of the gears and bearings.
 - Check to see that the set pins and set rings are in place.
 - Install the drive shaft and output shaft into the upper crankcase half.

Transmission Disassembly

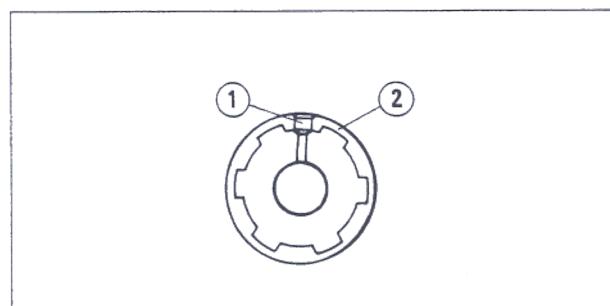
- Remove the transmission shafts.
 - Using the circlip pliers (special tool: 57001-144) to remove the circlips, disassemble the transmission shafts.
 - The 5th gear on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear as follows.
 - Set the output shaft in a vertical position holding the 3rd gear.
 - Spin the 5th gear quickly and pull it off upward.



- 1. 5th Gear
- 2. 3rd Gear
- 3. Spin quickly

Transmission Assembly

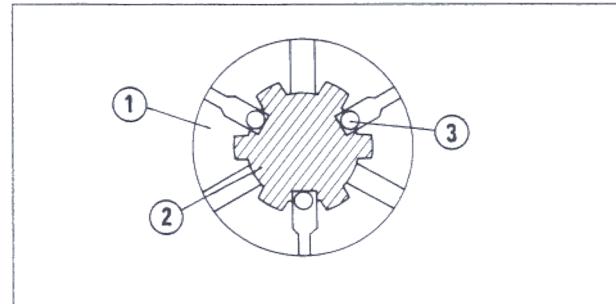
- Install the gear bushings on the shafts with their oil holes aligned with the shaft oil holes.



1. Oil Hole 2. Bushing

- Fit the steel balls into the 5th gear holes as shown.

View AA

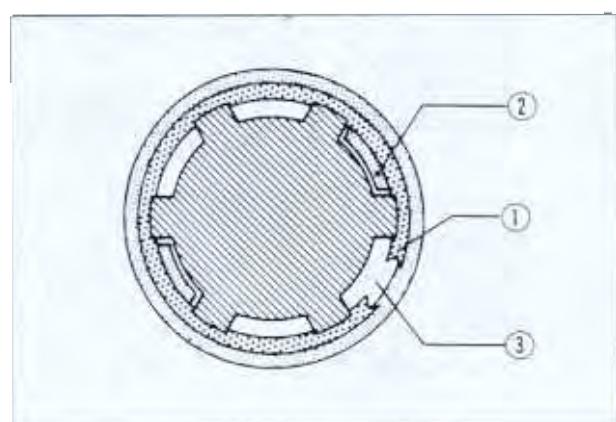


- 1. Gear
- 2. Shaft
- 3. Steel Balls

CAUTION

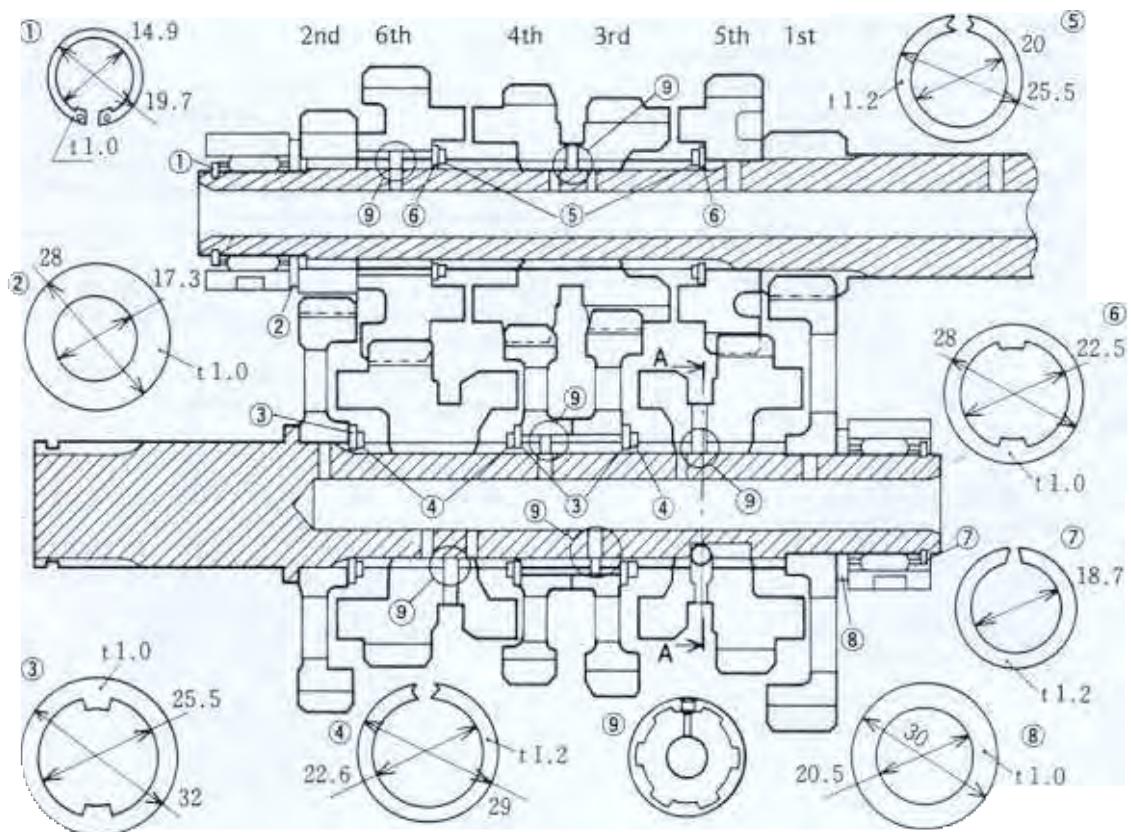
Do not apply grease to the steel balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

- Replace any circlip that were removed with new ones.
 - Install the circlips so that the opening is aligned with a spline groove.
 - Install the toothed washers so that the teeth are not aligned with the circlip opening.



1. Circlip 3. Groov
2. Toothed Washer

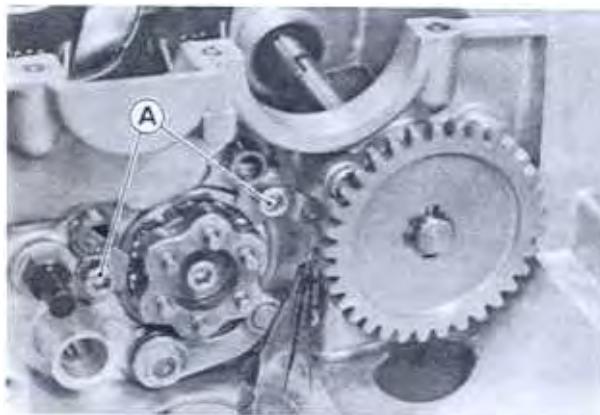
8-16 CRANKSHAFT / TRANSMISSION



Shift Drum and Fork Removal

- Remove the following.

Lower Crankcase Half (see Crankcase Splitting)
 External Shift Mechanism (see this chapter)
 Shift Drum Bearing Retainer Bolt

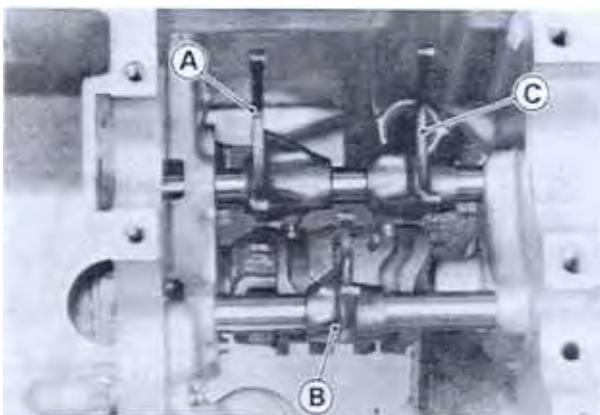


A. Shift Drum Bearing Retainer Bolt

- Pull out the shift rods and take off the shift forks.
- Pull out the shift drum.

Shift Drum and Fork Installation

- There are three types of the shift forks. The smaller shift fork is for the drive shaft gear.
- Other two are for output shaft gears.
- Install the shift forks as shown, noting the rib position.



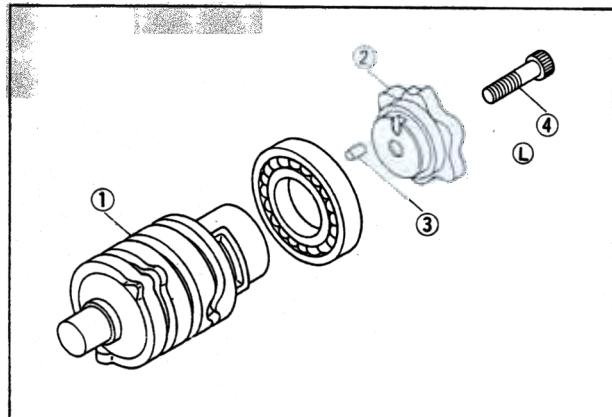
A. Shift Fork (clutch side)
 B. Shift Fork (for drive shaft gear)
 C. Shift Fork (engine sprocket side)

Shift Drum Disassembly

- Remove the shift drum (see this chapter).
- While holding the shift drum with a vise, remove the shift drum cam bolt.

Shift Drum Assembly

- Align the hole of the shift drum cam with the dowel pin.



1. Shift Drum 3. Dowel Pin
 2. Shift Drum Cam 4. Cam Mounting Bolt

- Tighten the following to the specified torque (see Exploded View).

Shift Drum Bearing Retainer Bolt
 Shift Drum Cam Mounting Bolt
 (Apply a non-permanent locking agent)

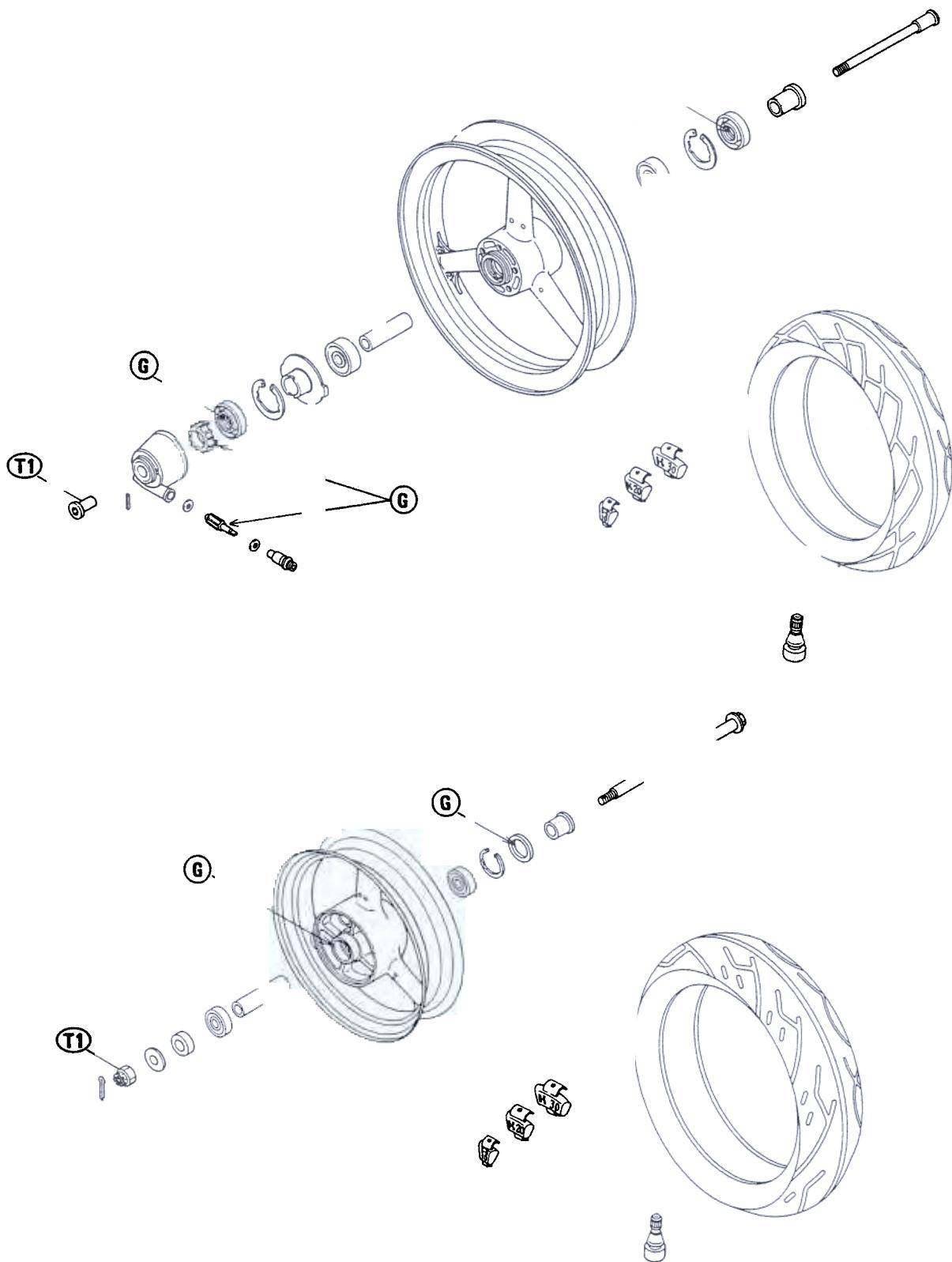
Wheels / Tires

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9-2 WHEELS / TIRES

Exploded View



T1: 11 N·m (11.0 kg·m, 80 ft-lb)

G : Apply grease.

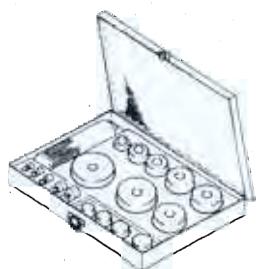
Specifications

Item	Standard	Service Limit
Wheels: Rim runout (with tire installed): Axial Radial	— — — — — —	0.5 mm 0.8 mm
Axle runout/100 mm	Under 0.05 mm	0.2 mm
Tires: Air pressure (when cold): Front Rear	225 kPa (2.25 kg/cm ² , 32 psi) 250 kPa (2.50 kg/cm ² , 36 psi)	— — — — — —
Tread Depth: Front Rear	4.0 mm 6.0 mm	1 mm 2 mm (Up to 130 km/h) 3 mm (Over 130 km/h)
Standard tire: Front: Size, Type Make Rear: Size, Type Make	120/60 VR17 TUBELESS DUNLOP K510F BRIDGESTONE CYROX-17 160/60 VR17 TUBELESS DUNLOP K510 BRIDGESTONE CYROX-16	— — — — — — — — — — — — — — —

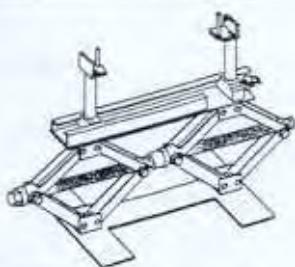
9-4 WHEELS / TIRES

Special Tools

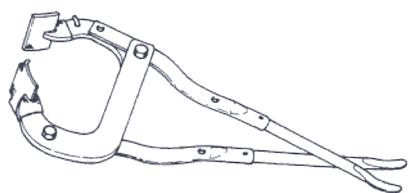
Bearing Driver Set: 57001-1129



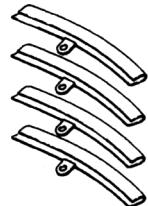
Jack: 57001-1238



Bead Breaker Assembly: 57001-1072



Rim Protector: 57001-1063



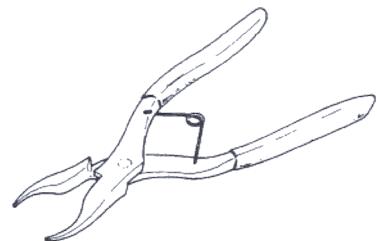
Bearing Remover Head, $\Phi 15 \times \Phi 17$: 57001-1267



Bearing Remover Head, $\Phi 20 \times \Phi 22$: 57001-1293



Inside Circlip Pliers: 57001-143



Bearing Remover Shaft: 57001-1265

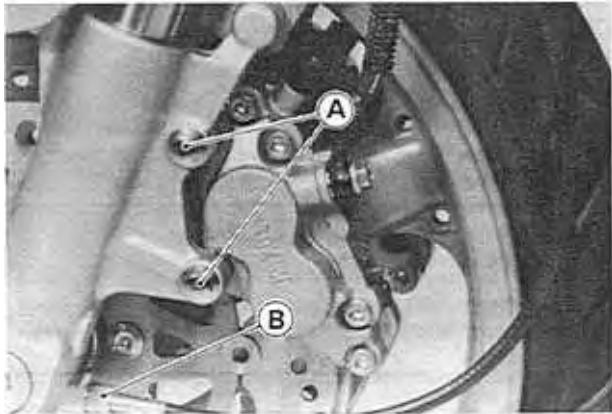


Wheels (Rims)

Front Wheel Removal

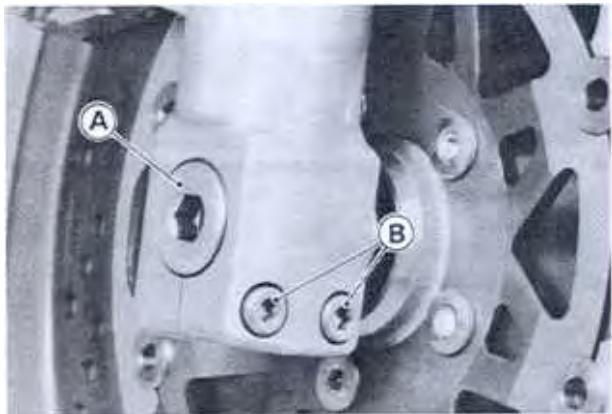
- Remove the following.

Lower Fairings (see Frame chapter)
Speedometer Cable Lower End
Right and Left Brake Calipers



A. Caliper Mounting Bolts
B. Speedometer Cable Lower End

Right Side Axle Clamp Bolts (Loosen)
Axe (Loosen)



A. Axe
B. Axe Clamp Bolts

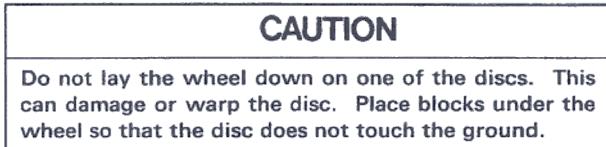
- Using the jack (special tool) and a stand, raise the front wheel off the ground.



A. Jack or Stand

B. Jack: 57001-1238

- Pull out the axle to the right and drop the front wheel out of the forks.

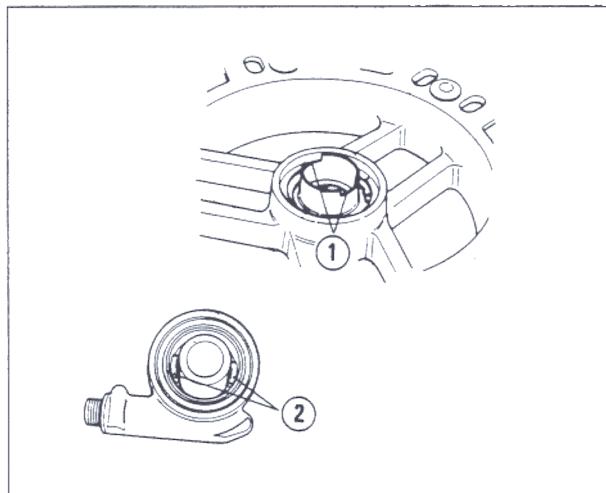


Front Wheel Installation

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

NOTE

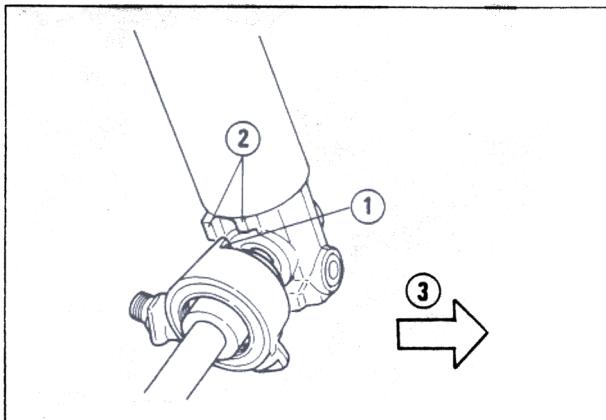
- Put the speedometer gear drive onto the wheel hub notches, then install the housings that it fits in the drive notches.
- Fit the speedometer gear housing stop in the fork leg stop.



1. Notches

2. Projections

9-6 WHEELS / TIRES



1. Housing Stop 3. Front
2. Fork Leg Stop

○Fit the collar in the right side of the hub.

- Apply grease to the speedometer gear and hub grease seal.
- Tighten the following fasteners to the specified torque (see Exploded View).
 - Axle Nut
 - Axle Clamp Bolts
 - Caliper Mounting Bolts
- 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 the following.
 - Chain Case
 - Rear Caliper
 - Cotter Pin and Axle Nut
- Remove the drive chain from the rear sprocket toward the left (see Final Drive chapter).
- Pull out the axle.
- Move the rear wheel back and remove the caliper bracket installed.



A. Rear Wheel B. Rear Caliper Bracket

CAUTION

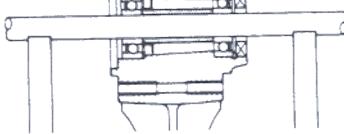
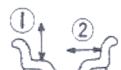
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

- Installation is the reverse of removal. Note the following.
 - Apply grease to the following.
 - Coupling Grease Seal
 - Wheel Hub Grease Seal
 - Caliper Holder Pivot
 - Adjust the drive chain after installation (see Final Drive chapter).
 - Tighten the following fasteners to the specified torque (see Exploded View).
 - Axle Nut
 - Caliper Mounting Bolts
 - Check the rear brake.

Wheel Inspection

- Remove the tire from the wheel (see Tire Removal).
- Measure the rim runout by using the dial gauge.

Rim Runout

1. Radial Runout

2. Axial Runout

- ★ If rim runout exceeds the service limit, check the wheel bearings (see this chapter).
- ★ If the problem is not due to the bearings, the wheel must be replaced.

Axial Runout

Service Limit: 0.5 mm

Radial Runout

Service Limit: 0.8 mm

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.

Balance Weight Installation

- 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 petroleum distillates because they will deteriorate the tire.

- Install the balance weight on the rim.
- Slip the weight on 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 rim flat portion.

WARNING

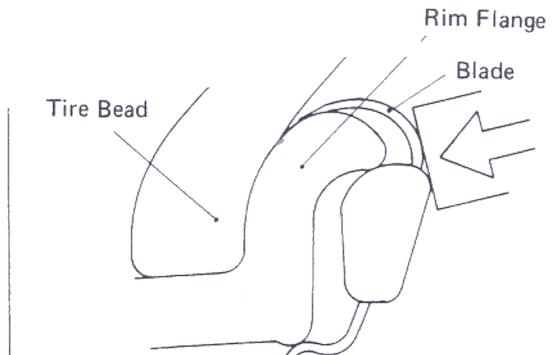
If the balance weight has any play on the rim flange, the blade and/or clip have been stretched. Replace the loose balance weight.
Do not reuse used balance weight.

Balance Weight

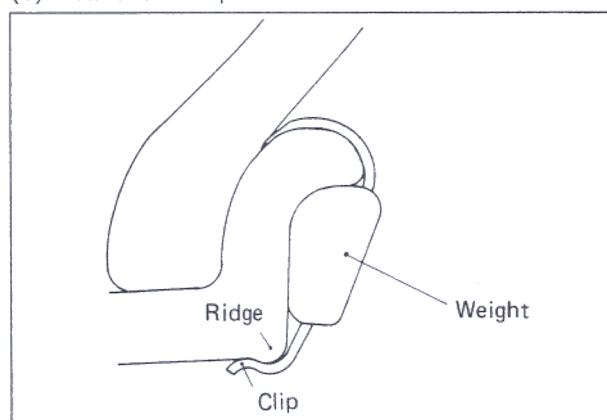
Part Number	Weight(grams)
41075-1014	10
41075-1015	20
41075-1016	30

Installing Balance Weight

- (a) Press or lightly hammer the weight in.



- (b) Installation completed.



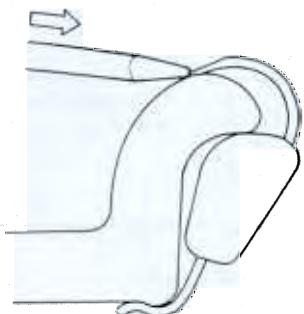
9-8 WHEELS / TIRES

Balance Weight Removal

- (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)

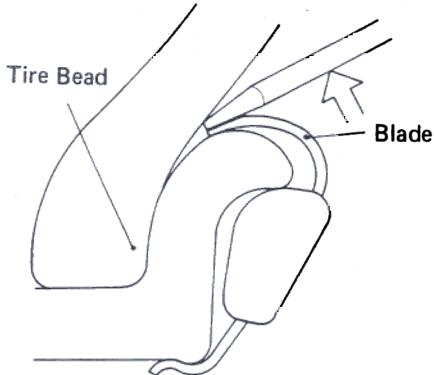
Push



(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 a tip of the screw driver between the tire bead and weight blade until the end of the tip reaches the end of the weight blade.
- Push the 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 Air Pressure Inspection

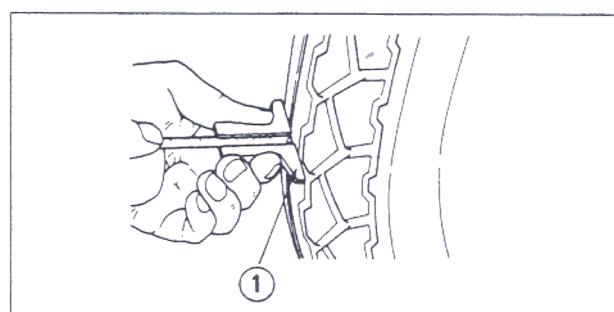
NOTE

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

Front	Up to 181 kg (401 lb)	225 kPa (2.25 kg/cm ² , 32 psi)
Rear	Up to 181 kg (401 lb)	250 kPa (2.50 kg/cm ² , 36 psi)

Tire Inspection

- Visually inspect the tire for cracks and cuts, replacing the tire in case of bad damage.
- Measure the tread depth at the center of the tread with a depth gauge.



1. Depth Gauge

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

Tire Tread Depth

Front

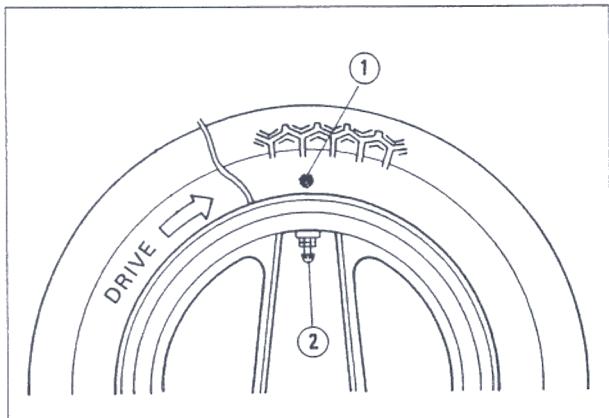
Standard 4.0 mm
Service Limit 1 mm

Rear

Standard 6.0 mm
Service Limit 2 mm (Up to 130 km/h)
3 mm (Over 130 km/h)

Removal

- Remove the following.
 - Wheel (see this chapter)
 - Disc(s)
 - Valve Core (let out the air)
- 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.



1. Chalk Mark or Yellow Mark 2. Valve Stem

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

CAUTION

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

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

NOTE

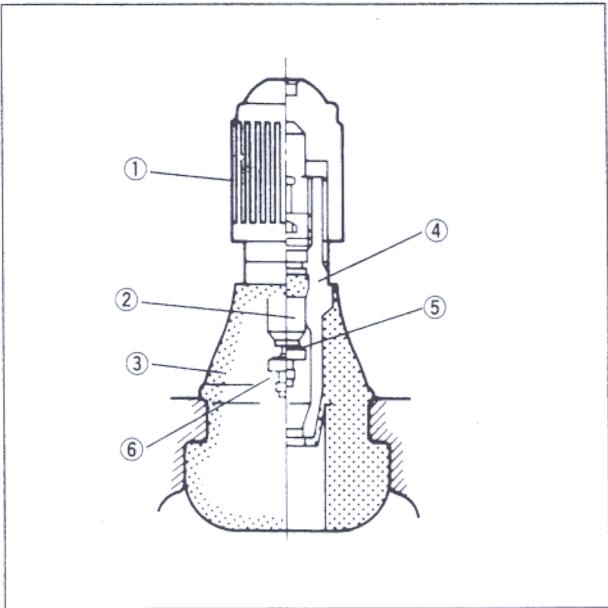
- The tires cannot be removed with hand tools because they fit the rims too tightly.

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.
- Remove the air valve and discard it.

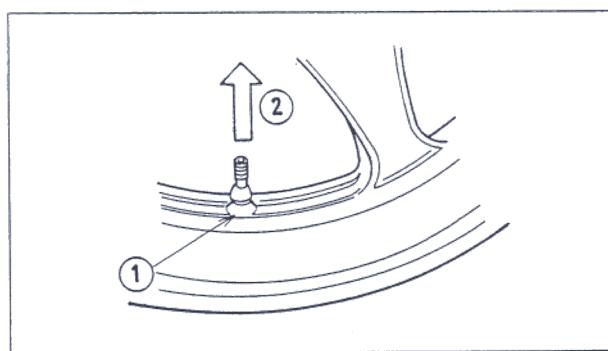
CAUTION

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



1. Plastic Cap 4. Valve Stem
2. Valve Core 5. Valve Seat
3. Stem Seal 6. Valve Opened

- 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

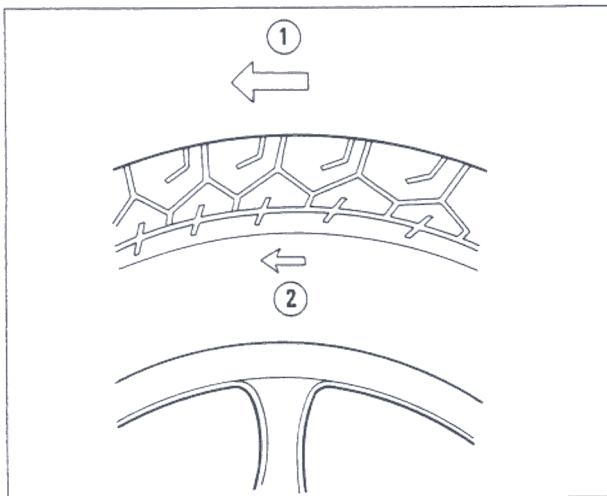
Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

- Apply a soap and water solution, or rubber lubricant to the rim flange and tire beads.
- Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.

NOTE

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

9-10 WHEELS / TIRES



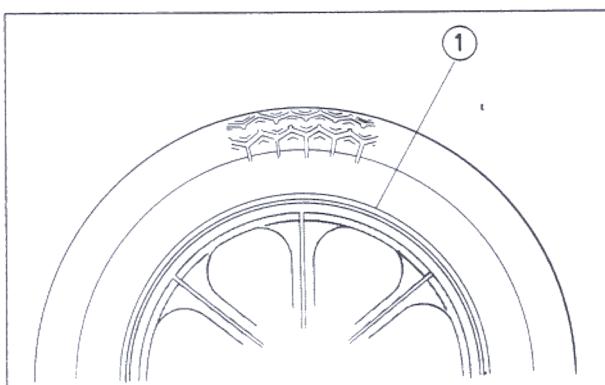
1. Rotation Direction
2. Rotation Mark (Arrow)

- 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).
- Install the tire on the rim using a suitable commercially available tire changer.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim 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 400 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

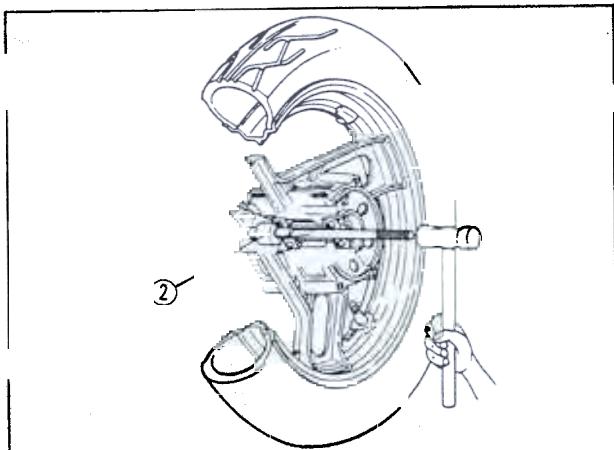
- If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core. Lubricate the rim flanges and tire beads. Install the valve core and inflate the tire again.

- 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 the tire, and check for bubbles that would indicate leakage.
- Adjust the air pressure to the specified pressure (see Tire Inspection).
- Install the brake disc(s) so that the disc rotation mark aligns with the tire rotation (see Brake System chapter).
- Adjust the wheel balance.

Hub Bearings

Removal

- Remove the following.
 - Wheel (see this chapter)
 - Oil Seals and Circlips
- Use the bearing remover (special tool) to remove the hub bearings



1. Bearing Remover Shaft: 57001-1265
2. Bearing Remover Head

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 that the disc does not touch the ground.

Installation

- Install the bearings by using the bearing driver set (special tools: 57001-1129).

NOTE

○ Install the bearings so that the marked or sealed side faces out.

Lubrication

NOTE

○ Since the front and rear hub bearings are packed with grease and sealed, they are not required to be removed for lubrication. Clean and grease the rear hub bearings.

Speedometer Gear Housing

Disassembly and Assembly

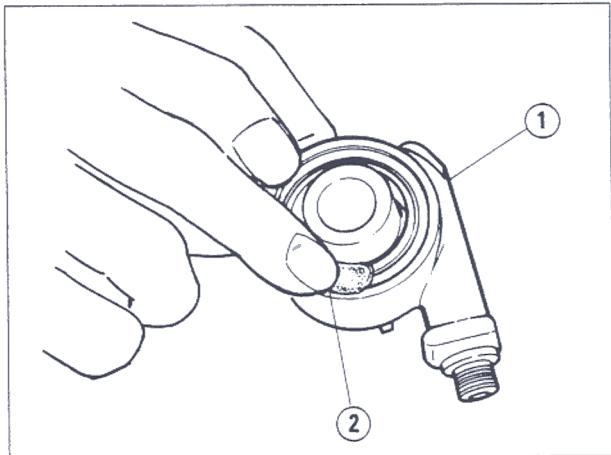
NOTE

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

- Install the speedometer gear housing so that it fits in the speedometer gear drive notches (see Front Wheel Installation).

Lubrication

- Clean and grease the speedometer gear housing.



1. Speedometer Gear Housing
2. Grease.

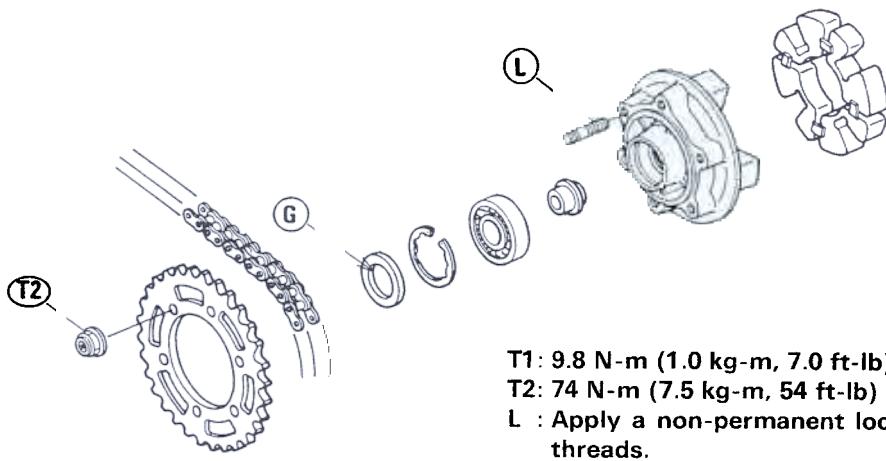
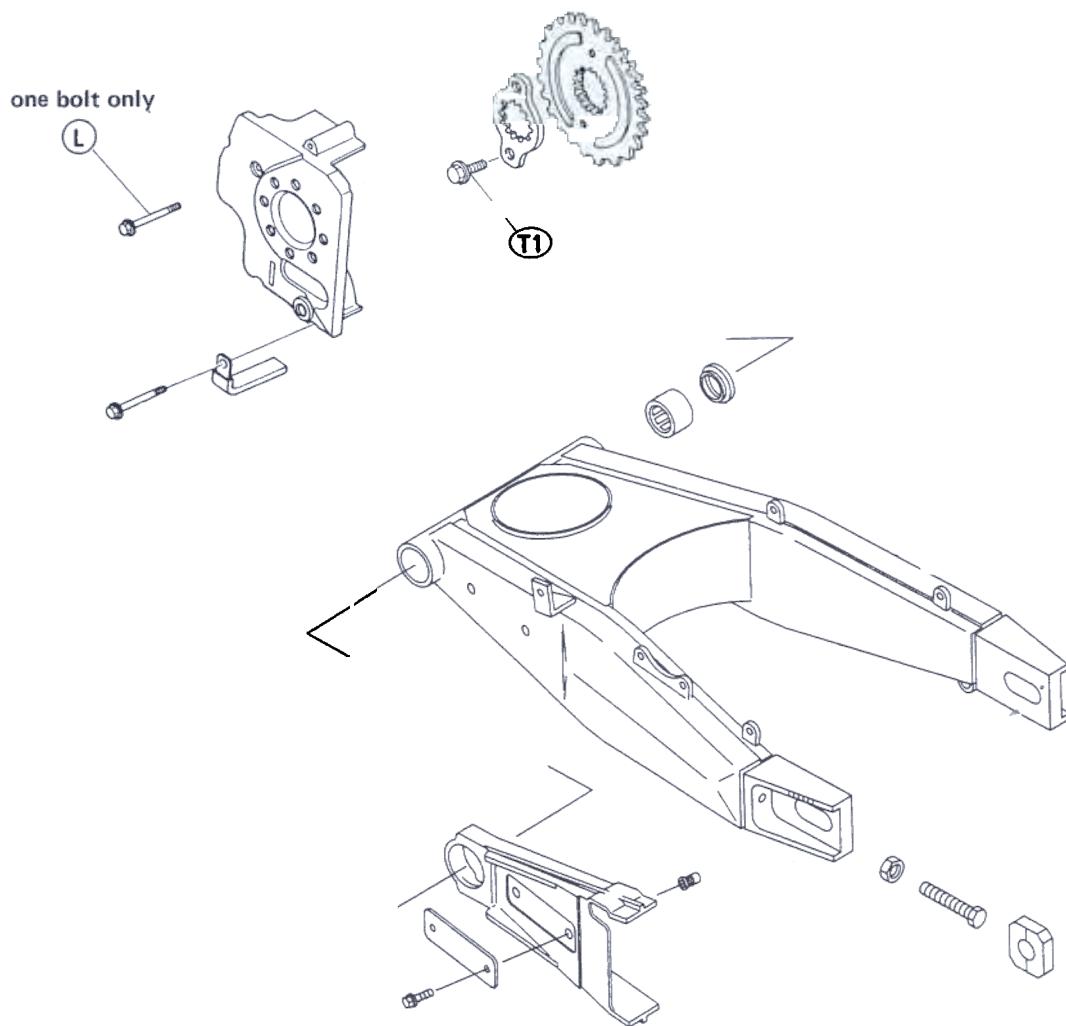
Final Drive

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10-2 FINAL DRIVE

Exploded View



T1: 9.8 N·m (1.0 kg·m, 7.0 ft-lb)

T2: 74 N·m (7.5 kg·m, 54 ft-lb)

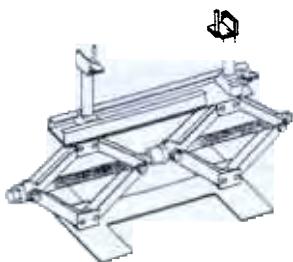
L : Apply a non-permanent locking agent to the threads.

