Electrical System

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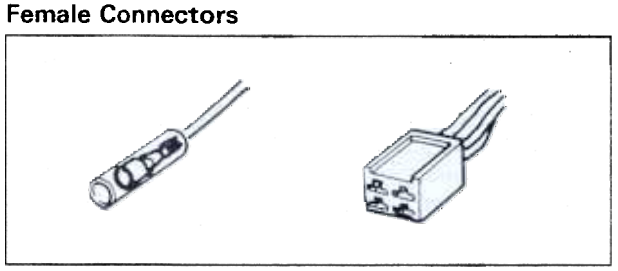
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Precautions

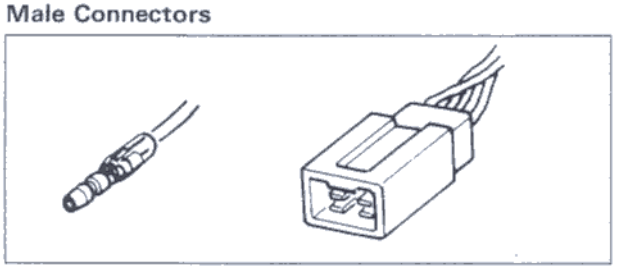
There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

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

Female Connectors



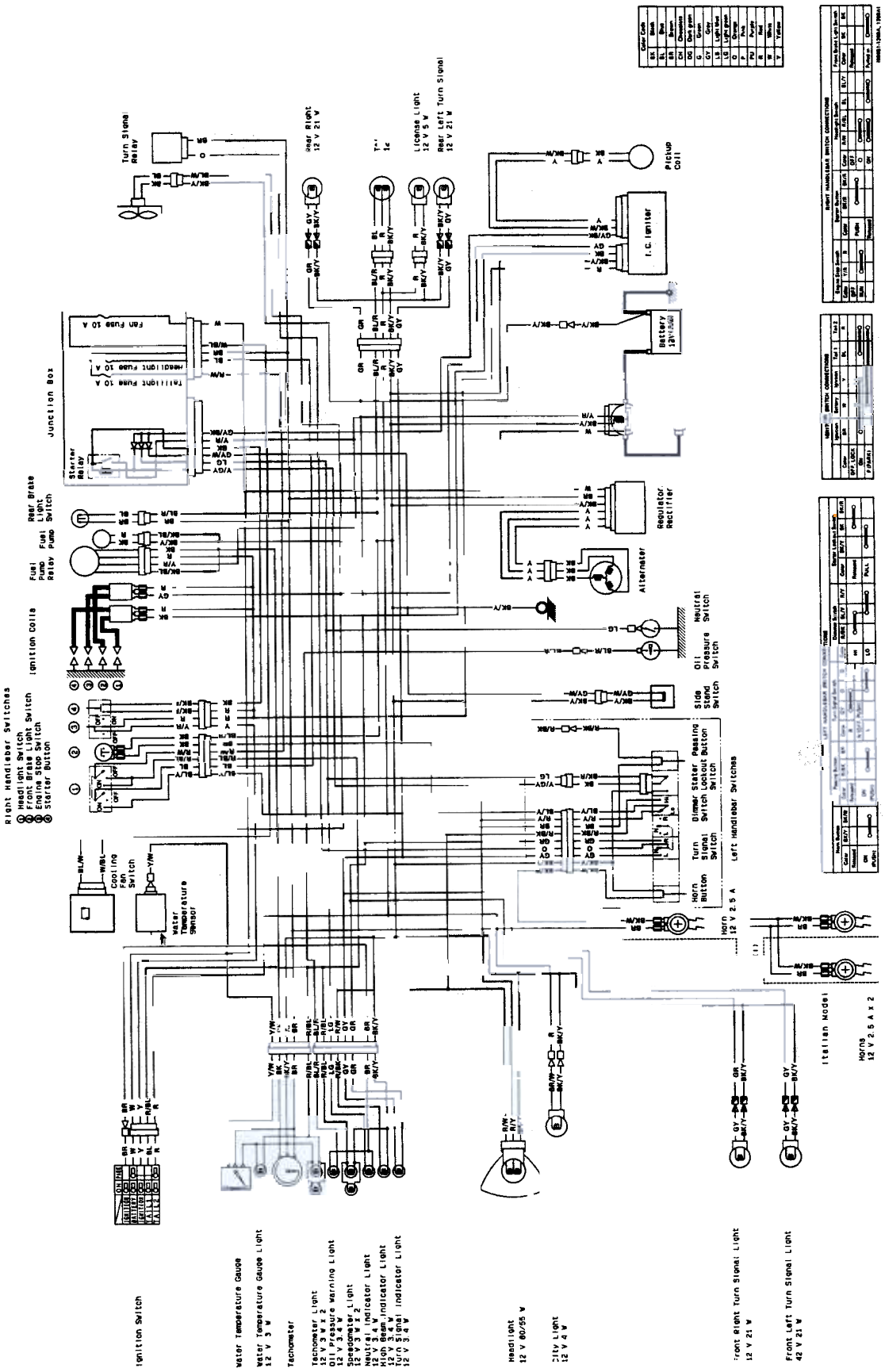
Male Connectors



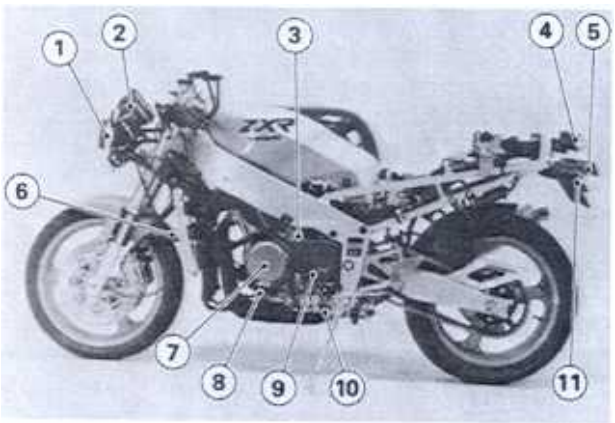
- Color Codes:

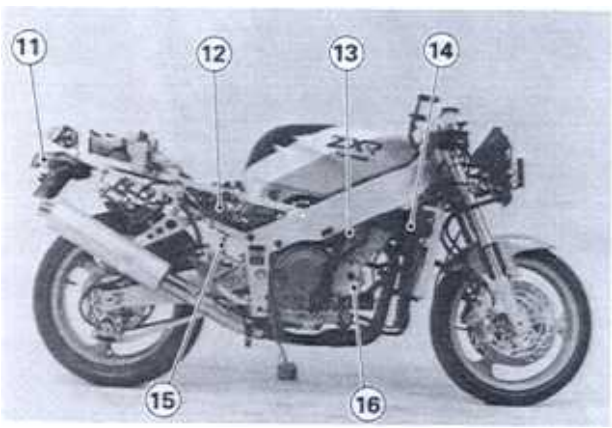
BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark green
G	Green
GY	Gray
LB	Light blue
LG	Light green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

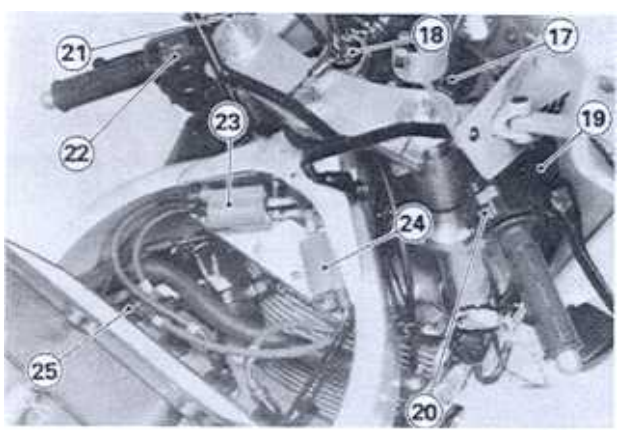
Wiring Diagram (ZX400-H2)

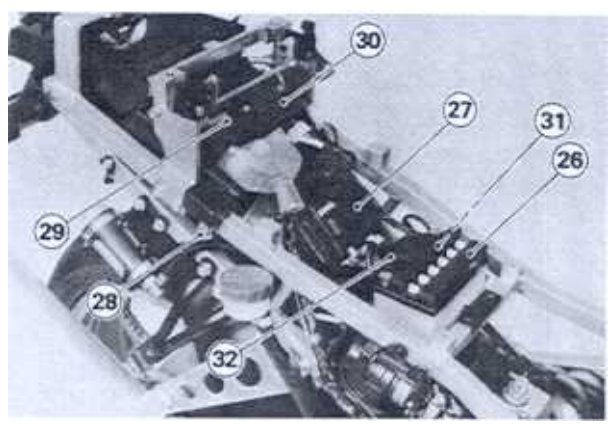


Parts Location





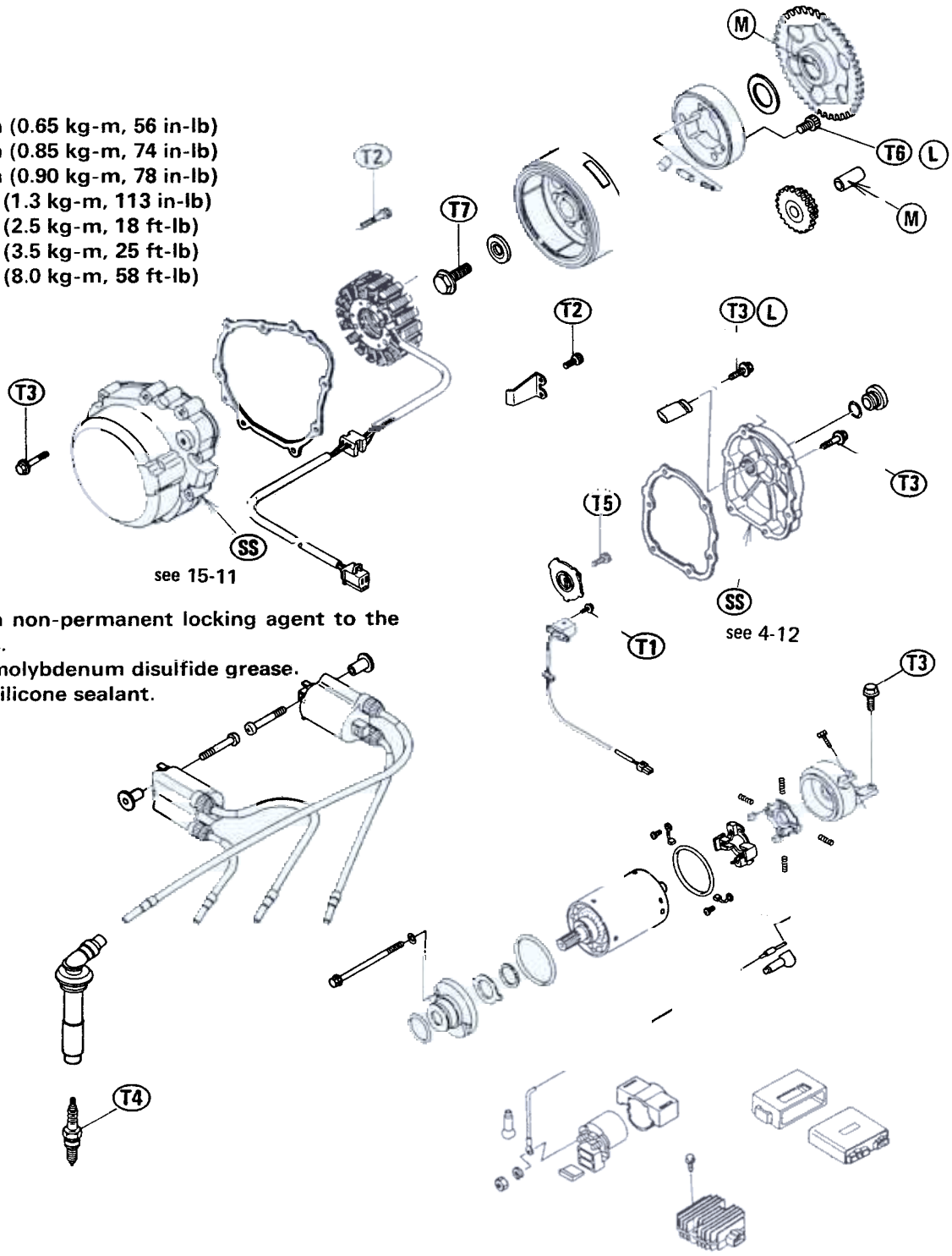




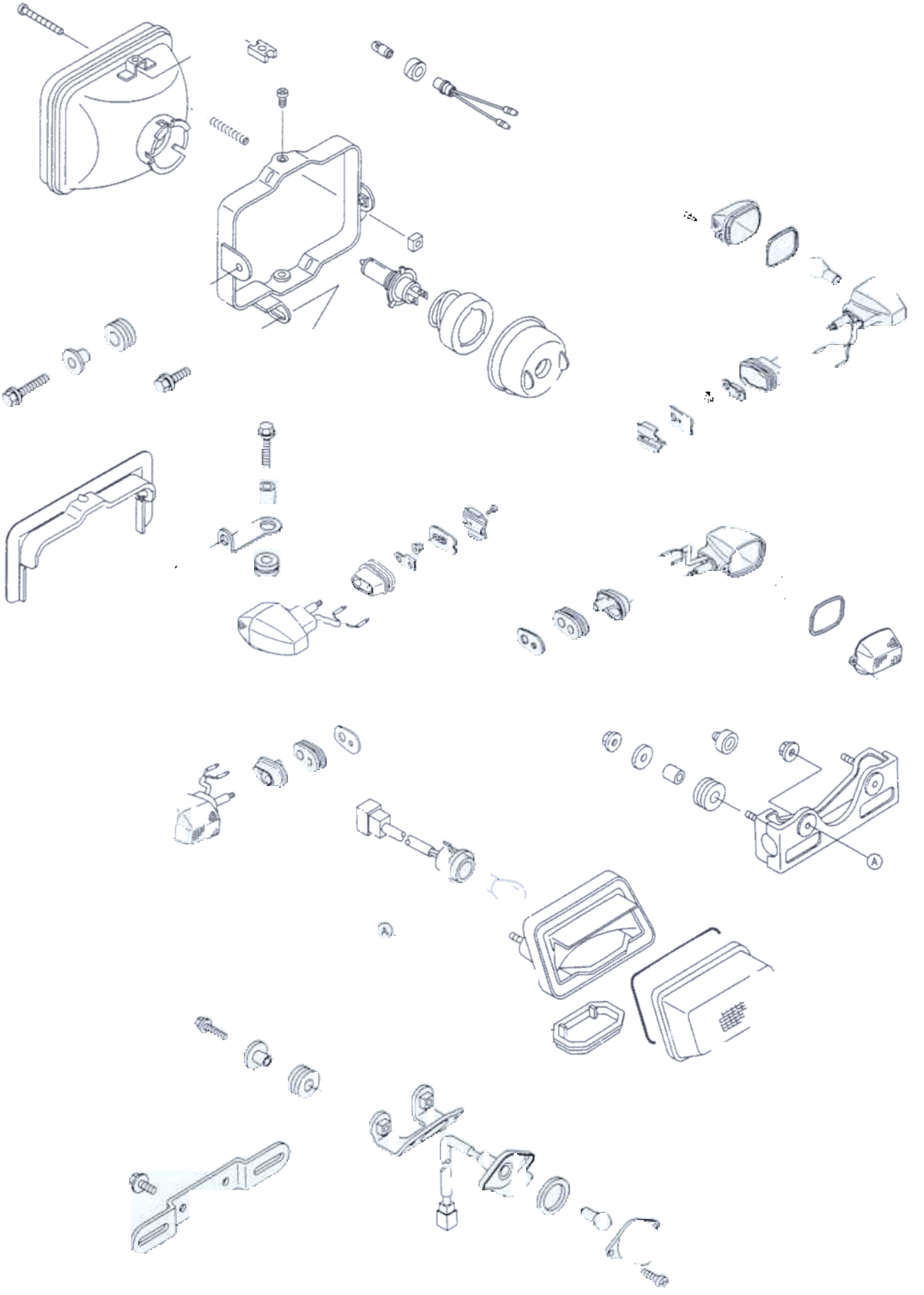
1. Headlight Unit
2. Meter Unit
3. Starter Motor
4. Tail/Brake Light
5. Licence Light
6. Fan Switch
7. Alternator
8. Oil Pressure Switch
9. Neutral Switch
10. Side Stand Switch
11. Turn Signal Light
12. Fuel Pump
13. Water Temperature Sensor
14. Radiator Fan
15. Rear Brake Light Switch
16. Pickup Coil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

