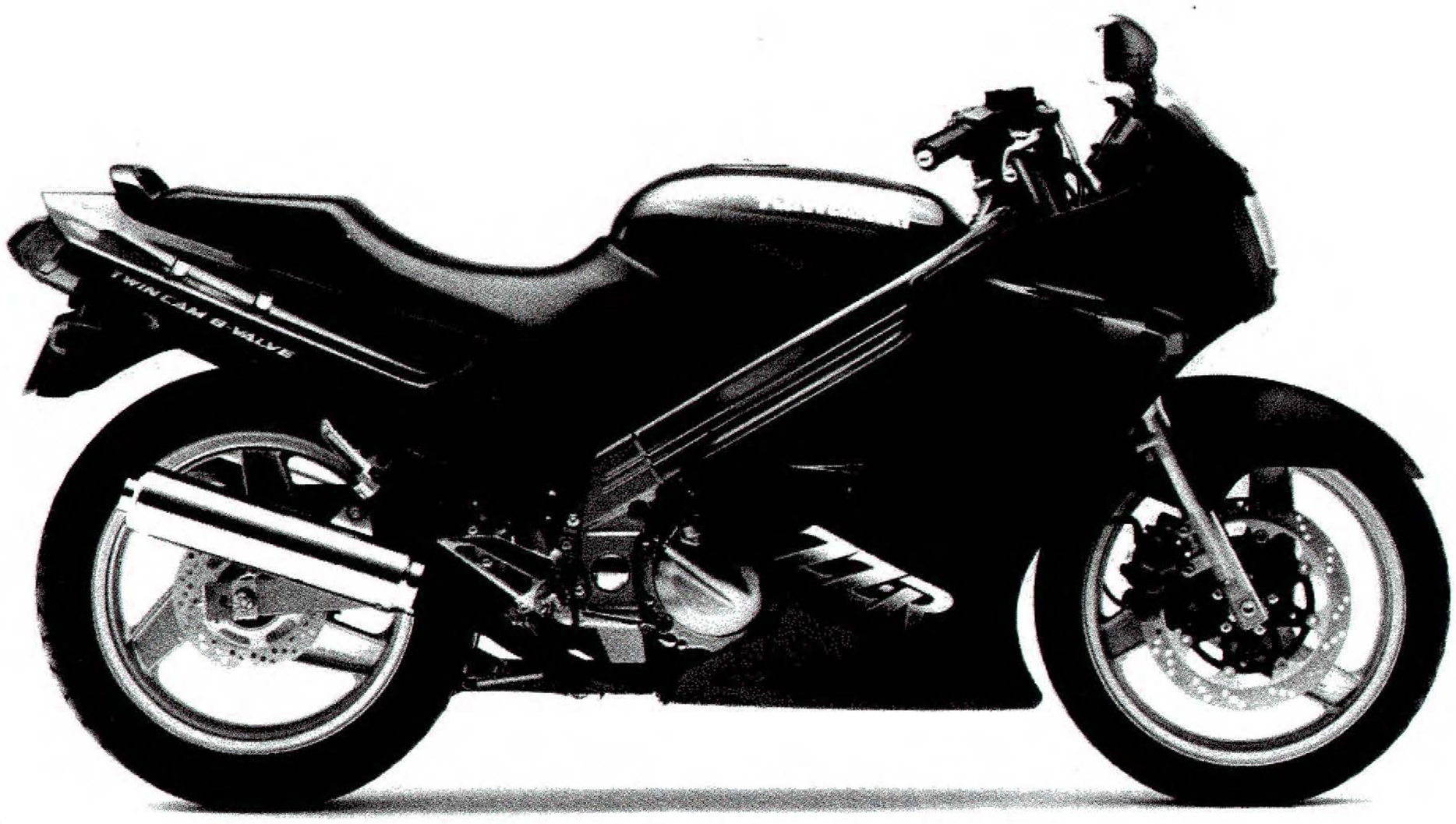
Kawasaki

ZZ-R250



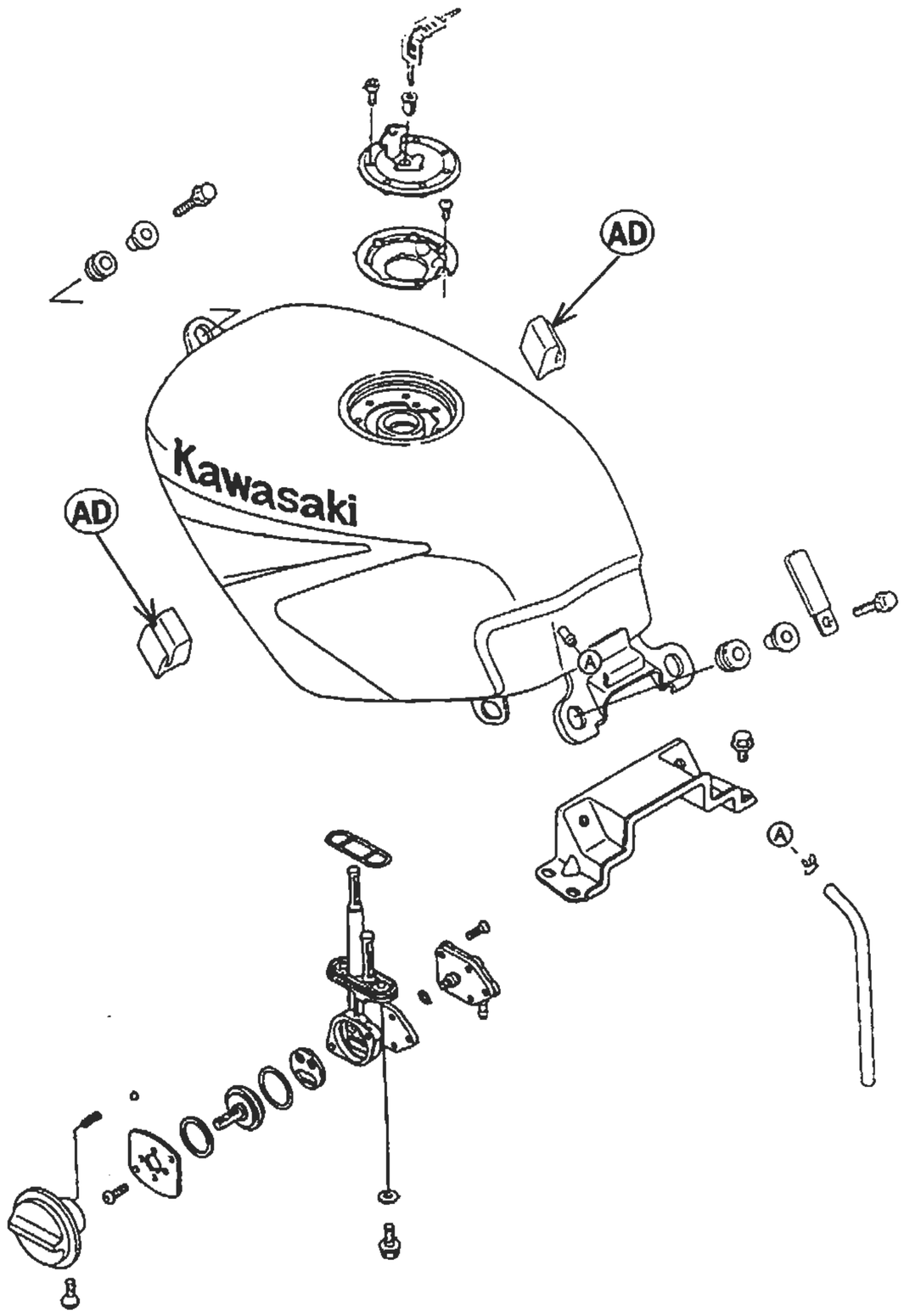
Motorcycle Service Manual Supplement

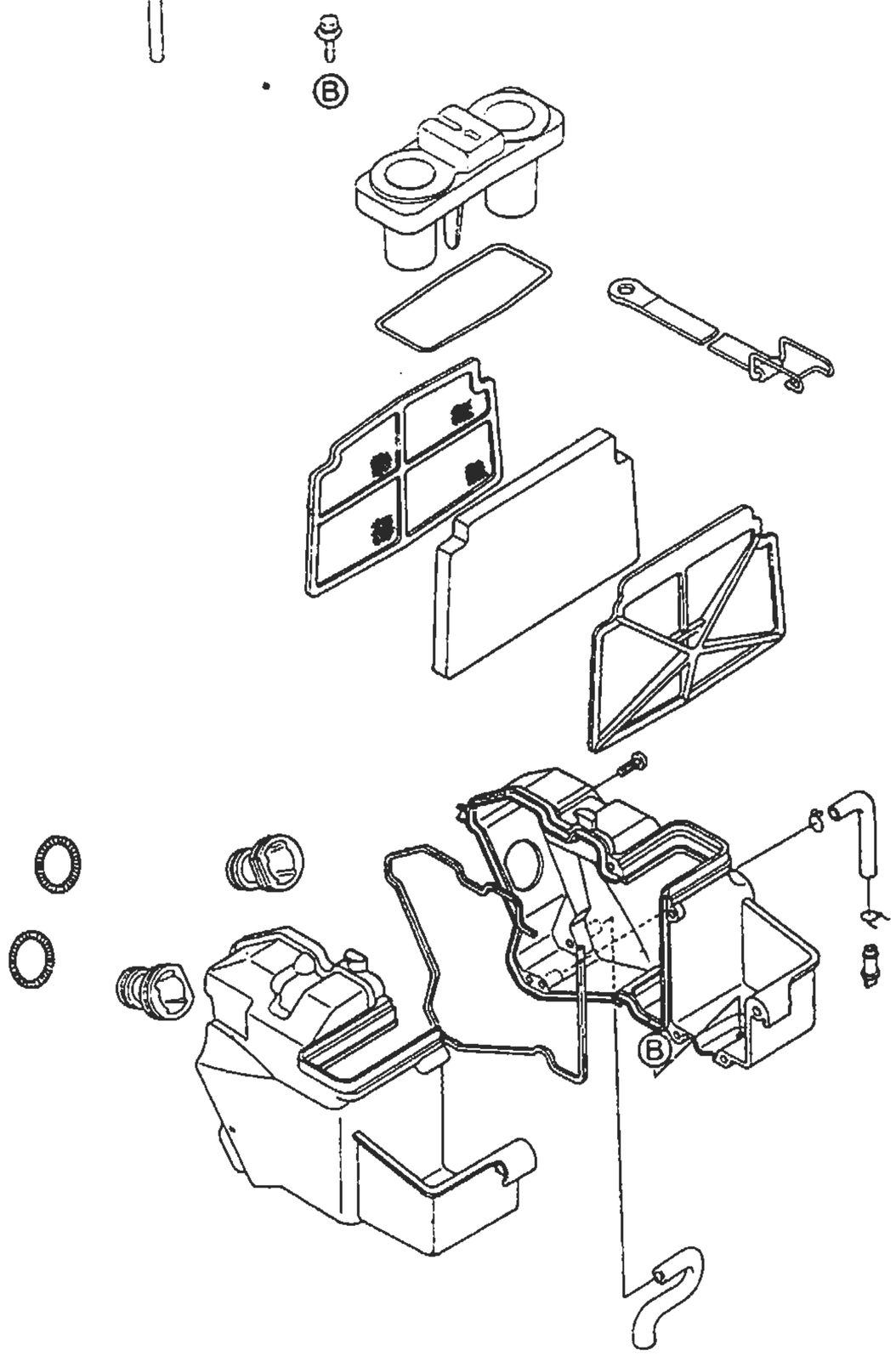
Torque and Locking Agent

The following tables list the tightening torque for the major fasteners, and the parts 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.
O : Apply an oil to the threads, seated surface, or washer.
S : Tighten the fasteners following the specified sequence.
SS : Apply silicone sealant to the threads.

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Cooling System:				
Fan switch	18	1.8	13.0	
Water temperature sensor	7.8	0.80	69 in-lb	SS
Engine Top End:				
Cylinder head cover bolts	9.8	1.0	87 in-lb	
Camshaft cap bolts	12	1.2	104 in-lb	
Camshaft sprocket bolts	15	1.5	11.0	L
Rear chain guide bolts: Upper	25	2.5	18.0	
Lower	27	2.8	20	L
Chain tensioner mounting bolts	–	–	–	L
Valve adjusting screw locknuts	20	2.0	14.5	
Cylinder head bolts: 8 mm dia.	25	2.5	18.0	S
6 mm dia.	12	1.2	104 in-lb	S
Cylinder head plugs	–	–	–	L
Clutch:				
Clutch lever holder clamp bolts	8.8	0.90	78 in-lb	
Clutch spring bolts	8.8	0.90	78 in-lb	
Clutch hub nut	130	13.5	98	
Engine Lubrication System:				
Oil pressure switch	15	1.5	11.0	SS
Oil hose banjo bolts (10 mm dia.)	20	2.0	14.5	
Oil pipe banjo bolt (8 mm dia.)	12	1.2	104 in-lb	
Crankcase oil passage plug	15	1.5	11.0	
Oil pressure relief valve	15	1.5	11.0	L
Oil pump mounting bolts	–	–	–	L
Oil drain plug	20	2.0	14.5	
Oil filter mounting bolt	20	2.0	14.5	
Engine Removal/Installation:				
Engine mounting bolt	32	3.3	23	
Engine mounting nuts	32	3.3	23	
Engine mounting bracket bolts	25	2.5	18.0	
Engine mounting bracket nuts	25	2.5	18.0	
Crankshaft/Transmission:				
Connecting rod big end cap nuts	27	2.8	20	O
Starter clutch bolts	34	3.5	26	L
Shift drum bearing holder bolts	–	–	–	L
Oil breather mounting bolts	9.8	1.0	87 in-lb	L
Crankcase bolts: 8 mm dia.	27	2.8	20	S
6 mm dia.	12	1.2	104 in-lb	
Shift drum positioning bolt	25	2.5	18.0	





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

AD : Apply adhesive agent.
G : Apply grease.
O : Apply oil.

Engine Top End

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* : Refer to Base Manual

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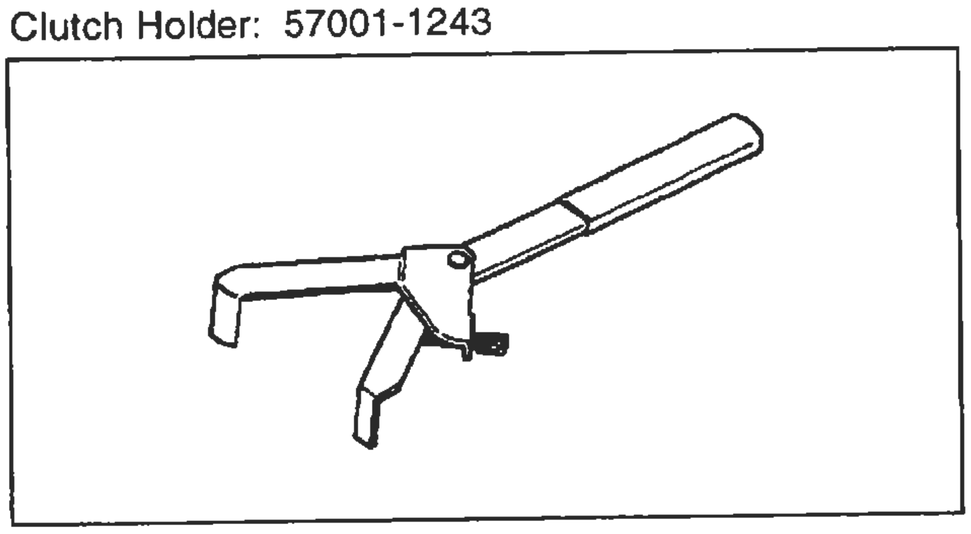
Specifications

Item	Standard	Service Limit
Clutch		
Clutch lever play	2 ~ 3 mm	– – –
Clutch spring free length	32.6 mm	31.7 mm
Friction plate thickness	2.9 ~ 3.1 mm	2.8 mm
Friction and steel plate warp	– – –	0.3 mm

