

# 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

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### Before Servicing

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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 Loctite Lock'n Seal (Blue).

**(10) Press**

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

**(11) Ball Bearing**

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

**(12) Oil Seal and Grease Seal**

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

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

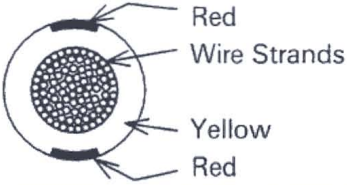
**(16) Lubrication**

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 ( $\text{MoS}_2$ ) 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.

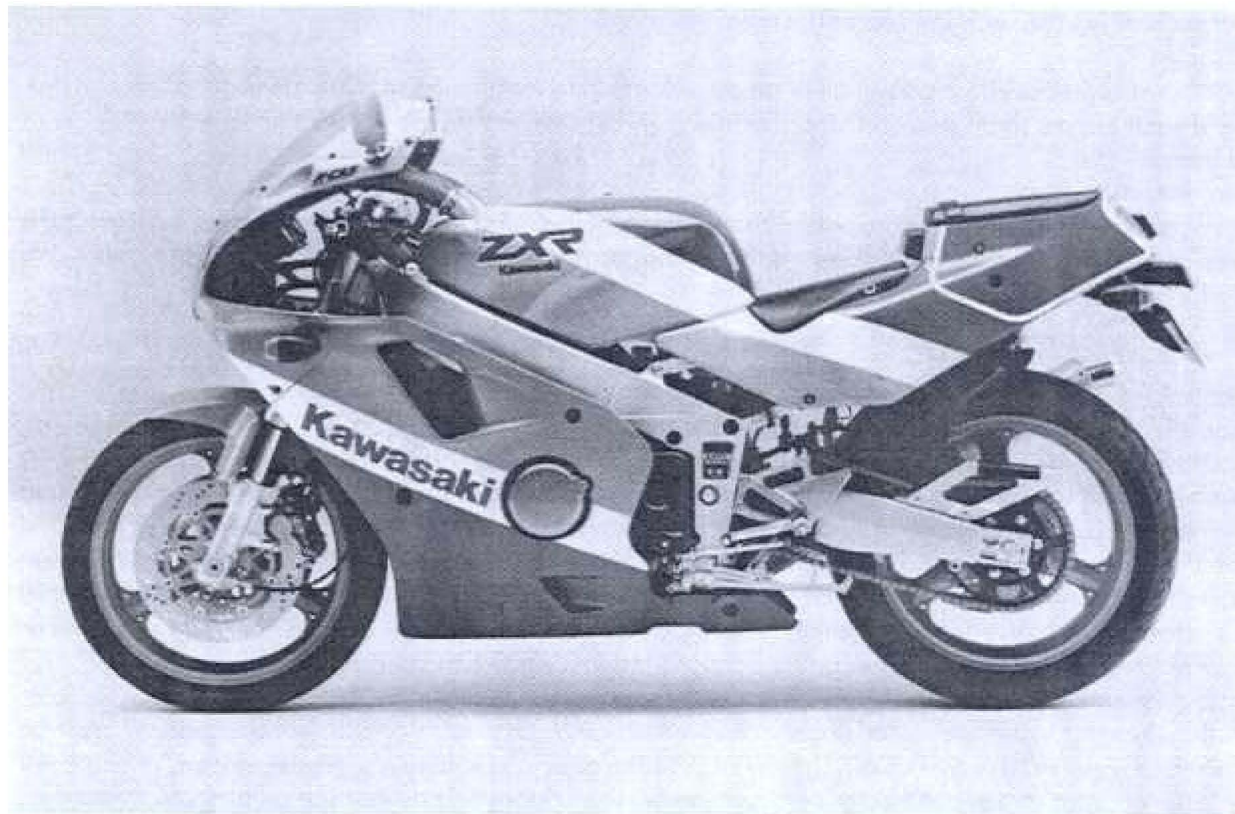
## 1-4 GENERAL INFORMATION

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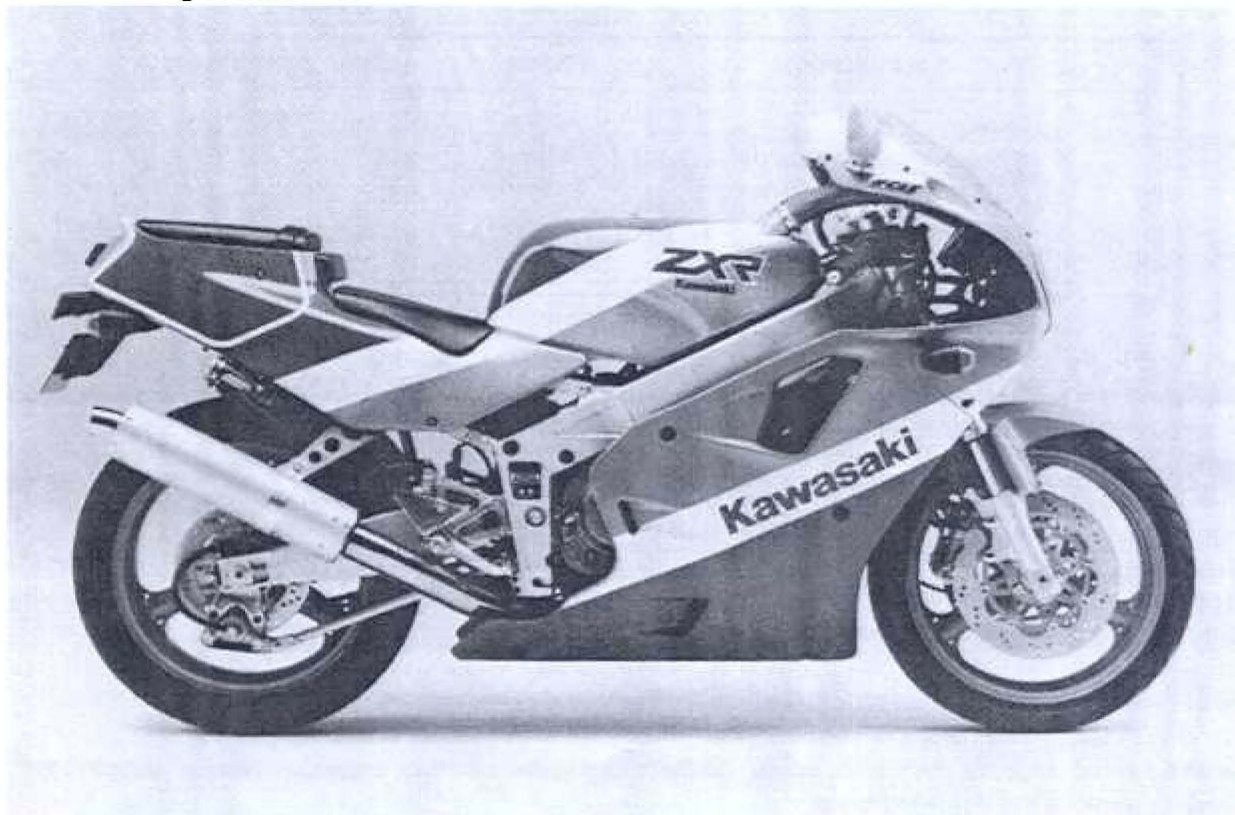
### Model Identification

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**ZX400-H2 Left Side View:**



**ZX400-H2 Right Side View:**



## General Specifications

Items	ZX400-H2
<b>Dimensions:</b>	
Overall length	2 035 mm, (I) 2 050 mm,
Overall width	705 mm
Overall height	1 125 mm
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
<b>Performance:</b>	
Braking distance	13.5 m from 50 km/h
Minimum turning radius	3.2 m
<b>Engine:</b>	
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
<b>Drive Train:</b>	
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:		
	Type	Chain drive
	Reduction ratio	3.000 (45/15)
	Overall drive ratio	7.317 @Top gear
<b>Frame:</b>		
	Type	Tubular, diamond
	Caster (rake angle)	24°
	Trail	85 mm
Front tire:	Size, type	120/60 VR17 TUBELESS
	Mark	DUNLOP K510F
		BRIDGESTONE CYROX-17
Rear tire:	Size, type	160/60 VR17 TUBELESS
	Mark	DUNLOP K510
		BRIDGESTONE CYROX-16
Front suspension:	Type	Telescopic fork
	Wheel travel	120 mm
Rear suspension:	Type	Swing arm (uni-trak)
	Wheel travel	140 mm
Brake type:	Front	Dual discs
	Rear	Single disc
<b>Electrical Equipment:</b>		
	Battery	12 V 10 Ah
Headlight:	Type	Semi-sealed beam
	Bulb	Quartz-halogen 12 V 60/55 W x 2,
		12 V 5/21 W x 2
Tail/brake light		
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	
<b>Cooling System:</b>				
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	
<b>Engine Top End:</b>				
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	
<b>Clutch</b>				
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	
<b>Engine Lubrication System:</b>				
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

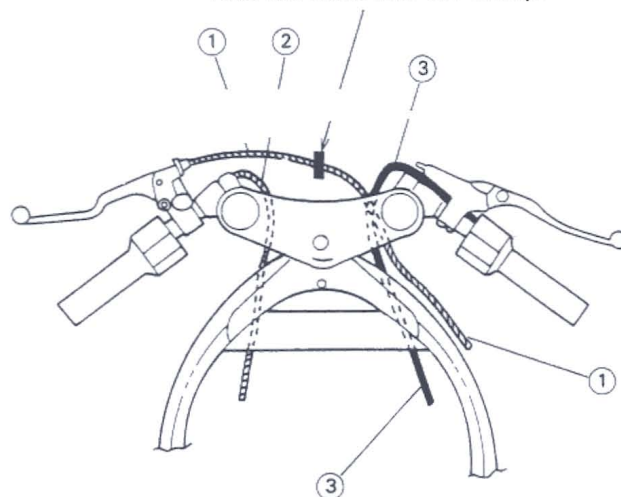
Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Oil Pressure Switch Terminal	1.5	0.15	13 in-lb	SS
Oil Pressure Switch	15	1.5	11.0	
Oil Pump Cover Screws	4.4	0.45	39 in-lb	
Oil Plug (Right, M18)	15	1.5	11.0	SS
Oil Plug (Left, PT $\frac{3}{8}$ )	17	1.75	12.5	
Oil Cooler Pipe Fitting Bolt	12	1.2	8.5	
Oil Pan Bolts	12	1.2	8.5	
<b>Engine Removal/Installation:</b>				
Engine Mounting Bracket Bolt	30	3.1	22	
Engine Mounting Bolts	36	3.7	27	
<b>Crankshaft/Transmission:</b>				
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 $\phi 6$	12	1.2	8.5	
$\phi 8$	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	
<b>Wheels/Tires:</b>				
Front Axle Clamp Bolts	20	2.0	14.5	
Front Axle Nut	110	11.0	80	
Rear Axle Nut	110	11.0	80	
<b>Final Drive:</b>				
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
<b>Brakes:</b>				
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	
<b>Suspensions:</b>				
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	L
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	
<b>Steering:</b>				
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	
<b>Frame:</b>				
Fairing Inner Cover Mounting Screws	—	—	—	L (engine side)
Side Stand Bracket Bolts	31	3.2	23	L
<b>Electrical System:</b>				
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	
<b>Alternator</b>				
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	

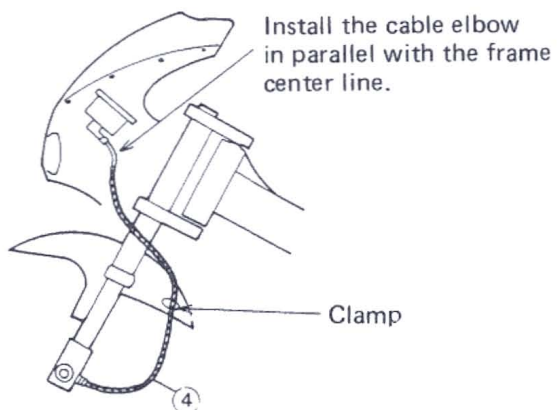
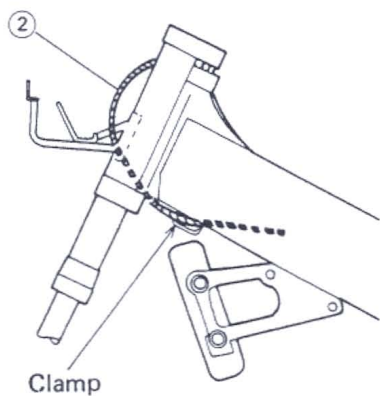
## 1-12 GENERAL INFORMATION

### Cable, Wire, and Hose Routing

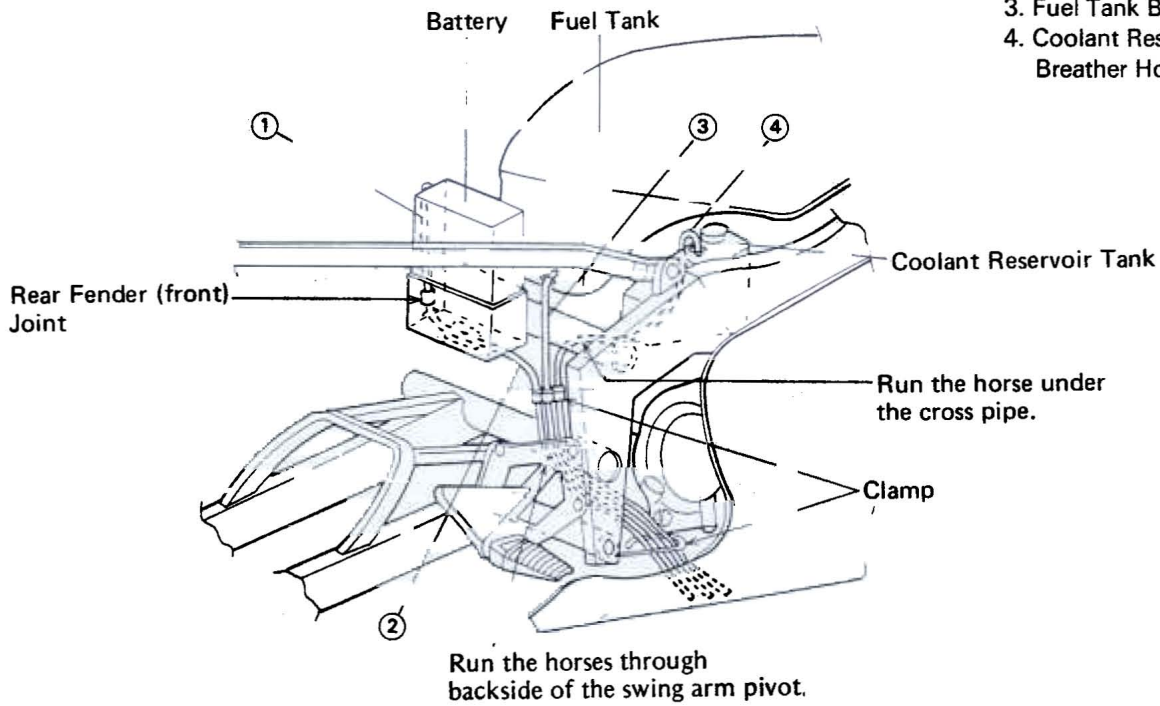
Run the cable into the clamp.



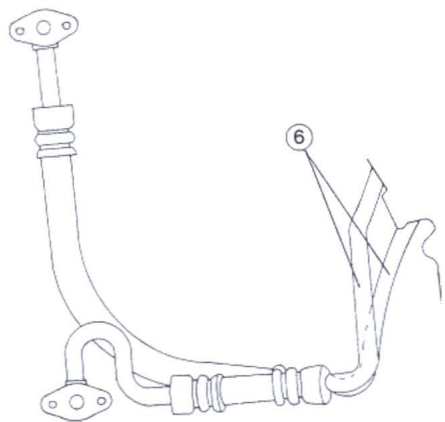
- 1. Clutch Cable
- 2. Choke Cable
- 3. Throttle Cable
- 4. Speedometer Cable



1. Battery Vent Hose (Transparent)
2. Battery Vent Hose (Black)
3. Fuel Tank Breather Hose
4. Coolant Reservoir Tank Breather Hose

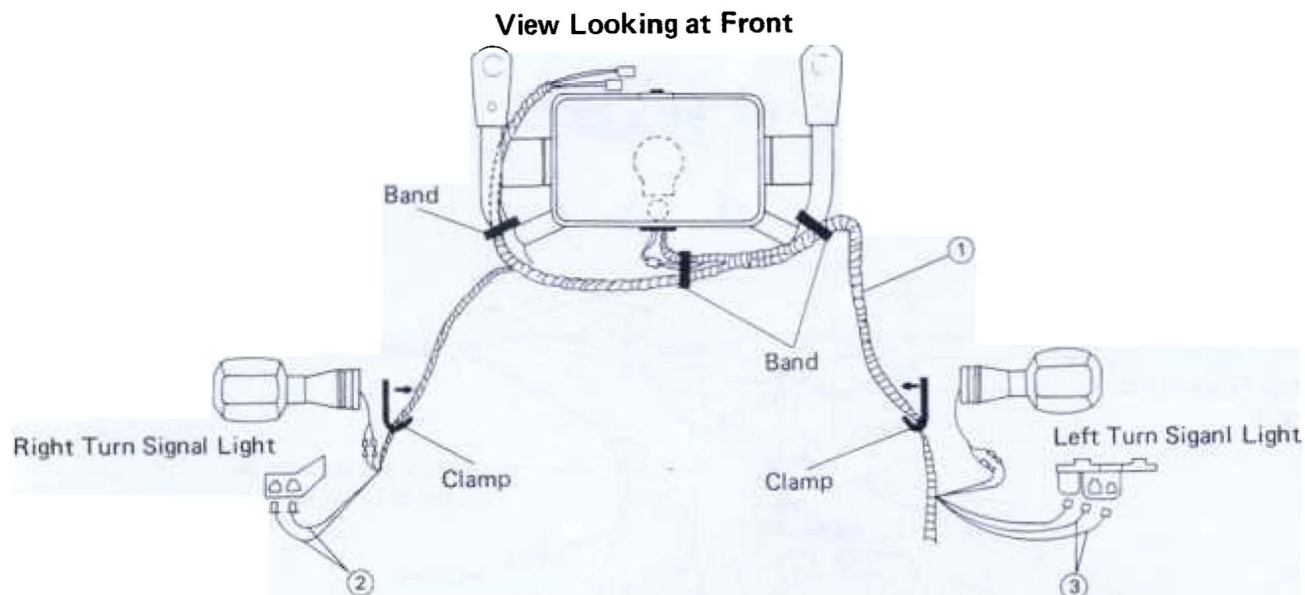


View Looking at Top



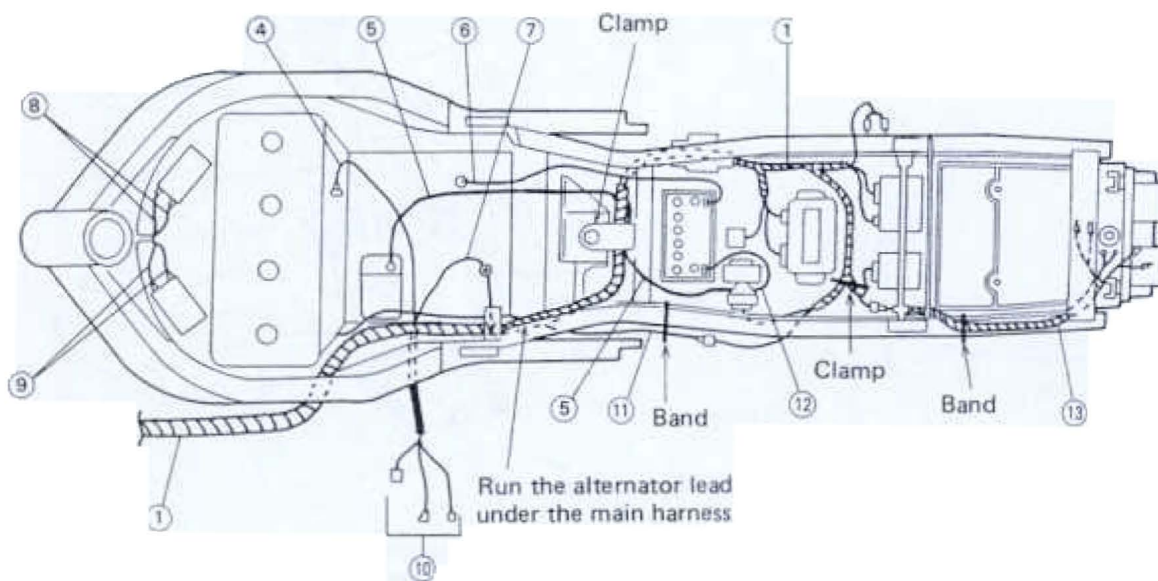
5. Coolant Reservoir Hose
6. Oil Cooler Pipe
7. Fuel Hose (from Fuel Pump to Carburetor)