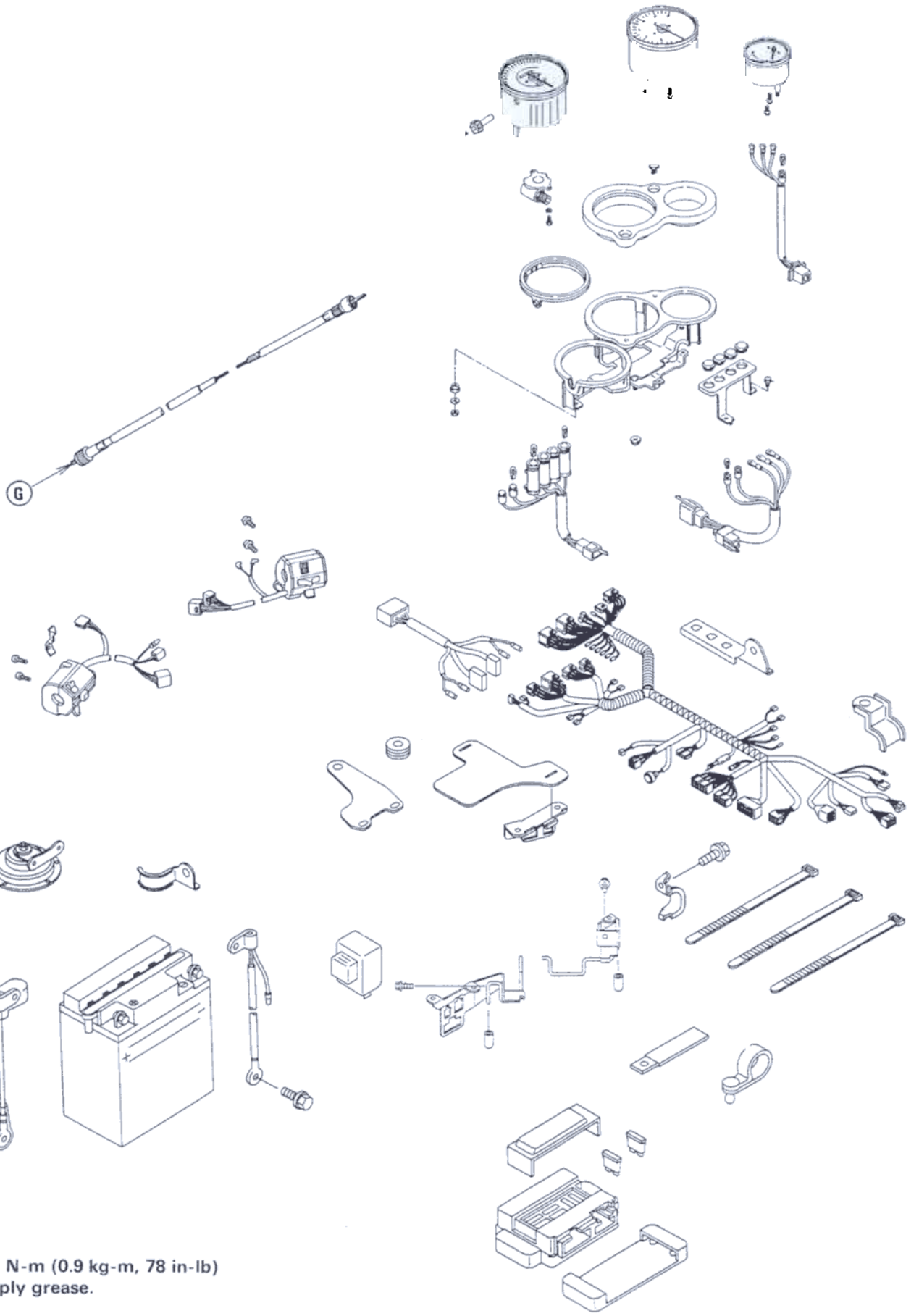
Exploded View

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



L : Apply a non-permanent locking agent to the threads.
M : Apply molybdenum disulfide grease.
SS: Apply silicone sealant.


A
A



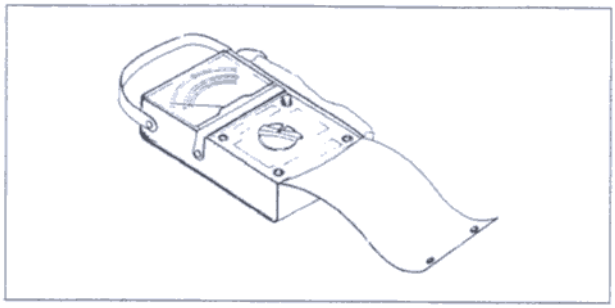
.8 N-m (0.9 kg-m, 78 in-lb)
Apply grease.

Specifications

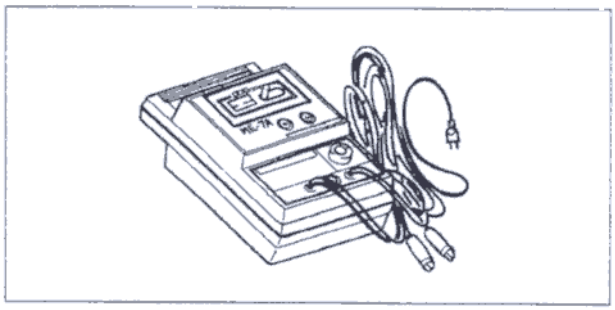
Item	Standard	Service Limit
Battery:		
Type	12 V 10 Ah	– – –
Specific gravity	1.280 @20°C (68°F)	– – –
Alternator:		
Charging voltage	14.5 V Night @4 000 r/min (rpm)	– – –
Output voltage	No less than 43 V @4 000 r/min (rpm)	– – –
Stator coil resistance	0.2 ~ 0.9 Ω	– – –
Ignition System:		
Pickup coil resistance	355 ~ 535 Ω	– – –
Ignition coil:		
3 needle arcing distance	7 mm or more	– – –
Primary winding resistance	2.3 ~ 3.5 Ω	– – –
Secondary winding resistance	12 ~ 18 kΩ	– – –
Spark plug gap	0.7 ~ 0.8 mm	– – –
Starter Motor:		
Carbon brush length	7 mm	3.5 mm
Commutator groove depth	0.45 ~ 0.75 mm	0.2 mm
Commutator diameter	24 mm	23 mm
Fuel Pump:		
Fuel pump pressure	11 ~ 16 kPa (0.11 ~ 0.16 kg/cm², 1.6 ~ 2.3 psi)	– – –
Switches and Sensors:		
Rear brake light switch	ON after about 10 mm pedal travel	– – –
Fan Switch: OFF → ON	93 ~ 103°C (199 ~ 217°F)	– – –
ON → OFF	91 ~ 95°C (196 ~ 203°F)	– – –
Water temperature sensor resistance	80°C (175°F) : 47 ~ 57 Ω	– – –
	100°C (212°F) : 25 ~ 30 Ω	– – –

Special Tools

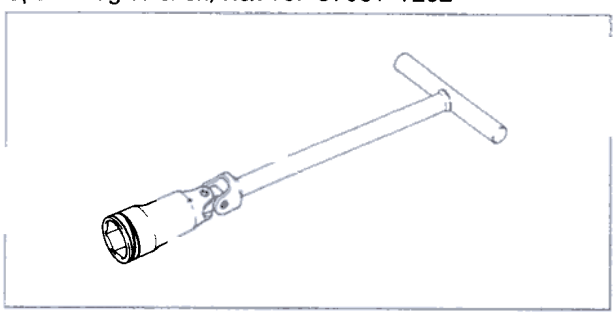
Hand Tester: 57001-983



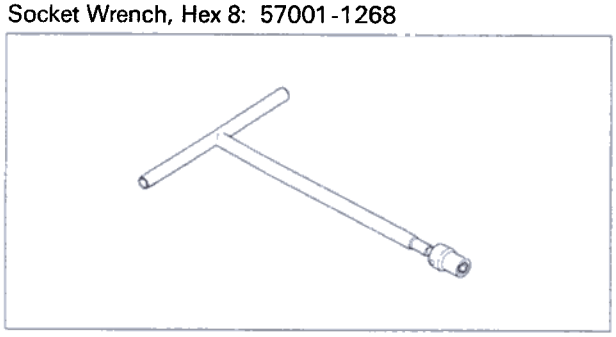
Coil Tester: 57001-1242



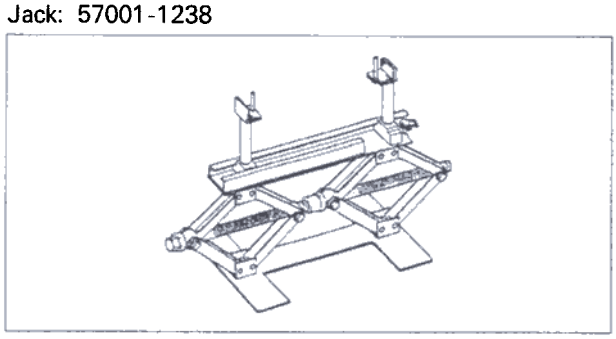
Spark Plug Wrench, Hex 16: 57001-1262



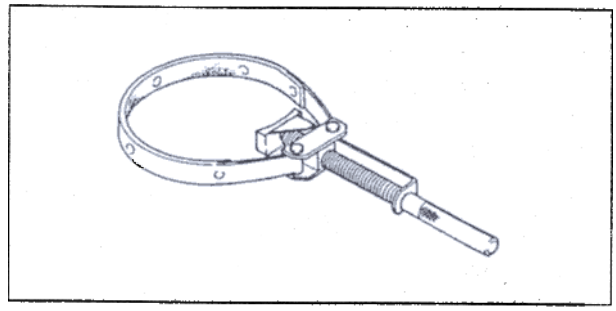
Socket Wrench, Hex 8: 57001-1268



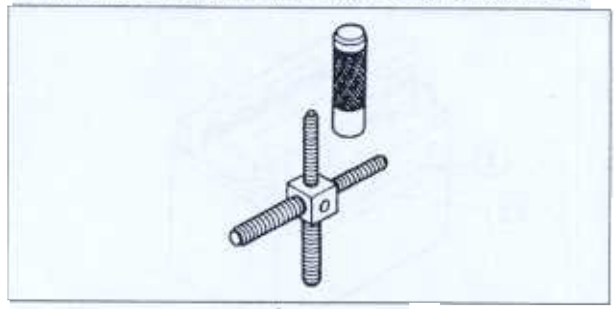
Jack: 57001-1238



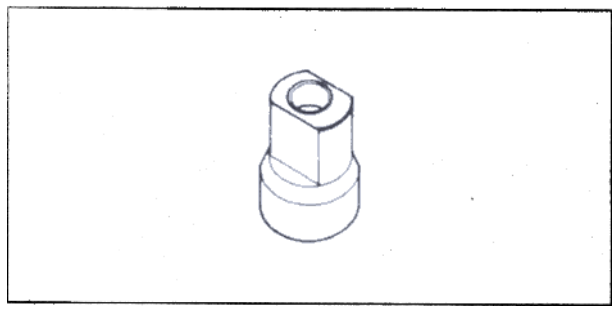
Flywheel Holder: 57001-1313



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

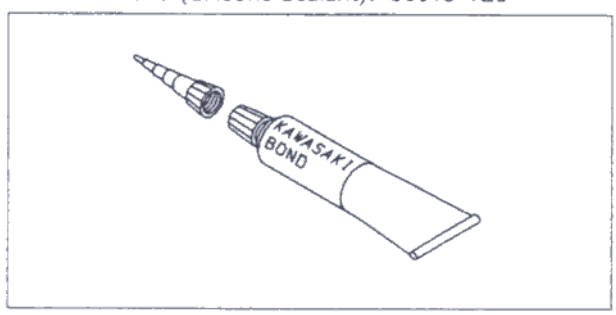


Rotor Puller, M33 x 1.5: 57001-1277



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120



Battery

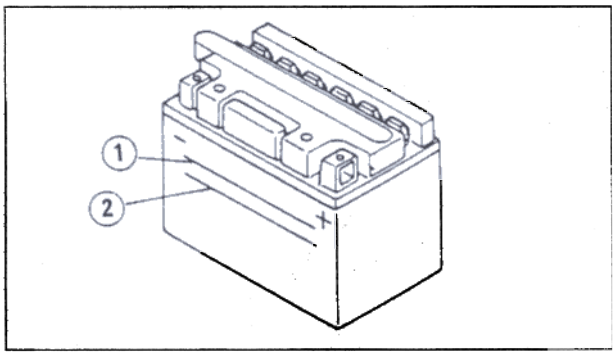
Electrolyte Level Inspection

●The electrolyte level should be between the upper and the lower level lines.

★If the level of electrolyte in any cell is below the lower level line, add only distilled water to cell, until the level is at the upper level line.