Specifications

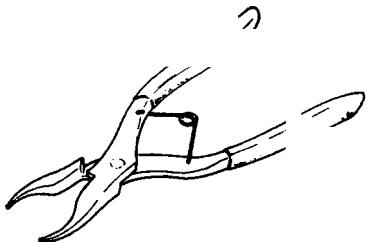
Item	Standard	Service Limit
Drive Chain:		
Make and type	ENUMA EK520-SX 0 Endless 108 links	---
Chain slack	20 ~ 35 mm (35mm is best)	Less than 20 mm, or more than 40 mm
20-link length	317.5 ~ 318.2 mm	323 mm

Special Tools

Jack: 57001-1238

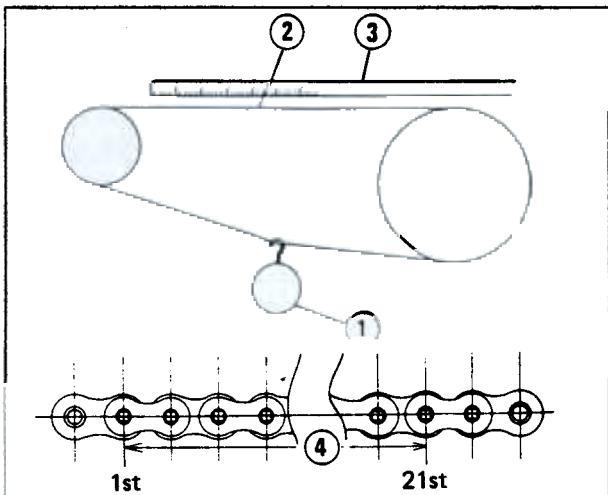


Inside Circlip Pliers: 57001-143



Bearing Driver Set: 57001-1129





1. Weight 3. Ruler
 2. Straight Part 4. Measure this length.

Drive Chain 20-Link Length

Standard: 317.5 ~ 318.2 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.

Lubrication

CAUTION

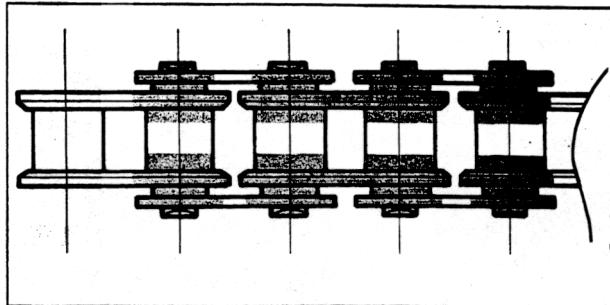
The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.

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.

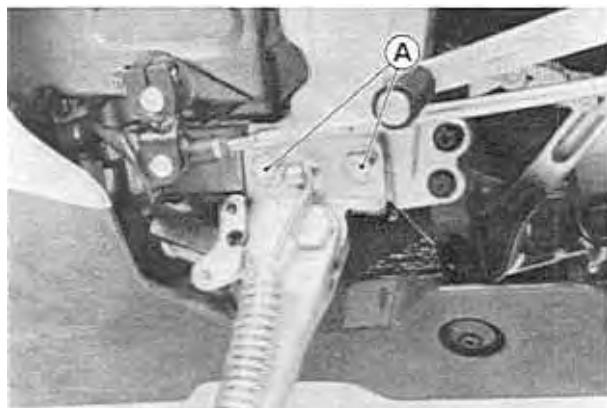
- If a special lubricant is not available, a heavy oil such as SEA 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.



■ Oil Applied Areas

Drive Chain Removal

- Remove the following.
 - Lower Fairings (see Frame chapter)
 - Chain Cover
 - Engine Sprocket Cover (see this chapter)
 - Rear Shock Absorber Mounting Nut (lower)
 - Tie-Rod Nuts (upper)
 - Swing Arm Shaft Nut
 - Rear Caliper (see Brakes chapter)
- Loosen the drive chain.
- Remove the side stand.



A. Side Stand Bracket Bolts

- Place the jack under the frame to steady the motorcycle.
- Disengage the chain from the rear sprocket and the engine sprocket.
- Remove the swing arm shaft and pull it backward.
- Remove the chain.



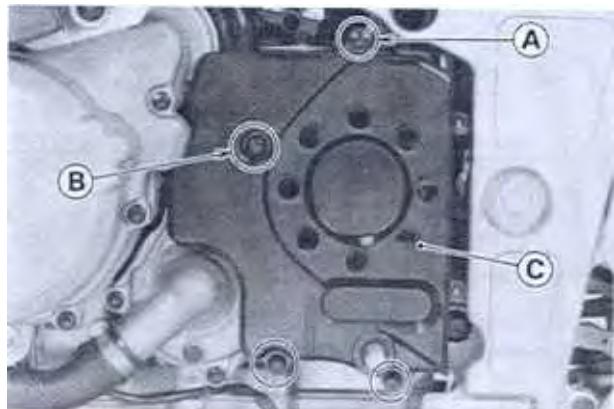
Drive Chain Installation

- Installation is the reverse of removal. Note the following.
 - Tighten the following fasteners to the specified torque.
 - Rear Shock Absorber Mounting Nuts
 - Tie-Rod Nuts
 - Swing Arm Shaft Nut
 - Rear Wheel Axle Nut
 - Apply a non-permanent locking agent to the side stand bracket bolts and tighten the specified torque (see Frame chapter).
 - Adjust the drive chain (see this chapter).

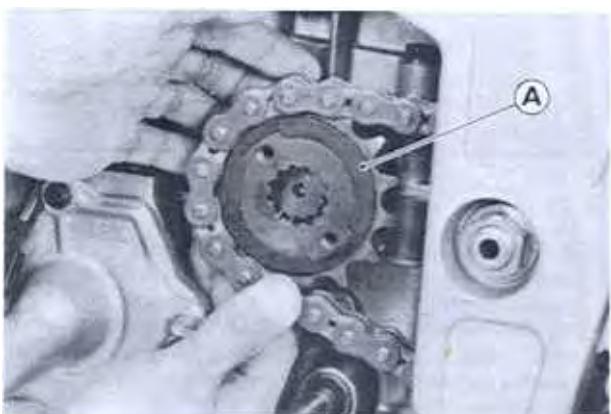
Sprocket, Coupling

Engine Sprocket Removal

- Loosen the drive chain (see Drive Chain Slack Adjustment).
 - Remove the following.
 - Left Lower Fairing (see Frame chapter)
 - Shift Pedal
 - Engine Sprocket Cover



- Remove the engine sprocket plate.
 - Pull the engine sprocket off the output shaft along with the chain.



A. Engine Sprocket

- Remove the engine sprocket.

Engine Sprocket Installation

- Installation is the reverse of removal. Note the following.
 - Engage the sprocket with the drive chain so that hollow side faces inward.
 - Tighten the sprocket plate bolt to the specified torque (see Exploded View).
 - Apply a non-permanent locking agent to the engine sprocket cover bolt (one bolt only, see Exploded View).

Rear Sprocket Removal

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

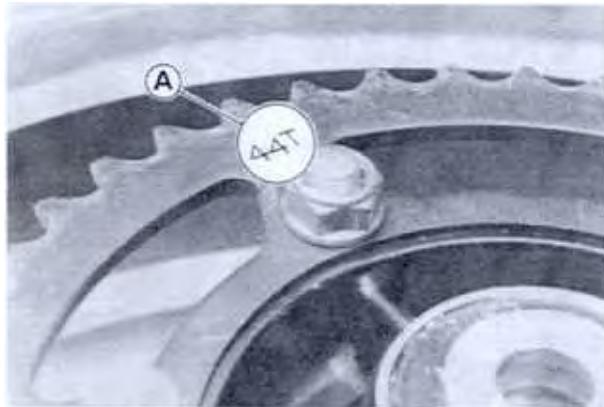
CAUTION

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

- Pull out the rear wheel coupling from the rear wheel.
- Remove the rear sprocket nuts.
- Remove the rear sprocket.

Rear Sprocket Installation

- Installation is the reverse of removal. Note the following.
- Install the sprocket facing the tooth number marking outward.



A. Tooth Number Marking

- Tighten the rear sprocket nuts to the specified torque (see Exploded View).
- If the stud bolt is to be replaced, apply a non-permanent locking agent to the lower half of the stud bolt.
- Install the rear wheel (see Wheels/Tires chapter).

Rear Sprocket Wear

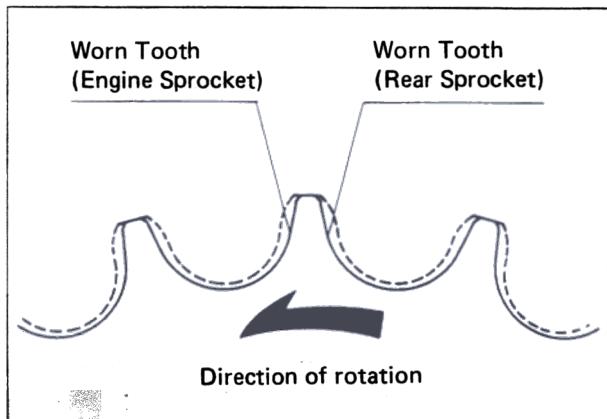
- Visually inspect the rear sprocket teeth.
- ★ If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain and engine sprocket (see Drive Chain Wear Inspection).

CAUTION

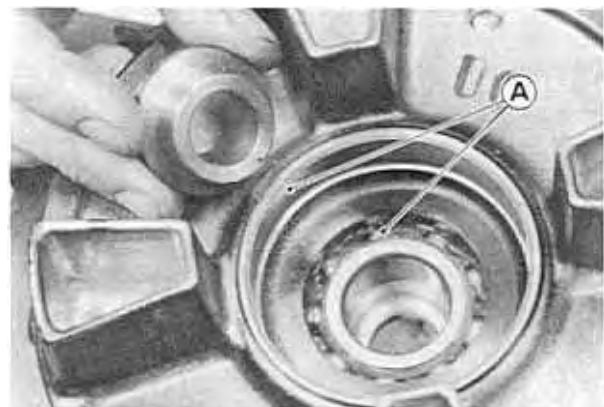
If a sprocket requires replacement, the drive chain is probably worn also. Upon replacing the rear sprocket, inspect the chain and engine sprocket.

NOTE

○ Sprocket wear is exaggerated for illustration.

Sprocket Teeth**Coupling Installation**

- Grease the following.
- Ball Bearing
- Coupling Grease Seal
- Coupling Internal Surface



A. Grease here.

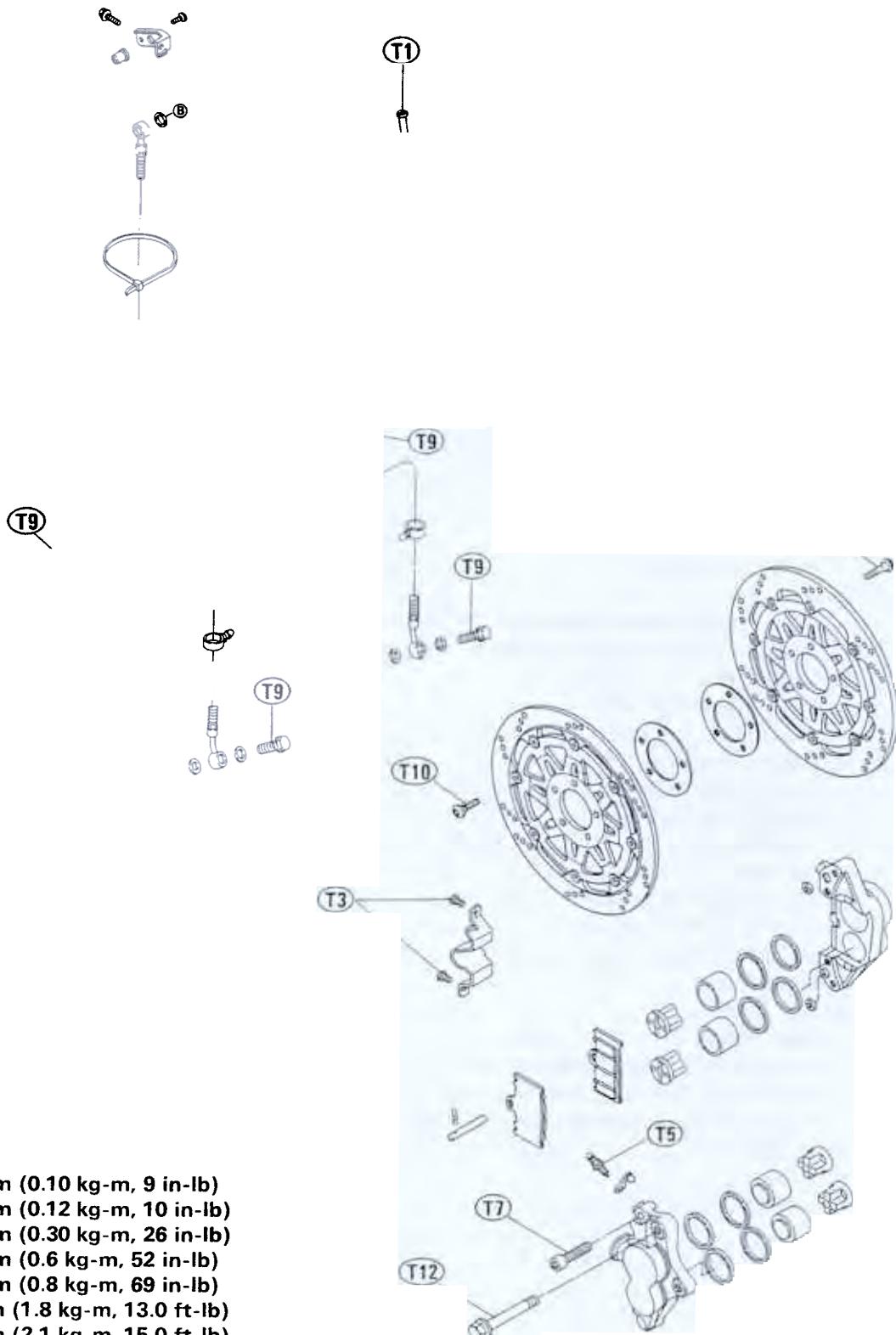
Brakes

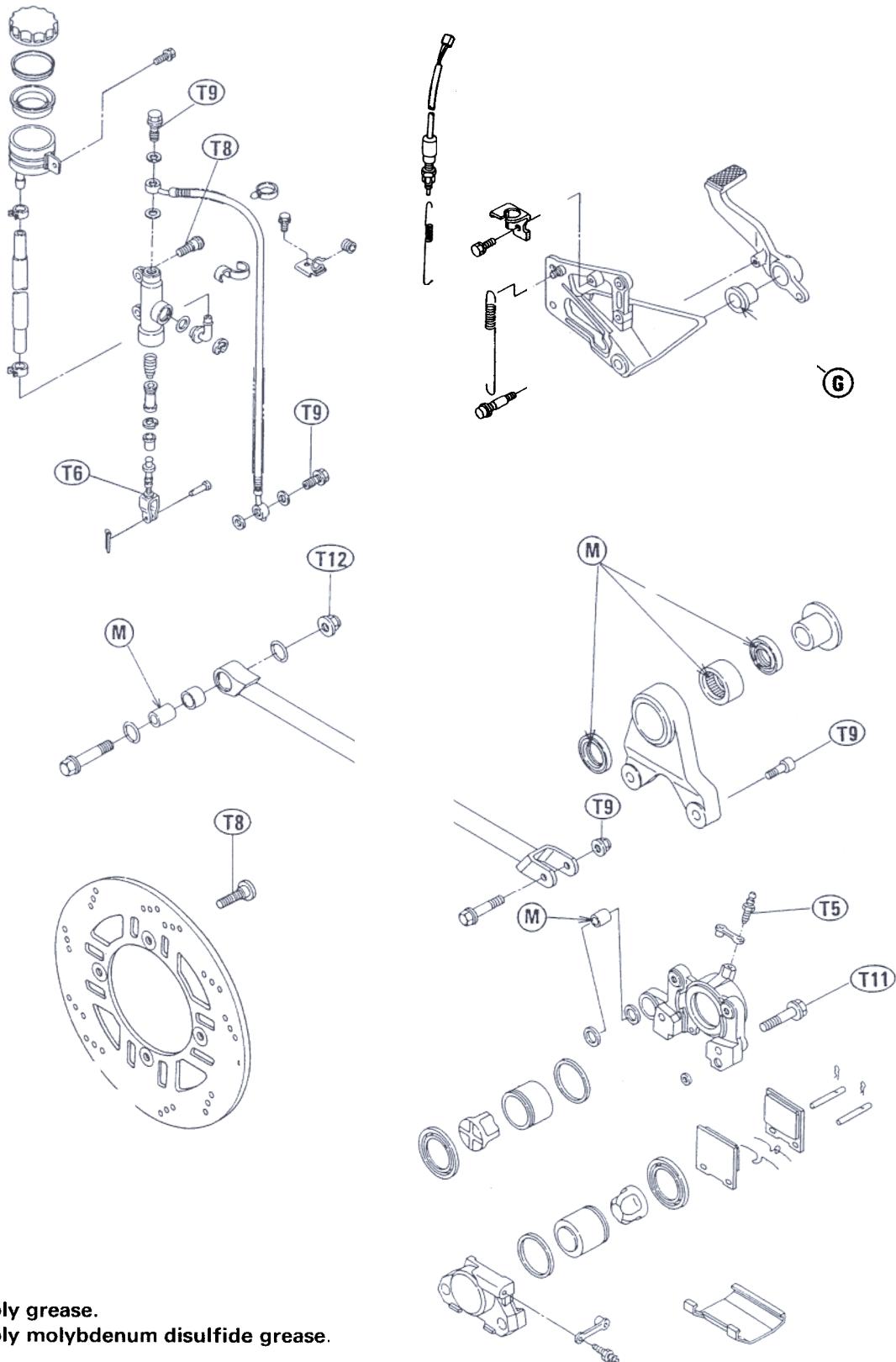
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11-2 BRAKES

Exploded View





G : Apply grease.

M : Apply molybdenum disulfide grease.

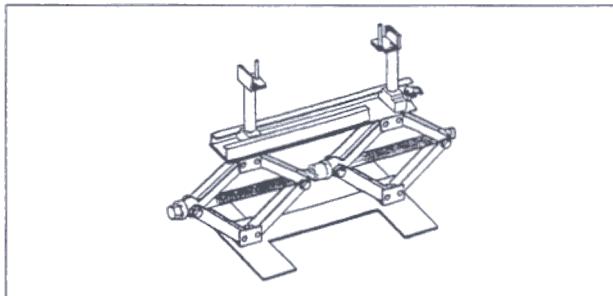
11-4 BRAKES

Specifications

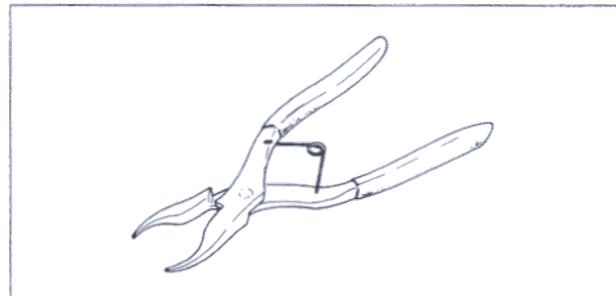
Item	Standard	Service Limit
Brake Fluid: Grade Brand (recommended)	D.O.T.3 Atlas Extra Heavy Duty Shell Super Heavy Duty Texaco Super Heavy Duty Wagner Lockheed Heavy Duty Castrol Girling-Universal Castrol GT (LMA) Castrol Disc Brake Fluid Non-adjustable	— — — — — —
Brake Lever Free Play:		— — —
Brake Pedal: Brake pedal free play Brake pedal position	Non-adjustable 43 mm below from center of brake pedal shaft	— — — — — —
Brake Light Switch: Front Rear	Non-adjustable ON after about 10 mm pedal travel	— — — — — —
Brake Pad Lining Thickness: Front Rear	4 mm 4 mm	1 mm 1 mm
Brake Discs: Disc thickness: Front Rear	4.3 ~ 4.6 mm 5.8 ~ 6.1 mm	4 mm 5 mm
Disc runout	0.2 mm or under	0.3 mm

Special Tools

Jack: 57001-1238



Inside Circlip Pliers: 57001-143



Brake Fluid

Fluid Level Inspection

In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the front and rear brake fluid reservoir.

- Check the brake fluid level in the reservoir.

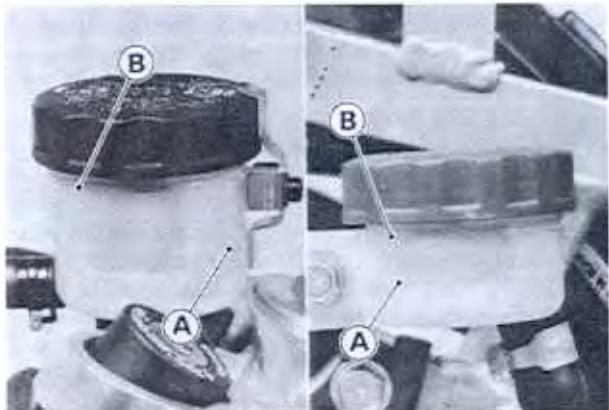
NOTE

○ 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.



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.3.

Recommended Disc Brake Fluid

Type	D.O.T.3
Brand	Atlas Extra Heavy Duty
	Shell Super Heavy Duty
	Texaco Super Heavy Duty
	Wagner Lockheed Heavy Duty
	Castrol Girling-Universal
	Castrol GT (LMA)
	Castrol Disc Brake Fluid

Changing Brake Fluid:

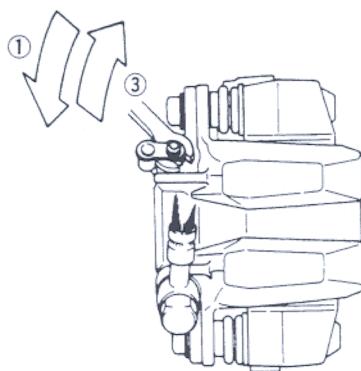
- Remove the rubber cap on the bleed valve.
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Open the bleed valve (counterclockwise to open), and pump the brake lever or pedal until all the fluid is drained from the line.
- Close the bleed valve.
- Remove the reservoir cap.
- Fill the reservoir with fresh brake fluid.
- Install the reservoir cap.
- 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.

- Bleed the air from the lines (continue with Bleeding the Brake).

Filling up the Brake Line



11-6 BRAKES

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.

● 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 (see Brake Fluid Change).

★ 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.

★ If brake lever or pedal action still feels soft or spongy, bleed the remaining air as follows.

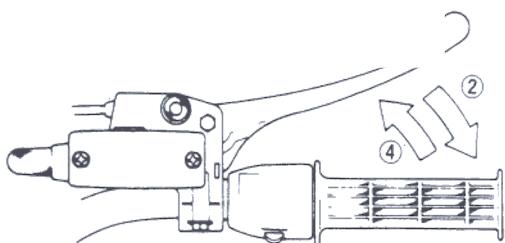
○ Connect a clear plastic hose to the bleed valve at the caliper, running the other end of the hose into a container.

○ Pump the brake lever or pedal a few times until it comes hard.

○ Holding the brake applied, quickly open (turn counter-clockwise) and close the bleed valve.

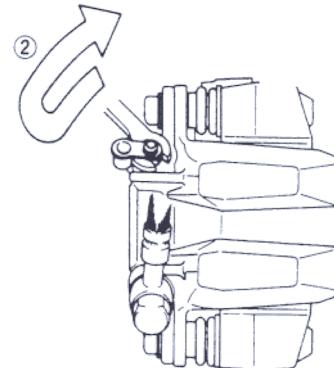
○ Repeat this operation until no more air can be seen coming out into the plastic hose.

○ Check the fluid level in the reservoir every so often, replenishing it as necessary.



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

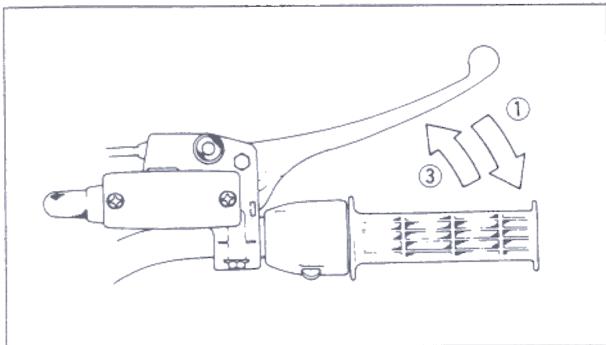
Bleeding the Brake Line



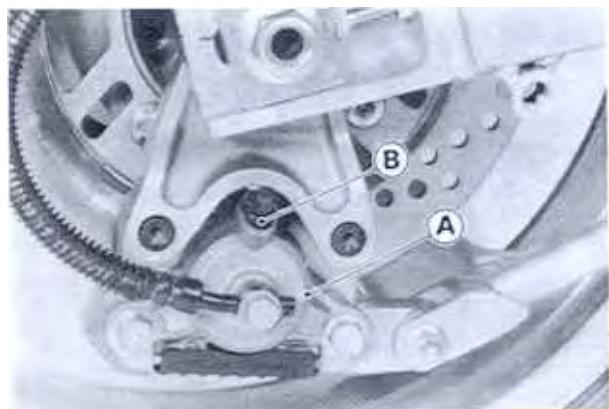
WARNING

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**.



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



A. Caliper

B. Bleed Valve

- When air bleeding 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 (handlebar turned so that the reservoir is level).

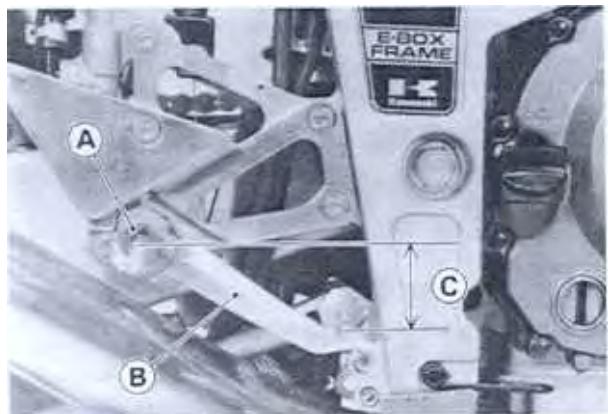
Brake Pedal

Brake Pedal Position Adjustment

- Check that the brake pedal is in the correct position.

Pedal Position

Standard: About 43 mm below from center of brake pedal shaft



A. Footpeg
B. Brake Pedal

C. Pedal Position

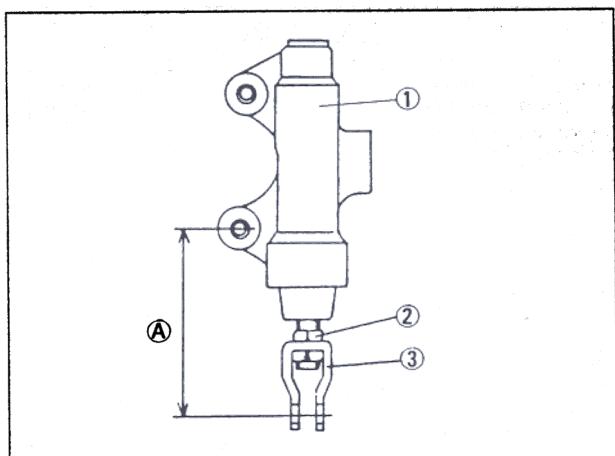
NOTE

○ Usually it is not necessary to adjust the pedal position, but always adjust it when the master cylinder is disassembled.

○ If the pedal position cannot be adjusted by turning the clevis, the brake pedal may be deformed or incorrectly installed.

● When the brake pedal is in its rest position, measure the length (A) indicated in the figure.

★ If the length (A) is not within the specified length, adjust a nut.



1. Master Cylinder
2. Locknut

3. Clevis

11-8 BRAKES

Rear Brake Light Switch Adjustment

- 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.

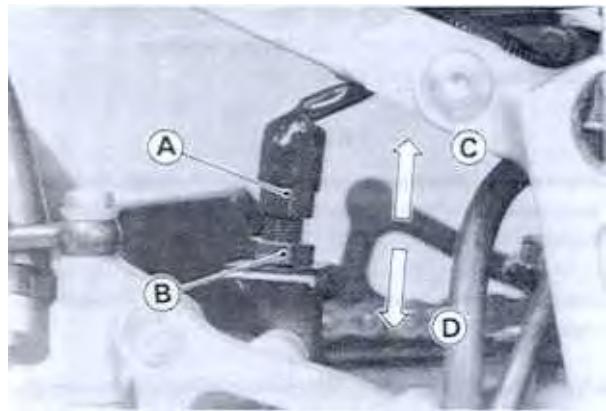


A. Brake Pedal

B. 10 mm

★ If it does not, adjust the brake light switch.

- Turn the adjusting nut to adjust the switch.



A. Switch Body
B. Adjusting Nut

C. Light sooner.
D. Light later.

CAUTION

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

Calipers

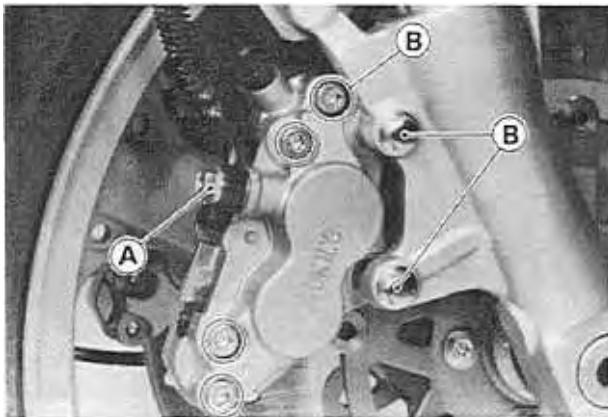
Front Caliper Removal

- Remove the following.
- Banjo Bolt (at the caliper)
 - 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.

- Remove the caliper.



A. Banjo Bolt

B. Caliper Assembly Bolts

C. Caliper Mounting Bolts

CAUTION

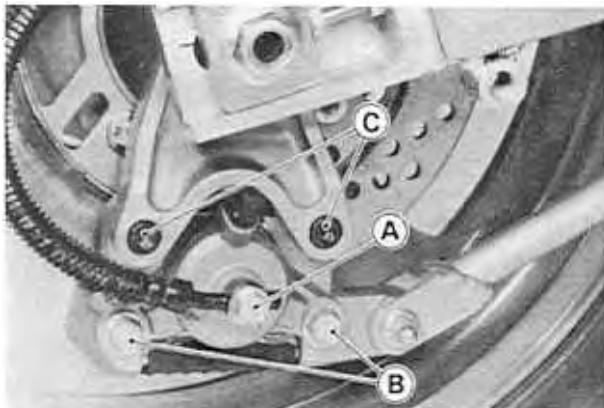
Immediately wipe up any brake fluid that spills.

Rear Caliper Removal

- Remove the rear caliper in the same way as the front caliper.

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.



A. Banjo Bolt C. Caliper Mounting Bolts
B. Caliper Assembly Bolts

Caliper Installation

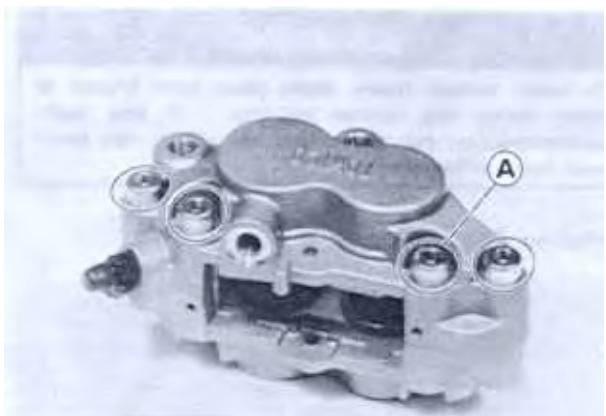
- Tighten the caliper mounting bolts to the specified torque (see Exploded View).
- Connect the brake hose to the caliper putting a new flat washer on each side of the brake hose fitting.
- Tighten the banjo bolt to the specified torque (see Exploded View).
- Check the fluid level in the master cylinder (reservoir), and bleed the brake line (see Bleeding the Brake).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

WARNING

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

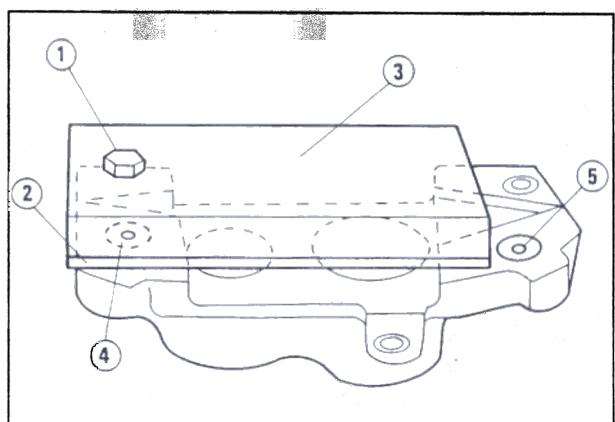
Front Caliper Disassembly

- Remove the following.
 - Front Brake Pads (see this chapter)
 - Front Caliper (see this chapter)
- Remove the caliper assembly bolts and split the front caliper.



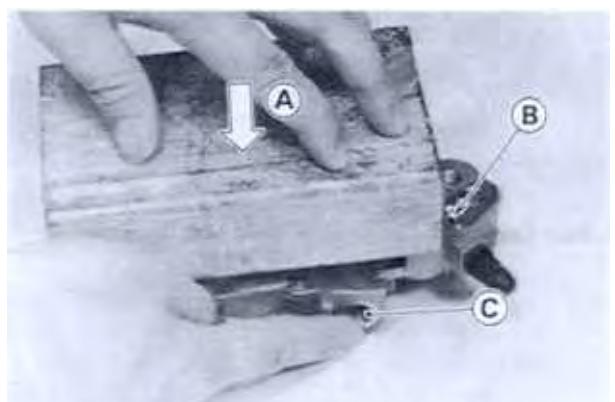
A. Caliper Assembly Bolts

- Remove the piston insulator and the O-rings.
- 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.



A. Push down C. Hose Joint Opening
B. Apply compressed air.

⚠️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.

- Pull out the pistons by hand.



- Remove the following.
 - Dust Seals
 - Fluid Seals
 - Repeat the previous step to remove the pistons from the other side of the caliper body.

Rear Caliper Disassembly

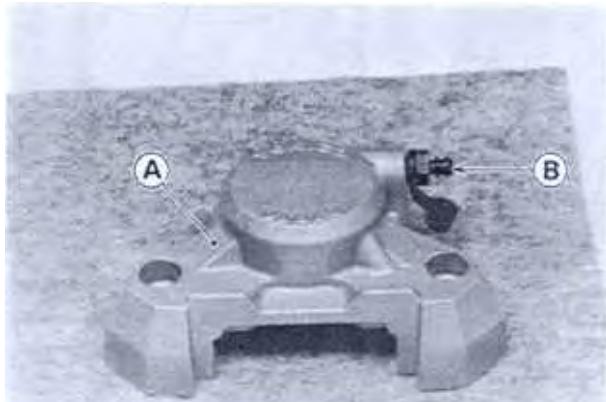
- Disassemble the rear caliper in the same manner as the front caliper (see Front Caliper Disassembly). Note the additional information below.