## 1-14 GENERAL INFORMATION



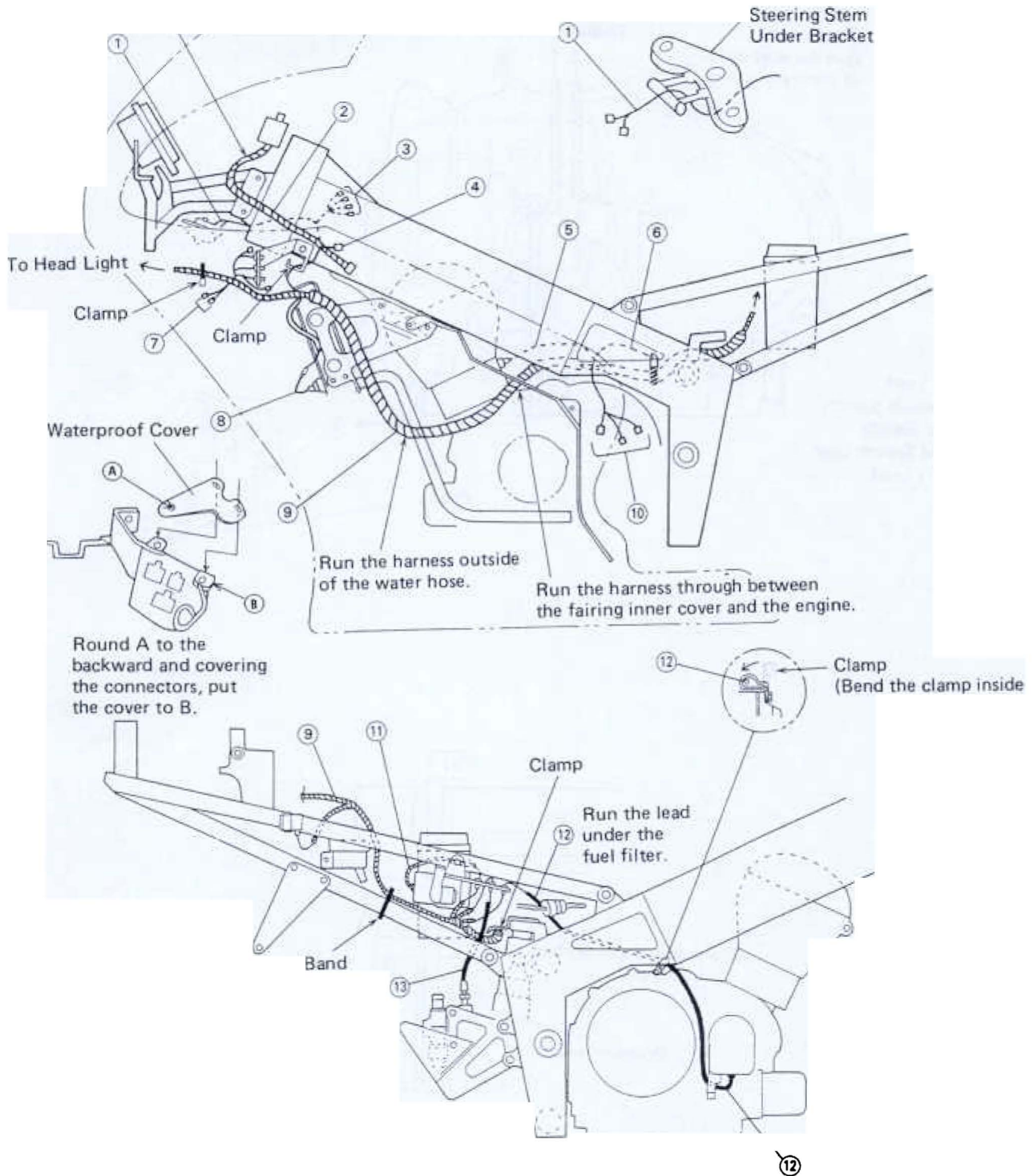
- 1. Main Harness
- 2. To Right Grip Switch
- 3. To Left Grip Switch
- 4. To Water Temperature Sensor
- 5. Starter Motor lead

- 6. Battery (-) Lead
- 7. Ground Lead
- 8. To Ignition Coil (#1, #4)
- 9. To Ignition Coil (#2, #3)



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

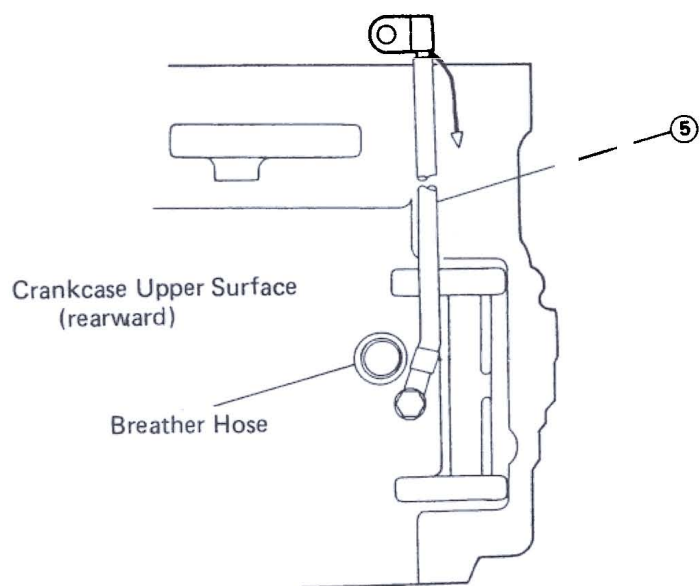
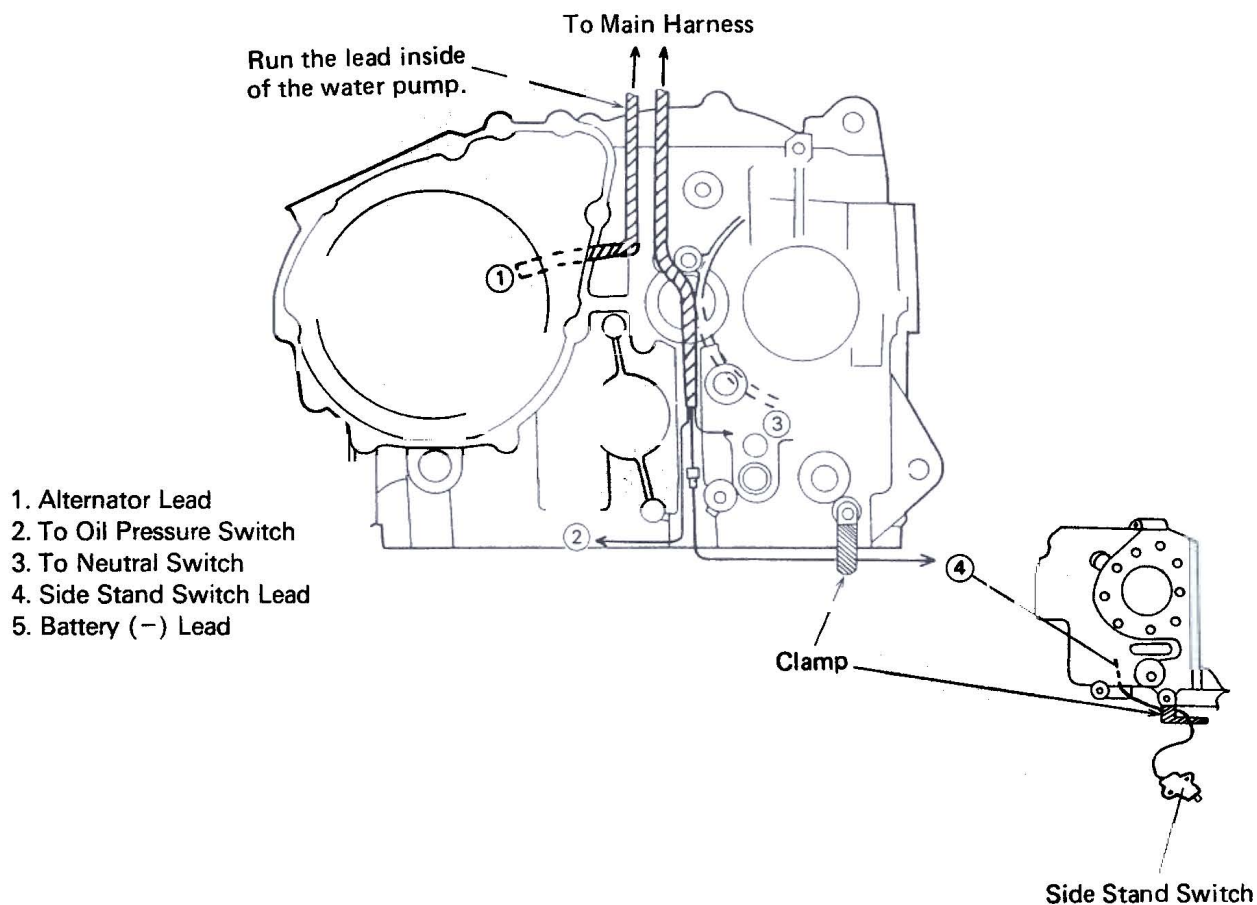
Run the lead over the fairing stay.



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



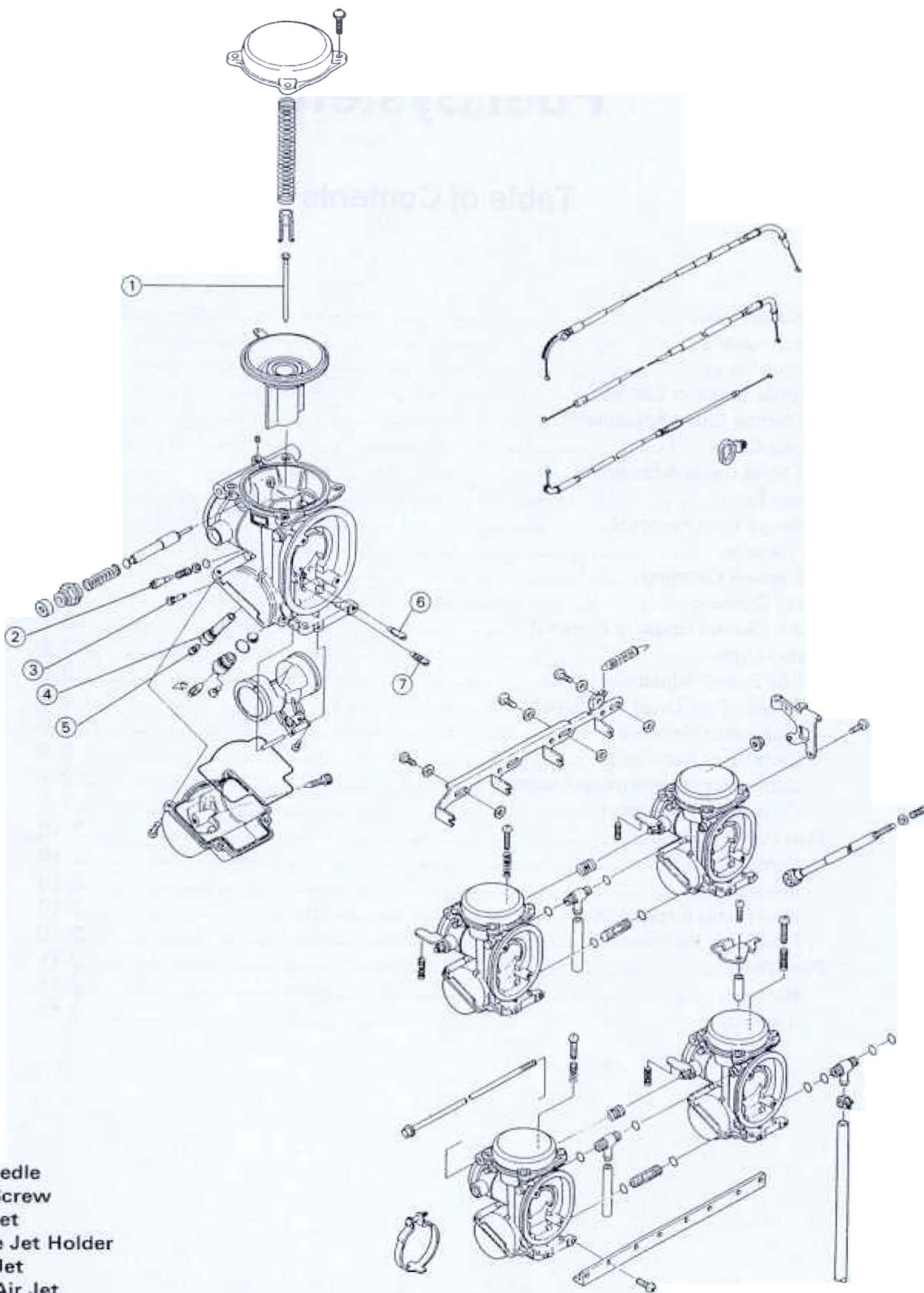
# Fuel System

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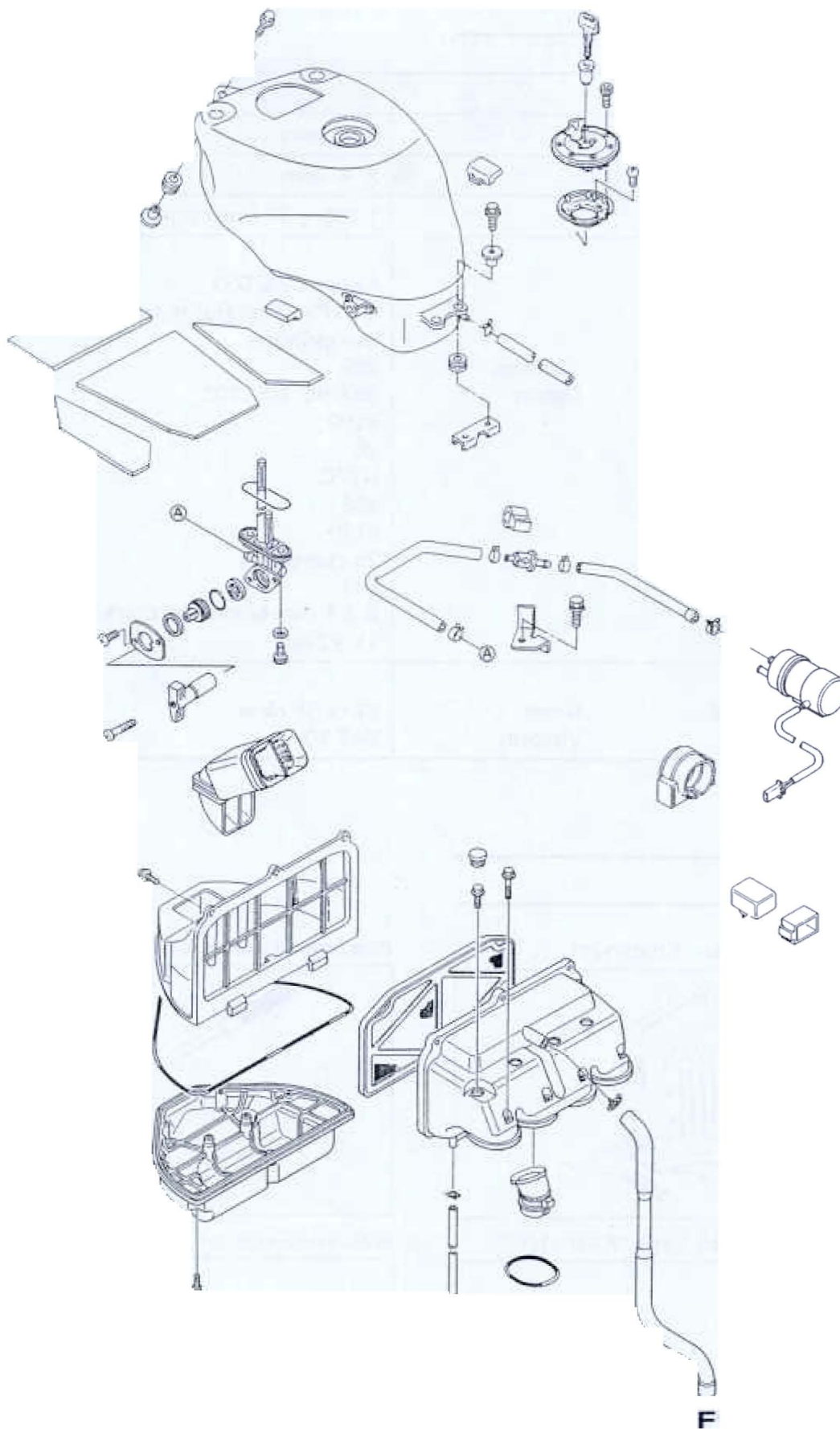
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## 2-2 FUEL SYSTEM

### 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



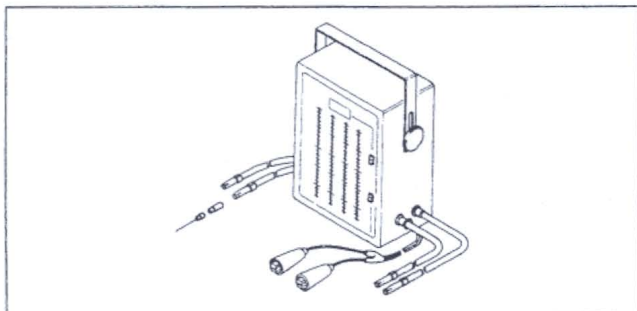
## 2-4 FUEL SYSTEM

### Specifications

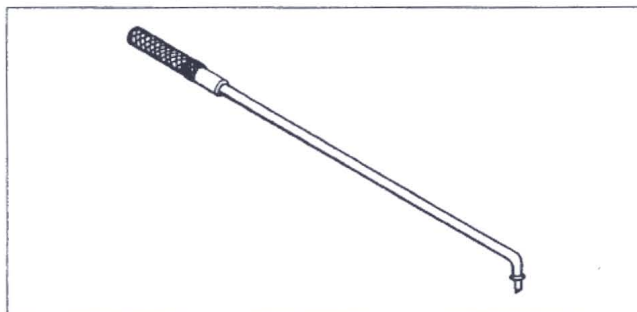
Item	Standard
Throttle Grip Free Play	2 ~ 3mm
Choke Cable Free Play	2 ~ 3mm
Idle Speed	1 200 ± 50 r/min (rpm)
<b>Carburetor Specifications:</b> Make/type Synchronization vacuum  Main jet Main air jet Needle jet Jet needle mark Pilot jet (slow jet) Pilot air jet Pilot screw Starter jet Service fuel level Float height	Keihin/CVK-D32 2.7 kPa (2 cm Hg) or less difference between two cylinders #98 #92, 95, 100, 102 #100 #6 N77C #35 #120 2¼ (turns out) #45 8 ± 1 mm below the mark 11 ± 2 mm
<b>Air Cleaner:</b> Air cleaner element oil: Grade Viscosity	SE or SF class SAE 30

### Special Tools

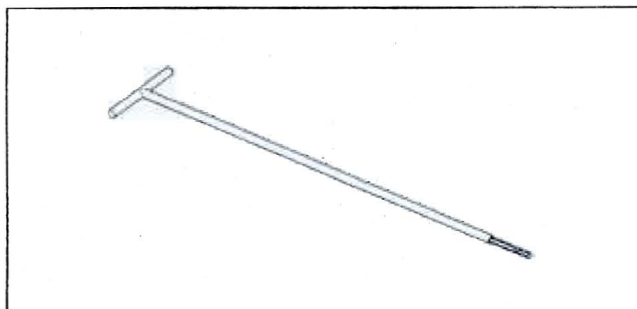
Vacuum Gauge & Tachometer: 57001-1291



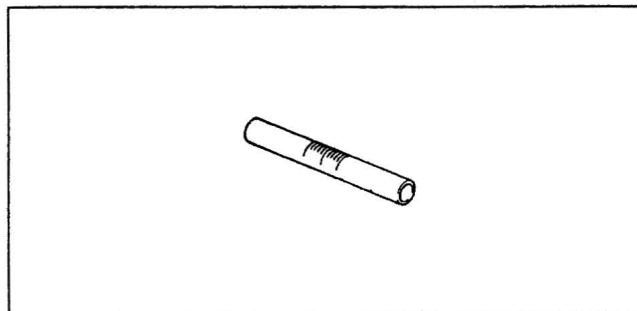
Pilot Screw Adjuster, A: 57001-1239



Carburetor Drain Plug Wrench, Hex 3: 57001-1269



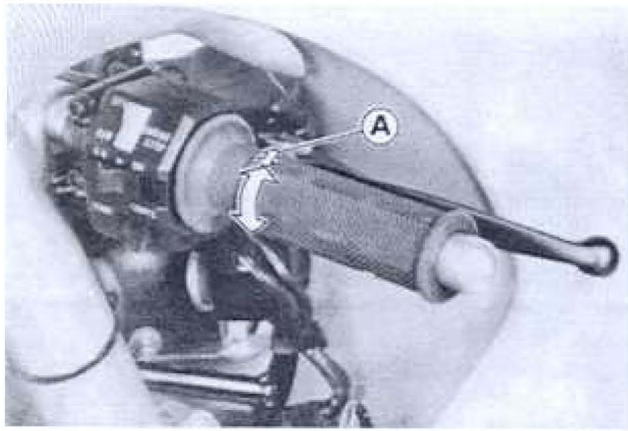
Fuel Level Gauge: 57001-1017



## Throttle Grip and Cables

### Throttle Cable Adjustment

- Check throttle grip free play.

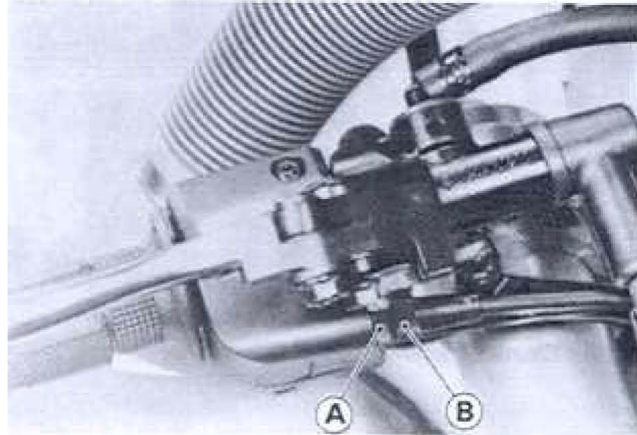


A. Throttle Grip Free Play

### Throttle Grip Free Play

Standard: 2 ~ 3 mm

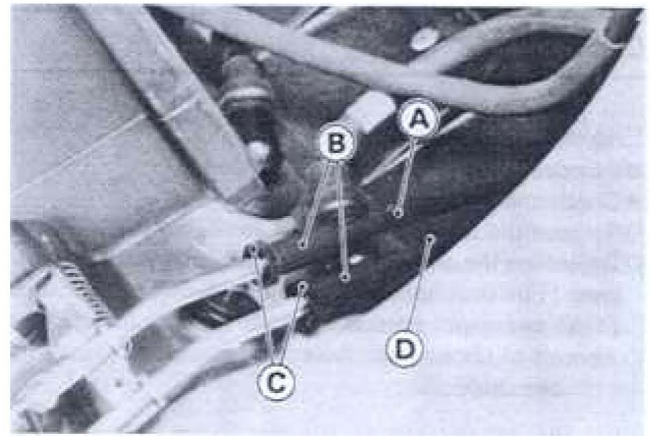
- ★ If the free play is incorrect, loosen the locknut and turn the adjuster of the accelerator cable until the proper amount of throttle grip play is obtained.