CAUTION

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



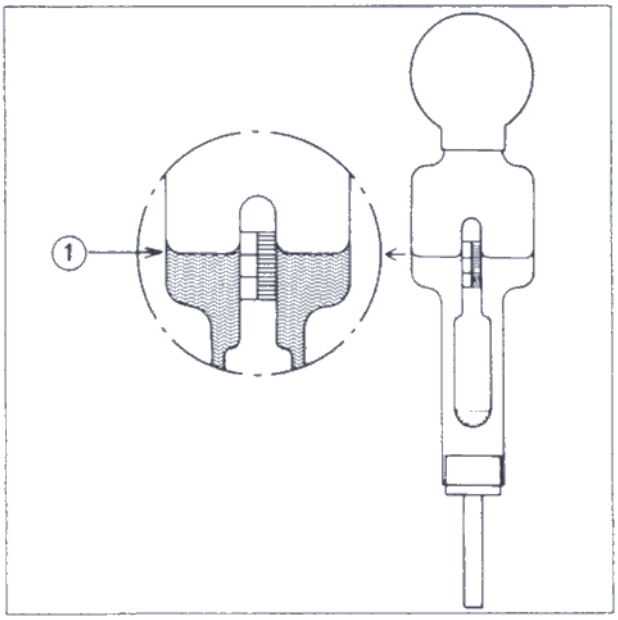
1. Upper Level Line 2. Lower Level Line

Electrolyte Specific Gravity Inspection

●Check battery condition by testing the specific gravity of the electrolyte in each cell with a hydrometer.

○Read the level of the electrolyte on the floating scale.

Hydrometer



1. Read here.

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

Initial Charging

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

⚠WARNING

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

●Fill each cell to the upper level line on the battery case with fresh electrolyte (specific gravity: 1.280) at a temperature of 30°C (86°F) or less. Let the battery stand for about 30 minutes before charging.

NOTE

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

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

CAUTION

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

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

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

Ordinary Charging

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

●Set the charging rate and time according to the battery condition previously determined (see Electrolyte Specific Gravity Inspection), using the Battery Charging Rate/Time Table.

⚠WARNING

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

CAUTION

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

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

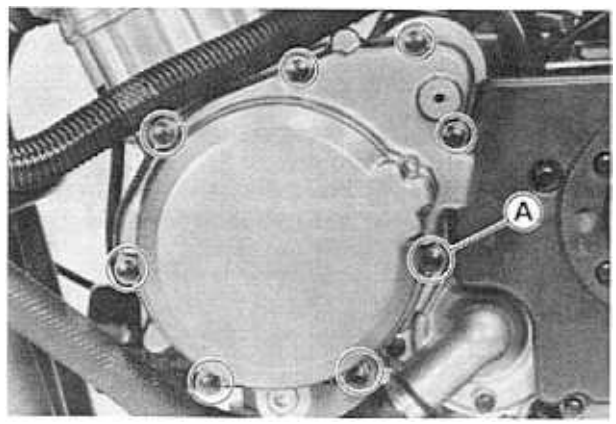
If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.

- Check the electrolyte level after charging.

Charging System

Alternator Cover Removal

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

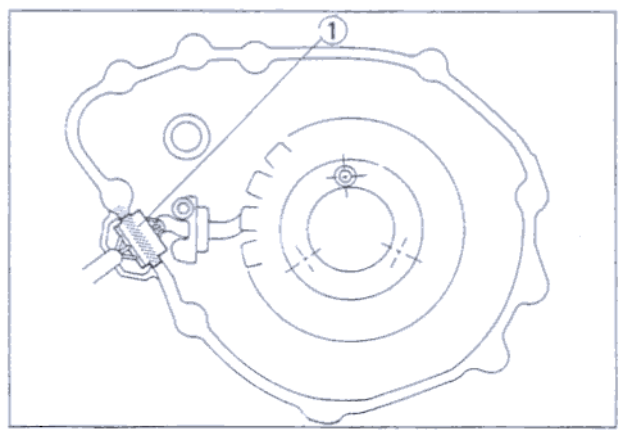


A. Alternator Cover Bolt

- Remove the alternator cover.

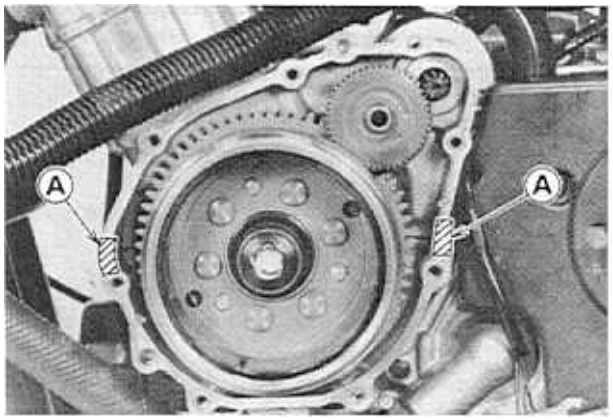
Alternator Cover Installation

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



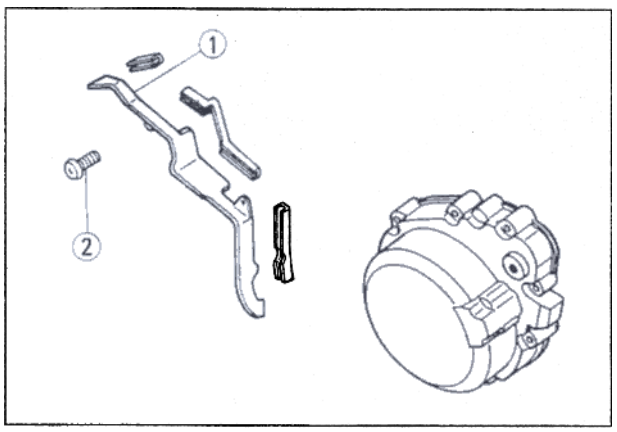
1. Apply silicone sealant

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



A. Silicone Sealant Applied Area

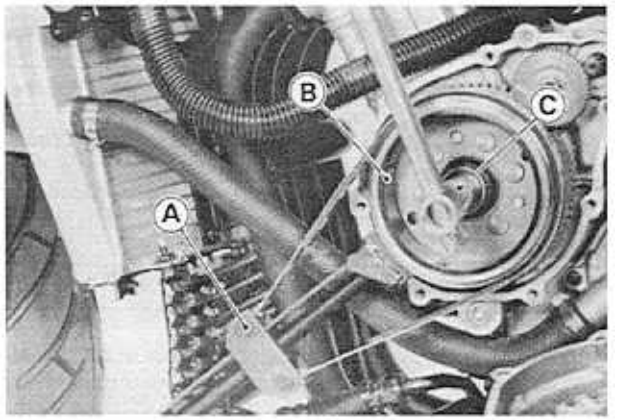
●Apply silicone sealant to the left inner cover bolt.



1. Left Inner Cover
2. Apply a non-permanent locking agent.

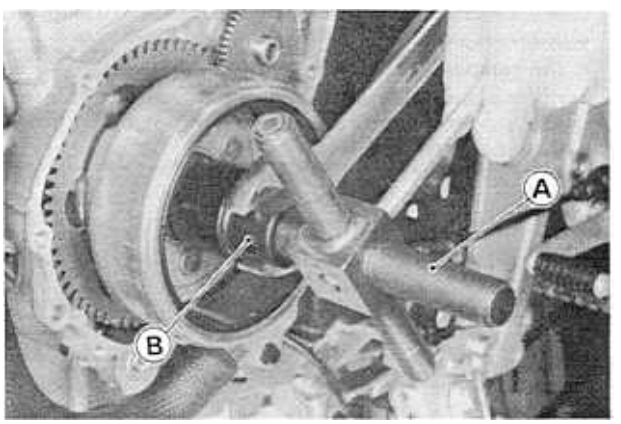
Alternator Rotor Removal

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



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

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



A. Rotor Puller: 57001-1216
B. Rotor Puller: 57001-1277

CAUTION

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

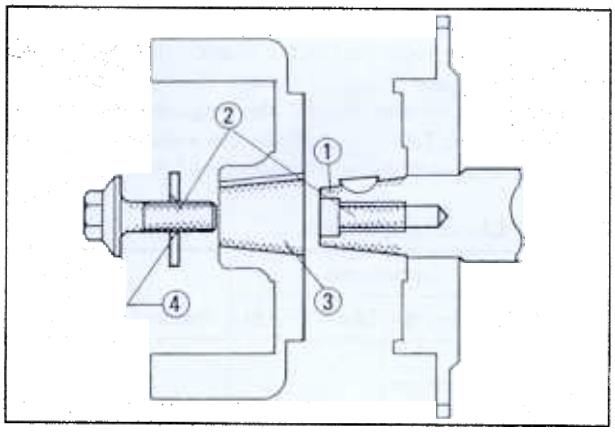
Alternator Rotor Installation Notes

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

⚠WARNING

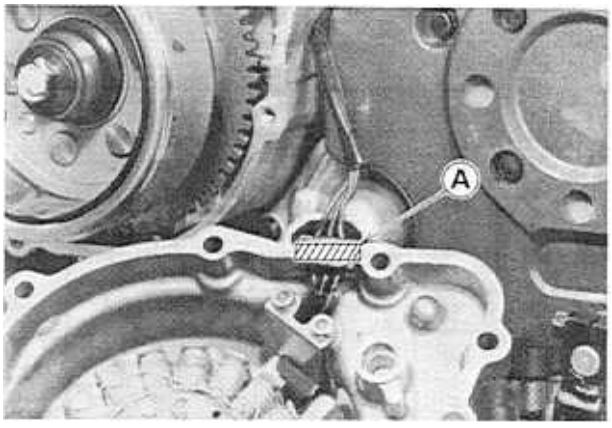
These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.

Alternator Rotor Cleaning Area



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

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

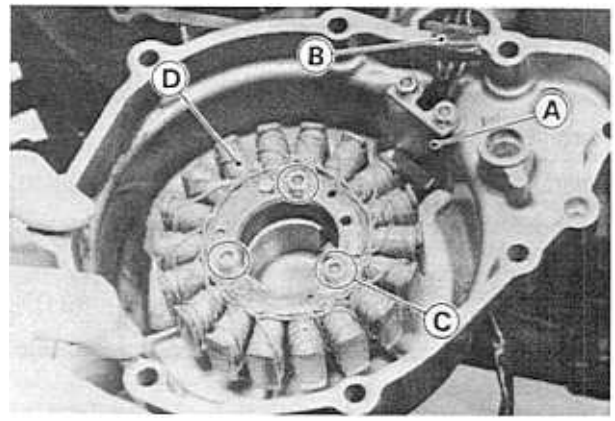


A. Silicone Sealant Applied Areas

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

Stator Coil Removal

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



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

Stator Installation Notes

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

Alternator Inspection

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

- To check the alternator output voltage, do the following procedures. Refer to the appropriate chapters and charging system Wiring Diagram.
  Turn off the ignition switch.
  Disconnect connector 1.
  Connect the hand tester (special tool: 57001-983) as shown in table.
  Start the engine.
  Run it at the rpm given in table.
  Note the voltage readings (total 3 measurements).

Alternator Output Voltage

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

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

- Check the stator coil resistance as follows:
  Stop the engine.

Connect the hand tester (special tool: 57001-983) as shown in table.
Note the readings (total 3 measurement)

Stator Coil Resistance

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

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

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

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

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

Rectifier Inspection

● Check the rectifier resistance as follows.

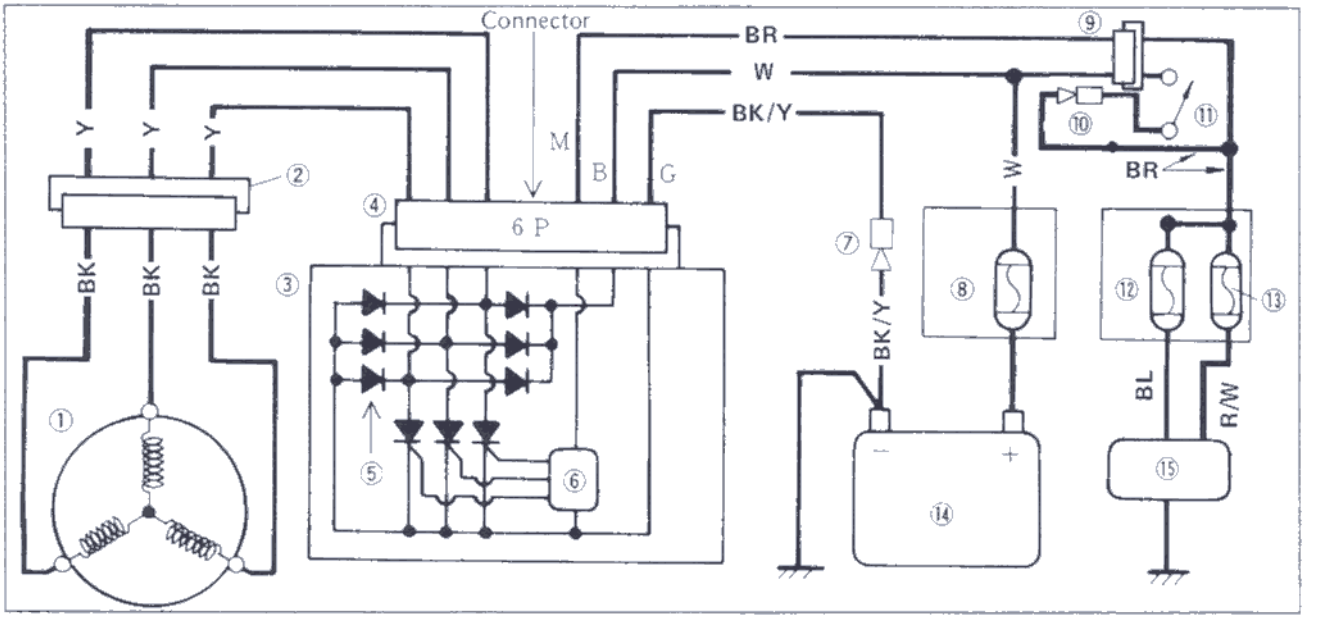
● Remove the regulator/rectifier and disconnect the connector 2 (see Charging System Wiring Diagram).

● Connect an ohmmeter to the regulator/rectifier as shown in the Table, and check the resistance in both directions of each diode following the table.