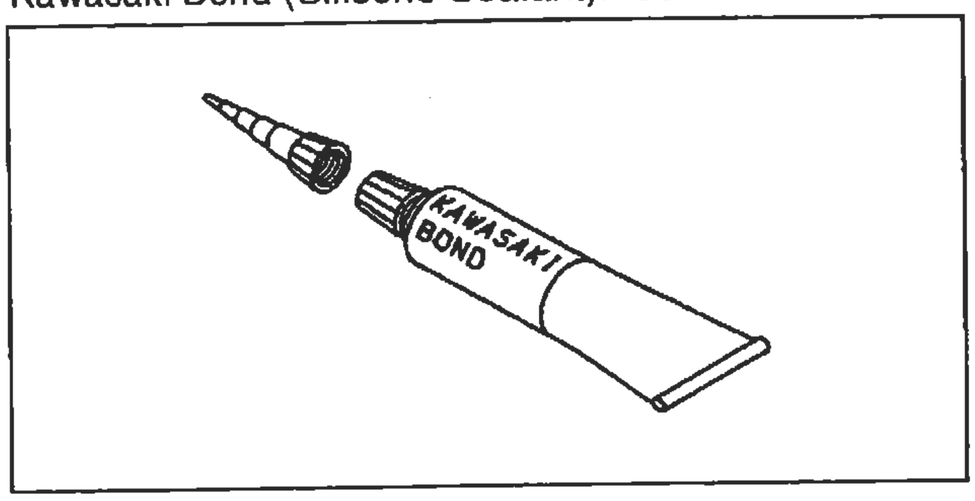
Special Tools

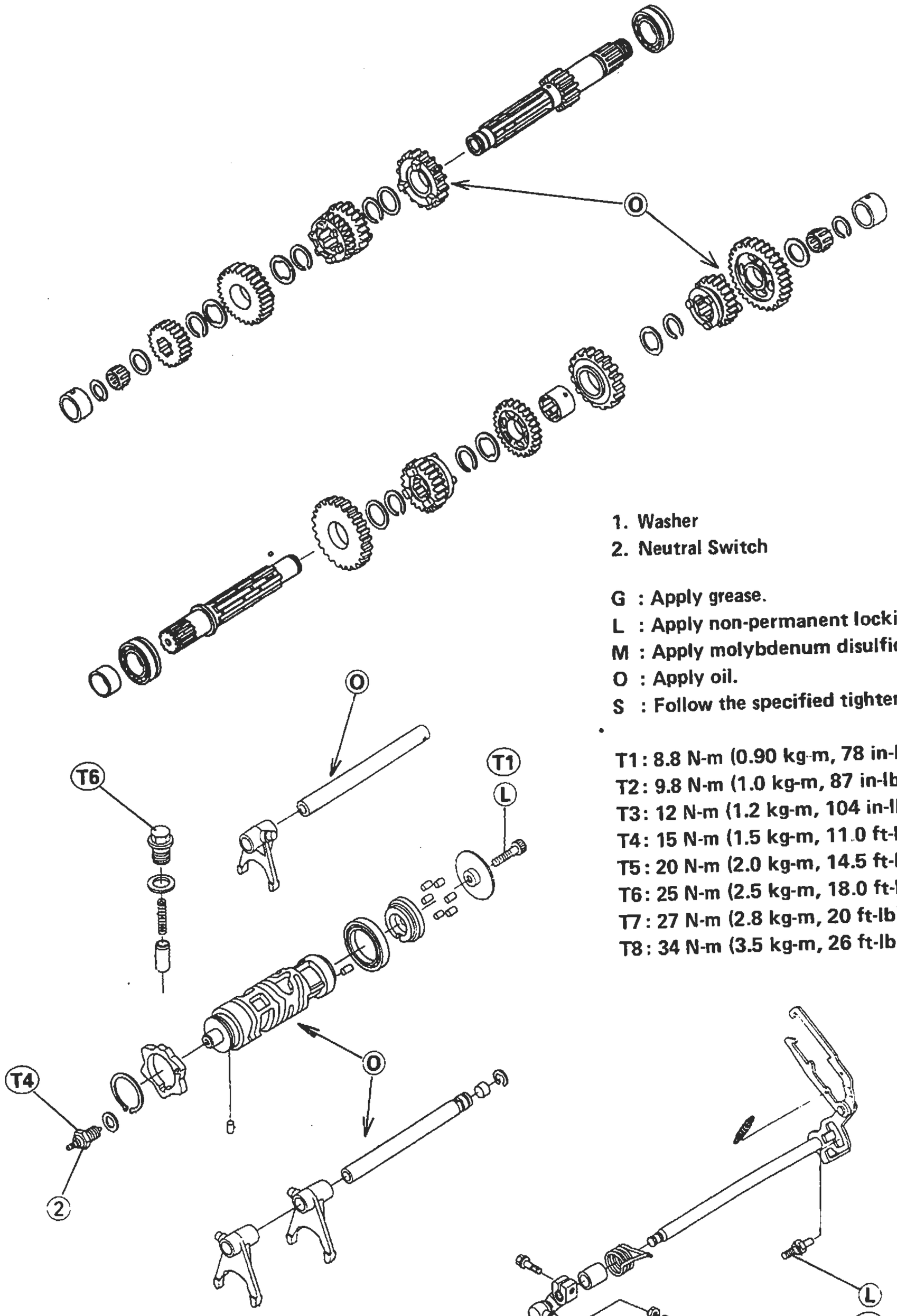
Clutch Holder: 57001-1243



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120





1. Washer
2. Neutral Switch

G : Apply grease.
L : Apply non-permanent locking agent.
M : Apply molybdenum disulfide grease.
O : Apply oil.
S : Follow the specified tightening sequence.

T1: 8.8 N-m (0.90 kg-m, 78 in-lb)
T2: 9.8 N-m (1.0 kg-m, 87 in-lb)
T3: 12 N-m (1.2 kg-m, 104 in-lb)
T4: 15 N-m (1.5 kg-m, 11.0 ft-lb)
T5: 20 N-m (2.0 kg-m, 14.5 ft-lb)
T6: 25 N-m (2.5 kg-m, 18.0 ft-lb)
T7: 27 N-m (2.8 kg-m, 20 ft-lb)
T8: 34 N-m (3.5 kg-m, 26 ft-lb)

Tires

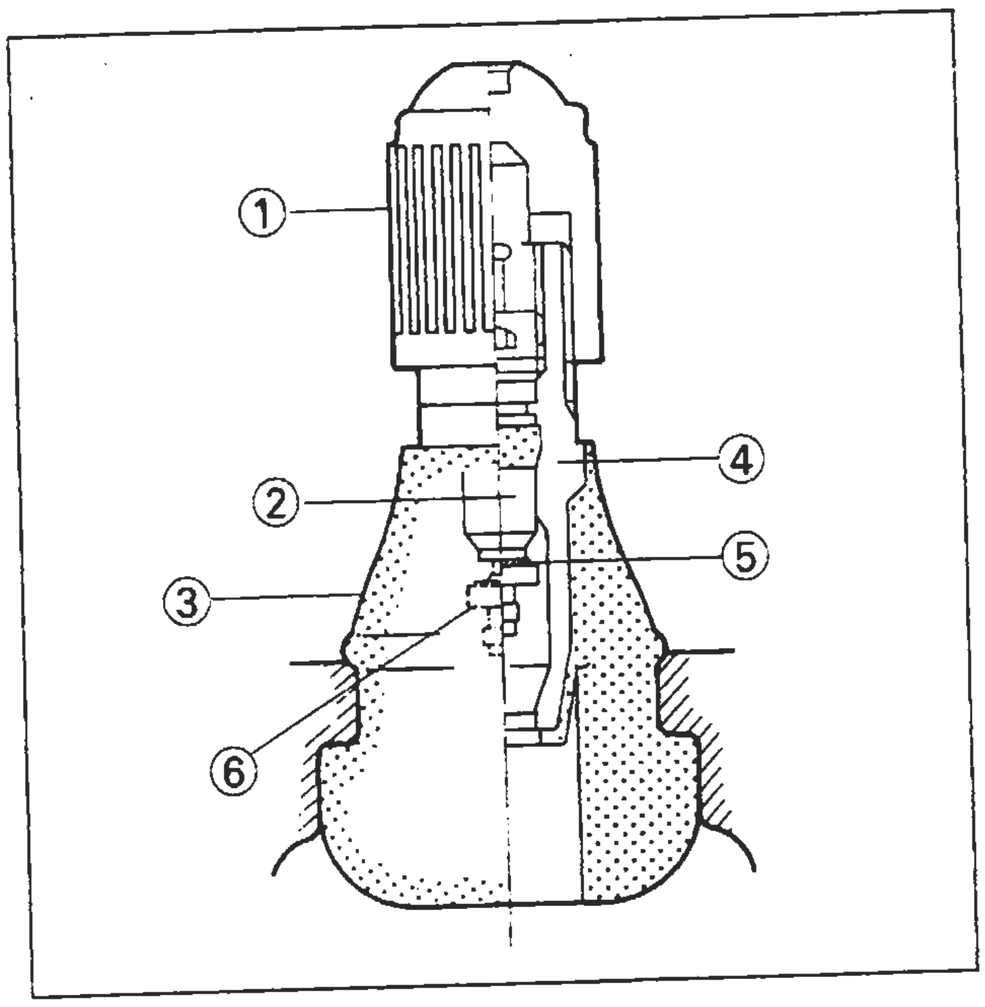
Tire Installation

Refer to the Base Manual, noting the following.

● Remove the air valve and discard it.

CAUTION

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



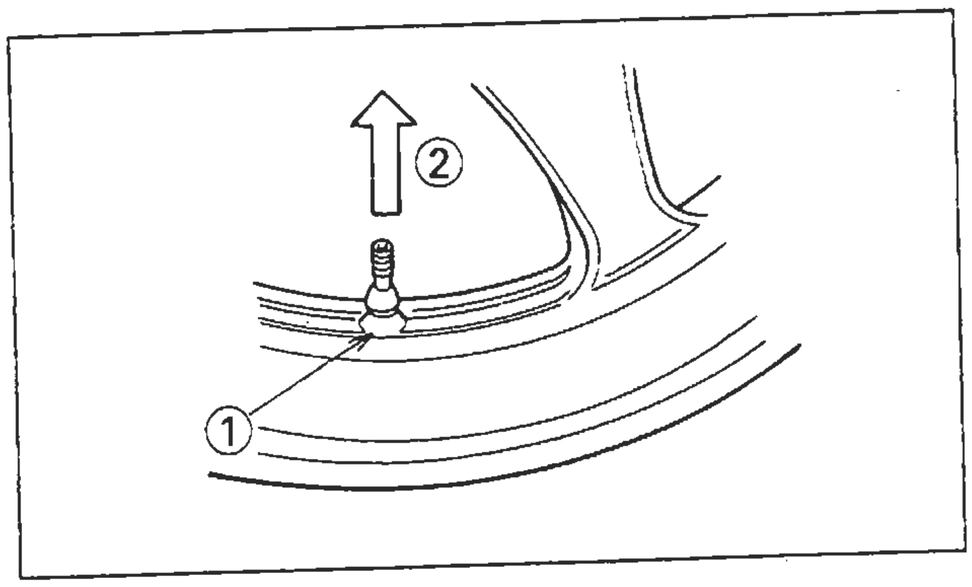
1. Plastic Cap
2. Valve Core
3. Stem Seal
4. Valve Stem
5. Valve Seat
6. Valve Opened

● Install a new valve in the rim.

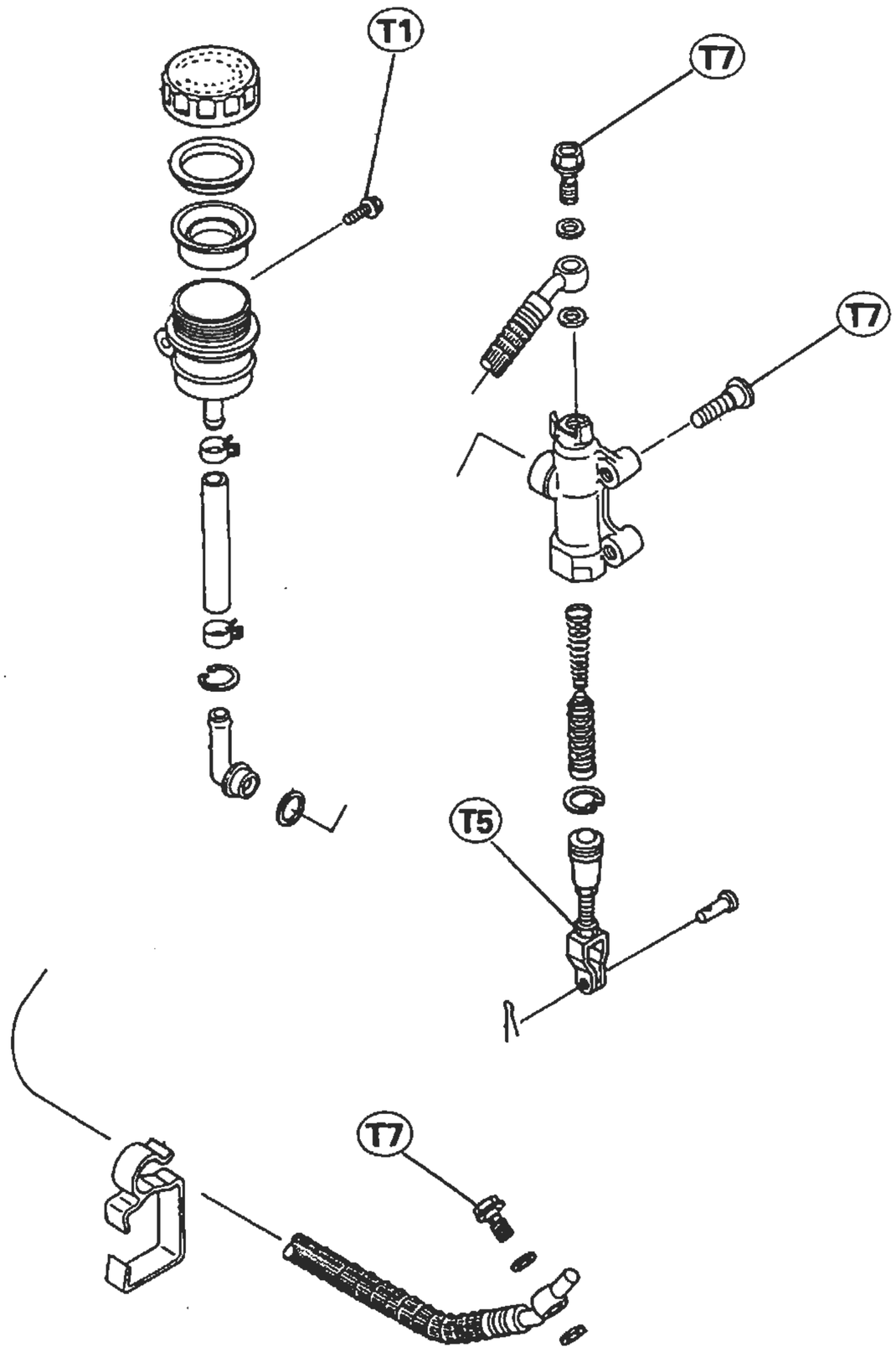
○ Remove the valve cap, lubricate the stem with a soap and water solution, and pull the stem through the rim from the inside out until it snaps into place.

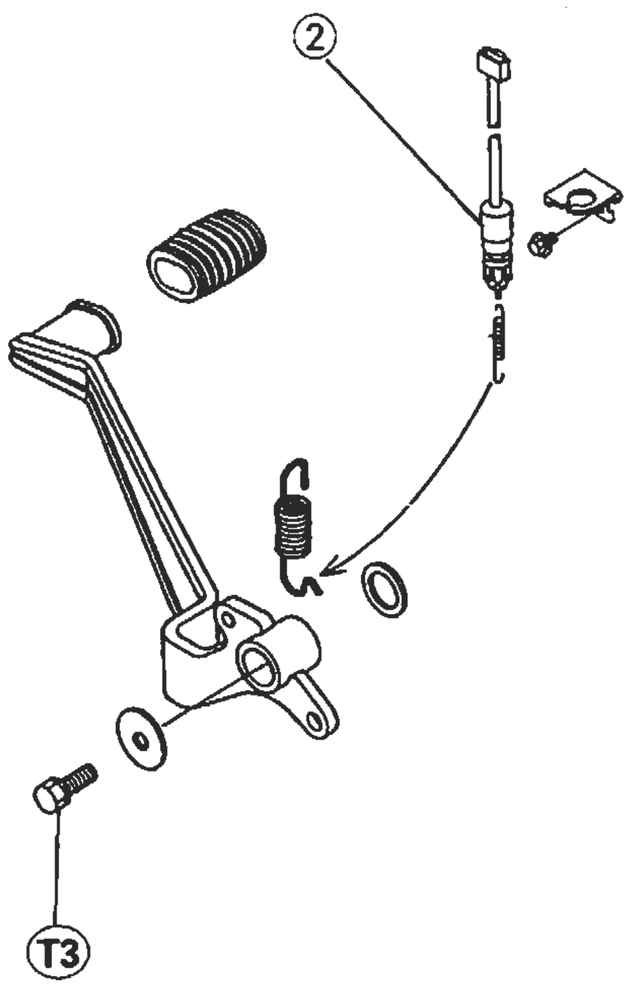
CAUTION

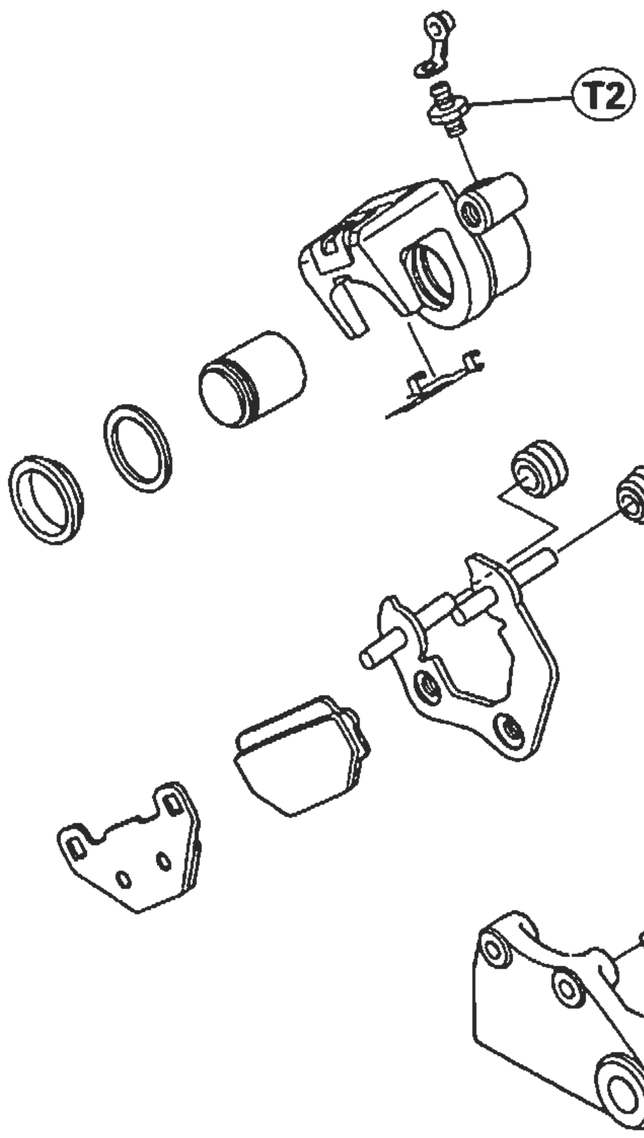
Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