- Remove the piston dust seal before piston removal.



A. Rear Caliper

B. Dust Seal



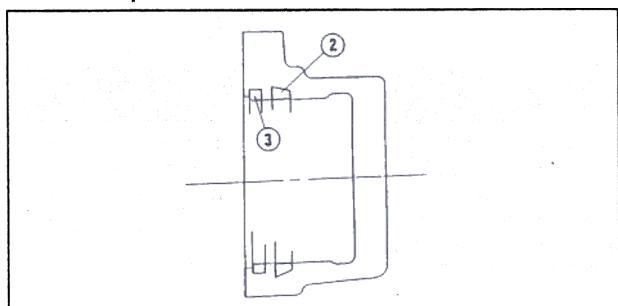
A. Rear Caliper

B. Apply compressed air.

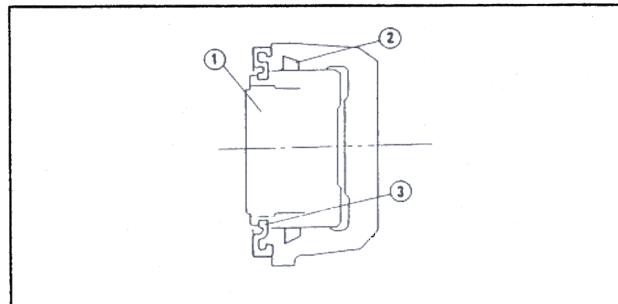
Assembly Notes

- Apply brake fluid to the cylinders, pistons, and fluid seals, and push the pistons into the cylinders by hand. Take care that neither the cylinder nor the piston skirt get scratched.
 - For the rear caliper, install the dust seal around the piston and push them into the cylinder. Check that the dust seal is properly fitted into the grooves in the piston and caliper body.

Front Caliper



Rear Caliper

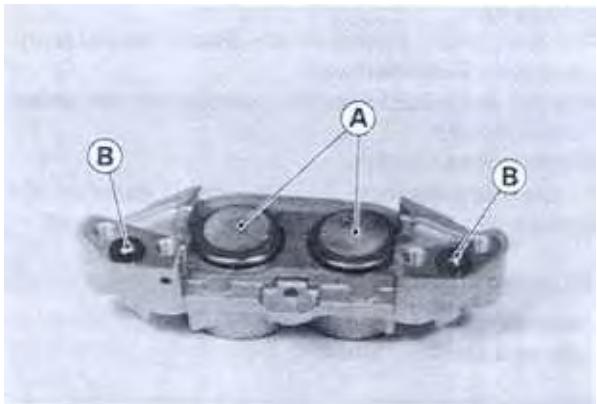


1. Piston

2. Fluid Seal

3. Dust Seal

- Be sure to install the following.



A. Piston Insulators

B. O-Rings

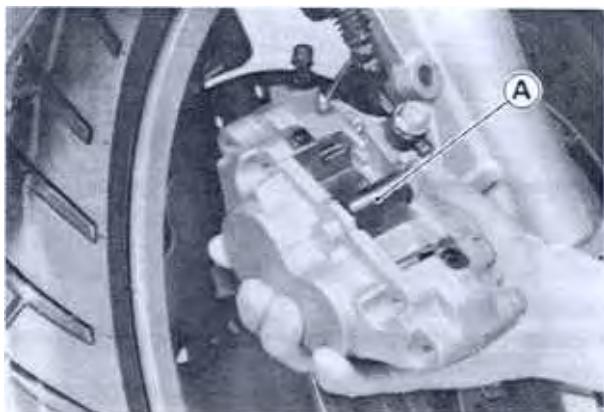
- Tighten the caliper assembly bolts to the specified torque (see Exploded View).

Brake Pads

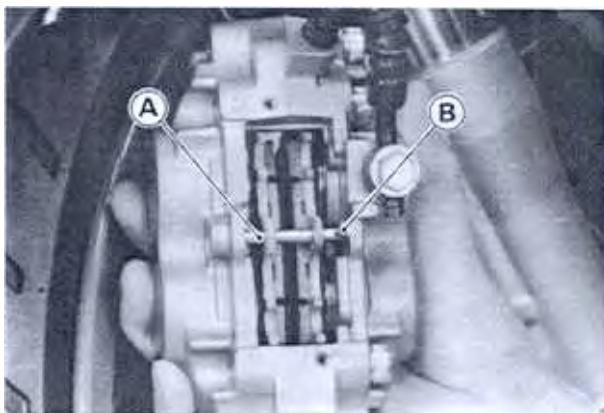
Front Brake Pad Removal

- Remove the following.

Pad Spring
Clip
Pad Pin



A. Pad Spring



A. Pad Pin

B. Clip

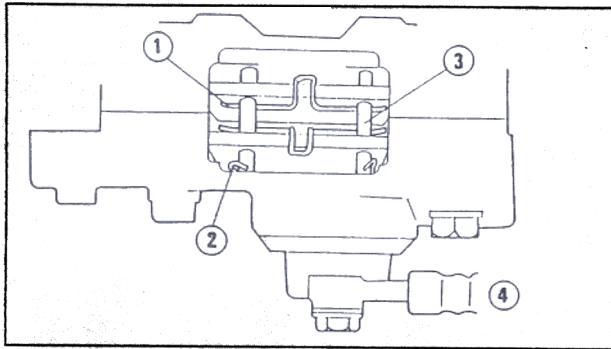
- Remove the brake pads.

Rear Brake Pad Removal

- Remove the following.

Rear Caliper (see this chapter)
Plastic Pad Cover
Clips
Pad Pins
Springs

11-12 BRAKES

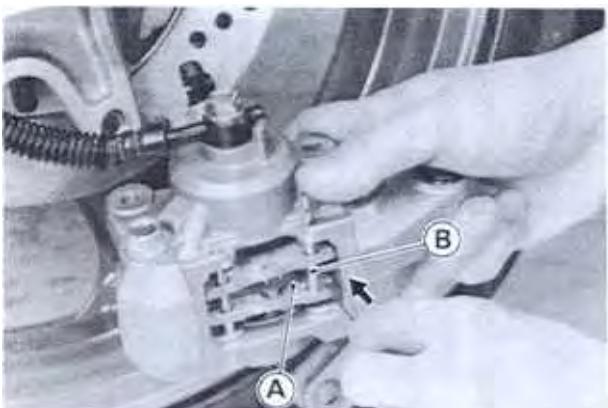


1. Springs 3. Pad Pins
2. Clips 4. Outside

- Remove the brake pads.

Installation Notes

- Push the caliper pistons in by hand as far as they will go.
- Install the pad pin(s) and clip(s) as shown. The clip(s) must be "outside" of the pads.



A. Spring B. Pad Pin

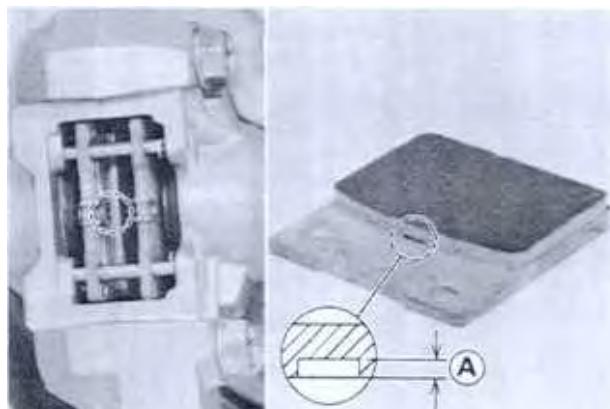
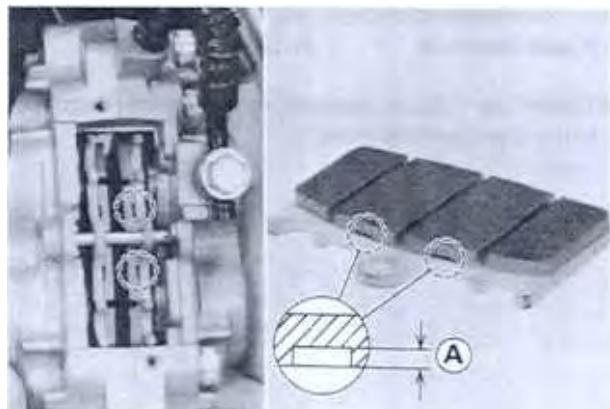
- For the rear caliper, install the springs, pad pins, and clips on the original position shown (see Rear Brake Pad Removal).

Lining Wear

- For front caliper pad inspection, remove the pad spring (see Front Caliper Removal).
- For rear caliper pad inspection, remove the rear caliper (see this chapter).
- Remove the pad cover.
- ★ 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 (front and rear)

Standard: 4 mm
Service Limit: 1 mm



A. Service Limit

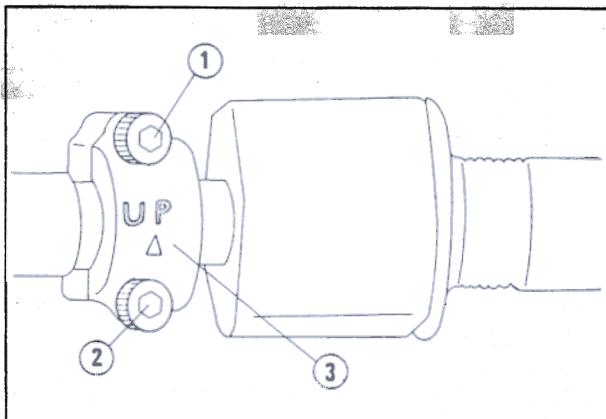
WARNING

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.

Master Cylinders

Front Master Cylinder Installation

- The master cylinder clamp must be installed with the arrow mark upward.
- Tighten the upper clamp bolt first, and then the lower clamp bolts to the specified torque (see Exploded View). There will be a gap at the lower part of the clamp after tightening.

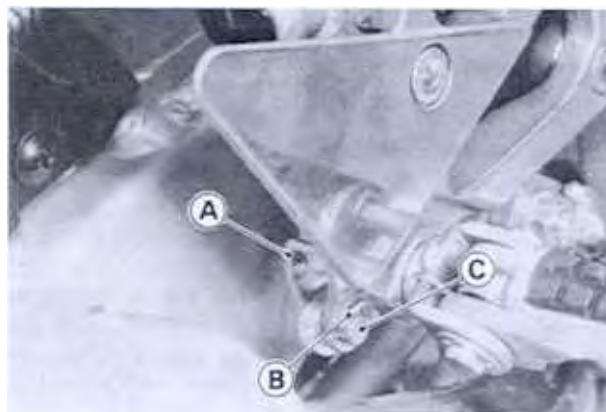


1. Tighten upper clamp bolts first.
2. Lower Clamp Bolt
3. Arrow Mark

- Use a new flat washer on each side of the brake hose fitting.
- Tighten the banjo bolts to the specified torque (see Exploded View).

Rear Master Cylinder Removal Notes

- Remove the cotter pin and then pull the joint pin out of the push rod clevis and brake pedal.



A. Clevis
B. Cotter Pin

C. Joint Pin

- Remove the master cylinder by taking off the mounting bolts.

Rear Master Cylinder Installation Notes

- Use a new flat washer on each side of the brake hose fitting.
- Tighten the banjo bolts to the specified torque (see Exploded View).
- Tighten the rear master cylinder mounting bolts (2) to the specified torque (see Exploded View).

Inspection and Adjustment after Installation

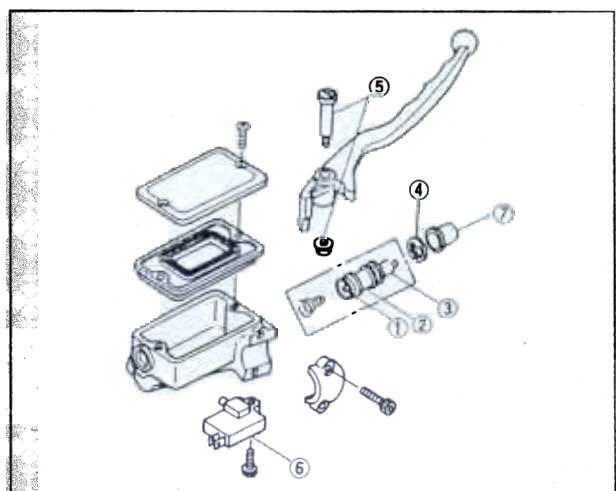
- Check and adjust the following items after installation.
 - Brake Pedal Position
 - Rear Brake Light Switch Position
 - Brake Line Air Bleed
 - Brake Drag
 - Braking Power
 - Brake Fluid Leakage

Disassembly

- Remove the following parts.
 - Dust Cover
 - Retainer
 - Piston with Secondary Cup
 - Primary Cup
 - Spring

CAUTION

Do not remove the secondary cup from the piston since removal will damage them.



- | | |
|------------------|--------------------------------|
| 1. Primary Cup | 5. Brake Lever Pivot Bolt, Nut |
| 2. Piston | 6. Front Brake Light Switch |
| 3. Secondary Cup | 7. Boot |
| 4. Retainer | |

11-14 BRAKES

Assembly

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.
- Apply brake fluid to the removed parts 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.

Inspection (Visually)

- Check that there are no scratches, wear, rust, or pitting on the following parts.

Inside of the Master Cylinder

Outside of the Piston

Primary Cups

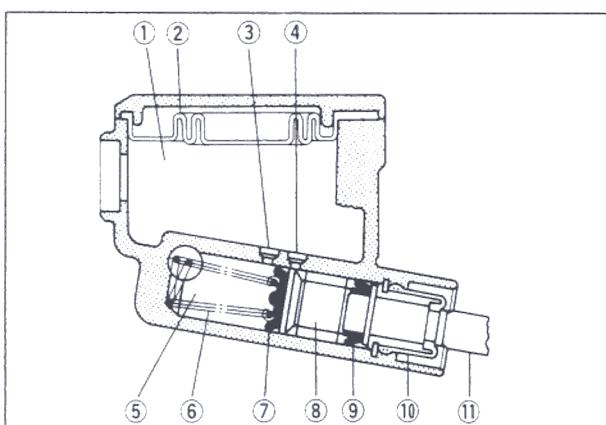
Secondary Cups

Dust Covers

Return Springs

Relief and Supply Port Plugged

- ★ If they are damaged, replace them.



1. Reservoir

2. Diaphragm

3. Relief Port

4. Supply Port

5. Cylinder

6. Return Spring

7. Primary Cup

8. Piston

9. Secondary Cup

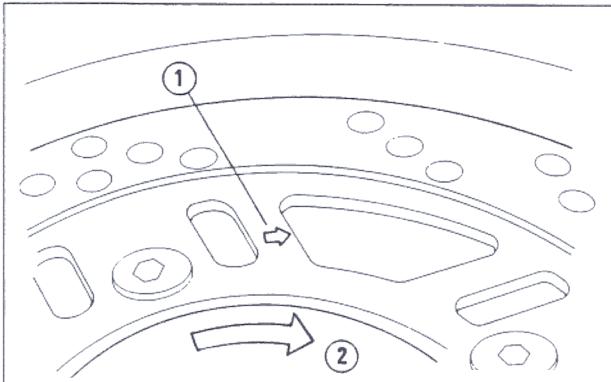
10. Dust Cover

11. Brake Lever

Brake Discs

Installation

- Install the brake disc on the wheel so that the rotation mark aligns with the tire rotation.



1. Rotation Mark

2. Rotation Direction

- Tighten the disc mounting bolts to the specified torque (see Exploded View).

Wear

- ★ Replace the disc if the sliding surfaces have worn past the service limit.

Front Disc Thickness

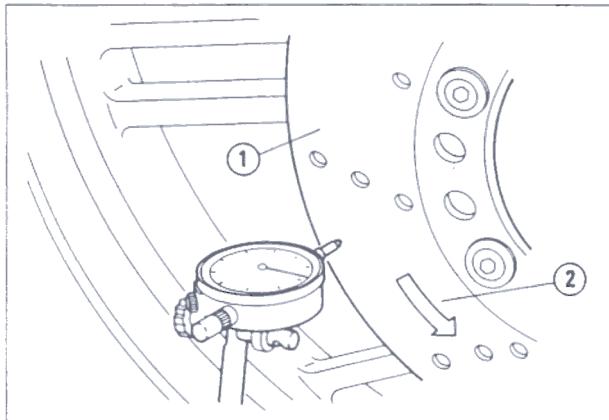
Standard: 4.3 ~ 4.6 mm
Service Limit: 4.0 mm

Rear Disc Thickness

Standard: 5.8 ~ 6.1 mm
Service Limit: 5.0 mm

Warp

- Jack up the motorcycle so that the wheel is off the ground (see Wheels/Tires chapter and Final Drive chapter).
 - For front disc inspection, turn the handlebar fully to one side.
 - Set up a dial gauge against the disc as shown and measure disc runout.
- ★ If runout exceeds the service limit, replace the disc.



1. Brake Disc

2. Turn the wheel by hand.

Disc Runout

Standard: Under 0.2 mm

Service Limit: 0.3 mm

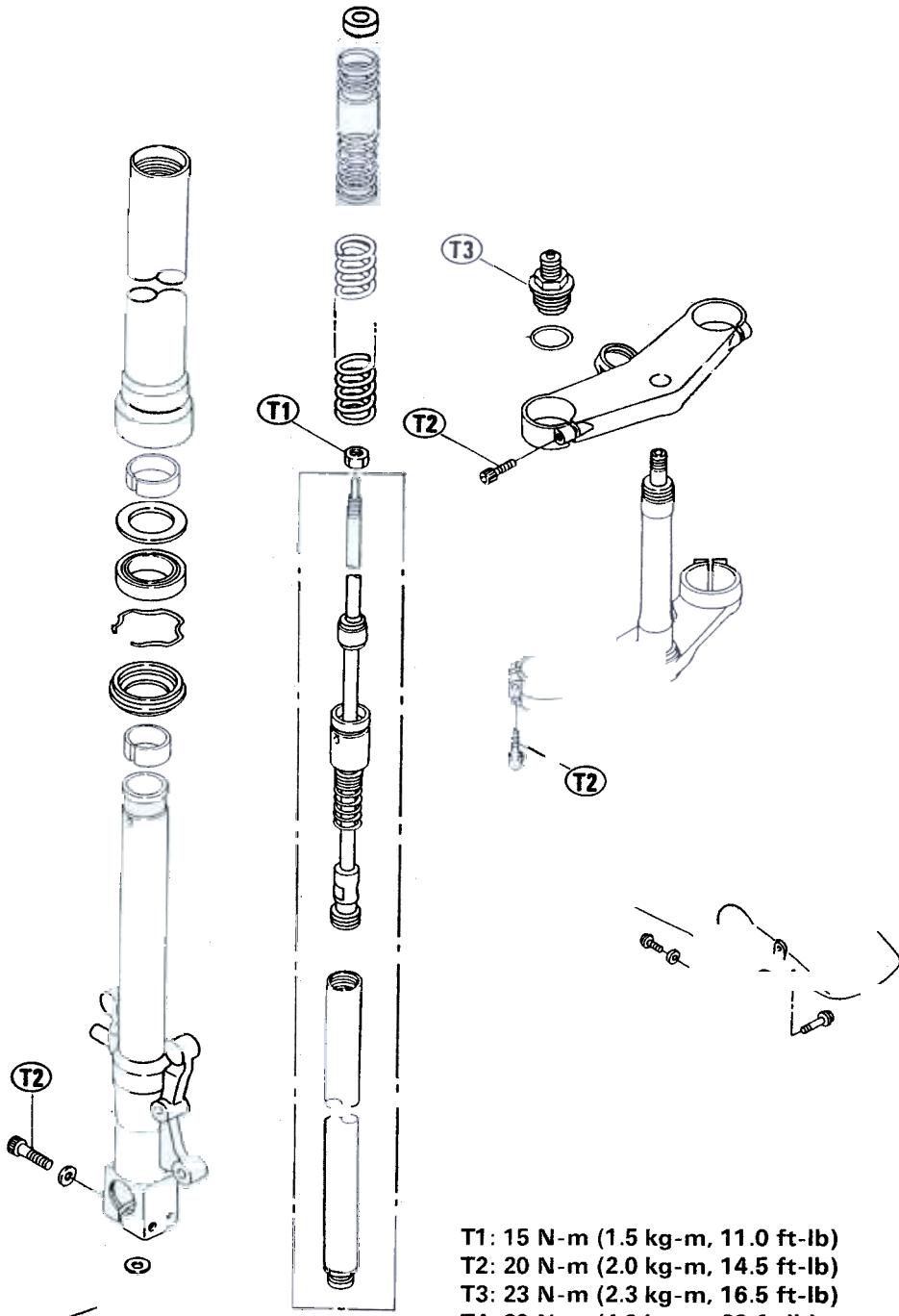
Suspension

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12-2 SUSPENSION

Exploded View



T1: 15 N·m (1.5 kg·m, 11.0 ft-lb)

T2: 20 N·m (2.0 kg·m, 14.5 ft-lb)

T3: 23 N·m (2.3 kg·m, 16.5 ft-lb)

T4: 39 N·m (4.0 kg·m, 29 ft-lb)

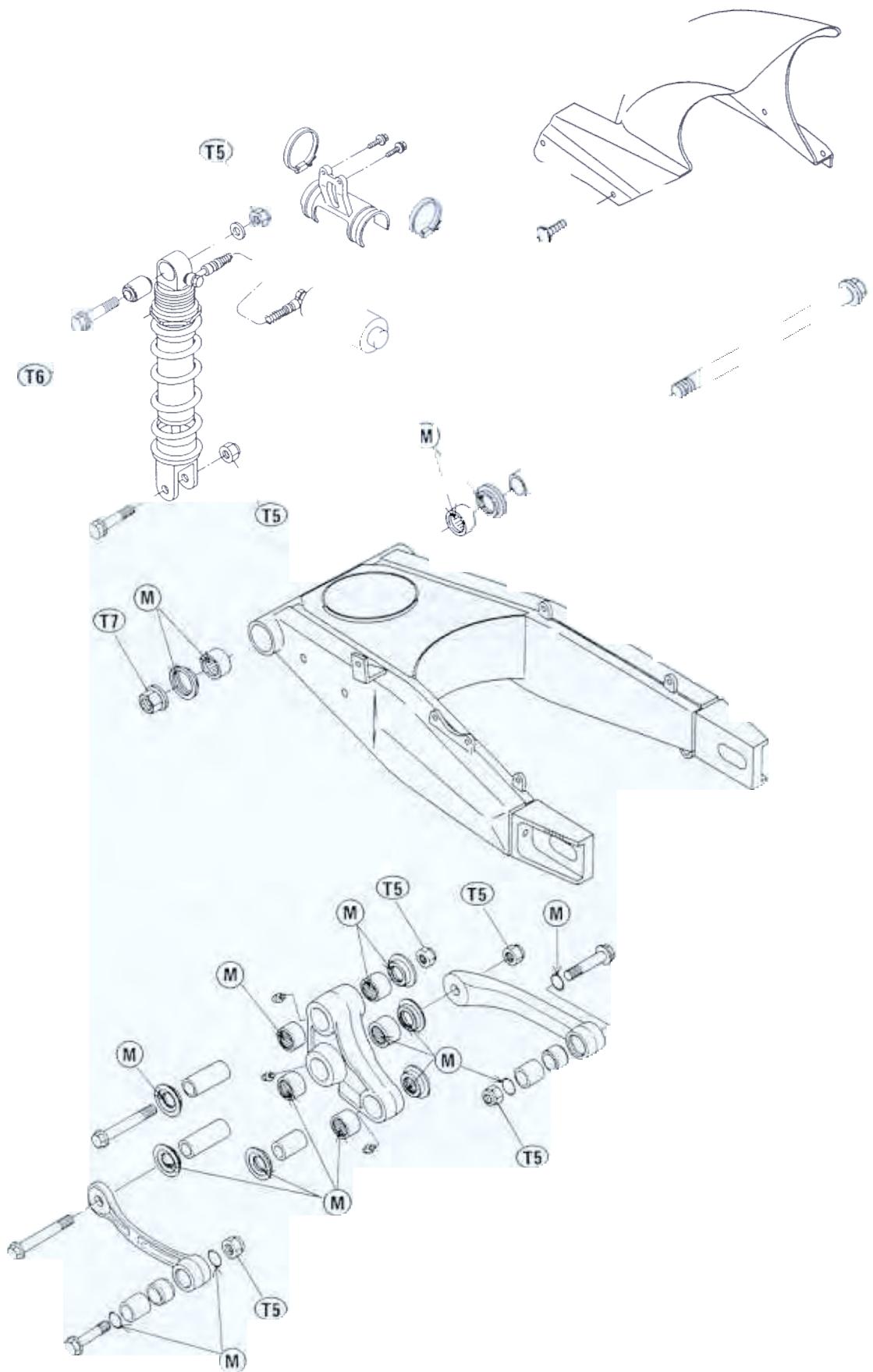
T5: 49 N·m (5.0 kg·m, 36 ft-lb)

T6: 88 N·m (9.0 kg·m, 65 ft-lb)

T7: 110 N·m (11.0 kg·m, 80 ft-lb)

L : Apply molybdenum disulfide grease.

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



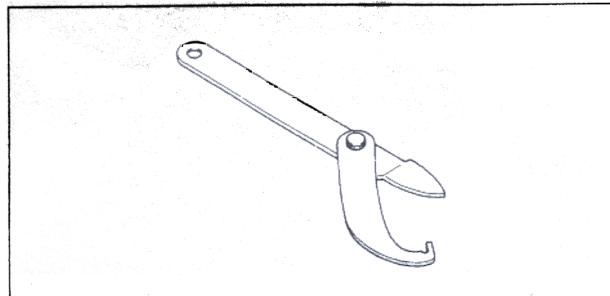
12-4 SUSPENSION

Specifications

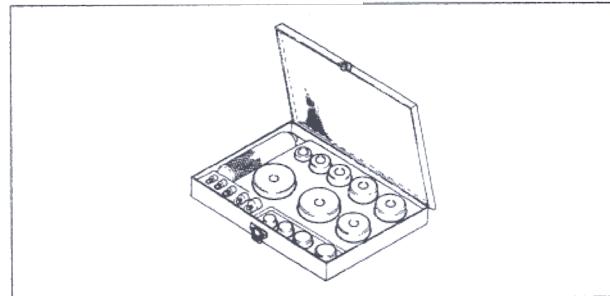
Item	Standard	Service Limit
Front Fork: Rebound damping setting Spring preload setting Fork oil: Viscosity Amount (perside): when changing oil After disassembly and completely dry Oil level (fully compressed, without spring) Fork spring free length	6th click from fully counterclockwise position 1/4 turn out position from fully counterclockwise position SAE 5W 355 mL 421 ± 4 mL 94 ± 2 mm below from top of inner tube 311.6 mm	--- --- --- --- 305 mm
Rear Shock Absorber: Rebound damping setting Spring preload setting Gas pressure	No. 1 of 4 position Spring free length minus 12 mm 980 kPa (10 kg/cm ² , 142 psi) Non-adjustable	Spring free length minus 12 mm to 24 mm ---

Special Tools

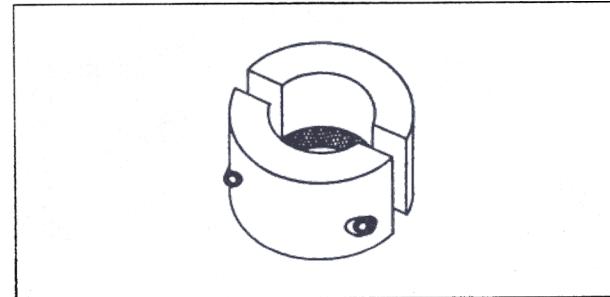
Steering Stem Nut Wrench: 57001-1100



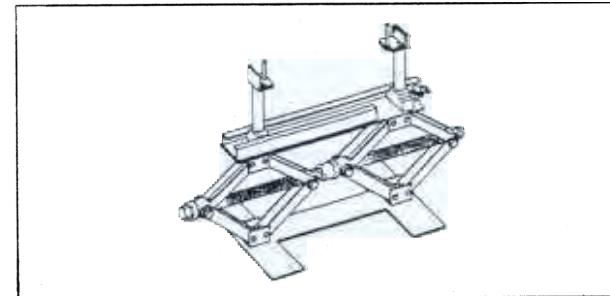
Bearing Driver Set: 57001-1129



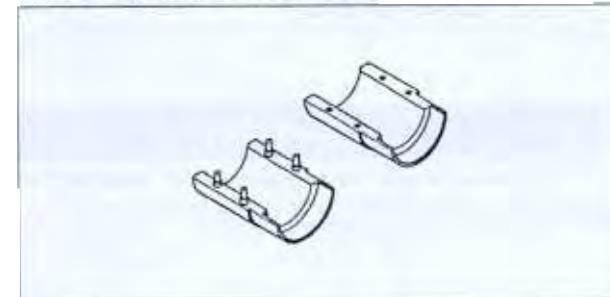
Fork Outer Tube Weight: 57001-1218



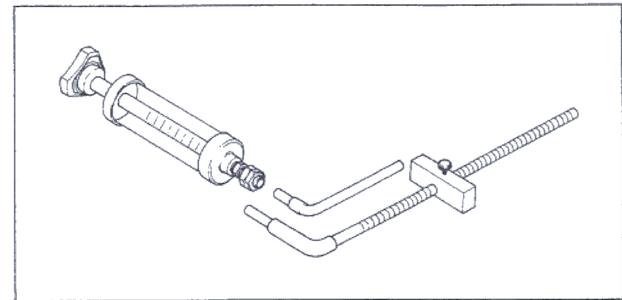
Jack: 57001-1238



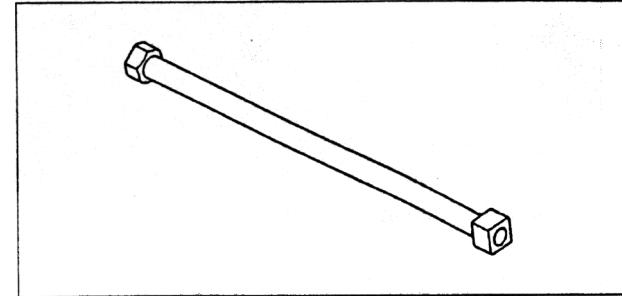
Fork Oil Seal Driver: 57001-1288



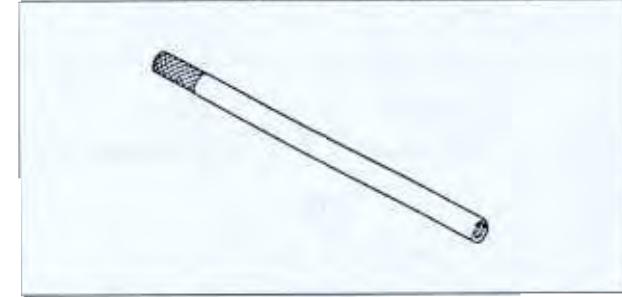
Oil Syringe: 57001-1290



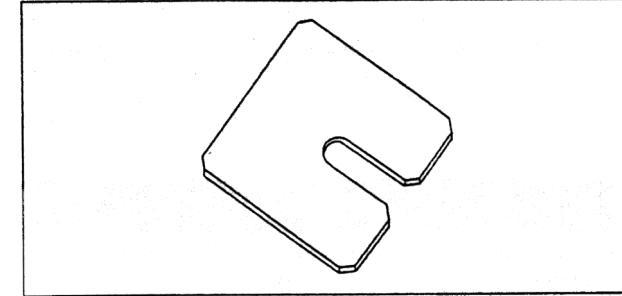
Fork Cylinder Holder: 57001-1297



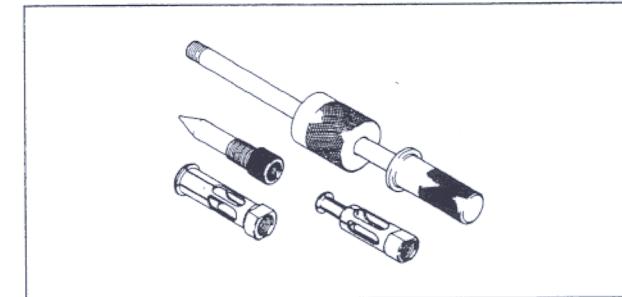
Fork Piston Rod Puller, M10 x 1.0: 57001-1298



Fork Spring Stopper: 57001-1316



Oil Seal & Bearing Remover: 57001-1058

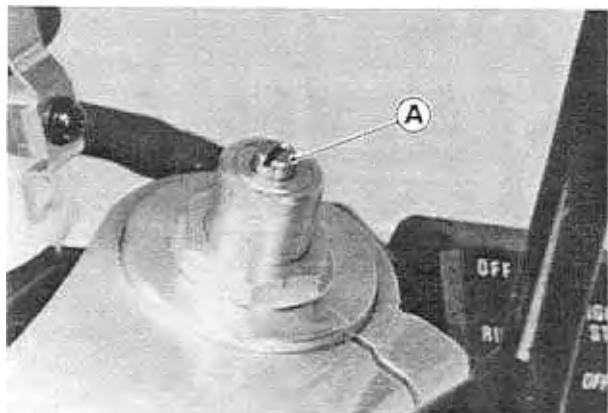


12-6 SUSPENSION

Front Fork

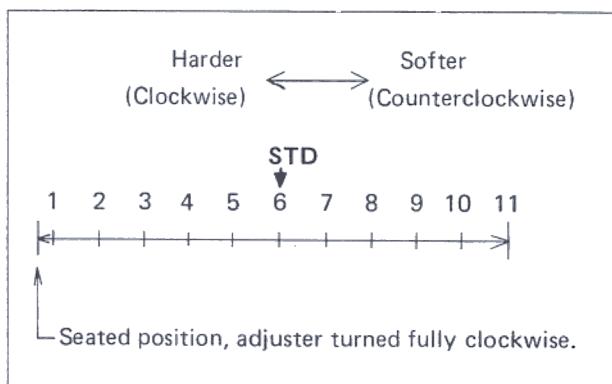
Rebound Damping Force Adjustment

- To adjust the rebound damping, turn the rebound damping adjuster until you feel a click.



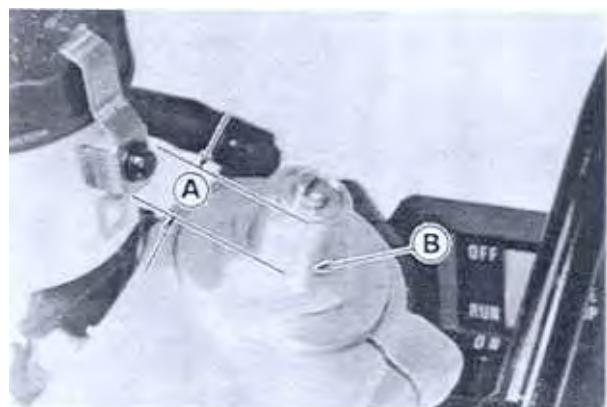
A. Rebound Damping Adjuster

- The standard adjuster setting is the **6th click** from the fully clockwise position.



A. Preload Adjuster

- The standard adjuster setting for the average-build rider of 68 kg (150 lb) with no passenger and no accessories is **14 mm** as shown.



A. 14 mm

B. 5 Marks

Adjuster Protrusion

Standard: 14 mm (5 Marks)

Usable Range: 5 ~ 20 mm (1 ~ 8 Marks)

WARNING

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result.

CAUTION

When setting the standard position, do not turn adjuster beyond the fully counterclockwise position. Fork top bolt may be loosen.

Spring Preload Adjustment

- Turn the adjuster in to increase spring preload and out to decrease spring preload.

WARNING

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result.

Fork Oil Change

- Remove the following.

Front Fork (see Front Fork Removal)

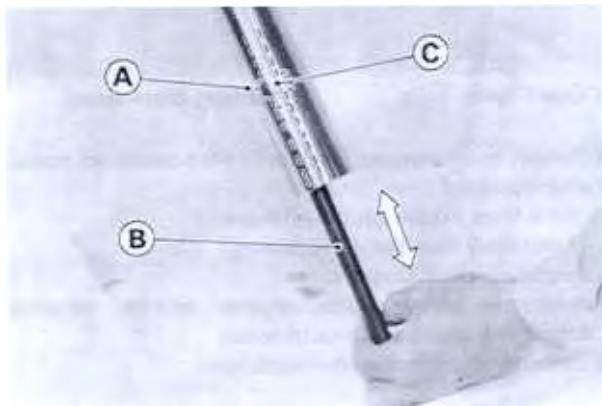
Top Bolt

Top Spring

Main Spring

- Pour out the fork oil with the fork upside down.

- Using the piston rod puller (special tool), move the piston rod up and down several times in order to expel all the oil from inside the fork cylinder.

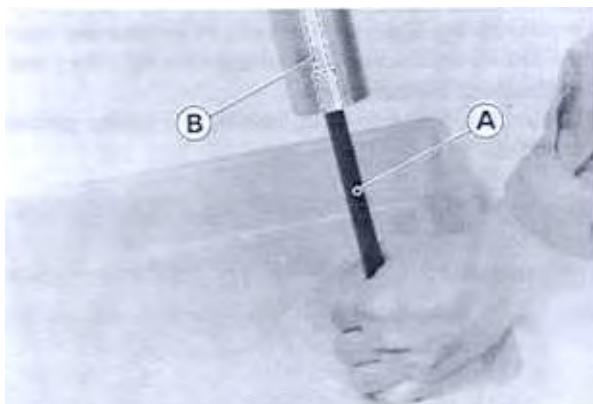


A. Inner Tube

B. Rod Puller: 57001-1298

C. Piston Rod

- Fill the specified type of oil in the fork cylinder.
- Using the fork position rod puller (special tool), bleed the air in the fork oil by pumping the push rod.