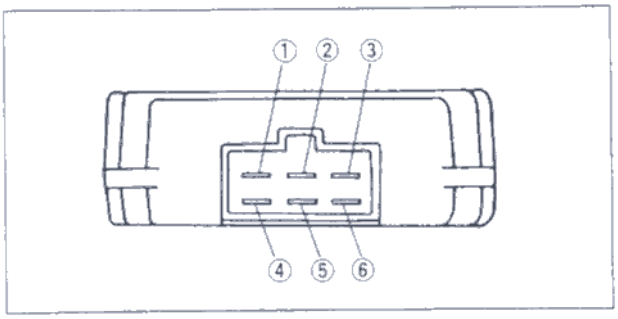
Rectifier Circuit Inspection

No.	Connections		Reading	Meter Range
	Meter (+) to	Meter (−) to		
1	Y_1	W	∞	x 10 Ω or x 100 Ω
2	Y_2			
3	Y_3			
4	Y_1	BK/Y	1/2 scale	
5	Y_2			
6	Y_3			
7	W	Y_1		
8		Y_2		
9		Y_3		
10	BK/Y	Y_1	∞	
11		Y_2		
12		Y_3		

Charging System Wiring Diagram



1. Alternator
2. Connector 1
3. Regulator/Rectifier
4. Connector 2
5. Diode (Rectifier)
6. Control Circuit (IC)
7. Connector 5
8. Main Fuse 30A
9. Connector 3
10. Connector 4
11. Ignition Switch
12. Headlight 10A Fuse (Junction Box)
13. Taillight 10A Fuse (Junction Box)
14. Battery
15. Load



1. W Lead Terminal
2. BR Lead Terminal
3. BK/Y Lead Terminal
4. Y_1 Lead Terminal
5. Y_2 Lead Terminal
6. Y_3 Lead Terminal

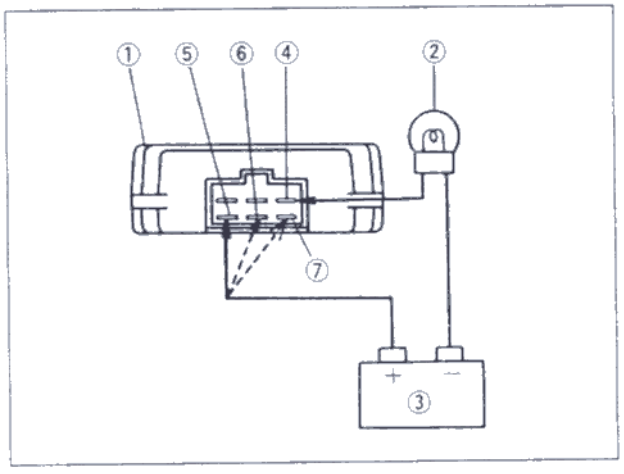
NOTE

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

Regulator Inspection

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

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

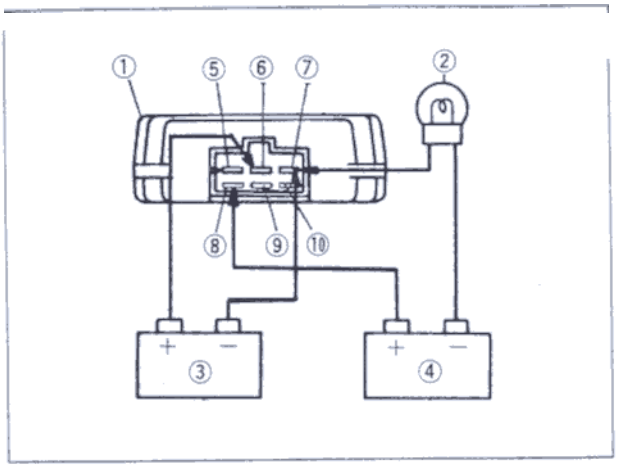


1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. BK/Y Lead Terminal
5. Y_1 Lead Terminal
6. Y_2 Lead Terminal
7. Y_3 Lead Terminal

CAUTION

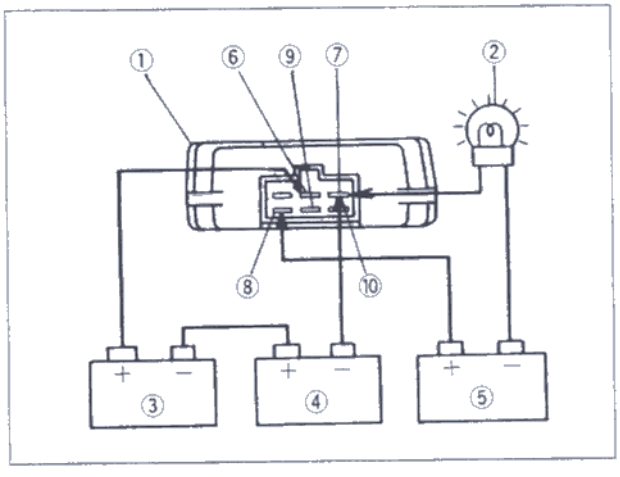
The test light works as an indicator and also as a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

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



1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. 12 V Battery
5. W Lead Terminal
6. BR Lead Terminal
7. BK/Y Lead Terminal
8. Y_1 Lead Terminal
9. Y_2 Lead Terminal
10. Y_3 Lead Terminal

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



1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. 12 V Battery
5. 12 V Battery
6. BR Lead Terminal
7. BK/Y Lead Terminal
8. Y_1 Lead Terminal
9. Y_2 Lead Terminal
10. Y_3 Lead Terminal

CAUTION

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

●Repeat the above three steps for other two yellow leads (in connector 2 which leads to the regulator/rectifier)).

★Replace the regulator/rectifier if the bulb does not light as described above.

NOTE

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

Regulator/Rectifier Output Voltage Inspection

●Check the battery condition (see Battery section).

●Warm up the engine to obtain actual alternator operating conditions.

●Remove the seat.

●Check that the ignition switch is turned off, and connect the hand tester as shown in table.

Regulator/Rectifier Output/Voltage

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

●Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.

●Turn off the ignition switch to stop the engine, and disconnect the hand tester.

★If the regulator/rectifier output voltage is kept between the values given in table, the charging system is considered to be working normally.

★If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the battery voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Ignition System

⚠WARNING

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

CAUTION

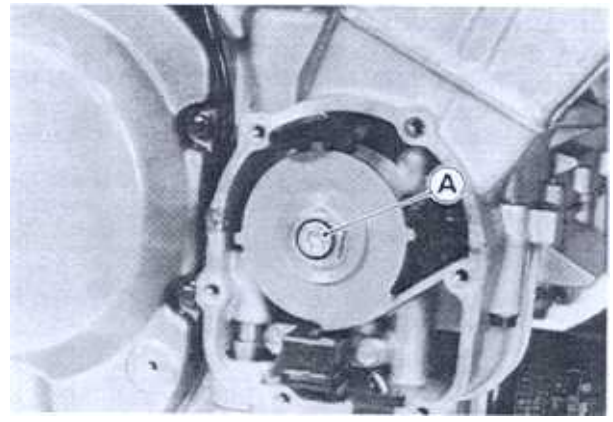
Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent IC igniter damage.

Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and IC igniter.

Pickup Coil Removal

●Remove the pickup coil cover (see Engine Top End chapter).

●Remove the Allen bolt.



A. Allen Bolt

Installation

●Tighten the Allen bolt to the specified torque (see Exploded View).

●Install the pickup coil cover (see Engine Top End chapter).

Pickup Coil Inspection

●Disconnect the pickup coil connector.

●Zero an ohmmeter, and connect it to the pickup coil leads.

★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

Pickup Coil Resistance (x 100 Ω)

355 ~ 535 Ω (BK, Y Lead)

●Using the highest resistance range of the ohmmeter, measure the resistance between the pickup coil leads and chassis ground.

★Any meter reading less than infinity (∞) indicates a short, necessitating replacement of the pickup coil assembly.

Ignition Coil Removal

●Remove surge tank cover (see Fuel System chapter)

●Remove the ignition coil from the bracket.

Ignition Coil Installation

●Connect the primary leads to the ignition coil terminals.

Black Lead → to #1, #4 Coil

Green Lead → to #2, #3 Coil

Red Lead → to both Coils

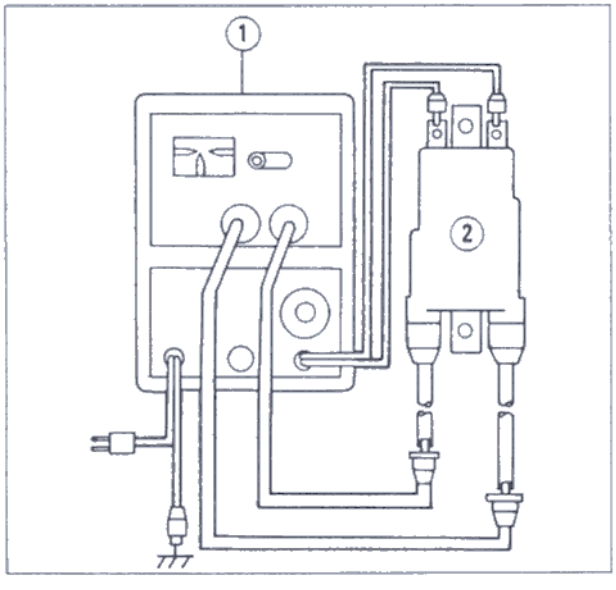
Ignition Coil Inspection

●Remove the ignition coils.

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

NOTE

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



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

⚠WARNING

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

★If the distance reading is less than the specified value, the ignition coil or spark plug caps are defective.

Ignition Coil Arcing Distance

7 mm or more

●To determine which part is defective, measure the arcing distance again with the spark plug caps removed from the ignition coil.

★If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug caps.

Measuring coil resistance:

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

●Disconnect the primary leads from the coil terminals.

●Measure the primary winding resistance.

○Connect an ohmmeter between the coil terminals.

○Set the meter to the x 1 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 leads.

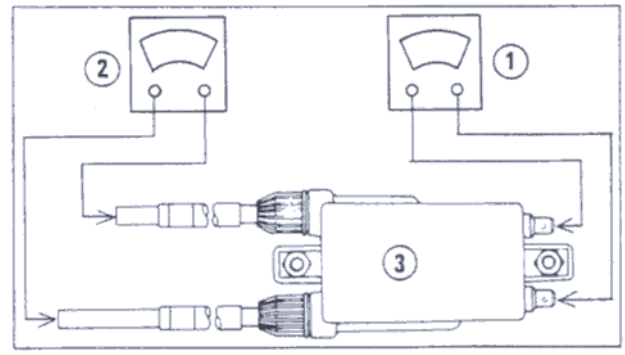
○Set the meter to the x 1 kΩ, and read the meter.

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

Ignition Coil Winding Resistance

Primary Windings:	2.3 ~ 3.5 Ω
Secondary Windings:	12 ~ 18 kΩ

Ignition Coil Winding Resistance

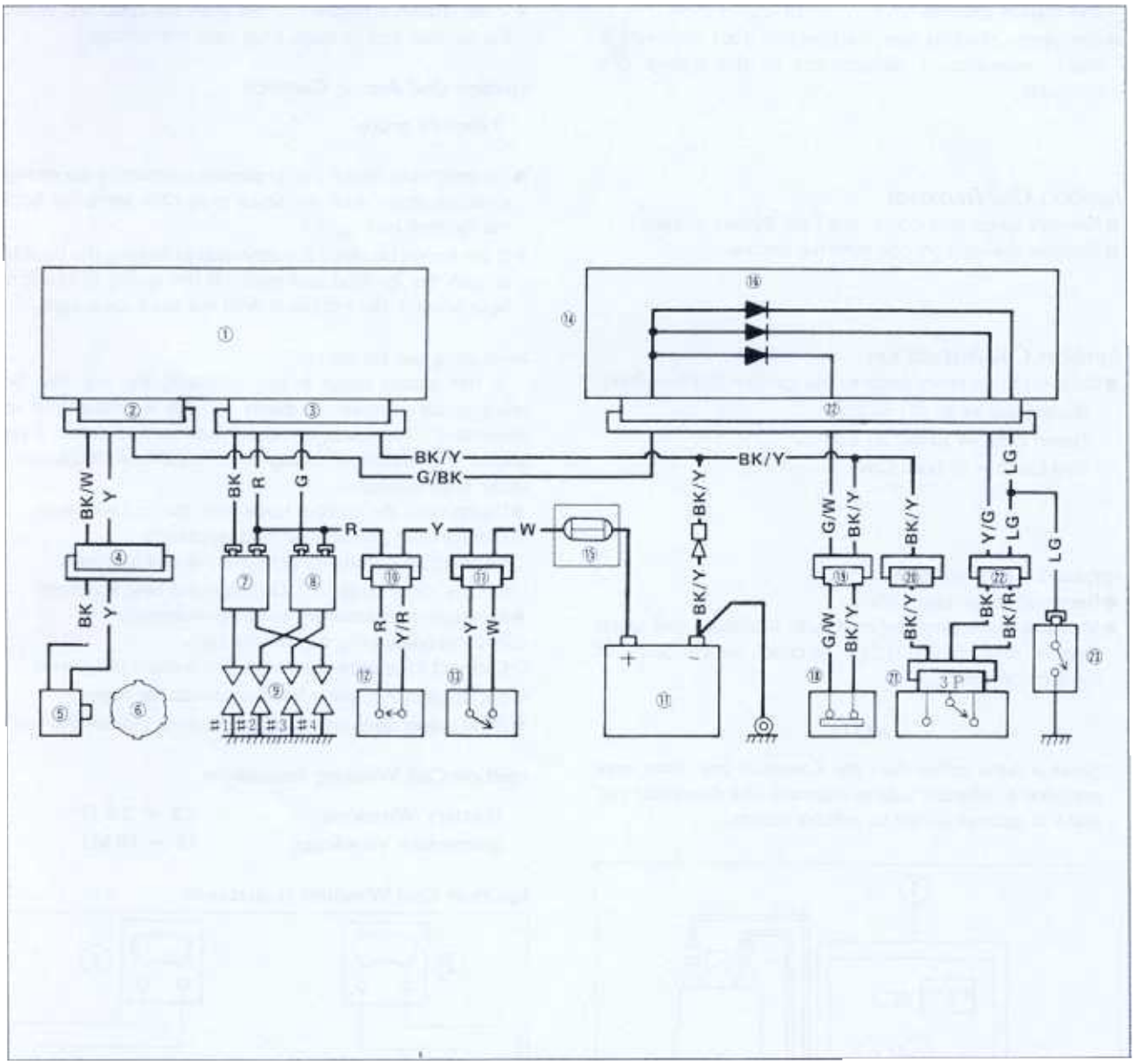


1. Measure primary winding resistance.
2. Measure secondary winding resistance.
3. Ignition Coil

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

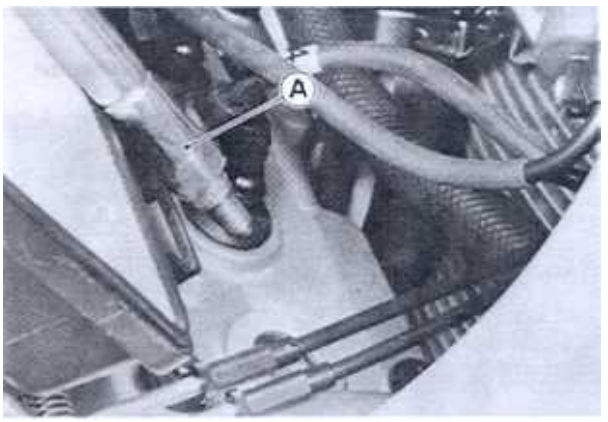
Ignition System Wiring Diagram



1. IC Igniter
2. 6-pin Connector
3. 4-pin Connector
4. 2-pin Connector
5. Pickup Coil (#1, #4 Cylinder)
6. Timing Rotor
7. Ignition Coil (#1, #4 Cylinder)
8. Ignition Coil (#2, #3 Cylinder)
9. Spark Plug
10. 4-pin Connector
11. 6-pin Connector
12. Engine Stop Switch
13. Ignition Switch
14. Junction Box
15. Main 30A Fuse
16. Diodes
17. Battery
18. Side Stand Switch
19. 9-pin Connector
20. 4-pin Connector
21. Starter Lockout Switch
22. 10-pin Connector
23. Neutral Switch

Spark Plug Removal

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



A. Spark Plug Wrench: 92110-1146

Spark Plug Installation Note

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

Spark Plug Cleaning and Inspection

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

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

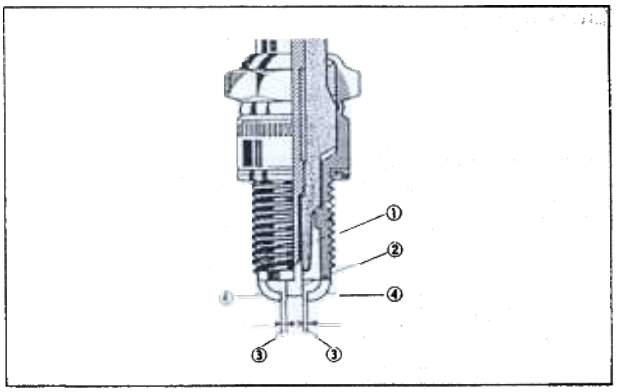
Spark Plug Gap Inspection

- Measure the gap with a wire-type thickness gauge.

