

## CHAPTER EIGHT

# ELECTRICAL SYSTEM

This chapter contains operating principles, service procedures and test procedures for all electrical and ignition components. Information regarding the battery and spark plugs are covered in Chapter Three.

The electrical system includes the following systems:

- a. Charging system.
- b. Ignition system.
- c. Starting system.
- d. Lighting system.
- e. Directional signal system.
- f. Switches.
- g. Various electrical components.

**Tables 1-5** are located at the end of this chapter.

### NOTE

*Where differences occur relating to the United Kingdom (U.K.) models they are identified. If there is no (U.K.) designation relating to a procedure, photo or illustration it is identical to the United States (U.S.) models.*

### NOTE

*Most motorcycle dealers and parts suppliers will not accept the return of any electrical part. When testing electrical components, three general requirements to make are: (1) that you follow the test procedures as described in this chapter; (2) that your test equipment is*

*working properly; and (3) that you are familiar with the test equipment and its operation. If a test result shows that a component is defective, have a Suzuki dealer **retest** the component to verify your test results prior to purchasing the new part.*

## ELECTRICAL CONNECTORS

The Suzuki Interceptor is equipped with many electrical components, connectors and wires. Corrosion-causing moisture can enter these electrical connectors and cause poor electrical connections leading to component failure. Troubleshooting an electrical circuit with one or more corroded electrical connectors can be time-consuming and frustrating.

When reconnecting electrical connectors, pack them in a dielectric grease compound. Dielectric grease is especially formulated for sealing and waterproofing electrical connectors and will not interfere with the current flow through the electrical connectors. Use only this compound or an equivalent designed for this specific purpose. Do *not* use a substitute that may interfere with the current flow within the electrical connector. Do *not* use silicone sealant.

After cleaning both the male and female connectors, make sure they are thoroughly dry. Pack one of the connector halves with dielectric grease compound before joining the 2 connector halves. On multi-pin connectors, pack the male side and on single-wire connectors, pack the female side. Use a good-size glob so that it will squish out when the two halves are pushed together. For best results, the

compound should fill the entire inner area of the connector. On multi-pin connectors, also pack the backside of both the male and female side with the compound to prevent moisture from entering the backside of the connector. After the connector is fully packed, wipe the exterior of all excessive compound.

Get into the practice of cleaning and sealing all electrical connectors every time they are unplugged. This may prevent a breakdown on the road and also save you time when troubleshooting a circuit.

Always make sure all ground connections are free of corrosion and are tight at various locations on the bike.

## BATTERY NEGATIVE TERMINAL

Some of the component replacement procedures and some of the test procedures in this chapter require disconnecting the battery negative (-) lead as a safety precaution.

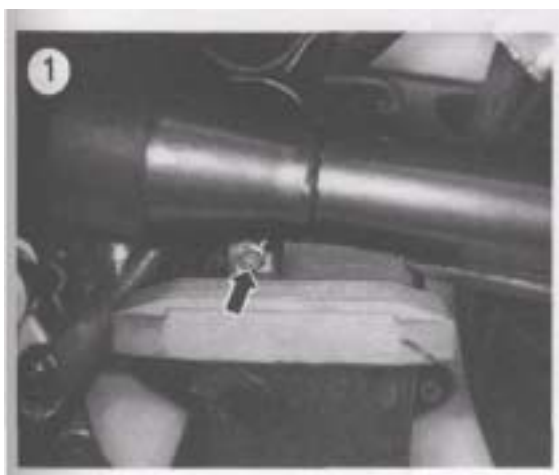
1. Remove the bolt and disconnect the battery negative (**Figure 1**) lead.
2. Reach into the battery case and move the negative lead out of the way so it will not accidentally make contact with the battery negative terminal.
3. Connect the battery negative lead to the terminal and tighten the bolt securely.

## CHARGING SYSTEM

The charging system consists of the battery, alternator and a solid-state voltage regulator/rectifier (**Figure 2**).

Alternating current generated by the alternator is rectified to direct current. The voltage regulator maintains constant voltage to the battery and electrical loads (lights, ignition, etc.) regardless engine speed and load.

A malfunction in the charging system generally causes the battery to remain undercharged. To prevent damage to the alternator and the regulator/rectifier when testing and repairing the charging system, note the following precautions: 1. Always disconnect the negative battery cable, as described in this chapter, before removing a component from the charging system.



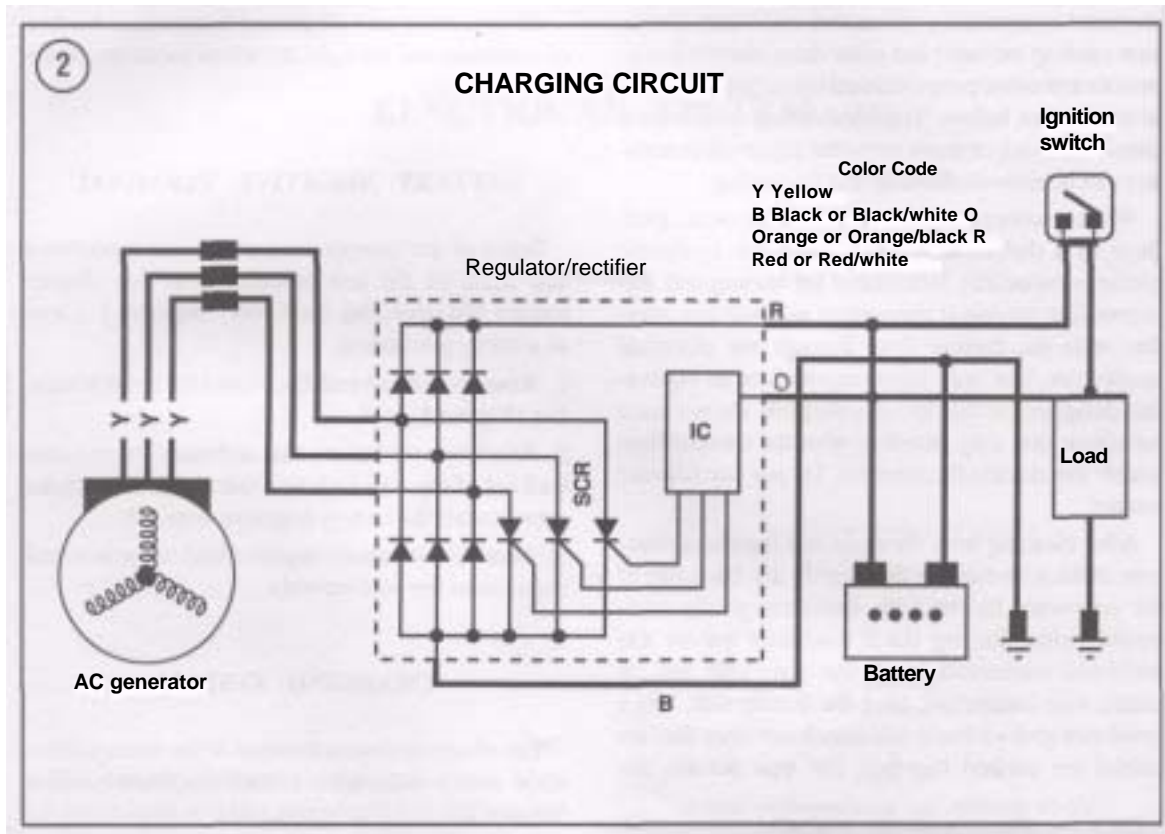
2. When it is necessary to charge the battery, remove the battery from the motorcycle and recharge it as described in Chapter Three.
3. Inspect the physical condition of the battery. Look for bulges or cracks in the case, leaking electrolyte or corrosion build-up.
4. Check the wiring in the charging system for signs of chafing, deterioration or other damage.
5. Check the wiring for corroded or loose connections. Clean, tighten or reconnect as required.

### Leakage Test

Perform this test prior to performing the output test to determine if some electrical component is remaining on and draining the battery.

#### NOTE

*Due to the location of the battery and its leads it is necessary to remove the battery from the motorcycle to perform this test.*



1. Remove the battery as described under *Battery Removal/Installation* in Chapter Three.
2. Turn the ignition switch OFF.

#### NOTE

*Make sure there is a good electrical connection at both ends of the jumper wire. Otherwise the test results may be faulty.*

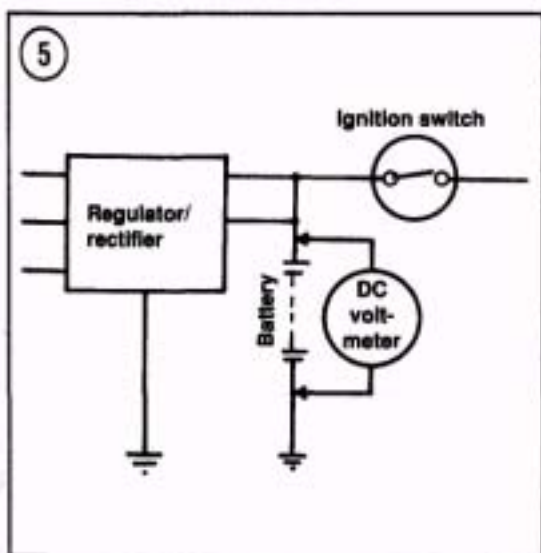
3. Connect a jumper wire from the battery positive (+) lead and the battery positive (+) terminal.
4. Connect an ammeter between the battery negative (-) lead and the negative (-) terminal of the battery.
5. The ammeter should read less than 0.1 mA. If the amperage is greater, this indicates there is a voltage drain in the system that will discharge the battery.
6. Install the battery as described in Chapter Three.

### Charging System Output Test

Whenever a charging system trouble is suspected, make sure the battery is fully charged and in good condition before going any further. Clean and test the battery as described in Chapter Three. Make sure all electrical connectors are tight and free of corrosion.

#### NOTE

*This procedure requires the use of an assistant due to the location of the battery. Have an assistant attach the positive test lead on the left-hand side of the*



*bike while you work on the right-hand side along with the meter while having access to the throttle grip. This will lessen the possibility of getting burned on one of the HOT mufflers.*

1. Start the engine and let it reach normal operating temperature. Shut off the engine.
2. Connect a portable tachometer following the manufacturer's instructions.
3. Remove the screw (A, **Figure 3**) securing the battery positive (+) cable terminal protector, remove the protector (B, **Figure 3**).
4. Restart the engine and let it idle.

#### WARNING

*The exhaust system is HOT. Protect your hands while connecting the test leads to the battery terminals.*

5. Have the assistant connect a 0-20 DC voltmeter positive test lead to the positive (+) test lead to the battery positive terminal (**Figure 4**) on the left-hand side of the bike.
6. Attach the voltmeter negative (-) test lead to the negative terminal (**Figure 1**) on the left-hand side of the bike (**Figure 5**).
7. Increase engine speed to 5,000 rpm. The voltage reading should be between 14-15 V. If the voltage is less than 14 V or greater than 15 V, inspect the alternator no-load performance and voltage regulator as described in this chapter. The voltage regulator/rectifier are separate from the alternator and either component can be replaced individually if faulty.
8. If the charging voltage is too high; the voltage regulator/rectifier is probably at fault.
9. After the test is completed; shut off the engine and disconnect the voltmeter and portable tachometer.
10. Install the battery positive (+) cable terminal protector (B, **Figure 3**) and tighten the screw securely.

### Charging System No-load Test

1. Remove the rider's seat and the frame side covers (A, **Figure 6**) as described in Chapter Thirteen.
2. Start the engine and let it reach normal operating temperature. Shut off the engine.
3. Connect a portable tachometer following the manufacturer's instructions.

4. Locate the alternator's 3 individual electrical connectors containing yellow wires (B, **Figure 6**) and disconnect all 3 wire connectors.
- 5., Restart the engine and let it idle.

#### NOTE

*In Step 7 connect the voltmeter test leads to the alternator side of the electrical connectors disconnected in Step 4.*

6. Increase engine speed to 5,000 rpm.
7. Connect a 0-150 V (AC) voltmeter between two of the yellow wire connectors as shown in **Figure 7**. Voltage should be above 65V (AC). Move one of the voltmeter probes to the other (3rd) yellow wire connector and check voltage again. Voltage should again be above 65V (AC).
8. If any test indicates less than specified voltage, the alternator is faulty and must be replaced.
9. Shut off the engine.
10. After completing the test, disconnect the volt meter and portable tachometer.
11. Reconnect the alternator's 3 individual yellow wire electrical connectors going to the voltage regulator/rectifier. Make sure connectors are corrosion free and tight.
12. Install the frame side covers and the rider's seat and as described in Chapter Thirteen.

## VOLTAGE REGULATOR/RECTIFIER

### Testing

Suzuki specifies the use of a specific multi-meter for accurate testing of the regulator/rectifier unit. The specified meter is the Suzuki Pocket Tester (part No. 09900-25002). Because of the different resistance value characteristics of the semiconductors used in this meter, the use of another meter may give you a different reading. This meter can be purchased through a Suzuki dealer or you can remove the regulator/rectifier unit and have the dealer test it for you.

1. Remove the rider's seat and the frame side covers (A, **Figure 6**) as described in Chapter Thirteen.
2. Disconnect the regulator/rectifier unit 6-pin electrical connector containing 5 wires. On 1985-1991 models the wire colors are; 2 red, 1 orange and 2 black/white. On 1992-on models the wire colors are; 2 red/white, 1 orange/black and 2 black/white.

3. Locate the 3 individual electrical connectors containing yellow wires (B, **Figure 6**) and disconnect all 3 wire connectors.

4. Set the pocket tester to the x 1k ohms scale.

5A. On 1985-1991 models, refer to Figure 8 for test connections and values.

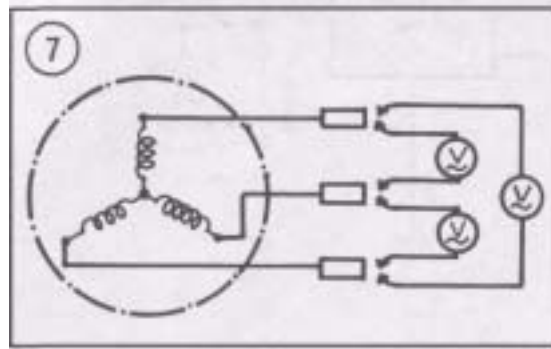
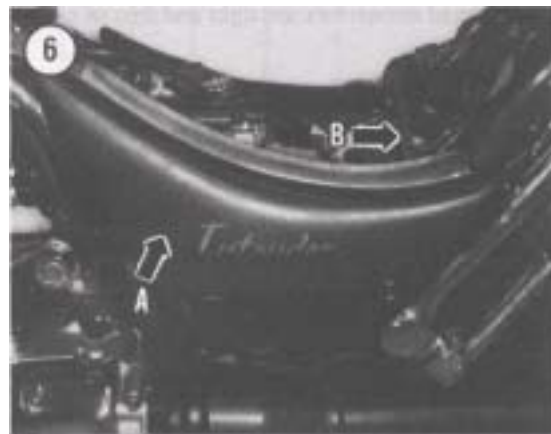
5B. On 1992-on models, refer to **Figure 9** for test connections and values.

6. If any of the meter readings differ from the stated values, first check the condition of the battery in the multimeter; an old battery can cause inaccurate readings. If the readings are still incorrect with a new battery, replace the regulator/rectifier unit as described in this chapter.

7. If the voltage regulator/rectifier check out okay, install the frame side covers and the rider's seat and as described in Chapter Thirteen.

### Voltage Regulator/Rectifier Removal/Installation

1. Remove the rider's seat and the frame side covers (A, **Figure 6**) as described in Chapter Thirteen.



2. Disconnect the battery negative (-) lead (A, **Figure 10**) as described in this chapter.

3. Disconnect the regulator/rectifier unit 6-pin electrical connector containing 5 wires. On 1985-1991 models the wire colors are; 2 red, 1 orange and 2 black/white. On 1992-on models the wire colors are; 2 red/white, 1 orange/black and 2 black/white. Also disconnect the 3 individual yellow wire electrical connectors.