A. Fork Piston Rod Puller: 57001-1298

B. Piston Rod

- Pull up the piston rod with the fork piston rod puller (special tool).

NOTE

- Pull up the piston rod slowly so as not to spill the fork oil out of the fork tube.

- Measure the fork oil level. Fork oil level may be measured using the oil syringe (special tool).

NOTE

- Measure the fork oil level, compressing the outer tube and piston rod down with the push rod installed.

- Set the oil syringe stopper so that its lower side shows the oil level distance specified.

NOTE

- The gauge tube is graduated in 1 cm division.

- The syringe body is graduated in 10 mL division, excluding the gauge tube of about 5 mL capacity.

Oil Level (fully compressed, without spring)

94 ±2 mm (from the top of the inner tube)

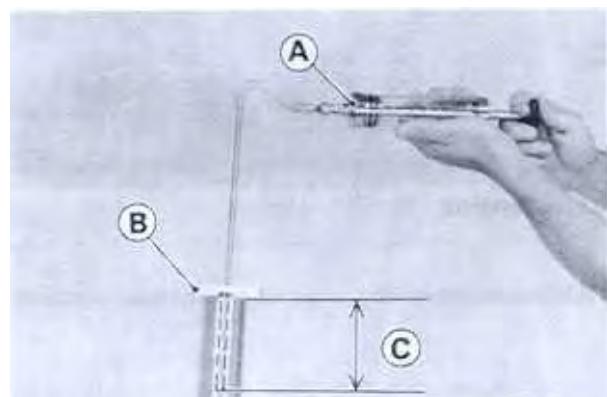
- With the fork fully compressed, insert the gauge tube into the inner tube and position the stopper across the inner tube top end.

NOTE

- Position the stopper so that the gauge tube is the center of inner tube diameter, or the specified oil level can not get correctly.

- Pull the handle slowly to pump out the excess oil until the oil comes out no longer.

- ★ If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



A. Oil Syringe: 57001-1290 C. Oil Level Distance

B. Stopper

- ★ If the oil is above or below the specified level, remove or add oil and recheck the oil level.

- Tighten the fork top plug to the specified torque (see Exploded View).

- Change the oil of the other fork leg in the same manner.

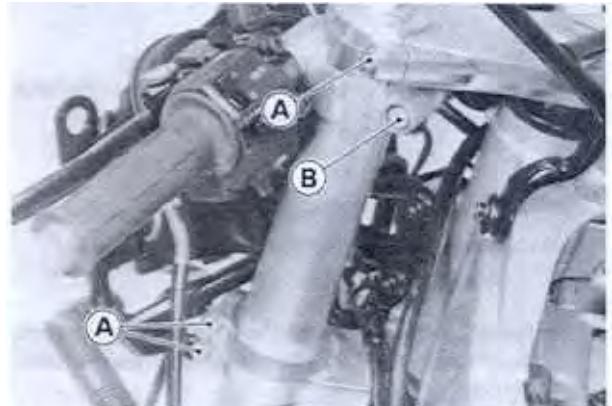
- Adjust the rebound damping force and the spring preload (see this chapter).

12-8 SUSPENSION

Removal

- Remove the following.

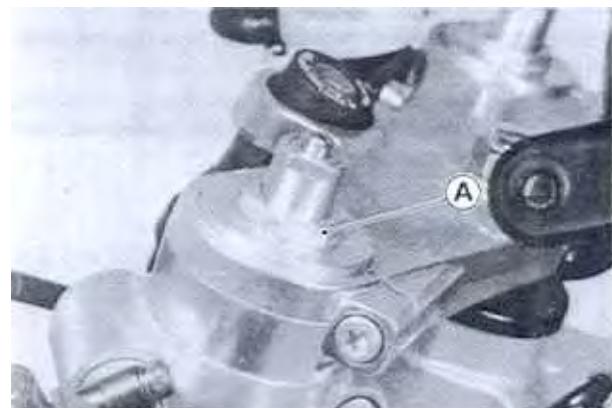
Lower Fairing
Front Wheel
Front Fender Mounting Bolts and Screws
Fork Clamp Bolts (upper and lower, loosen)
Handle Holder Clamp Bolts (loosen)



A. Fork Clamp Bolts

B. Handle Holder Clamp Bolt

- If the fork leg is to be disassembled, loosen the fork top bolt.

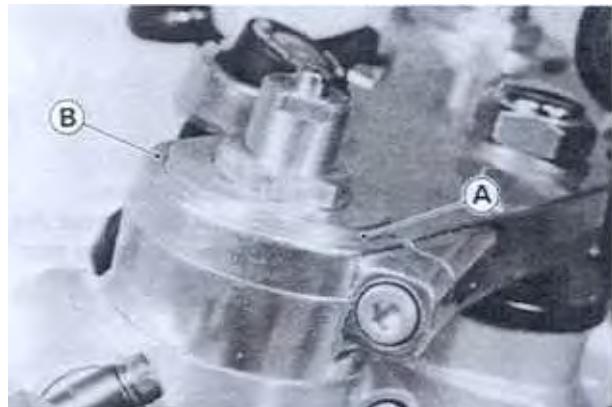


A. Fork Top Bolt

- With a twisting motion, work the fork leg down and out.

Installation

- If the fork leg was disassembled, adjust the fork oil level.
- Align the bottom of chamfer on the outer tube upper end, with the upper surface of the steering stem head.



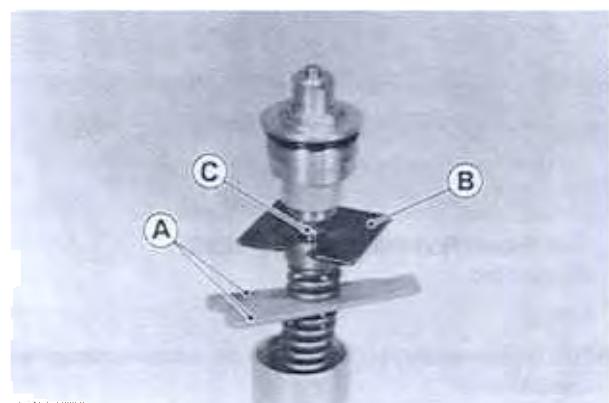
A. Outer Tube

B. Steering Stem Head

- Tighten the following fasteners to the specified torque (see Exploded View).
 - Fork Clamp Bolts (upper and lower)
 - Front Fork Top Bolt (if necessary)
 - Handle Holder Clamp Bolt
- Adjust the spring preload adjuster and the rebound damping adjuster (see this chapter).
- Check the front brake after installation.

Disassembly

- Remove the front fork (see this chapter).
- Drain the fork oil.
- Turn the spring preload adjuster fully counterclockwise until the adjuster stops.
- Remove the fork top bolt from the outer tube.
- To loose the piston rod nut inside the top spring press the top spring down with suitable thin plates and insert the fork spring stopper (special tool) between the piston rod nut and the top spring.
- Loosen the piston rod nut, holding the spring preload adjuster.



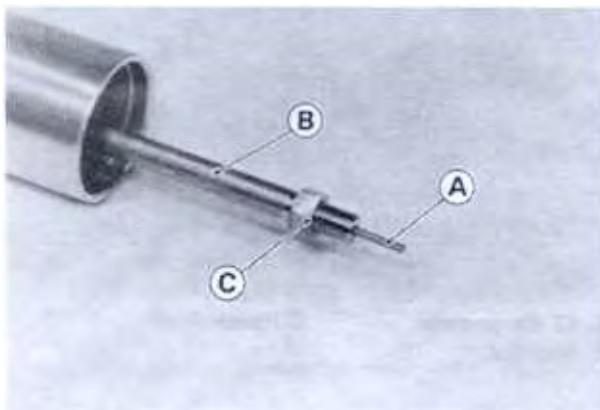
A. Suitable Thin Plates

B. Fork Spring Stopper: 57001-1316

- Remove the following.

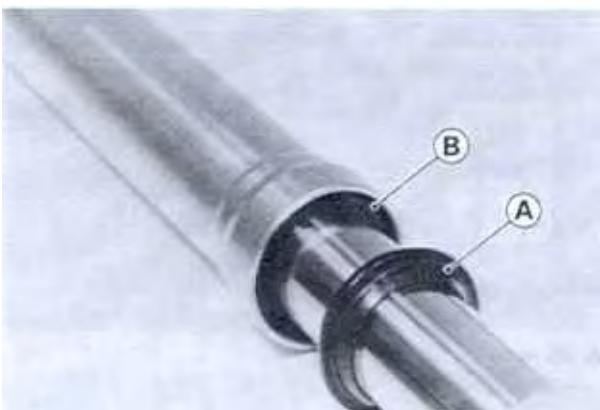
Fork Top Bolt
Collar
Top Spring with Fork Spring Guide
Main Spring

Push Rod
Piston Rod Nut



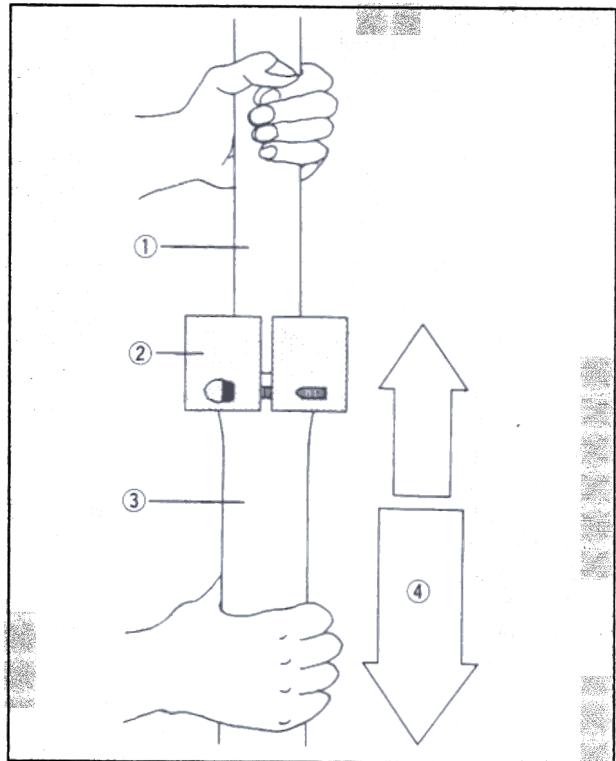
A. Push Rod C. Piston Rod Nut
B. Piston Rod

- Pour the fork oil into a container.
- Remove the following from the outer tube.
Dust Seal
Circlip



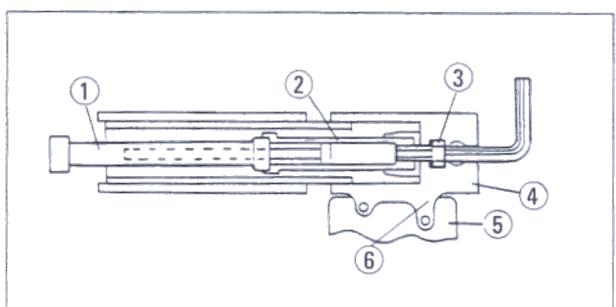
A. Dust Seal B. Circlip

- 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.
- Hold the axle holder in a vise.
- Stop the cylinder from turning by using the front fork cylinder holder (special tool).
- Unscrew the Allen bolt, then take the bolt and gasket out of the bottom of the axle holder.



1. Cylinder Holder: 57001-1297 4. Allen Wrench
2. Piston Cylinder Unit 5. Vise
3. Allen Bolt 6. Axle Holder

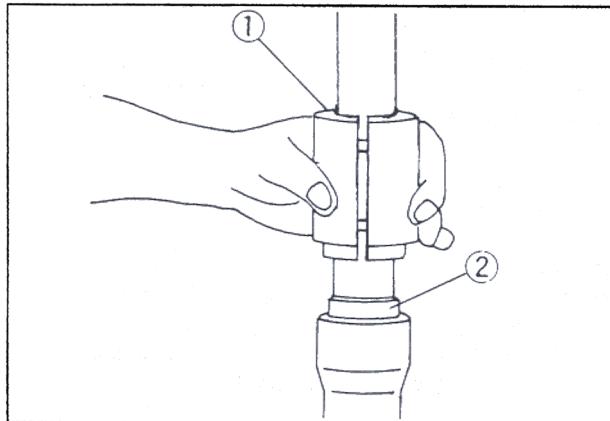
CAUTION

Be sure to hold the outer tube at disassembling. Or the piston cylinder unit could loosen and the bottom Allen bolt cannot be removed.

12-10 SUSPENSION

Assembly

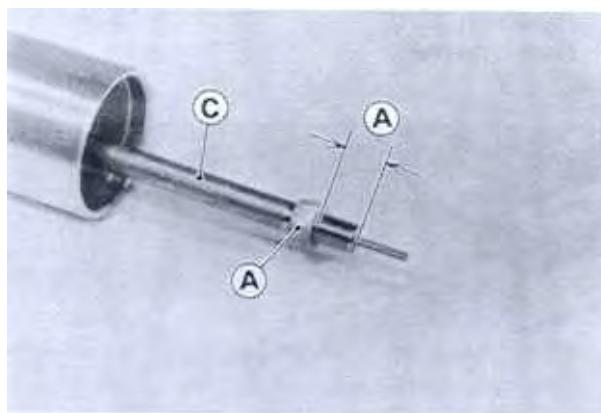
- Replace the bottom Allen bolt gasket with new one.
- Replace the following with new ones whenever they have removed from inner tube.
 - Oil Seal
 - Dust Seal
- Visually inspect the following, and replace them if necessary.
 - Guide Bush
 - O-ring of the Top Bolt
- Remove the guide bush from the inner tube and cover the groove with vinyl for installing new dust seal and oil seal.
- Install the following onto the inner tube.
 - Dust Seal
 - Oil Seal (spring force upward)
 - Guide Bush (outer tube side)
- Install the following into the outer tube, using the oil seal driver (special tool).
 - Guide Bush (outer tube side)
 - Washer
 - Oil Seal



1. Fork Oil Seal Driver: 57001-1288

2. Oil Seal

- Apply a non-permanent locking agent to the Allen bolt, and tighten it to the specified torque (see Exploded View).
- Insert the push rod in the piston rod.
- Pour in the specified type and amount of oil (see Fork Oil Change).
- Tighten the fork top bolt.
- Tighten the rod nut finger-tight.
- Check that the visible thread length is at least 12 mm.

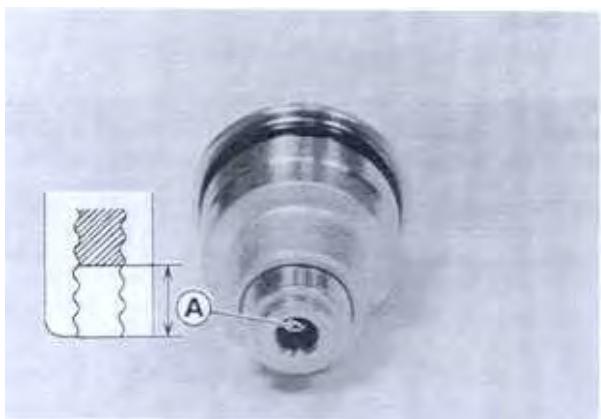


A. 12 mm or more

B. Rod Nut

C. Piston Rod

- Turn the spring preload adjuster fully counterclockwise until the adjuster stops.
- Screw in the rebound damping adjuster on the top bolt so that the distance between the adjuster bottom and the spring prelaod adjuster end is 25 mm.



A. 25 mm

- Install the main spring onto the push rod so that the closed side is upward.
- Install the top spring and collar onto the push rod.
- Press the top spring down with drivers, and insert the fork spring stopper (special tool) between the piston rod and the top spring.
- Tighten the top bolt finger-tight.
- While holding the fork top bolt, tighten the rod nut to the specified torque (see Exploded View).

NOTE

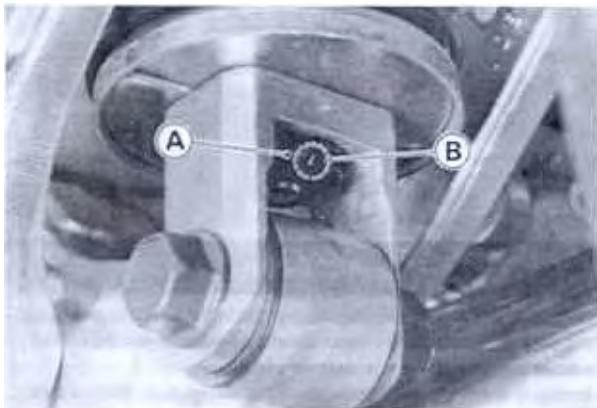
- Do not remove the fork spring stopper (special tool), while pressing the top spring down so that the spring cause the force against the rod nut.

- Install the top bolt in the outer tube.

Rear Shock Absorber

Rebound Damping Force Adjustment

The rebound damping force adjuster at the lower end of the rear shock absorber has 4 positions so that the rebound damping force can be adjusted for different road and loading conditions. The numbers on the adjuster show the setting position.



A. Rebound Damping Force Adjuster
B. Number

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

Position	1	2	3	4
Damping Force			→ Larger	

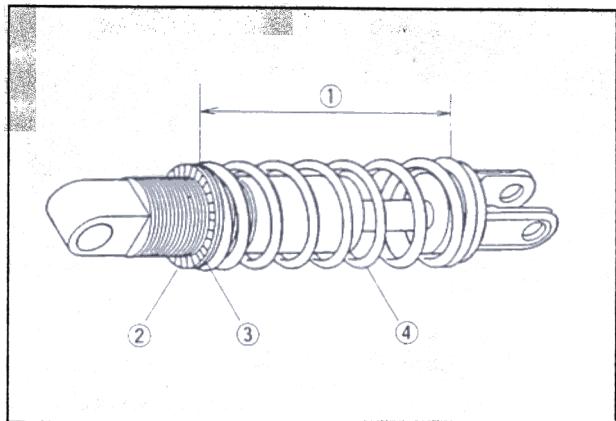
- The standard setting position of the adjuster for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is No. 1.
- Turn the rebound damping force adjuster to the desired number until you feel a click.

Spring Preload Adjustment

- Remove the shock absorber from the frame (see this chapter).
- Loosen the locknut and turn out the adjusting nut to free the spring using stem nut wrenches (special tools: 57001-1100).
- Measure the spring free length.
- Turn in the adjusting nut to the desired position and tighten the locknut.

Spring Preload Setting

Standard: Spring free length minus 12 mm
Usable Range: Spring free length minus 12 to 24 mm (weaker to stronger)



1. Spring Length
2. Locknut
3. Adjusting Nut
4. Spring

★ If the spring action feels too soft or too stiff, adjust it as in the front spring preload adjustment section of this chapter.

Removal

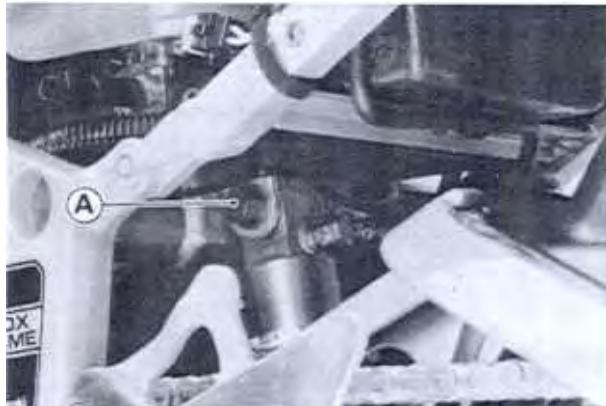
- Remove the following.
 - Seats
 - Side Cover Assembly
 - Rear Brake Reservoir Bracket
 - Shock Absorber Reservoir Clamps (loosen)
 - Rear Fender Upper Mounting Bolts, Nuts
- Remove the shock absorber reservoir from the bracket, then pull it forward between the rear frame and the rear fender.



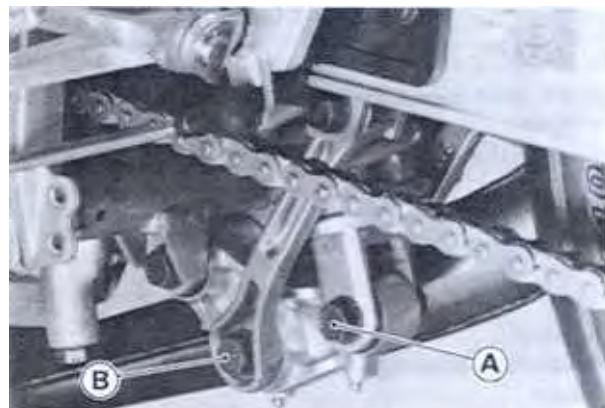
A. Shock Absorber Reservoir B. Clamp

- Remove the following.
 - Lower Fairings (see Frame chapter)
 - Tie-Rod Bolts, Nut (lower)
 - Rear Shock Absorber Mounting Nut (upper and lower, do not remove the bolt as yet.)

12-12 SUSPENSION



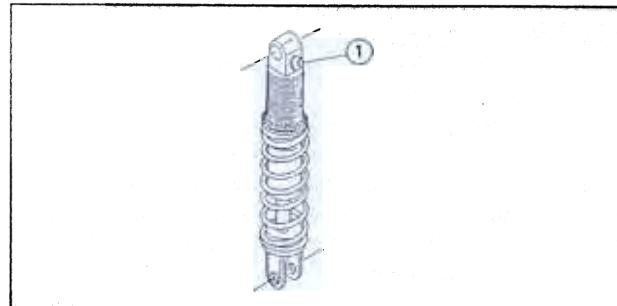
A. Rear Shock Absorber Mounting Bolt, Nut (upper)



A. Rear Shock Absorber Mounting Bolt, Nut (lower)

B. Tie-Rod Bolt, Nut (lower)

- Using the jack (special tool), raise the rear wheel off the ground (see Frame chapter).
- Remove the shock absorber mounting bolt (lower).
- Remove the shock absorber mounting bolt (upper).
- Remove the shock absorber towards the ground.



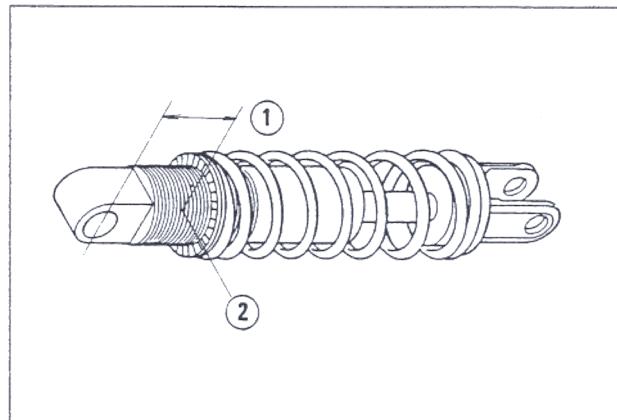
1. Banjo Bolt

Scraping

WARNING

Since the rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode.

Before a rear shock absorber is scrapped, drill a hole at a point shown to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may blow out bits of drilled metal when the hole opens.



1. 42 ~ 44 mm

2. Hole

Installation

- Tighten the following nuts to the specified torque (see Exploded View).
 - Tie-Rod Nut
 - Shock Absorber Mounting Nuts

Disassembly

- Since the rear shock absorber contains high pressure nitrogen gas, do not remove or loosen the oil hose banjo bolt or disassemble the rear shock absorber.

Swing Arm

Removal

- Remove the following.
 - Rear Wheel (see Wheels/Tires chapter)
 - Shock Absorber Mounting Bolt (lower)
 - Tie-Rod Bolts (upper)
 - Swing Arm Shaft



A. Swing Arm Shaft

- Remove the swing arm.



Installation

- Tighten the following fasteners to the specified torque (see Exploded View).
 - Swing Arm Nut
 - Shock Absorber Mounting Nut
 - Tie-Rod Nut
- Install the rear wheel (see Wheels/Tires chapter).

Swing Arm Sleeve Inspection

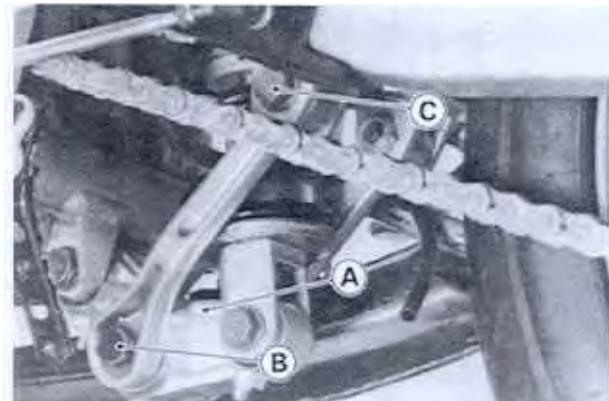
★ If there is visible damage, replace the sleeve, the ball bearing, and all the needle bearings as a set.

Tie-Rod, Rocker Arm

Tie-Rod Removal

- Remove the following.

Lower Fairings (see Frame chapter)
 Rocker Arm (see Rear Shock Removal)
 Lower and Upper Tie-Rod Bolts



A. Rocker Arm
 B. Lower Tie-Rod Bolt

C. Upper Tie-Rod Bolt

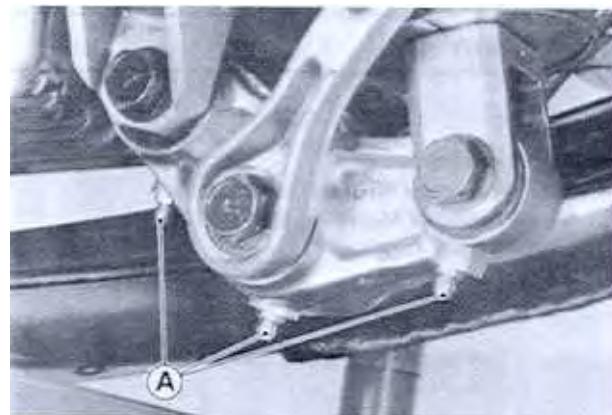
- Remove the tie-rods.

Tie-Rod Installation

- Pack the following bearings with molybdenum disulfide grease.
 - Rocker Arm Needle Bearings
 - Tie-Rod Needle Bearings
- Tighten the tie-rod upper and lower nuts to the specified torque (see Exploded View).

Rocker Arm Pivot Lubrication

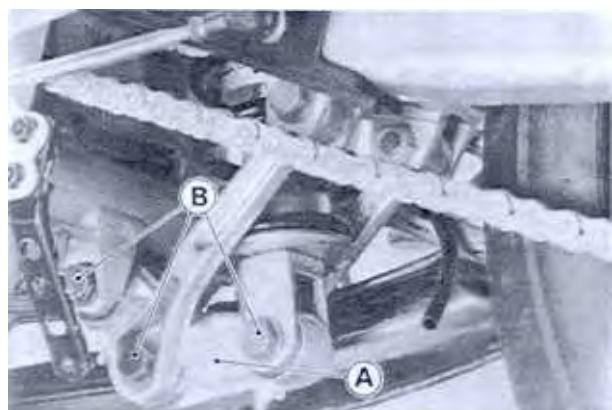
- Lubricate the rocker arm pivots with molybdenum disulfide grease through the grease fitting using a grease gun according to the Periodic Maintenance Chart (see General Information chapter and General Lubrication in the Appendix chapter).
- It is normal for a small amount of grease to seep out around the grease seals.
- ★ If the rocker arm pivots are disassembled. Lubricate the pivots as follows.
- Wipe all the old grease off the bearings, sleeves, and grease seals and grease them.



A. Rocker Arm Grease Nipples

Rocker Arm Removal

- The rocker arm is removed during the rear shock removal. Refer to Rear Shock Removal in this chapter.



A. Rocker Arm

B. Bolts

Rocker Arm Installation

- Installation is the reverse of removal. Note the following.
 - Apply molybdenum disulfide grease to the inside of the needle bearings.
 - Tighten the following nuts to the specified torque (see Exploded View).
 - Rocker Arm Nuts
 - Shock Absorber Mounting Nut
 - Tie-Rod Nut

Needle Bearing Inspection

- ★ If there is any doubt as to the condition of either needle bearing, replace the bearing(s) and sleeve as a set.
- To remove the needle bearings, use the oil seal and bearing remover (special tool: 57001-1058).

Tie-Rod, Rocker Arm Sleeve Inspection

- ★ If there is visible damage, replace the sleeve and needle bearing(s) as a set.

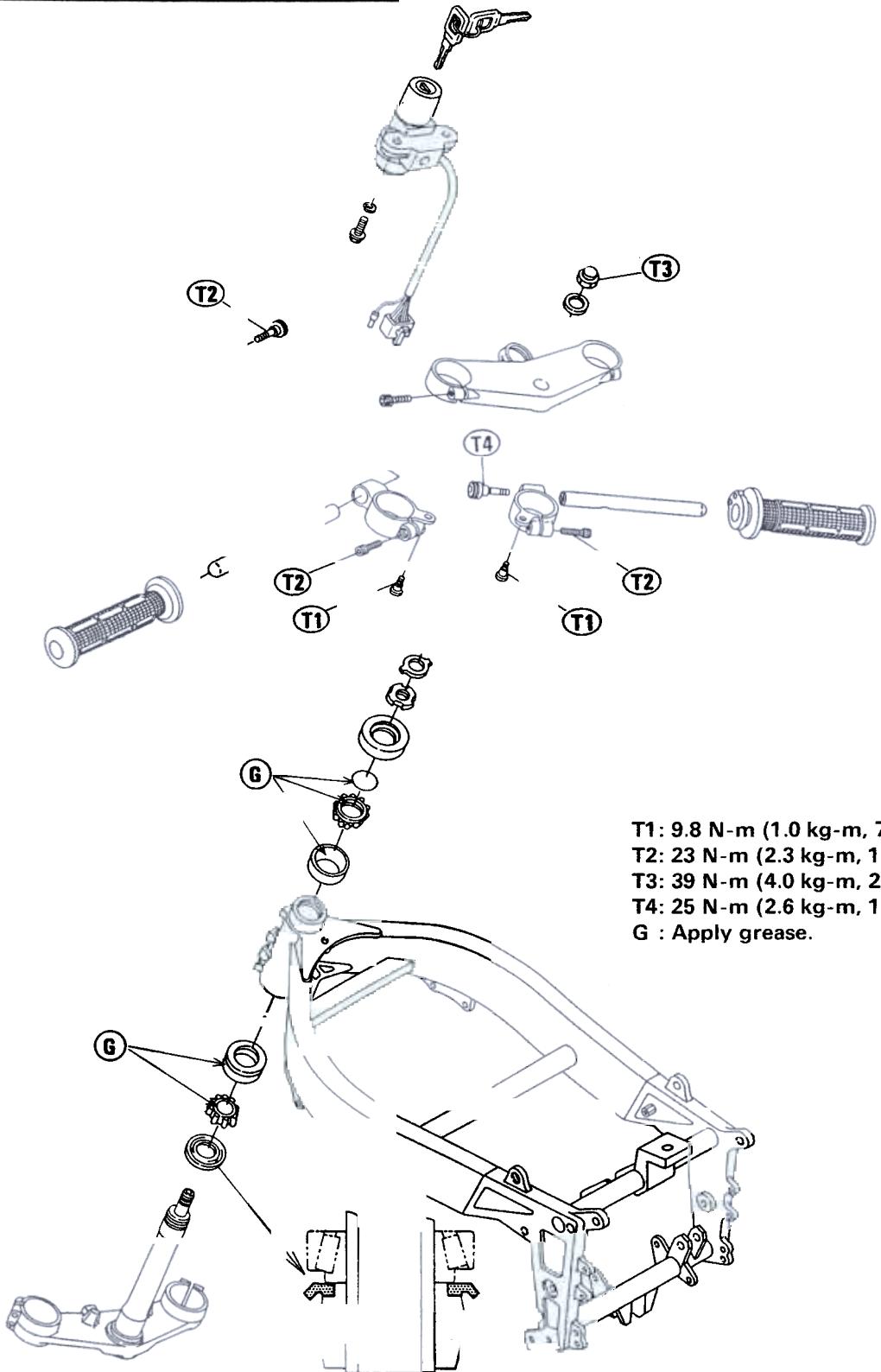
Steering

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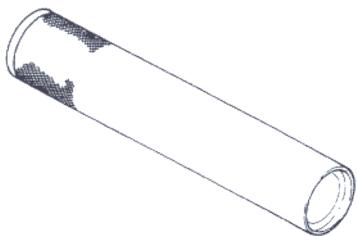
13-2 STEERING

Exploded View



Special Tools

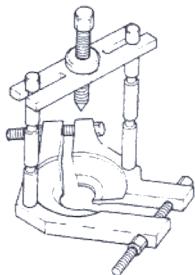
Stem Bearing Driver: 57001-137



Stem Bearing Driver Adapter: 57001-1092



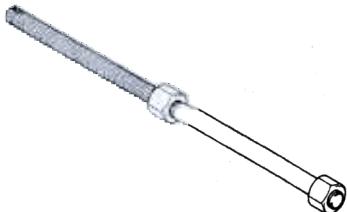
Bearing Puller: 57001-158



Bearing Puller Adapter: 57001-317



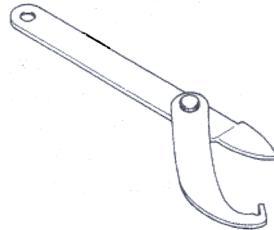
Head Pipe Outer Race Press Shaft: 57001-1075



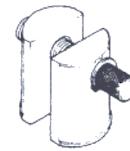
Head Pipe Outer Race Driver: 57001-1106



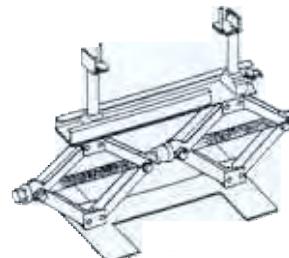
Steering Stem Nut Wrench: 57001-1100



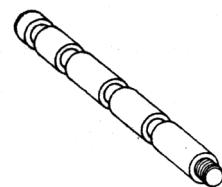
Head Pipe Outer Race Remover: 57001-1107



Jack: 57001-1238



Bearing Puller Stud: 57001-1190



13-4 STEERING

Steering

Adjustment

- Check the steering.
- Lift the front wheel off the ground using the jack (special tool: 57001-1238, see Wheels/Tires chapter).
- With the front wheel pointing straight ahead, alternately tap each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the lower bracket hits the stop.
 - ★ If the wheel binds or catches before the stop, the steering is too tight.
- Feel for steering looseness by pushing and pulling the forks.
 - ★ If you feel looseness, the steering is too loose.

NOTE

- The cables and wiring will have some effect on the motion of the fork which must be taken into account. Be sure the wires and cables are properly routed.
- The bearings must be in good condition and properly lubricated in order for any test to be valid.

★ Adjust the steering if necessary.

● Remove the following parts.

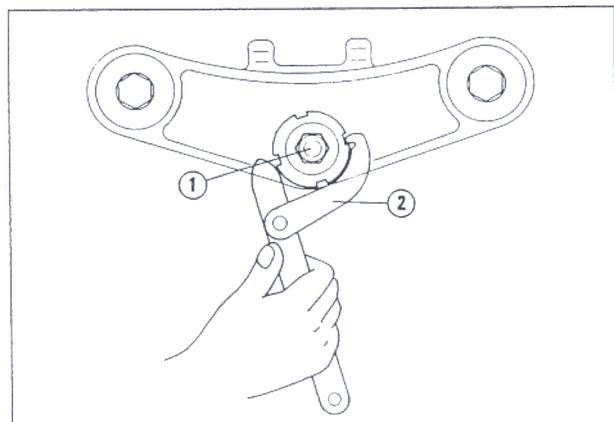
Upper Fairing (see Frame chapter)

Fuel Tank (see Fuel System chapter)

Fork Lower Clamp Bolts (both sides, loosen)

Stem Head Nut (Loosen)

● Adjust the steering with the stem nut wrench (special tool).



1. Stem Head Nut

2. Stem Nut Wrench: 57001-1100

★ 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 turn.

NOTE

- Turn the locknut 1/8 turn at a time maximum.

- Tighten the following bolts and nut to the specified torque (see Exploded View).

Steering Stem Head Nut
Front Fork Lower Clamp Bolts

● Check the steering again.

★ If the steering is still too tight or too loose, repeat the adjustment.

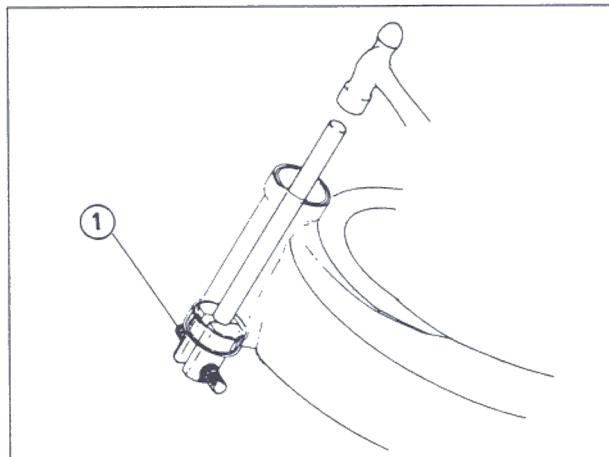
Steering Stem

Removal

- Remove the following parts.
 - Surge Tank (see Fuel System chapter)
 - Upper and Lower Fairings (see Frame chapter)
 - Front Fork Legs (see Suspension chapter)
 - Brake Hose Joint
 - Steering Stem Head Nut
 - Stem Head, Handlebar, Handle Holder
- Push up on the stem base, and remove the steering stem locknut using the stem nut wrench (special tool: 57001-1100), then remove the steering stem base.
- Remove the upper tapered roller bearing inner race.
- To remove the outer races pressed into the head pipe, install the outer race remover (special tool) as shown below.