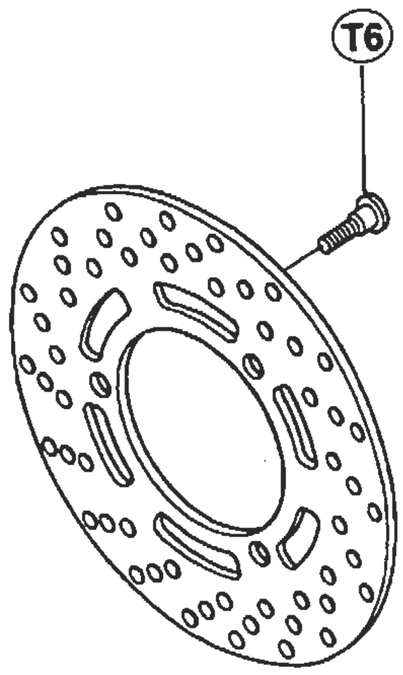


1. Apply soap and water solution.
2. Pull the stem out.

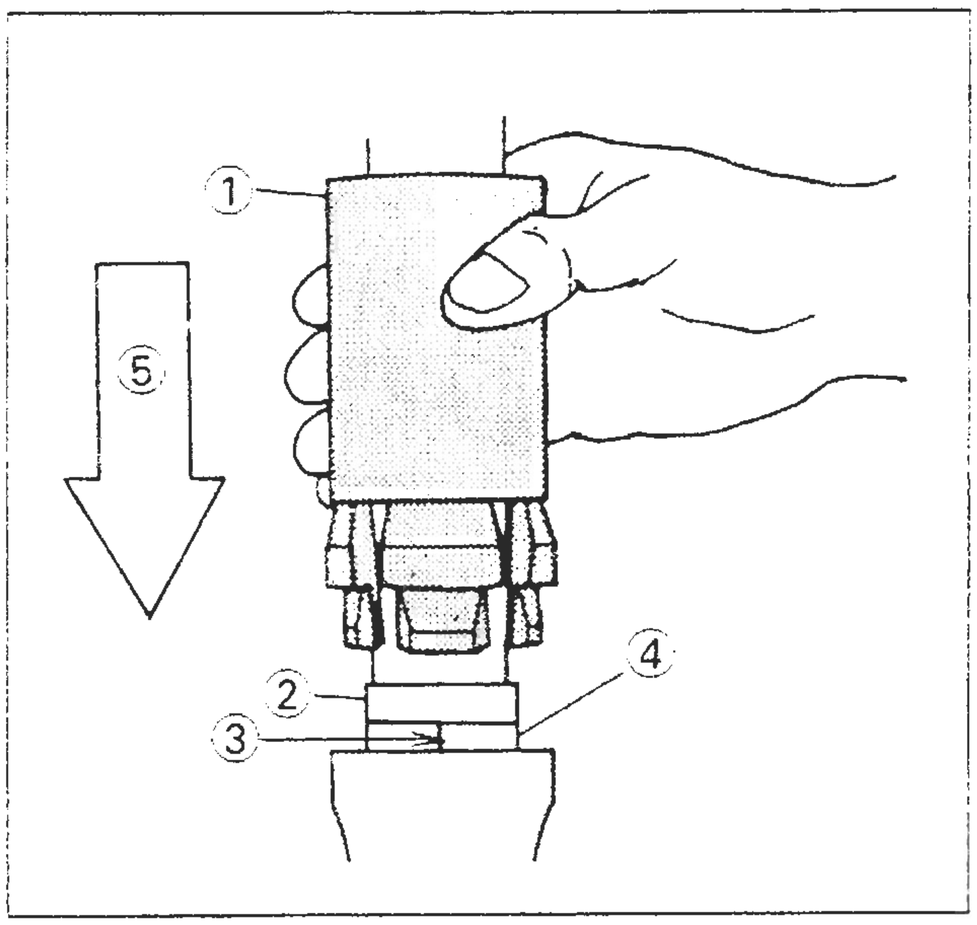

T1
T7
T7
T5
T7


2
T3


T2


T6

T7



1. Driver: 57001-1219
2. Used Guide Bush
3. Split (toward the right or left)
4. New Guide Bush
5. Tap

Rear Suspension (Uni-trak)

Rear Shock Absorber:

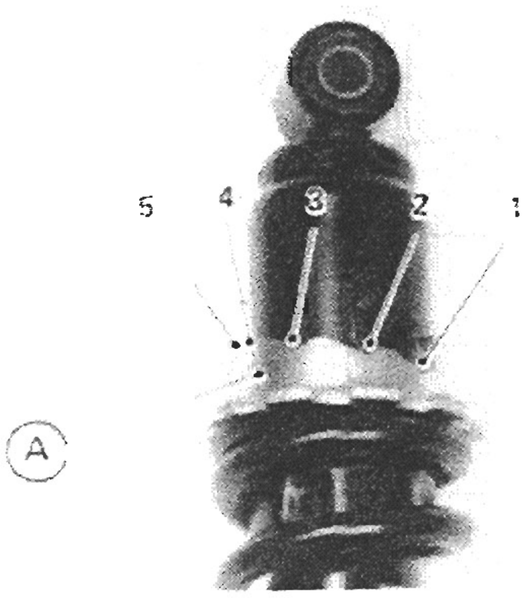
Spring Preload Adjustment

- ●Remove the rear shock absorber and hold it with a vise.
- ●Turn the adjuster to the desired position using the stem nut wrench (special tool).
- ○The spring preload can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

Spring Preload Adjustment

Adjuster Position	Spring Force	Setting	Load	Road	Speed
1	Weak	Soft	Light	Good	Low
↕	↕	↕	↕	↕	↕
5	Strong	Hard	Heavy	Bad	High

○The standard adjuster setting for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is **(2)**.



A. Adjuster

Rear Shock Absorber Removal

- ●Set the motorcycle up on its center stand.
- ●Remove the following.
  - Seat
  - Side Covers
  - Tie-rod Lower Nut and Bolt
  - Rear Shock Absorber Nuts and Bolts
- ○Support the rear wheel to remove the bolts.

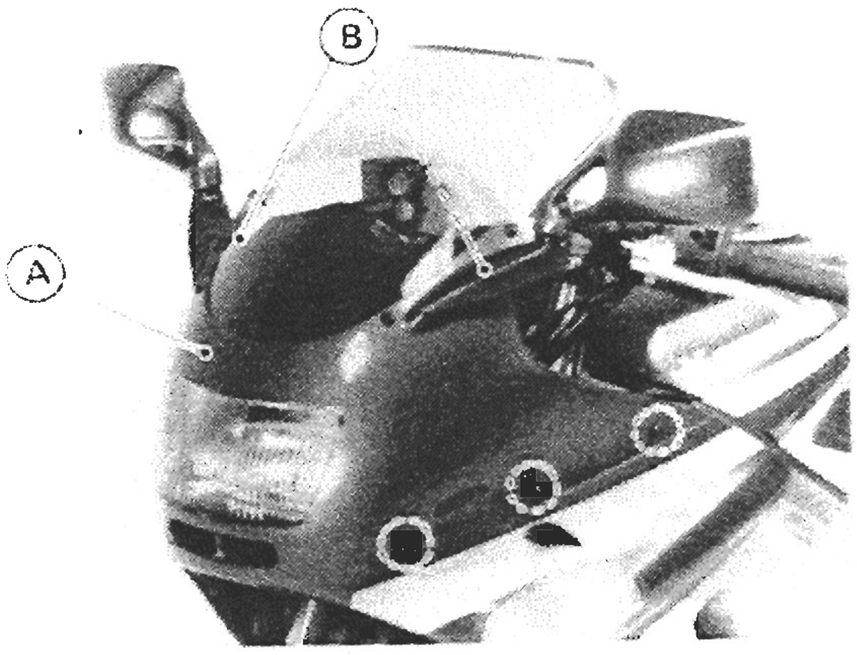
CAUTION

When pulling out the bolts, lift the rear wheel slightly. Forcing or tapping on a bolt could damage the bolt, sleeve, and bearing.

Fairings

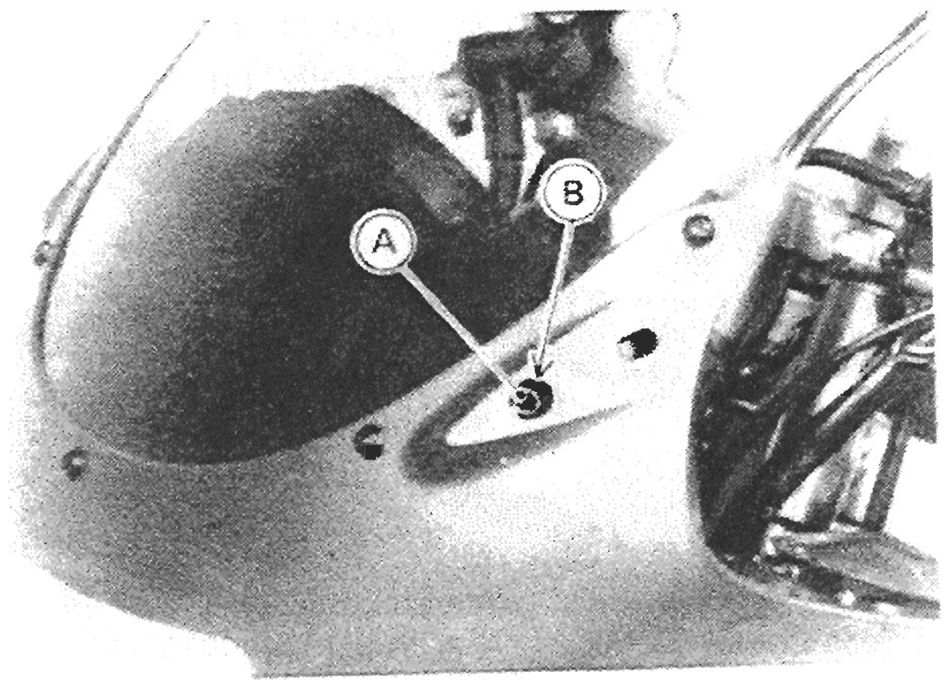
Upper Fairing Removal

● Remove the following.
Rear View Mirrors (left and right)
Upper Fairing



A. Upper Fairing B. Mirror Mounting Nuts

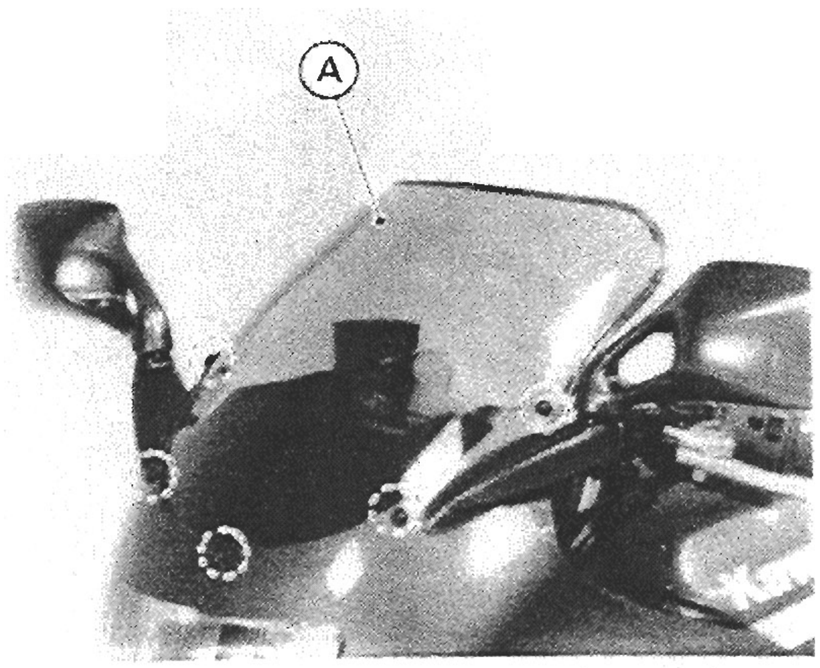
● Pull the upper fairing forward with bending the fairing outward, and free the fairing holes from the stopper on the bracket.



A. Stopper B. Hole

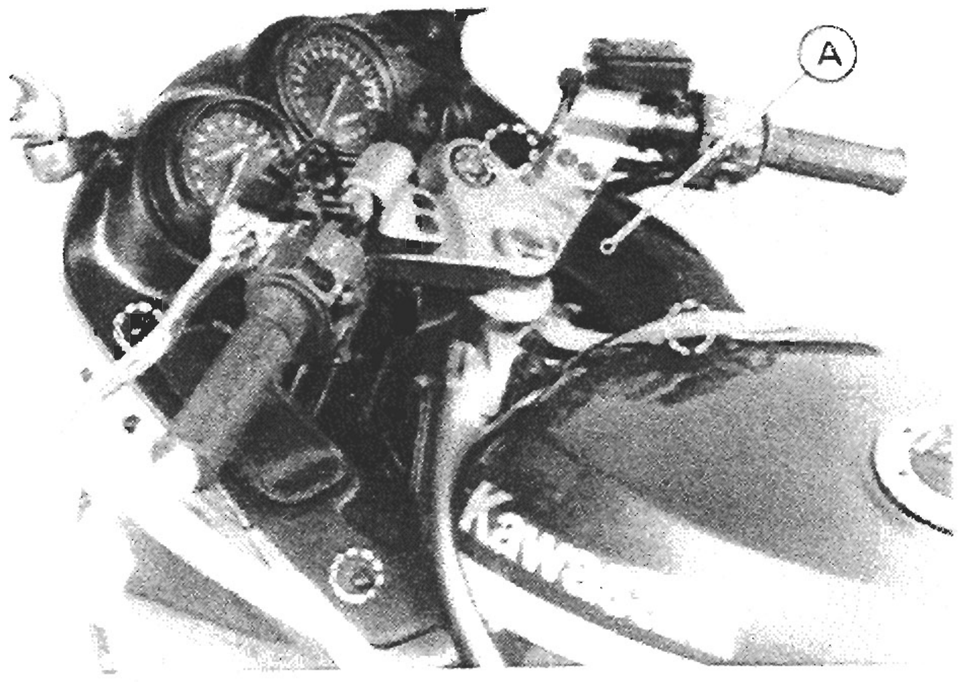
Inner Fairing Removal

● Before removing the inner fairing, remove the windshield.



A. Windshield

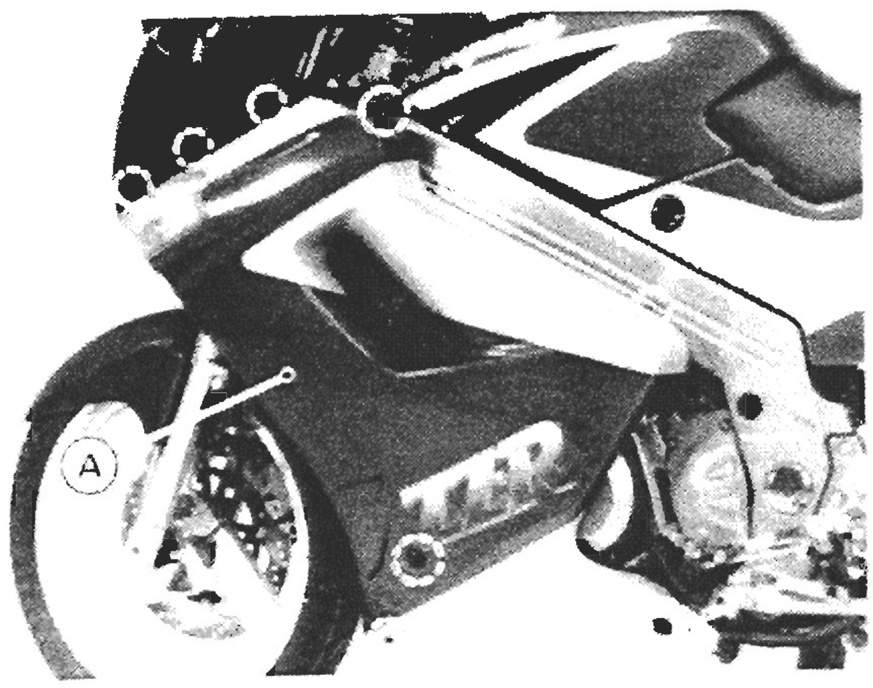
● Remove the following.
Inner Fairing



A. Inner Fairing

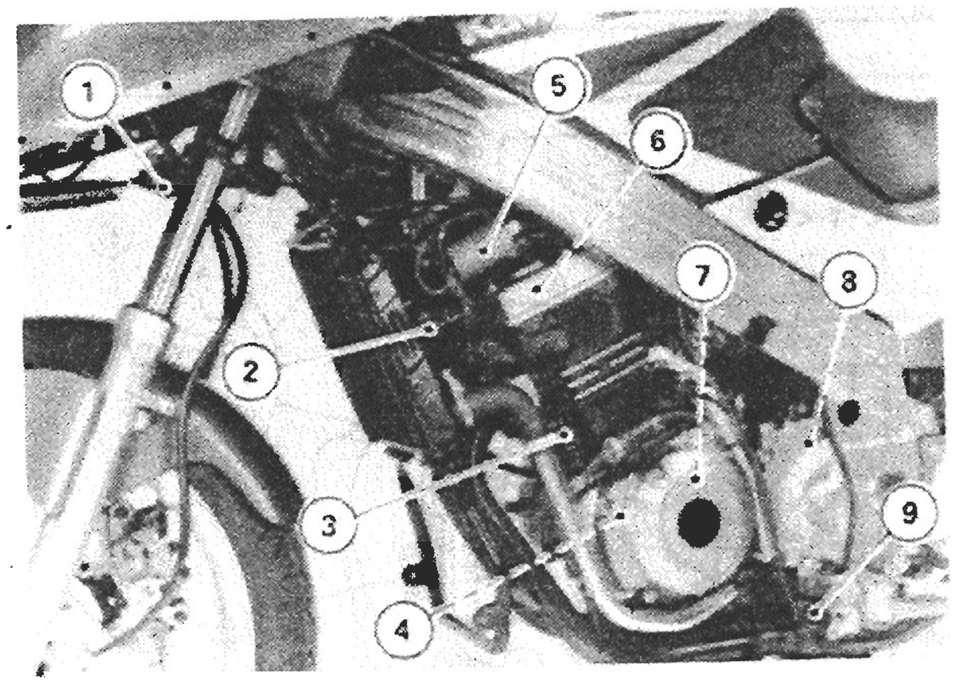
Lower Fairing Removal

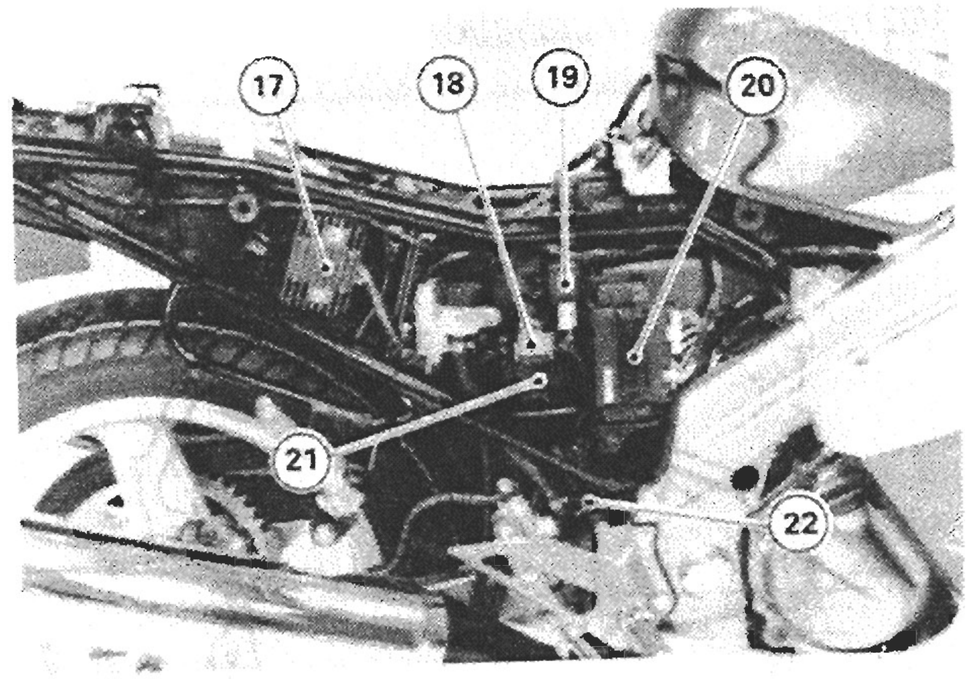
● Remove the following.
Lower Fairings (left, right, and front)