A. 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.



A. Accelerator Cable

B. Adjuster

C. Locknut

D. Decelerator Cable

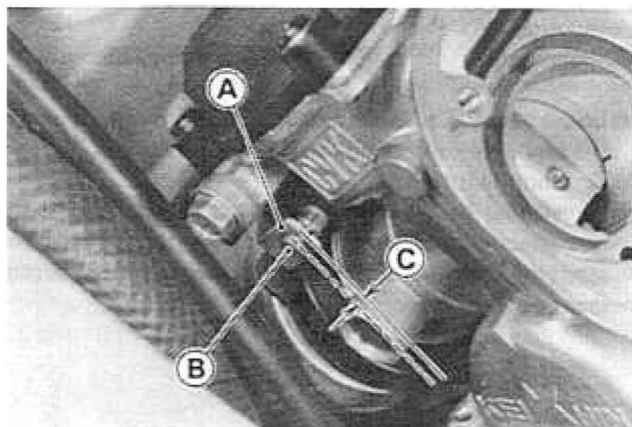
- Loosen all the adjuster and slide both throttle cables at the carburetor to obtain the specified free play.
- Tighten the locknuts.
- Check that the throttle linkage lever stops against the idle adjusting screw with the throttle grip released and stops against the carburetor stopper with the throttle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

## 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.

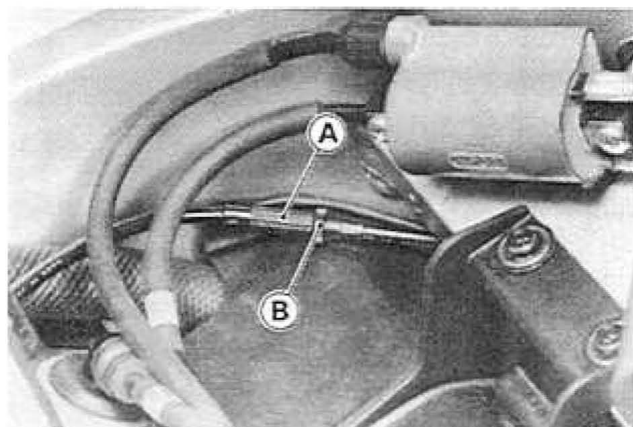


A. Starter Plunger Lever      C. Play  
B. Starter Plunger

#### Choke Cable Play

Standard:      2 ~ 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.



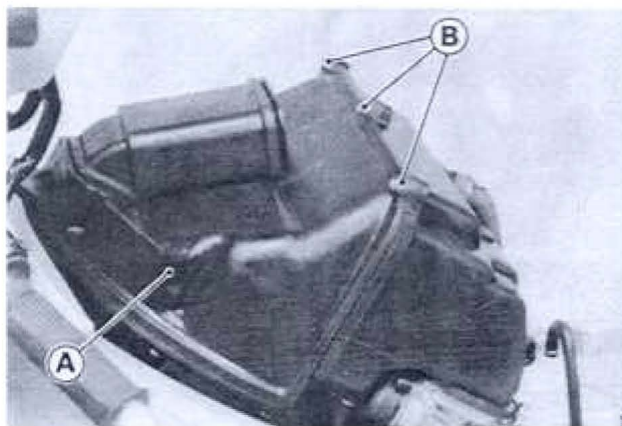
A. Adjuster      B. Locknut

- Tighten the locknut against the adjuster securely.

### Surge Tank

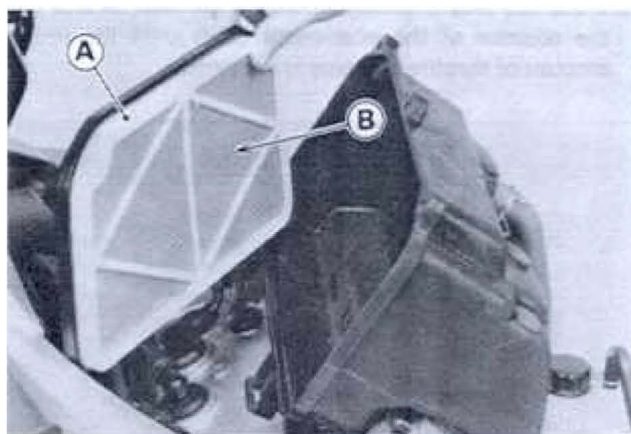
#### Surge Tank Removal

- 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

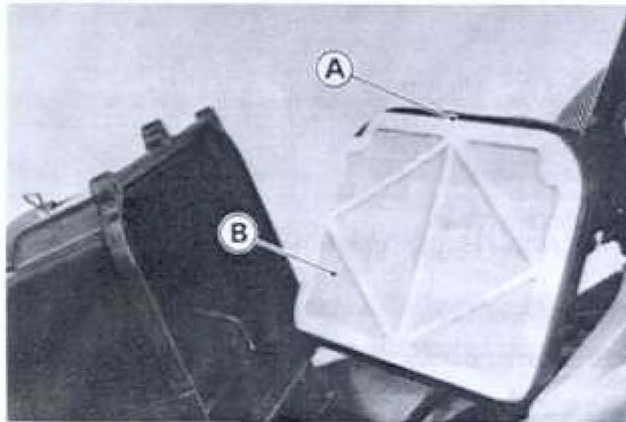
## Air Cleaner

### 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

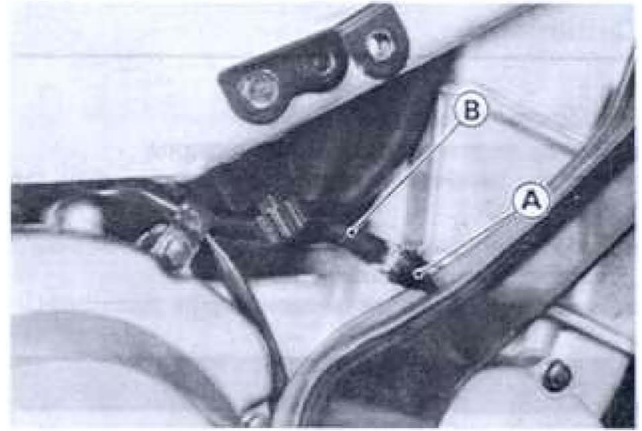
If dirt or dust is allowed to pass through into the carburetors, the throttle may become stuck, possibly causing accident.

- 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 hose 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.

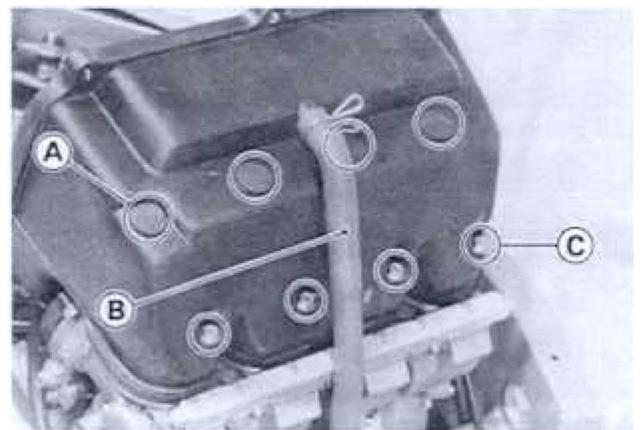


A. Plug

B. Drain Hose

### Air Cleaner Housing Removal

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



A. Plugs and Bolts

C. Bolts

B. Crankcase Breather Hose

## 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

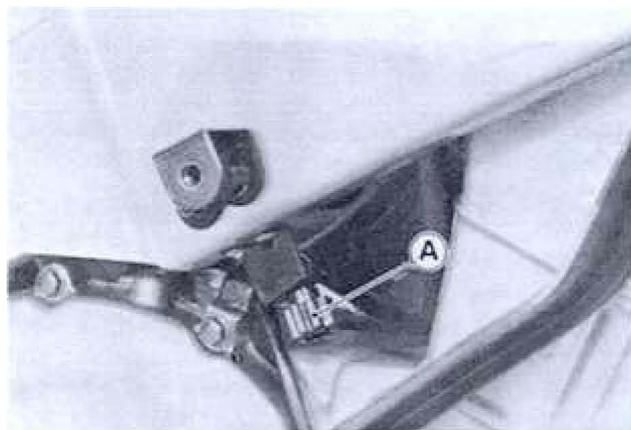
Operation with an improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.

- Check idle speed.

#### Idle Speed

Standard: 1200  $\pm$  50 r/min (rpm)

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



A. Idle Adjusting Screw

#### Service Fuel Level Adjustment

#### ⚠ WARNING

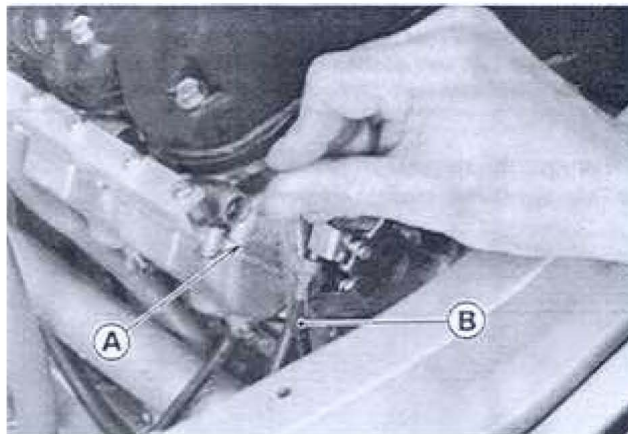
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- 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.



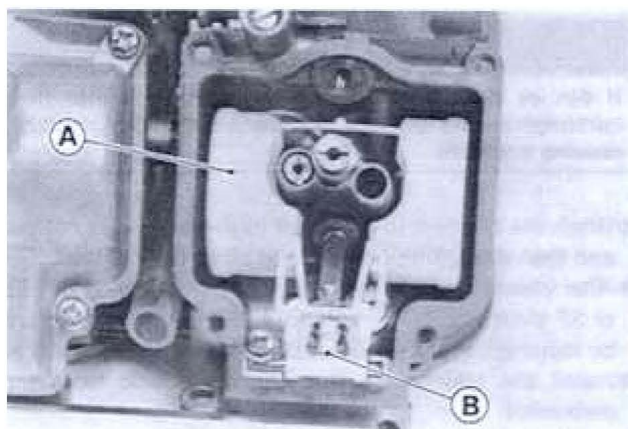
A. Fuel Level Mark

B. Fuel Level Gauge: 57001-1017

#### Service Fuel Level

8  $\pm$  1 mm below the mark on the carburetor body

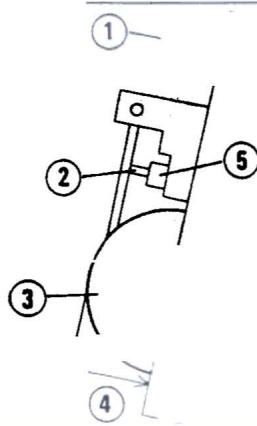
- To adjust the fuel level, remove the float bowl, and bend the tang on the float arm to change the float height.



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.

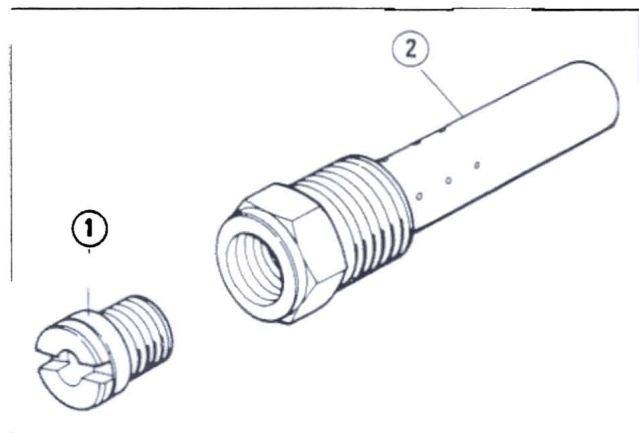
#### Carburetor Disassembly/Assembly

##### ⚠ 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

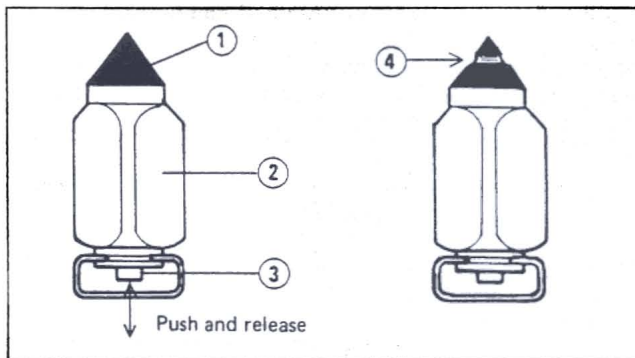
##### ⚠ WARNING

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.

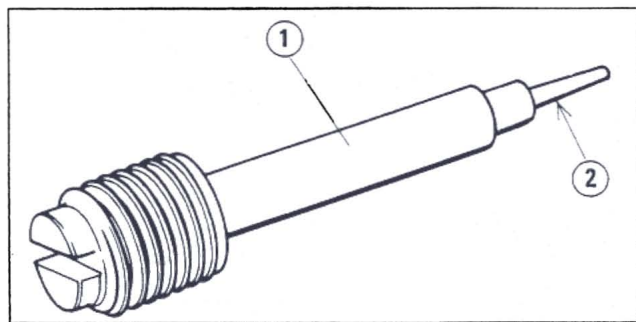
## 2-10 FUEL SYSTEM

- 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  
2. Valve Needle  
3. Rod  
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.;br 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

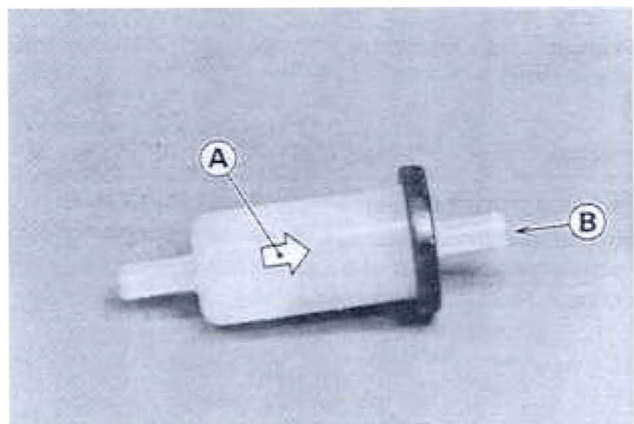
- Connect the fuel hoses.
- Install the fuel filter so that the arrow on it shows the fuel flow from the fuel tank to the fuel pump.
- Be sure to route the hoses so that they will not be kinked or stretched.

#### 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

### Installation

- Install the fuel tank hoses.

### Removal

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

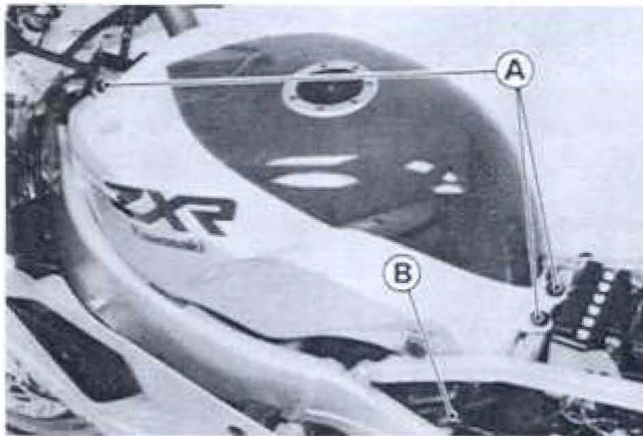
#### ⚠ WARNING

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.

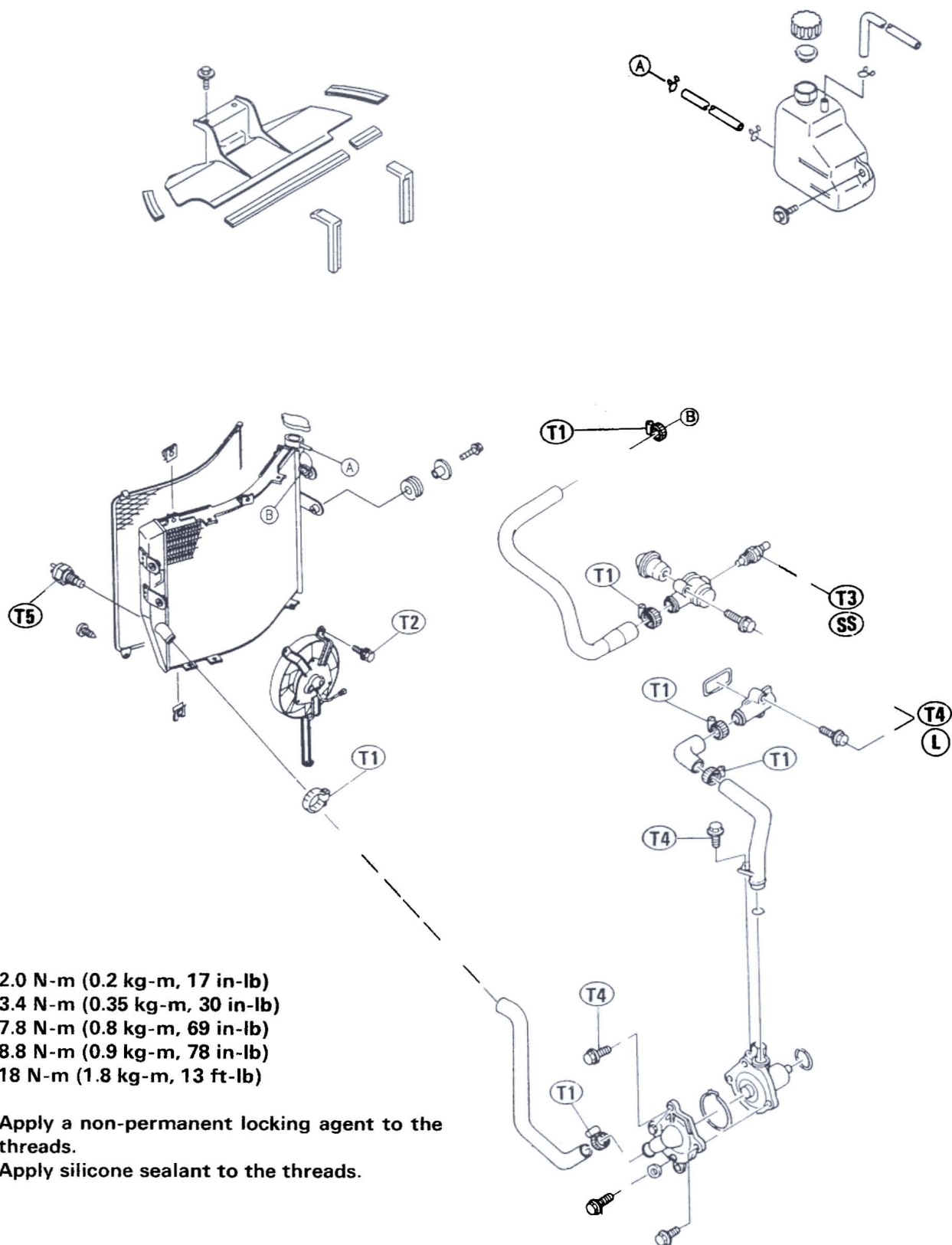
# Cooling System

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## 3-2 COOLING SYSTEM

### Exploded View

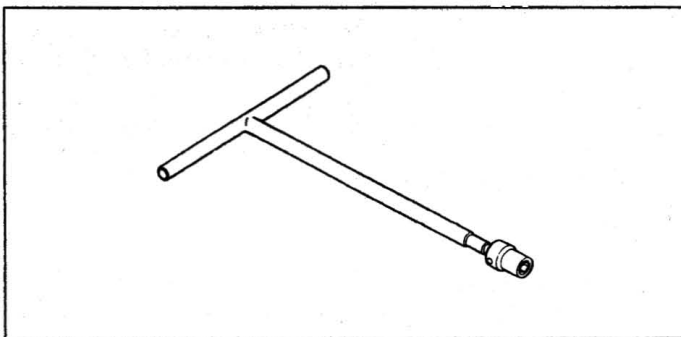


## Specifications

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

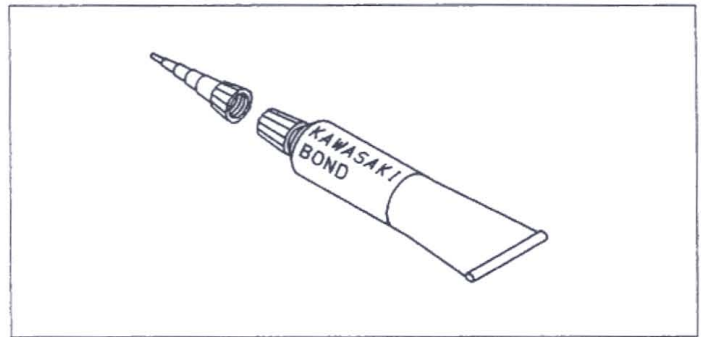
## Special Tool

Socket Wrench, Hex 8: 57001-1268



## Sealant

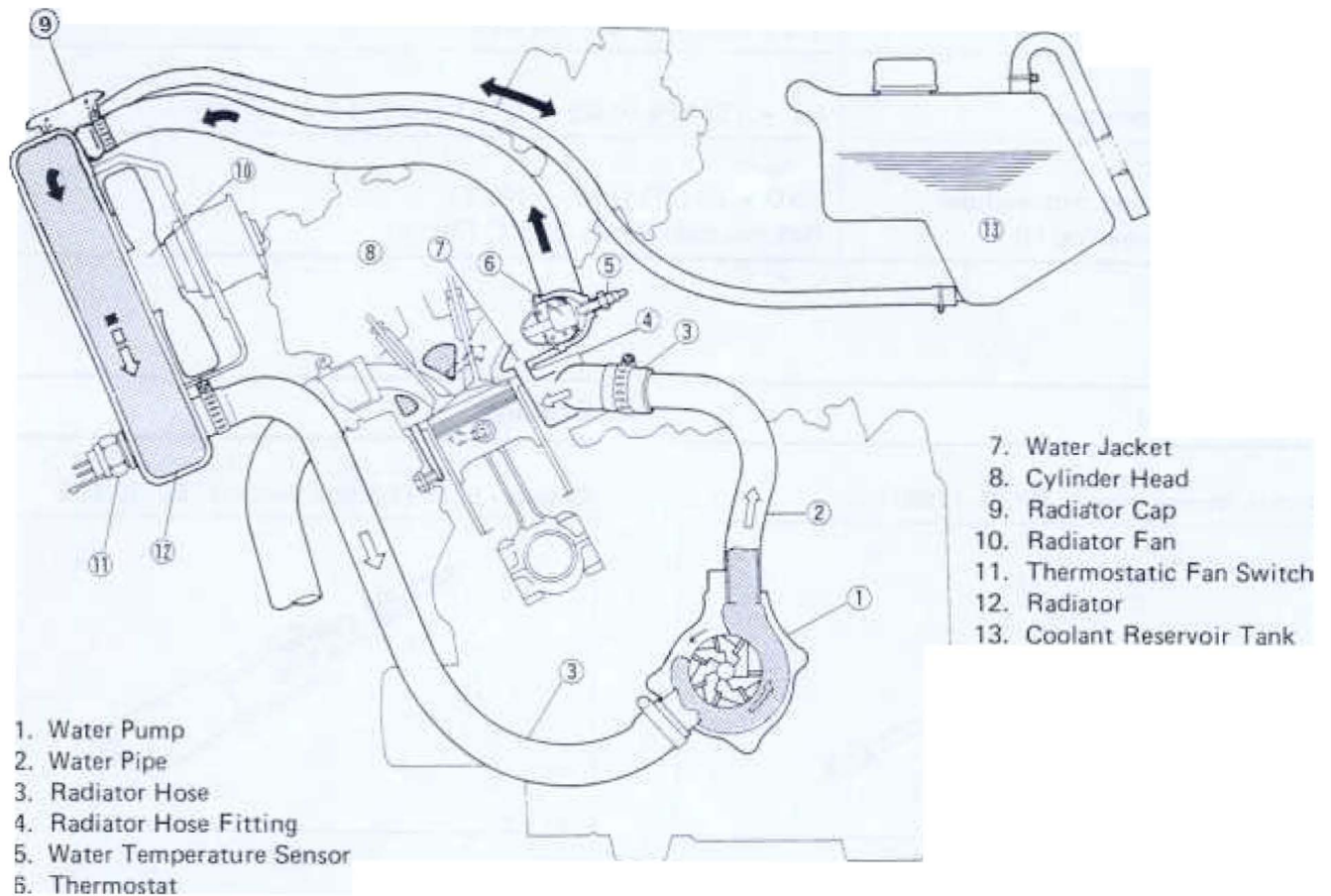
Kawasaki Bond (Silicone Sealant): 56019-120



### 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.



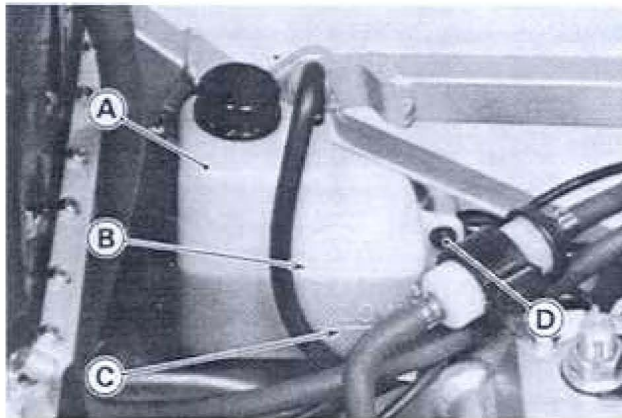
## Coolant

### 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 frame 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

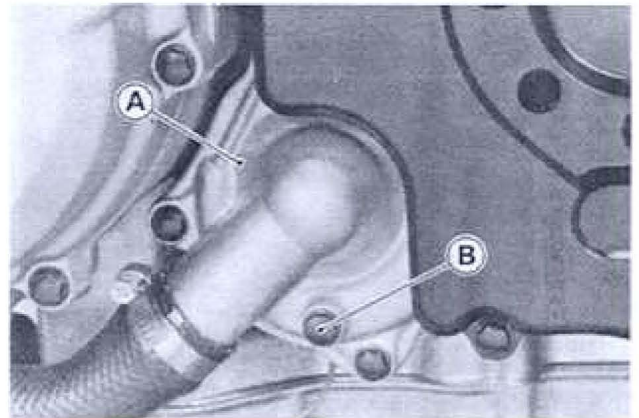
#### ⚠ WARNING

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.