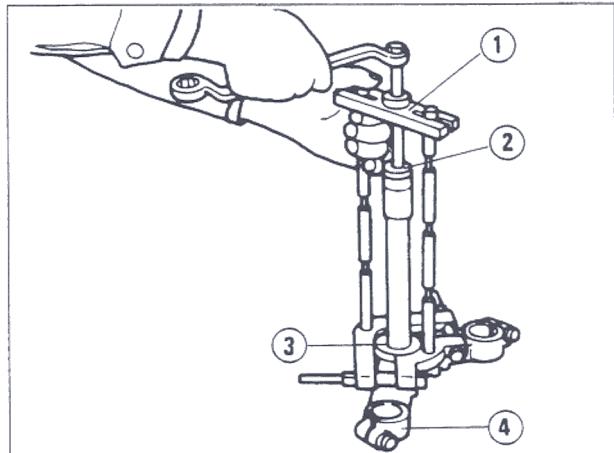
NOTE

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.



1. Outer Race Remover: 57001-1107

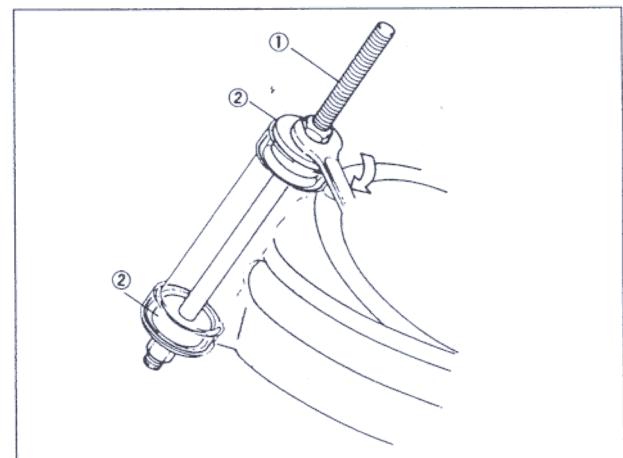
- Remove the lower tapered roller bearing (with its grease seal) which is pressed onto the steering stem with the steering stem bearing puller and adapters (special tools).



1. Bearing Puller: 57001-158
2. Adapter: 57001-317
3. Bearing Puller Stud: 57001-1190
4. Tapered Roller Bearing
5. Stem Base

Installation

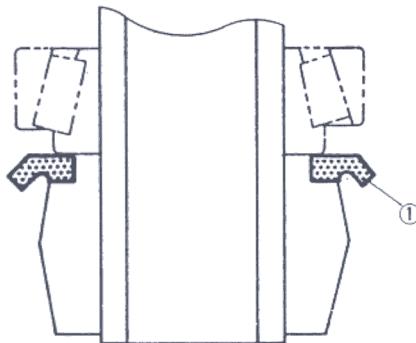
- Installation is the reverse of removal. Note the following.
- Apply grease to the outer races, and then drive them into the head pipe using the drivers and the press shaft (special tools).



1. Press Shaft: 57001-1075
2. Driver: 57001-1106

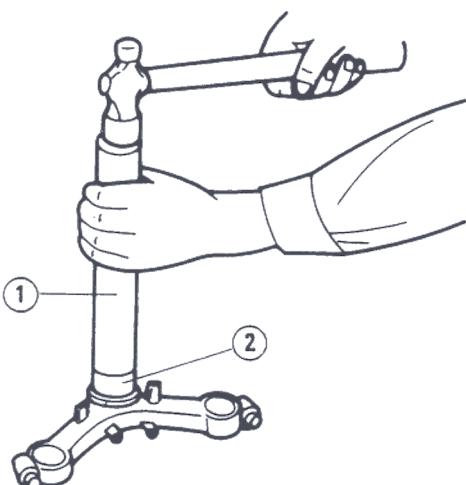
- Install the grease seal, noting the direction shown.

13-6 STEERING



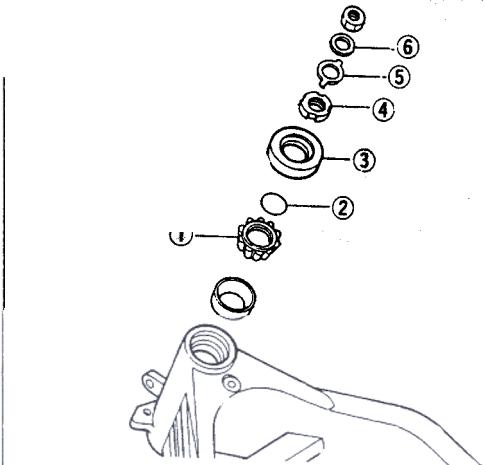
1.1 Grease Seal

- Apply grease to the lower tapered roller bearing, and drive it onto the steering stem using the stem bearing driver and adapter (special tools: 57001-137 and 57001-1092).



- 1. Stem Bearing Driver: 57001-137
- 2. Adapter: 57001-1092

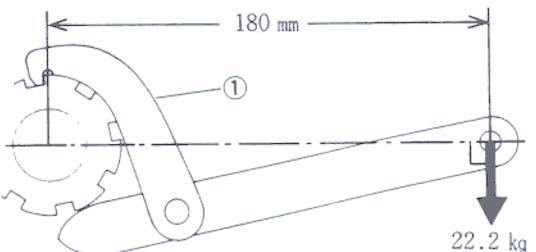
- Install the steering stem base on the head pipe, and install the following parts.



- 1. Upper Bearing
- 2. O-ring
- 3. Grease Seal
- 4. Stem Locknut
- 5. Pawl Washer
- 6. Washer

● 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.)



Stem Nut Wrench: 57001-1100

- Check that there is no play and the steering stem turns smoothly without the rattle.
★ If not, the steering stem bearing 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.
- Tighten the following fasteners to the specified torque.
Front Fork Clamp Bolts (Upper and Lower, see Suspension chapter)
Steering Stem Head Nut (see this chapter)
Front Axle Nut (see Wheel/Tires chapter)
Front Axle Clamp Bolts (see Suspension chapter)
Caliper Mounting Bolts (see Brake chapter)
- Check and adjust the following items after installation.
Steering
Throttle Cables

Choke Cables
Clutch
Front Brake

Steering Stem Bearing

Bearing Lubrication

- Perform the following.
- Remove the steering stem.
- Using a high-flash point solvent, wash the upper and lower tapered roller bearings in the cages.
- 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 light coat of grease to the upper and lower outer races.
- Install the steering stem, and adjust the steering.

Bearing Wear, Damage

- ★ Replace the bearing assemblies if they show damage.

Stem Cap Deterioration, Damage

- ★ Replace the grease seal if necessary.

Steering Stem Warp

- ★ If the steering stem shaft is bent, replace the steering stem.

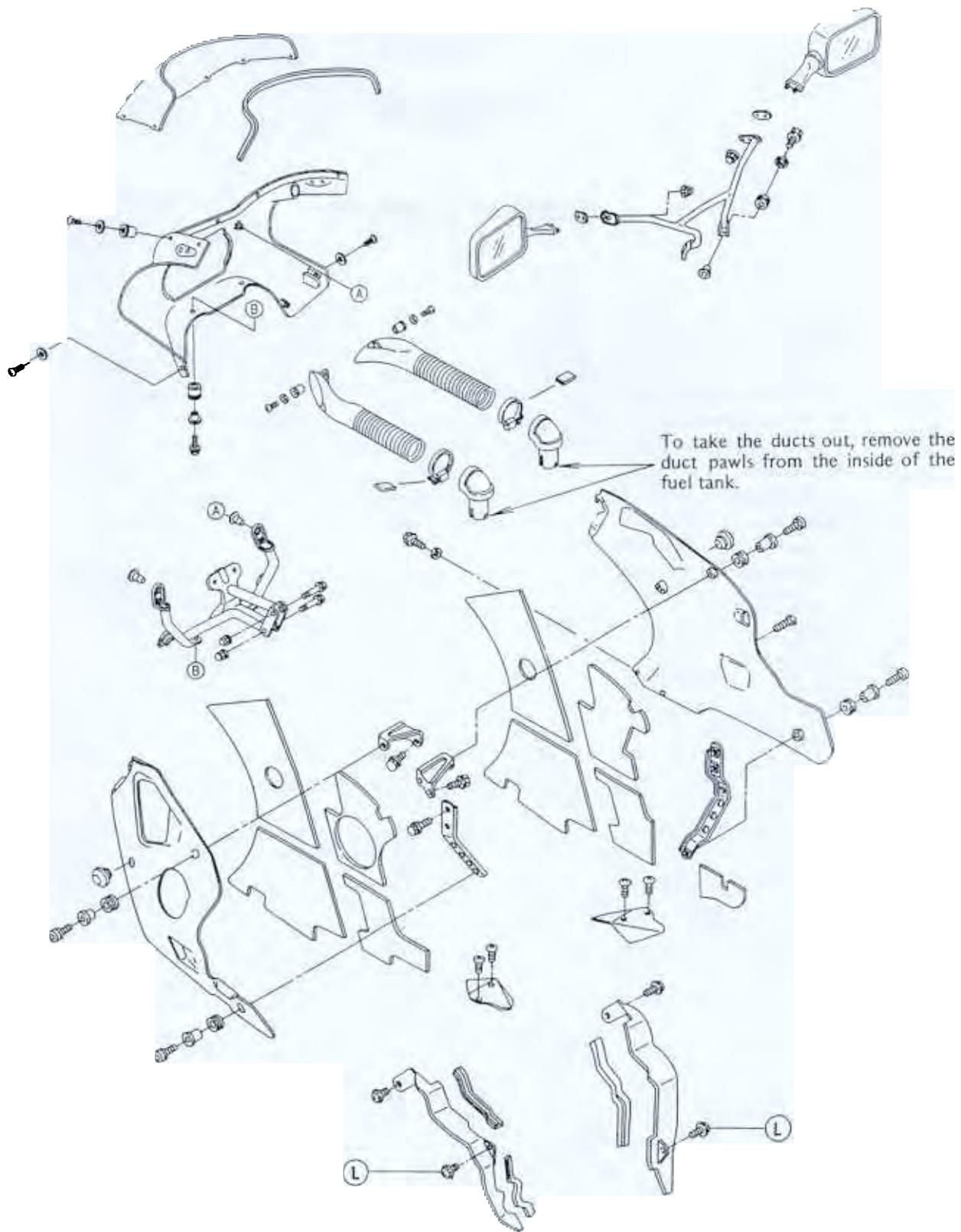
Frame

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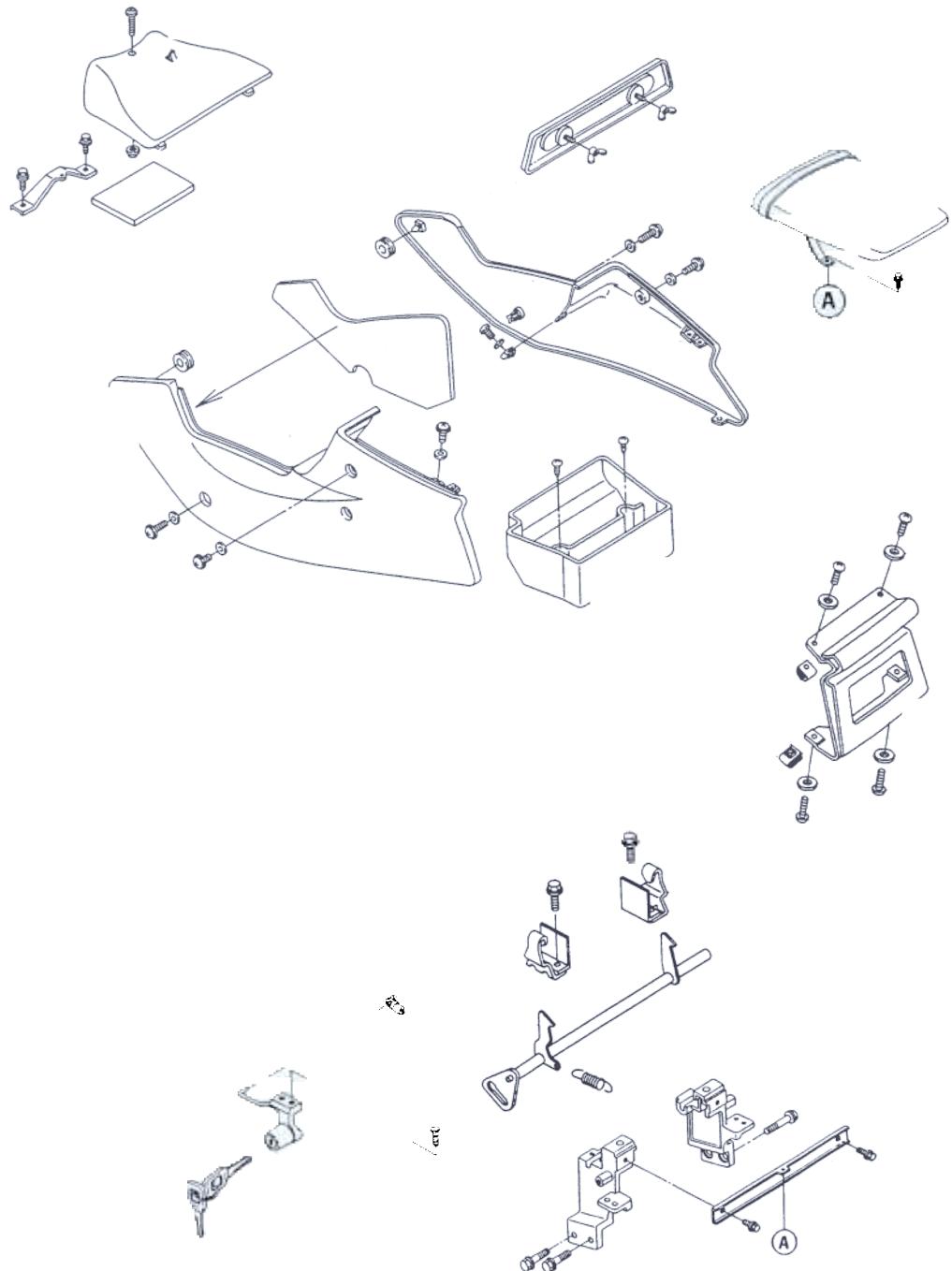
14-2 FRAME

Exploded View

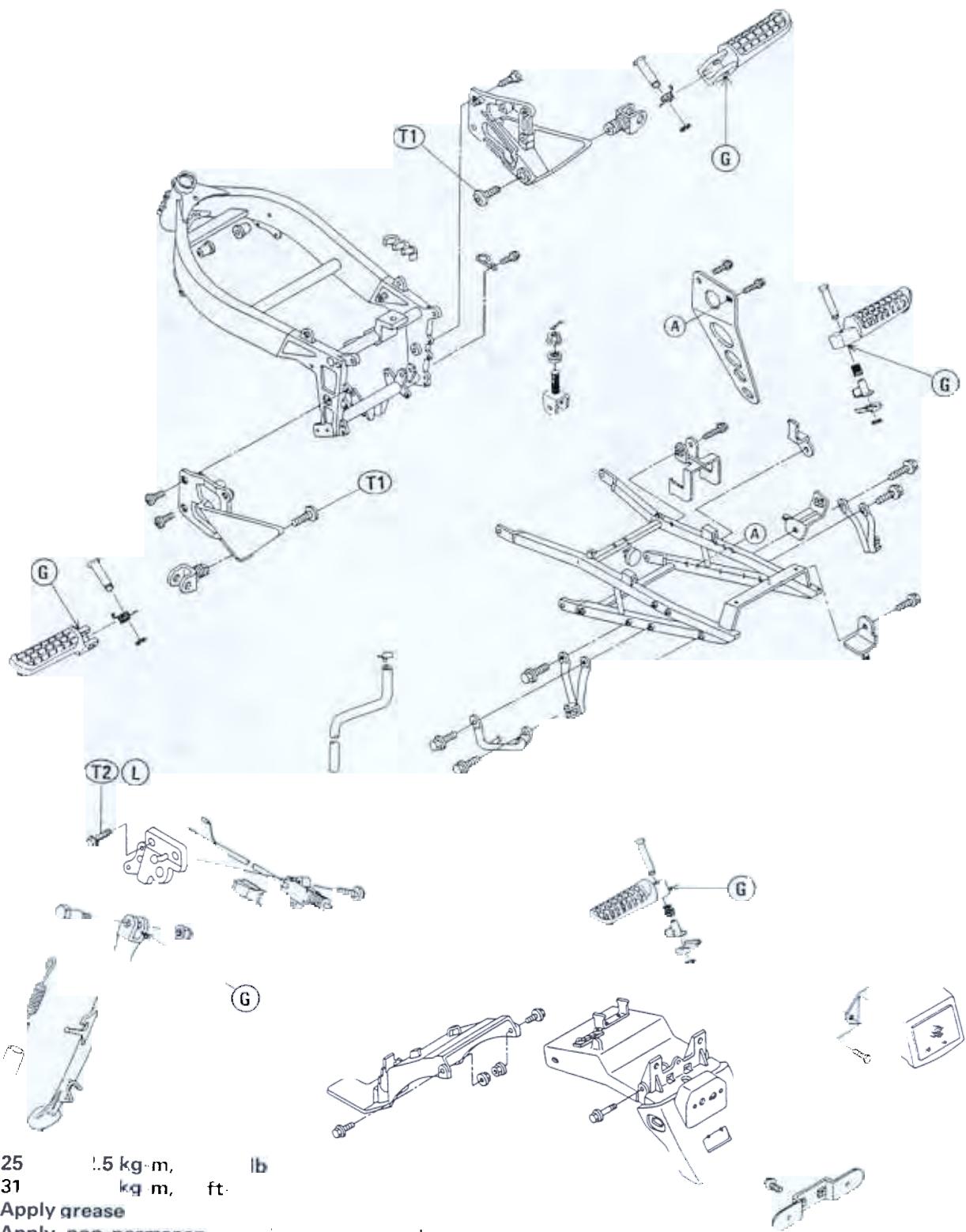


- L** Apply a non-permanent locking agent to the threads.

FRAME



4-4 RAM



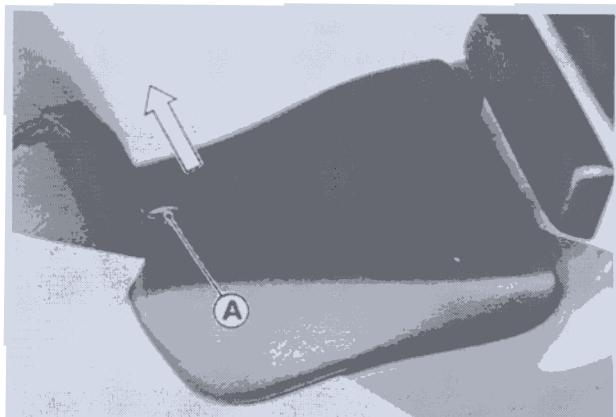
T1 25 1.5 kg·m, lb
T2: 31 kg m, ft

Apply grease
Apply non-permanent
threads

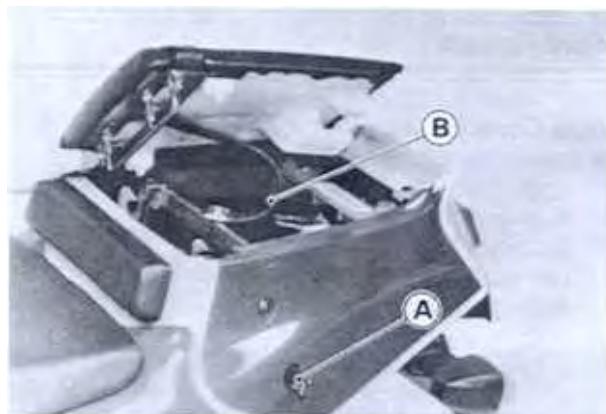
Seats

Front Seat Removal

- Remove the front seat mounting bolt, move it upward and slide it forward.



A. Mounting Bolt



A. Seat Lock

B. Seat Mounting Belt

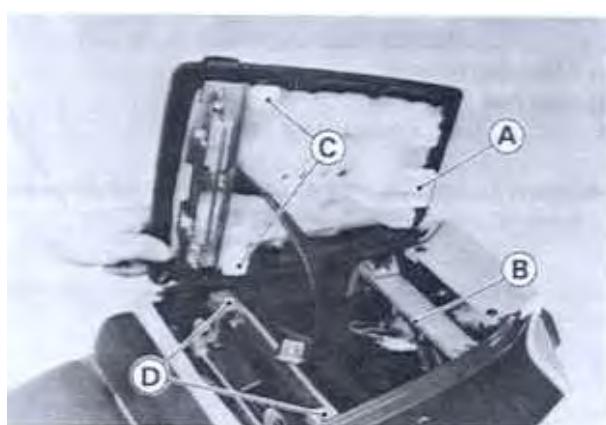
Front Seat Installation

- Slip the hooks of the front seat under the brace on the frame.



A. Fooks

B. Brace



A. Hook
B. Brace

C. Stoppers
D. Holes

- Push down the front part of the seat until the lock clicks.

Rear Seat Removal

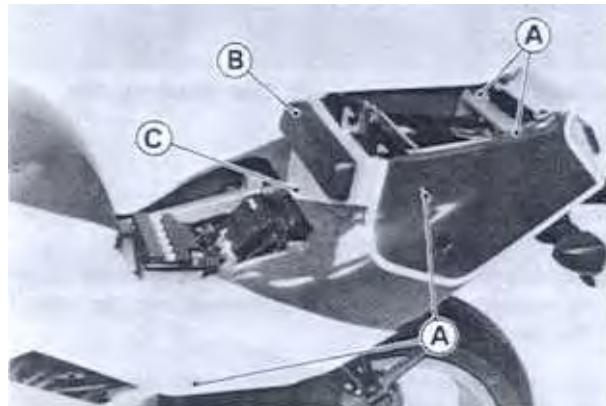
- Insert the ignition switch key into the seat lock.
- Turn the key to the right, and pull up on the front of the seat and pull it forward.

Side Covers

Side Cover Removal

- Remove the following.

Front Seat
Rear Seat
Seat Pad
Left and Right Cover Clamp Screws
Side Cover Mounting Screws



A. Mounting Screws
B. Seat Pad
C. Left and Right Cover Clamp Screws

- Spread the front part of side covers of the both sides and move the side covers backward.

Fairings

Upper Fairing Removal

- Remove the following in the order listed.

Rear View Mirror Nuts
Upper Fairing Mounting Bolts and Screws
Air Duct Clamps (Loosen)
Turn Signal Connectors



A. Rear View Mirror Nuts C. Fairing Mounting Screws
B. Fairing Mounting Bolts D. Air Duct Clamps

CAUTION

Be careful not to scratch the painted surface during removal or installation.

Lower Fairing Removal

- Remove the following.

Lower Fairing Mounting Bolts
Upper Fairing Mounting Screws



A. Mounting Bolts
B. Mounting Screws
C. Clamp Bolts (Do not remove.)

NOTE

- *Remove the lower fairings as assembly.*

Electrical System

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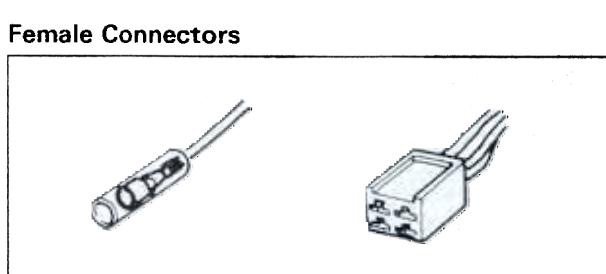
15-2 ELECTRICAL SYSTEM

Precautions

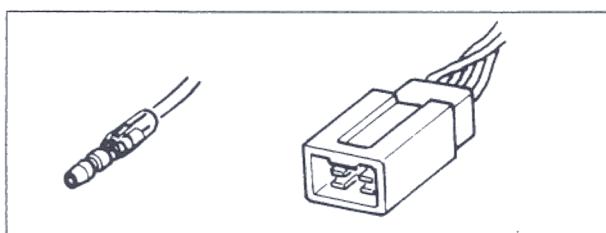
There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter 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 caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

Electrical Connectors



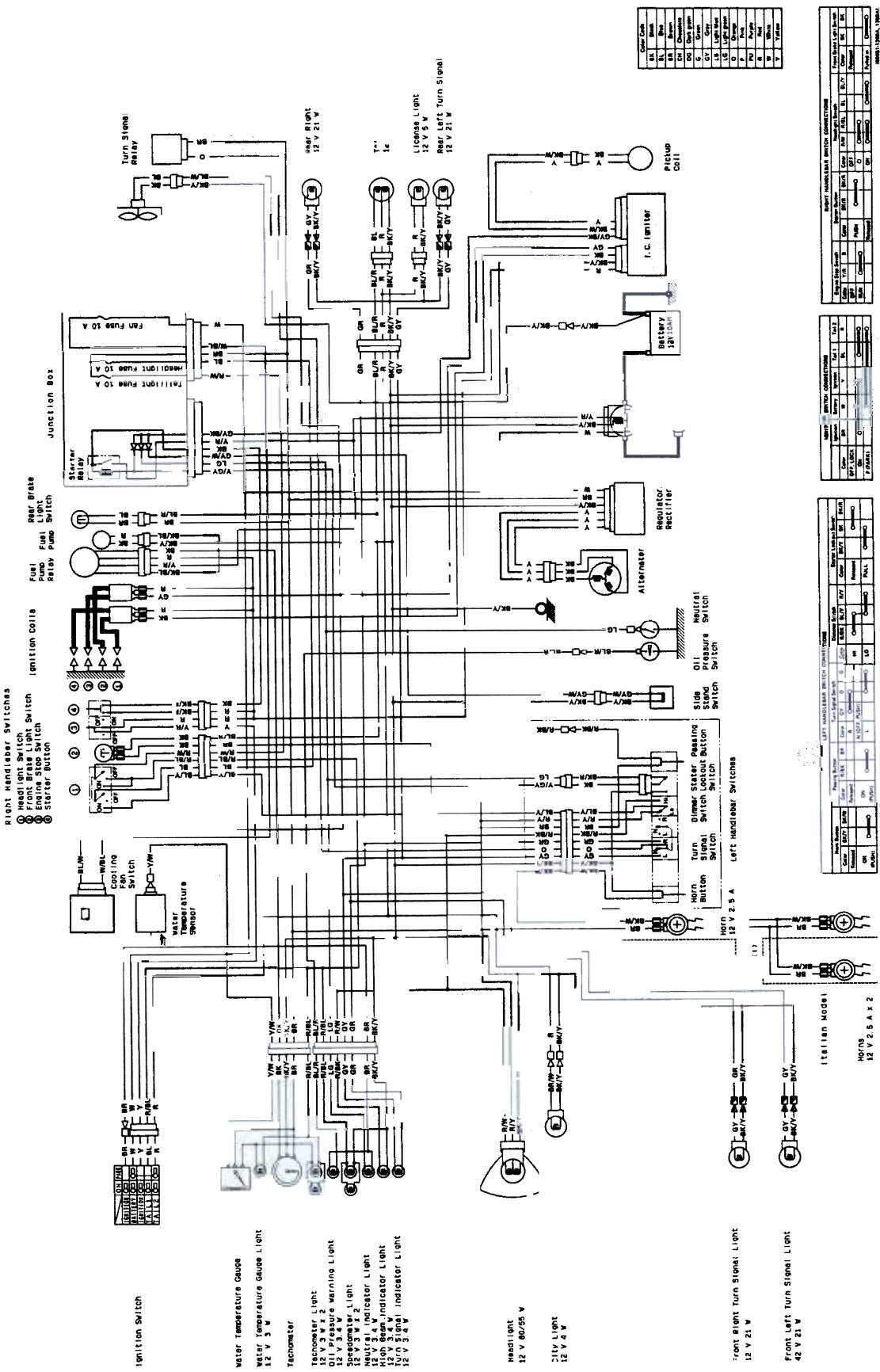
Male Connectors



○ Color Codes:

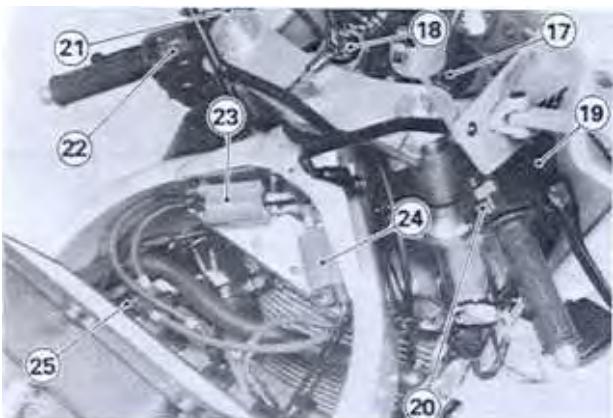
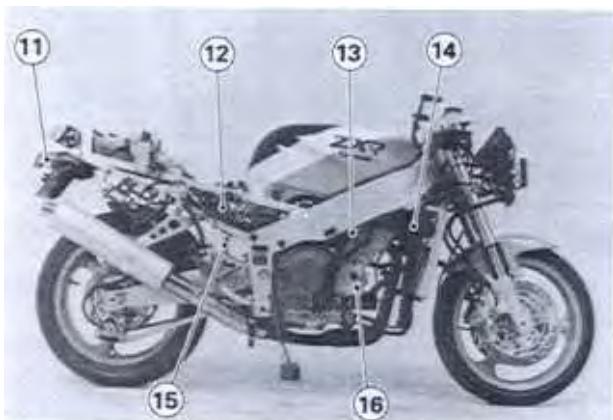
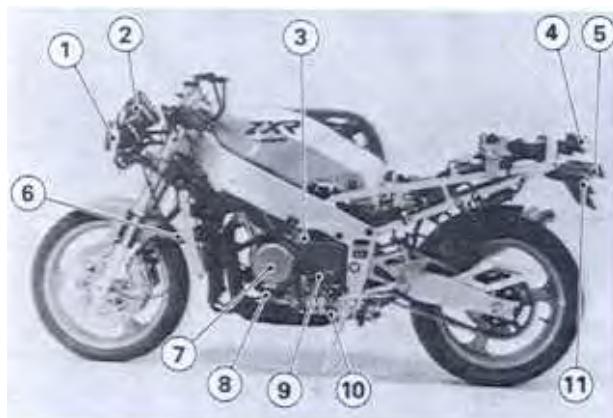
BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark green
G	Green
GY	Gray
LB	Light blue
LG	Light green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

Wiring Diagram (ZX400-H2)

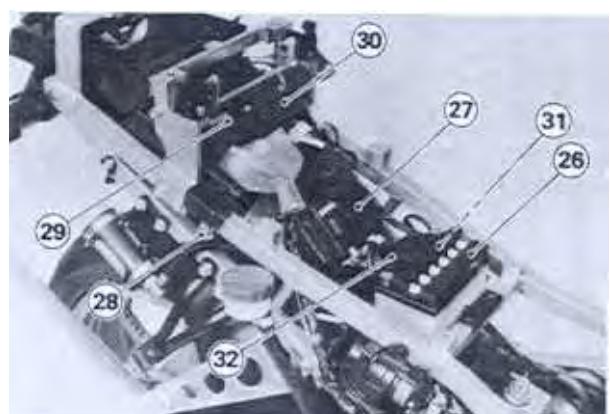


15-4 ELECTRICAL SYSTEM

Parts Location

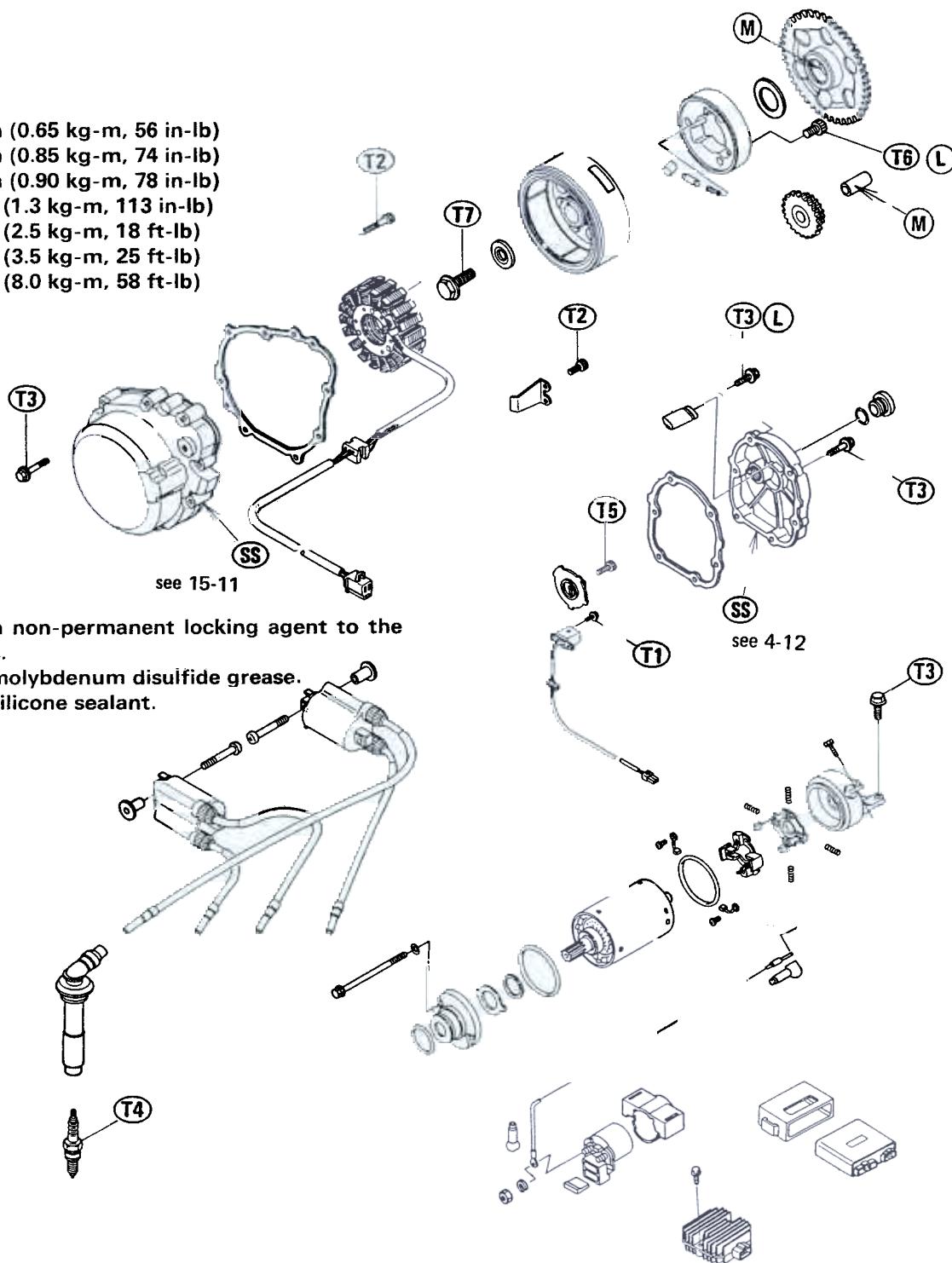


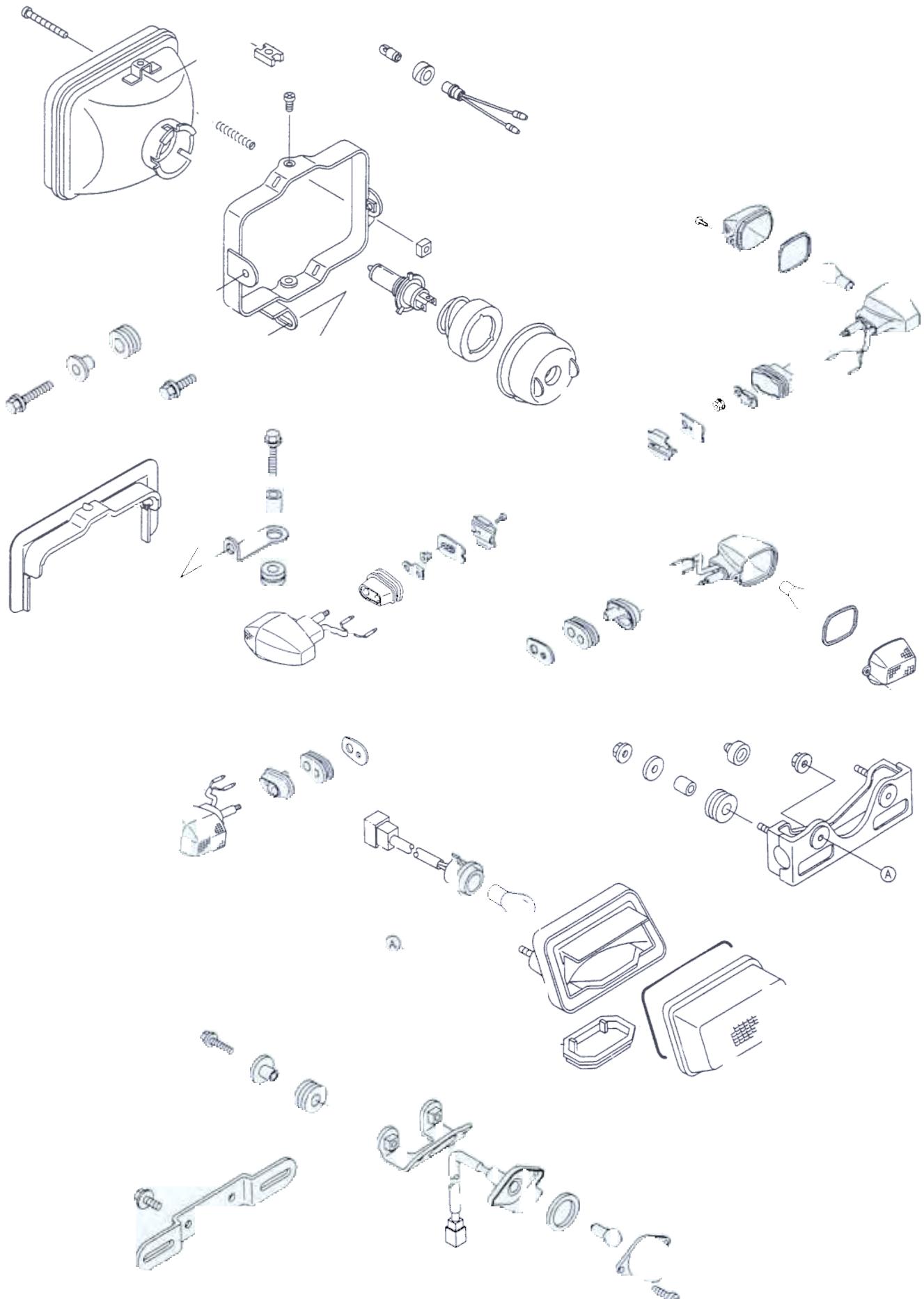
1. Headlight Unit
2. Meter Unit
3. Starter Motor
4. Tail/Brake Light
5. Licence Light
6. Fan Switch
7. Alternator
8. Oil Pressure Switch
9. Neutral Switch
10. Side Stand Switch
11. Turn Signal Light
12. Fuel Pump
13. Water Temperature Sensor
14. Radiator Fan
15. Rear Brake Light Switch
16. Pickup Coil
17. Indicator Light
18. Ignition Switch
19. Front Brake Light Switch
20. Right Grip Switch
21. Starter Lockout Switch
22. Left Grip Switch
23. Ignition Coil (#2, 3)
24. Ignition Coil (#1, 4)
25. Spark Plug
26. Battery
27. Junction Box
28. Fuel Pump Relay
29. IC Igniter
30. Regulator/Rectifier
31. Starter Relay
32. Turn Signal Relay