4. Remove the bolts located under the voltage regulator/rectifier (B, **Figure 10**) which attach regulator/rectifier to the frame.

5. Carefully pull the electrical wiring harness out through the frame, noting its path and remove the voltage regulator/rectifier assembly from the frame.

6. Install by reversing these removal steps, noting the following:

- Tighten the mounting bolts securely.
- Make sure all electrical connections are tight and free of corrosion.
- Connect the battery negative (-) lead.

## ALTERNATOR

The alternator is a form of electrical generator in which a magnetized field called a rotor revolves around a set of stationary coils called a stator assembly. As the rotor revolves, alternating current is induced in the stator coils. The current is then rectified to direct current and is used to operate the electrical systems on the motorcycle and to keep the battery charged. The rotor is permanently magnetized.

### Rotor Testing

The rotor is permanently magnetized and cannot be tested except by replacing it with a known good one. The rotor can lose magnetism from old age or a sharp hit. If defective, the rotor must be replaced; it cannot be re-magnetized.

**8**

**VOLTAGE REGULATOR/RECTIFIER TESTING (1985-1991)**

Unit: k $\Omega$

| (-) Probe of tester to: | (+ ) Probe of tester to: |             |             |            |
|-------------------------|--------------------------|-------------|-------------|------------|
|                         | R                        | O           | B/W         | Y          |
|                         | R                        | $\infty$    | $\infty$    | $\infty$   |
|                         | O                        | Approx. 80  | Approx. 35  | Approx. 50 |
|                         | B/W                      | Approx. 8.5 | Approx. 5.2 | Approx. 3  |
|                         | Y                        | Approx. 3   | $\infty$    | $\infty$   |

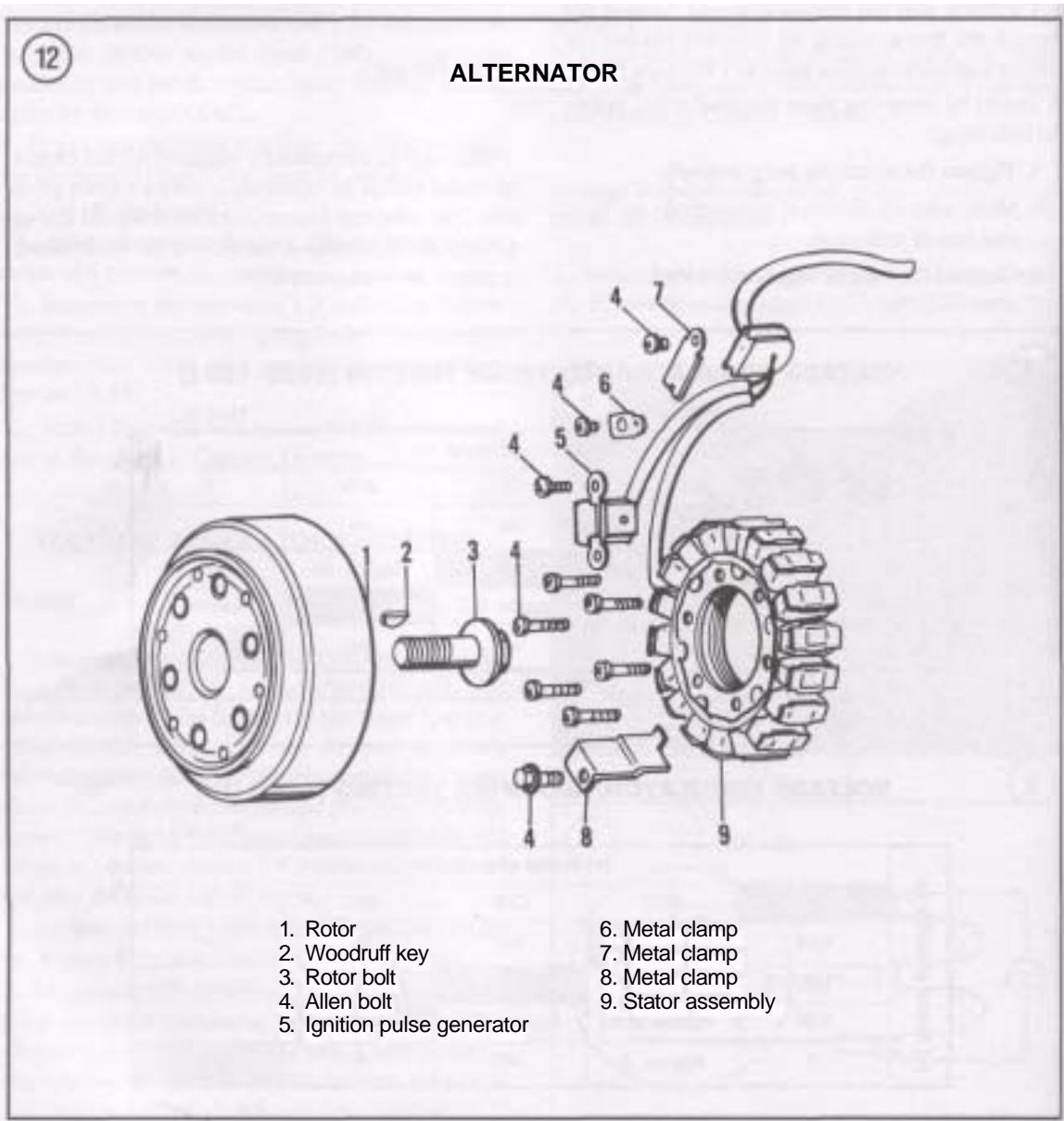
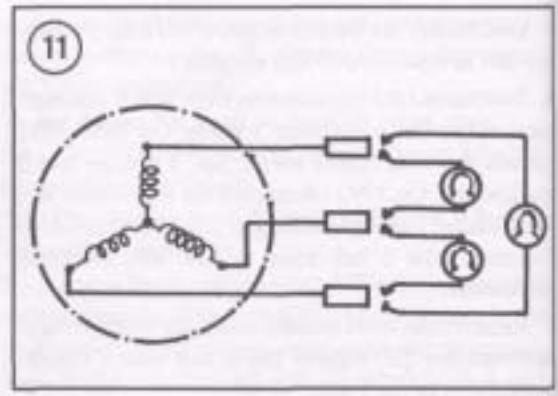
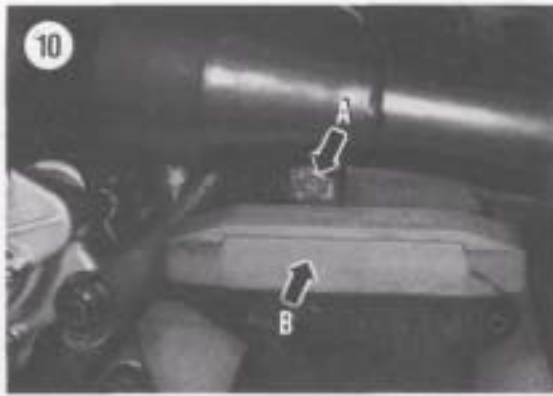
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**VOLTAGE REGULATOR/RECTIFIER TESTING (1992-ON)**

Unit: k $\Omega$

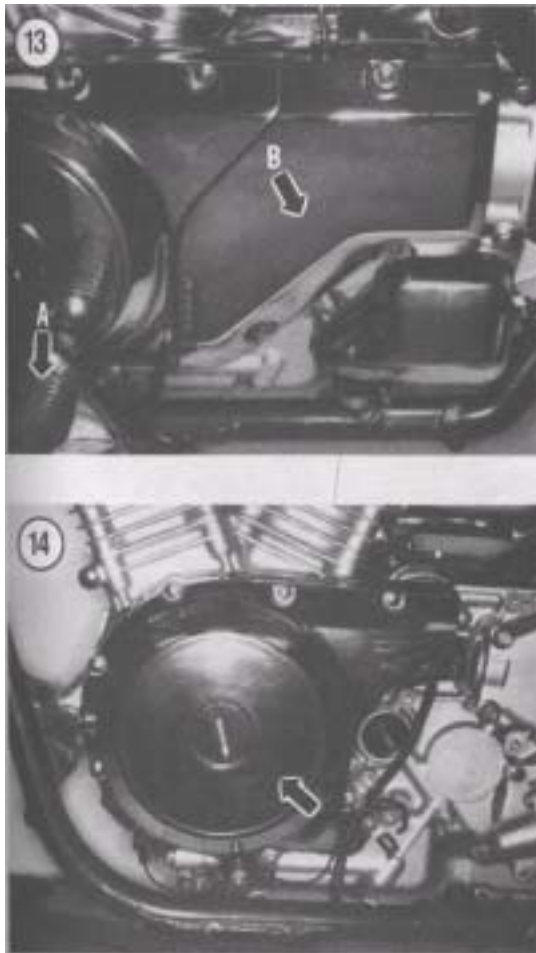
| (-) Probe of tester to: | (+ ) Probe of tester to: |             |             |            |
|-------------------------|--------------------------|-------------|-------------|------------|
|                         | R/W                      | O/B         | B/W         | Y          |
|                         | R/W                      | $\infty$    | $\infty$    | $\infty$   |
|                         | O/B                      | Approx. 80  | Approx. 35  | Approx. 50 |
|                         | B/W                      | Approx. 8.5 | Approx. 5.2 | Approx. 3  |
|                         | Y                        | Approx. 3   | $\infty$    | $\infty$   |





## Stator Testing

1. Remove the rider's seat and the frame side covers (A, **Figure 6**) as described in Chapter Thirteen.
2. Start the engine and let it reach normal operating temperature. Shut off the engine.
3. Locate the alternator's 3 individual electrical connectors containing yellow wires (B, **Figure 6**) and disconnect all 3 wire connectors.
4. Connect an ohmmeter set at R x 1 (to check continuity) between two of the yellow terminals on the alternator stator side of the connector (**Figure 11**). Move one of the probes to the third yellow terminal.
5. Replace the stator assembly if any yellow terminal indicates no continuity (infinite resistance) to the other two yellow terminals. This would indicate an open in the stator coil winding.



6. Use an ohmmeter set at R x 1 to check continuity between ground and each yellow terminal on the alternator stator side of the connector.
7. Replace the stator assembly if any yellow terminal shows continuity (indicated resistance) to ground. This would indicate a short within the stator coil winding.

### NOTE

*Prior to replacing the stator assembly, check the electrical wires to and within the electrical connector for any opens or poor connections.*

8. If the stator assembly fails either of these tests, it must be replaced as described in this chapter.

## Stator Assembly Removal/Installation

The stator assembly and the ignition pulse generator are attached to the back side of the alternator cover.

Refer to **Figure 12** for this procedure.

### NOTE

*Some of the photos in this procedure are shown with the engine removed from the frame and partially disassembled for clarity. It is not necessary to remove the engine to perform this procedure.*

1. Remove the rider's seat and the frame side covers (A, **Figure 6**) as described in Chapter Thirteen.
2. Remove the front footpeg assembly (A, **Figure 13**) as described under *Front Footpeg Assembly Removal/Installation* in Chapter Thirteen.
3. Remove the bolts securing the secondary drive cover (B, **Figure 13**) and remove the cover.
4. Locate the alternator's 3 individual electrical connectors containing yellow wires (B, **Figure 6**) and disconnect all 3 wire connectors.
5. Remove the starter motor as described in this chapter. The alternator stator electrical harness is routed under the starter motor and cover.
6. Remove the bolts securing the alternator cover (**Figure 14**) and remove the cover and gasket. Note the following:
  - a. Carefully pull the electrical wiring harness out through the bottom of the starter motor cavity in the crankcase and through the opening in the side of the crankcase (**Figure 15**).



- b. Don't lose the locating dowels.
  - c. Note the location of the gasket under the upper rear bolt on the cover. This gasket must be reinstalled in the same location during installation of the cover.
  - d. Note the location of the wiring harness clamps (**Figure 16**) under the cover bolts.
7. Place several shop cloths on the workbench to protect the chrome finish of the alternator cover. Turn the alternator cover upside down on these cloths.
  8. Remove the screws and small metal clamps (A, **Figure 17**) securing the stator assembly wiring harness to the alternator cover. Note the location of each of these metal clamps because they must all be reinstalled in the same location.

**NOTE**

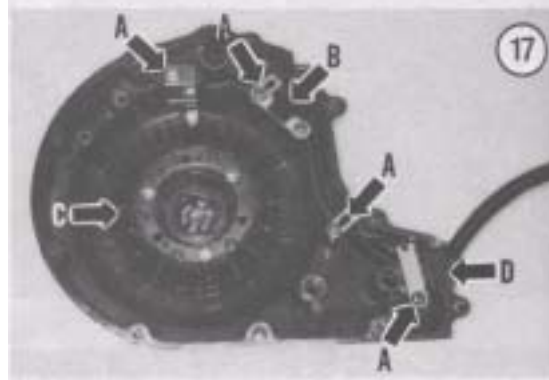
*The 1985-1987 models are equipped with 2 ignition signal generators. On 1988-on models there is only one signal generator.*

9. Remove the other screw(s) securing the ignition signal generator(s), (B, **Figure 17**) to the alternator cover.
10. Remove the bolts securing the stator assembly (C, **Figure 17**) to the cover. Carefully pull the rubber grommet (D, **Figure 17**) loose from the cover and remove the stator and ignition signal generator assembly from the cover.

**NOTE**

*The stator assembly and the ignition signal generator(s) are removed as an assembly, but they are 2 separate parts and can be replaced individually. The 2 separate wiring harnesses are covered by a single insulating tube as they exit the cover. This insulating tube can be removed and the individual parts replaced. Carefully wrap the 2 wiring harnesses with a quality electrical tape after replacing one of the parts.*

11. Install by reversing these removal steps, noting the following:
  - a. Tighten the bolts securing the alternator stator assembly securely.
  - b. All small metal clamps (A, **Figure 17**) securing the stator assembly and ignition signal generator(s) wiring harness to the cover must be reinstalled and must be installed in the correct





location. These clamps secure the wiring harness to the cover and away from the spinning rotor. If these wires come in contact with the rotor they will be damaged.

- c. Install the gasket (A, **Figure 18**) under the upper rear bolt on the cover. Failure to install this gasket will result in an oil leak.
- d. Make sure the rubber grommet (B, **Figure 18**) is installed correctly in the cover and seats tightly up against the surface of the crankcase.
- e. Make sure the electrical connectors are free of corrosion and are tight.
- f. Install the locating dowels (A, **Figure 19**) and a new gasket (B, **Figure 19**).
- g. Be sure to install the wiring harness clamps (**Figure 16**) under the cover bolts in the correct location.

## Rotor

### Removal/Installation

Refer to **Figure 12** for this procedure.

#### NOTE

*This procedure is shown with the engine removed from the frame and partially disassembled for clarity. It is not necessary to remove the engine to perform this procedure.*

1. Remove the alternator stator assembly as described in this chapter.
2. Remove the starter idler gear No. 2 and its shaft (**Figure 20**).
3. Withdraw the No. 1 idler gear shaft (A, **Figure 21**) then remove the No. 1 idler gear (B, **Figure 21**).
- 4A. If the engine is still in the frame; shift the transmission into gear and have an assistant apply the rear brake. This will prevent the alternator rotor from turning in the next step.
- 4B. If the engine has been removed; place an open-end wrench onto the hex fitting (A, **Figure 22**) on the rotor to prevent the alternator rotor from turning in the next step.

#### NOTE

*In Step 5, do not remove the rotor bolt. Break it loose, then loosen it several turns and leave it in place (A, **Figure 23**). The bolt must remain installed because it is used in conjunction with the rotor remover tool in Step 6.*

5. Loosen, but do not remove, the alternator rotor bolt (B, **Figure 22**). Loosen it several turns and leave it in place.