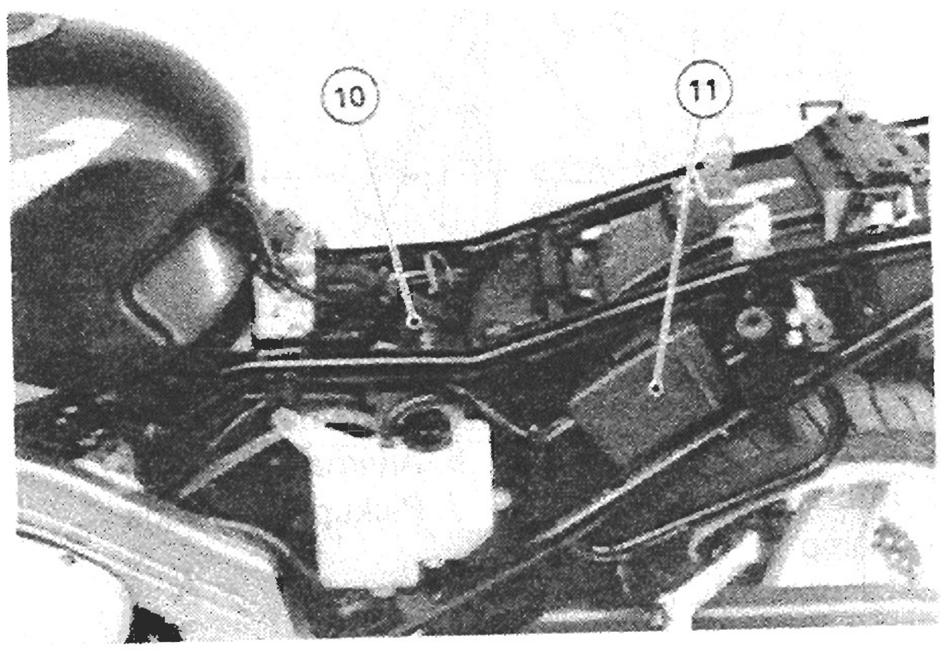


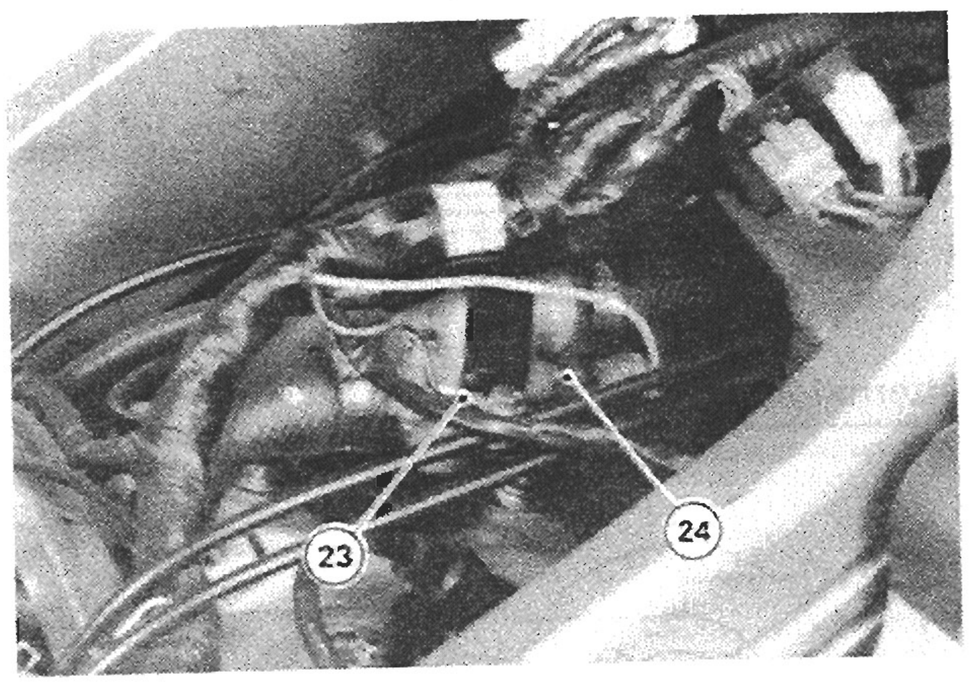
A. Lower Fairing (left)

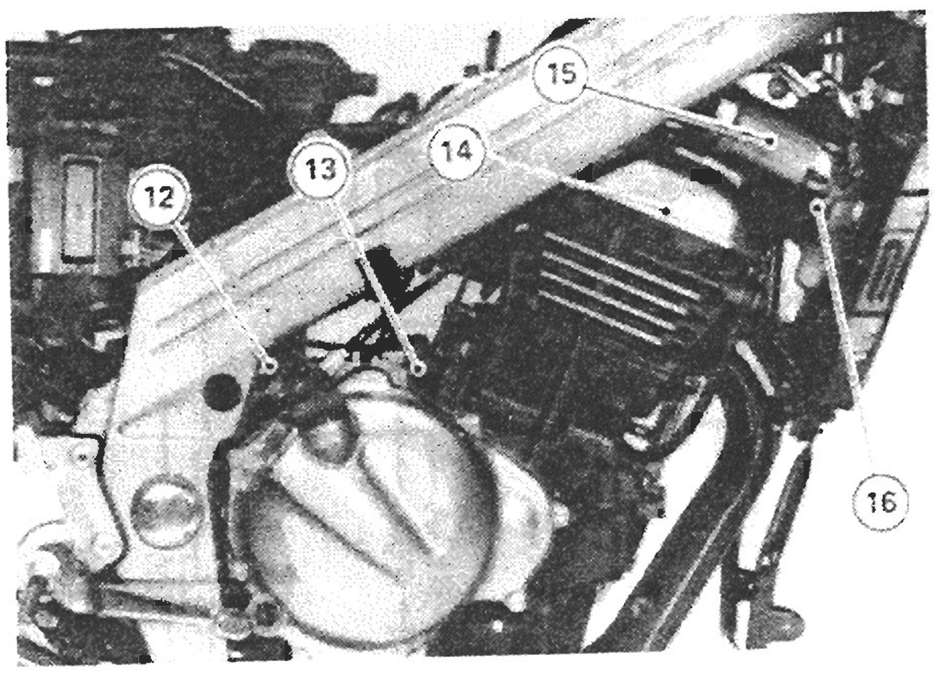
Parts Location

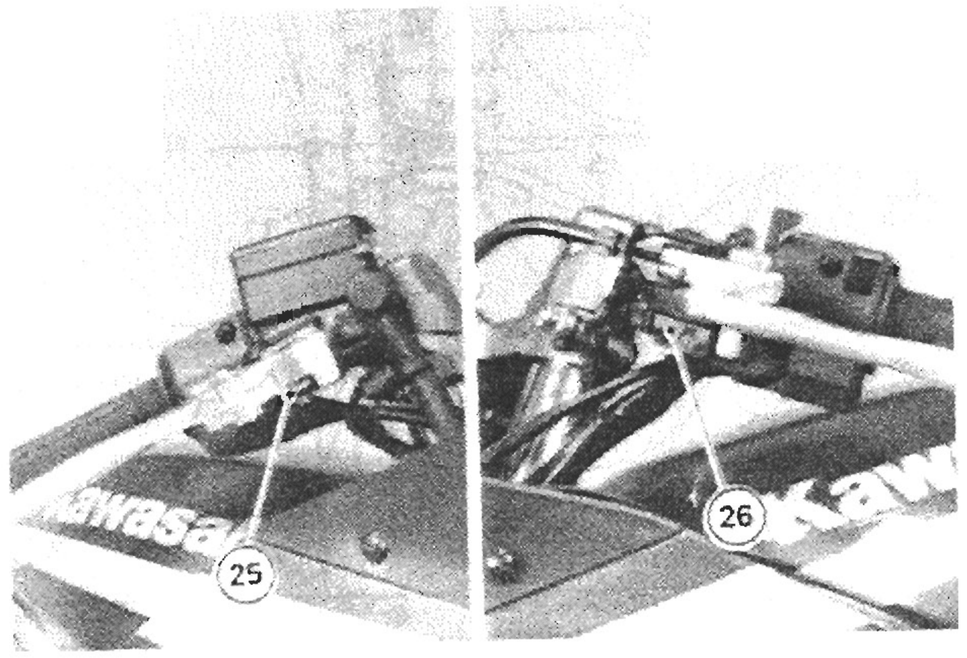












1. Horn
2. Radiator Fan Switch
3. Oil Pressure Switch
4. Pickup Coil
5. Ignition Coil (#1)
6. Spark Plug (#1)
7. Alternator
8. Neutral Switch
9. Side Stand Switch
10. Battery
11. IC Igniter
12. Ground Lead
13. Starter Motor
14. Spark Plug (#2)
15. Ignition Coil (#2)
16. Radiator Fan
17. Regulator/Rectifier
18. Main Fuse (30A)
19. Turn Signal Relay
20. Junction Box
21. Starter Relay
22. Rear Brake Light Switch
23. Ground Lead
24. Water Temperature Sensor
25. Front Brake Light Switch
26. Starter Lockout Switch

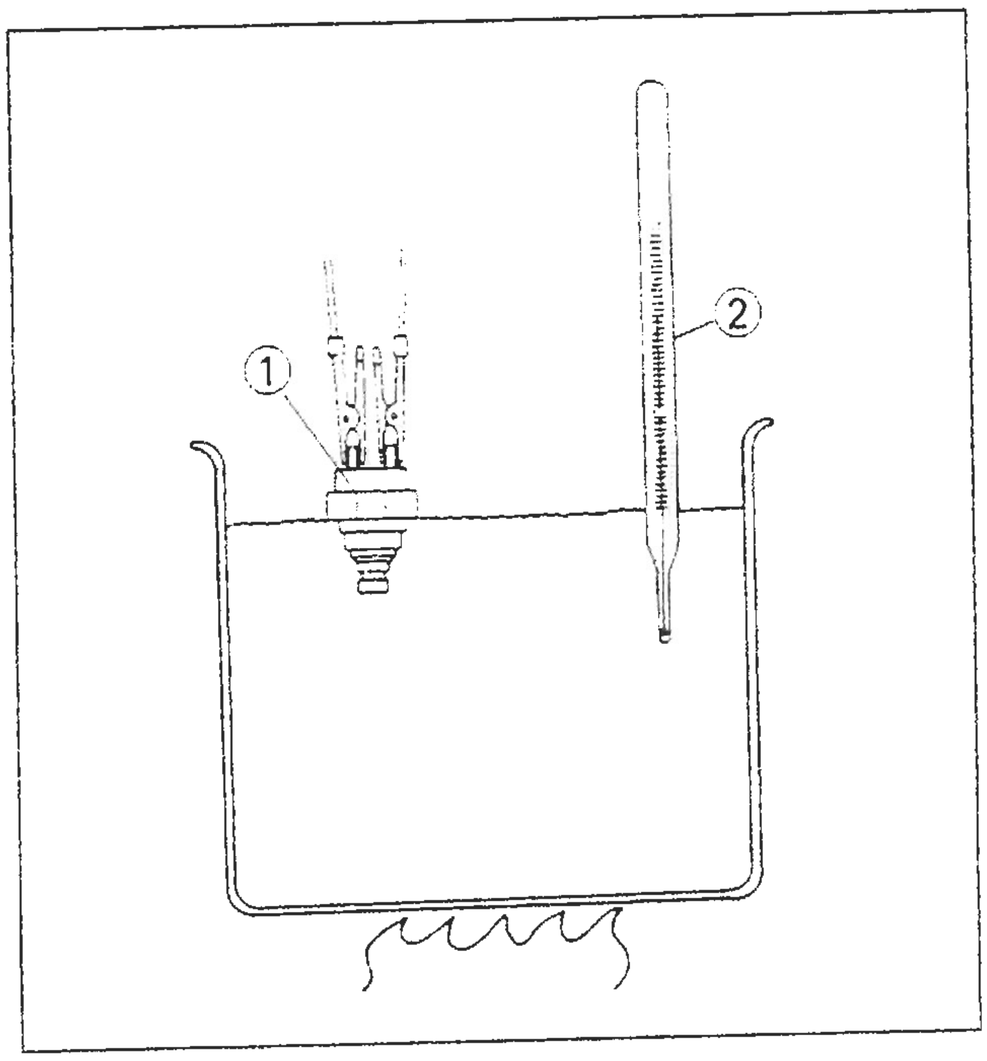
Fan Switch Inspection

- Remove the fan switch.
- Suspend the switch in a container of coolant so that the temperature-sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer in the coolant.

NOTE

○ *The switch and thermometer must not touch the container sides or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.



1. Fan Switch 2. Thermometer

- Using an ohmmeter, measure the internal resistance of the switch across the terminals at the temperature shown in the table.

★ If the meter does not read as specified, the switch is defective.

Fan Switch Resistance

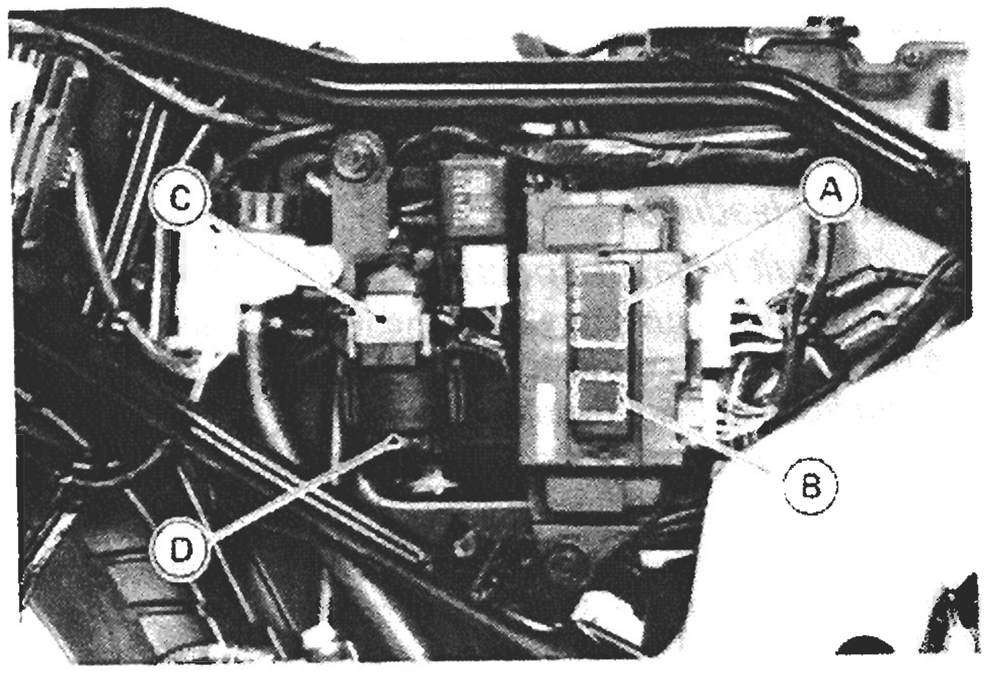
Rising temperature:
From OFF to ON at 96 ~ 100°C
(205 ~ 212°F)
Falling temperature:
From ON to OFF above 91°C (196°F)
ON: Less than 0.5 Ω
OFF: More than 1 MΩ

Junction Box

The junction box has fuses, relays, and diodes. The relays and diodes can not be removed.

Fuse Circuit Inspection and Replacement

- Remove:
  Seat
  Right Side Cover
- Remove the junction box.
- Remove the fuse from the junction box and inspect the fuse element.
- Replace the blown fuse with a new one of the correct capacity as specified on the junction box.