★If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.

Spark Plug Gap

0.7 ~ 0.8 mm



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

IC Igniter Inspection

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

CAUTION

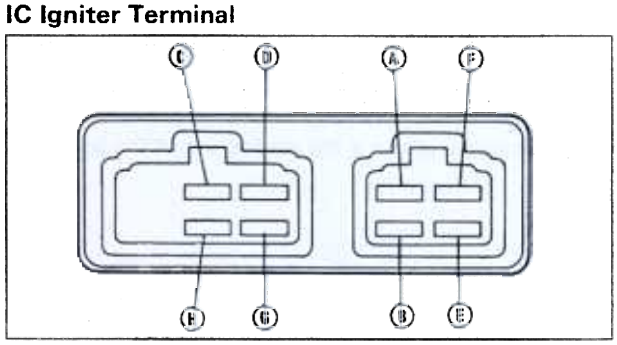
Use only Hand Tester 57001-983 for this test. A tester other than the Kawasaki Hand Tester may show different readings.
If a megger or a meter with a large-capacity battery is used, the IC igniter will be damaged.

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

IC Igniter Internal Resistance **Range : kΩ**

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

IC Igniter Terminal



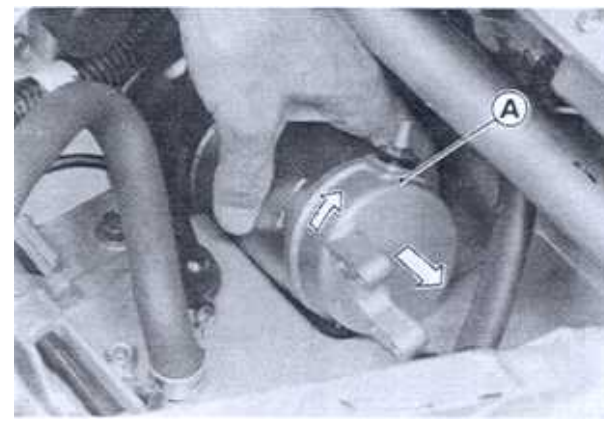
NOTE

○*No measurement is needed on H terminal.*

Electric Starter System

Starter Motor Removal

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



A. Starter Motor

Starter Motor Installation

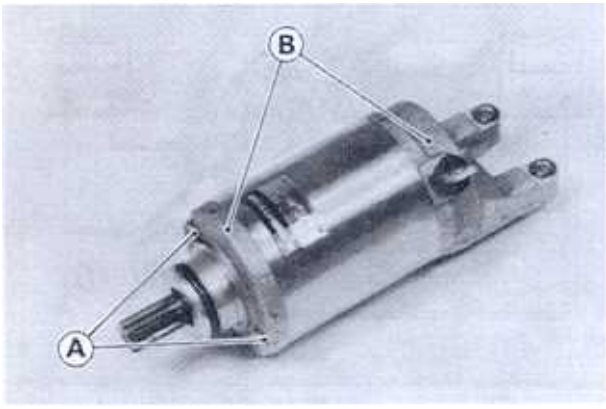
CAUTION

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

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

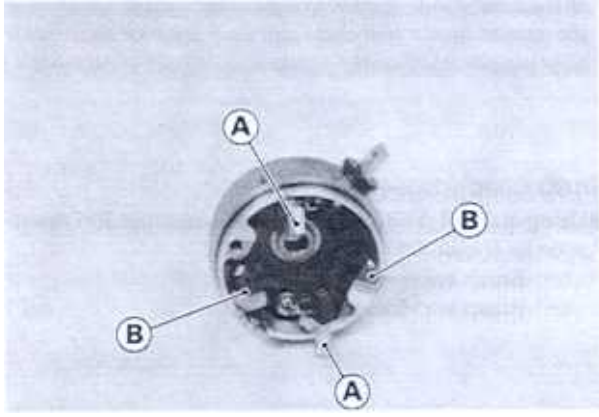
Starter Motor Disassembly

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

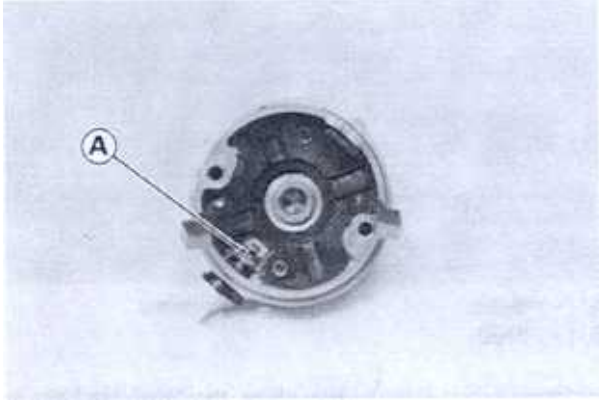


A. Bolts B. End Covers

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



A. (−) Brushes B. (+) Brushes



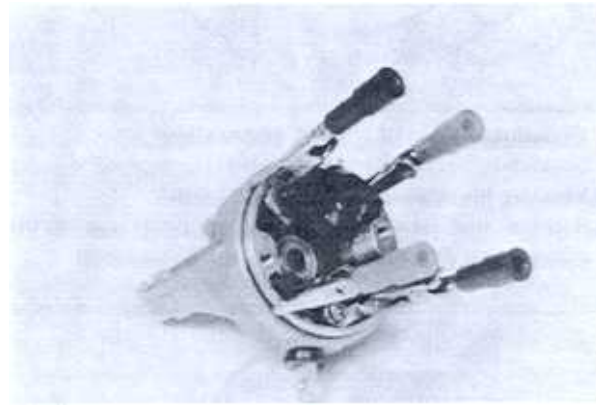
A. Soldered Terminal

Starter Motor Assembly Note

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

NOTE

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



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

Brush Inspection

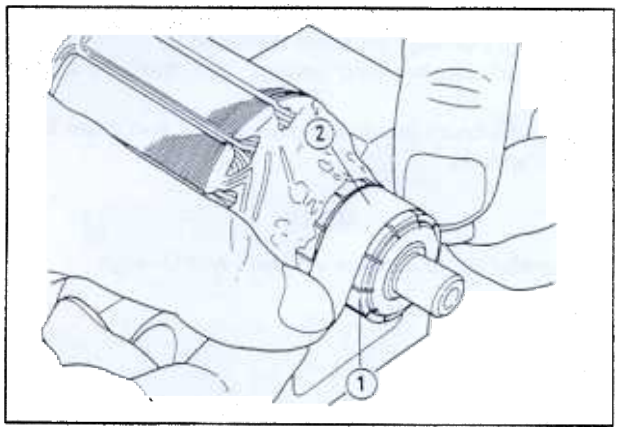
- Measure the length of each brush.
- ★ If any is worn down to the service limit, replace the carbon brush holder assembly and the terminal bolt assembly.

Starter Motor Brush Length

Standard:	**7.0 mm**
Service Limit:	**3.5 mm**

Commutator Cleaning and Inspection

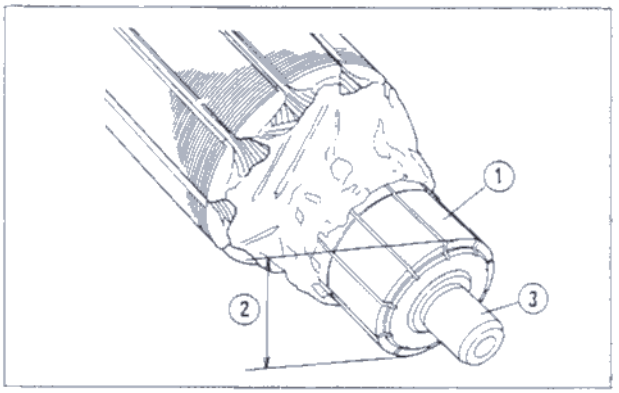
- Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves as illustrated.



1. Commutator 2. Emery Cloth

●Measure the diameter of the commutator.

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



1. Commutator Segment 3. Shaft
2. Diameter

Commutator Diameter

Standard:	**24 mm**
Service Limit:	**23 mm**

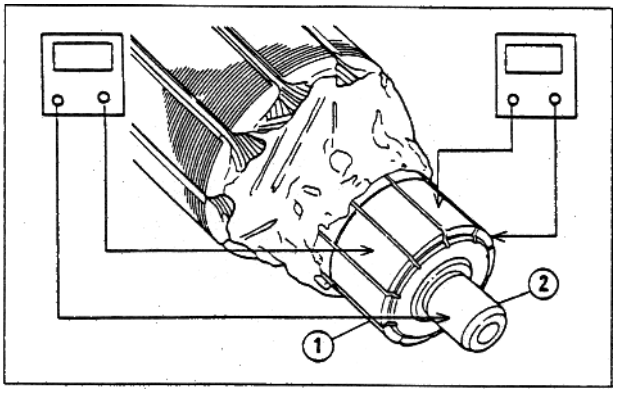
Armature Inspection

●Using the x 1 Ω ohmmeter range, measure the resistance between any two commutator segments.

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

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

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



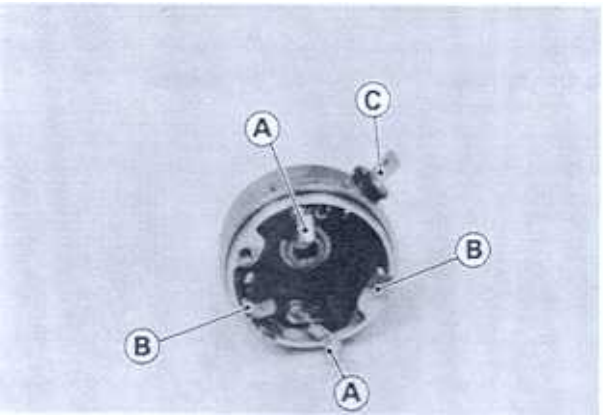
1. Segment 2. Shaft

NOTE

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with an ohmmeter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

Brush Lead Inspection

●Using the x 1 Ω ohmmeter range, measure the resistance as shown.
(+) Brush and (+) Terminal
(−) Brush and End Cover



A. (−) Brush C. (+) Terminal
B. (+) Brush

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

Brush Plate and Terminal Bolt Inspection

- Using the x 1 Ω ohmmeter range, measure the resistance as shown.
  between terminal bolt and brush plate
  between terminal bolt and (−) brush
  between terminal bolt and end cover

★If there is any reading, the brush holder assembly and/or terminal bolt assembly have a short. Replace the brush holder assembly and the terminal bolt assembly.

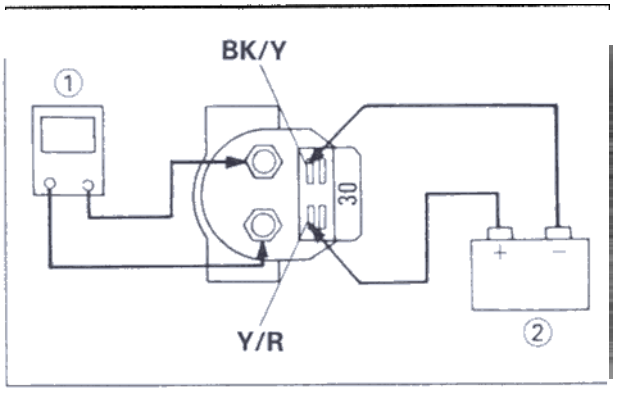
Starter Relay Inspection

- Remove the left side cover (see Frame chapter).
- Remove the starter relay.
- Connect the hand tester and 12 V battery to the starter relay as shown.

★If the relay does not work as specified, the relay is defective. Replace the relay.