#### CAUTION

*Don't try to remove the rotor without a puller; any attempt to do so will ultimately lead to some form of damage to the engine and/or rotor. Many aftermarket pullers are available from motorcycle dealers or mail order houses. The cost of one of these pullers is low and it makes an excellent addition to any mechanic's tool box. If you can't buy or borrow one, have the dealer remove the rotor.*

6. Install the rotor removal tool, Suzuki special tool (part No. 09930-30720) onto the threads of the rotor bolt (B, **Figure 23**).

7. Hold the rotor remover tool (A, **Figure 24**) with a 36 mm open-end wrench and turn the center bolt (B, **Figure 24**). Turn the center bolt until the rotor disengages from the crankshaft taper.

#### NOTE

*If the rotor is difficult to remove, strike the end of the puller (not the rotor as it will be damaged) firmly with a hammer. This will usually break it loose.*

#### CAUTION

*If normal rotor removal attempts fail, do not force the puller as the threads may be stripped from the rotor causing expensive damage. Take the bike to a dealer and have the rotor removed.*

8. Unscrew and remove the rotor puller from the rotor.

9. Unscrew the bolt from the crankshaft and remove it from the rotor.

10. Reach behind the rotor and hold onto the starter clutch gear and remove the rotor and the starter clutch as an assembly from the crankshaft.

11. It is not necessary to remove the starter clutch from the back side of the rotor. If inspection is necessary, refer to *Starter Gears* in this chapter.

12. Inspect the inside of the rotor (**Figure 25**) for small bolts, washers or other metal "trash" that may have been picked up by the magnets. These small metal bits can cause severe damage to the alternator stator assembly.

13. Inspect the rotor key way (**Figure 26**) for wear or damage. If damage is severe, replace the rotor.

14. Install by reversing these removal steps, noting the following:

- a. Use an aerosol electrical contact cleaner and clean all oil residue from the crankshaft taper



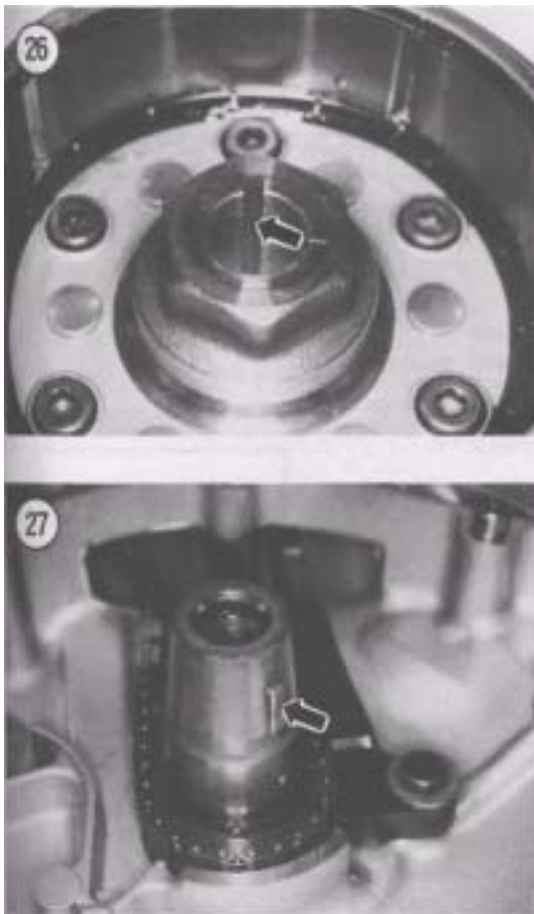
where the rotor slides onto it and the matching tapered surface in the rotor. This is to assure a good tight fit of the rotor onto the crankshaft.

- b. If removed, install and center the Woodruff key (**Figure 27**) in the crankshaft slot.
- c. Apply red Loctite (No. 271) to the rotor bolt threads prior to installation.
- d. Tighten the rotor bolt (A, **Figure 23**) to the torque specification listed in **Table 1**.

## TRANSISTORIZED IGNITION SYSTEM

The Intruder is equipped with a solid-state, transistorized ignition system that uses no breaker points. The ignition circuit is shown **Figure 28**.

The signal generator consists of a raised tab on the alternator rotor and signal generator(s), attached to the alternator cover next to the alternator stator coil assembly.



As the alternator rotor is turned by the crankshaft the raised tab passes the pickup coil(s) and a signal is sent to the ignition unit. This signal turns the ignitor unit transistor alternately ON and OFF. As the transistor is turned ON and OFF, the current passing through the primary windings of the ignition coil, is also turned ON and OFF. Thus it induces the secondary current in the ignition coil secondary windings to fire the spark plugs.

## Transistorized Ignition System Precautions

Certain measures must be taken to protect the ignition system. Instantaneous damage to the semi-conductors in the system will occur if the following precautions are not observed.

1. Never disconnect any of the electrical connections while the engine is running.
2. Keep all connections between the various units clean and tight. Be sure that the wiring connectors are pushed together firmly to help keep out moisture. Also pack the connectors with dielectric compound as described at the beginning of this chapter.
3. Do not substitute another type of ignition coil.

## Troubleshooting

Problems with the transistorized ignition system fall into one of the following categories. See **Table 2**.

- a. Weak spark.
- b. No spark.

## Ignition Signal Generator Testing

### NOTE

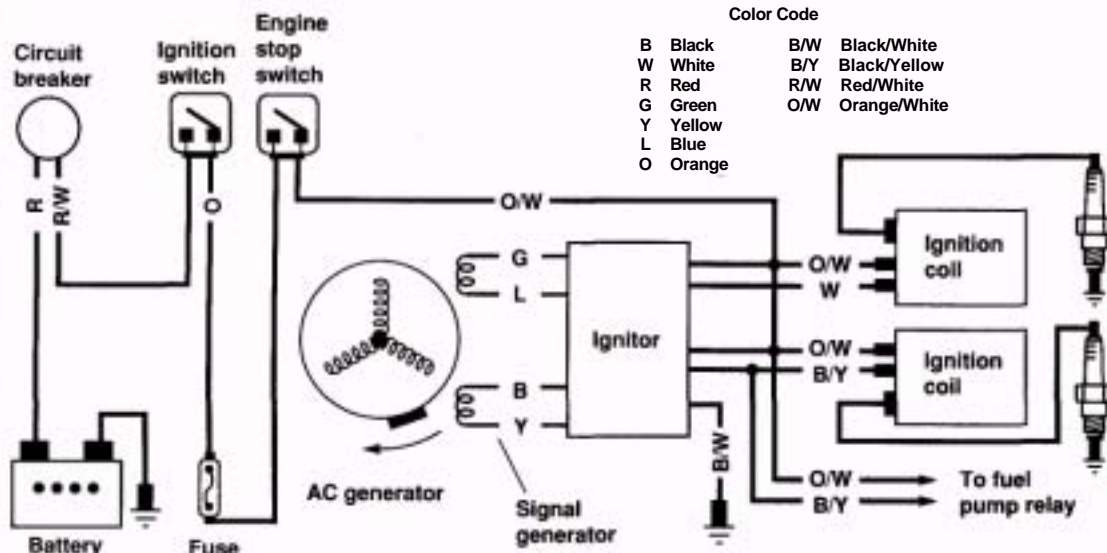
*The 1985-1987 models are equipped with 2 ignition signal generators. On 1988-on models there is only one signal generator.*

- \. Remove the seat and the frame side covers (A, **Figure 6**) as described in Chapter Thirteen. 2A. On 1985-1987 models, disconnect the 4-pin electrical connector containing 4 signal generator wires (1 green, 1 blue, 1 black and 1 yellow wire) from the ignitor unit (**Figure 29**). 2B. On 1988-on models, disconnect the signal generators 2-pin electrical connector (1 green and 1 blue wire) from the ignitor unit.

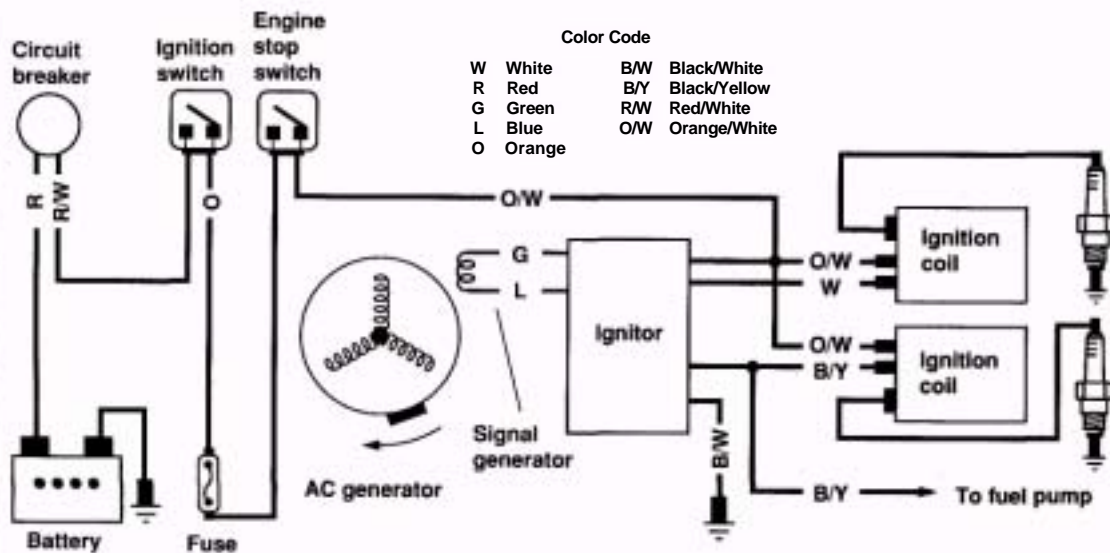


## IGNITION CIRCUIT

1985-1987



1988-ON





3. Use an ohmmeter set at R x 1000 and check the resistance between the following wires in the signal generator side of the electrical connector.

- a. 1985-1987 models: between the green and blue terminals and between the black and yellow terminals.
- b. 1988-on models: between the green and blue terminals.

The specified resistance is listed in **Table 3**.

4. If the resistance shown is less than specified or there is no indicated resistance (infinite resistance) between the 2 wires, the signal generator has an open or short and must be replaced as described in this chapter.

5. If the signal generator(s) checks out okay, reconnect the electrical connector. Make sure the electrical connector is free of corrosion and is tight.

6. Install the frame covers and the rider's seat.

### Ignition Signal Generator Removal/Installation

The alternator stator assembly and the ignition signal generator(s) are removed as an assembly, but they are 2 separate parts and can be replaced individually. The 2 separate wiring harnesses are covered by a single insulating tube as they exit the alternator cover.

1. Remove the alternator stator as described in this chapter.
2. Remove the covering from the electrical harnesses and separate the 2 harnesses.
3. Replace the ignition signal generator(s).
4. Carefully wrap the 2 wiring harnesses with a quality electrical tape after replacing one of the parts.



5. Install the alternator stator as described in this chapter.

### Ignition Coil Testing

The ignition coil is a form of transformer which develops the high voltage required to jump the spark plug gap. The only maintenance required is that of keeping the electrical connections clean and tight and occasionally checking to see that the coils are mounted securely.

If the condition of the coil(s) is doubtful, there are several checks which may be made.

#### NOTE

*The spark plug must ground against a piece of bare metal on the engine or frame. If necessary, carefully scrape away some of the engine paint.*

First as a quick check of coil condition, disconnect the high voltage lead from the spark plug. Remove one of the spark plugs from one of the cylinder heads as described under *Spark Plugs* in Chapter Three. Connect a new or known good spark plug to the high voltage lead and place the spark plug base on a good ground like the engine cylinder head. Position the spark plug so you can see the electrodes.

#### WARNING

*If it is necessary to hold the high voltage lead, do so with an insulated pair of pliers. The high voltage generated by the signal generator could produce serious or fatal shocks.*

Turn the engine over with the starter. If a fat blue spark occurs the coil is in good condition; if not proceed as follows. Make sure that you are using a known good spark plug for this test. If the spark plug used is defective the test results will be incorrect.

Reinstall the spark plug in the cylinder head and connect the high voltage lead.

#### NOTE

*In order to get accurate resistance measurements the coil must be warm (minimum temperature is 20° C [68° F]). If necessary, start the engine and let it warm up to normal operating temperature. If the engine will not start,*

warm the ignition coils with a portable hairdryer.

1. Remove the rider's seat as described in Chapter Thirteen.
2. Disconnect the battery negative lead as described in this chapter.
3. Remove the fuel tank as described under *Fuel Tank Removal/Installation* in Chapter Seven.
4. Disconnect all ignition coil wires (including the spark plug leads from the spark plugs) before testing.

#### NOTE

*In Step 5 and Step 6, the resistance specification is not as important as the fact that there is continuity between the terminals. If the ignition coil windings are in good condition the resistance values will be near those specified.*

5. Use an ohmmeter set at R x 1 and measure the primary coil resistance between the positive (+) and the negative (-) terminals on the top of the ignition coil (Figure 30). The specified resistance value is listed in **Table 3**.
6. Use an ohmmeter set at R x 1,000 measure the secondary coil resistance between the spark plug lead and one of the primary coil terminals (**Figure 30**). The specified resistance value is listed in **Table 3**.
7. Repeat Step 5 and Step 6 for the other ignition coil.
8. If the coil resistance does not meet (or come close to) either of these specifications, the coil must be replaced. If the coil exhibits visible damage, it should be replaced as described in this chapter.
9. Reconnect all ignition coil wires to the ignition coil.
10. Install the fuel tank as described in Chapter Seven.
11. Install the rider's seat as described in Chapter Thirteen.

#### Ignition Coil Removal/Installation

1. Remove the rider's seat as described in Chapter Thirteen.
2. Disconnect the battery negative lead as described in this chapter.
3. Remove the fuel tank as described under *Fuel Tank Removal/Installation* in Chapter Seven.

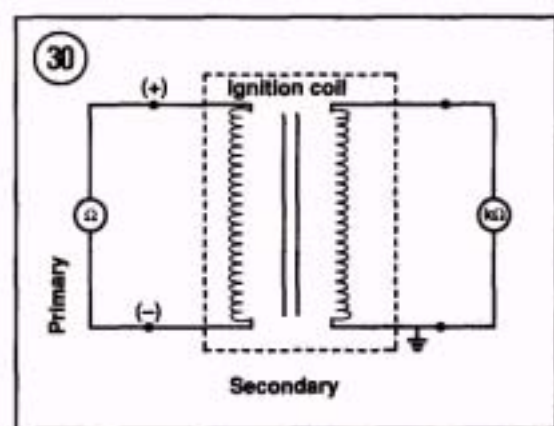
4. Disconnect the primary leads (A, **Figure 31**) from the ignition coil.
5. Disconnect the high voltage lead (B, **Figure 31**) from the spark plug.
6. Remove the bolts (C, **Figure 31**) securing the ignition coil to the frame and remove the coil.
7. If necessary, repeat Steps 4-6 for the other ignition coil.
8. Install by reversing these removal steps. Make sure all electrical connections are free of corrosion and are tight.

#### Igniter Unit Testing

Complete testing of the ignitor unit requires a special Suzuki electronic test tool (Ignitor Checker) and should be tested by a Suzuki dealer as these tools are expensive. If the ignition signal generator(s) and the ignition coils are working correctly, then this simple test can be run to confirm that the ignitor unit is working properly.

The dealer will either test the ignitor unit with the special tool or perform a "remove and replace" test to see if the ignitor unit is faulty. The "remove and replace" test is expensive if you purchase a new ignitor unit and it does *not* solve your particular ignition system problem. Remember, you *cannot* return the ignitor unit for refund. Most motorcycle dealers will *not* accept returns on any electrical component since they could be damaged internally even though they look okay externally.

Make sure all connections between the various components are clean and tight. Be sure that the wiring connectors are pushed together firmly and



packed with a dielectric compound to help keep out moisture.

1. Remove the rider's seat and the frame side covers as described in Chapter Thirteen.
2. Test the ignition signal generator and both ignition coils as described in this chapter prior to performing this test. If any one of these units is faulty, this test will not provide any usable test results.
3. Test the ignitor unit's ability to produce a spark.