A. Fuses (10A)
B. Spare Fuse (10A, 30A)
C. Main Fuse (30A)
D. Spare Fuse (30A)

Fuse Circuit Inspection (EX250-H1 ~ H4)

Meter Connection	Meter Reading (Ω)
*1 – 3B	0
1 – 2	0
6 – 7	0
6 – 17	0
1 – 7	∞
8 – 17	∞

(*) : EX250-H3, H4 Australian Model only

Supplement - 2000 ~ 2001 Models

Table of Contents

Electrical System

Specifications

Item	Standard	Service Limit
Battery :		
Type	12 V 6 Ah	— — —
Specific gravity	1.320 @20°C (68° F)	— — —
Charging System :		
Charging voltage	14.5 V, Night @4 000 r/min (rpm)	— — —
Alternator stator coil resistance	0.2 ~ 0.9 Ω	— — —
Ignition System :		
Pickup coil air gap	0.7 mm	— — —
Pickup coil resistance	100 ~ 150 Ω	— — —
Ignition coil :		
3 needle arcing distance	7 mm or more	— — —
Primary winding resistance	2.2 ~ 3.5 Ω	— — —
Secondary winding resistance	10 ~ 16 kΩ	— — —
Spark plug gap :		
Standard plug	NGK CR8HSA or ND U24FSR-U	— — —
Optional plug	NGK CR7HSA or ND U22FSR-U	— — —
Plug gap	0.6 ~ 0.7 mm	— — —
Electric Starter System :		
Starter motor carbon brush length	11 mm	5 mm
Starter motor commutator diameter	23 mm	22 mm
Switches and Sensors :		
Rear brake light switch	ON after about 10 mm pedal travel	— — —
Fan switch : OFF → ON	96 ~ 100°C (205 ~ 212°F)	— — —
ON → OFF	Above 91°C (196°F)	— — —
Water temperature sensor resistance	80°C (176°F) : about 52 Ω	— — —
	100°C (212°F) : about 27 Ω	— — —

Engine Lubrication System

Specifications

Item	Standard
Engine Oil:	
Type	API SE, SF or SG API SH or SJ with JASO MA
Viscosity	SAE 10W-40
Capacity	1.5 L (when filter is not removed) 1.9 L (when filter is removed)
Oil pressure Measurement:	
Relief valve opening pressure	430 ~ 590 kPa (4.4 ~ 6.0 kgf/cm^2, 63 ~ 85 psi)
Oil pressure @4 000 r/min (rpm), oil temp 90°C (194°F)	More than 345 kPa (3.5 kgf/cm^2, 50 psi)

Sealant - Kawasaki Bond (Silicone sealant): 56019–120

Engine Oil and Oil Filter

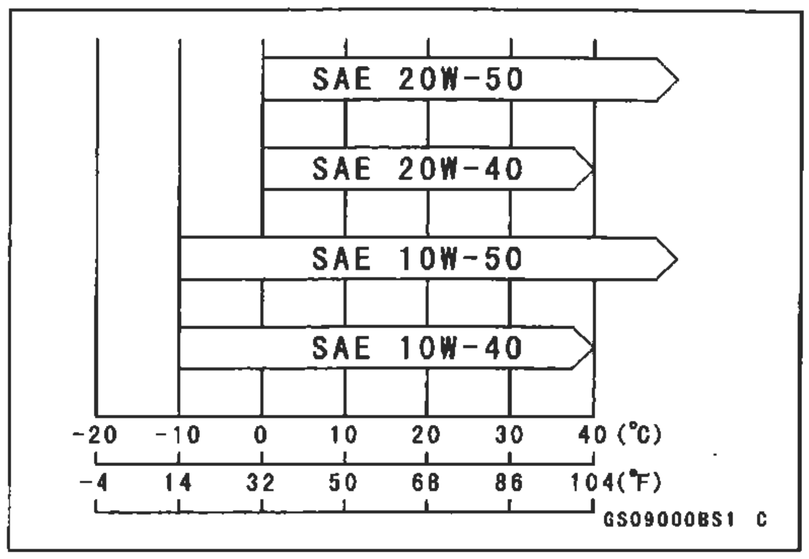
Engine Oil Change

Recommended Engine Oil

Type : API SE, SF or SG
API SH or SJ with JASO MA

Viscosity : SAE 10W-40

Capacity : 1.5 L (when filter is not removed)
1.9 L (when filter is removed)



NOTE

○ *Depending on the atmospheric temperature of your riding area, the engine oil viscosity should be change accordingly to the chart.*

Before Servicing

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

Especially note the following:

(1) Dirt

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

(2) Battery Ground

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

(a) the possibility of accidentally turning the engine over while partially disassembled.

(b) sparks at electrical connections which will occur when they are disconnected.

(c) damage to electrical parts.

(3) Tightening Sequence

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

Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

(4) Torque

The torque values given in this Service Manual should always be adhered to. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(5) Force

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

(6) Edges

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

(7) High Flash-point Solvent

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

(8) Gasket, O-ring

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

(9) Liquid Gasket, Nonpermanent 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).

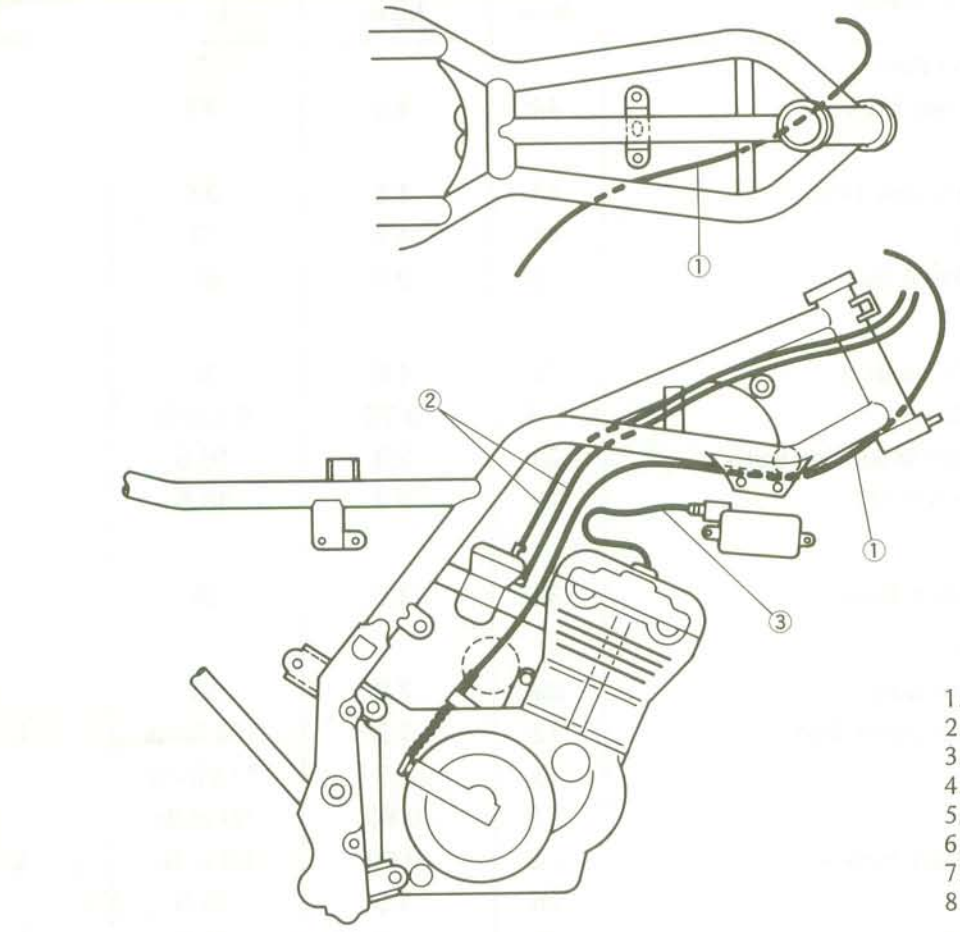
(10) Press

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.

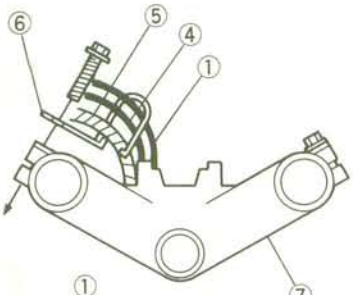
(11) Ball Bearing

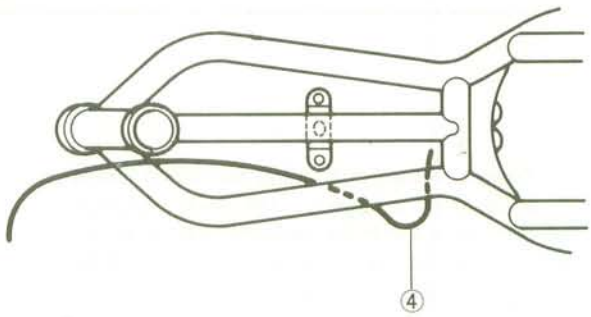
When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft.

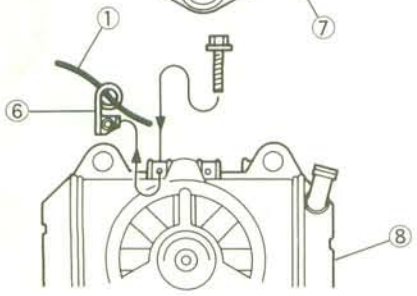
Suggested Wiring, Cable or Hose Routing

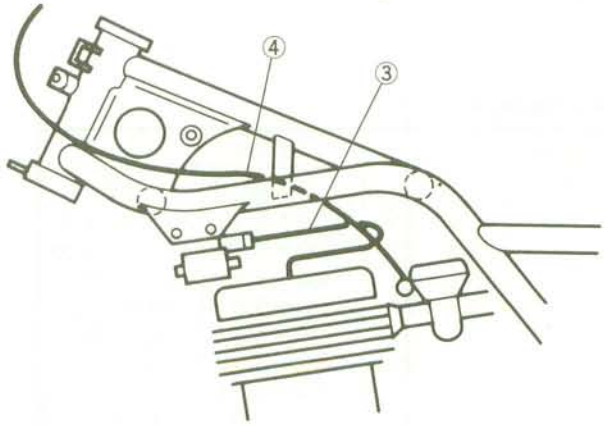


1. Clutch Cable
2. Throttle Cables
3. Spark Plug Lead
4. Choke Cable
5. LH Switch Housing
6. Cable Guide
7. Steering Stem Head
8. Radiator









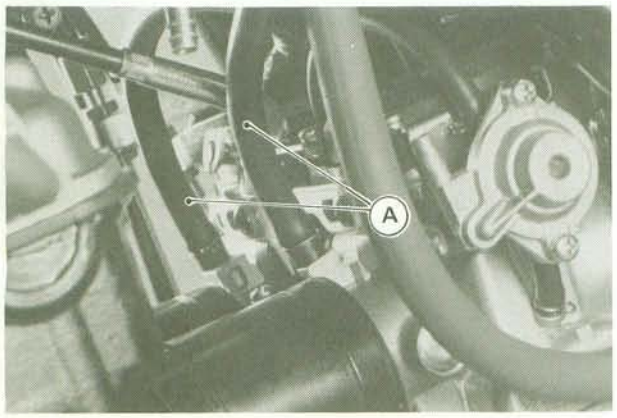
Carburetor Synchronization Inspection

- Warm up the engine.
- Check idle speed and adjust if necessary.
- Remove the left hand kneegrip cover.
- Turn the fuel tap PRI position.

WARNING

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

- Pull the vacuum hoses out of the vacuum hose fittings at the fuel tap and the carburetor fuel enricher.
- Attach vacuum gauge set (special tool: 57001-1198) to the vacuum hoses.



A. Vacuum Hoses

- Start the engine and idle to measure the engine intake vacuum.

★If the intake vacuum difference between any two cylinders exceeds the limit, synchronize the carburetor butterfly valves (see Butterfly Valve Synchronization).

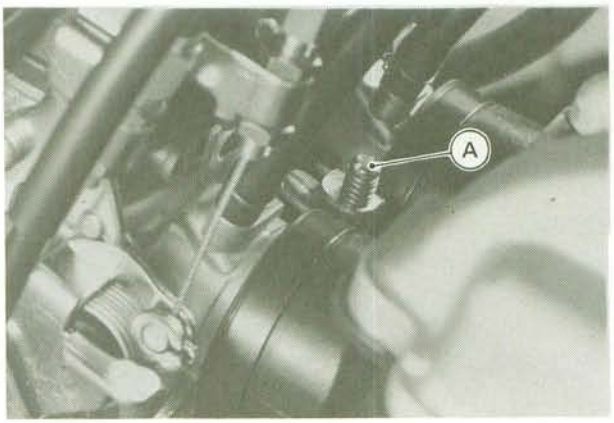
Engine Vacuum Synchronization

Less than 2.7 kPa (2.0 cmHg) difference between both cylinders

- Remove the vacuum gauge, connect the vacuum hoses to the vacuum hose fittings.
- Insert the kneegrip pad.

Carburetor Synchronization

- Turn the adjusting screw to synchronize the butterfly valves.



A. Adjusting Screw

- Check idle speed and adjust if necessary.

Fuel Level Inspection

WARNING

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

- Prepare a rubber hose (6 mm in diameter and about 300 mm long).
- Connect fuel level gauge (Special Tool) to the carburetor float bowl with the fuel hose.
- Hold the gauge vertically against the side of the carburetor body so that the "zero" line is several millimeters higher than the bottom edge of the carburetor body.
- Turn the fuel tap to the PRI position to feed fuel to the carburetor, then turn out the carburetor drain plug a few turns.
- Wait until the fuel level in the gauge settles.
- Keeping the gauge vertical, slowly lower the gauge until the "zero" line is even with the bottom edge of the carburetor body.

NOTE

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

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

Fuel Tank and Cap Inspection

●Visually inspect the gaskets on the tank and cap for any damage.
★Replace the gaskets if they are damaged.
●Remove the hose(s) from the fuel tank, and open the tank cap.
●Check to see if the breather pipe (also the fuel return pipe for the US California vehicle) in the tank are not clogged. Check the tank cap breather too.
★If the tank breather pipe is clogged, remove the tank and drain it and then blow the breather free with compressed air.
★If the tank cap breather is clogged, replace it.

Evaporative Emission Control System (US California Vehicle only)

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

Parts Removal/Installation Notes

WARNING

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

CAUTION

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

●To prevent the gasoline from flowing into the canister or from lowing out of the canister, hold the separator perpendicular to the ground.
●Connect the hoses according to the diagram of the system. Make sure they do not get pinched or kinked.

Hose Inspection

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

Separator Inspection

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

Separator Operation Test

WARNING

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

●Connect the hoses to the separator, and install the separator on the motorcycle.
●Disconnect the breather hose from the separator, and inject about 20 mL of gasoline into the separator through the hose fitting.
●Disconnect the fuel return hose from the fuel tank.
●Run the open end of the return hose in to the container level with the tank top.
●Start the engine, and let it idle.
★If the gasoline in the separator comes out of the hose, the separator works well. If it does not, replace the separator with a new one.

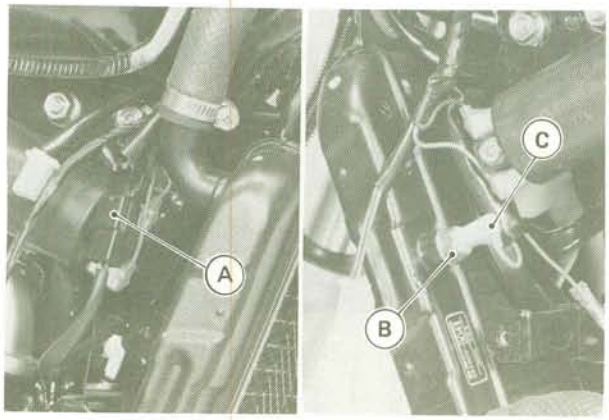
Canister Inspection

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

NOTE

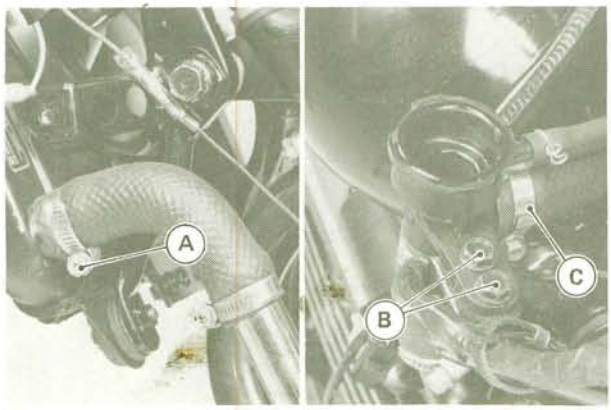
○*The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.*

COOLS OFF. TOUCHING THE FAN BEFORE THE ENGINE COOLS COULD CAUSE INJURY FROM THE FAN BLADES.



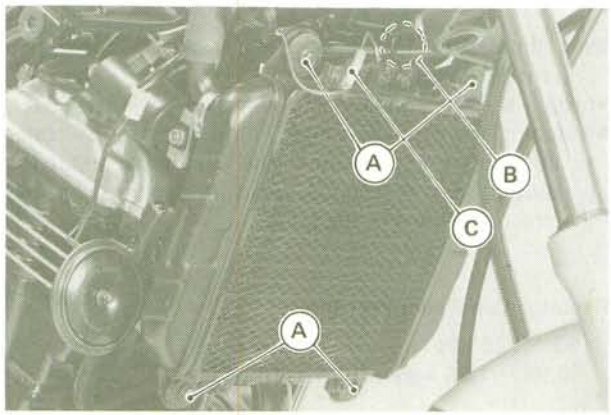
A. Fan Motor Connector
B. Fan Switch
C. Fan Switch Connector

- Disconnect the fan switch connector.
- Loosen the hose clamps and pull off the radiator hoses on both side.



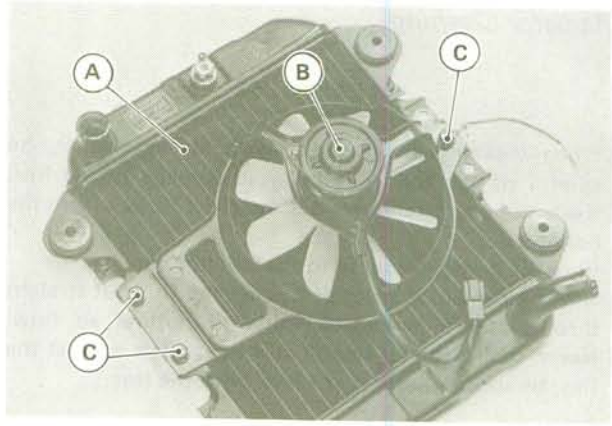
A. Hose Clamp (Left)
B. Filler Mounting Bolts
C. Hose Clamp (Right)

- Remove the bolt and free the clutch cable clamp.
- Disconnect the ground wire connector, then remove the radiator mounting bolts and take the radiator off the frame.



A. Mounting Bolts
B. Cable Clamp
C. Ground Wire Connector

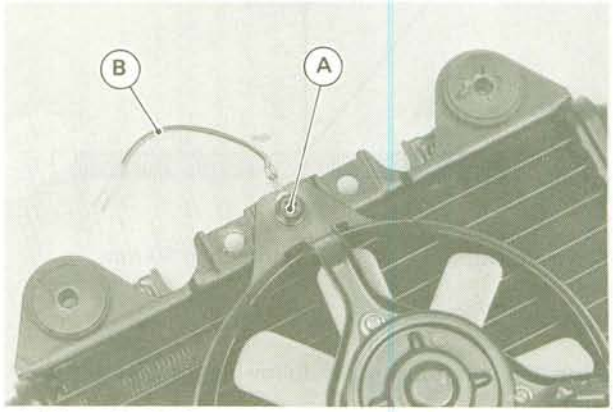
- Separate the filler and radiator hose from the radiator.
- Separate the radiator fan from the radiator.