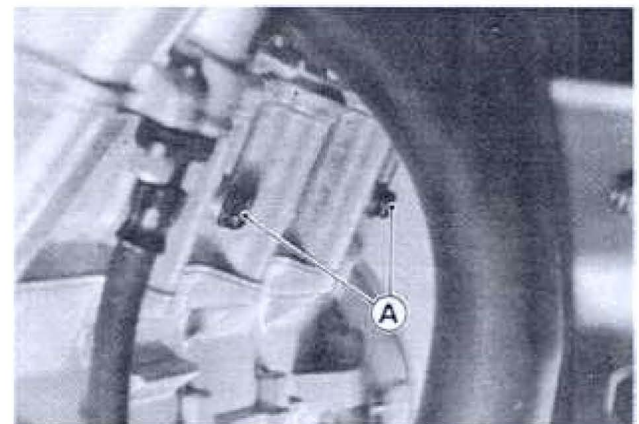
Since coolant is harmful to the human body, do not use for drinking.

- 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



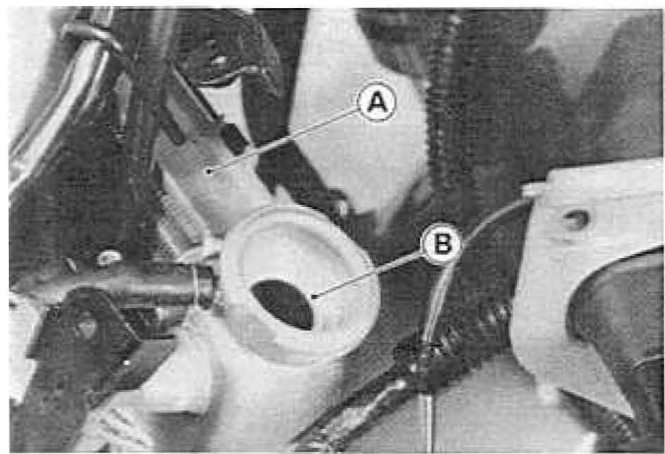
A. Cylinder Drain Plugs

- 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

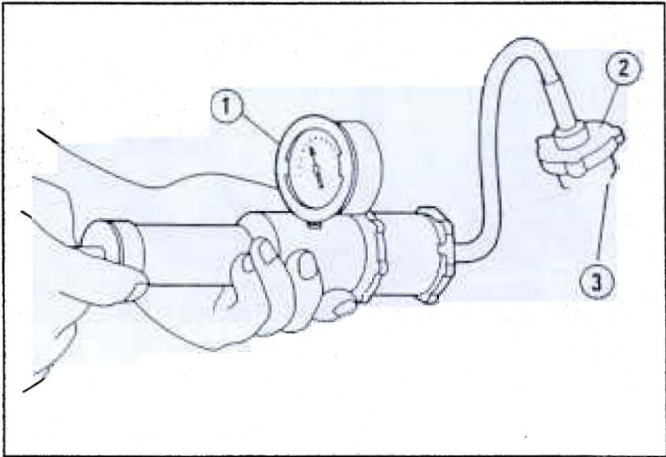
- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.

- 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.



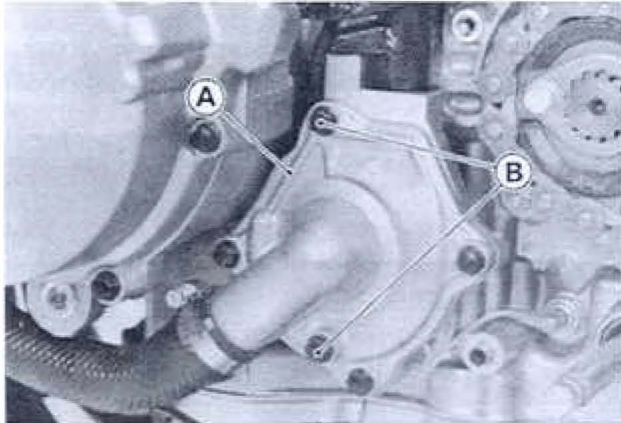
1. Pressure Tester                      3. Radiator Filler Neck  
2. Adapter

- ★ 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)



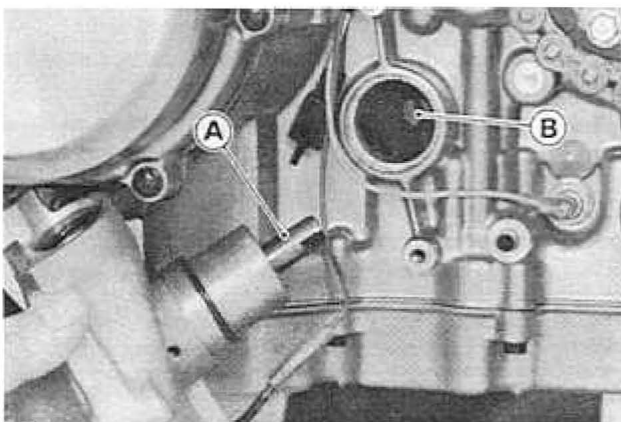
A. Water Pump

B. Mounting Bolts

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

### 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

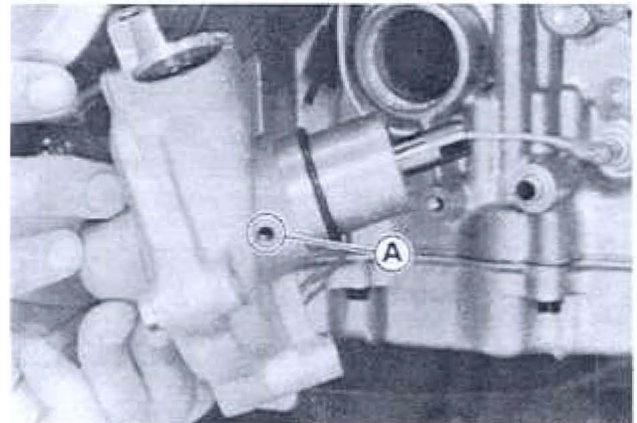
### Water Pump Pipe Mounting Bolt

### 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)

## 3-8 COOLING SYSTEM

### Radiator and Radiator Fan

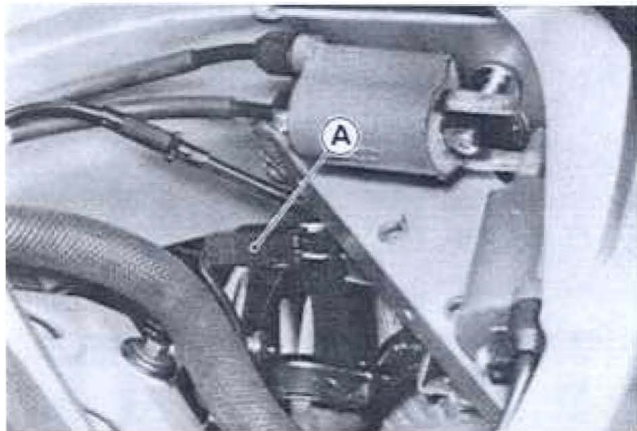
#### Removal

#### ⚠ 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.**

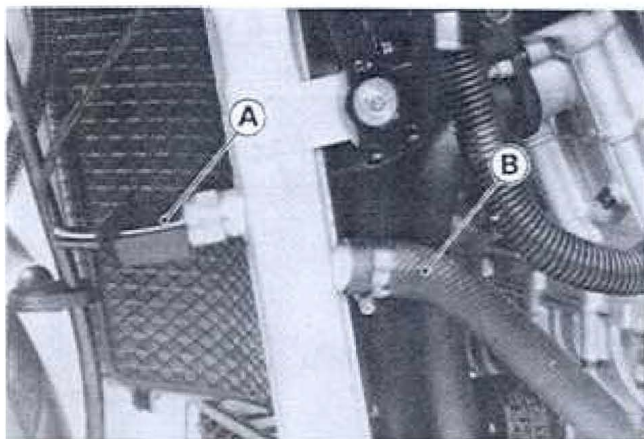
● Remove the following.

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

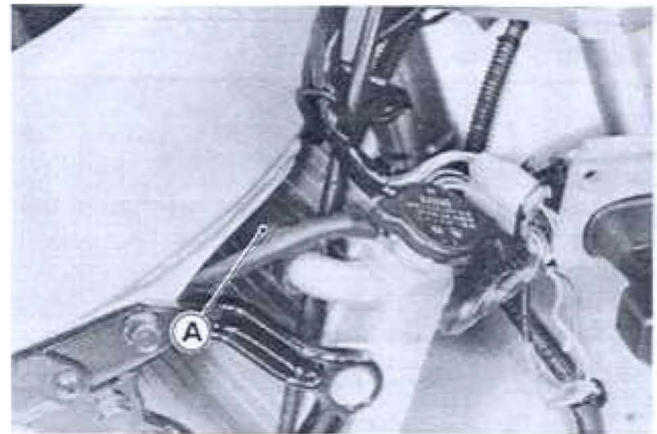


A. Radiator Fan Connector

- Radiator Fan Switch Connector
- Radiator Hoses

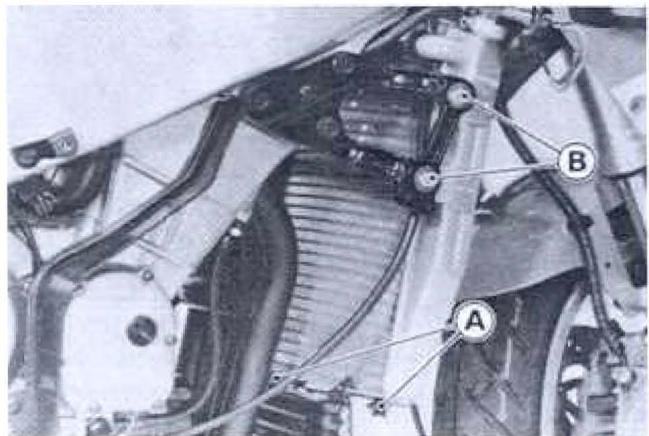


A. Radiator Fan Switch Connector    B. Radiator Hose



A. Radiator Hose

- Radiator Lower Mounting Bolts
- Radiator Side Mounting Bolts



A. Lower Mounting Bolts  
B. Side Mounting Bolts

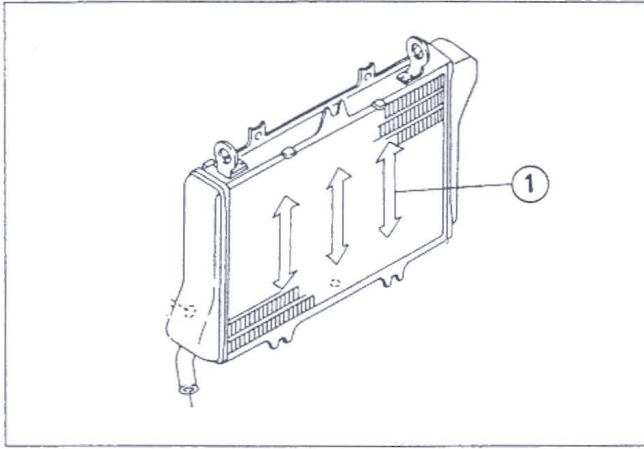
● Remove the radiator

#### Radiator Inspection

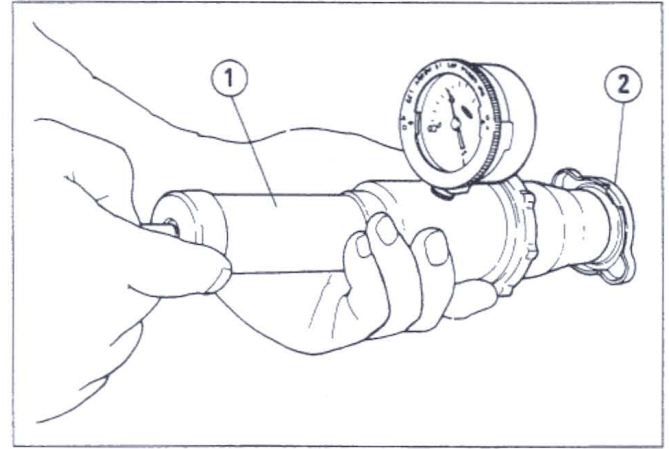
- Check the radiator core.
- ★ If there are obstructions to air flow, remove them.
- ★ If the corrugated fins are deformed, carefully straighten them.
- ★ If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator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

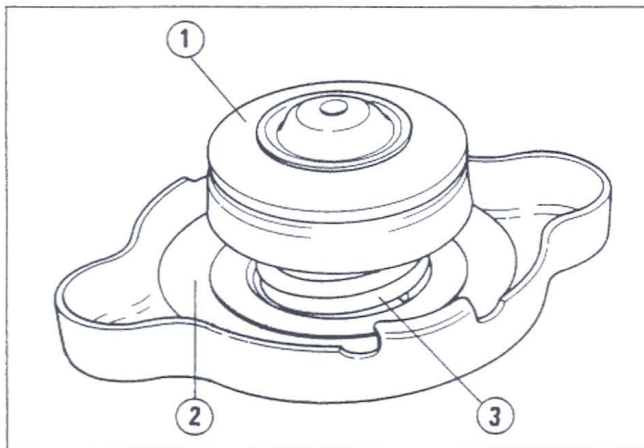


1. Pressure Tester

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/cm<sup>2</sup>, 14 ~ 18 psi)

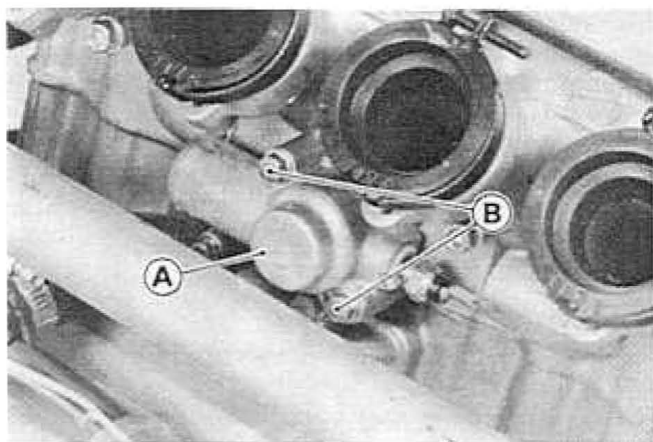
- ★ If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.

## 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

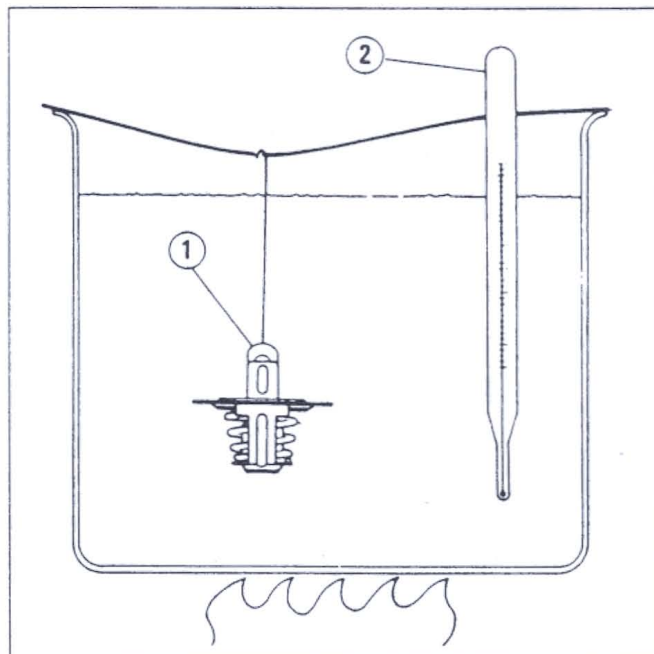
B. Mounting Bolt

#### 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.



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)

# Engine Top End

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**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.

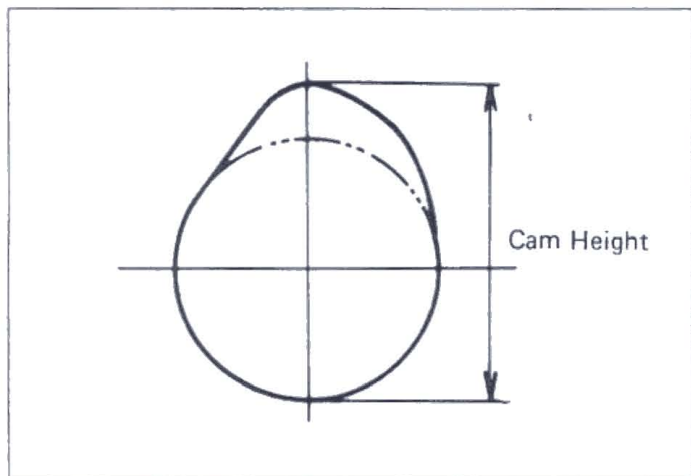
**SS:** Apply silicone sealant to the threads.