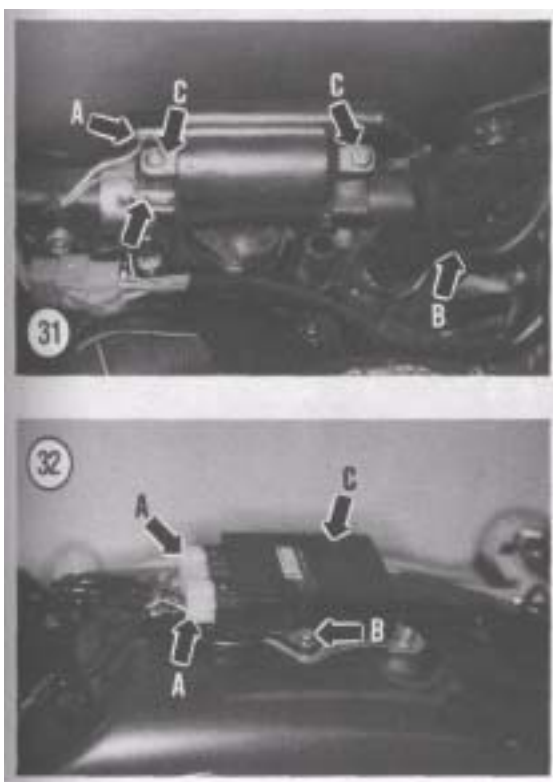
Perform the following:

- a. Disconnect the high voltage lead from one of the spark plugs. Remove the spark plug from the cylinder head as described under *Spark Plugs* in Chapter Three.

#### NOTE

*The spark plug must ground against a piece of bare metal on the engine or frame. If necessary, carefully scrape away some of the engine paint.*

- b. Connect a new or known good spark plug to the high voltage lead and place the spark plug base on a good ground like the engine cylinder head cover. Position the spark plug so you can see the electrodes.



#### WARNING

*If it is necessary to hold the high voltage lead, do so with an insulated pair of pliers. The high voltage generated by the ignitor unit could produce serious or fatal shocks.*

- c. Turn the engine over rapidly with the starter and check for a spark. If there is a fat blue spark, the ignitor unit is working properly.
  - d. If a weak spark or no spark is obtained and the signal generator and ignition coils are okay, have the ignitor unit tested by a Suzuki dealer.
  - e. Reinstall the spark plug and connect the high voltage lead onto the spark plug.
4. If all of the ignition components are okay, then check the following:
    - a. Check for an open or short in the wire harness between each component in the system.
    - b. Again, make sure all connections between the various components are clean and tight. Be sure that the wiring connectors are pushed together firmly to help keep out moisture.

#### Ignitor Unit Replacement

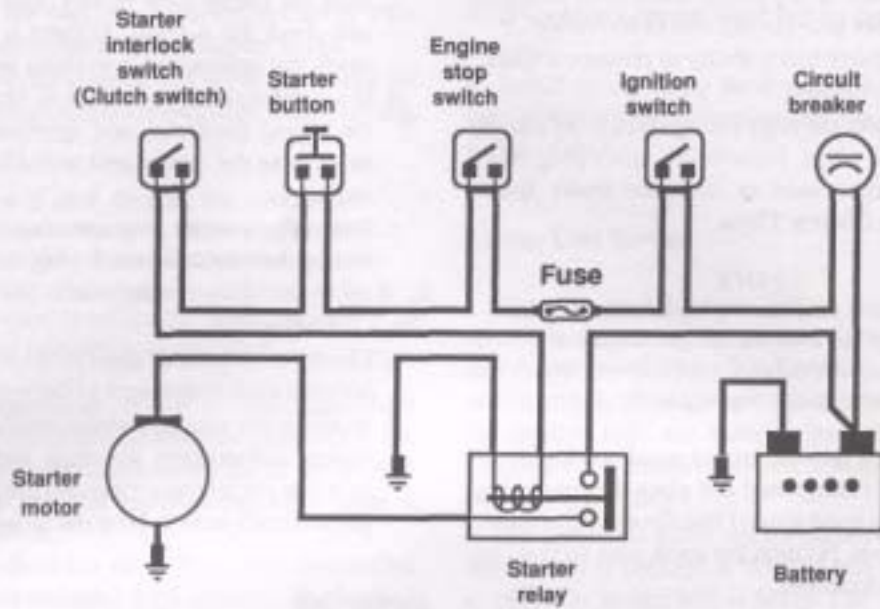
1. Remove the rider's seat and the frame side covers as described in Chapter Thirteen.
2. Disconnect the battery negative lead as described in this chapter.
3. Disconnect the electrical connectors (A, **Figure 32**) from the ignitor unit.
4. Remove the screw and washer (B, **Figure 32**) on each side securing the ignitor unit. Remove the ignitor unit (C, **Figure 32**) from the mounting bracket on top of the rear fender.
5. Install a new ignitor unit onto the mounting bracket and tighten the screws securely.
6. Attach both electrical wire connectors to it. Make sure both electrical connectors are free of corrosion and are tight.
7. Connect the battery negative lead.
8. Install the frame side covers and rider's seat.

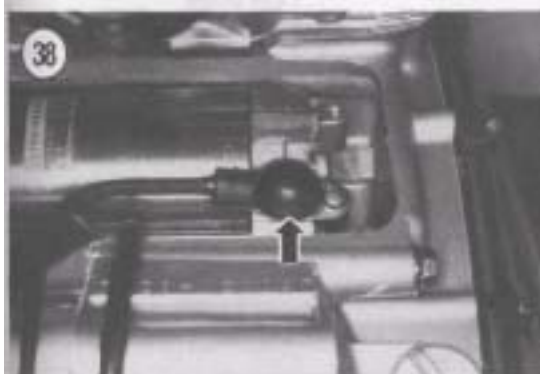
#### STARTER SYSTEM

The starter system includes an ignition switch, a starter switch, clutch interlock switch, sidestand in-

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## STARTING CIRCUIT





terlock switch (1987-on models), starter relay, battery and starter motor as shown in **Figure 33**. Each component of this system is covered separately in this chapter except for the battery that is covered in Chapter Three.

## ELECTRIC STARTER

### Removal/Installation

1. Drain the cooling system as described under *Coolant Change* in Chapter Three.
2. Disconnect the battery negative (-) lead as described in this chapter.
3. Remove the battery case (A, **Figure 34**) as described under *Battery Case Removal/Installation* in this chapter.

#### NOTE

*Some of the following photographs are shown with the engine removed from the frame and partially disassembled for clarity. The starter motor can be removed with the engine in the frame.*

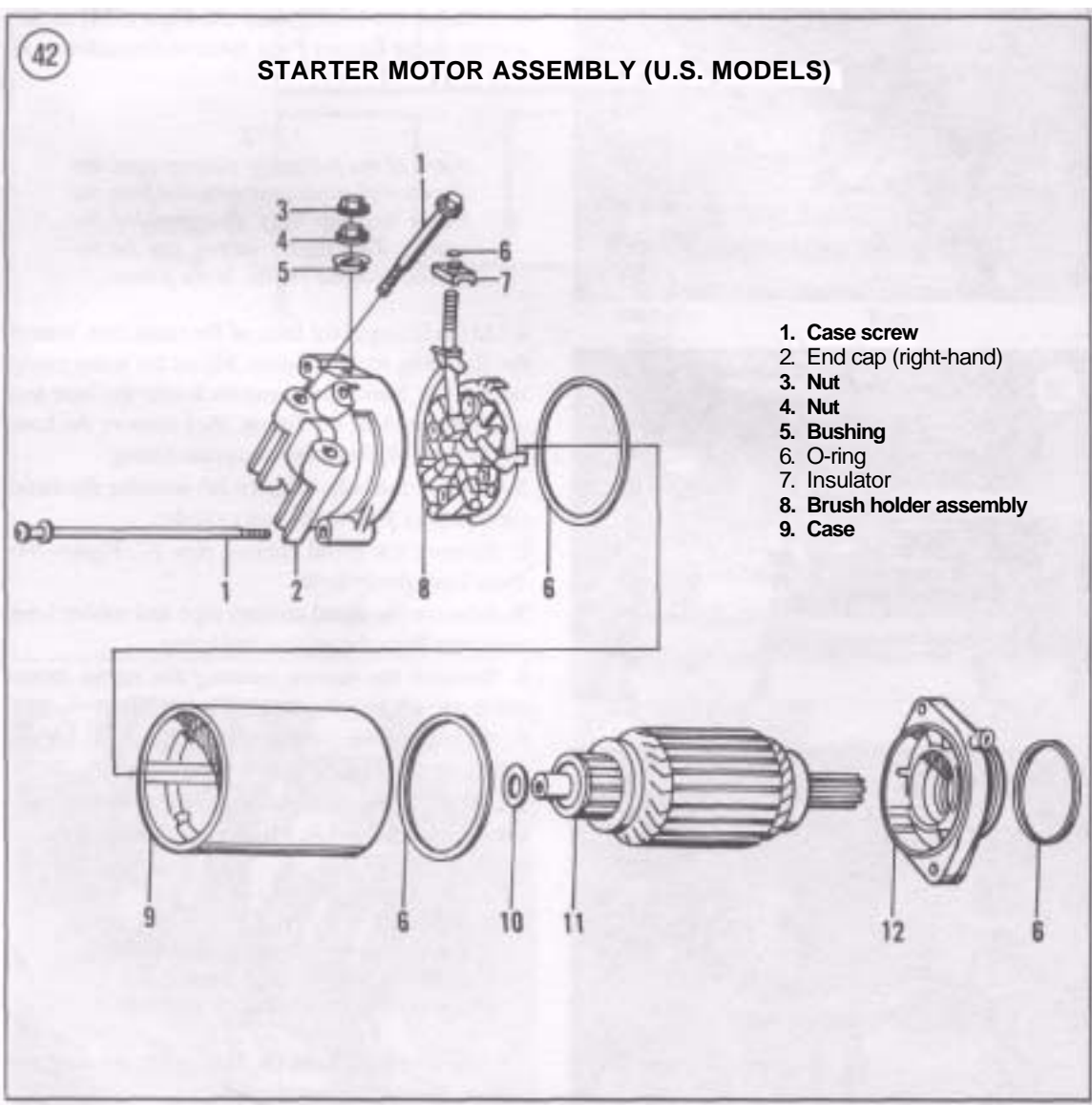
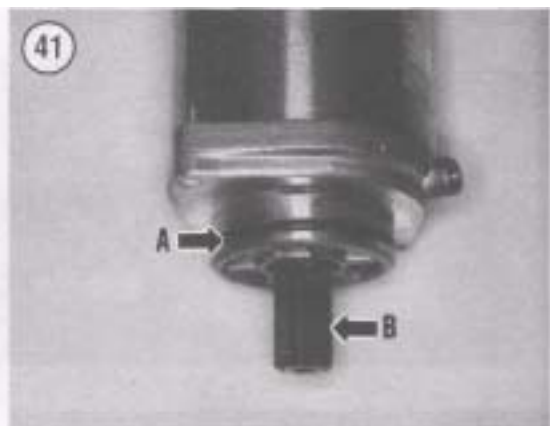
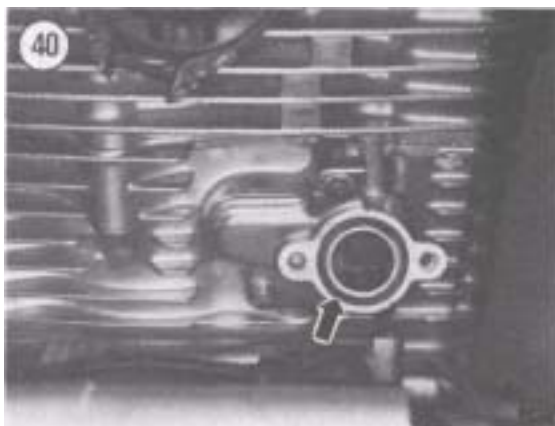
4. At the fitting at the back of the crankcase, loosen the clamping screw (**Figure 35**) on the water pump outlet hose. Move the clamp back onto the hose and off of the neck of the fitting, then remove the hose (B, **Figure 34**) from the crankcase fitting.
5. Remove the bolts (**Figure 36**) securing the metal coolant inlet pipe to the rear cylinder.
6. Remove the metal coolant pipe (C, **Figure 34**) away from the cylinder.
7. Remove the metal coolant pipe and rubber hose assembly from the engine and frame.
8. Remove the screws securing the starter motor cover and remove the cover (**Figure 37**).
9. Slide back the rubber boot (**Figure 38**) on the electrical cable connector.
10. Remove the nut and disconnect the starter electrical motor cable (A, **Figure 39**) from the starter motor.

#### NOTE

*Only 1 of the starter motor mounting bolts (B, **Figure 39**) is visible in the figure. Be sure to remove both bolts.*

11. Remove the 2 bolts (B, **Figure 39**) securing the starter motor to the crankcase.



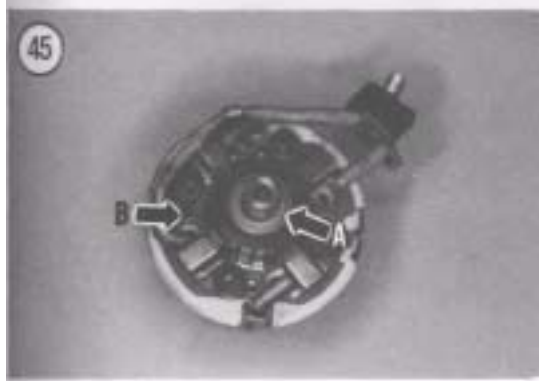
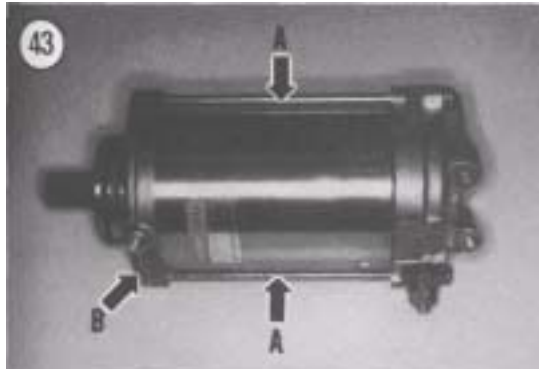


- 10. Washer
- 11. **Armature**
- 12. End cap (left-hand)

12. Partially lift up and pull the starter motor toward the right-hand side to disengage it from the idler gears. Remove the starter motor (C, **Figure 39**) from the top of the crankcase.

13. Install by reversing these removal steps, noting the following:

- a. When installing the water pump outlet hose onto the rear cylinder, install a new O-ring seal (**Figure 40**) into the receptacle in the cylinder and apply a light coat of clean engine oil to the O-ring.



- b. Install all components removed.
- c. Refill the cooling system with the recommended type and quantity of coolant. Refer to *Coolant Change* in Chapter Three.
- d. Start the engine and check for leaks.

### Preliminary Inspection

The overhaul of a starter motor is best left to an expert. This procedure shows how to detect a defective starter.

Inspect the O-ring seal (A, **Figure 41**). O-ring seals tend to harden after prolonged use and heat and therefore lose their ability to seal properly. Replace as necessary.

Inspect the gear (B, **Figure 41**) for chipped or missing teeth. If damaged, the starter assembly must be replaced.

### Disassembly (U.S. Models)

Refer to **Figure 42** for this procedure.

1. Remove the case screws and washers (A, **Figure 43**), then separate the left-hand end cap (B, **Figure 43**) from the case.
2. Withdraw the case from armature coil assembly and right-hand case.
3. Remove the both nuts, bushing and insulator (A, **Figure 44**) securing the brush holder assembly to the right-hand end cap.
4. Withdraw the threaded stud of the brush holder from the right-hand end cap and remove the end cap (B, **Figure 44**). The insulator and O-ring seal will usually stay on the threaded stud.
5. Remove the washer (A, **Figure 45**) from the end of the armature.
6. Carefully pull the brush holder assembly (B, **Figure 45**) from the armature.