A. Radiator
B. Radiator Fan
C. Fan Mounting Bolts

Radiator Installation Note

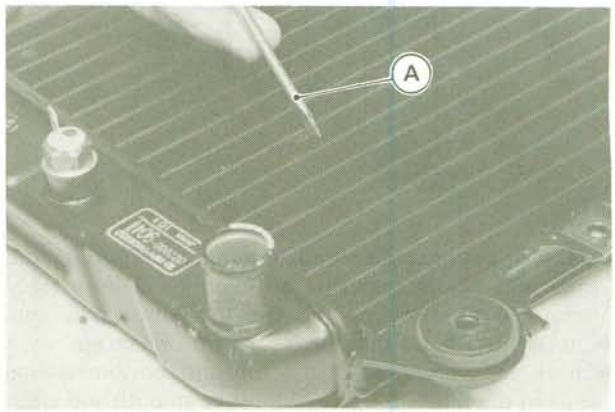
- Be sure to install the fan switch ground wire on the one of the fan mounting bolts.



A. Mounting Bolt
B. Ground Lead

Radiator Inspection

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



A. Thin Screwdriver

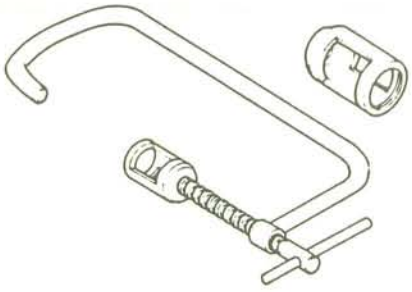
Special Tools

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

Piston Base: 57001-149

Compression Gauge: 57001-221
Adapter: 57001-1255
Gasket: 57001-1224

Valve Spring Compressor Assembly: 57001-241
Adapter: 57001-1202



Valve Guide Arbor: 57001-1203

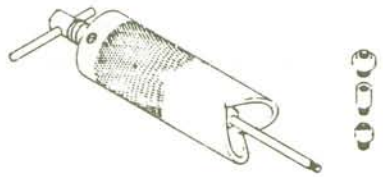
Valve Guide Reamer: 57001-1204

Cutter Holder ϕ5 mm: 57001-1208

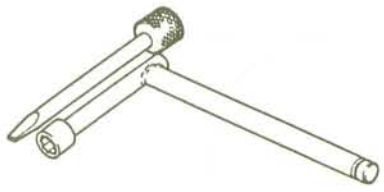
Bar: 57001-1128

Valve Seat Cutters:
(45° ~ ϕ24.5: 57001-1113)
(32° ~ ϕ25: 57001-1118)
(32° ~ ϕ22: 57001-1206)
(67.5° ~ ϕ22: 57001-1207)

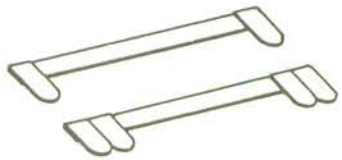
Piston Pin Puller Assembly: 57001-910



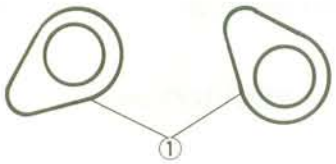
Valve Adjusting Screw Adjuster: 57001-1220



Thickness Gauge Set: 57001-1221



Camshaft Position

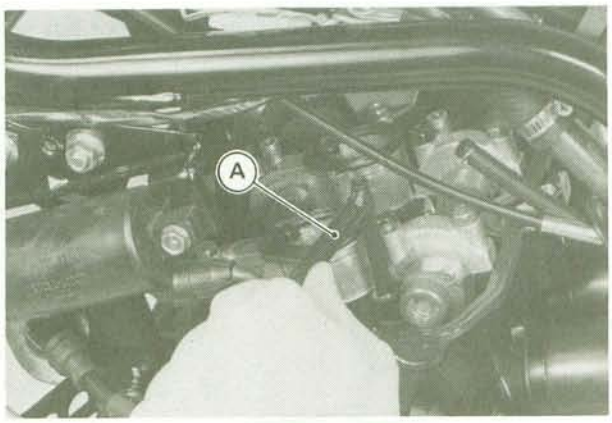


1. Number 1 Cylinder s Camshafts

★If the valve clearance is incorrect, the valve clearance must be adjusted.

Valve Clearance Adjustment

●Loosen the valve adjusting screw locknut by using the valve adjuster (special tool).



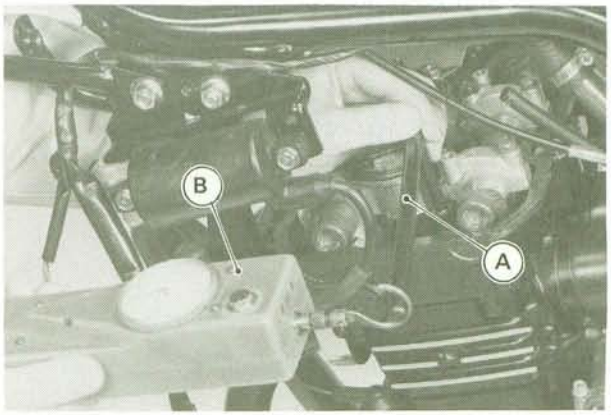
A. Valve Adjuster: 57001-1220

●Inspect the adjust gauge (special tool) between the cam lobe and the locker arm.
●Turn the adjusting screw until the gauge drags in the clearance.

Thickness Gauge: 57001-1221 Adjust Gauge

1. For Inlet Valve Adjustment
2. For Exhaust Valve Adjustment

●Tighten the locknut by the valve adjuster temporary.
●Tighten the locknut to the specified torque (13 kg Force) while preventing the adjusting screw from revolving with the locknut by using a push-pull gauge.



A. Valve Adjuster B. Push-Pull Gauge

●Reinstall the removing parts.
●Fill the radiator up to the filler neck with coolant.

Valve Seat Inspection

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

Valve Seating Surface Width

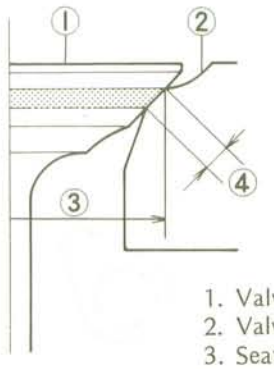
Inlet	**0.5 – 1.0 mm**
Exhaust	**0.5 – 1.0 mm**

NOTE

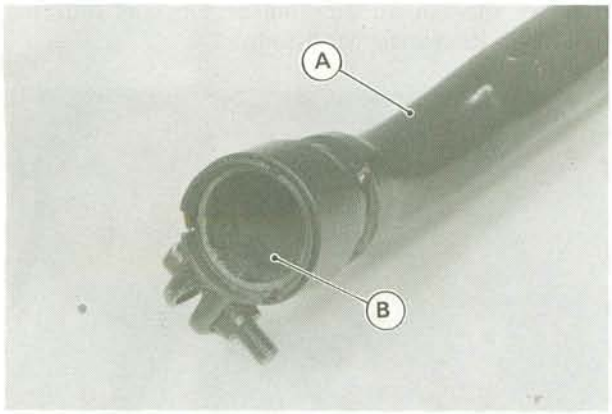
○*The valve stem and guide must be in good condition or this check will not be valid.*

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

Valve Seating Area Dimensions



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



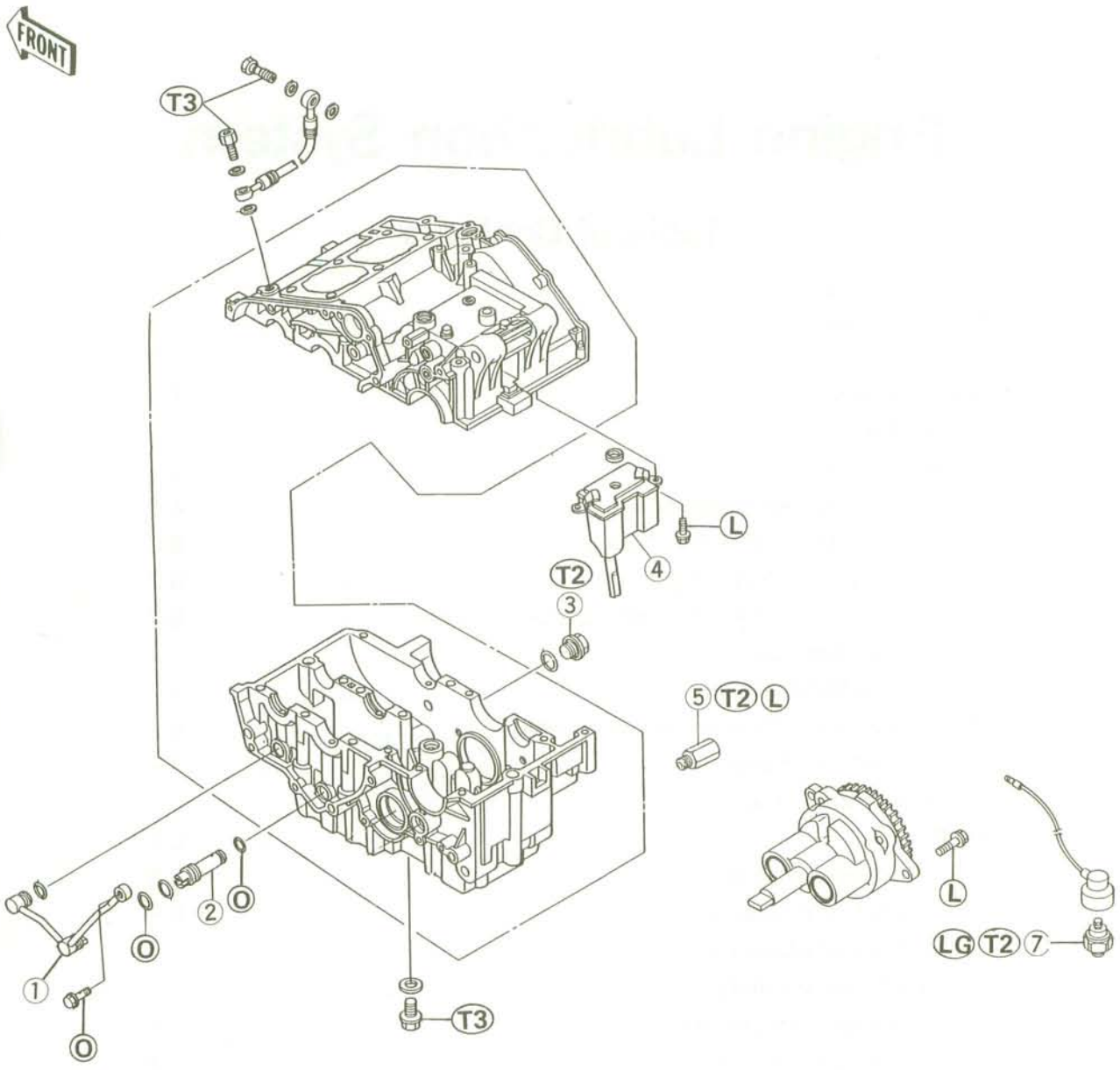
A. Exhaust Pipe B. Gasket

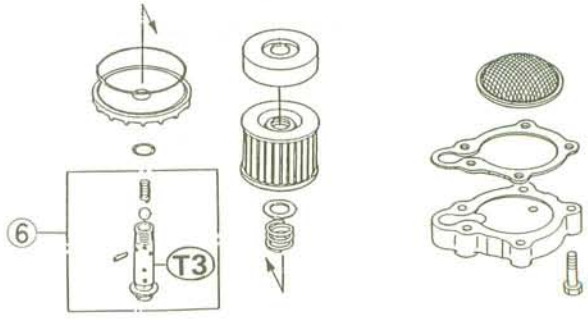
- ●Slip the muffler into place from the rear of the frame, so that it fits over the exhaust pipe.
- ○Hold the muffler up and put in the mounting bolts, but do not tighten them yet.
- ●Tighten the exhaust pipe holder nuts evenly and securely.
- ●Tighten the muffler mounting bolts securely.
- ●Tighten the muffler clamp bolt securely.

Exhaust System Inspection

- ●Before removing the exhaust system, check for signs of leakage at the exhaust pipe gasket in the cylinder head and at the muffler clamp.
- ★If there are signs of leakage around the exhaust pipe gasket, it should be replaced. If the muffler-to exhaust pipe joint leaks, tighten the clamp.
- ●Remove the exhaust system (see Exhaust Pipe and Muffler Removal).
- ●Inspect the gasket for damage and signs of leakage.
- ★If the gasket is damaged or has been leaking, replace it.
- ●Check the exhaust pipe and muffler for dents, cracks, rust and holes.
- ★If the exhaust pipe or muffler is damaged or holes, it should be repalced for best performance and least noise.

Exploded View





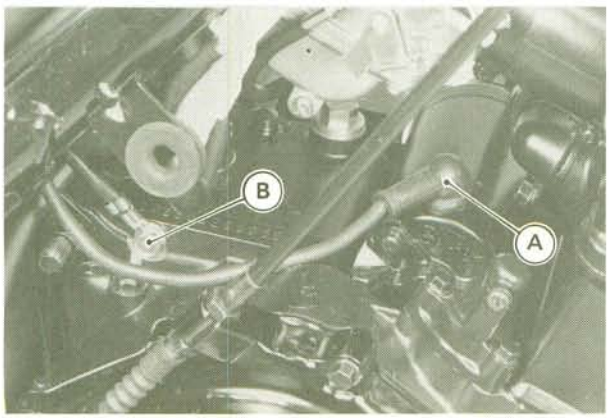
1. Oil Pipe
2. Oil Passage Pipe
3. Oil Passage Plug
4. Oil Breather
5. Relief Valve
6. Oil Filter Bolt
7. *Oil Pressure* Switch

L : Apply non-permanent locking agent to the threads.
LG: Apply liquid gasket to the threads.
O : Apply engine oil to the surface.
T1: 12 N-m (1.2 kg-m, 104 in-lb)
T2: 15 N-m (1.5 kg-m, 11.0 ft-lb)
T3: 20 N-m (2.0 kg-m, 14.5 ft-lb)

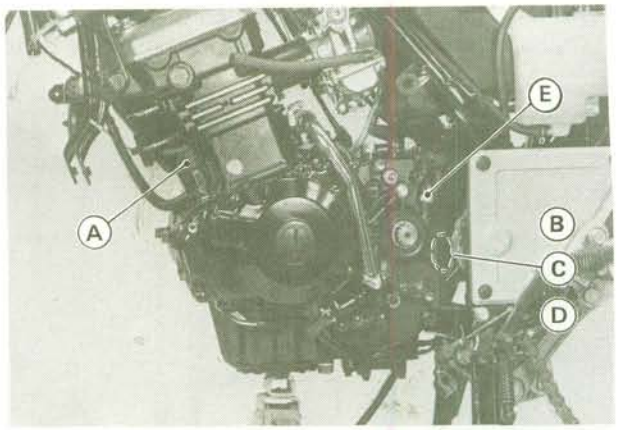
Engine Removal/Installation

Engine Removal

- Drain the engine oil (see Engine Oil Change in Engine Lubrication System chapter).
- Drain the coolant (see Coolant Change in Cooling System chapter).
- Remove the seats, side covers, kneegrip pads.
- Remove the fairing (see Fairing Removal in Frame chapter).
- Remove the fuel tank (see Fuel Tank Removal in Fuel chapter).
- Remove the following parts.
  - Radiator (see Radiator Removal in Cooling System chapter)
  - Muffler (see Muffler Removal in Engine Top End chapter)
  - Engine Sprocket (see Engine Sprocket Removal in Final Drive chapter)
  - Throttle and Choke Cables
  - Clutch Cable
- Disconnect the wiring from the engine components, and free them from the clamps.
  - Starter Motor Wire Terminal
  - Oil Pressure Switch Wire Terminal
  - Alternator Wire Connector
  - Pickup Coil Wire Connector
  - Side Stand Switch Wire Connector
  - Battery Ground Wire Terminal
  - Neutral Switch Wire Terminal

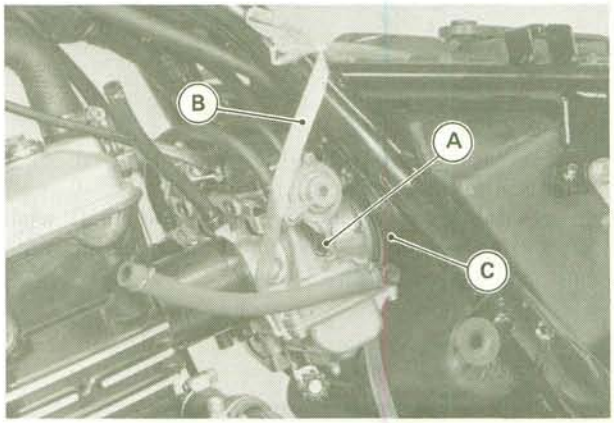


A. Starter Motor Wire Terminal
B. Battery Ground Wire Terminal



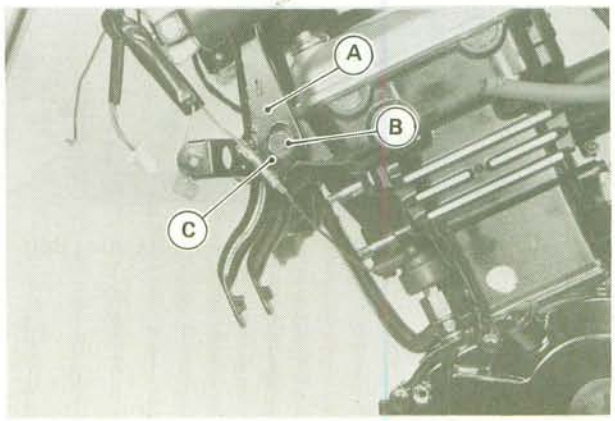
A. Oil Pressure Switch Wire Terminal
B. Alternator Wire Connector
C. Pickup Coil Wire Connector
D. Side Stand Switch Wire Terminal
E. Neutral Switch Wire Terminal

- Before removing the engine, hold the carburetor to the air cleaner duct with a string.