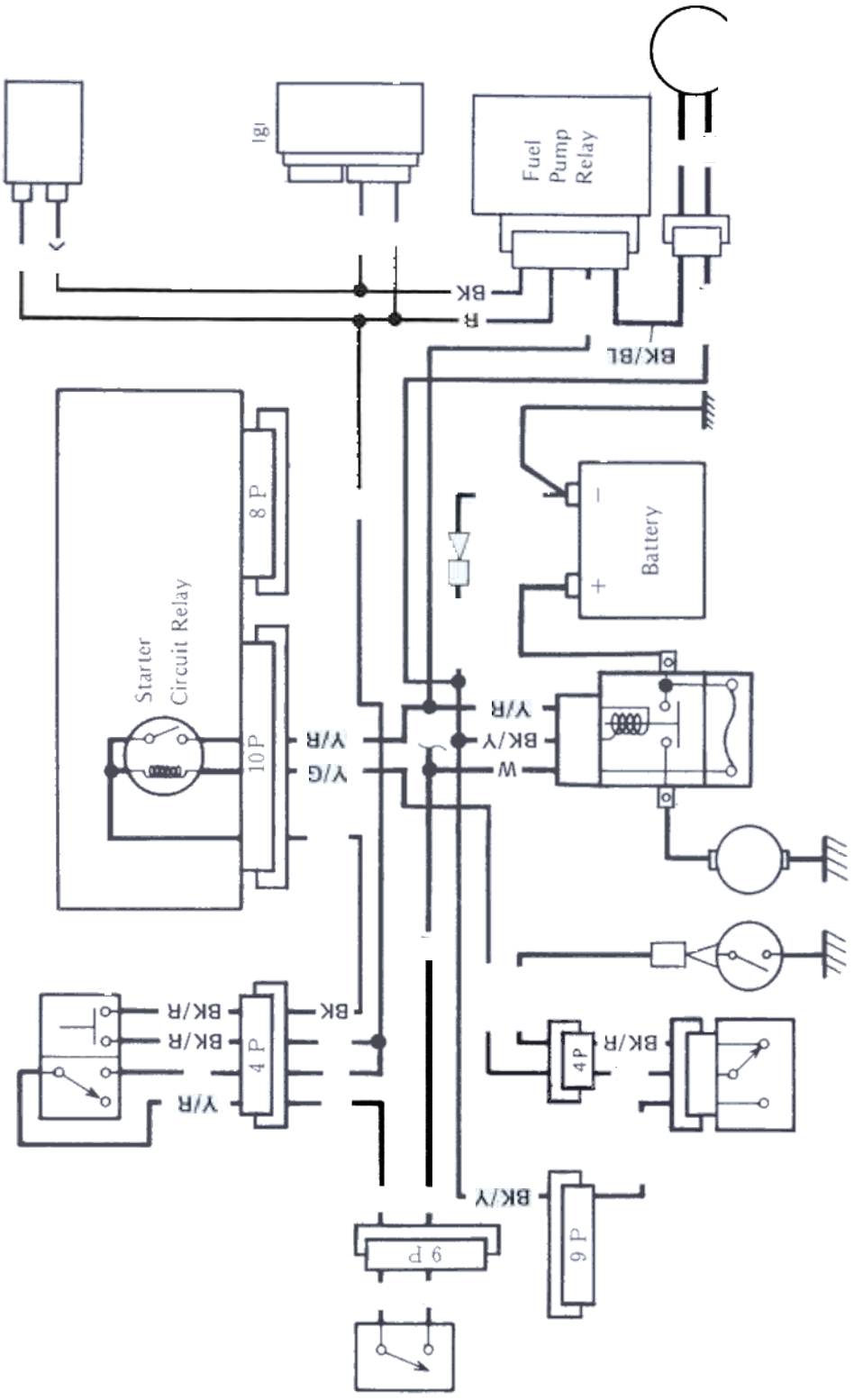
Testing Relay

Hand Tester Range: **x 1 Ω range**
Criteria: **When battery is connected → 0 Ω**
When battery is disconnected → ∞ Ω



1. Tester 2. 12 V Battery

Electric Starter and Fuel Pump Circuit

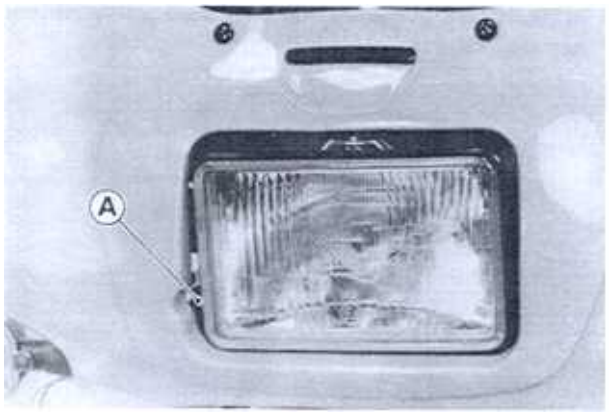


Lighting System

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

Headlight Beam Horizontal Adjustment

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



A. Adjusting Screw

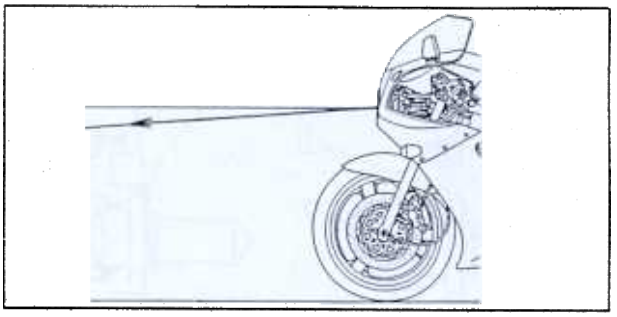
Headlight Beam Vertical Adjustment

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

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

NOTE

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





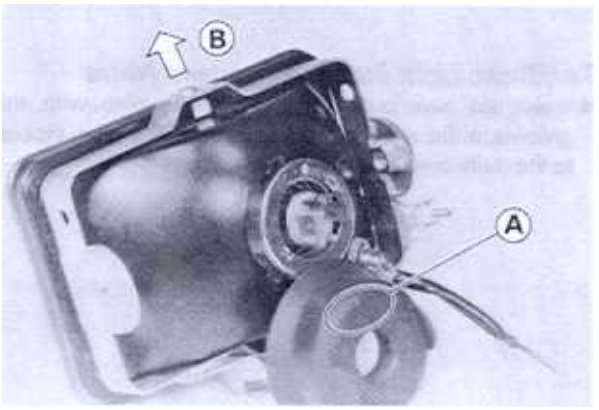
A. Adjusting Bolt

Headlight Bulb Replacement Notes

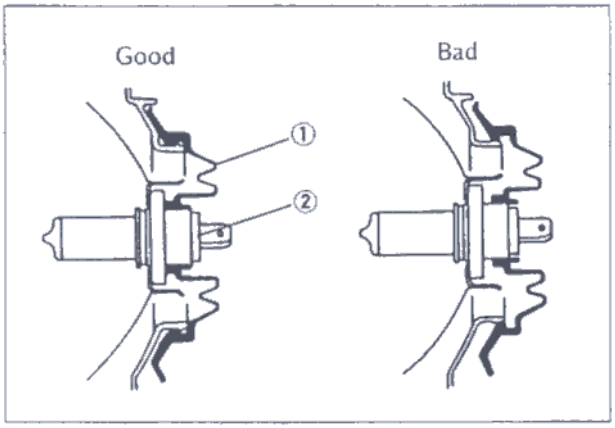
CAUTION

When handling the quartz-halogen bulbs, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

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



A. Top Mark B. Up

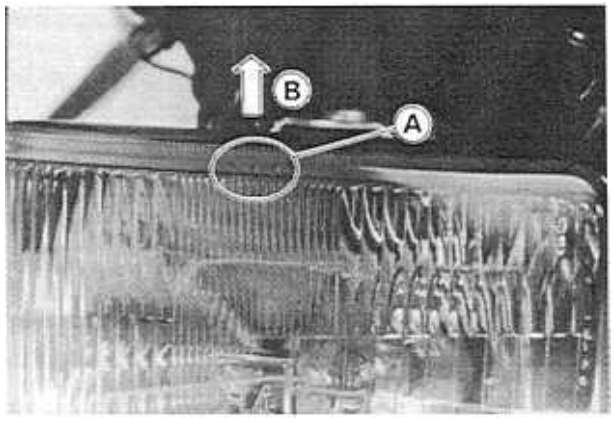


1. Dust Cover 2. Headlight Bulb

● Check the headlight aim after installation.

Headlight Unit Removal/Installation Note

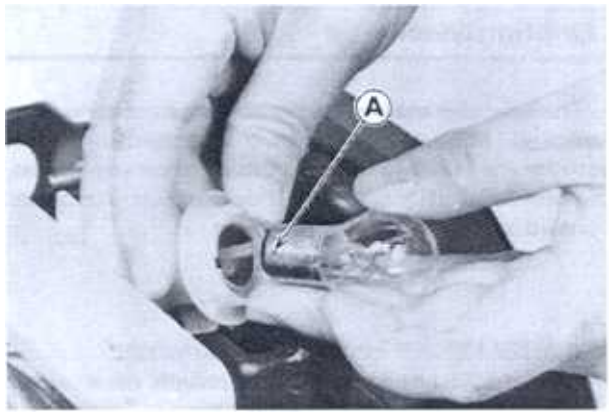
● Install the headlight unit so that the "TOP" mark on the lens points up.



A. Top Mark B. Up

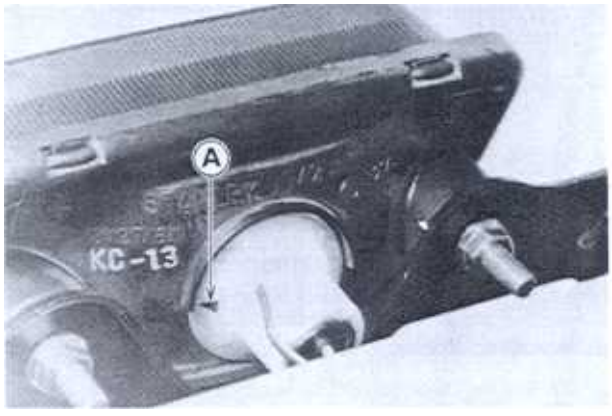
Tail/Brake Light Bulb Replacement Notes

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



A. Pin Closest to Base.

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



A. Triangular Mark

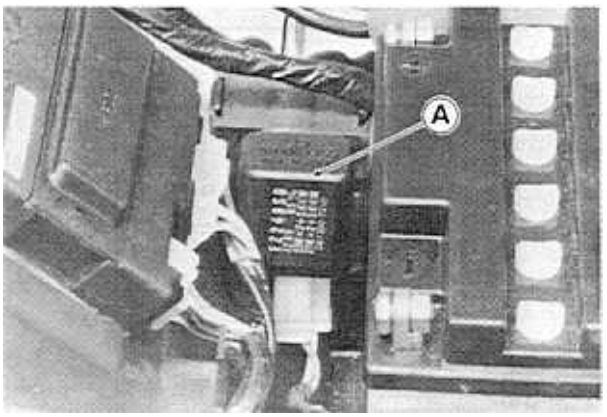
Turn Signal Light Bulb Replacement Note

● Be careful not to overtighten the lens mounting screws.

Turn Signal Relay Inspection

● Remove the seat.

● Take the turn signal relay out of the bracket.



A. Turn Signal Relay

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

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

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

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

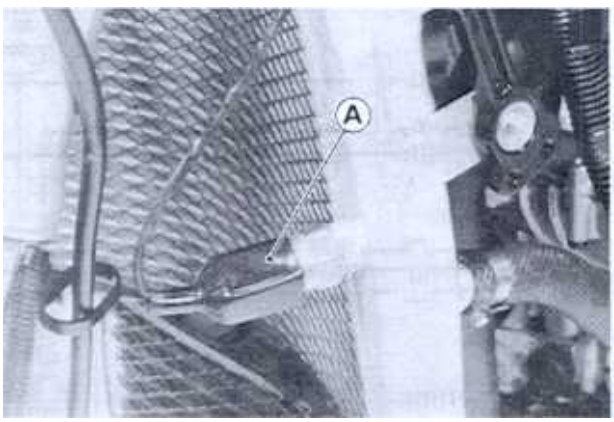
(4) Neither light on one side comes:
★Unless both lights for that side are burned out, the trouble is with the turn signal switch.

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

Radiator Fan System

Fan System Circuit Inspection

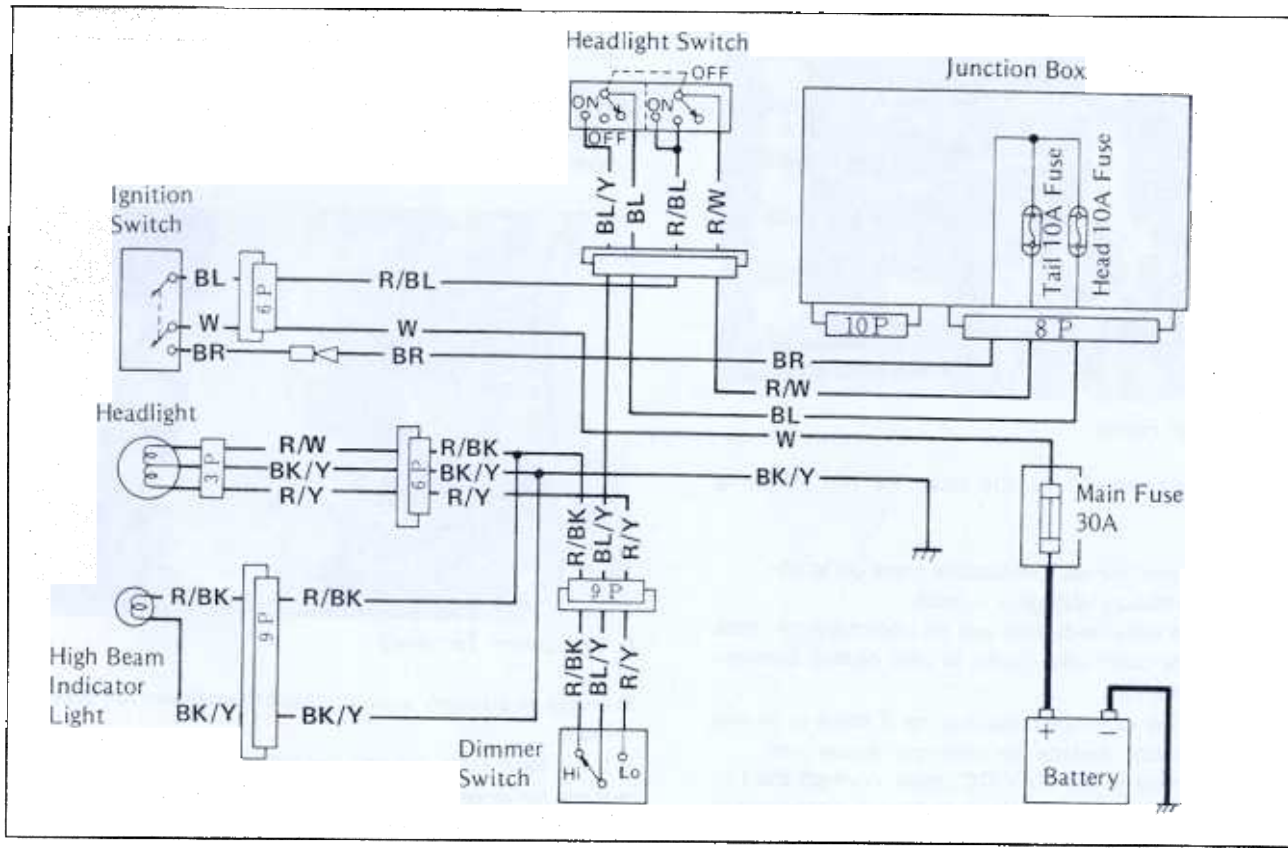
●Remove the left lower fairing and disconnect the leads from the radiator fan switch.