#### CAUTION

*Do not immerse the wire windings in the case or the armature coil in solvent as the insulation may be damaged. Wipe the windings with a cloth lightly moistened with solvent and thoroughly dry.*

7. Clean all grease, dirt and carbon from all components.
8. Inspect the starter motor components as described in this chapter.

### Assembly (U.S. Models)

1. If removed, install the O-ring seal into both the right-hand (**Figure 46**) and left-hand (**Figure 47**) end caps.
2. Push all 4 brushes into their holders and carefully install the brush holder assembly (B, **Figure 45**) onto the armature. Push it down until it stops.
3. Install the washer (A, **Figure 45**) onto the end of the armature.
4. The locating tab (A, **Figure 48**) on the brush holder must align with the raised boss (B, **Figure 48**) on the case during installation (**Figure 49**).
5. Make sure the O-ring and insulator (C, **Figure 48**) are still in place on the threaded stud of the brush holder.
6. Install the threaded stud of the brush holder into the right-hand end cap (B, **Figure 44**).
7. Install the bushing and nuts (A, **Figure 44**) securing the brush holder assembly to the right-hand end cap. Tighten the first nut securely, then install the other nut only finger-tight.
8. Install the case onto the armature coil assembly and right-hand end cap.
9. Correctly align the case screw holes in both end caps and push the caps onto the case until they bottom out.
10. Apply a small amount of blue Loctite (No. 242) to the case bolt threads prior to installation.
11. Install the case screws and washers (A, **Figure 43**) and tighten securely.

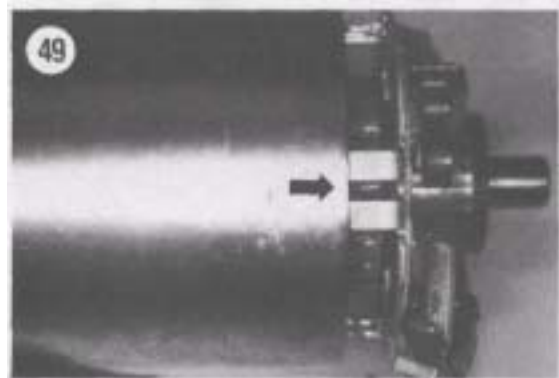
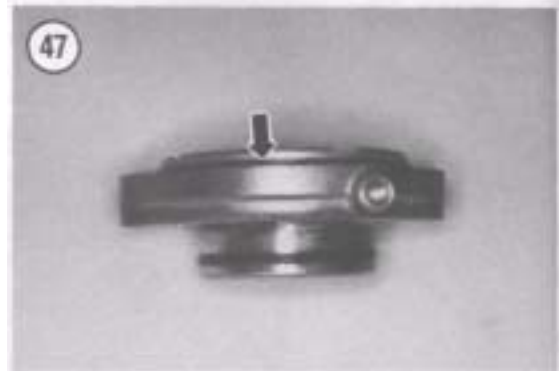
### Disassembly (U.K. Models)

Refer to **Figure 50** for this procedure.

1. Remove the case screws and washers, then separate the right-hand and left-hand end caps from the case.
2. Remove the negative (-) brush holder (**Figure 51**) from the case.
3. Withdraw the armature coil assembly (**Figure 52**) from the case.

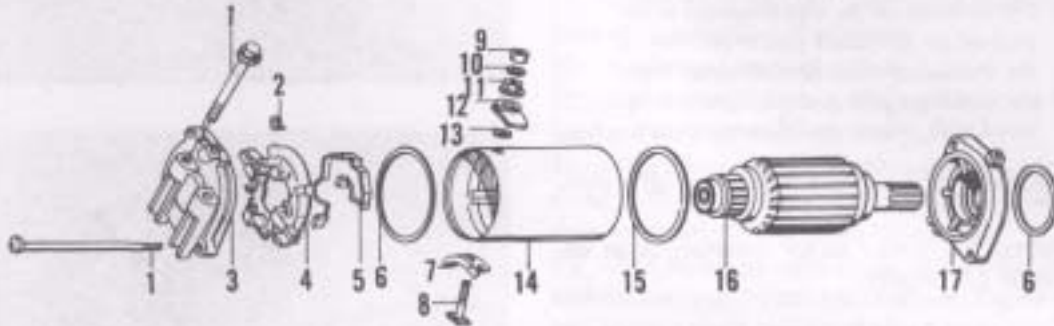
#### NOTE

*Before removing the nuts and washers, write down their description and order. They must be reinstalled in the same order to insulate this set of brushes from the case.*



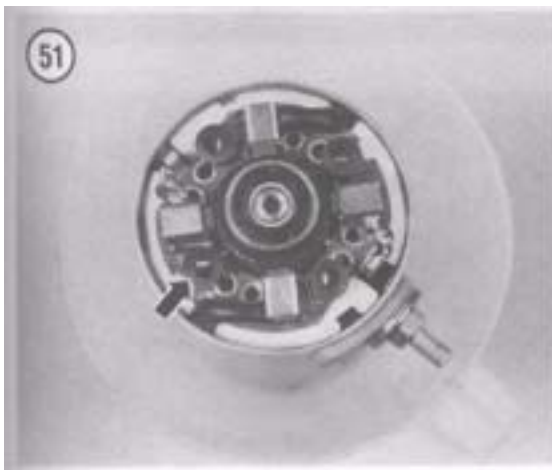
50

# **STARTER MOTOR ASSEMBLY (U.K. MODELS)**

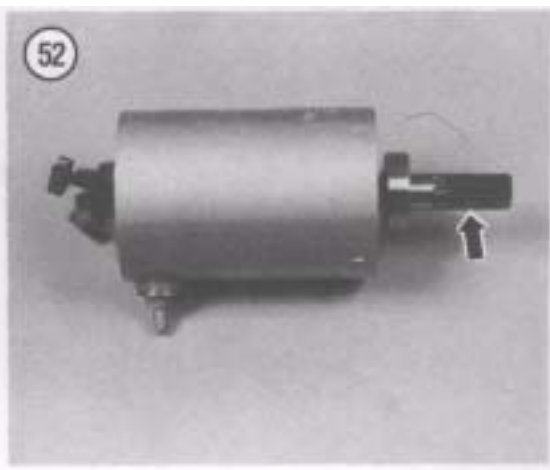


- |  |                              |
|--|------------------------------|
| 1. Case screw                          | 9. Nut                       |
| 2. Brush spring                        | 10. Lockwasher               |
| 3. End cap<br>(right-hand)             | 11. Nut                      |
| 4. Brush holder<br>assembly (negative) | 12. Outer bushing/<br>flange |
| 5. Brush holder<br>assembly (positive) | 13. Gasket                   |
| 6. O-ring                              | 14. Case                     |
| 7. Inner bushing                       | 15. O-ring                   |
| 8. Bolt                                | 16. Armature                 |
|  | 17. End cap<br>(left-hand)   |

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4. Remove the flange nut, outer bushing (**Figure 53**) and O-ring (**Figure 54**) securing the brush positive and negative brush sets.
5. Remove the bolt (**Figure 55**) and the inner bushing (**Figure 56**).
6. Remove the positive (+) brush holder (**Figure 57**) from the end of the case.

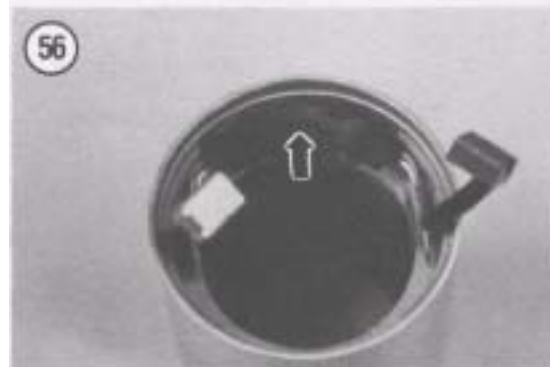
#### CAUTION

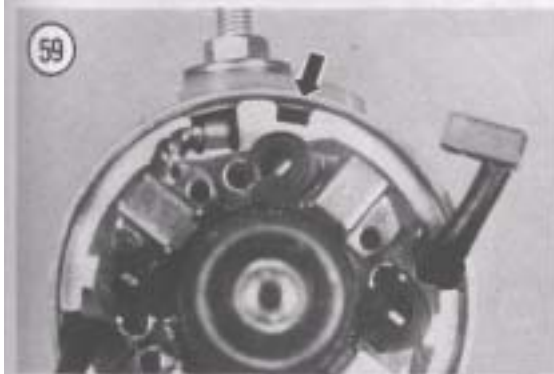
*Do not immerse the wire windings in the case or the armature coil in solvent as the insulation may be damaged. Wipe the windings with a cloth lightly moistened with solvent and thoroughly dry.*

1. Clean all grease, dirt and carbon from all components.
8. Inspect the starter motor components as described in this chapter.

#### Assembly (U.K. Models)

1. Install the positive (+) brush holder (**Figure 57**).
2. Install the inner bushing (**Figure 56**).
3. Install the bolt (**Figure 55**) and install the O-ring (**Figure 54**).
4. Install the outer bushing and flange nut (**Figure 53**) securing the brush assembly to the case.
5. Insert the armature coil assembly (**Figure 52**) into the left-hand end of the case.
6. Release the springs from the brushes (**Figure 58**) in the negative (-) brush holder.
7. Move the positive (+) brushes out so the negative (-) brush holder can be installed over them. Carefully align the positive brush wires with the notches in the negative brush holder.





8. Install the negative (-) brush holder into the end of the case. Align the notch in the holder with the locating tab (**Figure 59**) in the case.

9. Install the positive (+) brushes into their receptacles in the negative brush holder.

10. Rotate the end of the spring *counterclockwise* and index the spring end into the backside of the brush. Repeat for all 4 brushes.

11. Inspect the O-ring seal (**Figure 60**) in the right-hand end cap; replace if necessary.

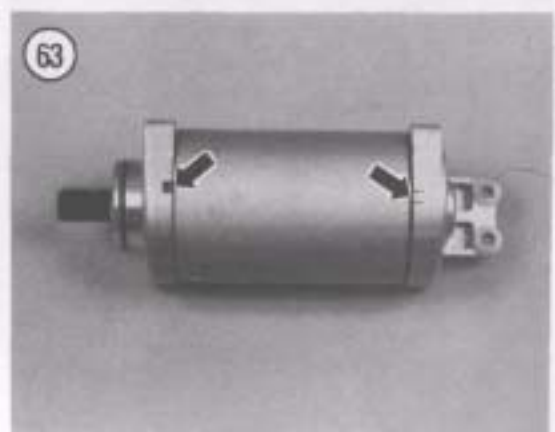
12. Install the right-hand end cap.

13. Inspect the O-ring seal (**Figure 61**) in the left-hand end cap; replace if necessary.

14. Align the raised tab on the negative (-) brush holder with the locating notch (**Figure 62**) in the right-hand end cap and install the end cap.

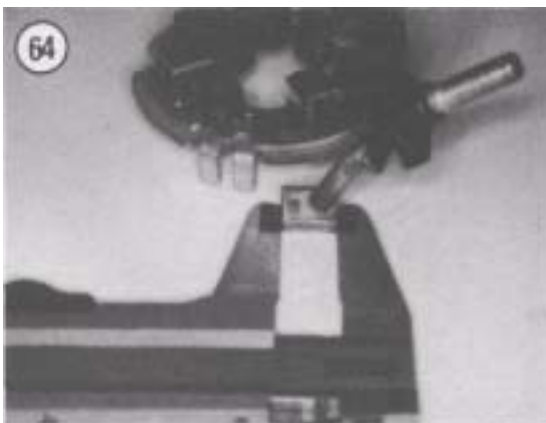
15. Align the raised marks on the right hand end cap with the notch on the left-hand end cap (**Figure 63**).

16. Apply a small amount of blue Loctite No. 242 to the case screw threads prior to installation. Install the case screws and washers, then tighten securely.



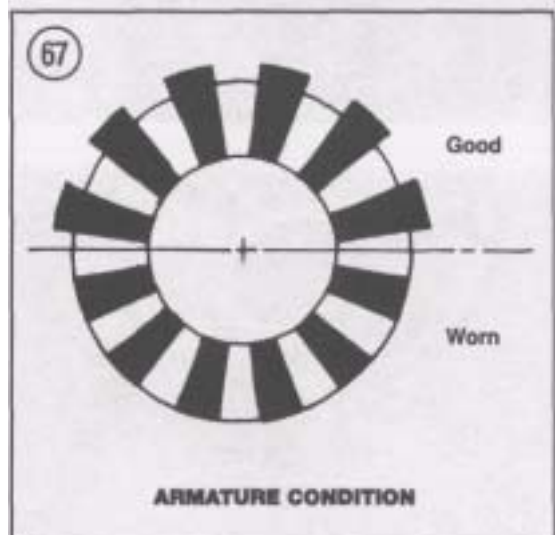
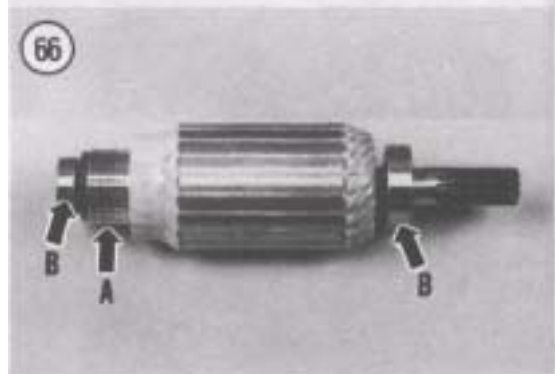
### Inspection (All Models)

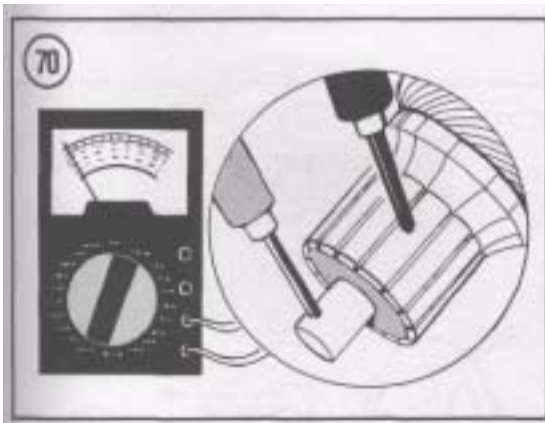
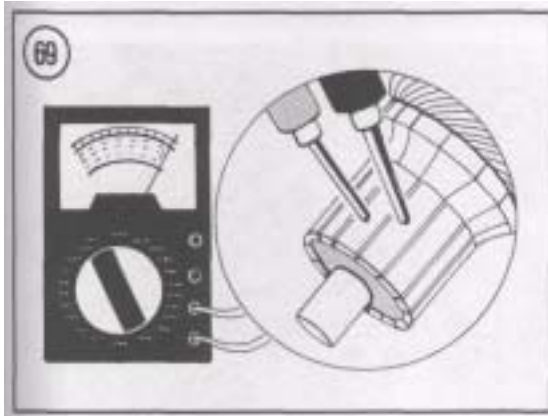
1. Measure the length of each brush (**Figure 64**) with a vernier caliper. If the length is 9.0 mm (0.35 in.) or less for any one of the brushes, the brush sets must be replaced. The brushes cannot be replaced individually.
2. Inspect the commutator. Refer to A, **Figure 65** for U.S. models or A, **Figure 66** for U.K. models. The mica should be just below the surface of the copper bars. On a worn commutator the mica and copper bars may be worn to the same level (**Figure 67**). If necessary, have the commutator serviced by a dealer or electrical repair shop.
3. Inspect the commutator copper bars (**Figure 68**) for discoloration. If a pair of bars are discolored, grounded armature coils are indicated.
4. Use an ohmmeter and perform the following:
  - a. Check for continuity between the commutator bars (**Figure 69**); there should be continuity (indicated resistance) between any two of the bars.
  - b. Check for continuity between the commutator bars and the shaft (**Figure 70**); there should be *no* continuity (infinite resistance).
5. Use an ohmmeter and perform the following:
  - a. Check for continuity between the starter cable terminal and the starter case; there should be continuity (indicated resistance).
  - b. Check for continuity between the starter cable terminal and the brush wire terminal; there should be *no* continuity (infinite resistance).