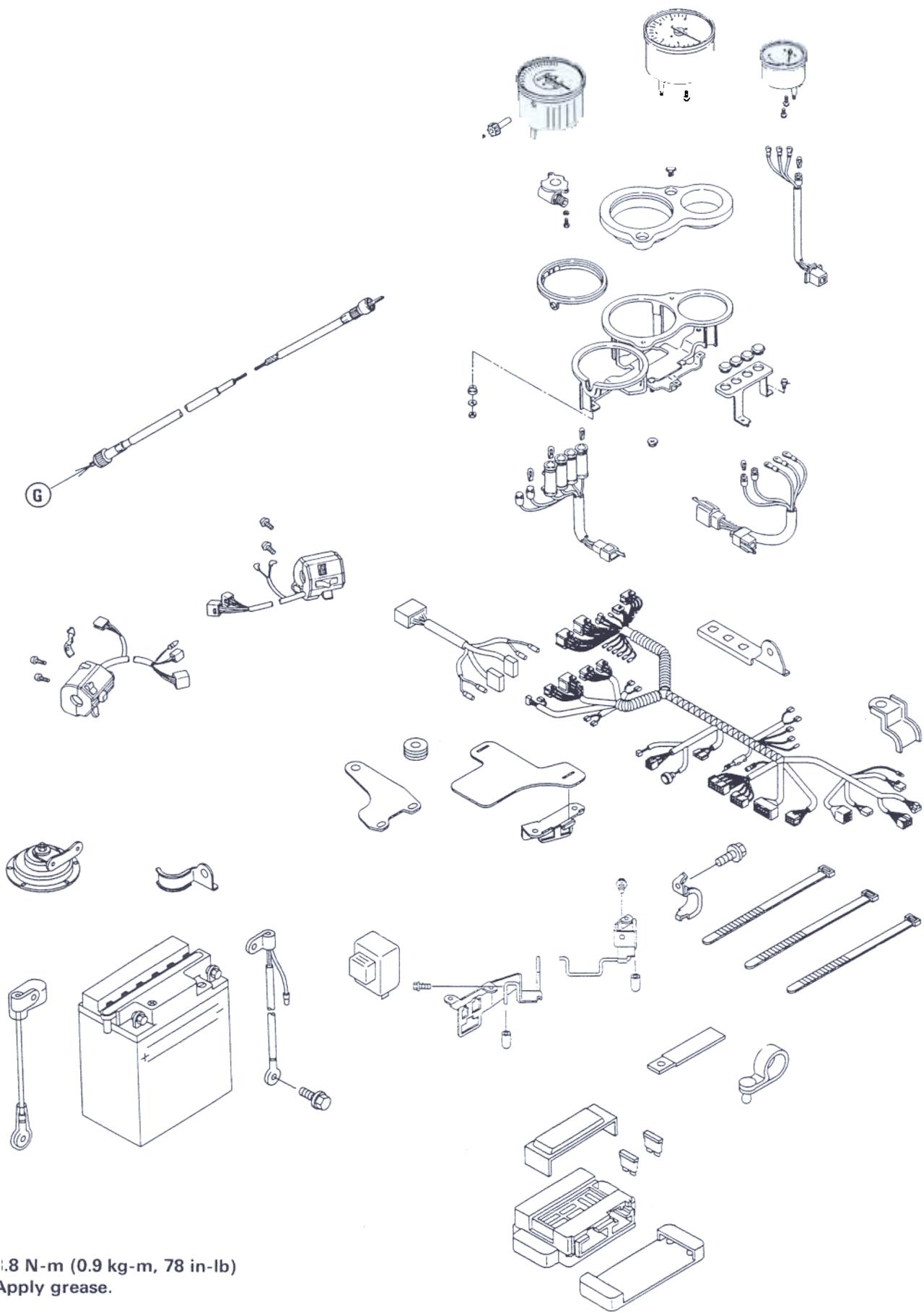


Exploded View

T1: 6.4 N·m (0.65 kg·m, 56 in-lb)
 T2: 8.3 N·m (0.85 kg·m, 74 in-lb)
 T3: 8.8 N·m (0.90 kg·m, 78 in-lb)
 T4: 13 N·m (1.3 kg·m, 113 in-lb)
 T5: 25 N·m (2.5 kg·m, 18 ft-lb)
 T6: 34 N·m (3.5 kg·m, 25 ft-lb)
 T7: 78 N·m (8.0 kg·m, 58 ft-lb)







Apply grease.

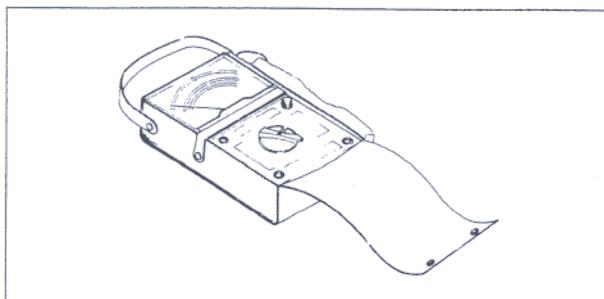
15-8 ELECTRICAL SYSTEM

Specifications

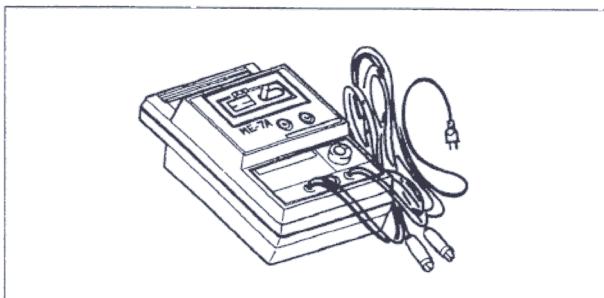
Item	Standard	Service Limit
Battery: Type Specific gravity	12 V 10 Ah 1.280 @20°C (68°F)	--- ---
Alternator: Charging voltage Output voltage Stator coil resistance	14.5 V Night @4 000 r/min (rpm) No less than 43 V @4 000 r/min (rpm) 0.2 ~ 0.9 Ω	--- --- ---
Ignition System: Pickup coil resistance Ignition coil: 3 needle arcing distance Primary winding resistance Secondary winding resistance Spark plug gap	355 ~ 535 Ω 7 mm or more 2.3 ~ 3.5 Ω 12 ~ 18 kΩ 0.7 ~ 0.8 mm	--- --- --- --- ---
Starter Motor: Carbon brush length Commutator groove depth Commutator diameter	7 mm 0.45 ~ 0.75 mm 24 mm	3.5 mm 0.2 mm 23 mm
Fuel Pump: Fuel pump pressure	11 ~ 16 kPa (0.11 ~ 0.16 kg/cm ² , 1.6 ~ 2.3 psi)	---
Switches and Sensors: Rear brake light switch Fan Switch: OFF → ON ON → OFF Water temperature sensor resistance	ON after about 10 mm pedal travel 93 ~ 103°C (199 ~ 217°F) 91 ~ 95°C (196 ~ 203°F) 80°C (175°F) : 47 ~ 57 Ω 100°C (212°F) : 25 ~ 30 Ω	--- --- --- --- ---

Special Tools

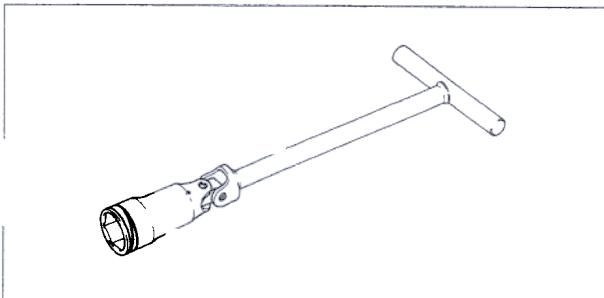
Hand Tester: 57001-983



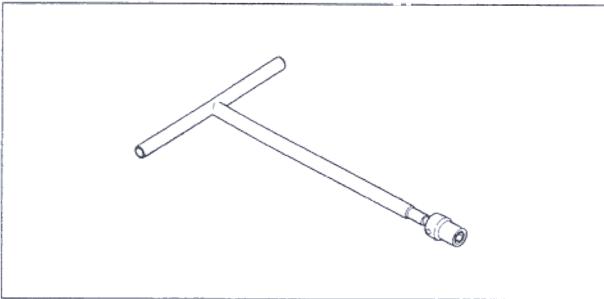
Coil Tester: 57001-1242



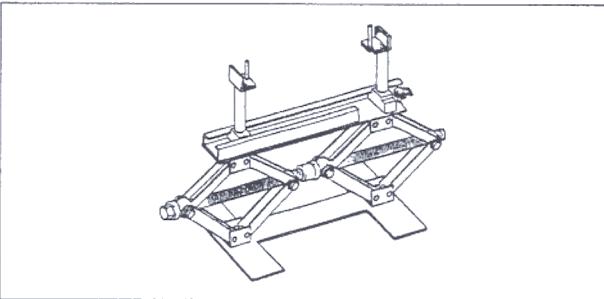
Spark Plug Wrench, Hex 16: 57001-1262



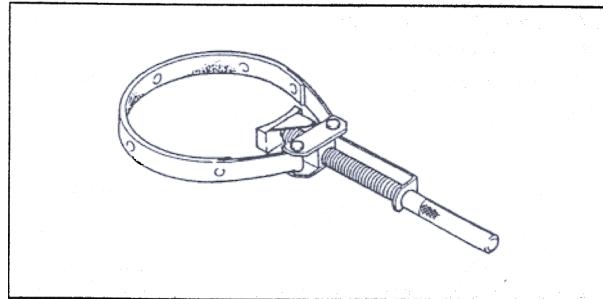
Socket Wrench, Hex 8: 57001-1268



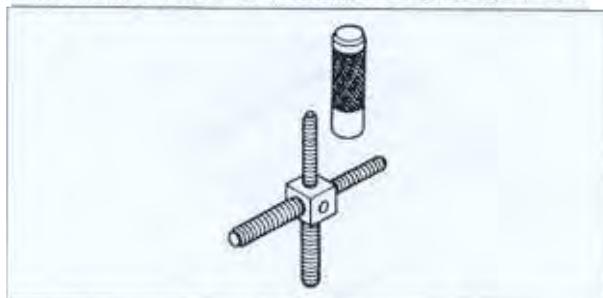
Jack: 57001-1238



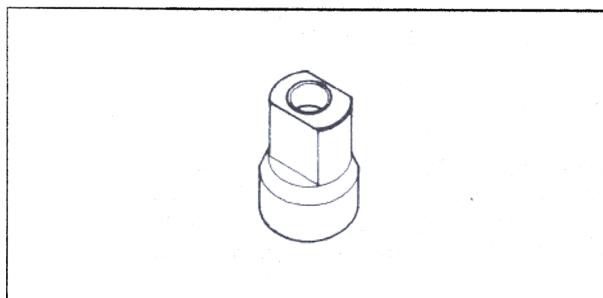
Flywheel Holder: 57001-1313



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

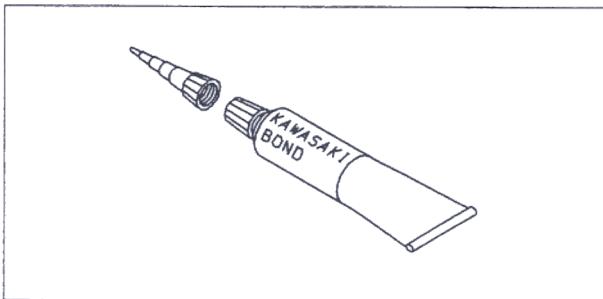


Rotor Puller, M33 x 1.5: 57001-1277



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120



15-10 ELECTRICAL SYSTEM

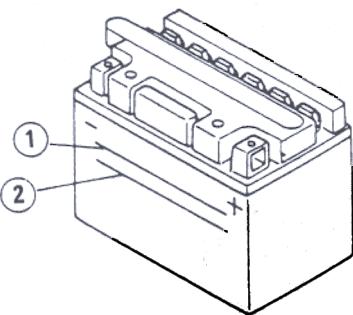
Battery

Electrolyte Level Inspection

- The electrolyte level should be between the upper and the lower level lines.
- ★ If the level of electrolyte in any cell is below the lower level line, add only distilled water to cell, until the level is at the upper level line.

CAUTION

Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.



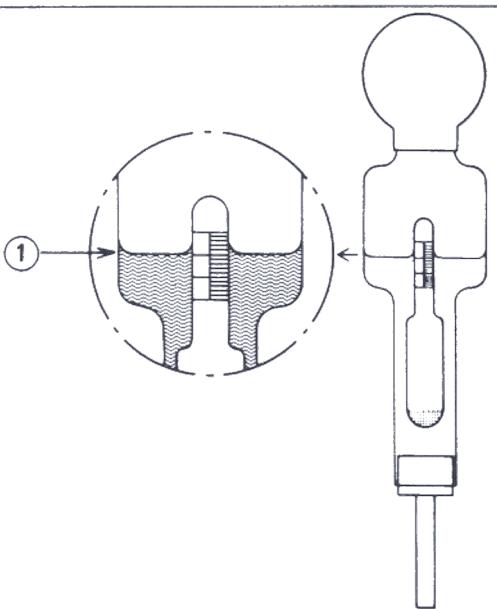
1. Upper Level Line

2. Lower Level Line

Electrolyte Specific Gravity Inspection

- Check battery condition by testing the specific gravity of the electrolyte in each cell with a hydrometer.
- Read the level of the electrolyte on the floating scale.

Hydrometer



1. Read here.

- ★ If the specific gravity is below 1.20 (charge 60%), the battery needs to be charged.

Initial Charging

- Remove the rear and front seats (see Frame chapter) and take out the battery.

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.

- Fill each cell to the upper level line on the battery case with fresh electrolyte (specific gravity: 1.280) 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.

- Set the charging rate at 1/10 the battery capacity, and charge it for 10 hours. For example, if the battery is rated at 14 Ah, the charging rate would be 1.4 A.

CAUTION

If the battery is not given a full initial charging, it will discharge in a few weeks. After that it can not be charged by supplement charging.

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

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.

Ordinary Charging

- Remove the rear and front seats (see Frame chapter) and take out the battery.
- Set the charging rate and time according to the battery condition previously determined (see Electrolyte Specific Gravity Inspection), using the Battery Charging Rate/Time Table.

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

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.

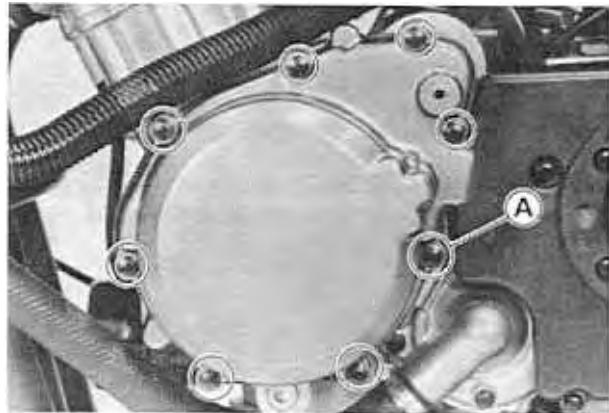
Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates 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.

- Check the electrolyte level after charging.

Charging System**Alternator Cover Removal**

- Remove the lower fairing.
- Set a suitable container under the engine.
- Remove the alternator cover bolts, using the socket wrench (special tool: 57001-1268).

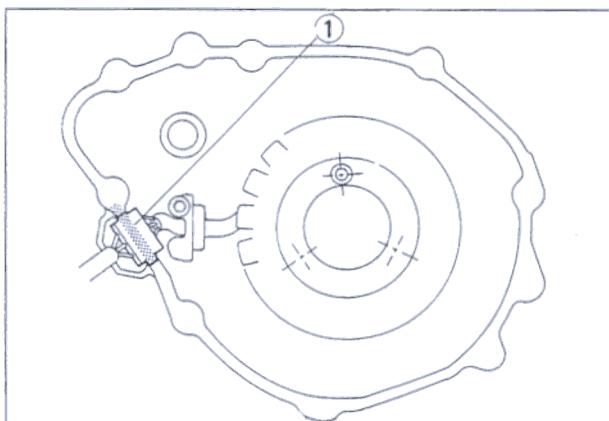


A. Alternator Cover Bolt

- Remove the alternator cover.

Alternator Cover Installation

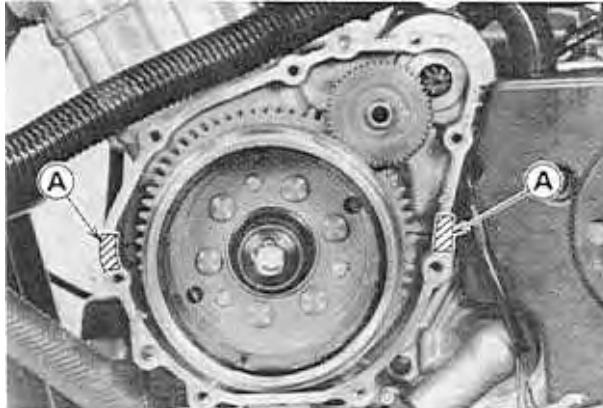
- Replace the gasket with a new one.
- Run the stator lead as shown.
- Apply silicone sealant to the stator lead grommet.



1. Apply silicone sealant

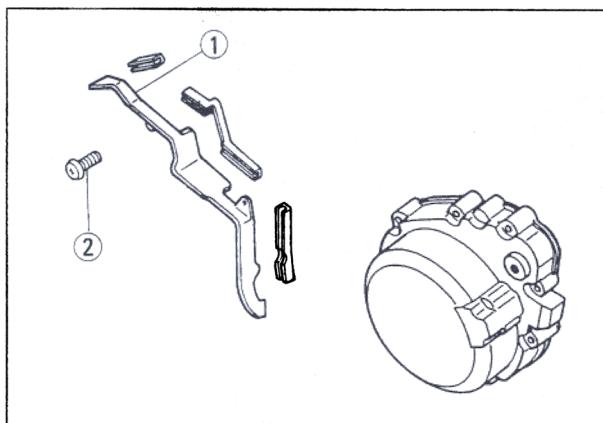
- Apply silicone to the crankcase halves mating surface on the front and rear sides of the cover mount.

15-12 ELECTRICAL SYSTEM



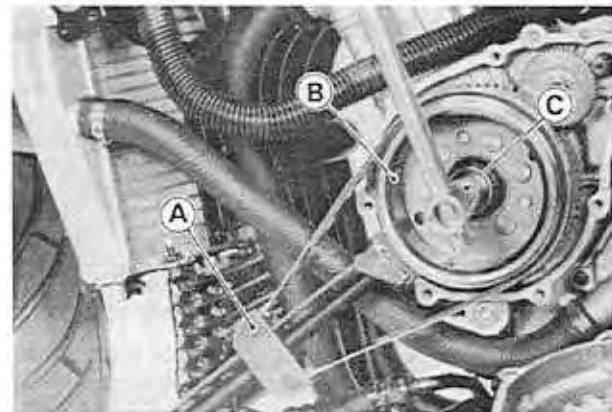
A. Silicone Sealant Applied Area

- Apply silicone sealant to the left inner cover bolt.



1. Left Inner Cover

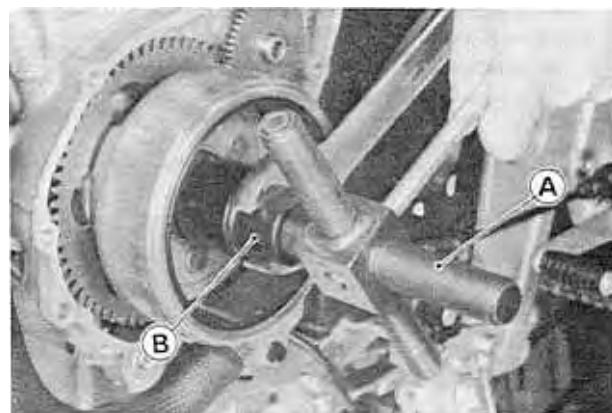
2. Apply a non-permanent locking agent.



A. Flywheel Holder: 57001-1313 C. Rotor Bolt

B. Rotor

- Threads the rotor puller (special tool) and the rotor puller (special tool) onto the alternator rotor.
- Holding the rotor puller, turn the rotor puller until the alternator rotor is forced off the end of the crankshaft.



A. Rotor Puller: 57001-1216

B. Rotor Puller: 57001-1277

CAUTION

If the rotor is difficult to remove, turn the puller while tapping the end of the puller covered with the cap. Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Alternator Rotor Removal

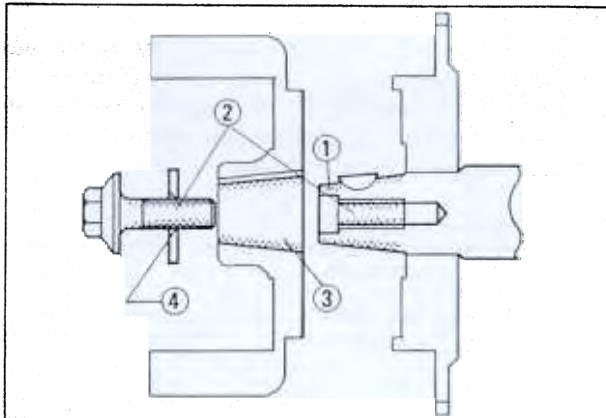
- Place the jack (special tool) under the frame to steady the motorcycle.
- Place a suitable container under the alternator cover.
- Remove the alternator cover.
- Wipe oil off the outer circumference of the rotor.
- Hold the alternator rotor steady with the flywheel holder (special tool), and remove the rotor bolt.

Alternator Rotor Installation Notes

- Clean the following portions with an oil-less cleaning fluid such as trichloroethylene or acetone.

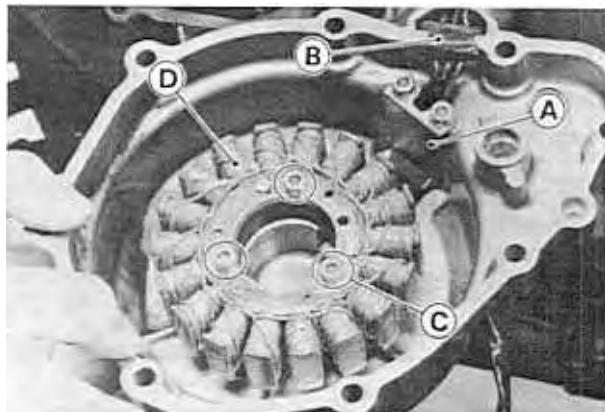
WARNING

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

Alternator Rotor Cleaning Area

1. The tapered portion of the crankshaft.
2. The alternator rotor bolt and the threads in the crankshaft.
3. The tapered portion of the alternator rotor.
4. Chamfer

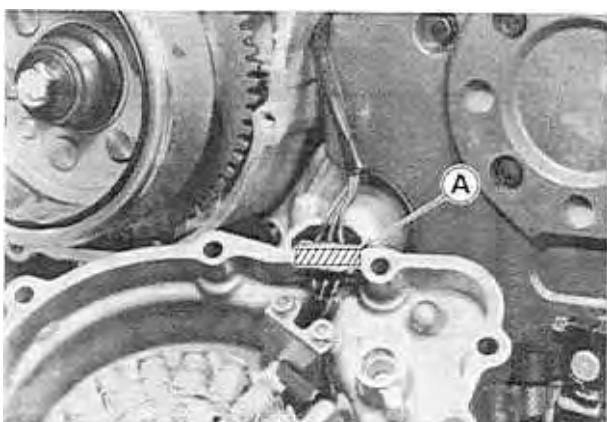
- Install the washer so that the chamfer side faces out.
- Tighten the alternator rotor bolt to the specified torque (see Exploded View) while holding the alternator rotor steady with the flywheel holder (special tool: 57001-1313).



A. Holding Plate C. Mounting Bolts
B. Grommets D. Stator

Stator Installation Notes

- Fit the stator coil lead grommet first, and the pickup coil lead grommet into the notch of cover securely.
- Route the stator coil leads in accordance with the Wire Routing in the General Information chapter.



A. Silicone Sealant Applied Areas

- Install a new gasket and the alternator cover.
- Tighten the cover bolts to the specified torque (see Exploded View).
- Fill the engine with engine oil (see Engine Lubrication System chapter).

Alternator Inspection

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

- To check the alternator output voltage, do the following procedures. Refer to the appropriate chapters and charging system Wiring Diagram.

Turn off the ignition switch.

Disconnect connector 1.

Connect the hand tester (special tool: 57001-983) as shown in table.

Start the engine.

Run it at the rpm given in table.

Note the voltage readings (total 3 measurements).

Alternator Output Voltage

Meter Range	Connections		Reading 4 000 rpm
	Meter (+) to	Meter (-) to	
250 V AC	One yellow lead (Connector 1)	Another yellow lead (Connector 1)	about 43 V

★ If the output voltage shows the value in table, the alternator operates properly and the regulator/rectifier is damaged. A much lower reading than that given in the table indicates that the alternator is defective.

- Check the stator coil resistance as follows:

Stop the engine.

Stator Coil Removal

- Remove the alternator cover (see this chapter).
- Remove the holding plate.
- Unit the pickup coil lead and stator coil lead grommets out of the notch of cover.
- Unscrew the mounting bolt, and take off the stator.

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Connect the hand tester (special tool: 57001-983)

as shown in table.

Note the readings (total 3 measurement)

Stator Coil Resistance

Meter Range	Connections		Reading
	Meter (+) to	Meter (-) to	
x 1 Ω	One yellow lead (Connector 1)	Another yellow lead (Connector 1)	0.2 ~ 0.9 Ω

★ If there is more resistance than shown in the Table, or no meter reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

● Using the highest resistance range of the hand tester measure the resistance between each of the yellow leads and chassis ground.

★ Any meter reading less than infinity (∞) indicates a short, necessitating stator replacement.

★ If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnetism have probably weakened, and the rotor must be replaced.

Rectifier Inspection

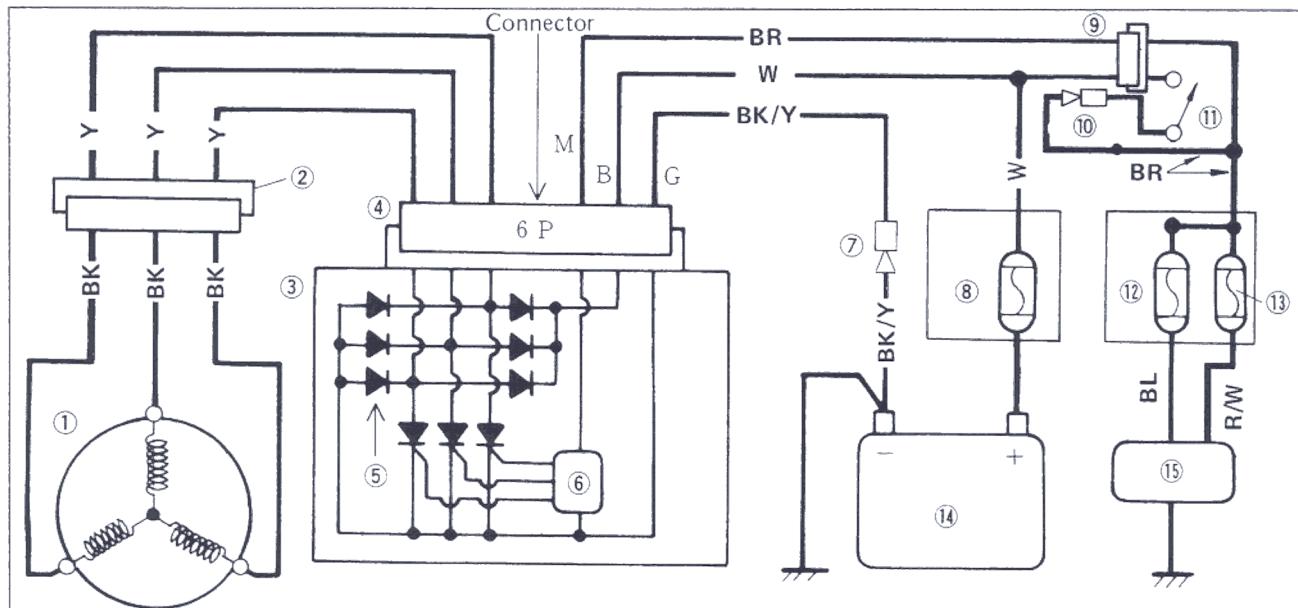
● Check the rectifier resistance as follows.

● Remove the regulator/rectifier and disconnect the connector 2 (see Charging System Wiring Diagram).
● Connect an ohmmeter to the regulator/rectifier as shown in the Table, and check the resistance in both directions of each diode following the table.

Rectifier Circuit Inspection

No.	Connections		Reading	Meter Range
	Meter (+) to	Meter (-) to		
1	Y ₁	W	∞	
2	Y ₂			
3	Y ₃			
4	Y ₁			
5	Y ₂			
6	Y ₃			
7	W	Y ₁	∞	x 10 Ω or x 100 Ω
8		Y ₂		
9		Y ₃		
10	BK/Y	Y ₁	∞	
11		Y ₂		
12		Y ₃		

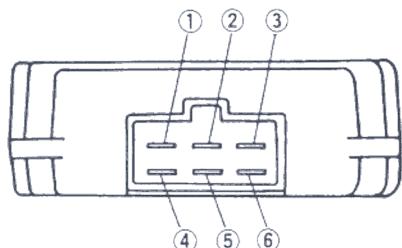
Charging System Wiring Diagram



1. Alternator
2. Connector 1
3. Regulator/Rectifier
4. Connector 2
5. Diode (Rectifier)

6. Control Circuit (IC)
7. Connector 5
8. Main Fuse 30A
9. Connector 3
10. Connector 4

11. Ignition Switch
12. Headlight 10A Fuse (Junction Box)
13. Taillight 10A Fuse (Junction Box)
14. Battery
15. Load



- | | |
|-----------------------|---------------------------------|
| 1. W Lead Terminal | 4. Y ₁ Lead Terminal |
| 2. BR Lead Terminal | 5. Y ₂ Lead Terminal |
| 3. BK/Y Lead Terminal | 6. Y ₃ Lead Terminal |

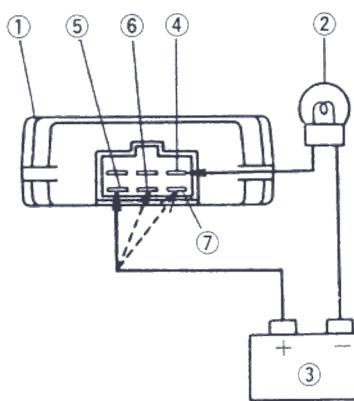
NOTE

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

Regulator Inspection

To test the regulator out of circuit, use three 12 V batteries and a test light made from 12 V 3 ~ 6 W bulb in a socket with leads.

- Remove the regulator/rectifier unit from the frame.
- Using auxiliary leads, connect one of the yellow lead terminal at the unit to the battery (+) terminal, and connect the test light between the black/yellow lead terminal at the unit, and the battery (-) terminal.
- At this time the bulb should not be lit.

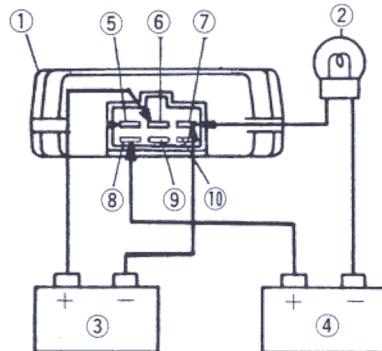


- | | |
|------------------------|---------------------------------|
| 1. Regulator/Rectifier | 5. Y ₁ Lead Terminal |
| 2. Test Light | 6. Y ₂ Lead Terminal |
| 3. 12 V Battery | 7. Y ₃ Lead Terminal |
| 4. BK/Y Lead Terminal | |

CAUTION

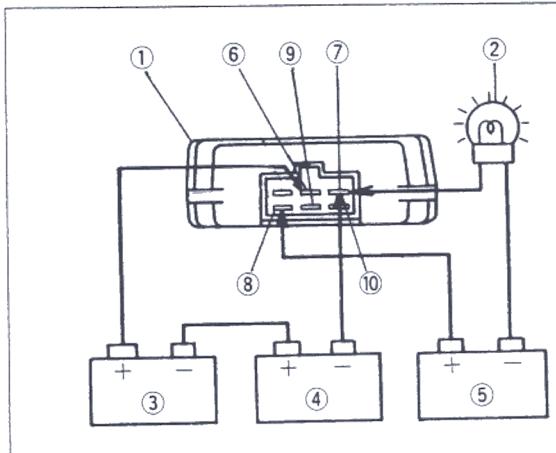
The test light works as an indicator and also as a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

- Connect the brown lead terminal to the other battery (+) terminal and connect the black/yellow lead terminal to the battery (-) terminal momentarily. At this time the bulb should not be lit.



- | | |
|------------------------|----------------------------------|
| 1. Regulator/Rectifier | 6. BR Lead Terminal |
| 2. Test Light | 7. BK/Y Lead Terminal |
| 3. 12 V Battery | 8. Y ₁ Lead Terminal |
| 4. 12 V Battery | 9. Y ₂ Lead Terminal |
| 5. W Lead Terminal | 10. Y ₃ Lead Terminal |

- To apply 24 V to the regulator/rectifier, connect two 12 V batteries in series, and connect the brown lead terminal to the battery (+) terminal and the black/yellow lead terminal to the battery (-) terminal momentarily. The bulb should now light and stay on until the bulb circuit is opened.



- | | |
|------------------------|----------------------------------|
| 1. Regulator/Rectifier | 6. BR Lead Terminal |
| 2. Test Light | 7. BK/Y Lead Terminal |
| 3. 12 V Battery | 8. Y ₁ Lead Terminal |
| 4. 12 V Battery | 9. Y ₂ Lead Terminal |
| 5. 12 V Battery | 10. Y ₃ Lead Terminal |

CAUTION

Do not apply more than 24 volts. If more than 24 volts is applied, the regulator/rectifier may be damaged. Do not apply 24 V more than a few seconds. If 24 volts is applied for more than a few seconds, the regulator/rectifier may be damaged.

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- Repeat the above three steps for other two yellow leads (in connector 2 which leads to the regulator/rectifier)).
- ★ Replace the regulator/rectifier if the bulb does not light as described above.

NOTE

○ The above test is not foolproof. If the above checks show the regulator/rectifier is not damaged, but there is still trouble in the charging system, first carefully inspect the alternator, battery, wiring, and all connections. Replace the regulator/rectifier if all these other components turn out good.

Regulator/Rectifier Output Voltage Inspection

- Check the battery condition (see Battery section).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the seat.
- Check that the ignition switch is turned off, and connect the hand tester as shown in table.

Regulator/Rectifier Output/Voltage

Meter Range	Connections		Reading
	Meter (+) to	Meter (-) to	
25 V DC	Battery (+)	Black/Yellow (Connector 5)	Battery Voltage – 14 ~ 15 V

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.
- Turn off the ignition switch to stop the engine, and disconnect the hand tester.
- ★ If the regulator/rectifier output voltage is kept between the values given in table, the charging system is considered to be working normally.
- ★ If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the battery voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Ignition System

WARNING

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

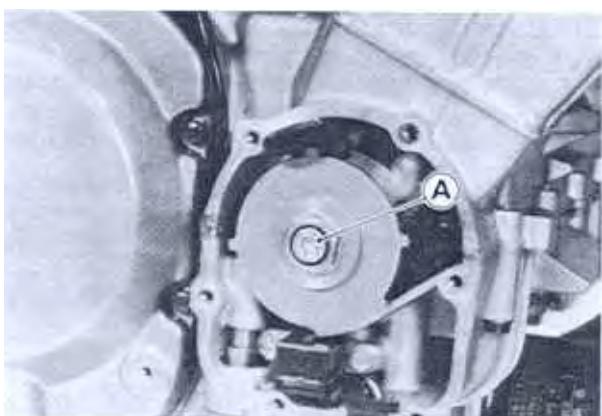
CAUTION

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.

Pickup Coil Removal

- Remove the pickup coil cover (see Engine Top End chapter).
- Remove the Allen bolt.



A. Allen Bolt

Installation

- Tighten the Allen bolt to the specified torque (see Exploded View).
- Install the pickup coil cover (see Engine Top End chapter).