## 4-4 ENGINE TOP END

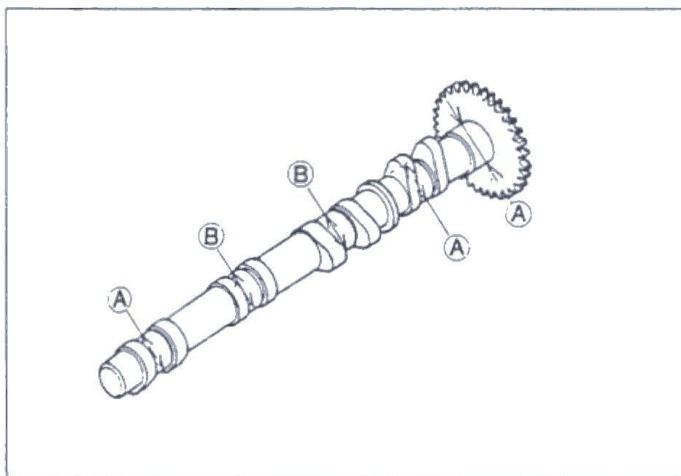
### Specifications

Item	Standard	Service Limit
<b>Camshaft:</b>		
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
<b>Cylinder Head:</b>		
Cylinder compression (Usable range)	686 ~ 1 079 kPa (7.0 ~ 11.0 kg/cm <sup>2</sup> , 99 ~ 156 psi) @330 r/min (rpm)	
Cylinder head warp	---	0.05 mm
<b>Valves:</b>		
Valve clearance:		
Inlet	0.12 ~ 0.17 mm	---
Exhaust	0.16 ~ 0.21 mm	---
Valve spring free length:	38.2 mm	36.4 mm
Valve head thickness:		
Inlet	0.5 mm	0.25 mm
Exhaust	0.7 mm	0.35 mm
Valve stem bend	0.02 TIR or under	0.05 mm TIR
Valve seat cutting angle	45°, 32°, 60°	---
Valve seat surface:		
Width:		
Inlet	0.5 ~ 1.0 mm	---
Exhaust	0.5 ~ 1.0 mm	---
Outside diameter:		
Inlet	21.5 ~ 21.7 mm	---
Exhaust	18.5 ~ 18.7 mm	---

Camshaft Height Measurement

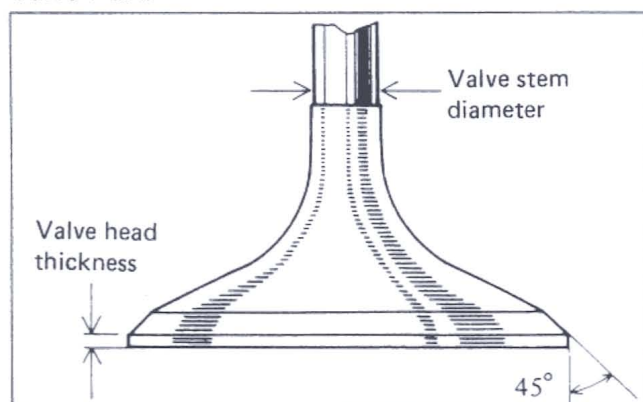


Camshaft Journal Diameter

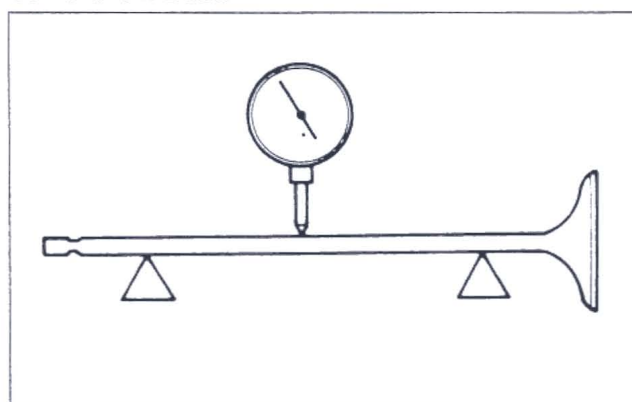


Item	Standard	Service Limit
Valve/valve guide clearance (wobble method):		
Inlet	0.031 ~ 0.140 mm	0.34 mm
Exhaust	0.085 ~ 0.180 mm	0.41 mm
Valve stem diameter:		
Inlet	3.975 ~ 3.990 mm	3.96 mm
Exhaust	3.955 ~ 3.970 mm	3.94 mm
Valve guide inside diameter	4.000 ~ 4.012 mm	4.08 mm
<b>Cylinder, Piston:</b>		
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

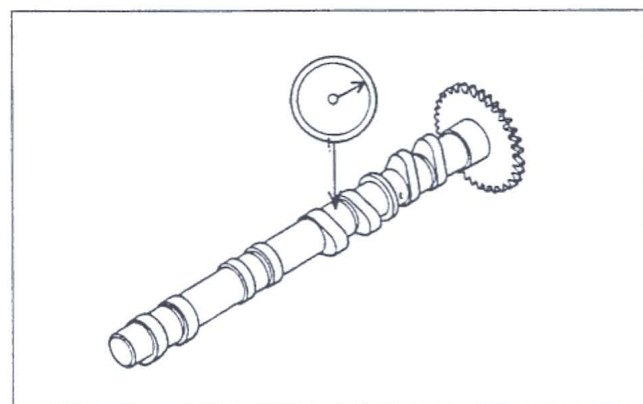
Valve Head



Valve Stem Bend



Camshaft Runout



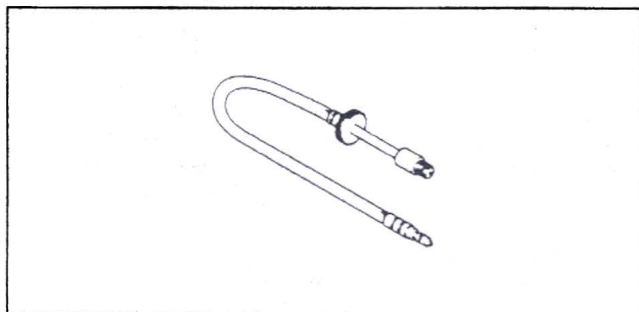
## 4-6 ENGINE TOP END

### Special Tools

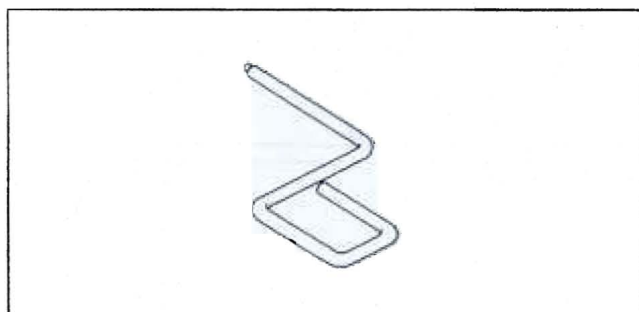
Compression Gauge: 57001-221



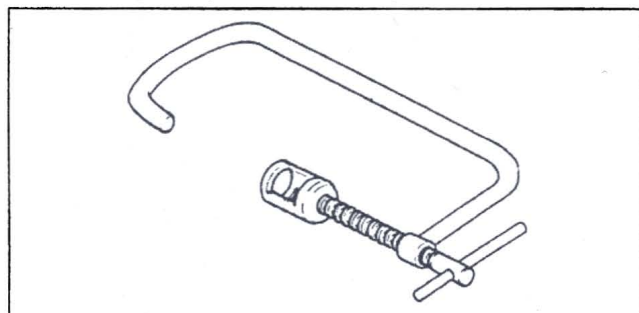
Compression Gauge Adapter, M10 X 1.0: 57001-1317



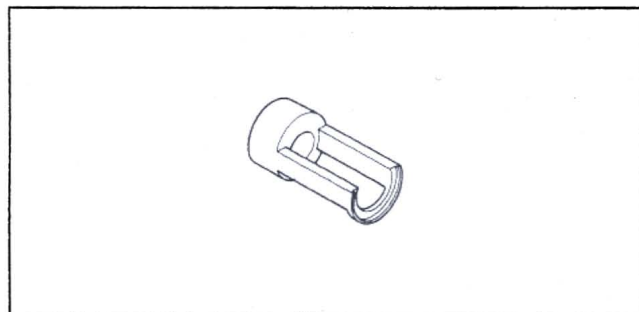
Rocker Arm Holder: 57001-1270



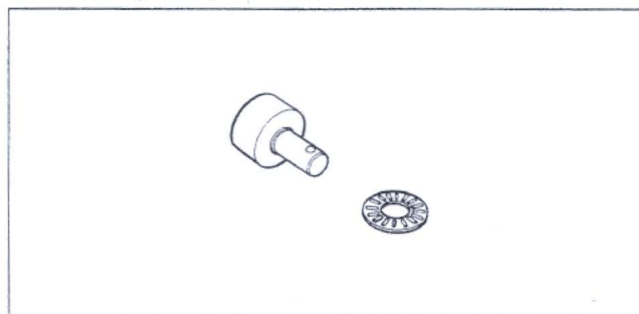
Valve Spring Compressor Assembly: 57001-241



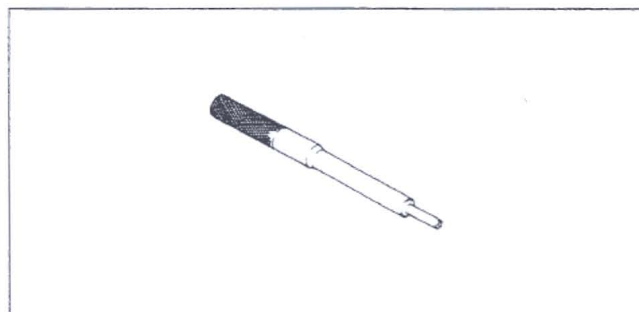
Valve Spring Compressor Adapter,  $\phi 21$ : 57001-1272



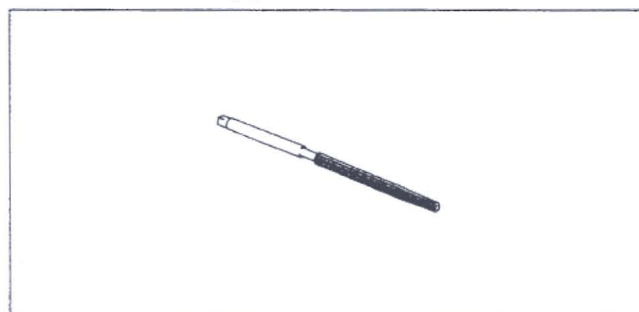
Valve Spring Compressor Joint: 57001-1271



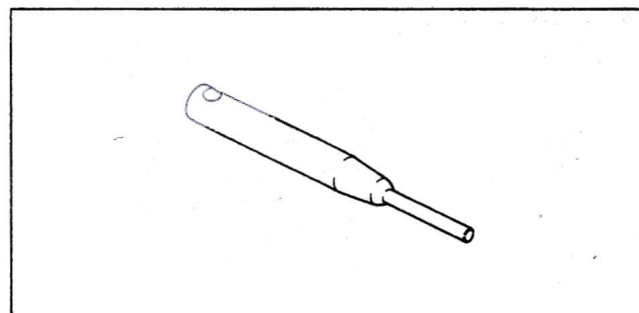
Valve Guide Arbor,  $\phi 4$ : 57001-1273



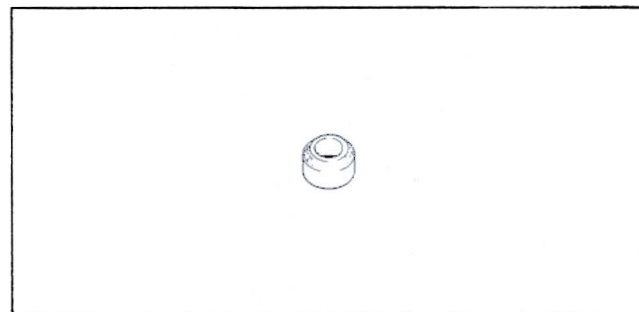
Valve Guide Reamer,  $\phi 4$ : 57001-1274



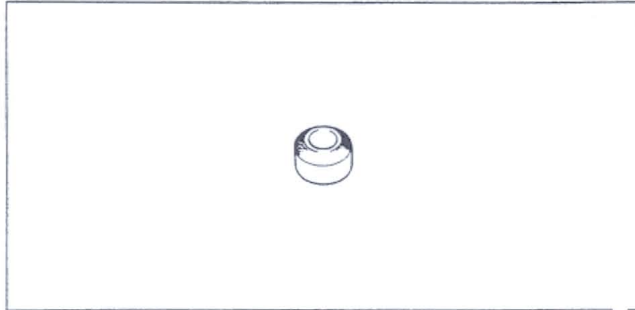
Valve Seat Cutter Holder,  $\phi 4$ : 57001-1275



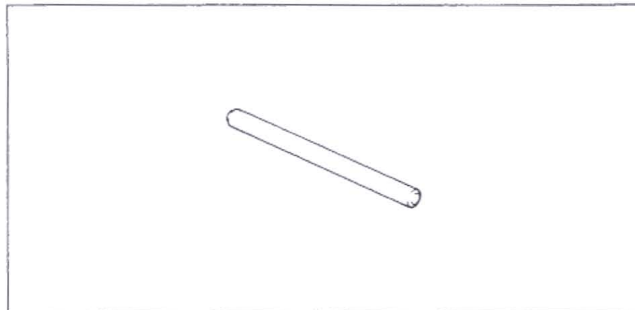
Valve Seat Cutter,  $45^\circ - \phi 24.5$ : 57001-1113



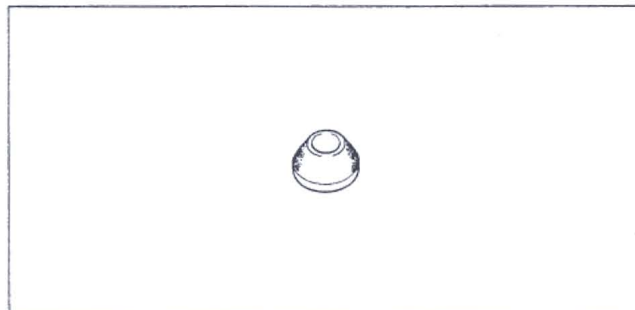
Valve Seat Cutter, 32° –  $\phi 25$ : 57001-1118



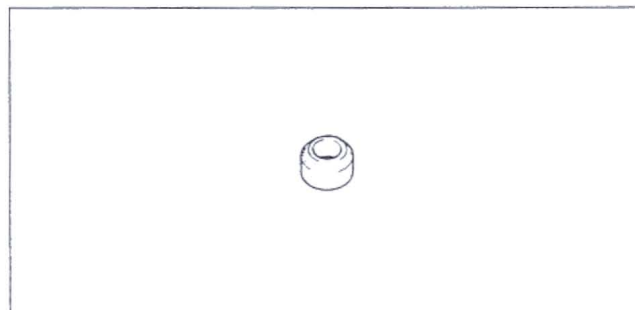
Valve Seat Cutter Holder Bar: 57001-1128



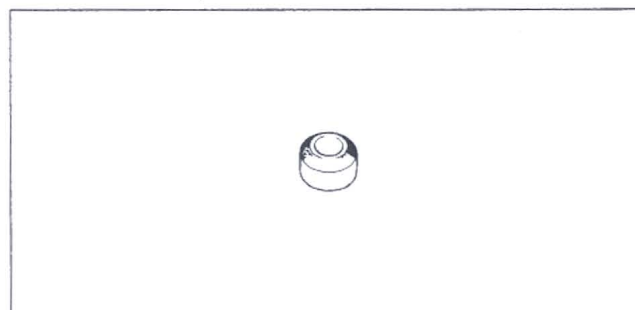
Valve Seat Cutter, 60° –  $\phi 30$ : 57001-1123



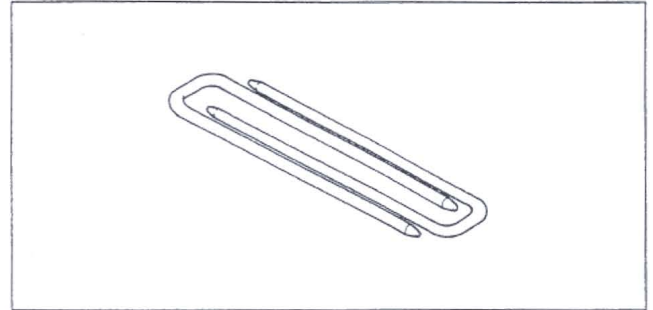
Valve Seat Cutter, 45° –  $\phi 22$ : 57001-1205



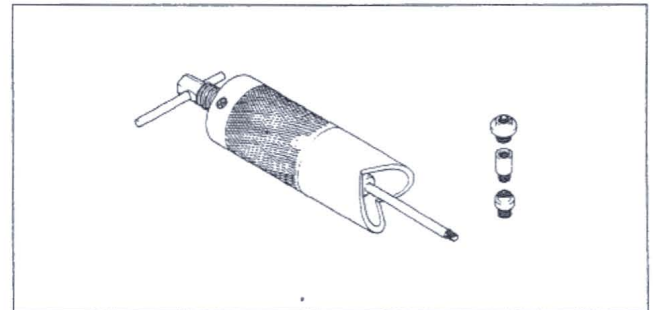
Valve Seat Cutter, 32° –  $\phi 22$ : 57001-1206



Piston Base,  $\phi 8$ : 57001-147

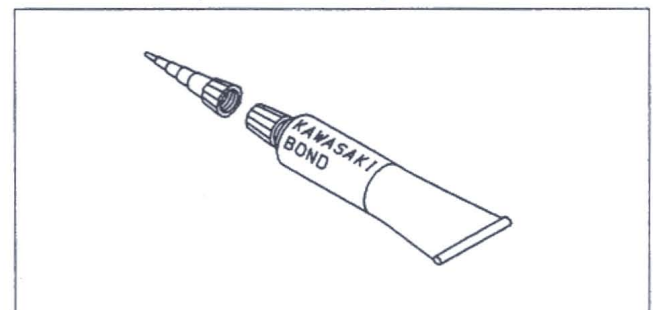


Piston Pin Puller Assembly: 57001-910



## Sealant

Kawasaki Bond (Silicone Sealant): 56019-120

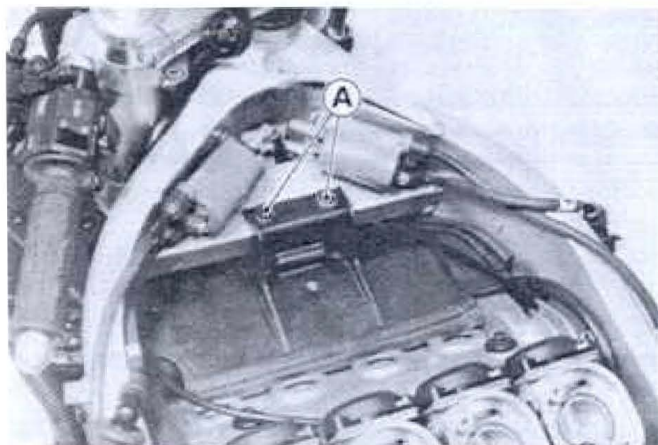


## 4-8 ENGINE TOP END

### Cylinder Head Cover

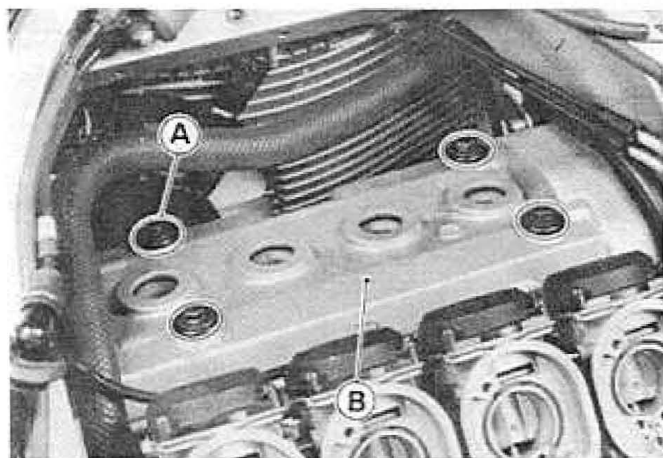
#### Removal

- Remove the following.
  - Fuel Tank (see Fuel System chapter)
  - Air Cleaner Housing (see Fuel System chapter)
  - Ignition Coils
  - Throttle Cable
  - Choke Cable
  - Baffle Plate



A. Baffle Plate Bolt

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

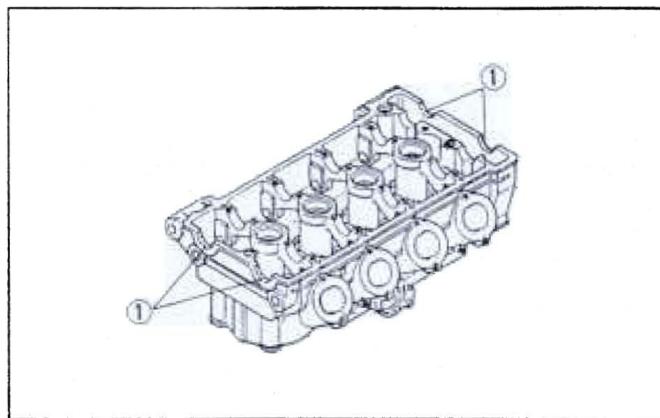


A. Bolts

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).

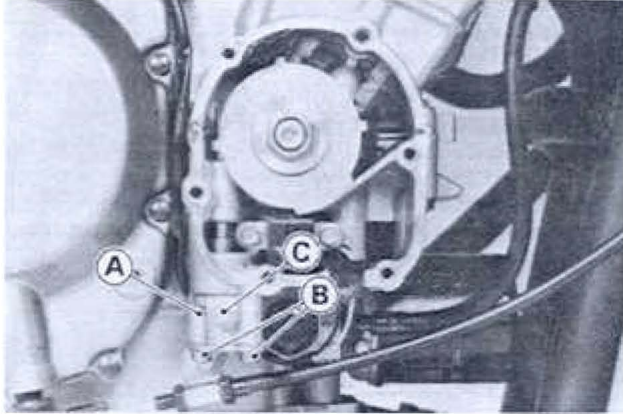


1. Silicone Sealant Applied Areas

## 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

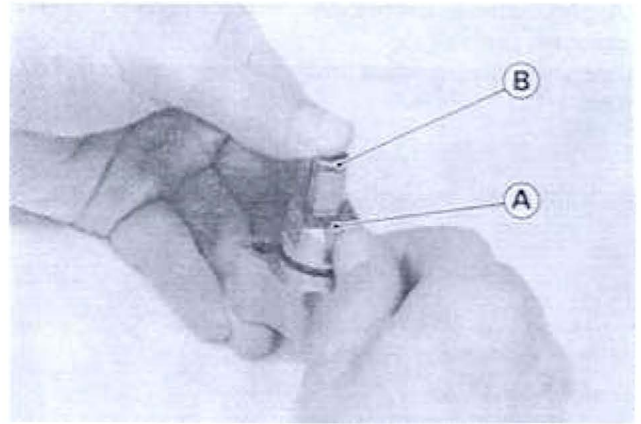
This is a non-return type cam chain tensioner. The push rod does not return to its original position once it moves out to take up cam chain slack. Observe all the rules listed below:

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.

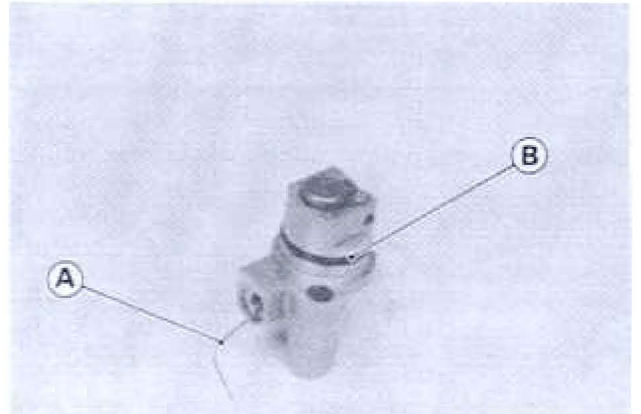
### Installation

- Compressing the push rod, into the tensioner body and lock it.
- Remove the lock bolt on the side of the tensioner body.
- While pushing the taper part of the stopper, push the rod.