- c. If the unit fails either of these tests, the starter assembly must be replaced. The case/field coil assembly cannot be replaced individually.

6A. On U.S. models, inspect the bearing (B, **Figure 65**) for the armature coil assembly. It must rotate freely with no signs of wear. If the bearing is worn,





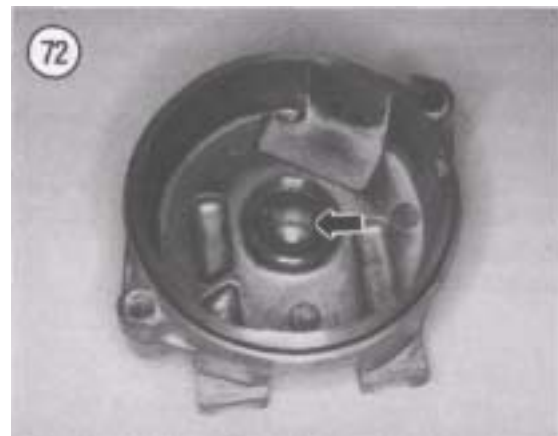
replace the armature coil assembly. The bearings cannot be replaced individually. 6B. On U.K. models, inspect the bearings (B, **Figure 66**) at each end of the armature coil assembly. It must rotate freely with no signs of wear. If the bearing is worn, replace the armature coil assembly. The bearings cannot be replaced individually.

7. Inspect the oil seal (**Figure 71**) in the left-hand end cap for wear, damage or deterioration. The oil seal cannot be replaced. If damaged, replace the left-hand end cap.

8. Inspect the right-hand end cap for wear or damage, replace if necessary.

9. On U.S. models, inspect the right-hand end cap bushing (**Figure 72**) for wear or damage, replace the end cap if necessary.

10. Inspect the case assembly for wear or damage. Make sure the field coils (**Figure 73**) are bonded securely in place. If damaged or any field coils are loose, replace the case assembly.



11. On U.S. models, inspect the brush holder assembly (**Figure 74**) for wear or damage, if damaged; replace the assembly.
12. On U.K. models, perform the following:
  - a. Inspect the positive (+) brush holder and brush springs (**Figure 75**) assembly for wear or damage; replace any damaged parts.
  - b. Inspect the negative (-) brush holder and brush springs (**Figure 76**) assembly for wear or damage. The springs are the only replacement parts available for this assembly.

## STARTER CLUTCH AND GEARS

The starter gears can be removed with the engine in the frame. This procedure is shown with the engine removed for clarity.

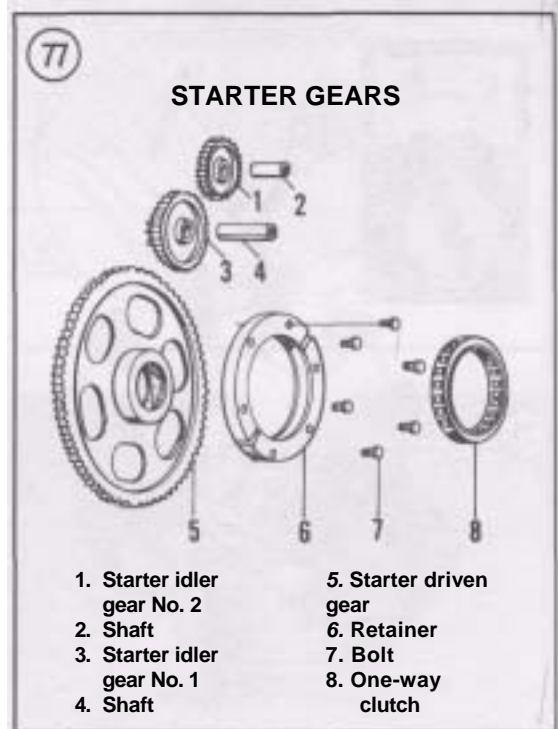
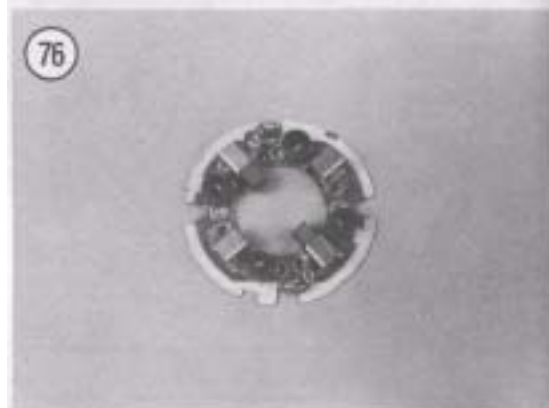
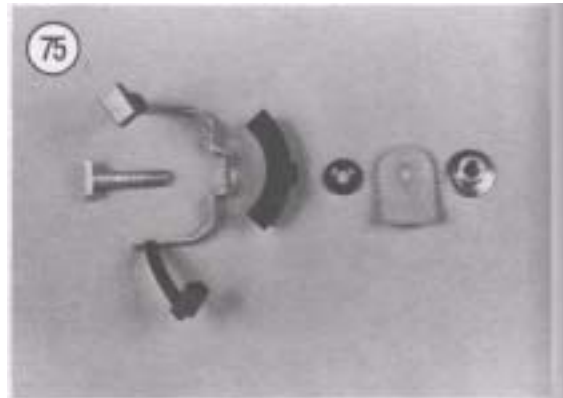
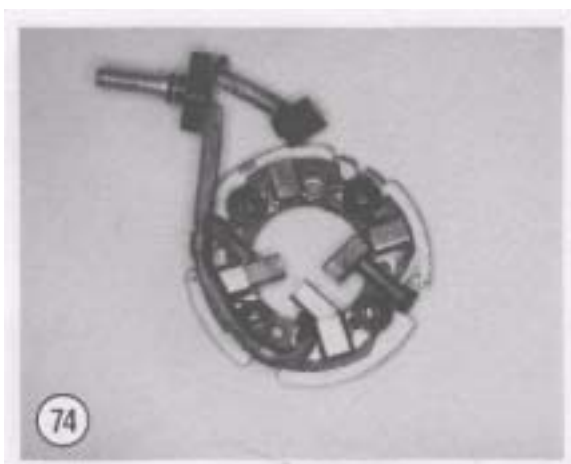
Refer to **Figure 77** for this procedure.

### Removal

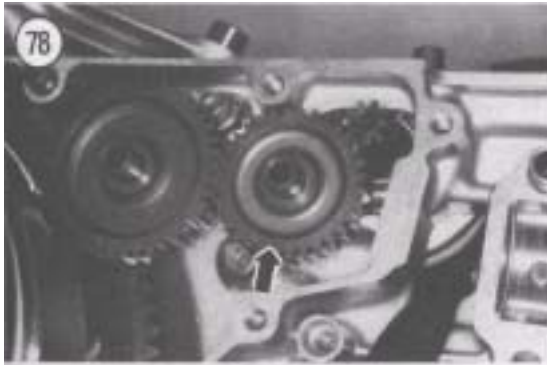
1. Remove the alternator stator assembly as described in this chapter.
2. Remove the starter idler gear No. 2 and its shaft (**Figure 78**).
3. Withdraw the No. 1 idler gear shaft (A, **Figure 79**) then remove the No. 1 idler gear (B, **Figure 79**).
4. Remove the alternator rotor assembly as described in this chapter.

### NOTE

*The starter driven gear may come off with the alternator rotor in Step 4 or stay on the crankshaft.*



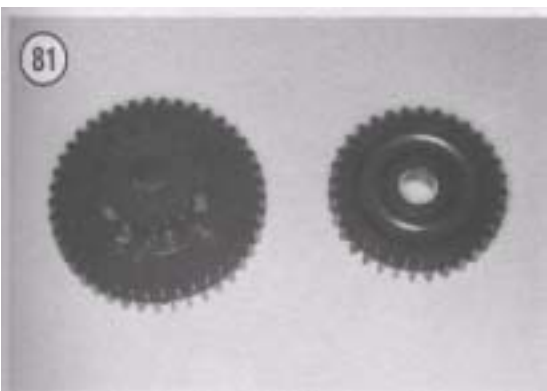
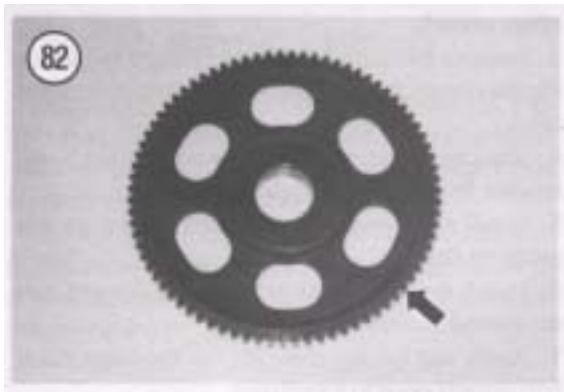




5. If still installed on the crankshaft, remove the starter driven gear from the crankshaft.
6. If removed, install the starter driven gear into the backside of the alternator rotor.
7. Try to rotate the starter driven gear (**Figure 80**). It should rotate freely in one direction and be locked up in the other direction.
8. If the starter driven gear will rotate in both directions or is locked up in both directions, replace the starter clutch as described in this chapter.

### Inspection

1. Inspect the starter idler gears (**Figure 81**) for wear or damage. Replace if necessary. Insert the shaft into its respective gear and rotate the gear. Suzuki does not provide specifications for the shafts nor the inside diameter of the gears. If there is a noticeable amount of play, replace the gear(s) and shaft(s) as a set.
2. Inspect the starter driven gear (**Figure 82**) for wear, chipped or missing teeth. Replace if necessary.
3. Inspect the starter driven gear inner bushing (**Figure 83**) where it rides on the crankshaft and the outer



surface (**Figure 84**) where it engages the one-way clutch. If either surface is damaged, replace the gear.

4. Inspect the rollers (**Figure 85**) of the one-way clutch for burrs, wear or damage. Replace if necessary.

### Installation

1. If removed, install the starter driven gear into the backside of the alternator rotor (**Figure 80**).
2. Install the starter driven gear and alternator rotor assembly onto the crankshaft. Tighten the rotor bolt as described in this chapter.
3. Install the No. 1 idler gear (B, **Figure 79**) then install the No. 1 idler gear shaft (A, **Figure 79**).
4. Install the starter idler gear No. 2 and its shaft (**Figure 78**).
5. Install the alternator stator assembly as described in this chapter.

### Starter Clutch Replacement

1. If still installed, remove the starter driven gear from the backside of the alternator rotor (**Figure 80**).
2. Hold onto the center of the rotor with a 36 mm offset wrench.
3. Remove the 6mm Allen bolts (**Figure 86**) securing the starter clutch assembly to the backside of the rotor.
4. Separate the starter clutch one-way clutch and retainer from backside of the rotor.
5. Install a new one-way clutch with the flange side going on first.
6. Install the retainer, align the bolt holes and turn the assembly over.
7. Apply red Loctite (No. 271) to the 6mm Allen bolt threads prior to installation.
8. Use the same tool set-up used for removal to hold the alternator rotor stationary while tightening the bolts. Tighten the Allen bolts in a crisscross pattern to the torque specification listed in **Table 1**.

## STARTER RELAY

### Testing

1. Remove the rider's seat and frame left-hand side cover (**Figure 87**) as described in Chapter Thirteen.

### CAUTION

*When disconnecting the starter electrical wire from the starter solenoid, do **not** touch the other electrical terminal of the starter relay—this would result in a short.*

2. Disconnect the electrical wire (A, **Figure 88**) going from the starter relay to the starter. Leave the other electrical wire connected to the relay.
3. Shift the transmission into NEUTRAL.
4. Turn the ignition switch ON.
5. Pull in on the clutch lever until it bottoms out.
6. Press the START button.



7. Have an assistant connect an ohmmeter between the positive and negative terminals (B, **Figure 88**) on top of the relay and check for continuity. If there is continuity (low resistance) the relay is okay. If there is no continuity (infinite resistance), the relay may be faulty, proceed to Step 8.
8. Disconnect the battery (+) wire and the ground (-) wire from the large terminals on the relay.
9. Disconnect the relay coil wire 2-pin electrical connector containing 2 wires (1 yellow/green, 1 black/white) from the harness.
10. Connect an ohmmeter to the terminals in the relay side of the 2-pin electrical connector and check the resistance. The specified resistance is 2-6 ohms. If the resistance is not within specified range, the relay coil is faulty and the relay must be replaced.
11. If the relay checks out okay, install all electrical wires to the relay and to the large terminals tighten the nuts securely. Make sure the electrical connec-



tors are on tight and that the rubber boot is properly installed to keep out moisture. 12. Install the side cover and seat.

### Removal/Installation

1. Remove the rider's seat and frame left-hand side cover (**Figure 87**) as described in Chapter Thirteen.
2. Slide off the rubber protective boots and disconnect the large electrical wires from the top terminals of the relay (B, **Figure 88**).
3. Disconnect the relay coil wire 2-pin electrical connector containing 2 wires (1 yellow/green, 1 black/white) from the harness.
4. Remove the bolt and nut securing the relay to the frame and remove the relay and coil wiring and connector from the frame.
5. Replace by reversing these removal steps, noting the following:
  - a. Install all electrical wires to the solenoid and on the large terminals tighten the nuts securely.
  - b. Make sure the electrical connectors are on tight and that the rubber boot is properly installed to keep out moisture.

## LIGHTING SYSTEM

The lighting system consists of a headlight, tail-light/brakelight, directional lights, indicator lights and a speedometer illumination light. **Table 4** lists replacement bulbs for these components.

Always use the correct wattage bulb as indicated in this section. The use of a larger wattage bulb will give a dim light and a smaller wattage bulb will burn out prematurely.

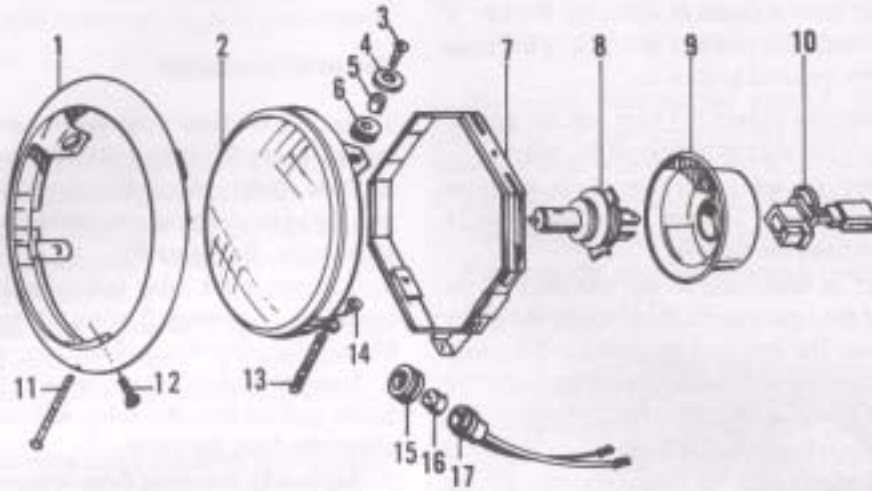
### Headlight Bulb and Lens Replacement

Refer to **Figure 89** for this procedure.

1. Remove the screw (**Figure 90**), on each side, at the bottom of the headlight case.
2. Pull out on the bottom of the headlight trim ring and disengage it from the headlight case. Remove the trim ring and headlight lens unit assembly from the case.
3. Disconnect the electrical connector (**Figure 91**) from the backside of the bulb.
4. Remove the rubber cover (**Figure 92**) from the back of the headlight lens unit.