Pickup Coil Inspection

- Disconnect the pickup coil connector.
- Zero an ohmmeter, and connect it to the 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 (x 100 Ω)

355 ~ 535 Ω (BK, Y Lead)

● 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.

WARNING

To avoid extremely high voltage shocks, do not touch the coil or lead.

★ 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.

Ignition Coil Removal

- Remove surge tank cover (see Fuel System chapter)
- Remove the ignition coil from the bracket.

Ignition Coil Installation

- Connect the primary leads to the ignition coil terminals.

Black Lead → to #1, #4 Coil

Green Lead → to #2, #3 Coil

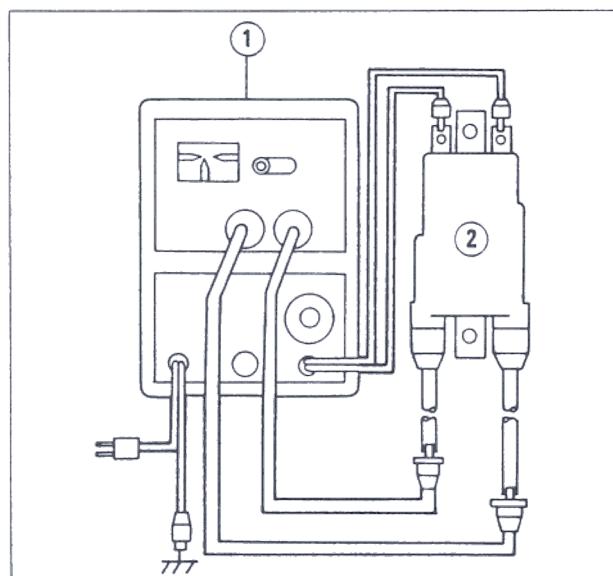
Red Lead → to both Coils

Ignition Coil Inspection

- Remove the ignition coils.
- Measure the arcing distance with Kawasaki coil tester (special tool: 57001-1242) to check the condition of the ignition coil.

NOTE

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



1. Ignition Coil Tester: 57001-1242
2. Ignition Coil

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.

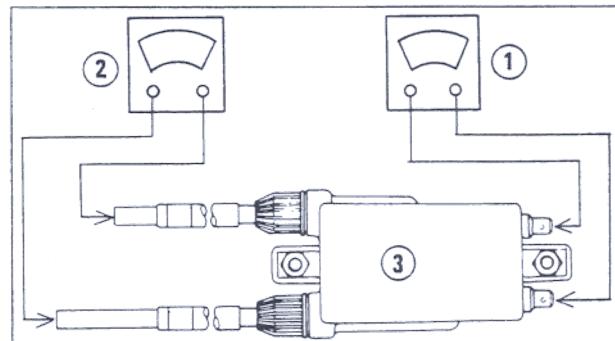
- Disconnect the primary leads from the coil terminals.
- Measure the primary winding resistance.
- Connect an ohmmeter between the coil terminals.
- Set the meter to the $x 1 \Omega$ range, and read the meter.
- Measure the secondary winding resistance.
- Pull the spark plug cap off the lead.
- Connect an ohmmeter between the spark plug leads.
- Set the meter to the $x 1 k\Omega$, and read the meter.

★ If the meter does not read as specified, replace the coil.

Ignition Coil Winding Resistance

Primary Windings: 2.3 ~ 3.5 Ω

Secondary Windings: 12 ~ 18 kΩ

Ignition Coil Winding Resistance

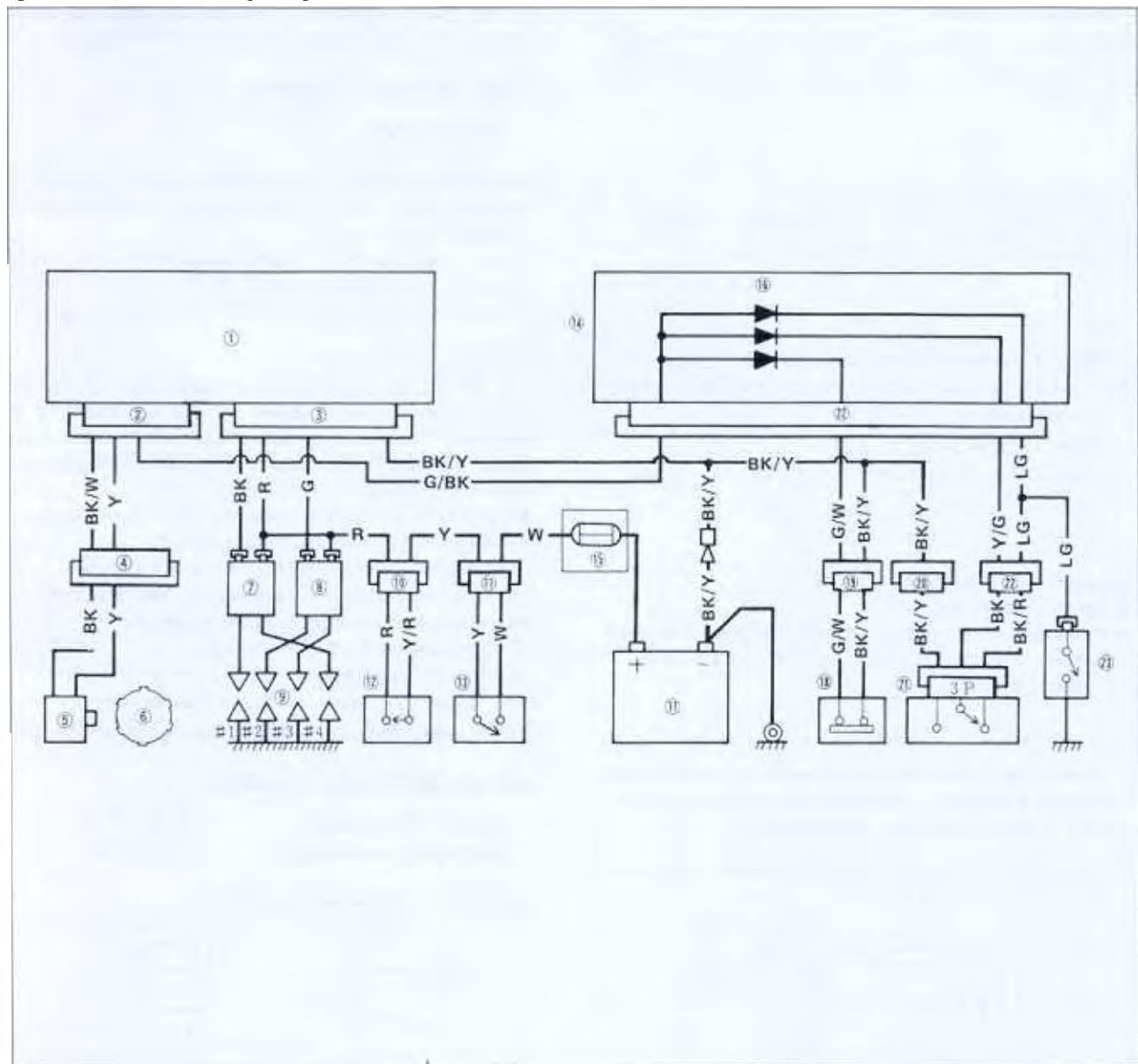
1. Measure primary winding resistance.
2. Measure secondary winding resistance.
3. Ignition Coil

★ 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 and replace the coil with one known to be good.

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- Check the spark plug leads for visible damage.
- ★ If any spark plug lead is damaged, replace the coil.

Ignition System Wiring Diagram



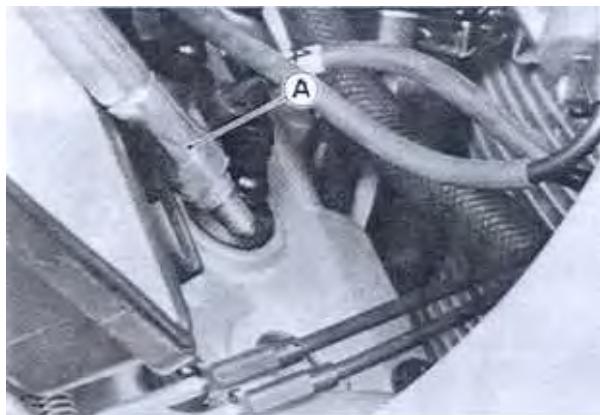
- 1. IC Igniter
- 2. 6-pin Connector
- 3. 4-pin Connector
- 4. 2-pin Connector
- 5. Pickup Coil
(#1, #4 Cylinder)
- 6. Timing Rotor
- 7. Ignition Coil
(#1, #4 Cylinder)

- 8. Ignition Coil
(#2, #3 Cylinder)
- 9. Spark Plug
- 10. 4-pin Connector
- 11. 6-pin Connector
- 12. Engine Stop Switch
- 13. Ignition Switch
- 14. Junction Box
- 15. Main 30A Fuse

- 16. Diodes
- 17. Battery
- 18. Side Stand Switch
- 19. 9-pin Connector
- 20. 4-pin Connector
- 21. Starter Lockout Switch
- 22. 10-pin Connector
- 23. Neutral Switch

Spark Plug Removal

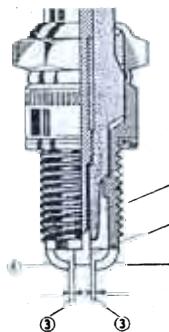
- Remove the following.
 - Surge Tank (see Fuel System chapter)
 - Spark Plug Caps
 - Remove the spark plugs with the box wrench in the tool kit (P/N: 92110-1146) or the spark plug wrench (special tool: 57001-1262).



A. Spark Plug Wrench: 92110-1146

Spark Plug Installation Note

- Tighten the spark plugs to the specified torque (see Exploded View).
 - Run the spark plug leads correctly (see Cable Routing section in the General Information chapter).



1. Insulator 3. Plug Gap
 2. Center Electrode 4. Side Electrode

IC Igniter Inspection

- Remove the side cover assembly (see Frame chapter).
 - Remove the ignitor connector.
 - Zero an ohmmeter, and connect it to terminals of the IC igniter to check the internal resistance of the 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.

★Replace the IC igniter if the reading is not the specified value.

Spark Plug Cleaning and Inspection

- Remove the spark plug, and visually inspect.
 - 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 Inspection

- 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

0.7 ~ 0.8 mm

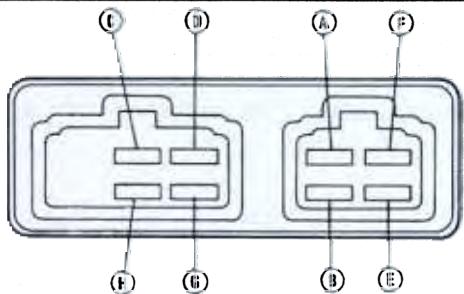
15-20 ELECTRICAL SYSTEM

IC Igniter Internal Resistance

Range : kΩ

Terminal	Tester Positive (+) Lead Connection						
	A	B	C	D	E	F	G
A		2.3 ~ 9.2	4.2 ~ 17	2.3 ~ 9.2	5.4 ~ 22	5.4 ~ 22	6.6 ~ 27
B	∞		1.4 ~ 5.6	0	1.7 ~ 7.0	1.7 ~ 7.0	3.1 ~ 13
C	∞	1.4 ~ 5.8		1.4 ~ 5.8	3.7 ~ 15	3.7 ~ 15	4.6 ~ 19
D	∞	0 5.6	1.4 ~ 5.6		1.7 ~ 7.0	1.7 ~ 7.0	3.1 ~ 13
E	∞	∞	∞	∞		∞	∞
F	∞	∞	∞	∞	∞		∞
G	∞	3.4 ~ 14	4.9 ~ 20	3.4 ~ 14	6.4 ~ 26	6.4 ~ 26	

IC Igniter Terminal



NOTE

○ No measurement is needed on H terminal.

Electric Starter System

Starter Motor Removal

- Remove the fuel tank (see Fuel System chapter).
- Remove the terminal nut of starter motor wiring and take out the mounting bolts.
- Using the socket wrench (special tool: 57001-1268) makes work easy.
- Pull the starter motor upwards with twisting motion.



A. Starter Motor

Starter Motor Installation

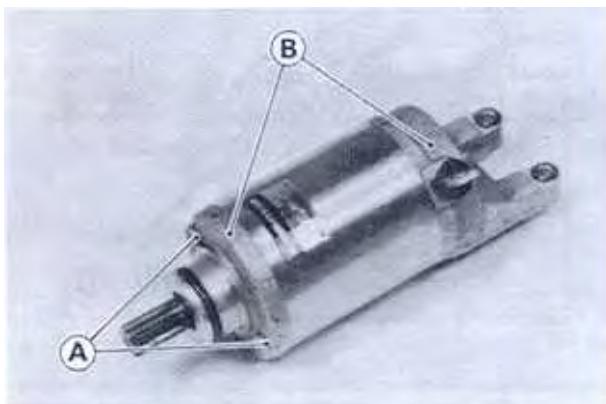
CAUTION

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- When installing the starter motor, clean the starter motor legs and crankcase where the starter motor is grounded.
- Apply a small amount of engine oil to the O-ring.
- Tighten the following fasteners to the specified torque (see Exploded View).
 - Starter Motor Mounting Bolt
 - Terminal Nut

Starter Motor Disassembly

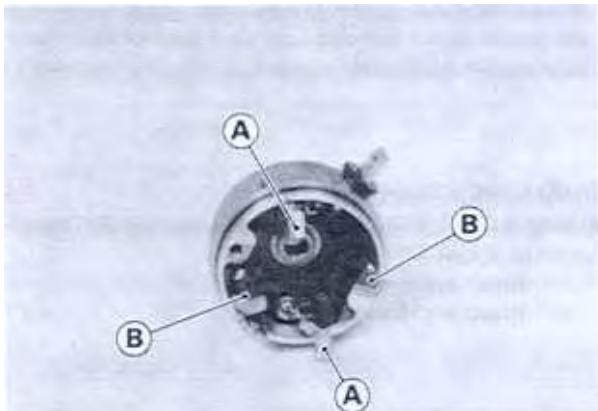
- Remove both end covers and pull the armature out of yoke.



A. Bolts

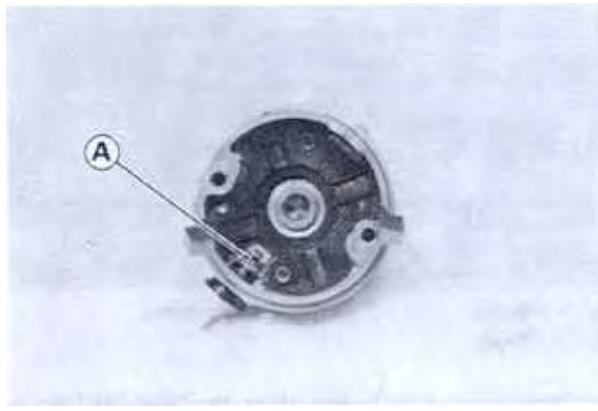
B. End Covers

- Be careful not to lose the brush springs.
- Remove the screw and take out the (-) brushes.
- Unsolder the (+) terminal and take out the (+) brushes.



A. (-) Brushes

B. (+) Brushes



A. Soldered Terminal

Starter Motor Assembly Note

- Inspect the O-rings if it is not damaged.
- Install the brushes and springs into the end cover holder.
- Clamp the brush leads with clips on the end cover and fix the springs.

NOTE

- Be careful not to damage the leads and O-rings.



- Pull the armature out from the yoke and install it on the end cover (brush side).
- Fit the alignment projection on the yoke into the notches of the end cover.

Brush Inspection

- Measure the length of each brush.
- ★ If any is worn down to the service limit, replace the carbon brush holder assembly and the terminal bolt assembly.

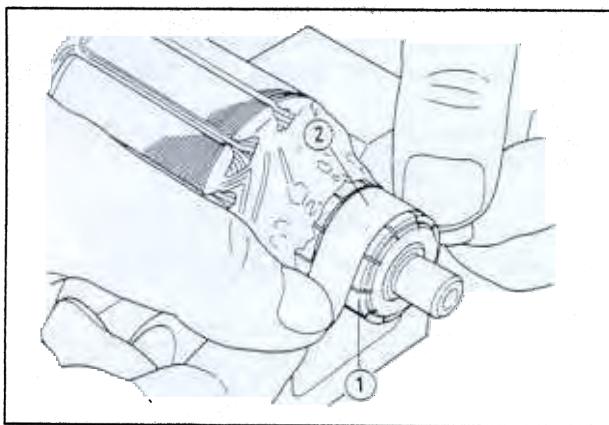
Starter Motor Brush Length

Standard: 7.0 mm
Service Limit: 3.5 mm

Commutator Cleaning and Inspection

- Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves as illustrated.

15-22 ELECTRICAL SYSTEM

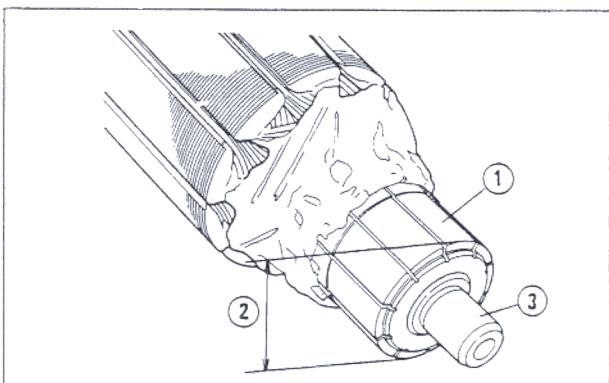


1. Commutator

2. Emery Cloth

● Measure the diameter of the commutator.

★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.



1. Commutator Segment

2. Diameter

3. Shaft

Commutator Diameter

Standard: 24 mm
Service Limit: 23 mm

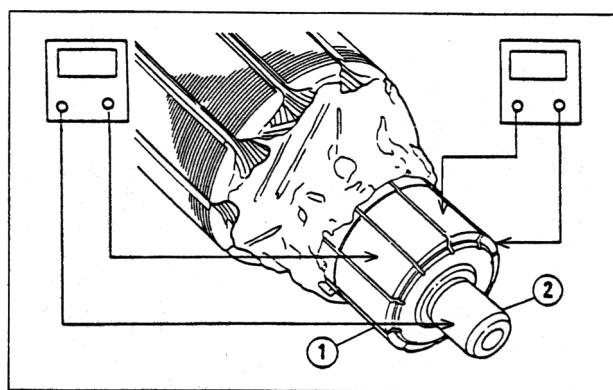
Armature Inspection

● Using the $x 1 \Omega$ 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.

● Using the highest ohmmeter range, measure the resistance between the segments and the shaft.

★ If there is any reading at all, the armature has a short and the starter motor must be replaced.



1. Segment

2. Shaft

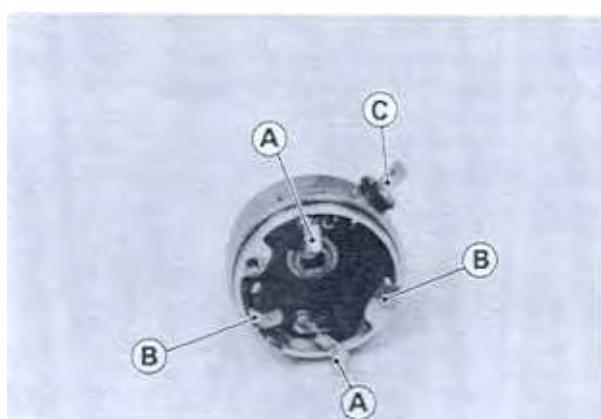
NOTE

○ 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 Lead Inspection

● Using the $x 1 \Omega$ ohmmeter range, measure the resistance as shown.

- (+) Brush and (+) Terminal
(-) Brush and End Cover



A. (-) Brush

B. (+) Brush

C. (+) Terminal

★ If there is not close to zero ohms, the brush lead has an open. Replace the terminal bolt assembly and/or the brush holder assembly.

Brush Plate and Terminal Bolt Inspection

- Using the $\times 1 \Omega$ ohmmeter range, measure the resistance as shown.
 - between terminal bolt and brush plate
 - between terminal bolt and (-) brush
 - between terminal bolt and end cover
- ★ If there is any reading, the brush holder assembly and/or terminal bolt assembly have a short. Replace the brush holder assembly and the terminal bolt assembly.

Starter Relay Inspection

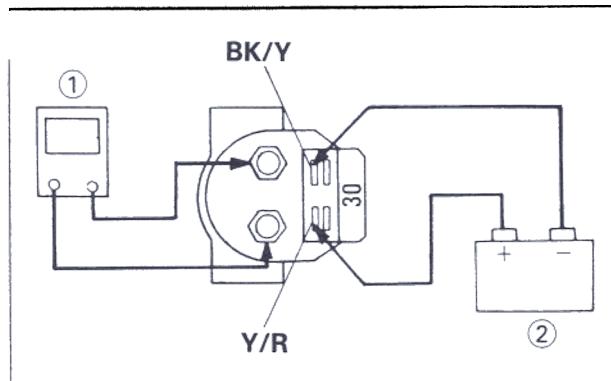
- Remove the left side cover (see Frame chapter).
- Remove the starter relay.
- Connect the hand tester and 12 V battery to the starter relay as shown.
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

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

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

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

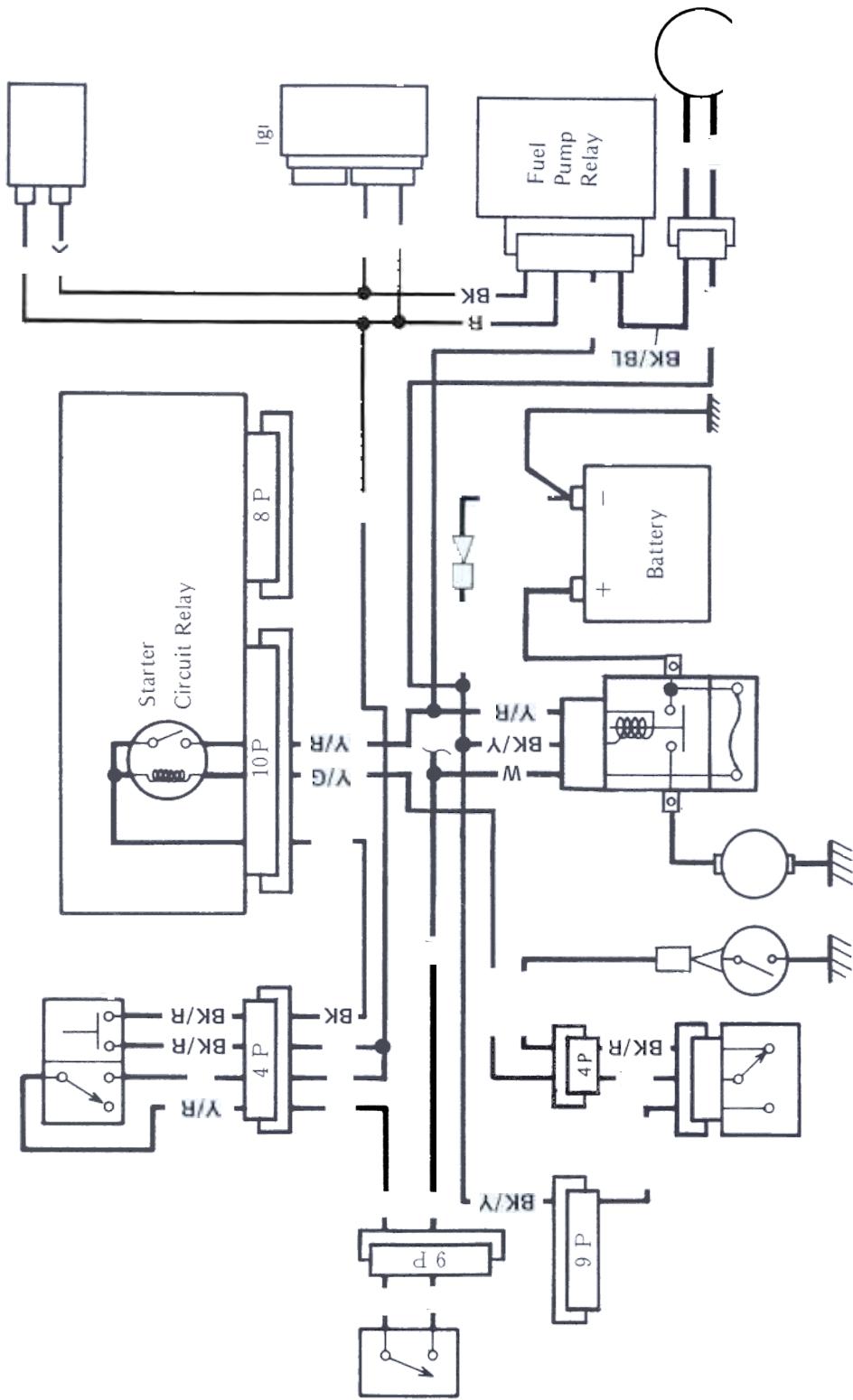


1. Tester

2. 12 V Battery

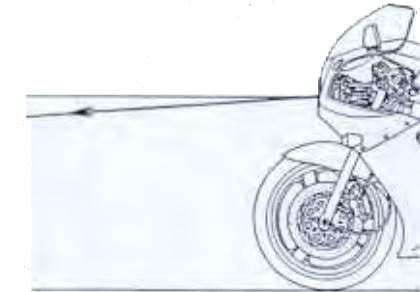
ELECTRICAL SYSTEM

Electric Starter and Fuel Pump Circuit



Lighting System

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



Headlight Beam Horizontal Adjustment

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



A. Adjusting Screw

Headlight Beam Vertical Adjustment

The headlight beam is adjustable vertically. If adjusted too low, neither low nor high beam will illuminate the road far enough ahead. If adjusted too high, the high beam will fail to illuminate the road close ahead, and the low beam will bind oncoming drivers.

- Loosen the adjusting bolt and adjust the beam until the beam points straight ahead.
- Tighten the bolt after adjusting the beam.

NOTE

- On high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlights to the proper angle according to local regulations.



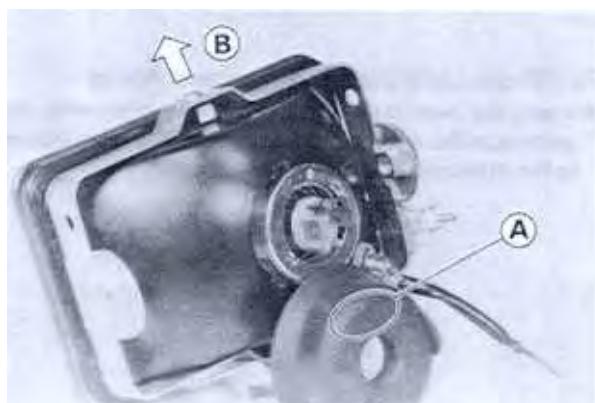
A. Adjusting Bolt

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.

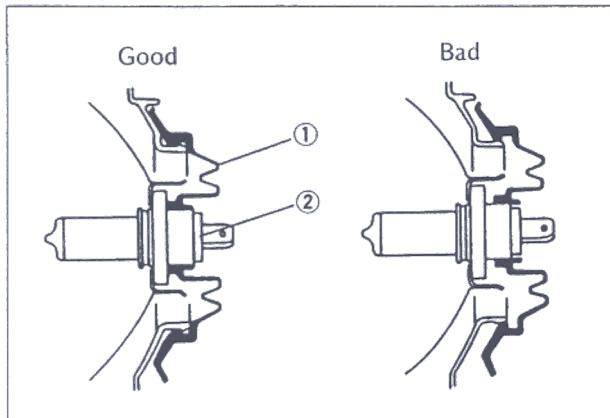
- Install the dust cover so that the "TOP" mark point up and the cover fits onto the bulb firmly as shown.



A. Top Mark

B. Up

15-26 ELECTRICAL SYSTEM



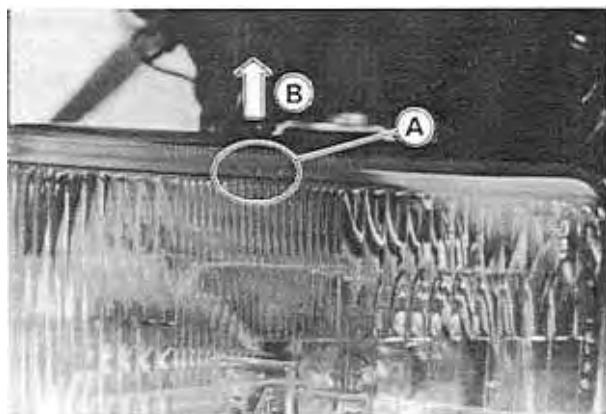
1. Dust Cover

2. Headlight Bulb

- Check the headlight aim after installation.

Headlight Unit Removal/Installation Note

- Install the headlight unit so that the "TOP" mark on the lens points up.



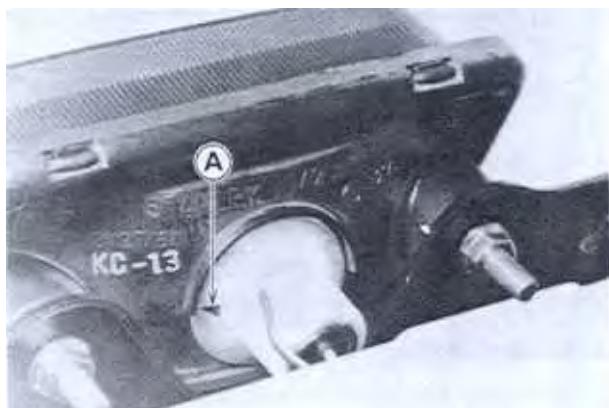
A. Top Mark

B. Up



A. Pin Closest to Base.

- Insert the socket by aligning the tangs with the catches in the housing so that the triangular mark points left, and turn it clockwise.



A. Triangular Mark

Tail/Brake Light Bulb Replacement Notes

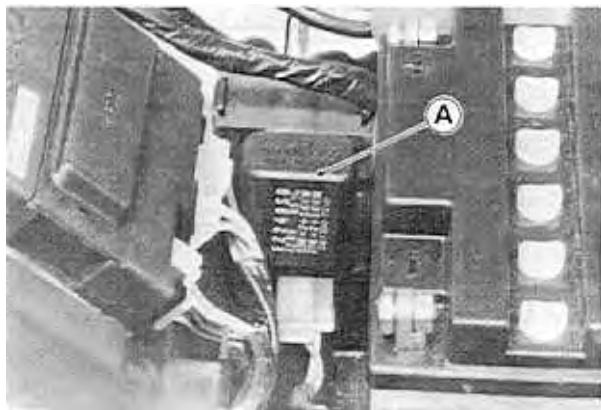
- Insert the new bulb by aligning the pins with the grooves in the walls of the socket so that the pin closest to the bulb base is to the upper right.

Turn Signal Light Bulb Replacement Note

- Be careful not to overtighten the lens mounting screws.

Turn Signal Relay Inspection

- Remove the seat.
- Take the turn signal relay out of the bracket.



A. Turn Signal Relay

- Check the condition or the relay for the following troubles.

(1) Neither right nor left turn signals come on at all:

- Check that battery voltage is normal.
- Unplug the relay leads and use an ohmmeter to check that there is continuity (close to zero ohms) between the relay terminals.
- ★ If there is no ohmmeter reading, or if there is several ohms resistance, replace the relay with a new one.
- Turn the meter to the 25 V DC range, connect the (+) meter lead to the brown lead that was disconnected from the relay, and connect the (-) meter lead to the orange lead.
- With the ignition switch on, first switch the turn signal switch to the R and then to the L position. The meter should register battery voltage at either position.
- ★ If it does not, the fuse, ignition switch, or wiring is at fault.

(2) Both right or both left turn signals come on and stay on or flash too slowly:

- Check that battery voltage is normal.
- Check that all wiring connections are good.
- Check that the turn signal bulbs and indicator bulbs are of the correct wattage.
- ★ If all of the above check good, replace the relay.

(3) A single light on one side comes on and stays on:

- ★ Either the light that does not come one is burned out of the incorrect wattage, or the wiring is broken or improperly connected.

(4) Neither light on one side comes:

- ★ Unless both lights for that side are burned out, the trouble is with the turn signal switch.

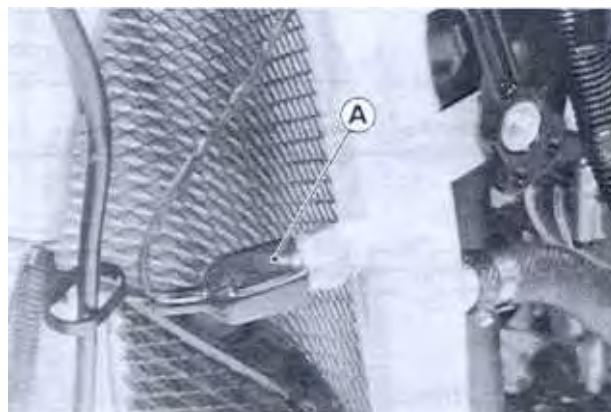
(5) Flashing rate is too fast:

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

Radiator Fan System

Fan System Circuit Inspection

- Remove the left lower fairing and disconnect the leads from the radiator fan switch.



A. Fan Switch Terminals

- Using an auxiliary wire, connect the radiator fan switch leads.

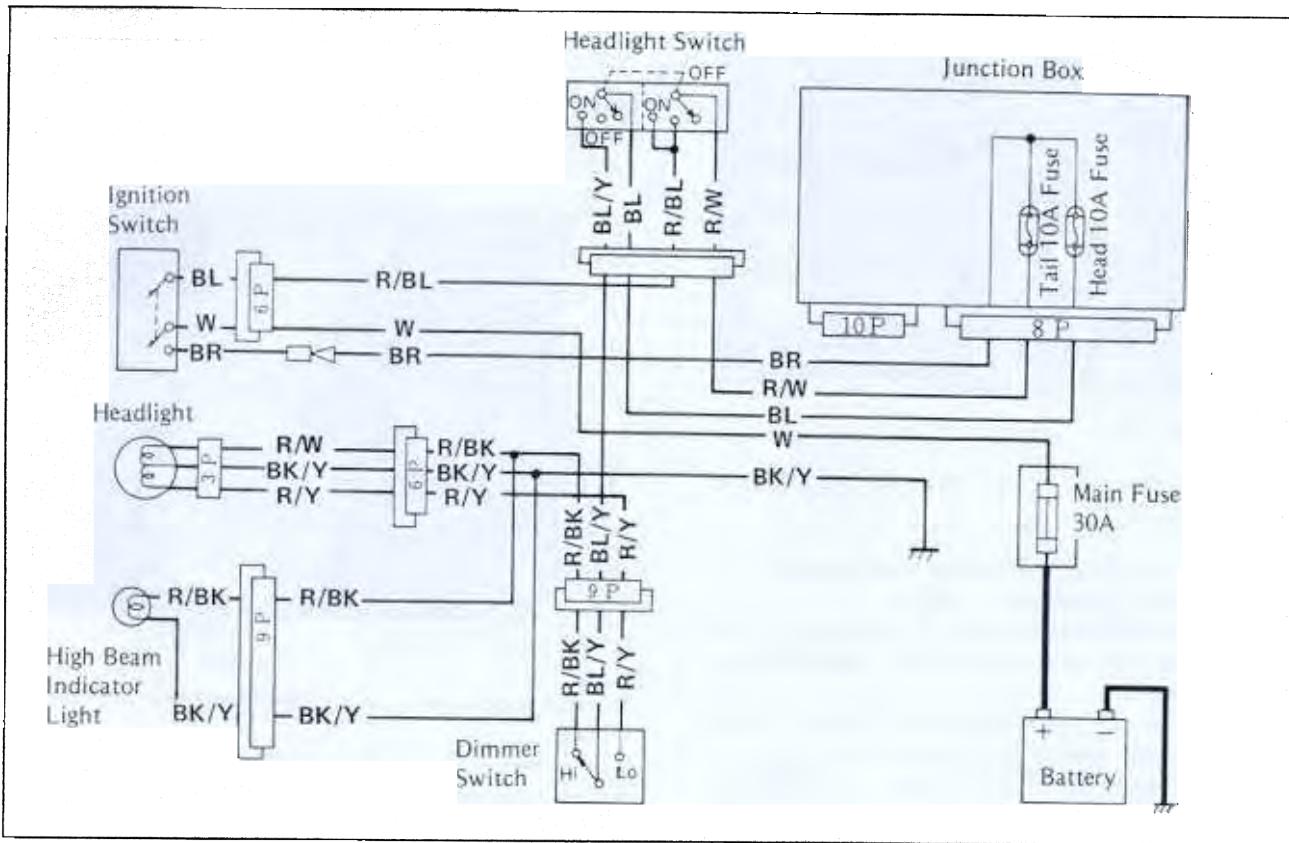
★ If the fan rotates, inspect the fan switch.

★ If the fan does not rotate, inspect the following.

Fan Fuse (Junction Box)
Headlight Circuit
Leads and Connectors
Main Fuse
Fan

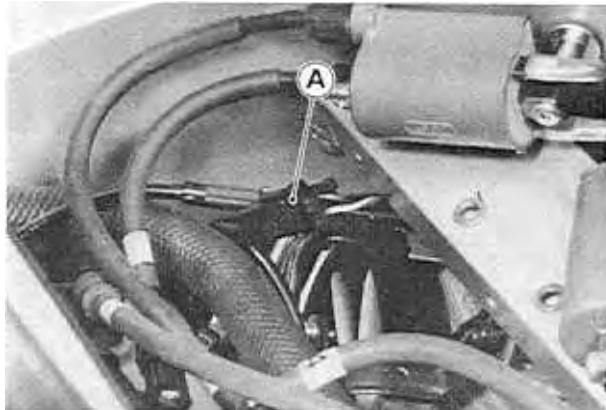
15-28 ELECTRICAL SYSTEM

Headlight Circuit



Fan Inspection

- Remove the following.
 - Surge Tank
 - Baffle Plate
- Disconnect the 2-pin connector in the fan leads.