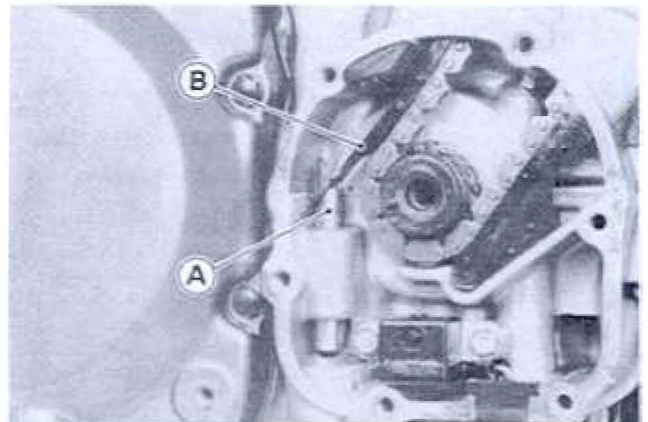
A. Taper Part (Stopper)      B. Push Rod

- 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

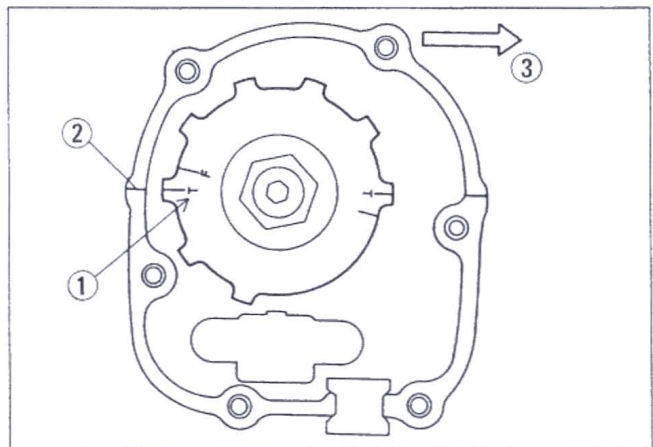
---

#### *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)

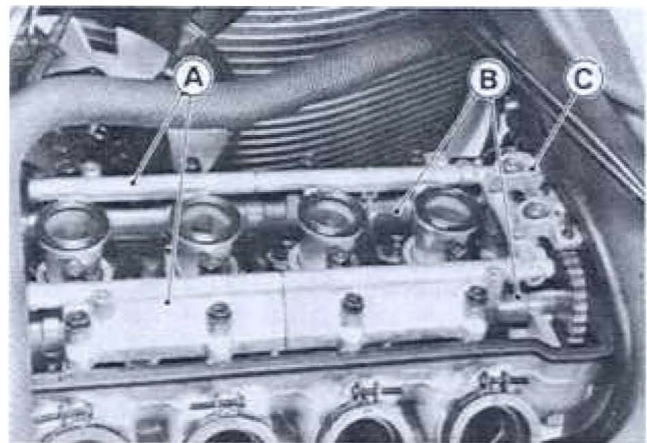
#### NOTE

- *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**

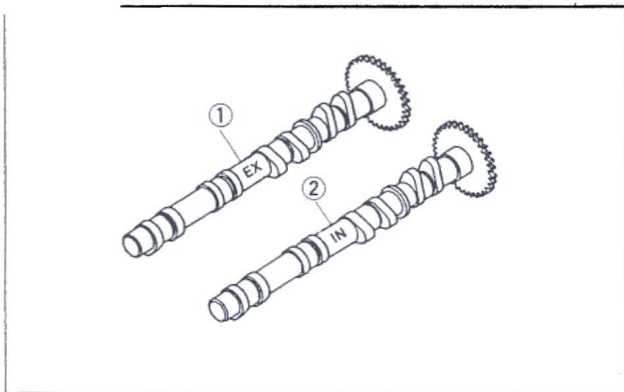
The crankshaft may be turned, while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

**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**

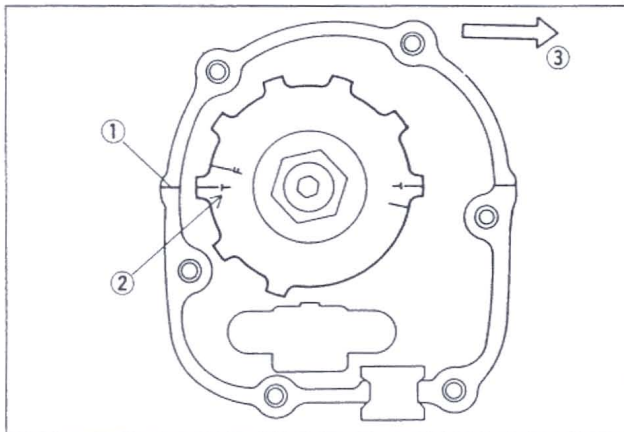
- The exhaust camshaft has an EX mark and the inlet camshaft has an IN mark. Be careful not to mix up these shafts.



1. EX Mark

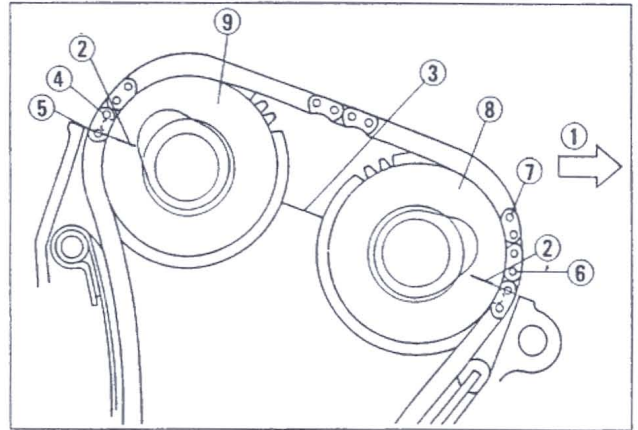
2. IN Mark

- 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

2. Timing Mark

3. Cylinder Head Upper Surface

4. 29th

5. 30th

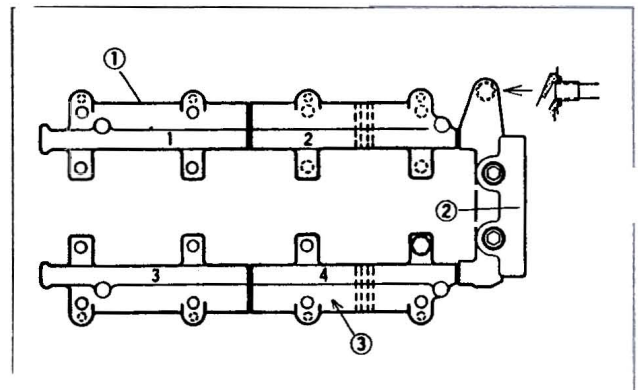
6. 1st

7. 2nd

8. Exhaust Camshaft

9. Inlet Camshaft

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



1. Camshaft Cap

2. Upper Chain Guide

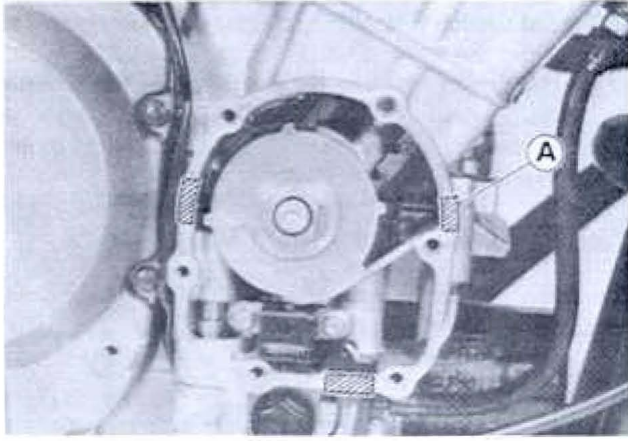
3. Location Number

**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.

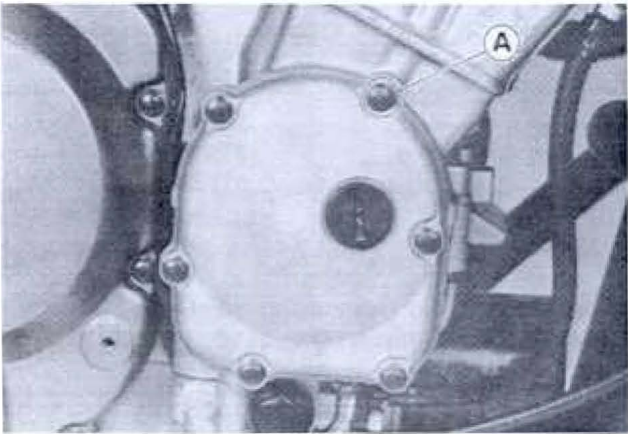
- Tighten the camshaft cap bolts to the specified torque (see Exploded View).
- Install the camshaft chain tensioner.
- Install the pickup coil cover, noting the following.
- Apply silicone sealant to the following.
  - Crankcase Parting Line
  - Grommet

## 4-12 ENGINE TOP END



A. Apply silicone sealant.

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



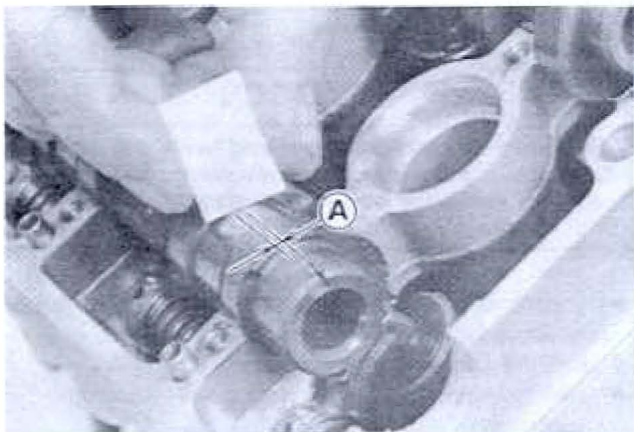
A. Apply a non-permanent locking agent.

### 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.

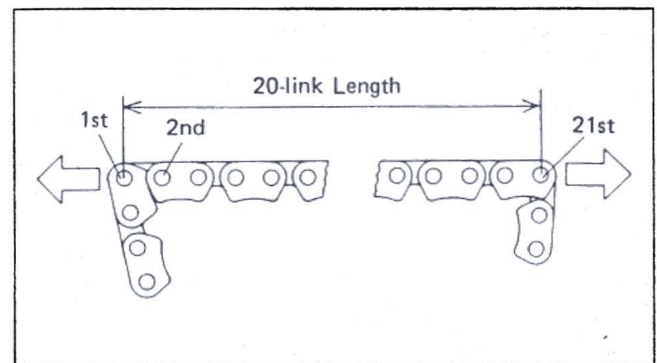
- ★ If any measurement exceeds the service limit, replace the chain.

### Camshaft Chain 20-Link Length

Standard: 127.0 ~ 127.4 mm

Service Limit: 128.9 mm

### Chain Length Measurement



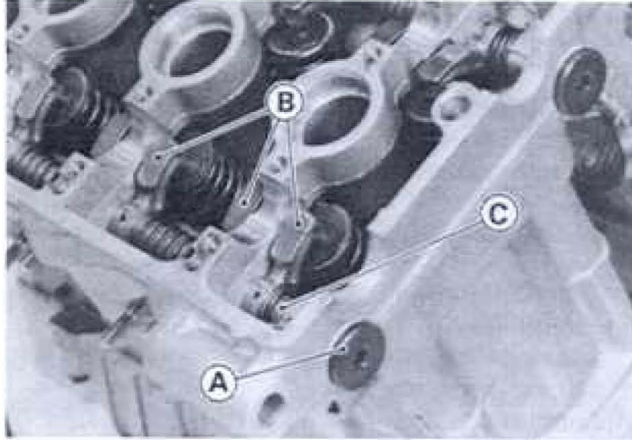
## Rocker Arm, Rocker Shaft

### 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.

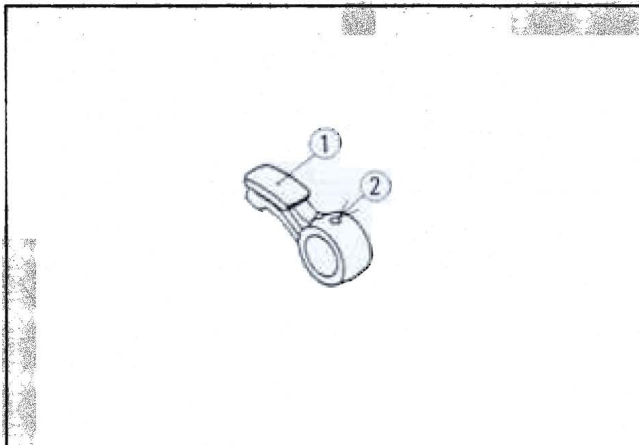


A. Plug  
B. Rocker Arms  
C. Rocker Shaft

### Rocker Arm and Rocker Shaft

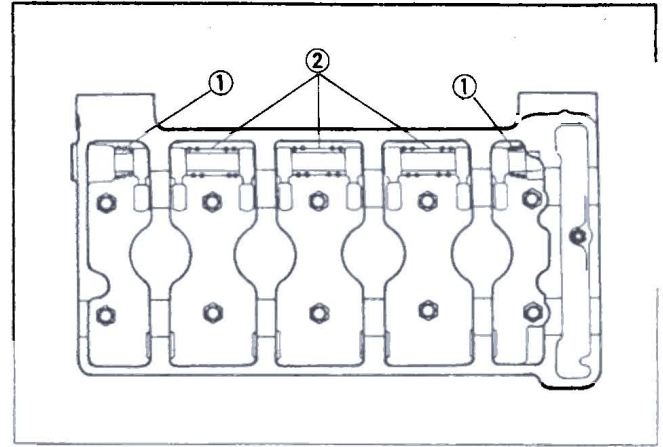
#### Installation Notes

- 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.



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.

## 4-14 ENGINE TOP END

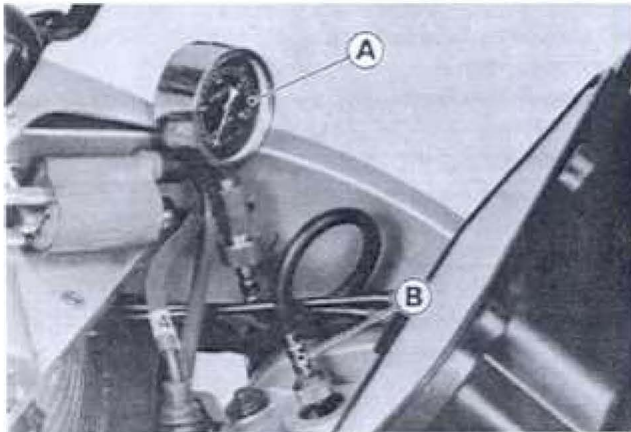
### Cylinder Head

#### 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/cm<sup>2</sup>, 99 ~ 156 psi)

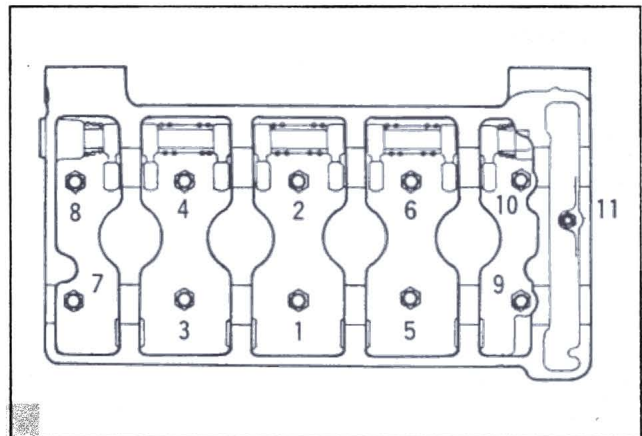
- ★ If cylinder compression is higher than the specified range, check the following.
  - Carbon build-up on the cylinder head combustion chamber
  - Carbon build-up on the piston head
- ★ If cylinder compression is lower than the specified range, check the following.
  - Valve not seating properly
 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

#### Removal

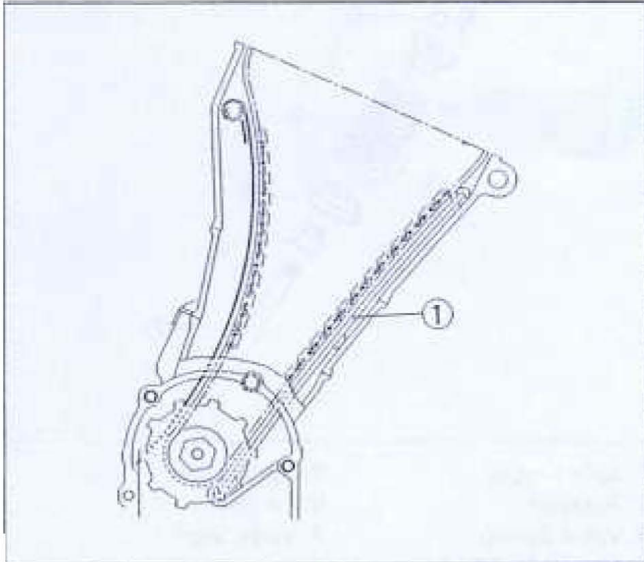
- Drain coolant (see Cooling System chapter)
- Remove the following.
  - Radiator (see Cooling System chapter)
  - Muffler
  - Camshafts (see this chapter)
  - Oil Hose (Cylinder Head)
  - Engine Mounting Bracket Bolts, Nuts (Cylinder Head)
- Remove the cylinder head bolts and take off the cylinder head.

#### 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

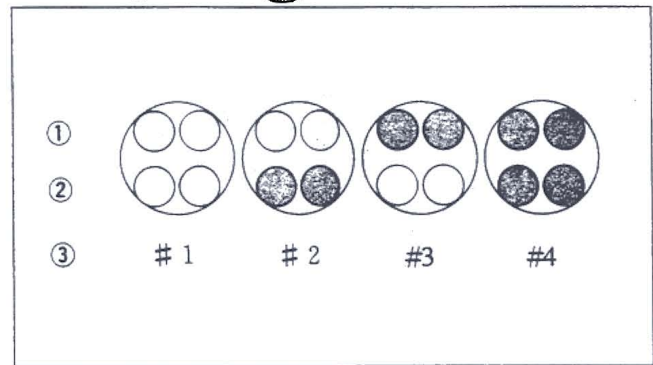
### Valve Clearance Adjustment

#### 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

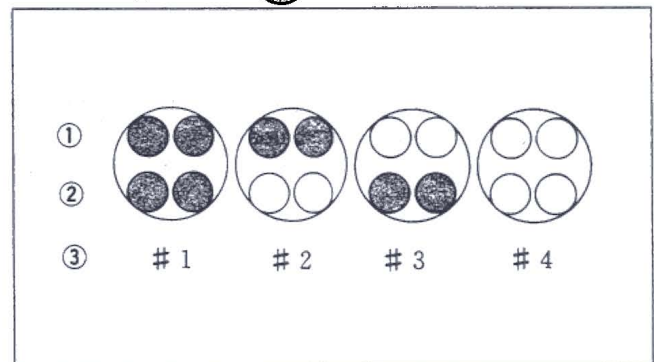
3. Cylinder Numbers

2. Inlet Valves

○ 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

3. Cylinder Numbers

2. Inlet Valves

#### 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

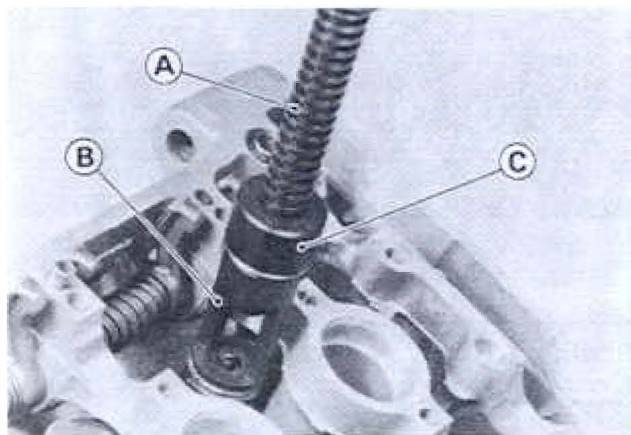
- Apply engine oil to the O-ring, install the spark plug retainer.
- ★ If the valve clearance is not within the specified range, first record the clearance, and then adjust it.
- To change the valve clearance, replace the shim with one of a different thickness.

### 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

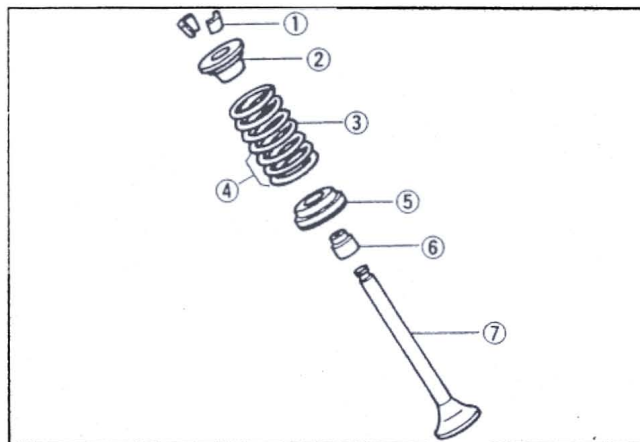
- Perform the following.
- Using the valve spring compressor assembly (special tool), remove the valve.



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

### Valve Installation

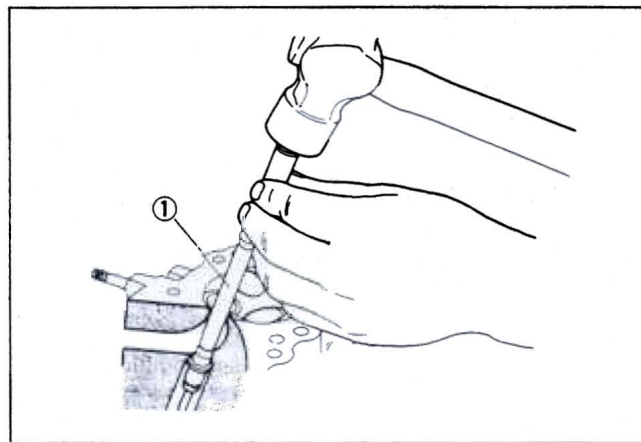
- Replace the oil seal with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the springs so that the closed coil end faces downwards.



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

### Valve Guide Removal

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



1. Valve Guide Arbor: 57001-1273

### NOTE

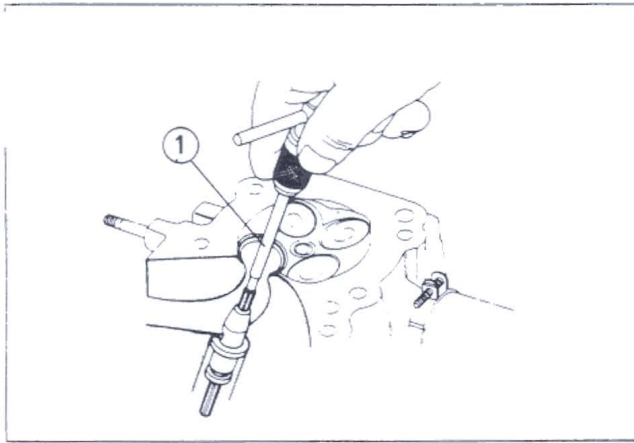
- Heat the area around the valve guide to 120 ~ 150 °C (248 ~ 302°F).

### 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

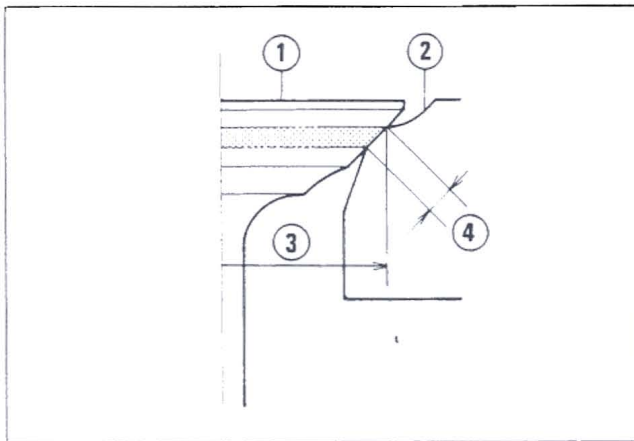
- If the outside diameter of the seating pattern on the valve seat is too large or too small, repair the valve seat.