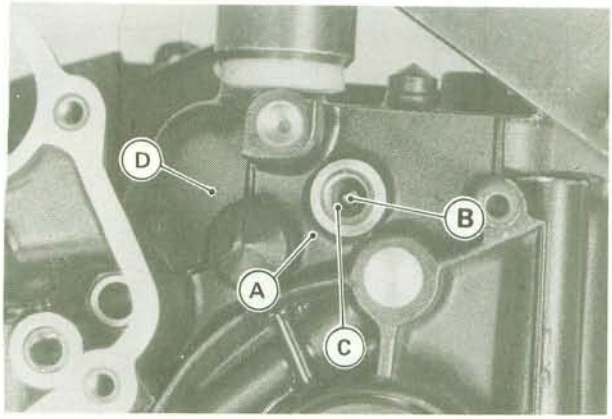
A. Carburetor
B. String
C. Air Cleaner Duct

- Remove the engine bracket bolt and take the both bracket with ignition coils off the frame.



A. Engine Bracket
B. Engine Bracket Bolt
C. Oil Pressure Switch Wire Connector

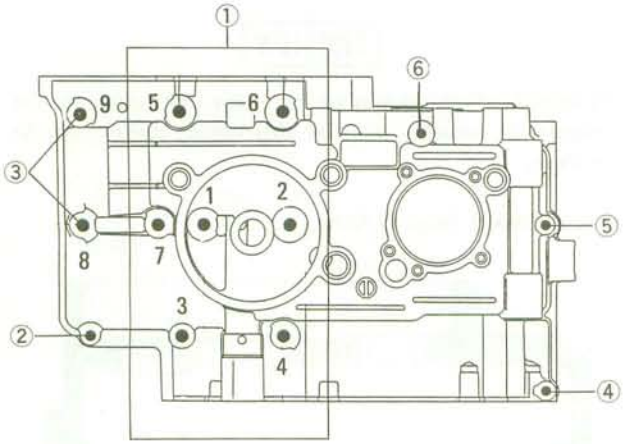
○Check to see that the shift drum is in the neutral position, that is, the projection at operating plate is seen from neutral switch hole at the upper crankcase half.



A. Neutral Switch Hole
B. Projection
C. Operating Plate
D. Upper Crankcase Half

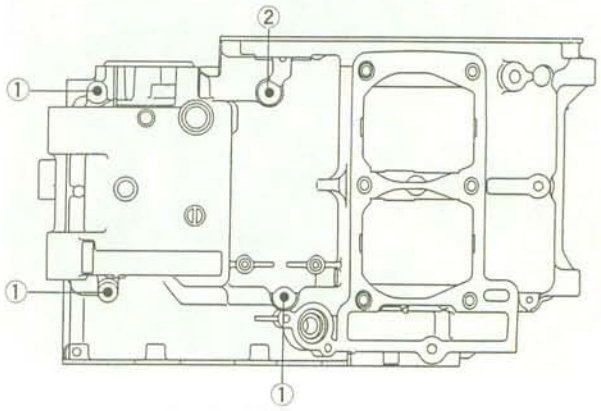
○When fitting the lower crankcase half on the upper crankcase half, each shift fork must fit in its gear groove.
○Loosely tighten all lower crankcase half bolts to a snug fit.
○Following the sequence numbers on the lower crankcase half, tighten the 8 mm bolts first to about one half of the specified torque, and finally to the specified torque in the same sequence (see Exploded View).

Lower Crankcase Half Bolts Tightening Order



1. M8 x 72 mm
2. M6 x 38 mm
3. M8 x 90 mm
4. M6 x 60 mm
5. M6 x 135 mm
6. M6 x 85 mm (Copper Washer)

Upper Crankcase Half Bolts



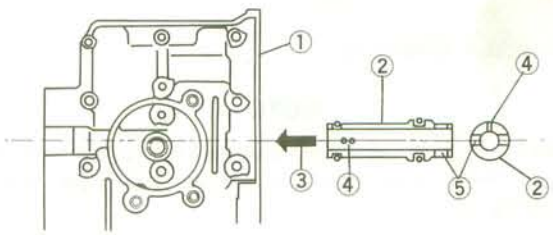
1. M6 x 85 mm
2. M6 x 60 mm (Copper Washer)

○Tighten the 6 mm bolts on the upper crankcase half to the specified torque (see Exploded View).
○Tighten the 6 mm bolts on the lower crankcase half to the specified torque (see Exploded View).
●After tightening all crankcase bolts, check the following items.
○Drive shaft and output shaft turn freely.
○While spinning the output shaft, shift the transmission smoothly from 1st to 6th gear, and back.
○Unless the output shaft is turning, the transmission cannot be shifted to 2nd gear or other higher gear positions.

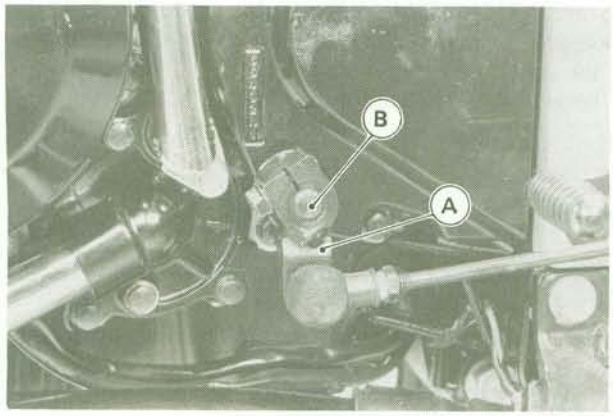
Crankcase Exchange

★If crankcase is damaged, replace it with new one.
●Remove the crankcase parts from the damaged case, and install it to the new case. Pay attention to the following items.
○When installing the oil passage plug must be inserted as shown.

Oil Passage Pipe Installation

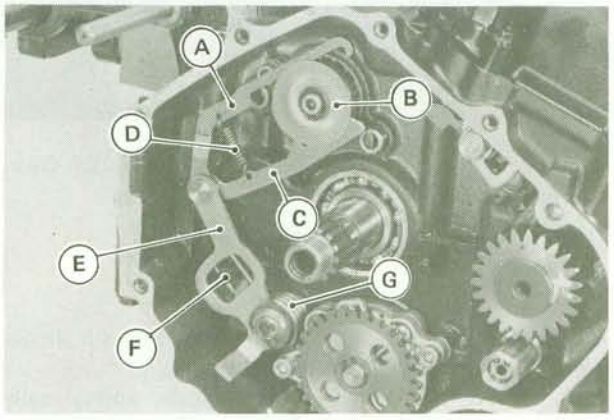


1. Lower Crankcase Half
2. Oil Passage Pipe
3. Press
4. Small Hall (Up)
5. Slit (Horizontal)



A. Shift Lever
B. Shift Shaft

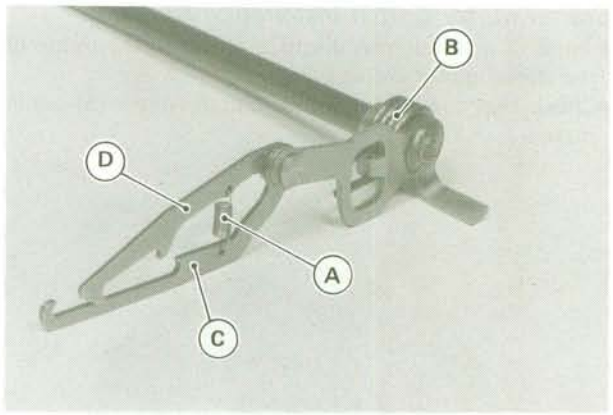
•Remove the clutch (see Clutch Removal in Clutch chapter).
•Move the shift mechanism arm and overshift limiter out of their positions on the end of the shift drum, and pull out the shift shaft with the arm, pawl spring and return spring.



A. Overshift Limiter
B. Shift Drum
C. Shift Mechanism Arm
D. Pawl Spring
E. Shift Shaft
F. Return Spring Bolt
G. Return Spring

External Shift Mechanism Installation Notes

•Check that the return spring and pawl spring are properly fitted on the mechanism, install the external shift mechanism, and place the shift mechanism arm and overshift limiter on the shift drum pins.

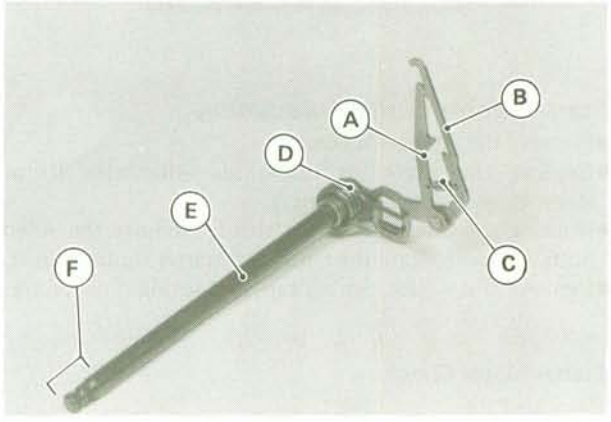


A. Pawl Spring
B. Return Spring
C. Overshift Limiter
D. Shift Mechanism Arm

•Add engine oil (see Engine Oil Level Inspection in Lubrication System chapter).

External Shift Mechanism Inspection

•Examine the shift shaft for any damage.



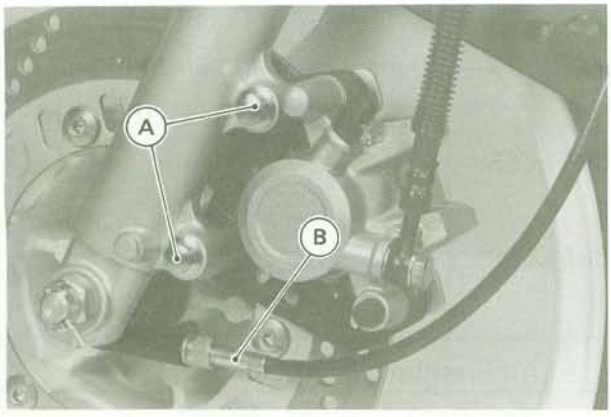
A. Shift Mechanism Arm
B. Overshift Limiter
C. Pawl Spring
D. Return Spring
E. Shift Shaft
F. Splines

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

Wheels (Rims)

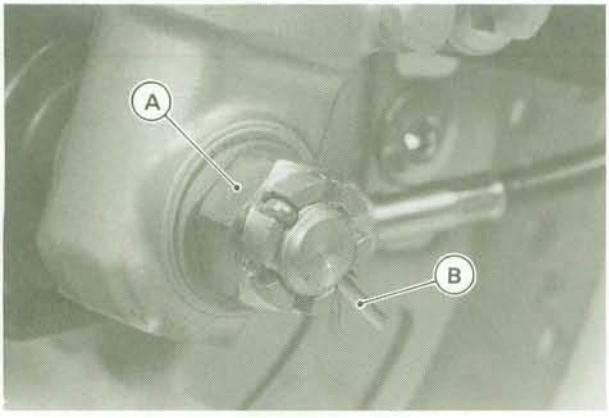
Front Wheel Removal

- Disconnect the speedometer cable lower end.
- Remove both mounting bolts for the brake caliper. Support the caliper so that does not hang by its brake hose.



A. Caliper Mounting Bolts B. Speedometer Cable

- Remove the cotter pin, and loosen the axle nut.



A. Axle Nut B. Cotter Pin

- Use a jack under the engine or other suitable means to lift the front of the motorcycle.
- Pull out the axle to the right and drop the front wheel out of the forks.
- Remove the front wheel.

CAUTION

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

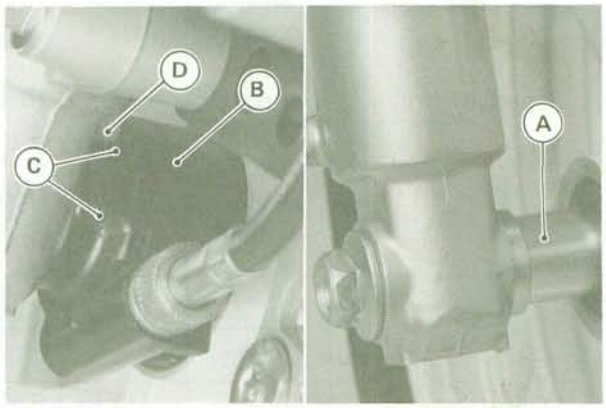
Front Wheel Installation

- Install is the reverse of removal.

NOTE

○Install the speedometer gear housing so that it fits in the speedometer gear drive notches.

○Fit the speedometer gear housing stop to the fork leg stop, and check that the collar is on the right hand side of the hub.



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

- Tighten the axle nut to the specified torque (see Exploded View).
- Replace the axle nut cotter pin with a new one.
- Tighten the caliper mounting bolts to the specified torque (see Exploded View in Brake chapter).
- Check the front brake.

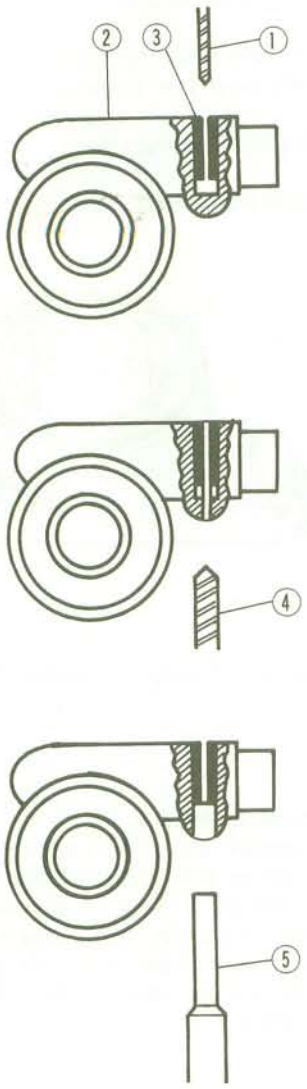
WARNING

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

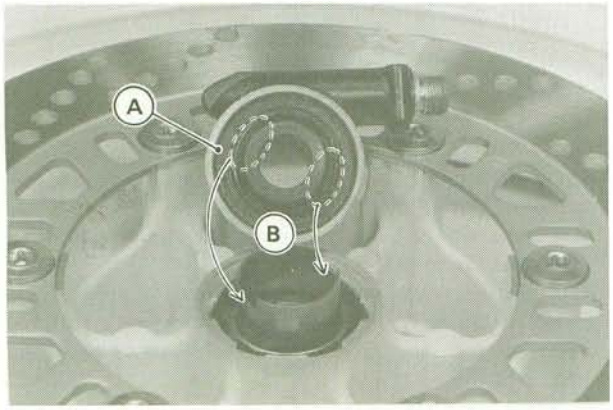
Rear Wheel Removal

- Remove or loosen the following parts before rear wheel removal.
  - Chain Cover (Remove)
  - Axle Nut Cotter Pin (Remove)
  - Torque Link Nut (Loosen)
  - Chain Adjusting Bolt Locknuts, Adjusting Bolts (Full Loosen)
  - Drive Chain (Full Loosen)
  - Axle and Axle Nut (Remove)
- Pull the drive chain toward the left, and remove the rear wheel.

Speedometer Gear Housing Pin Removal



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

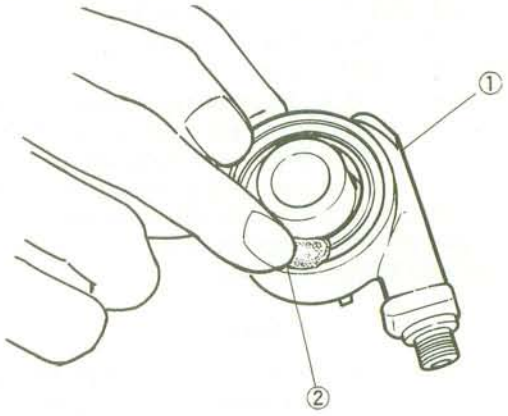


A. Speedometer Gear Housing
B. Fit in the gear drive notches.

Speedometer Gear Housing Lubrication

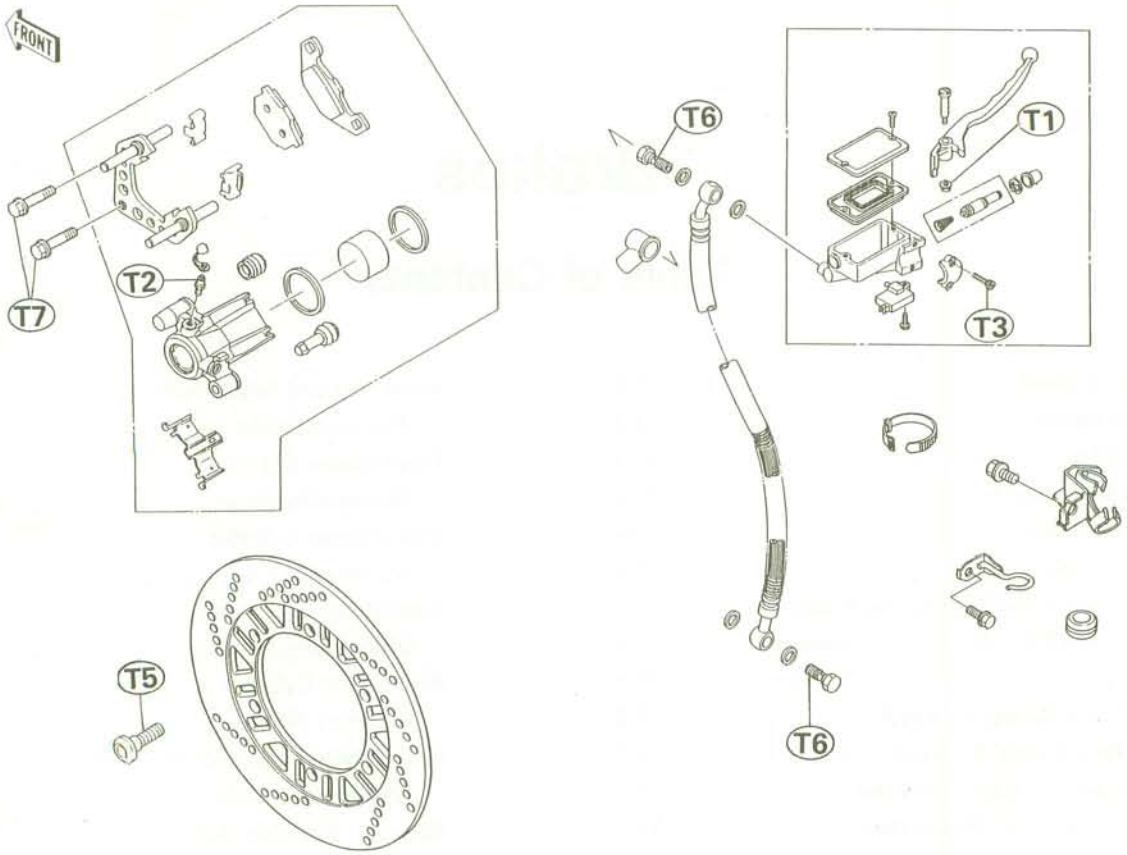
Clean and grease the speedometer gear housing in accordance with the Periodic Maintenance Chart.