A. Fan Switch Terminals

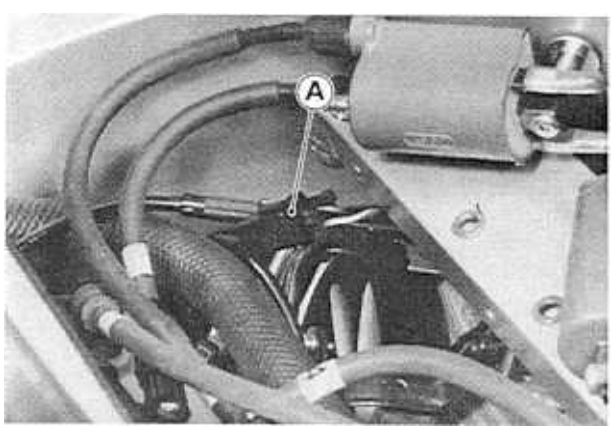
●Using an auxiliary wire, connect the radiator fan switch leads.
★If the fan rotates, inspect the fan switch.
★If the fan does not rotate, inspect the following.
Fan Fuse (Junction Box)
Headlight Circuit
Leads and Connectors
Main Fuse
Fan

Headlight Circuit



Fan Inspection

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



A. Fan Connector

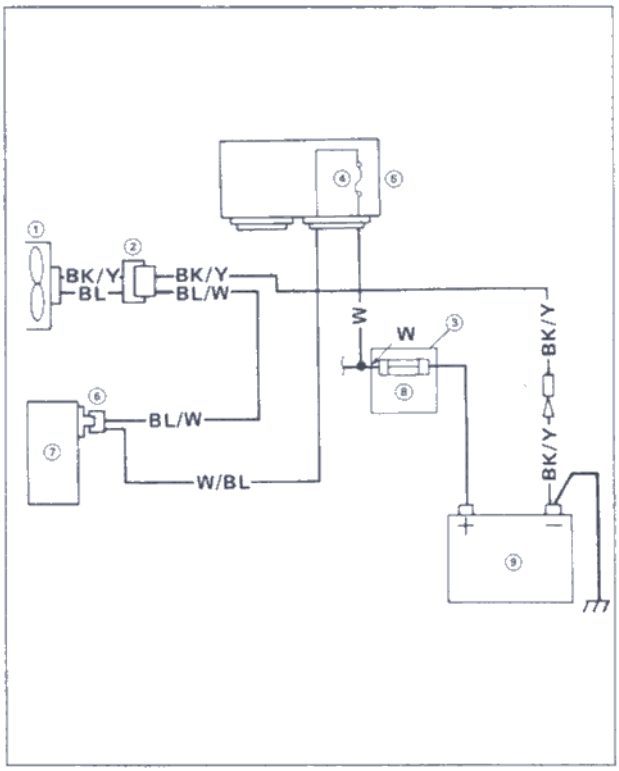
- Using two auxiliary wires, supply battery power to the fan.

★If the fan does not rotate at this time, the fan is defective and must be replaced.

Fan Installation

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

Cooling Fan Circuit



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

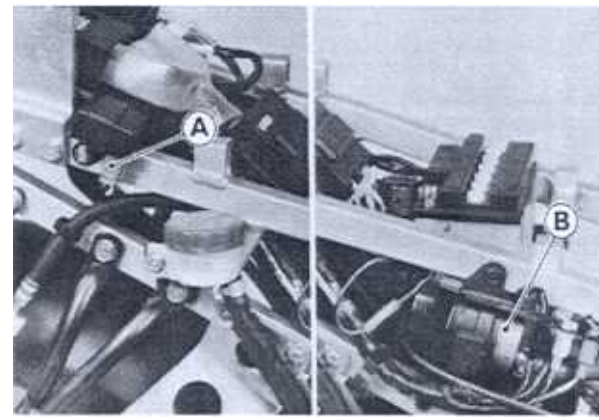
Fuel Pump

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

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

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

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



A. Pump Relay B. Fuel Pump

Removal/Installation

●Refer to the fuel system chapter.

Fuel Pump Relay Inspection

●Remove the side cover assembly (see Frame chapter) and take out the fuel pump relay.

●Set the hand tester (special tool: 57001-983) to the x 1 kΩ range and make the measurements shown in the table.

★If the tester readings are not as specified, replace the fuel pump relay.

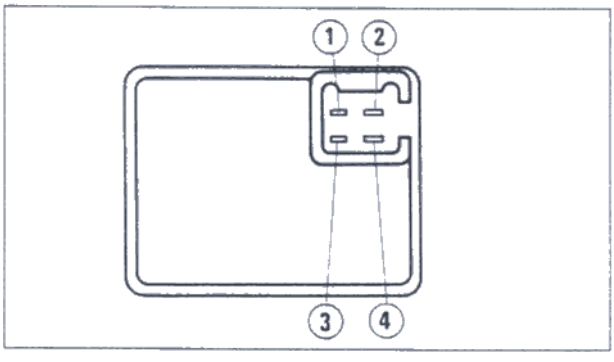
★If the tester readings are normal, check the fuel pump operation.

CAUTION

Use only Hand Tester 57001-983 for this test. An ohmmeter other than the Kawasaki Hand Tester may show different readings.
If a megger or a meter with a large-capacity battery is used, the pump relay will be damaged.

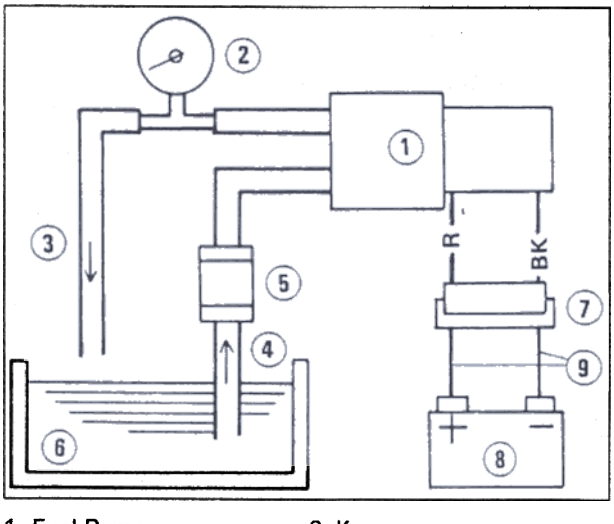
Fuel Pump Relay Internal Resistance

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



Pump Operational Inspection

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



1. Fuel Pump
2. Pressure Gauge
3. Outlet Hose
4. Inlet Hose
5. Fuel Filter
6. Kerosene
7. 2-Pin Connector
8. Battery
9. Auxiliary Leads

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

★If the pump operates, check the pump relay.

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

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

- When the pump stops, read the pressure gauge.

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

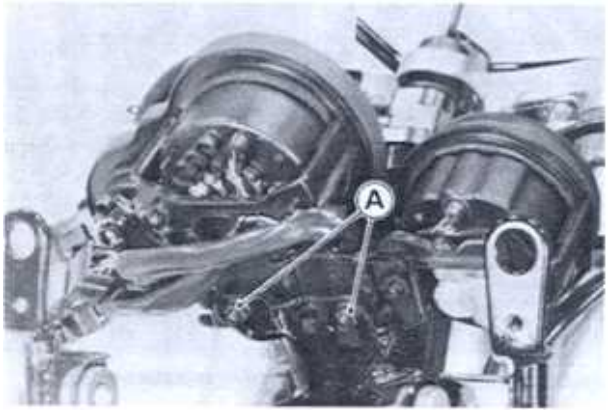
Fuel Pump Pressure

Standard **11 ~ 16 kPa**
(0.11 ~ 0.16 kg/cm², 1.6 ~ 2.3 psi)

Meters, Gauges

Removal

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



A. Meter Mounting Nuts

CAUTION

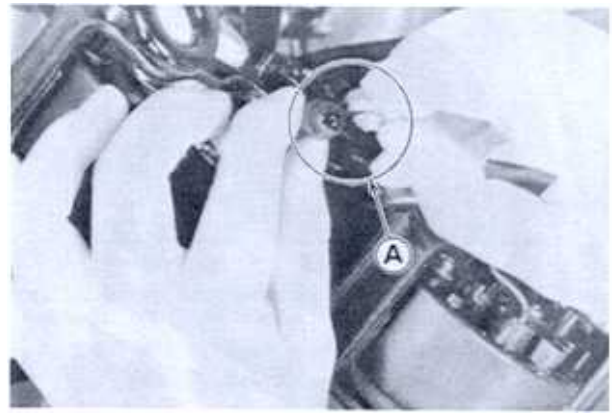
Place the meter or gauge so that the face is up. If a meter or gauge is left upside down or sideways for any length of time it will malfunction.

Bulb Replacement

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

CAUTION

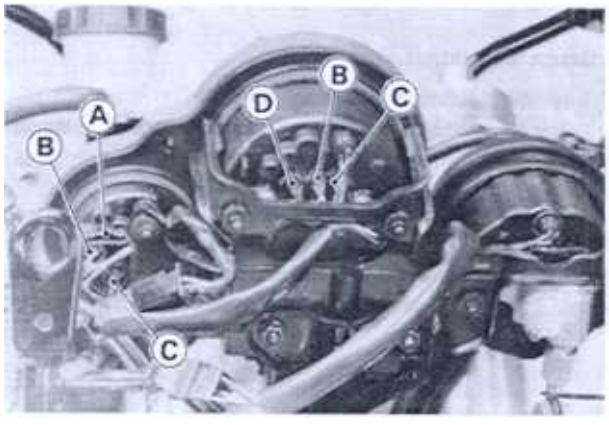
Do not use bulb rated for greater wattage than the specified value.
Do not turn the bulb to prevent damage to the bulb.



A. Pull the bulb.

Meter, Gauge Assembly Note

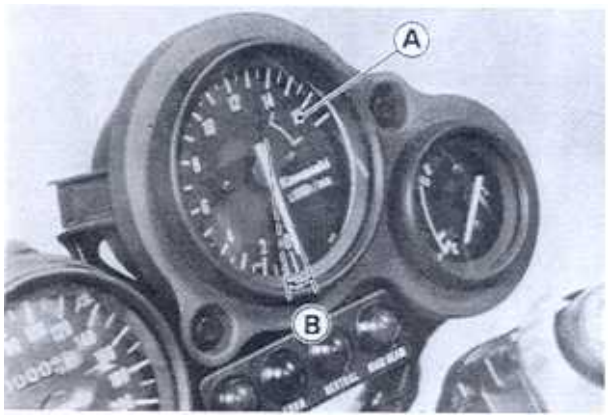
● Install each lead on the original position shown.



A. W/Y Lead
B. BK/Y Lead
C. BR Lead
D. BK Lead

Tachometer Inspection

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



A. Tachometer B. Pointer flicks.

Water Temperature Gauge Operation Inspection

● Prepare an auxiliary wire, and check the operation of the gauge.

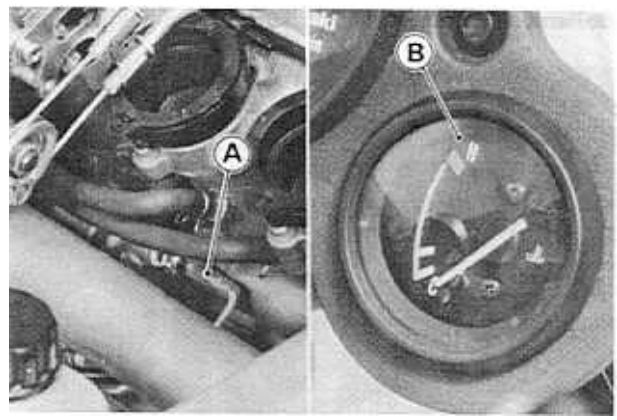
Gauge Operation Test

Ignition Switch Position: ON
Wire Location: Water temperature sensor female connector (disconnected)
Results: Gauge should read C when sensor wire is opened.
Gauge should read H when sensor wire is grounded to engine.

CAUTION

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

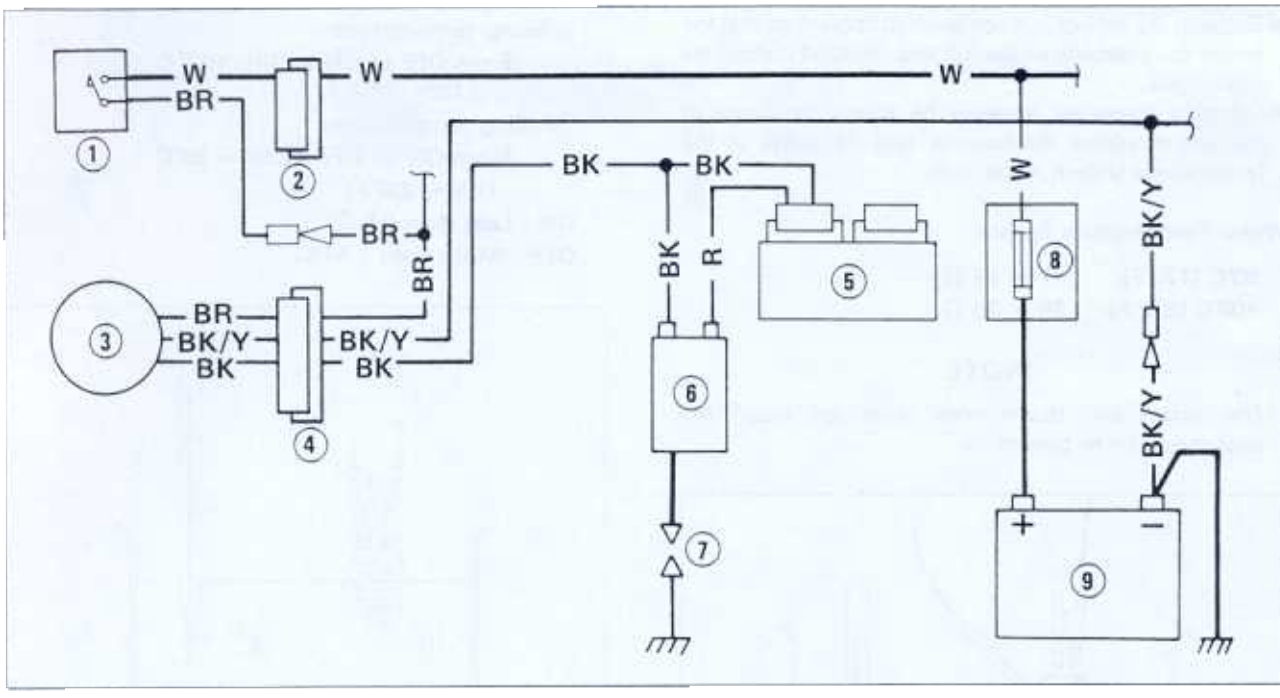
★If these readings are not correct, the trouble is with the gauge and/or wiring.