### 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.

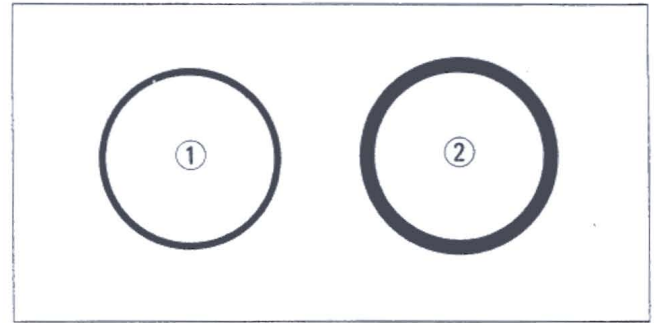


1. Valve
2. Valve Seat
3. Seating Surface Outside Diameter
4. Valve Seat Width

### Valve Seat Width (IN and EX)

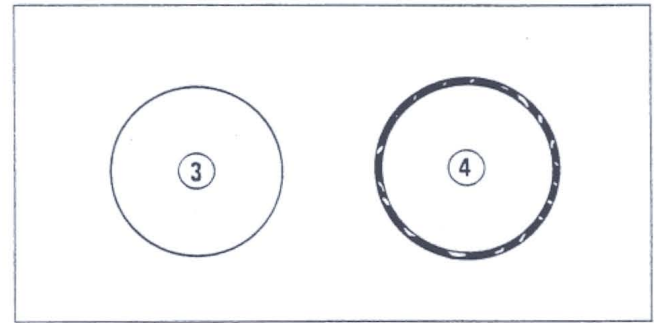
Standard:	0.5 ~ 1.0 mm
-----------	--------------

- ★ 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° - $\phi 24.5$	57001-1113
	32° - $\phi 25$	57001-1118
	60° - $\phi 30$	57001-1123
Exhaust Valves:	45° - $\phi 22$	57001-1205
	32° - $\phi 22$	57001-1206
	60° - $\phi 30$	57001-1123

### Holder and Bar

Holder:	57001-1275
Bar:	57001-1128

- ★ If the manufacture'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

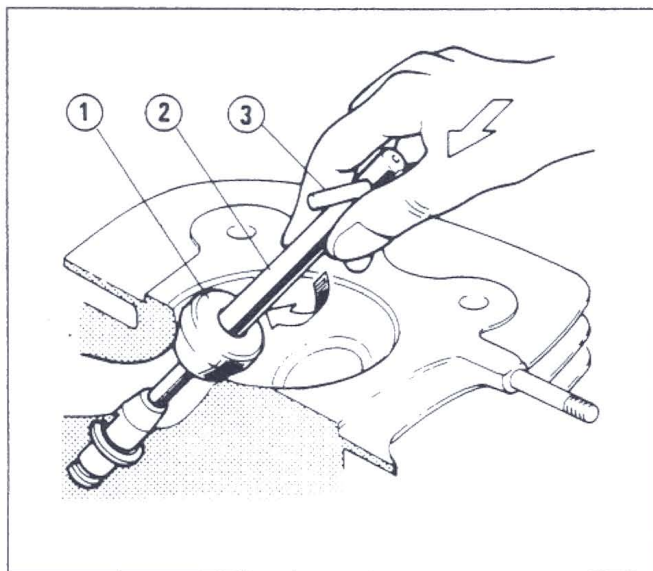
○ Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.

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.

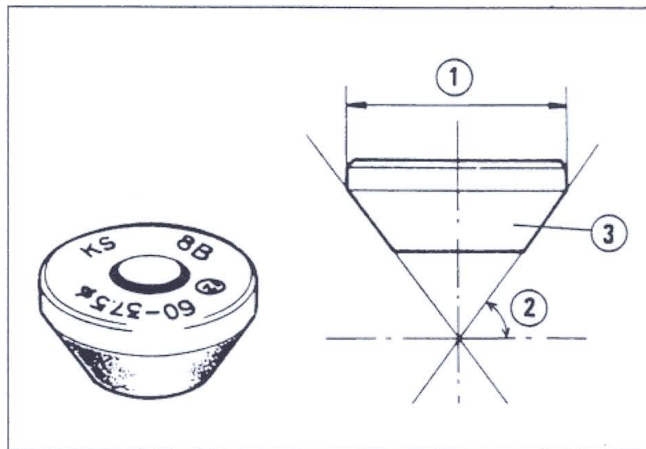


1. Cutter
2. Cutter Holder
3. Bar

### 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

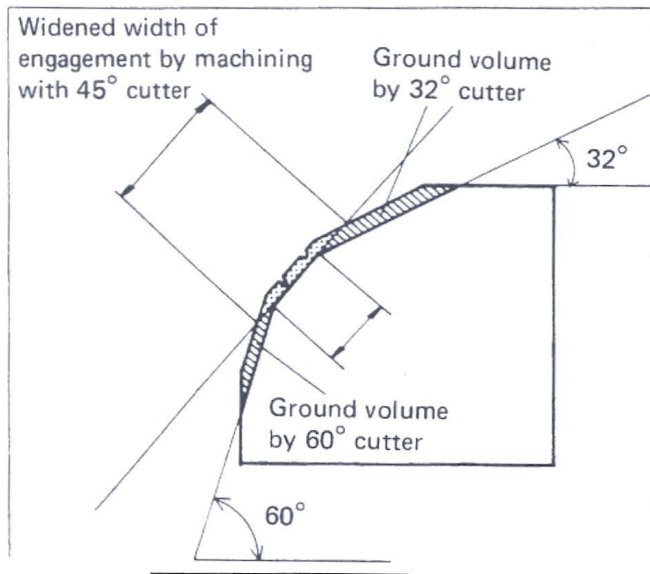
Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

- 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

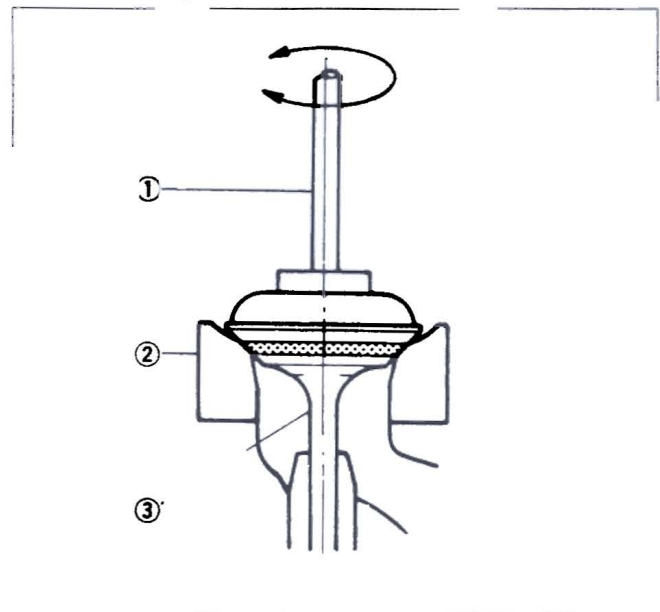
The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

### Valve Seat Repair



- 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).

### Valve Lapping



- 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.

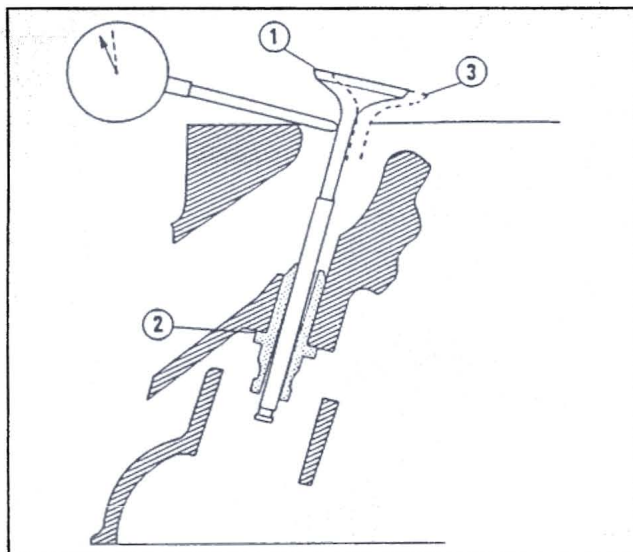
### NOTE

- 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

## 4-20 ENGINE TOP END



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.

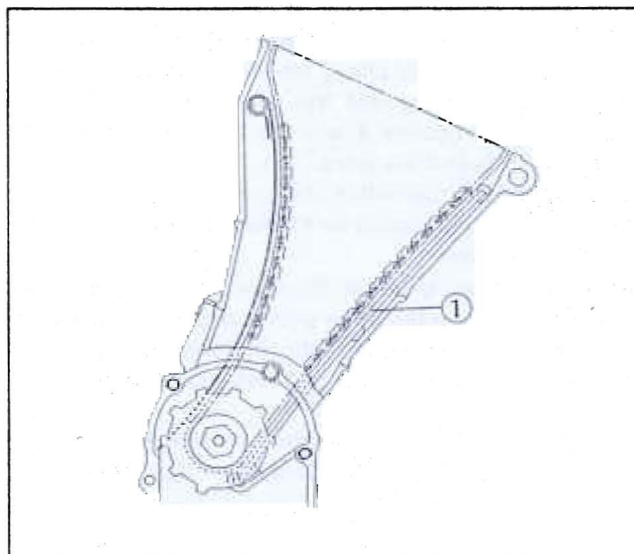
#### *Cylinder Installation*

- 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

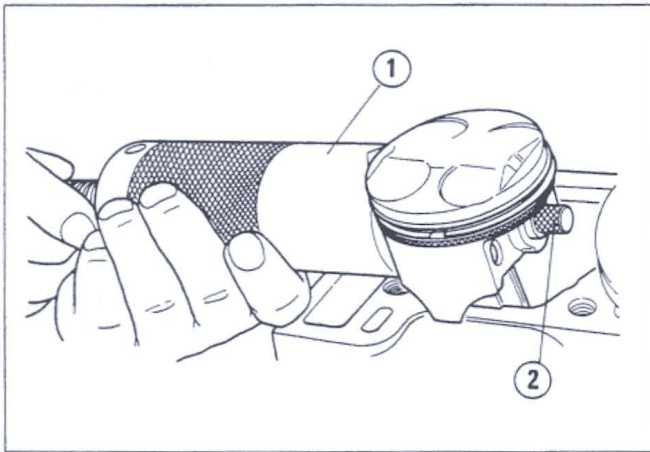
- Install the cylinder and the chain guide (exhaust side) as shown.



1. Chain Guide

### Piston Removal

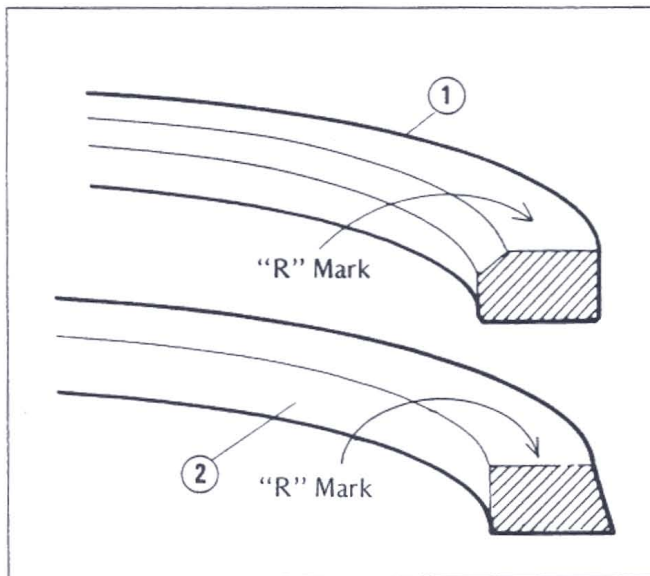
- Remove the cylinder (see this chapter).
- Place a clean cloth under the pistons and remove the piston pin snap rings from the outside of each piston.
- Using the piston pin puller assembly (special tool), remove the piston pins.



1. Piston Pin Puller Assembly: 57001-910  
2. Adapter

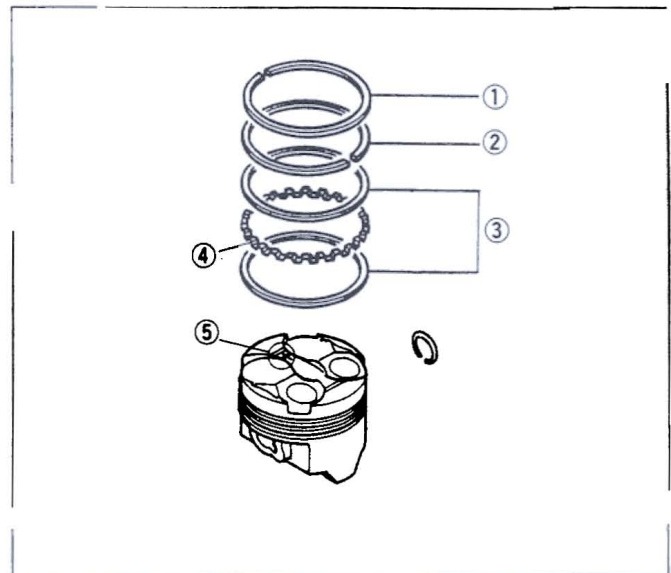
### Piston Installation

- 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.



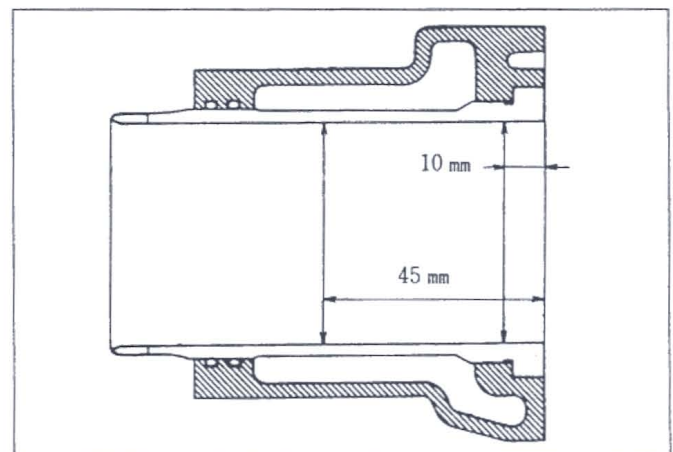
1. Top Ring                      4. Oil Ring Expander  
2. Second Ring                5. Arrow  
3. Oil Ring Steel Rails

### 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

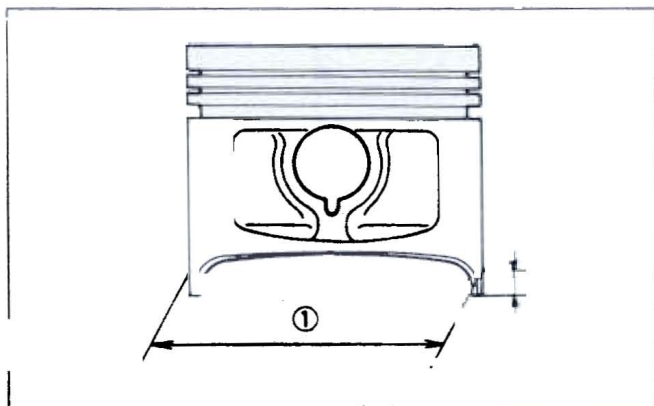
### *Piston Wear*

- 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



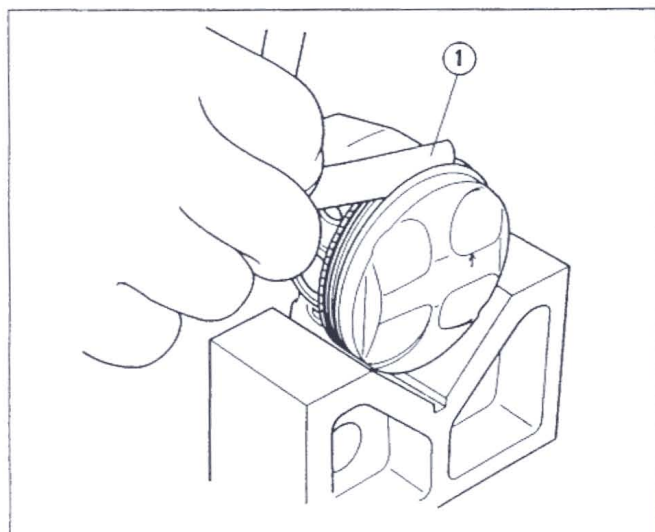
1. Piston Outside Diameter
2. 5mm up from bottom

### *Piston Ring, 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



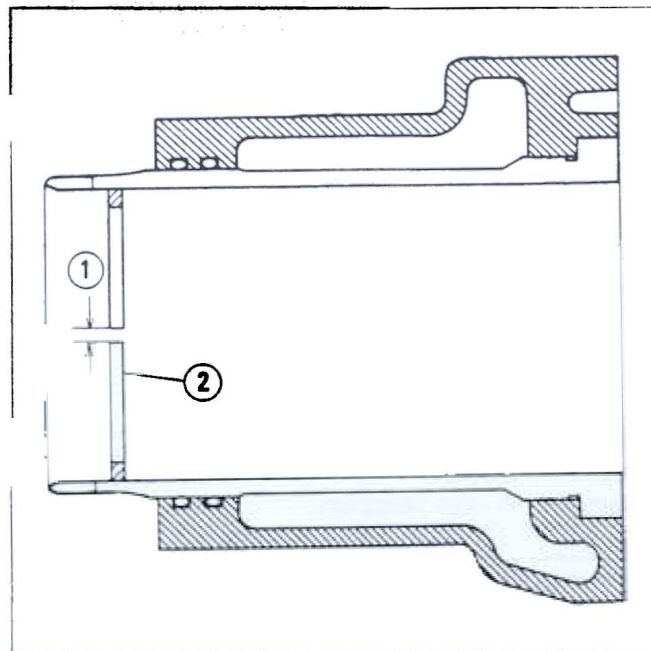
1. Thickness Gauge

### *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



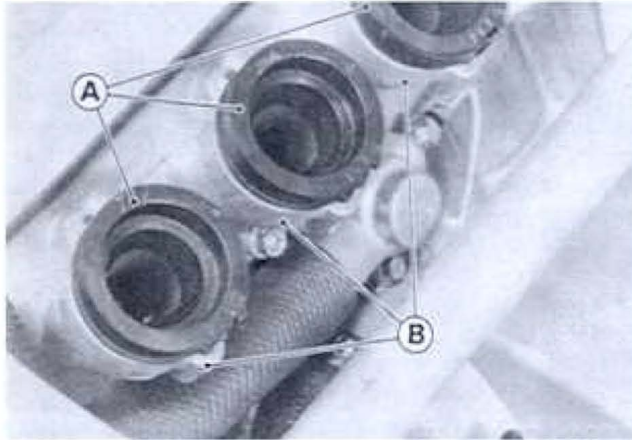
1. Gap

2. Piston Ring

## Carburetor Holders

### Removal

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



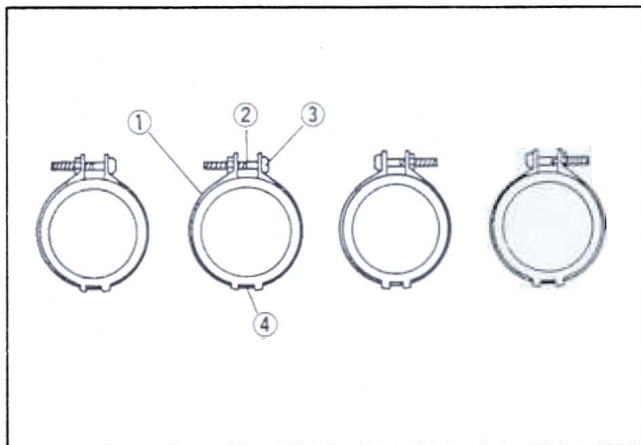
A. Carburetor Holders

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

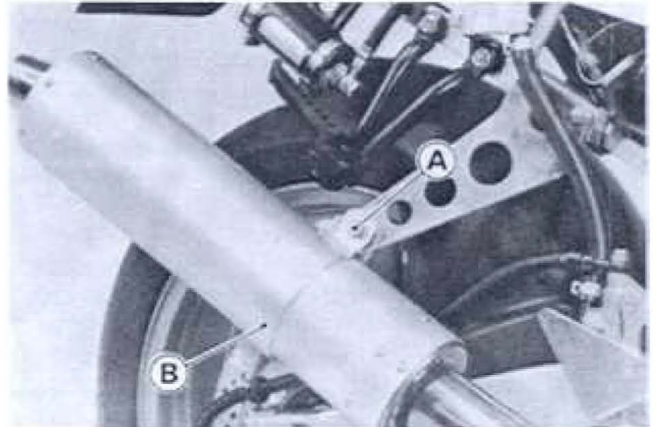
### ⚠ WARNING

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.