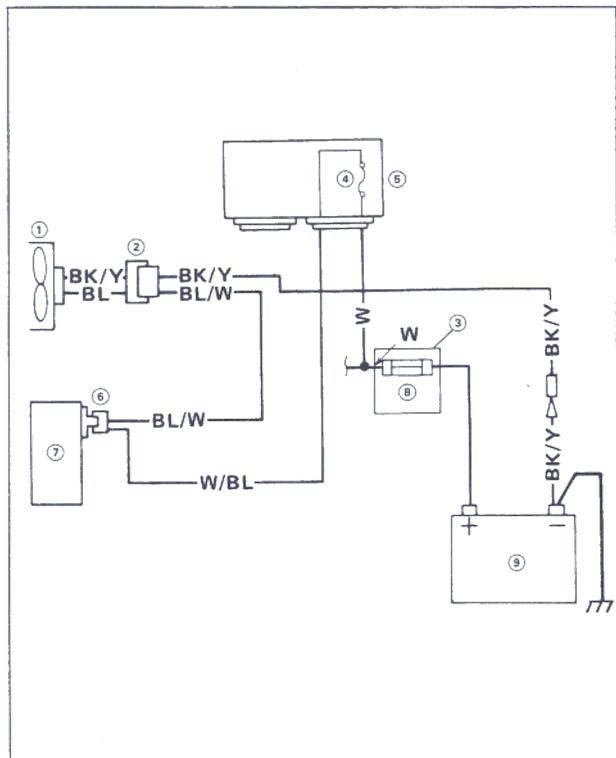


A. Fan Connector

- Using two auxiliary wires, supply battery power to the fan.
- ★ If the fan does not rotate at this time, the fan is defective and must be replaced.

Fan Installation

- Tighten the fan mounting bolt to the specified torque (see Exploded View in the Cooling System chapter).

Cooling Fan Circuit

- 1. Radiator Fan
- 2. 2-pin Connector
- 3. Starter Relay
- 4. Fan Fuse 10A
- 5. Junction Box
- 6. Fan Switch
- 7. Radiator
- 8. Main Fuse 30A
- 9. Battery

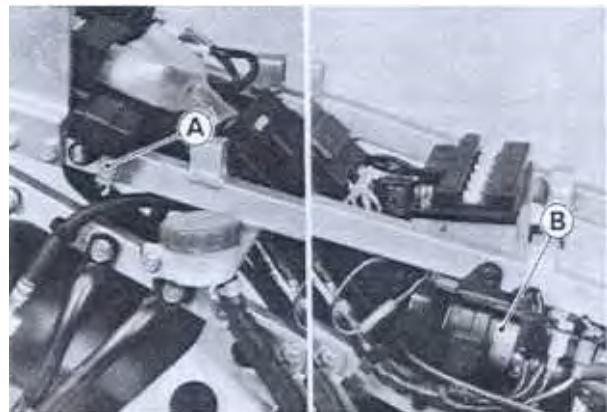
Fuel Pump

The pump operates when the starter button is pushed on or the engine is running.

- Refer to the Starter Motor section for the Fuel Pump Wiring Diagram.

When fuel level in the float bowl is low, the fuel pump operates to supply fuel into the float bowl.

When the fuel reaches a certain level, the fuel pressure rises, and the fuel pump stops.



A. Pump Relay

B. Fuel Pump

Removal/Installation

- Refer to the fuel system chapter.

Fuel Pump Relay Inspection

- Remove the side cover assembly (see Frame chapter) and take out the fuel pump relay.
- Set the hand tester (special tool: 57001-983) to the $\times 1\text{ k}\Omega$ range and make the measurements shown in the table.
- ★ If the tester readings are not as specified, replace the fuel pump relay.
- ★ If the tester readings are normal, check the fuel pump operation.

CAUTION

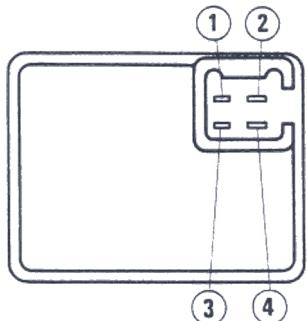
Use only Hand Tester 57001-983 for this test. An ohmmeter other than the Kawasaki Hand Tester may show different readings.

If a megger or a meter with a large-capacity battery is used, the pump relay will be damaged.

15-30 ELECTRICAL SYSTEM

Fuel Pump Relay Internal Resistance

Range x 1 kΩ		Tester (+) Lead Connection			
		1	2	3	4
Tester (-) Lead Connection	1	∞	∞	∞	∞
	2	∞	∞	∞	∞
	3	∞	10 – 100	∞	∞
	4	∞	20 – 200	1 – 5	∞



● Connect the pump leads to the battery using auxiliary wires as shown.

★ If the pump operates, check the pump relay.

★ If the pump does not operate, the pump is defective.

★ If the pump operates and the pump relay is normal, close the outlet hose while operating the fuel pump.

● When the pump stops, read the pressure gauge.

★ If the pressure gauge reading is out of the specified pressure, the pump is defective.

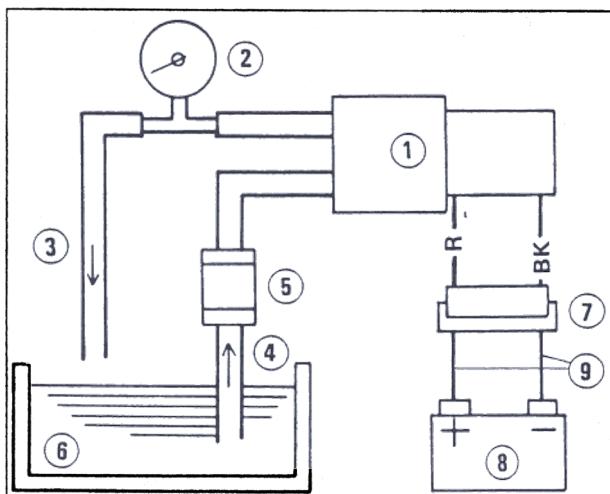
Fuel Pump Pressure

Standard 11 ~ 16 kPa

(0.11 ~ 0.16 kg/cm², 1.6 ~ 2.3 psi)

Pump Operational Inspection

- Remove the fuel pump with the fuel filter (see Fuel System chapter).
- Prepare a container filled with kerosene.
- Prepare the rubber hoses, and connect them to the pump fittings.
- Connect the suitable pressure gauge to the outlet hose as shown.



1. Fuel Pump

2. Pressure Gauge

3. Outlet Hose

4. Inlet Hose

5. Fuel Filter

6. Kerosene

7. 2-Pin Connector

8. Battery

9. Auxiliary Leads

Meters, Gauges

Removal

- Remove the following.
Upper Fairing (see Frame chapter)
Headlight Unit
Speedometer Cable Upper End
Wiring Connectors
- Remove the meter unit by taking off the mounting nuts.



A. Meter Mounting Nuts

CAUTION

Place the meter or gauge so that the face is up. If a meter or gauge is left upside down or sideways for any length of time it will malfunction.

Bulb Replacement

- To remove the wedge-base type bulb, pull the bulb out of the socket.

CAUTION

Do not use bulb rated for greater wattage than the specified value.

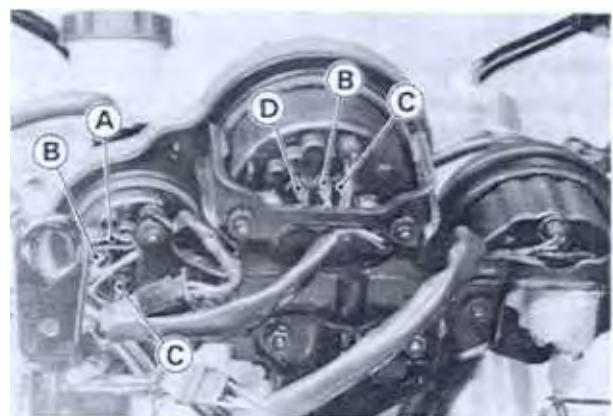
Do not turn the bulb to prevent damage to the bulb.



A. Pull the bulb.

Meter, Gauge Assembly Note

- Install each lead on the original position shown.

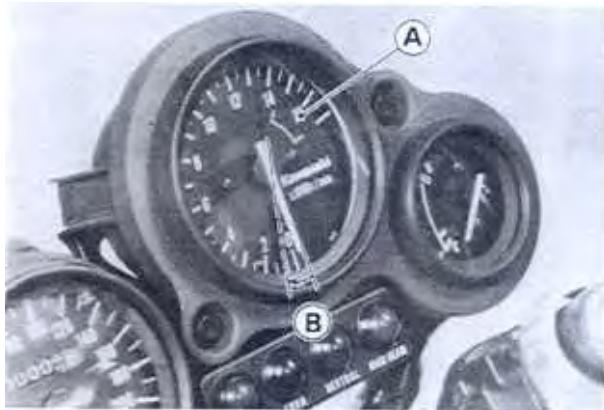


A. W/Y Lead
B. BK/Y Lead

C. BR Lead
D. BK Lead

Tachometer Inspection

- Check the tachometer circuit wiring (see Tachometer Circuit and Wiring Inspection).
- ★ If all wiring and components other than the tachometer unit check out good, the unit is suspect. Check the unit as shown.
- Remove the surge tank (see Fuel System chapter).
- Remove the BK lead of the ignition coil.
- Turn the ignition switch ON.
- Open or connect the BK lead to the battery positive terminal using an auxiliary lead. Then the pointer should flick.
- Turn the ignition switch OFF.
- ★ If the pointer does not flick, replace the tachometer unit.



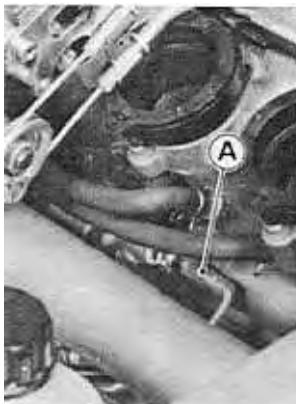
A. Tachometer

B. Pointer flicks.

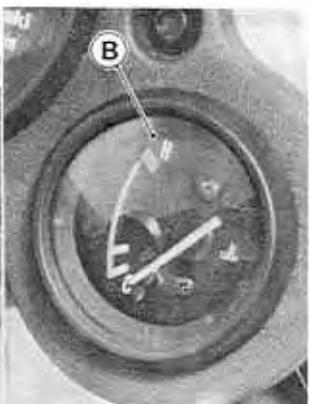
CAUTION

Do not ground the wiring longer than necessary. After the pointer swings to the H position, stop the test. Otherwise the gauge could be damaged.

- ★ If these readings are not correct, the trouble is with the gauge and/or wiring.



A. Sensor Connector



B. Water Temperature Gauge

- Prepare an auxiliary wire, and check the operation of the gauge.
- 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 gauge is defective.

Gauge Operation Test

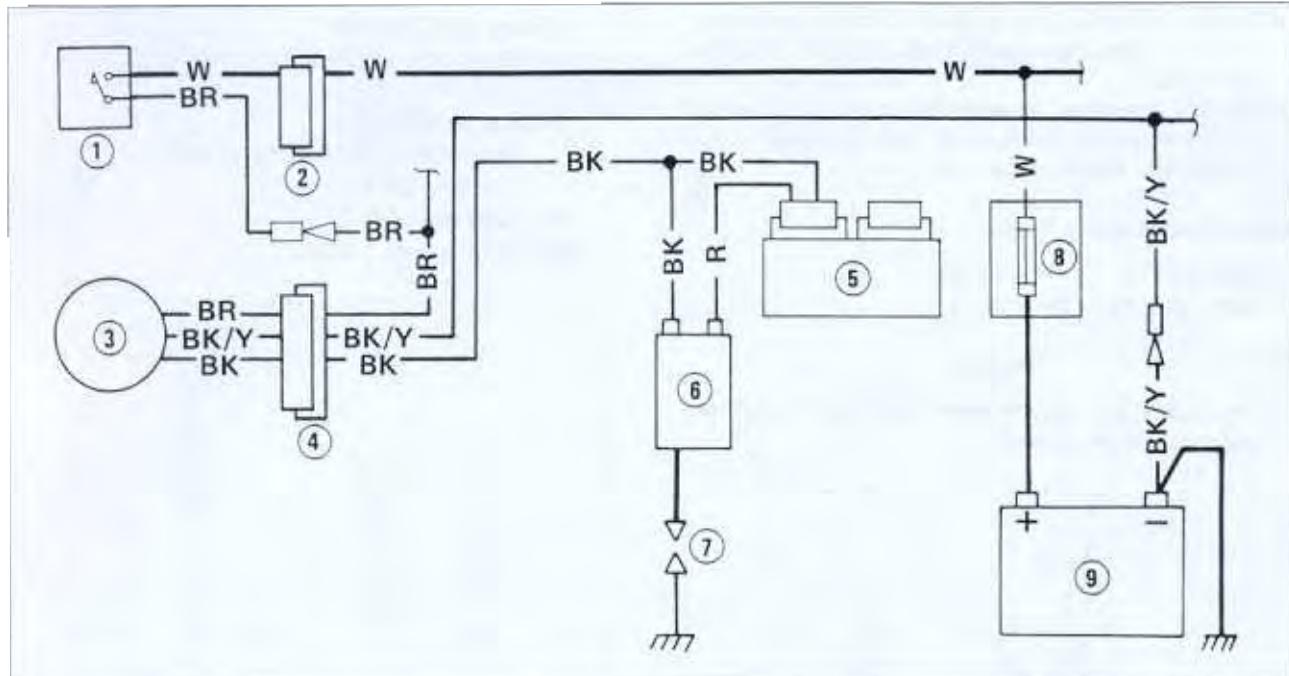
Ignition Switch Position: ON

Wire Location: Water temperature sensor female connector (disconnected)

Results: Gauge should read C when sensor wire is opened.

Gauge should read H when sensor wire is grounded to engine.

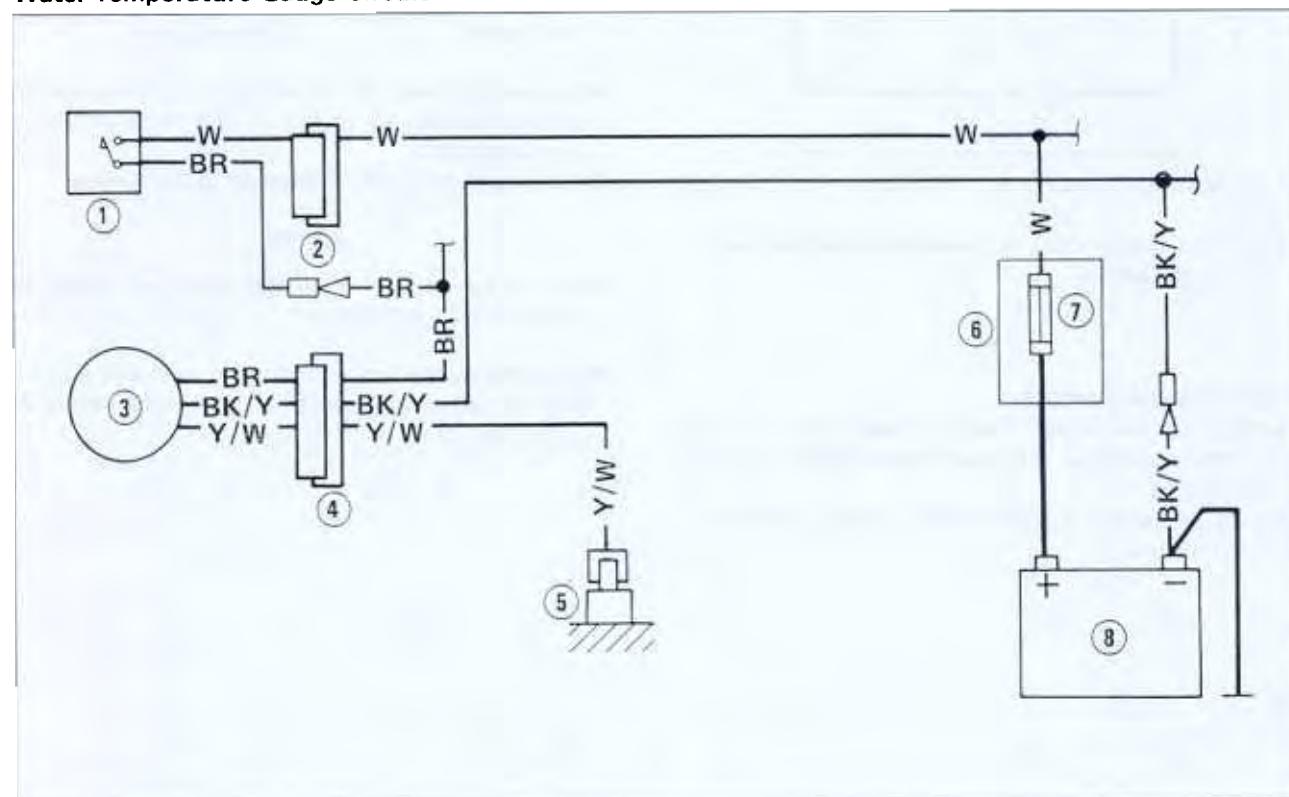
Tachometer Circuit



1. Ignition Switch
2. 6-Pin Connector
3. Tachometer
4. 4-Pin Connector
5. IC Igniter

6. Ignition Coil (#1, #4)
7. Spark Plug
8. 30A Main Fuse in Starter Relay
9. Battery

Water Temperature Gauge Circuit



1. Ignition Switch
2. 6-Pin Connector
3. Water Temperature Gauge
4. 6-Pin Connector

5. Water Temperature Sensor
6. Starter Relay
7. 30A Main Fuse
8. Battery

15-34 ELECTRICAL SYSTEM

Water Temperature Sensor Inspection

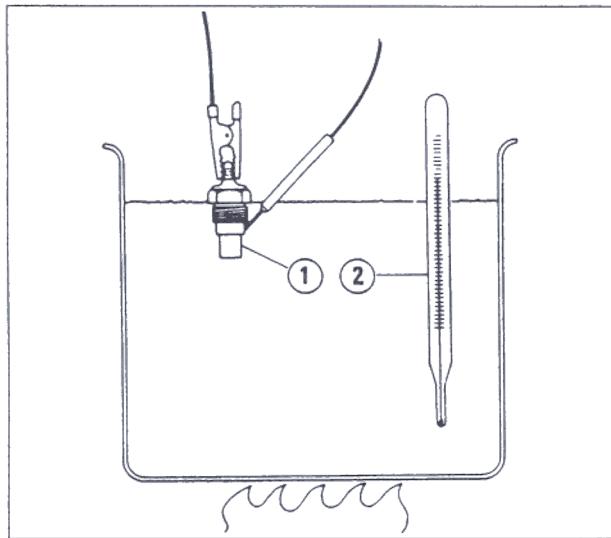
- Suspend the sensor in a container of coolant so that the temperature sensing projection and threaded portion are submerged.
- Using an ohmmeter, measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.

Water Temperature Sensor

80°C (175°F): 47 ~ 57 Ω
100°C (212°F): 25 ~ 30 Ω

NOTE

- The sensor and thermometer must not touch the container sides or bottom.



1. Water Temperature Sensor 2. Thermometer

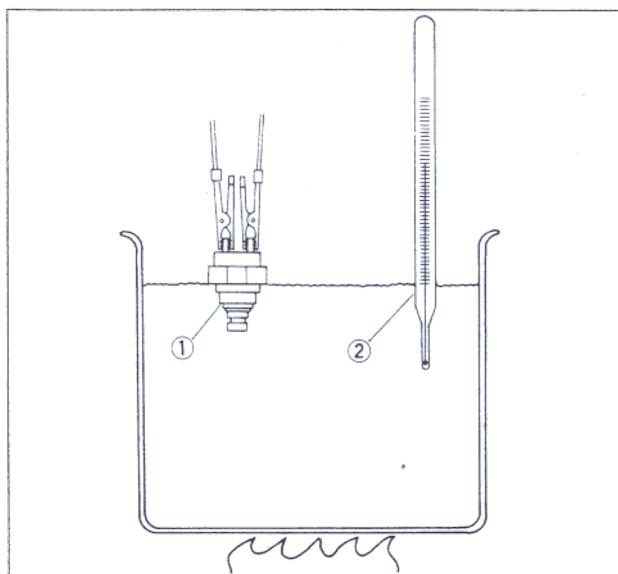
- ★ If the ohmmeter does not show the specified values, replace the sensor.

Fan 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 or replace it with new one.

Fan Switch Resistance

- Rising temperature:
From OFF to ON at 93~103°C
(199~217°F)
- Falling temperature:
From ON to OFF at 91 ~ 95°C
(196~ 203°F)
ON : Less than 0.5 Ω
OFF : More than 1 M Ω



1. Fan Switch

- Suspend the switch in a container of coolant so that the temperature-sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer in the coolant.

NOTE

- The switch and thermometer must not touch the container sides or bottom.

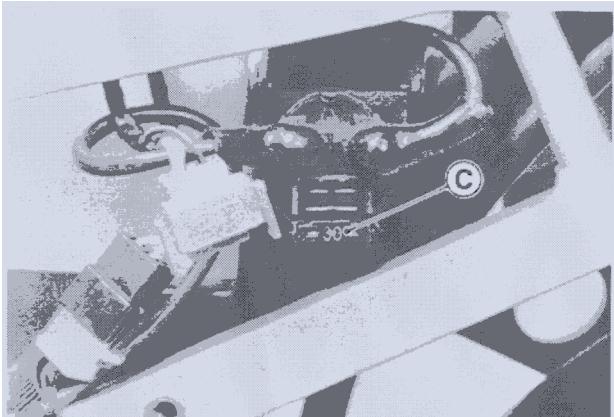
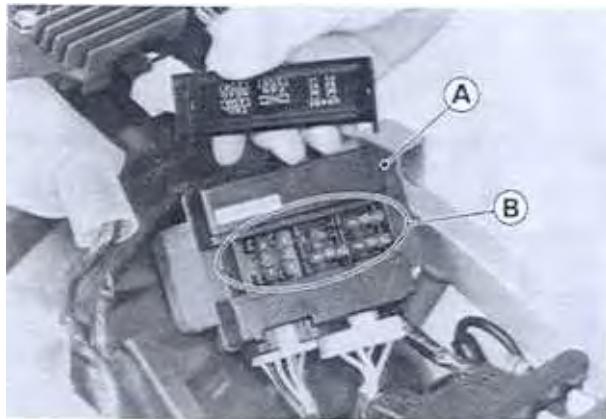
- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.

Junction Box

The junction box has fuses, relays, and diodes. The relays and diodes can not be removed.

Fuse Removal

- Remove the seats (see Frame chapter).
- Unlock the hook to lift up the locking arm.
- Pull the fuses straight out of the junction box with needle nose pliers.
- Pull out the main fuse from the starter relay.



A. Junction Box
B. Fuses

C. Main Fuse

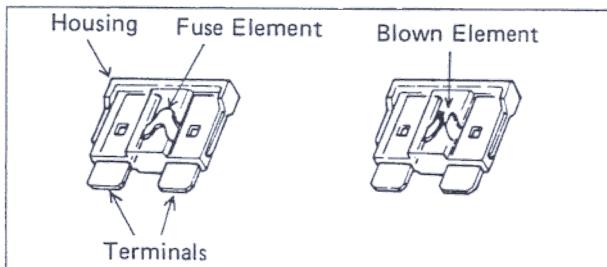
Fuse Inspection

- Remove the fuse (see Fuse Removal).
- 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.

Fuse



Junction Box Fuse Circuit Inspection

- Remove the junction box (see Fuse Removal).
- Pull off the 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 numbered terminals with the hand tester (special tool).
- ★ If the tester does not read as specified, replace the junction box.

Fuse Circuit Inspection

Meter Connection	Meter Reading (Ω)
1 – 2	0
1 – 3B	0
6 – 7	0
6 – 17	0
1 – 7	∞
8 – 17	∞

Fuse Installation

- ★ If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.

15-36 ELECTRICAL SYSTEM

Starter Circuit

- Remove the junction box (see Fuse Removal).
- Check conductivity of the following numbered terminal by connecting the hand tester (special tool) and one 12 V battery to the junction box as shown.
- ★ If the relay does not work as specified, replace the junction box.

Relay Circuit Inspection (with the battery disconnected)

Meter Connection	Meter Reading
11 – 13	∞
12 – 13	∞

Relay Circuit Inspection (with the battery connected)

Meter Connection	Battery Connection + -	Meter Reading (Ω)
11 – 13	11 – 12	0

Diode Circuit Inspection

- Remove the junction box from the motorcycle.
- Pull off the connectors from the junction box.
- Check conductivity of the following pair of terminals.

Terminals for Diode Circuit Inspection

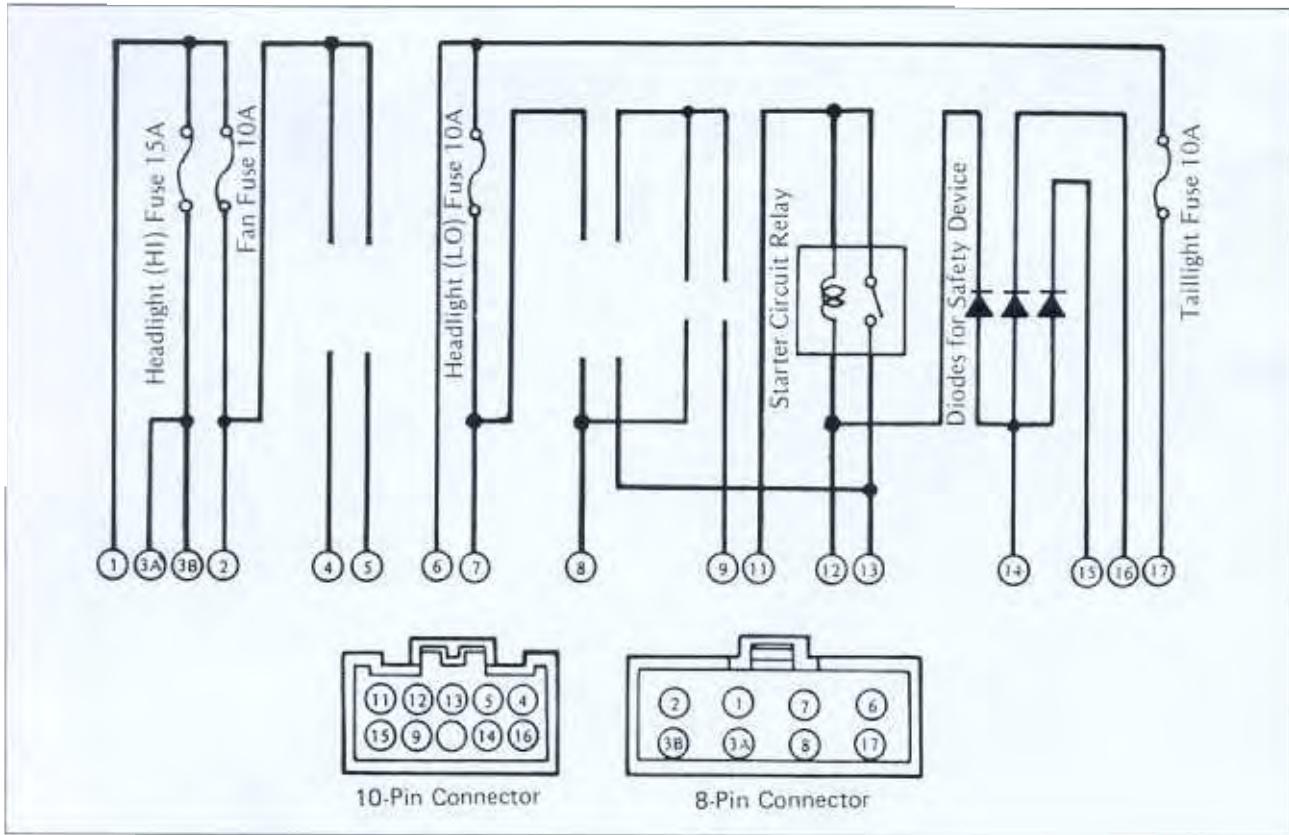
14-12, 14-15, 14-16

- ★ 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 junction box must be replaced.

NOTE

- *The actual meter reading varies with the meter used and the individual diodes, but, generally speaking, the lower reading should be from zero to one half the scale.*

Junction Box Internal Circuit



Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully.
If it is damaged, replace it.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect an ohmmeter between the ends of the leads.
- Set the meter to the $\times 1 \Omega$ range, and read the meter.
- ★ If the meter does not read 0Ω , the lead is defective.
Replace the lead or the wiring loom if necessary.

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Additional Considerations for Racing

This motorcycle has been manufactured for use in a reasonable and prudent manner and as a vehicle only. However, some may wish to subject this motorcycle to abnormal operation, such as would be experienced under racing conditions. **KAWASAKI STRONGLY RECOMMENDS THAT ALL RIDERS RIDE SAFELY AND OBEY ALL LAWS AND REGULATIONS CONCERNING THEIR MOTORCYCLE AND ITS OPERATION.**

Racing should be done under supervised conditions, and recognized sanctioning bodies should be contacted for further details. For those who desire to participate in competitive racing or related use, the following technical information may prove useful. However, please note the following important notes.

- You are entirely responsible for the use of your motorcycle under abnormal conditions such as racing, and Kawasaki shall not be liable for any damages which might arise from such use.
- Kawasaki's Limited Motorcycle Warranty and Limited Emission Control Systems Warranty specifically exclude motorcycles which are used in competition or related uses. Please read the warranty carefully.
- Motorcycle racing is a very sophisticated sport, subject to many variables. The following information is theoretical only, and Kawasaki shall not be liable for any damages which might arise from alterations utilizing this information.
- When the motorcycle is operated on public roads, it must be in its original state in order to ensure safety and compliance with applicable regulations.

Carburetor:

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

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

Spark Plug:

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

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

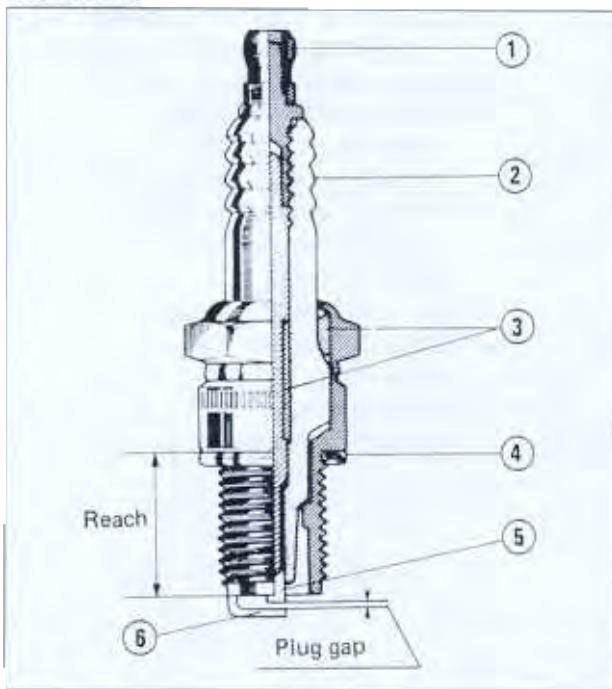
Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of the correct heat range is used should be determined by removing and inspecting the plug.

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

A spark plug for higher operating temperatures is used for racing. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a "colder" plug. If a spark plug with too cool a heat range is used – that is, a "cold" plug that cools itself too well – the plug will stay too cool to burn 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 Condition

Carbon Fouling



Oil Fouling



Normal Operation



Overheating

Spark Plug Inspection

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

Standard Spark Plug Threads

Diameter:	10 mm
Pitch:	1.0 mm
Reach:	19 mm

NOTE

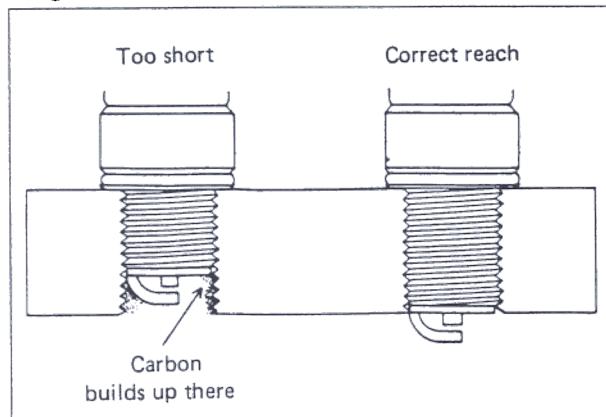
- The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling).

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 type electrode (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

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

No fuel flow:

- 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/groove clearance excessive

- Cylinder head gasket damaged

- Cylinder head warped

- Valve spring broken or weak

- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:**Spark weak:**

- 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/groove 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

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 needle jet holder or needle jet clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner duct poorly sealed
- Water or foreign matter in fuel
- Carburetor holder loose
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Fuel filter clogged

Compression low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, 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
- Vacuum piston doesn't slide smoothly
- Brake dragging
- Clutch slipping
- Overheating
- Engine oil level too high
- Engine oil viscosity too high
- Drive train 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 slave cylinder trouble
- Clutch hub or housing unevenly worn

Clutch not disengaging properly:

- Clutch plate warped or too rough
- Clutch spring compression 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

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
- Shift return spring weak or broken
- Shift return spring pin loose

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Pawl spring broken
Shift mechanism arm broken

Jumps out of gear:

Shift fork worn
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Neutral positioning pin spring weak or broken
Shift fork pin worn
Drive shaft, output shaft, and/or gear splines worn

Overshifts:

Neutral positioning lever spring weak or broken
Pawl 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 pin hole 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

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 passage 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 to 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 O-ring damaged
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 bearings worn
 Rim warped, or not balanced
 Wheel bearing worn
 Handlebar mounting bolt loose
 Steering stem head nut loose

Handlebar pulls to one side:

Frame bent
 Wheel misalignment
 Swing arm bent or twisted
 Steering maladjusted
 Front fork bent
 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 adjustment too hard
 Rear shock adjustment too soft
 Tire air pressure too high
 Front fork anti-dive mechanism trouble
 Front fork bent
 (Too soft)
 Front fork oil insufficient and/or leaking
 Front fork oil viscosity too low
 Front fork air pressure too low
 Front fork, rear shock absorber spring weaken
 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 leakage
 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
 Regulator/Rectifier trouble

Battery Overcharged:

Regulator/Rectifier trouble

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

Side Stand
 Clutch Lever
 Brake Lever
 Brake Pedal

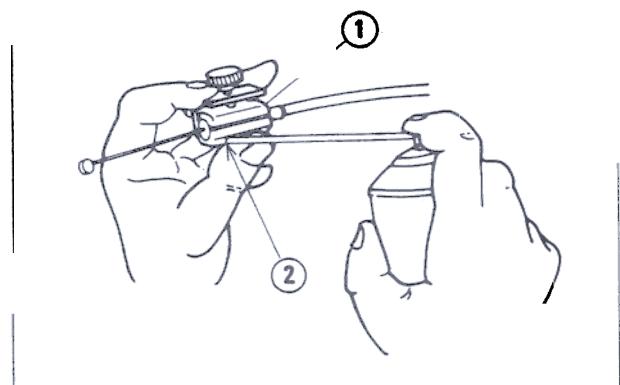
Points: Lubricate with Grease.

Throttle Inner Cable Lower End
 Speedometer Inner Cable*

*Grease the lower part of the inner cable sparingly.

Cables: Lubricate with Cable Lubricant

Choke Cable
 Throttle Cables
 Clutch Cable

Cable Lubrication

1. Cable

2. Pressure Cable Luber: K56019-021

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 1/2 turn, then tighten it.

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

Nut, bolt and fastener to be checked

Wheels:

Front Axle Nut
Front Axle Clamp Bolts
Rear Axle Nut
Chain Adjusting Bolt Locknut

Brakes:

Front Master Cylinder Clamp Bolts
Caliper Mounting Bolts
Rear Master Cylinder Mounting Bolts
Rear Caliper Mounting Bolts
Torque Link Nuts
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 Nuts
Swing Arm Pivot Shaft Nut
Uni-Trak Link Nuts

Steering:

Stem Head Nut
Handlebar Mounting Bolts

Engine:

Engine Mounting Bolts
Cylinder Head Bolts
Muffler Connecting Pipe Clamp Bolts
Muffler Mounting Bolt and Nut
Muffler Connecting Clamp Bolts
Clutch Lever Pivot Nut

Others:

Side Stand Bolt
Front Footpeg Mounting Bolts
Footpeg Bracket Mounting Bolts
Down Tube Mounting Bolts

Standard Torque Table

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

General Fasteners

Threads dis. (mm)	Torque		
	N-m	kg-m	ft-lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in-lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in-lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

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 0.00001

Units of Mass:

kg	x	2.205	=	lb
g	x	0.03527	=	oz

Units of Volume:

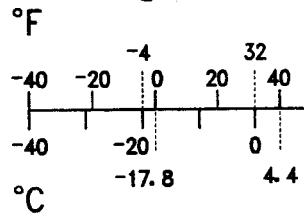
L	x	0.2642	=	gal (US)
L	x	0.2200	=	gal (imp)
L	x	1.057	=	qt (US)
L	x	0.8799	=	qt (imp)
L	x	2.113	=	pint (US)
L	x	1.816	=	pint (imp)
mL	x	0.03381	=	oz (US)
mL	x	0.02816	=	oz (imp)
mL	x	0.06102	=	cu in

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 Temperature:

$$\frac{9(\text{ }^{\circ}\text{C}+40)}{5}-40=\text{ }^{\circ}\text{F}$$

**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

$$\frac{5(\text{ }^{\circ}\text{F}+40)}{9}-40=\text{ }^{\circ}\text{C}$$