89

## HEADLIGHT



- 1. Trim ring
- 2. Lens assembly
- 3. Screw
- 4. Washer
- 5. Collar
- 6. Rubber grommet

- 7. Mounting unit
- 8. Bulb
- 9. Rubber cap
- 10. Electrical connector
- 11. Adjust screw
- 12. Screw

- 13. Spring
- 14. Nut
- 15. Rubber grommet
- 16. Bulb (position light)
- 17. Socket (position light)







### CAUTION

*Carefully read all instructions shipped with the replacement quartz bulb. Do not touch the bulb glass with your fingers because any traces of skin oil on the quartz halogen bulb will drastically reduce bulb life. Clean any traces of oil from the bulb with a cloth moistened in alcohol or lacquer thinner.*

5. Unhook the clip (Figure 93) and remove the light bulb (Figure 94). Replace with a new bulb (Figure 95).

6. To remove the headlight lens unit, perform the following:

- a. Remove the adjustment screws (Figure 96).
- b. Remove the screws, washers and spacers (Figure 97) securing the lens unit to the mounting ring and remove the mounting ring and trim ring from the lens unit.

7. Install by reversing these removal steps, noting the following.

- a. Install the rubber cover with the "TOP" arrow (A, Figure 98) facing upward.
- b. Make sure the electrical connector (B, Figure 98) is on tight and that the rubber cover is properly installed to keep out moisture.
- c. Adjust the headlight as described in this chapter.





### Front Position Light Bulb Replacement (U.K.Models)

1. Reach up under the headlight case and remove the socket/bulb and electrical connector from the headlight case.
2. Remove the bulb from the socket.
3. Replace the bulb and install the socket assembly.

### Headlight Case Removal/Installation

1. Remove the headlight bulb and lens assembly from the headlight case as described in this chapter.
2. Disconnect the electrical wire connectors (A, **Figure 99**) within the headlight case and withdraw the wires from the case (B, **Figure 99**).
3. Remove the nuts (**Figure 100**) securing the headlight case to the lower fork bridge and remove the case assembly.
4. Install by reversing these removal steps.
5. Adjust the headlight as described in this chapter.

### Headlight Adjustment

Adjust the headlight horizontally and vertically according to Department of Motor Vehicle regulations in your area.

Turn the screws on the bottom of the trim ring, until the aim is correct. To adjust the headlight horizontally, turn the left-hand adjust screw (A, **Figure 101**). To adjust the headlight vertically turn the right-hand adjust screw (B, **Figure 101**).

### Taillight/Brakelight Bulb Replacement

Refer to **Figure 102** for this procedure.

1. Remove the screws (**Figure 103**) securing the lens and remove the lens and gasket.
2. Wash out the inside and outside of the lens with a mild detergent and wipe dry.
3. Inspect the lens gasket and replace it if damaged or deteriorated.
4. Push in and turn the bulb (A, **Figure 104**) counterclockwise and remove the bulb.
5. Carefully wipe off the reflector surface (B, **Figure 104**) behind the bulb with a soft cloth.

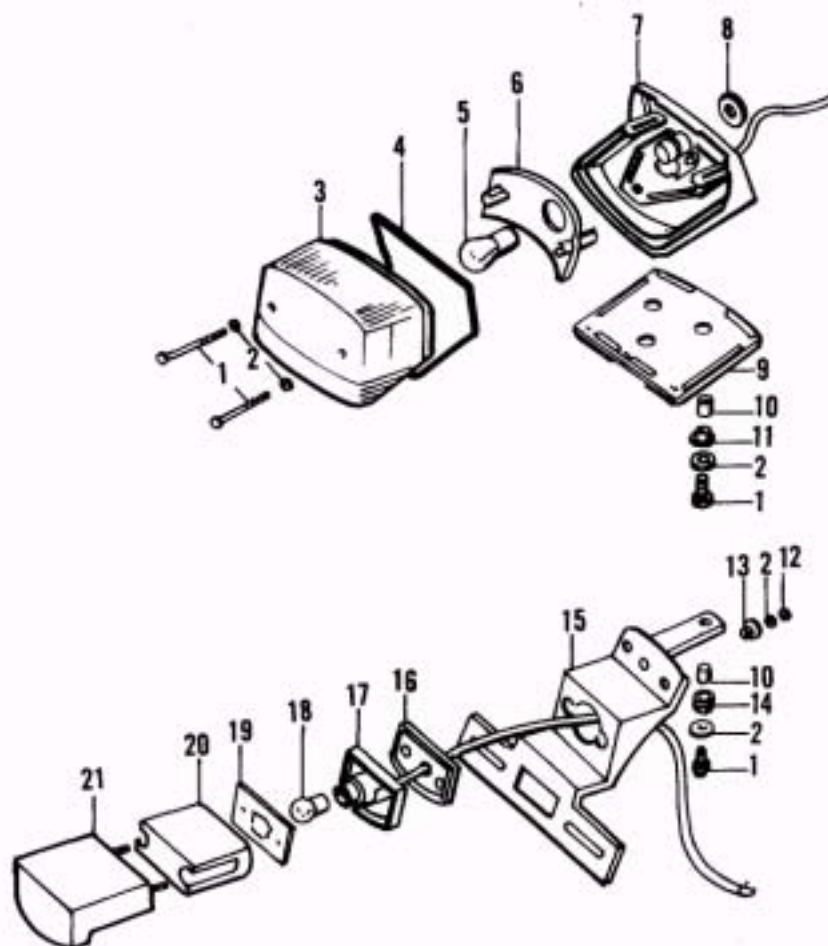
6. Replace the bulb (A, **Figure 104**) and install the lens and gasket; do not over-tighten the screws as the lens may crack.

### License Plate Light Bulb Replacement

Refer to **Figure 102** for this procedure. 1. Working behind the license plate assembly, remove the nuts and lockwashers securing the light assembly.



# TAILLIGHT/BRAKELIGHT AND LICENSE PLATE LIGHT



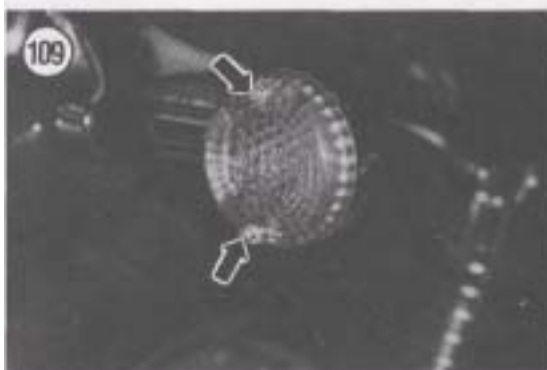
- |                               |                    |
|-------------------------------|--------------------|
| 1. Screw                      | 11. Collar         |
| 2. Washer                     | 12. Nut            |
| 3. Lens (tail/<br>brakelight) | 13. Collar         |
| 4. Gasket                     | 14. Rubber bushing |
| 5. Bulb                       | 15. Bracket        |
| 6. Reflector                  | 16. Plate          |
| 7. Base                       | 17. Housing        |
| 8. Nut                        | 18. Bulb           |
| 9. Rubber cushion             | 19. Gasket         |
| 10. Collar                    | 20. Lens           |
|                               | 21. Cover          |

2. Remove the cover (**Figure 105**) and the lens (**Figure 106**) from the housing on the license plate bracket. Don't lose the mounting hole collars in the bracket.
3. Wash out the inside and outside of the lens with a mild detergent and wipe dry.
4. Inspect the lens gasket (**Figure 107**) and replace it if damaged or deteriorated.
5. Push in and turn the bulb (A, **Figure 108**) counterclockwise and remove the bulb.
6. If necessary, remove the housing and plate (B, **Figure 108**) from the bracket.
7. If removed, install the housing and plate (B, **Figure 108**) onto the bracket.
8. If removed, install the gasket onto the housing.
9. Replace the bulb (A, **Figure 108**) and install the lens and cover.
10. Make sure mounting hole collars are in place in the bracket.
11. Install the lockwashers and nuts securing the assembly. Tighten the nuts securely.

#### Directional Signal Light Bulb Replacement

1. Remove the screws (**Figure 109**) securing the lens and remove the lens.
2. Push in and turn the bulb (A, **Figure 110**) counterclockwise and remove the bulb.
3. Wash out the inside and outside of the lens with a mild detergent and wipe dry.
4. Carefully wipe off the reflector surface (B, **Figure 110**) behind the bulb with a soft cloth.
5. Replace the bulb (A, **Figure 110**) and install the lens and gasket; do not over-tighten the screws as the lens may crack.





## Speedometer Illumination Light Indicator Light Replacement

1. Remove the screws and washers (A, **Figure 111**) securing the speedometer assembly in the case.
2. Carefully pull the speedometer housing (B, **Figure 111**) up and out of the case.
3. Carefully pull the defective lamp holder/electrical wire assembly from the backside of the speedometer housing.
4. Pull the bulb straight out of the holder and replace the defective bulb.

### NOTE

*If a new bulb will not work, check the wire connections for loose or broken wires. Also check the bulb socket for corrosion. Replace as necessary.*

5. Push the lamp socket/electrical wire assembly back into the housing. Make sure it is completely seated to prevent the entry of water and moisture.
6. Make sure the gasket (C, **Figure 111**) is in place and install the speedometer housing (B, **Figure 111**) into the case.
7. Install the screws and washers (A, **Figure 111**) securing the speedometer assembly in the case.

## SWITCHES

Switches can be tested for continuity with an ohmmeter (see Chapter One) or a test light at the switch connector plug by operating the switch in each of its operating positions and comparing results with the switch operation. For example, **Figure 112** shows a continuity diagram for the ignition switch. It shows which terminals should

| <b>IGNITION SWITCH</b> |               |        |       |       |
|------------------------|---------------|--------|-------|-------|
| Color<br>Position      | Red/<br>white | Orange | Gray  | Brown |
| Off                    |               |        |       |       |
| On                     | ● — ●         |        | ● — ● |       |
| Park                   | ● — ●         |        |       | ● — ● |



show continuity when the ignition switch is in a given position.

When the ignition switch is in the PARK position, there should be continuity between terminals red/white and brown. This is indicated by the line on the continuity diagram. An ohmmeter connected between these 2 terminals should indicate little or no resistance and a test lamp should light. When the ignition switch is OFF, there should be no continuity between any of the terminals.

### Testing

If the switch or button doesn't perform properly, replace it. Refer to the following figures when testing the switches:

- Ignition switch: **Figure 112.**
- Engine stop switch and start switch: **Figure 113.**
- Sidestand switch: **Figure 114.**
- Clutch switch: **Figure 115.**
- Headlight switch (U.K.): **Figure 116.**
- Front brake switch: **Figure 117.**
- Rear brake switch: **Figure 118.**

**113**

**ENGINE STOP AND START SWITCH**

| Position \ Color | Orange/white<br>(Red tube) | Orange/white | Yellow/green |
|------------------|----------------------------|--------------|--------------|
| Off              |                            |              |              |
| Run              | ●————●                     |              |              |
| Start<br>(Push)  |                            | ●————●       |              |

**114**

**SIDESTAND CHECK SWITCH**

| Position \ Color          | Green/white | Brown/white |
|---------------------------|-------------|-------------|
| On<br>(Down position)     | ●————●      |             |
| Off<br>(Upright position) |             |             |

**115**

**CLUTCH SWITCH**

| Position \ Color      | Yellow/green | Yellow/green |
|-----------------------|--------------|--------------|
| On<br>(Squeeze lever) | ●————●       |              |
| Off                   |              |              |

**116**

**HEADLIGHT SWITCH (U.K.)**

| Position \ Color | Yellow/white | Orange/red | Orange/black | Gray |
|------------------|--------------|------------|--------------|------|
| On               | ●————●       |            | ●————●       |      |
| S                |              |            | ●————●       |      |
| Off              |              |            |              |      |

**117**

**FRONT BRAKE SWITCH**

| Position \ Color      | Orange | White/blue |
|-----------------------|--------|------------|
| On<br>(Squeeze lever) | ●————● |            |
| Off                   |        |            |

**118**

**REAR BRAKE SWITCH**

| Position \ Color      | Orange | White/blue |
|-----------------------|--------|------------|
| On<br>(Depress pedal) | ●————● |            |
| Off                   |        |            |



**119**

**DIMMER SWITCH**

| Color<br>Position | White   | Yellow  | Orange/<br>red |
|-------------------|---------|---------|----------------|
| Hi                |         | ● ——— ● |                |
| Lo                | ● ——— ● |         |                |

**120**

**DIRECTIONAL SIGNAL SWITCH**

| Color<br>Position | Blue    | Light blue | Light green |
|-------------------|---------|------------|-------------|
| Right             |         | ● ——— ●    |             |
| Off               |         |            |             |
| Left              | ● ——— ● |            |             |

**121**

**NEUTRAL INDICATOR SWITCH**

| Color<br>Position | Black   | Ground |
|-------------------|---------|--------|
| Neutral           | ● ——— ● |        |
| The others        |         |        |

**122**

**HORN SWITCH**

| Color<br>Position | Green   | Blue/<br>white |
|-------------------|---------|----------------|
| On<br>(Push)      | ● ——— ● |                |
| Off               |         |                |

h. Dimmer switch: **Figure 119.**

i. Directional signal switch: **Figure 120.**

j. Neutral indicator switch: **Figure 121.**

k. Horn switch: **Figure 122.**

When testing switches, note the following:

- First check the fuses as described under *Fuses* in this chapter.
- Check the battery as described under *Battery* in Chapter Three; charge the battery to the correct state of charge, if required.
- Disconnect the negative (-) cable from the battery, as described in this chapter, if the switch connectors are not disconnected in the circuit.

**CAUTION**

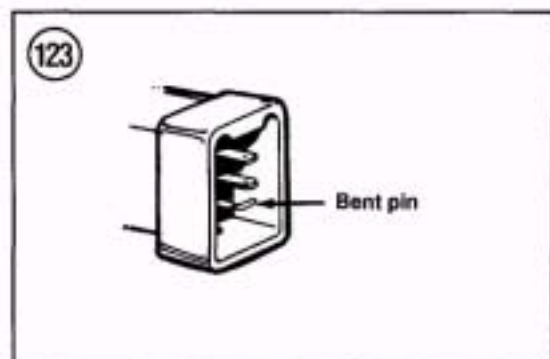
*Do not attempt to start the engine with the battery negative (—) cable disconnected or you may damage the wiring harness.*

- When separating 2 electrical connectors, depress the retaining clip and pull on the electrical connector housings and *not* the wires.

**NOTE**

*Electrical connectors can be serviced by disconnecting them and cleaning with electrical contact cleaner. Multiple pin connectors should be packed with a dielectric compound (available at most automotive and motorcycle supply stores).*

- After locating a defective circuit, check the electrical connectors to make sure they are clean and properly connected. Make sure there are no bent metal pins on the male side of the connector (**Figure 123**). Check all wires going into an electrical connector housing to make



sure each wire is properly positioned and that the wire end is not loose (**Figure 124**).

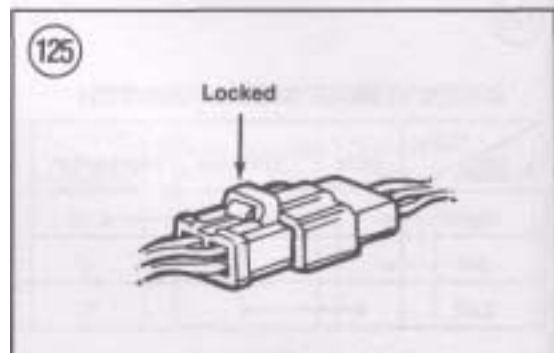
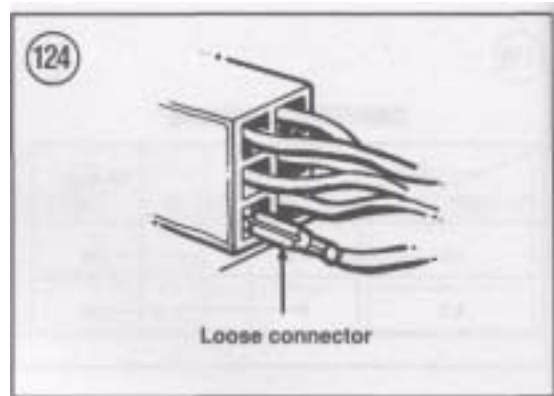
- f. To properly connect electrical connectors, push them together until they click and are locked into place (**Figure 125**).
- g. When replacing handlebar switch assemblies, on models with electrical wiring external of the handlebar, make sure the wiring is routed correctly so that it is not crimped when the handle bar is turned from side to side. Also secure the wiring to the handlebar with the plastic tie wraps.