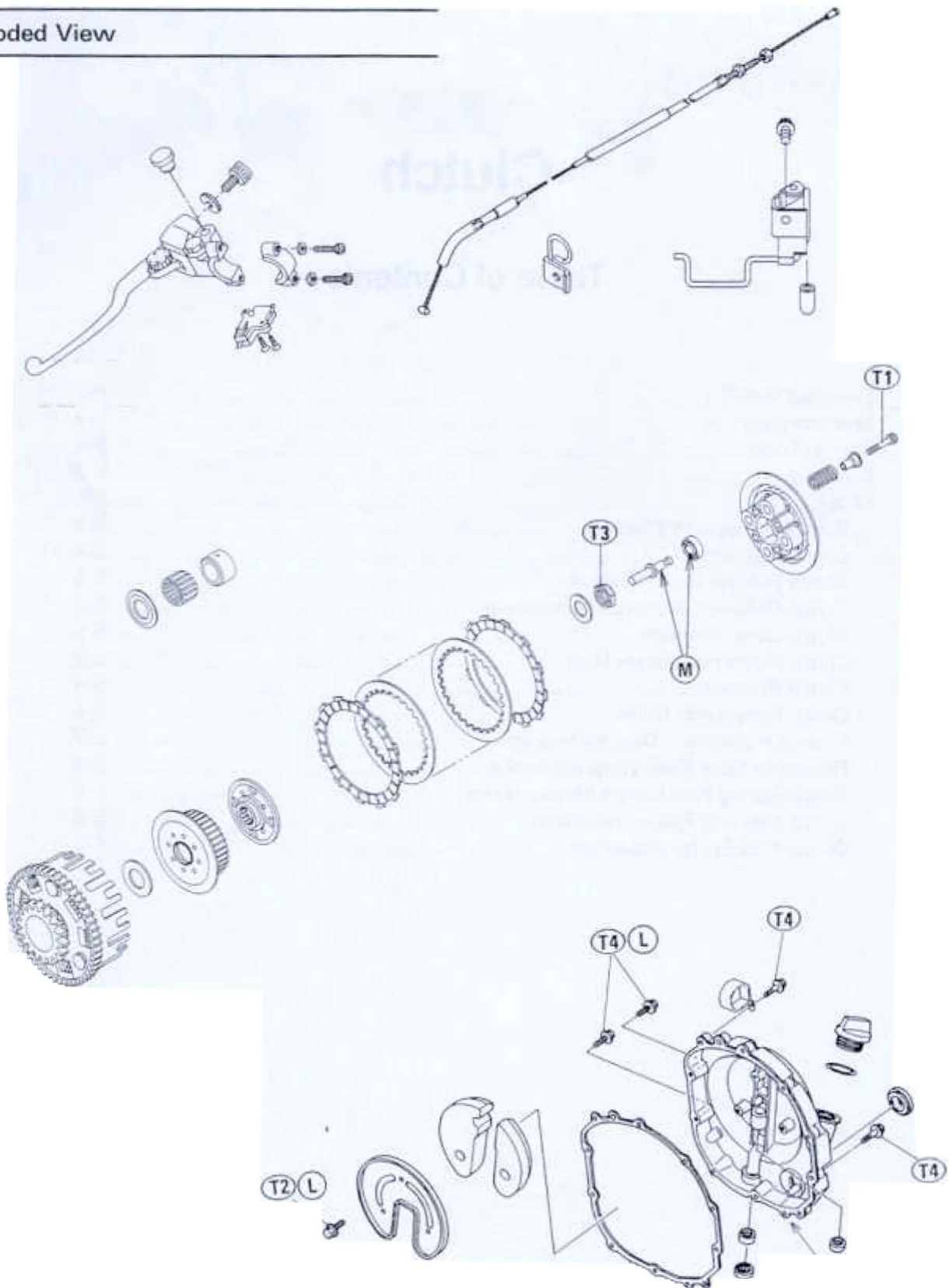
# Clutch

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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)**

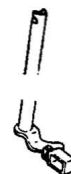
**T3: 130 N-m (13.5 kg-m, 98 ft-lb)**

**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



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**Specifications**

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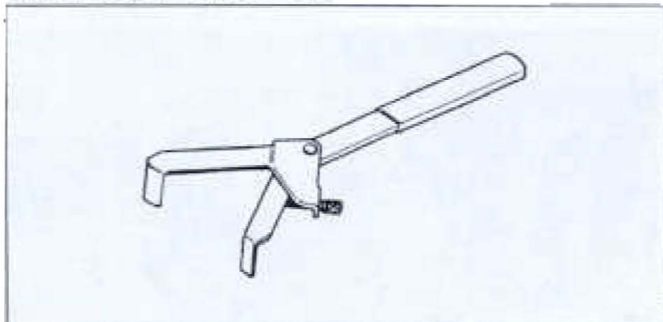
Item	Standard	Service Limit
<b>Clutch:</b>		
Clutch lever free play	2 ~ 3 mm	---
Friction plate thickness	2.7 ~ 2.9 mm	2.5 mm
Friction and steel plate warp	0.2 mm or under	0.3 mm
Clutch spring free length	33.6 mm	32.6 mm

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**Special Tools**

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Clutch Holder: 57001-1243

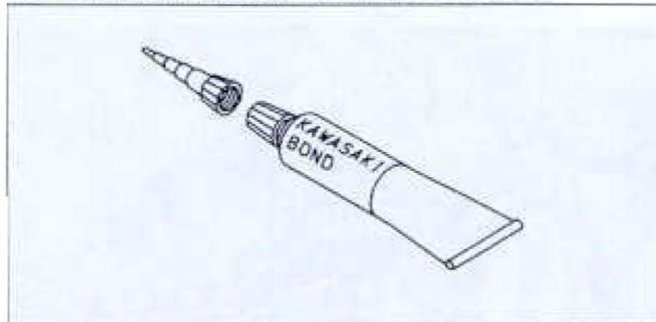


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**Sealant**

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Kawasaki Bond (Silicone Sealant): 56019-120



## 5-4 CLUTCH

### Clutch

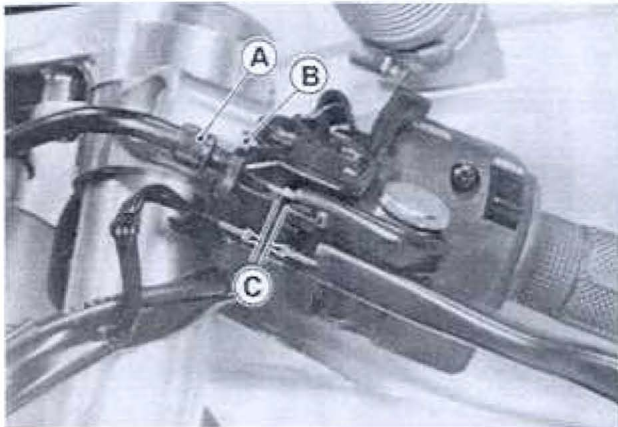
Due to the friction plate wear and clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart.

#### ⚠ 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.

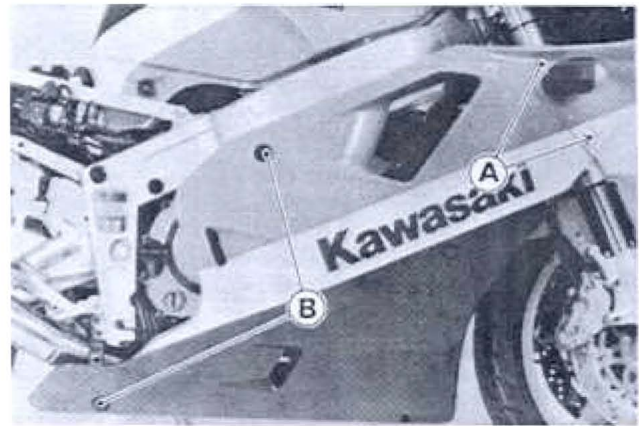


A. Adjuster  
B. Locknut  
C. Clutch Lever Free Play 2 ~ 3 mm

- ★ 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.

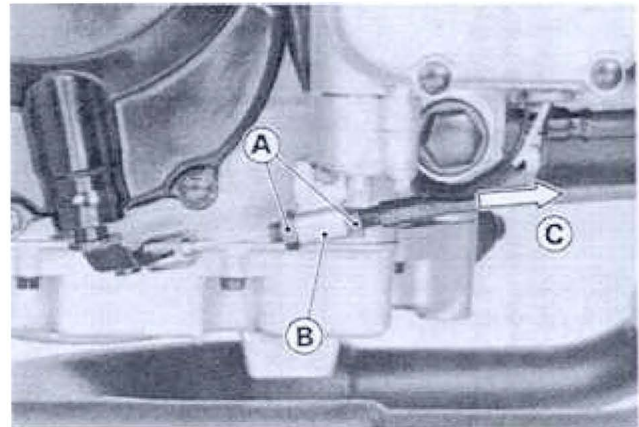
#### Clutch Adjustment

- 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.



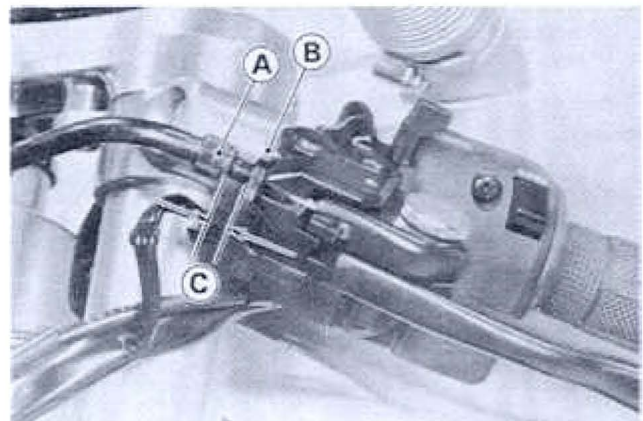
A. Fairing Mounting Screws  
B. Fairing Mounting Bolts

- 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.

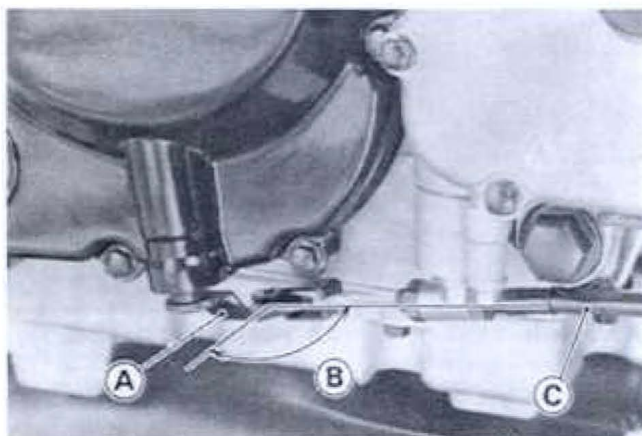
- Loosen the knurled locknut at the clutch lever.
- Turn the adjuster so that 5 ~ 6 mm of threads are visible.



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

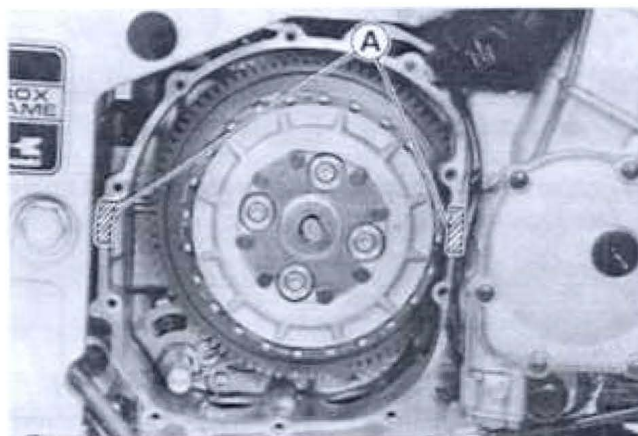
- Drain the engine oil (see Engine Oil Change in Engine Lubrication System chapter).
- Remove the lower fairing (see Lower Fairing Removal in Frame chapter).
- Remove the inner cover.
- Remove the clutch cable lower end from the clutch cover.
- Remove the clutch cover bolts and take off the cover.

##### 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.

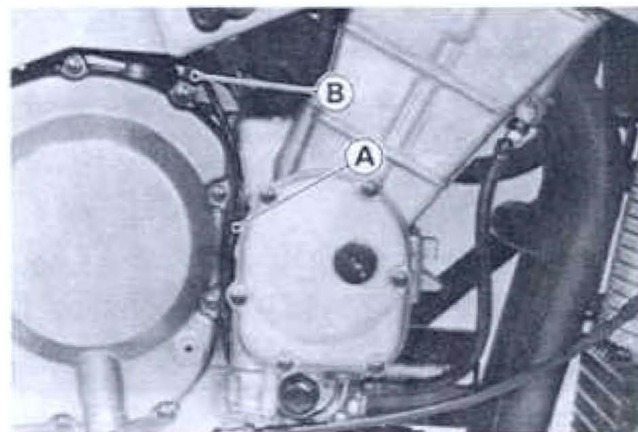
#### Clutch Cover Installation Note

- 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)

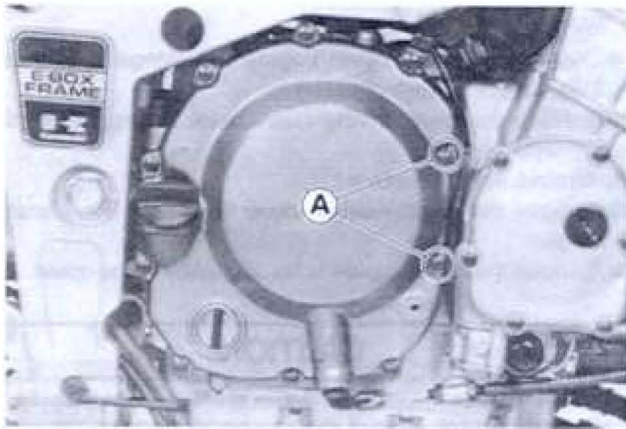
- Clamp the pick-up coil wire as shown.



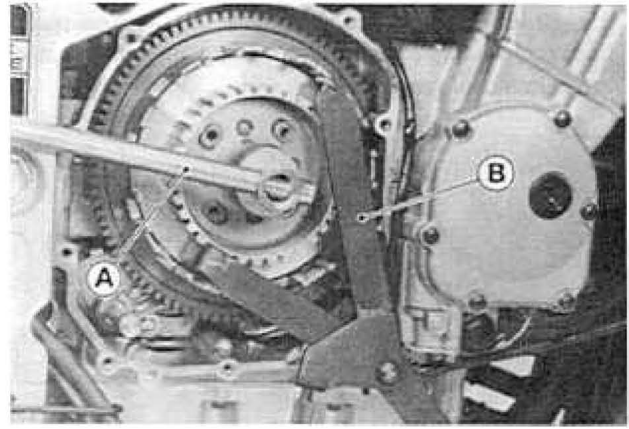
A. Pick-up Coil Lead                      B. Clamp

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

## 5-6 CLUTCH



A. Cover Bolt



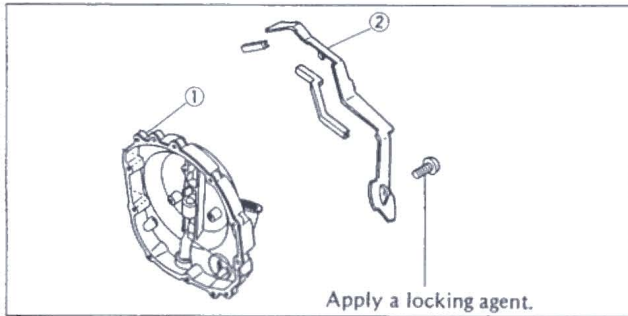
A. Wrench

B. Holder: 57001-1243

- Remove the thrust washer, clutch hub, clutch cam, washer, clutch housing, needle bearing, collar, and spacer.

### *Clutch Installation Notes*

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



1. Clutch Cover

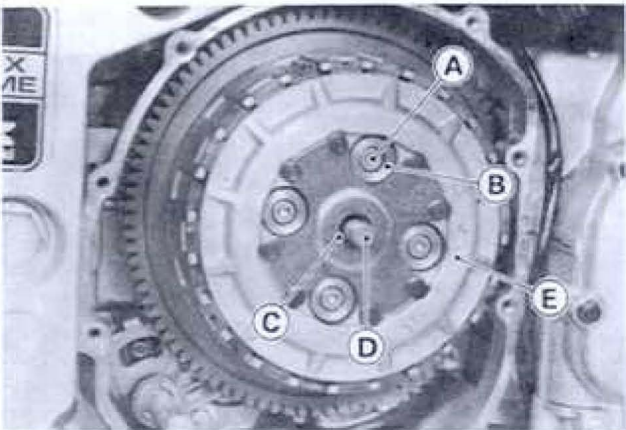
2. Right Inner Cover

Apply a locking agent.

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

### *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

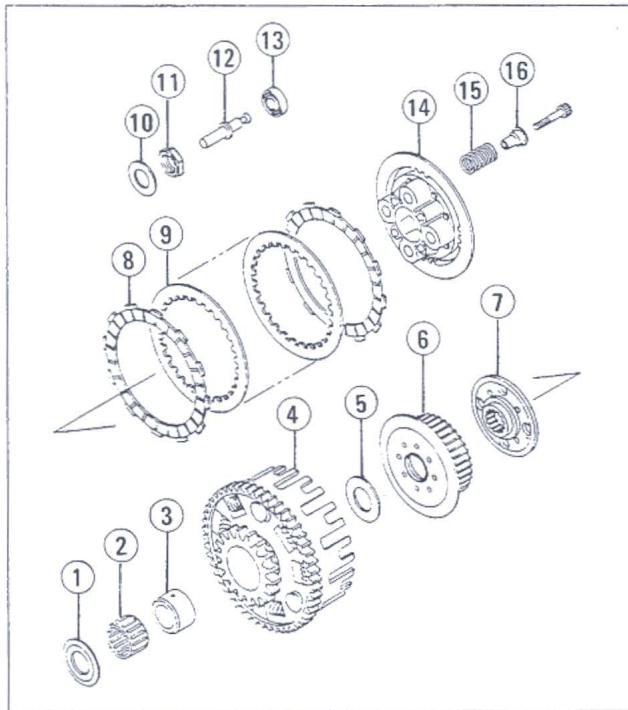
B. Retainer

C. Bearing

D. Pusher

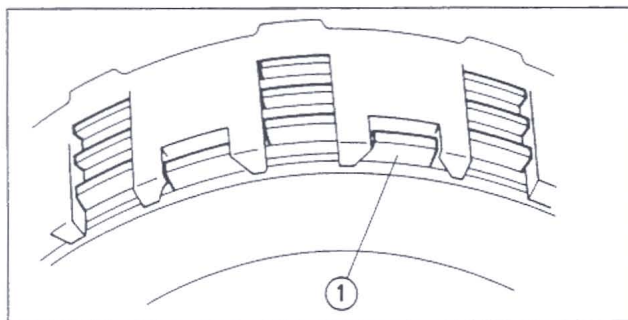
E. Clutch Spring Plate

- 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.



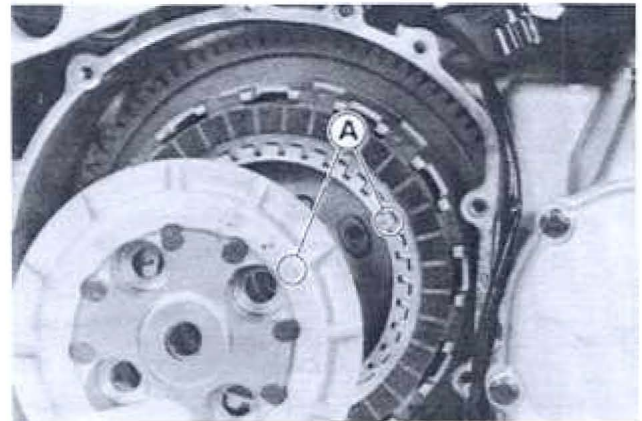
1. Last Friction Plate

- 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.

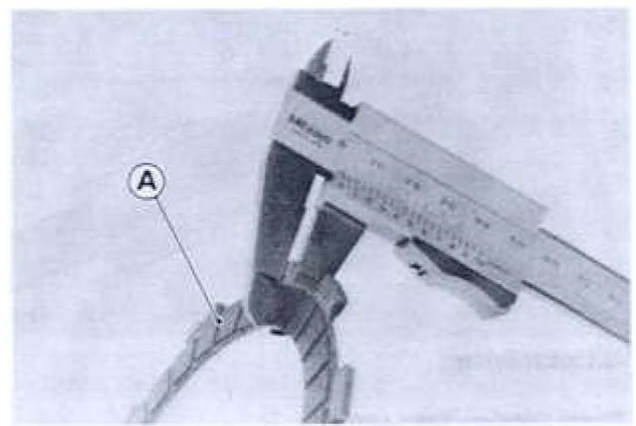


A. Marks

- 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

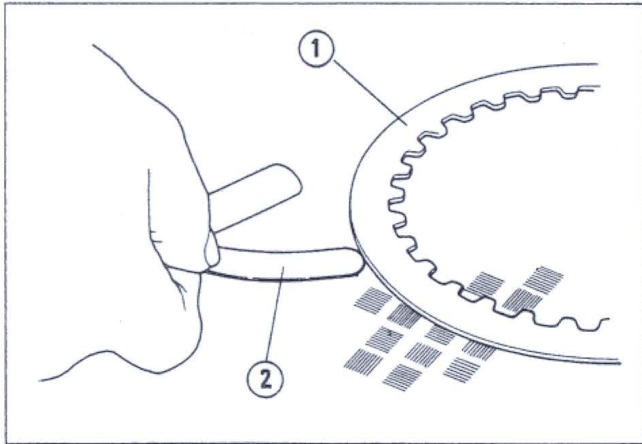
**Friction Plate Thickness**

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.



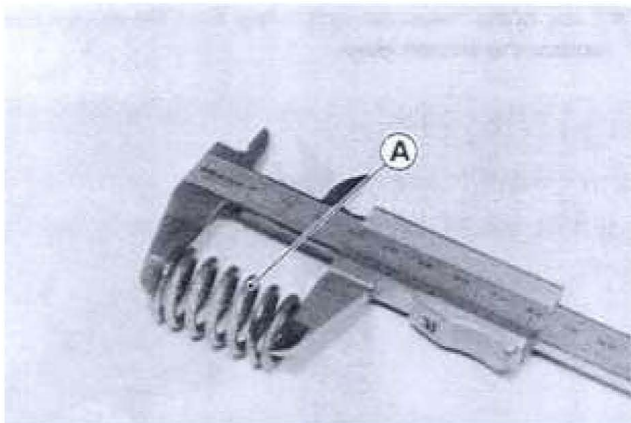
1. Friction or Steel Plate      2. Thickness Gauge

### **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.



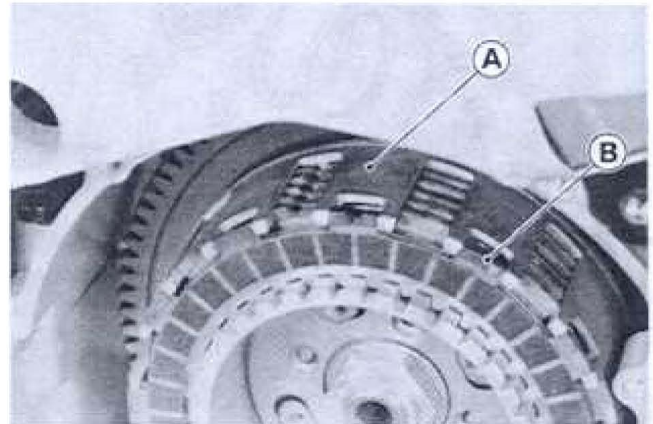
A. Clutch Spring

### **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.



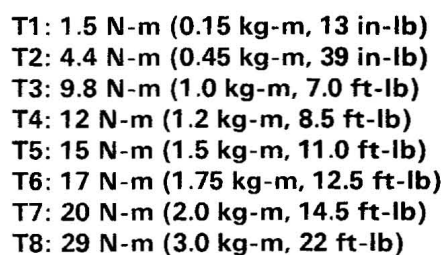
A. Clutch Hub Spline

# Engine Lubrication System

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### Exploded View



**SS: Apply silicone sealant to the threads.**