Speedometer Gear Housing Lubrication



1. Speedometer Gear Housing
2. Grease.

Exploded View



Specifications

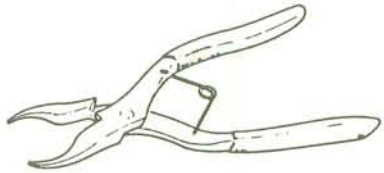
Item		Standard	Service Limit
Brakes:			
Pad lining thickness:	Front and Rear	5.0 mm	1 mm
Brake fluid grade		D.O.T.3	— — —
Brake pedal position		About 40 mm	— — —
Disc runout:	Front	Under 0.15 mm	0.3 mm
	Rear	Under 0.15 mm	0.3 mm
Disc thickness:	Front	4.8 – 5.1 mm	4.5 mm
	Rear	5.3 – 5.6 mm	5.0 mm

Recommended Disc Brake Fluid

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

Special Tools

Circlip Pliers: 57001-143



Brake Fluid Requirement:

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

Recommended Brake Fluid

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

Changing Brake Fluid:

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

NOTE

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

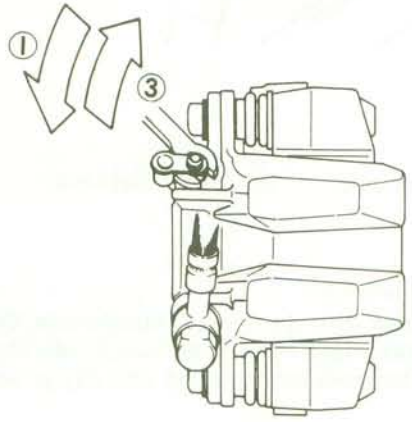
- ●Bleed the air from the lines (continue with Bleeding the Brake).

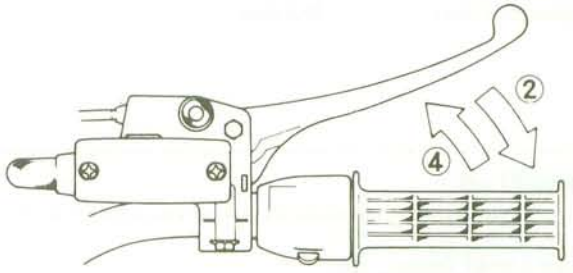
Bleeding the Brake Line

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

- ●Bleed the air from the brake whenever brake lever or pedal action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.
- ●Check that there is plenty of fluid in the reservoir.
- ○The fluid level must be checked several times during the bleeding operation and replenished as necessary (see Brake Fluid Change).
- ★If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.
- ●With the reservoir cap off, slowly pump the brake lever or pedal several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.
- ★If brake lever or pedal action still feels soft or spongy, bleed the remaining air as follows.
- ○Connect a clear plastic hose to the bleed valve at the caliper, running the other end of the hose into a container.
- ○Pump the brake lever or pedal a few times until it comes hard.
- ○Holding the brake applied, quickly open (turn counterclockwise) and close the bleed valve.
- ○Repeat this operation until no more air can be seen coming out into the plastic hose.
- ○Check the fluid level in the reservoir every so often, replenishing it as necessary.

Filling up the Brake Line





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

Rear Suspension (Uni-trak)

Rear Shock Absorber:

Rear Shock Absorber Adjustment

The rear shock absorbers can be adjusted by changing the spring preload to suit various riding and loading conditions.

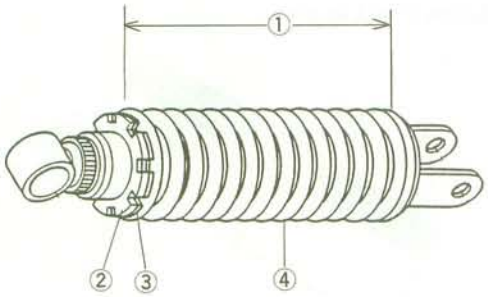
Uni-trak Spring Preload Adjustment

- Remove the shock absorber from the frame.
- Using the hook wrenches (special tool: 57001-1100), loosen the locknut and unscrew the adjusting nut until the spring is fully extended.
- Measure the free length of the shock absorber spring.
- Turn in the adjusting nut as required.
  - Turning the adjusting nut down makes the spring preload stronger.
  - The recommended adjusting nut position is compressed 5 mm than spring free length.

Spring Preload Setting

Recommended:	**Spring Free Length minus 5 mm**
Usable Range:	**Spring Free Length minus 0 mm to Spring Free Length minus 20 mm**

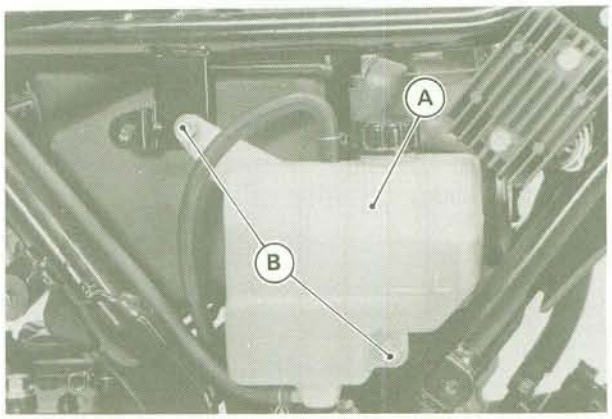
Spring Preload Adjustment



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

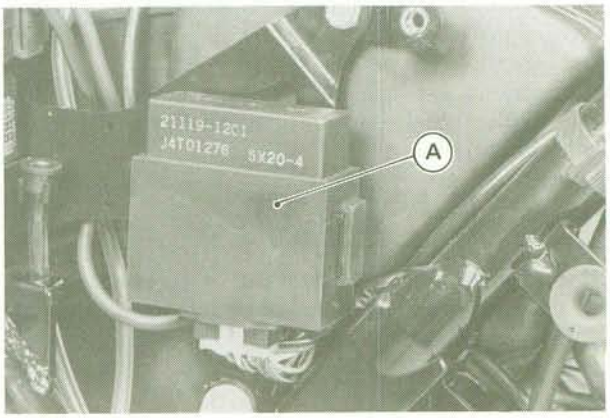
Rear Shock Absorber Removal

- Remove the seats, kneegrip pads, and side covers.
- Remove the coolant reservoir tank bolts, and take the tank out of the frame.



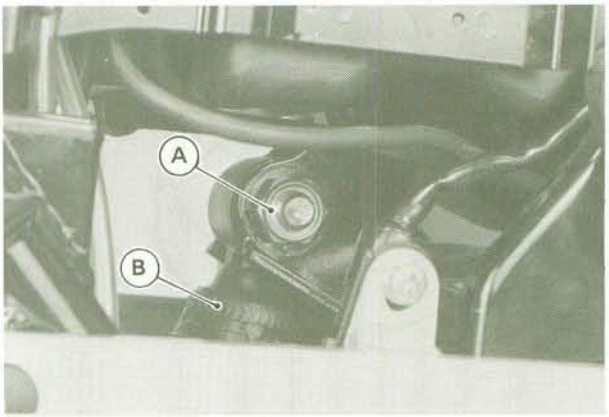
A. Reservoir Tank B. Bolts

- Pull the IC igniter off the bracket and out of place.



A. IC Igniter

- Loosen the upper shock absorber nut. Do not remove it yet.
- Remove the lower shock absorber bolt, and the tie rod lower bolt.



A. Upper Shock Absorber Nut B. Shock Absorber

Frame

Table of Contents

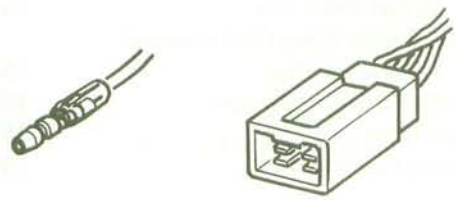
Precautions

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

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter switch pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Do not use a meter illumination bulb rated for other than voltage or wattage specified in the wiring diagram, as the meter or gauge panel could be warped by excessive heat radiated from the bulb.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was brough on by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Electrical Connectors

Female Connectors

Male Connectors



- Color Codes:

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

- Measure coil and winding resistance when the part is cold (at room temperature).

NOTE

○*The specific gravity of the electrolyte varies with changes in temperature, so the specific gravity reading must be corrected for the temperature of the electrolyte.*

○*Celsius: Add 0.007 points to reading for each 10°C above 20°C or subtract 0.007 points for each 10°C below 20°C.*

○*Fahrenheit: Add 0.004 points to reading for each 10°F above 68°F or subtract 0.004 points for each 10°F below 68°F.*

★If the specific gravity of any of the cells is more than 0.050 away from any other reading, the battery will probably not accept a charge. It is generally best to replace a battery in this condition.

★If the specific gravity of all the cells is 1.280 or move the battery is fully charged.

Battery Initial Charging

Before being placed in service, **a new battery must be given an initial charging.**

●Cut off the sealed end of the battery vent hose and remove the filler caps.

●Fill each cell to the upper level line on the battery case with fresh electrolyte at a temperature of 30°C (86°F) or less. Let the battery stand for about 30 minutes before charging.

NOTE

○*If the electrolyte level drops, add electrolyte to the upper level line before charging.*

●Leaving the caps off the cells, connect the battery to a charger, set the charging rate at 1/10 the battery capacity, and **charge it for 10 hours.** For example, if the battery is rated at 12 Ah, the charging rate would be 1.2 A.

CAUTION

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

WARNING

○**Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.**

CAUTION

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

○**If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.**

●Turn the charger off, then disconnect it from the battery.

●Check battery voltage. Battery voltage should be 12 – 13 V.

●Check the specific gravity of each cell with a hydrometer (see Battery Condition).

★If the voltmeter or hydrometer readings are below those specified, additional charging is necessary before the battery can be installed.

Battery Ordinary Charging

●Remove the battery from the motorcycle.

CAUTION

○**Always remove the battery from the motorcycle for charging. If the battery is charged while still installed, battery electrolyte may spill and corrode the frame or other parts of the motorcycle.**

●Clean off the battery using a baking soda-and-water solution.

○Mix one heaping tablespoon of baking soda in one cup of water.

○Be careful not to get any of the cleaning solution in the battery.

○The terminals must be especially clean.

●If any of the cells are low, fill them to the LOWER level line with distilled water only. The electrolyte will expand during charging, and the level will rise.

●Connect a charger to the battery BEFORE plugging it in or turning it on.

WARNING

○**Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.**

●Set the charge rate and time according to the battery condition previously determined (see Battery Condition), using the table.

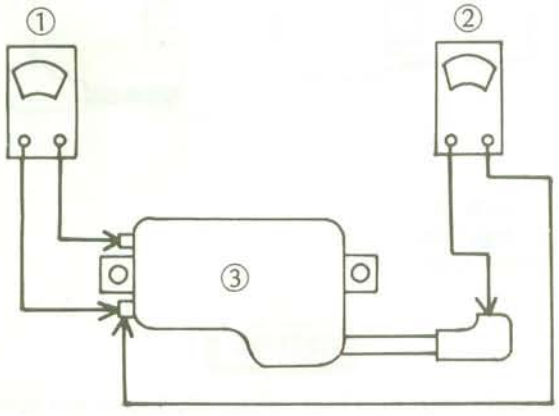
ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting form insulation breakdown under high voltage.

- ●Disconnect the primary leads from the coil terminals.
- ●Measure the primary winding resistance.
- ○Connect an ohmmeter between the coil terminals.
- ○Set the meter to the x 1 Ω range, and read the meter.
- ●Measure the secondary winding resistance.
- ○Pull the spark plug cap off the lead.
- ○Connect an ohmmeter between the spark plug lead and the terminal.
- ○Set the meter to the x 1 kΩ range, and read the meter.
- ★If the meter does not read as specified, replace the coil.

Ignition Coil Winding Resistance

Primary windings:	**2.1 – 3.2 Ω**
Secondary windings:	**10 – 16 kΩ**

Ignition Coil Winding Resistance



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

★If the meter reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.

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

Spark Plug Cleaning Inspection

- ●Remove the spark plug.
- ●Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool.

★If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard plug or its equivalent.

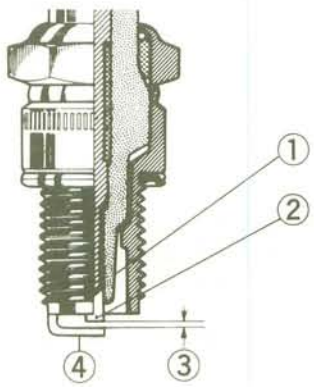
Spark Plug Gap

- ●Measure the gap with a wire-type thickness gauge.
- ★If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.

Spark Plug Gap

0.6 – 0.7 mm

Spark Plug Gap



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

IC Igniter Inspection

- ●Remove the IC igniter.
- ●Zero an ohmmeter, and connect it to terminals of the IC igniter to check the internal resistance of the igniter.

CAUTION

- ○**Use only Kawasaki Hand Tester 57001-983 for this test. A tester other than the Kawasaki Hand Tester may show different readings.**
- ○**If a megger or a meter with a large-capacity battery is used, the IC igniter will be damaged.**

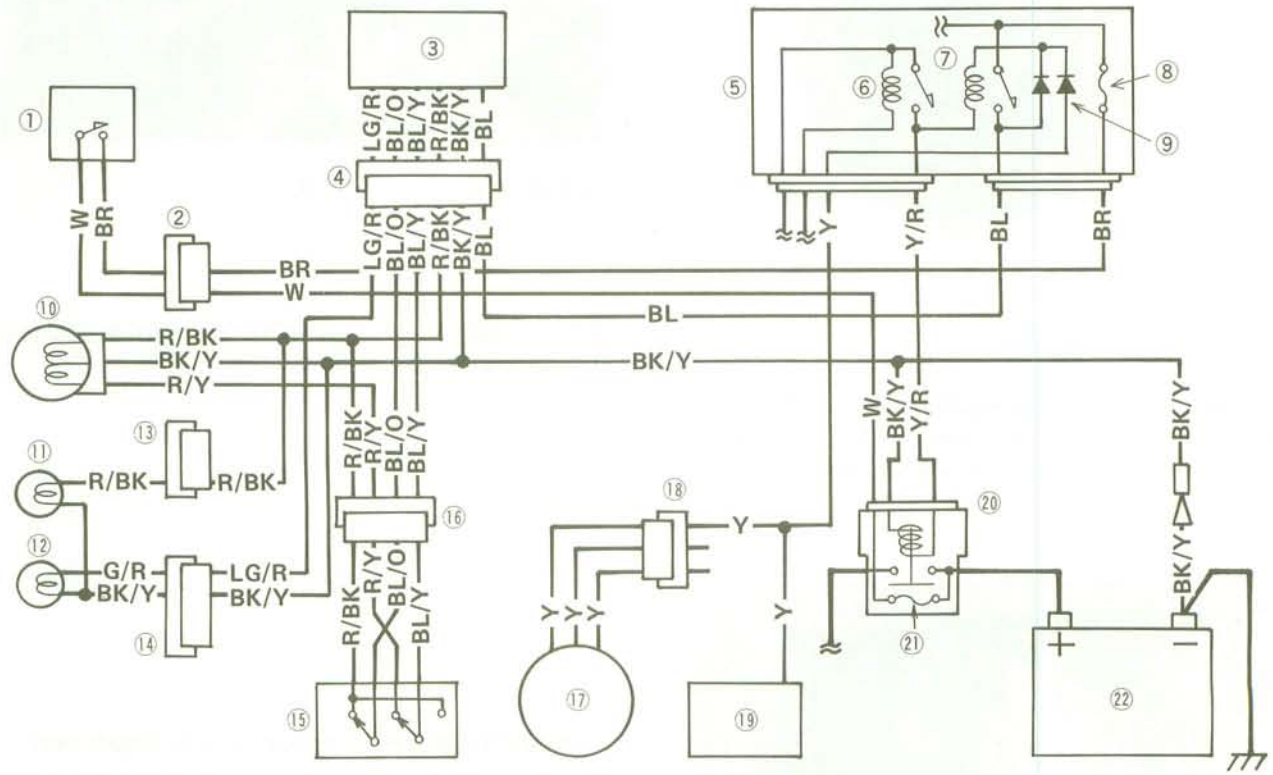
Inspection:

For any lighting system problems, always check the lighting system wiring and the bulbs first (see Wiring Inspection).

Reserve Lighting System Operation

Headlight	Dimmer Switch Position	Headlight Failure Indicator Light	Reserve Lighting
Both high and low beam filaments are normal	HI	Goes on (hardly visible)	———
	LO	Goes on (hardly visible)	———
High beam filament burned out	HI	Goes on	Low beam comes on.
	LO	Goes on (hardly visible)	———
Low beam filament burned out	HI	Goes on (hardly visible)	———
	LO	Goes on	High beam comes on dimly.

Headlight Circuit (US Model Shown)



1. Ignition Switch
2. 6-pin Connector
3. Reserve Lighting Device
4. 6-pin Connector
5. Junction Box
6. Starter Circuit Relay
7. Headlight Relay
8. Headlight Fuse 10A
9. Diodes
10. Headlight
11. High Beam Indicator Light
12. Failure Indicator Light
13. 6-pin Connector
14. 6-pin Connector
15. Dimmer Switch
16. 9-pin Connector
17. Alternator
18. 3-pin Connector
19. Regulator/Rectifier
20. Starter Relay
21. Main Fuse 30A
22. Battery