A. Sensor Connector B. Water Temperature Gauge

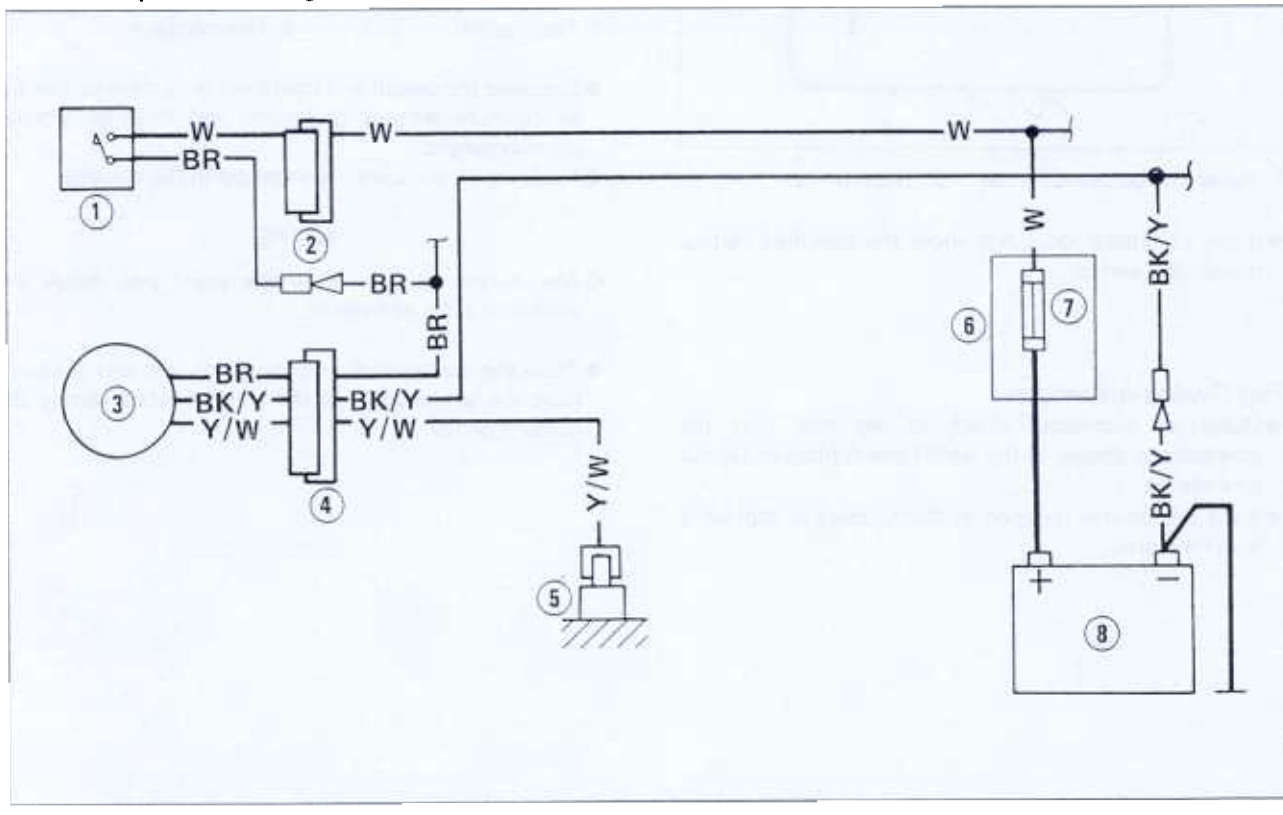
● Check the water temperature gauge circuit wiring (see Wiring Inspection).
● If all wiring and components other than the water temperature gauge unit check out good, the gauge is defective.

Tachometer Circuit



1. Ignition Switch
2. 6-Pin Connector
3. Tachometer
4. 4-Pin Connector
5. IC Igniter
6. Ignition Coil (#1, #4)
7. Spark Plug
8. 30A Main Fuse in Starter Relay
9. Battery

Water Temperature Gauge Circuit



1. Ignition Switch
2. 6-Pin Connector
3. Water Temperature Gauge
4. 6-Pin Connector
5. Water Temperature Sensor
6. Starter Relay
7. 30A Main Fuse
8. Battery

Water Temperature Sensor Inspection

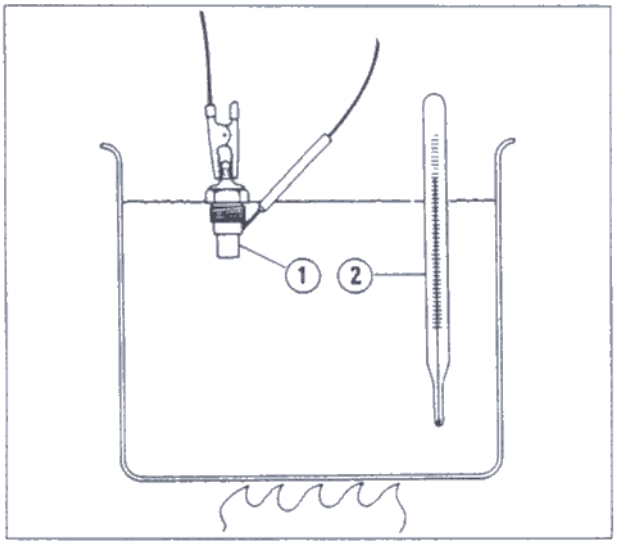
- Suspend the sensor in a container of coolant so that the temperature sensing projection and threaded portion are submerged.
- Using an ohmmeter, measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.

Water Temperature Sensor

80°C (175°F):	47 ~ 57 Ω
100°C (212°F):	25 ~ 30 Ω

NOTE

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



1. Water Temperature Sensor 2. Thermometer

★If the ohmmeter does not show the specified values, replace the sensor.

Fan Switch Inspection

- Using an ohmmeter, check to see that only the connections shown in the table have continuity (about zero ohms).

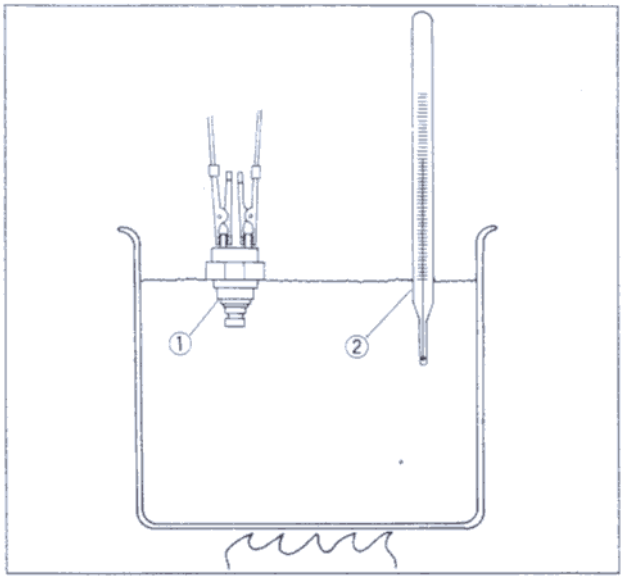
★If the switch has an open or short, repair or replace it with new one.

Fan Switch Resistance

○ **Rising temperature:**
From OFF to ON at 93~103°C (199~217°F)

○ **Falling temperature:**
From ON to OFF at 91 ~ 95°C (196~ 203°F)

ON : Less than 0.5 Ω
OFF : More than 1 M Ω



1. Fan Switch

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

NOTE

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

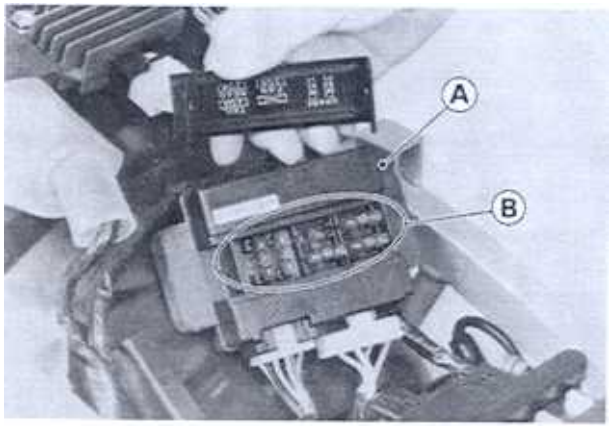
- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.

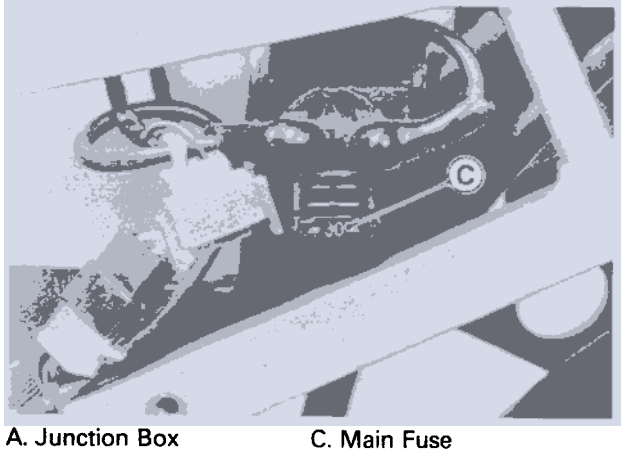
Junction Box

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

Fuse Removal

- Remove the seats (see Frame chapter).
- Unlock the hook to lift up the locking arm.
- Pull the fuses straight out of the junction box with needle nose pliers.
- Pull out the main fuse from the starter relay.





A. Junction Box
B. Fuses
C. Main Fuse

Fuse Installation

★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.

Fuse Inspection

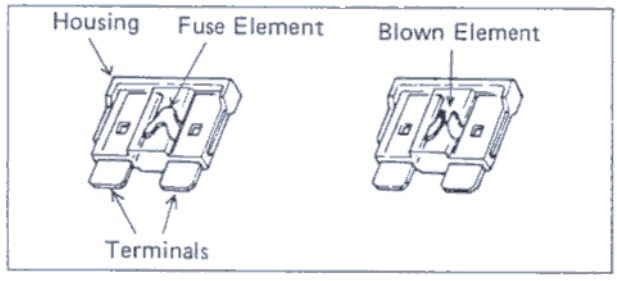
- Remove the fuse (see Fuse Removal).
- Inspect the fuse element.

★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

CAUTION

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

Fuse



Junction Box Fuse Circuit Inspection

- Remove the junction box (see Fuse Removal).
- Pull off the connectors from the junction box.
- Make sure all connector terminals are clean and tight, and none of them have been bent.

★Clean the dirty terminals, and straighten slightly-bent terminals.

- Check conductivity of the numbered terminals with the hand tester (special tool).

★If the tester dose not read as specified, replace the junction box.

Fuse Circuit Inspection

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

Starter Circuit

- Remove the junction box (see Fuse Removal).
- Check conductivity of the following numbered terminal by connecting the hand tester (special tool) and one 12 V battery to the junction box as shown.

★If the relay does not work as specified, replace the junction box.

Relay Circuit Inspection
(with the battery disconnected)

Meter Connection	Meter Reading
11 — 13	∞
12 — 13	∞

Relay Circuit Inspection
(with the battery connected)

Meter Connection	Battery Connection + −	Meter Reading (Ω)
11 − 13	11 − 12	0

Diode Circuit Inspection

- Remove the junction box from the motorcycle.
- Pull off the connectors from the junction box.
- Check conductivity of the following pair of terminals.

Terminals for Diode Circuit Inspection

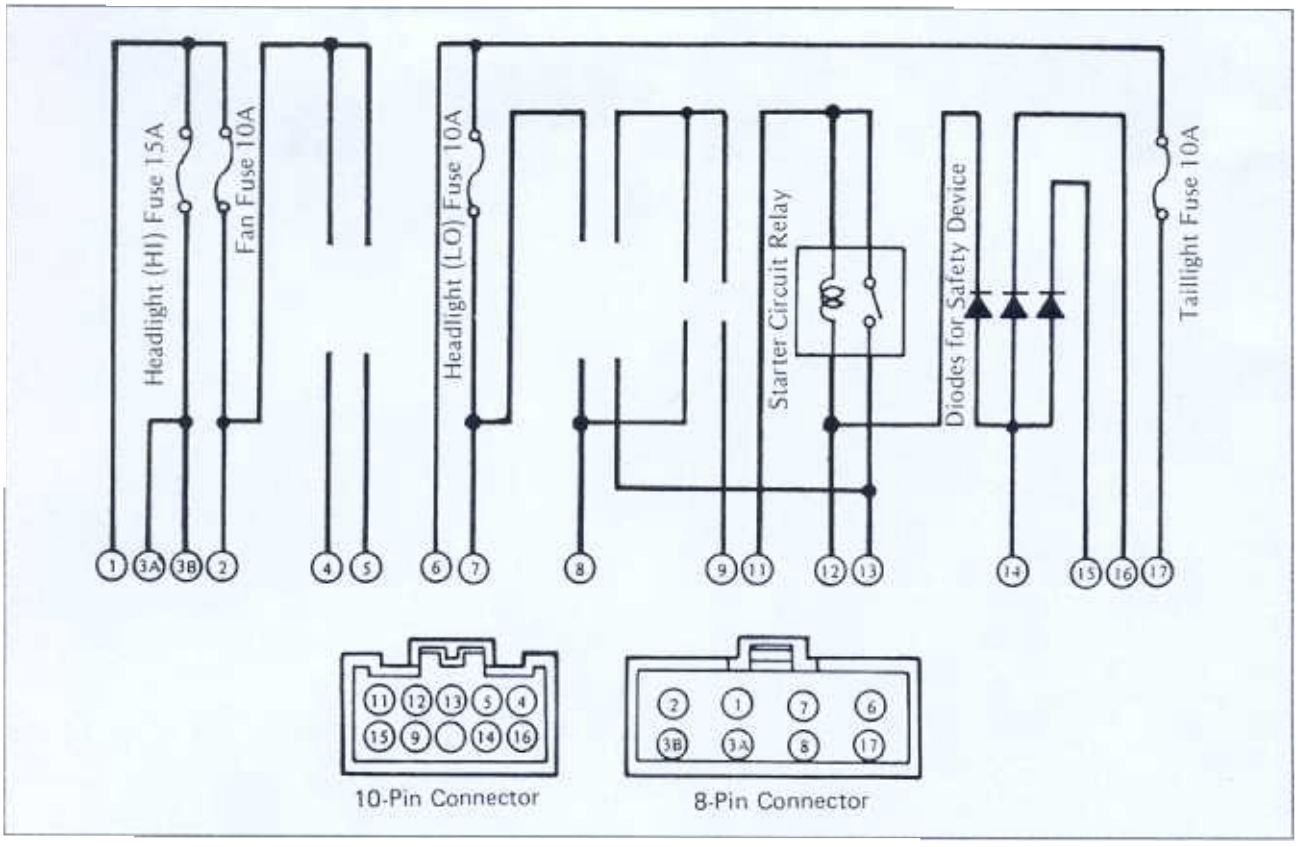
14-12, 14-15, 14-16

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

NOTE

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

Junction Box Internal Circuit



Electrical Wiring

Wiring Inspection

- ●Visually inspect the wiring for signs of burning, fraying, etc.
- ★If any wiring is poor, replace the damaged wiring.
- ●Pull each connector apart and inspect it for corrosion, dirt, and damage.
- ★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- ●Check the wiring for continuity.
- ○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- ○Connect an ohmmeter between the ends of the leads.
- ○Set the meter to the x 1 Ω range, and read the meter.
- ★If the meter does not read 0 Ω, the lead is defective. Replace the lead or the wiring loom if necessary.