#### NOTE

*On some models, the switch electrical wires run through the interior of the handlebar. The wiring enters a opening in the handlebar adjacent to the switch (**Figure 126**) and exits at the base of the handlebar by the speedometer. On these models, if the electrical wiring cannot be disconnected at the switch assembly, the electrical wiring must be pulled through the handlebar during removal and again during installation.*

### Ignition Switch Removal/Installation

1. Remove the rider's seat and frame left-hand side cover (A, **Figure 127**) as described in Chapter Thirteen.
2. Disconnect the battery negative (—) lead as described in this chapter.
3. Follow the wiring harness from the ignition switch to the wiring harness.
4. Disconnect the ignition switch 4-pin electrical connector containing 4 wires (1 red/white, 1 orange, 1 gray and 1 brown).
5. Remove the mounting screw and washer (B, **Figure 127**) securing the ignition switch to the frame on the left-hand side.
6. Remove the switch assembly (C, **Figure 127**) from the frame.
7. Install the new ignition switch onto the frame and tighten the screw securely.
8. Reconnect the 4-pin electrical connector. Make sure the electrical connector is free of corrosion and is tight.
9. Connect the battery negative (-) lead as described in this chapter.



10. Install the side cover and seat.

**Right-hand Combination Switch and on 1985-1987, Front Brake Light Switch (Engine Start and Stop Switch and on U.K. Models the Headlight Switch)  
Removal/Installation**

The right-hand combination switch assembly contains both the engine start, engine stop switch and on U.K. models the Headlight Switch. If any



portion of the switch is faulty the entire switch assembly must be replaced.

1. Remove the seat as described under *Seat Removal/Installation* in Chapter Thirteen.
2. Disconnect the battery negative (-) lead as described in this chapter.
3. Remove the fuel tank as described under *Fuel Tank Removal/Installation* in Chapter Seven.

**NOTE**

*The location of the electrical connectors, and the color of the wiring, vary with the different type of handlebars, different years and with the country the bike is sold in. Therefore the exact location of the connector(s) is not shown in this procedure.*

4. Follow the right-hand switch electrical wiring either on the exterior of the handlebar or where the internal wiring exits at the base of the handlebar by the speedometer. Follow these wires to the area along the top of the frame rails. The electrical connectors are located either by the front air filter case (**Figure 128**) or by the rear air filter case (**Figure 129**).
5. Locate and disconnect the electrical connector(s).
- 6A. On 1985-1987 models, remove the screws and disassemble the front brake light switch. The electrical connector is part of the switch assembly and will be removed along with the rest of the wiring harness.
- 6B. On 1988-on models, disconnect the electrical connector (**Figure 130**) from the front brake light switch. This wire goes from the start switch to the front brake light switch.
7. Remove the electrical wire harness from any clips on the frame and carefully pull the harness out from the frame.
8. Remove the screws securing the right-hand combination switch together and remove the switch assembly (**Figure 131**).
9. Install a new switch and tighten the screws securely. Do not over-tighten the screws or the plastic switch housing may crack.
10. Reconnect the electrical connector(s)
11. Make sure the electrical connector(s) are free of corrosion and are tight. Install a tie wrap to hold the electrical wires to the front of the frame. The wires

must be retained in this manner to allow room for the fuel tank.

12. Connect the battery negative (-) lead as described in this chapter.
13. Install the fuel tank as described in Chapter Seven.
14. Install the seat as described in Chapter Thirteen.

**Left-hand Combination Switch and Starter Interlock Switch  
(Headlight Dimmer Switch, Directional Signal Switch, Horn Switch and on U.K. Models the Passing Switch)  
Removal/Installation**

The left-hand combination switch assembly contains both the headlight dimmer switch, turn signal switch, horn switch and on U.K. models the Passing Switch. If any portion of the switch is faulty the entire switch assembly must be replaced.

1. Remove the seat as described under *Seat Removal/Installation* in Chapter Thirteen.
2. Disconnect the battery negative (-) lead as described in this chapter.
3. Remove the fuel tank as described under *Fuel Tank Removal/Installation* in Chapter Seven.

**NOTE**

*The location of the electrical connectors, and the color of the wiring, vary with the different types of handlebars, different years and with the country the bike is sold in. Therefore the exact location of the connector(s) is not shown in this procedure.*

4. Follow the left-hand switch electrical wiring either on the exterior of the handlebar or where the internal wiring exits at the base of the handlebar by the speedometer. Follow these wires to the area along the top of the frame rails. The electrical connectors are located either by the front air filter case (**Figure 128**) or by the rear air filter case (**Figure 129**).

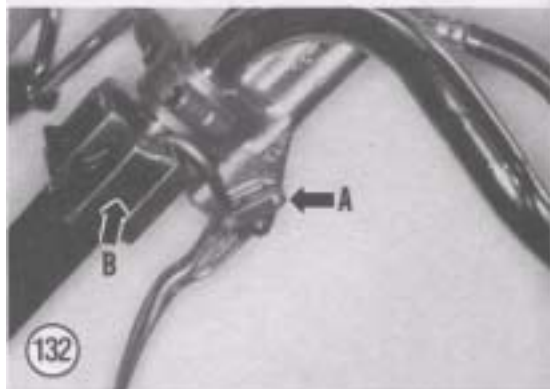
5. Locate and disconnect the electrical connector(s).
6. Remove the screws and disassemble the starter interlock switch (A, **Figure 132**) on the clutch lever. The electrical connector is part of the switch assembly and will be removed along with the rest of the wiring harness.

7. Remove the electrical wire harness from any clips on the frame and carefully pull the harness out from the frame.

8. Remove the screws securing the left-hand combination switch together and remove the switch assembly (B, **Figure 132**).

9. Install a new switch and tighten the screws securely. Do not over-tighten the screws or the plastic switch housing may crack.

10. Reconnect the electrical connector(s)





11. Make sure the electrical connector(s) are free of corrosion and are tight. Install a tie wrap to hold the electrical wires to the front of the frame. The wires must be retained in this manner to allow room for the fuel tank.
12. Connect the battery negative (-) lead as described in this chapter.
13. Install the fuel tank as described in Chapter Seven.
14. Install the seat as described in Chapter Thirteen.



### Front Brake Light Switch (1988-on Models) Removal/Installation

#### NOTE

*The front brake light switch on 1985-1987 models is removed along with the right-hand combination switch assembly as previously described.*

1. Disconnect the electrical connector (A, **Figure 133**) from the switch.
2. Remove the screws securing the front brake light switch to the front brake lever housing and remove the switch assembly (B, **Figure 133**).
3. Install a new switch and tighten the screws securely.
4. Reconnect the 2 individual electrical connectors.
5. Make sure the electrical connectors are free of corrosion and are tight.

### Rear Brake Light Switch Removal/Installation

1. Remove the rider's seat and frame right-hand side cover (**Figure 134**) as described in Chapter Thirteen.
2. Remove the trim panel (**Figure 135**) at the rear of the rear brake pedal.
3. Disconnect the return spring (A, **Figure 136**) from the switch.
4. Remove the switch (B, **Figure 136**) from the frame mounting bracket.
5. Remove any tie wraps securing the wiring to the frame.
6. Follow the 2 electrical wires (1 white/black, 1 orange/green) from the switch to where it connects to the harness.
7. Locate and disconnect the individual electrical connectors.
8. Remove the switch and electrical wires from the frame.
9. Install by reversing these removal steps, noting the following:
  - a. Make sure the electrical connectors are free of corrosion and are tight.
  - b. Adjust the switch as described in this chapter.

### Rear Brake Light Switch Adjustment

1. Turn the ignition switch to the ON position.



2. Depress the brake pedal. The brake light should come on just as the brake begins to work.
3. To make the brake light come on earlier, hold the brake light switch body and turn the adjusting nut *clockwise* as viewed from the top. Turn the adjusting nut (**Figure 137**) *counterclockwise* to delay the light from coming on.

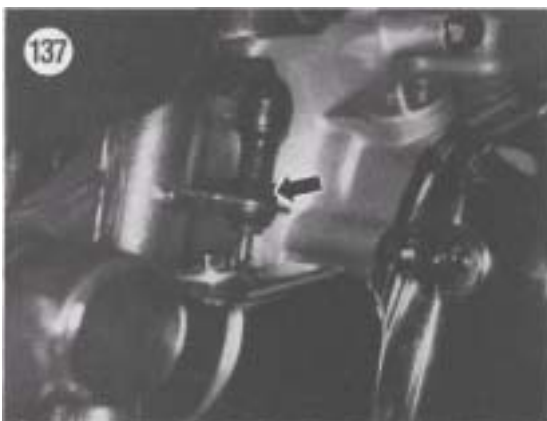
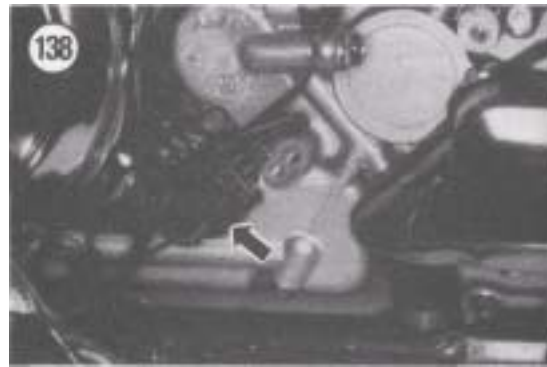
**NOTE**

*Some rider's prefer the brake light to come on a little early. This way, they can tap the pedal without braking to warn drivers who are following too closely.*

### Neutral Switch Removal/Installation

The neutral switch is located on the left-hand side of the bike next to the clutch slave cylinder (**Figure 138**).

1. Remove the bolts securing the secondary drive cover (**Figure 139**) and remove the cover.
2. Disconnect the sidestand check switch electrical connectors (**Figure 140**) from the neutral switch electrical harness.
3. Disconnect the electrical connector (**Figure 141**) from the oil pressure switch.
4. Remove the starter motor as described in this chapter. The neutral switch electrical harness is routed under the starter motor and cover.
5. Remove any tie-wraps securing the electrical harness to the frame.
6. From the neutral switch, follow the electrical harness to the electrical connector in the upper portion of the frame and disconnect the electrical connector.





#### NOTE

Steps 7-9 are shown with the engine removed from the frame and partially disassembled for clarity. It is not necessary to remove the engine from the frame for this procedure.

#### NOTE

Note the location of the electrical wire strap (A, **Figure 142**). It must be reinstalled in the same location during installation.



7. Remove the screws securing the neutral switch (B, **Figure 142**) and separate the neutral switch assembly from the crankcase.
8. Remove the O-ring seal (**Figure 143**) from the receptacle in the crankcase.
9. To avoid the loss of small parts, remove the switch contact plunger (**Figure 144**) and spring from the end of the gearshift drum.
10. Carefully remove the electrical harness from the frame noting its path through the frame. The harness for the new switch must follow the same path.
11. Install the switch contact spring and plunger (**Figure 145**) into the end of the gearshift drum. Make sure they are completely seated (**Figure 144**).
12. Apply a light coat of oil to the O-ring and install the O-ring seal (**Figure 143**) into the receptacle in the crankcase. Make sure it is seated correctly.
13. Install the neutral switch (B, **Figure 142**), the electrical wire strap (A, **Figure 142**) and screws. Tighten the screws securely.
14. Continue the installation by reversing these removal steps, noting the following:
  - a. Be sure to reconnect the electrical connectors to the oil pressure switch and the sidestand check switch.
  - b. Make sure all electrical connectors are free of corrosion and are tight.
  - c. Secure the electrical harness under the wire strap as shown in **Figure 138**.
  - d. Attach any tie-wraps securing the electrical wire to the frame.

### Sidestand Check Switch Removal/Installation

1. Place the bike on the sidestand.
2. Remove the bolts securing the secondary drive cover (**Figure 139**) and remove the cover.

3. Disconnect the sidestand check switch electrical connectors (**Figure 140**) from the neutral switch electrical harness.

#### NOTE

*The sidestand check switch is attached to the front footpeg bracket assembly.*

4. Unhook the wire wrap (A, **Figure 146**) securing the wiring harness to the footpeg assembly.
- 5A. Using an off-set Phillips screwdriver, loosen then remove the screws securing the switch (B, **Figure 146**) to the footpeg assembly and remove the switch.
- 5B. If you don't have an off-set Phillips screwdriver, perform the following:
  - a. Remove the clips (A, **Figure 147**) from the bolts securing the front footpeg assembly (B, **Figure 147**) to the frame.
  - b. Remove the bolts and lower the footpeg assembly.
  - c. Remove the screws (**Figure 148**) securing the switch to the footpeg assembly and remove the switch.
6. Install by reversing these removal steps, noting the following:
  - a. If the front footpeg assembly was removed, tighten the bolts to the torque specification listed in **Table 1** and install the clips (A, **Figure 147**) on the 2 outboard bolts on each side.
  - b. Make sure all electrical connectors are free of corrosion and are tight.
  - c. Secure the electrical harness under the wire strap as shown in **Figure 138**.

### Oil Pressure Switch Removal/Installation

1. Drain the engine oil as described under *Engine Oil and Oil Filter Change* in Chapter Three.

#### NOTE

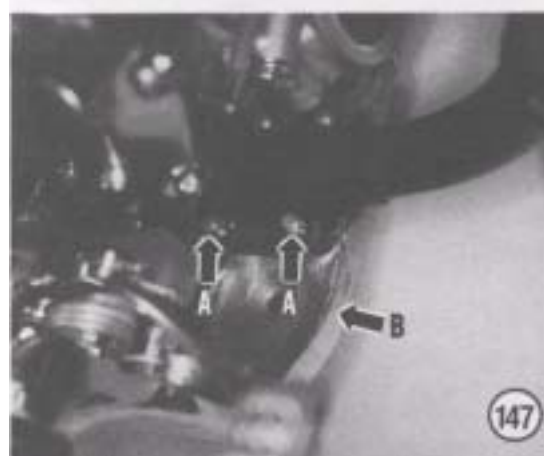
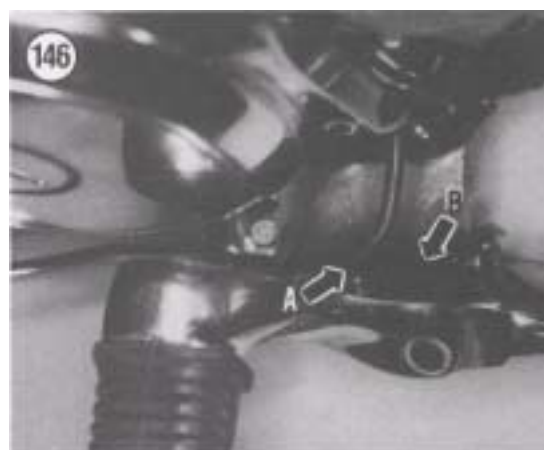
*In the following steps, the engine is shown removed from the frame and partially disassembled for clarity. It is not necessary to remove the engine nor disassemble it for this procedure.*

2. Pull the rubber boot (A, **Figure 149**) off the switch.
3. Disconnect the oil pressure sending switch wire (B, **Figure 149**).

4. Unscrew the oil pressure switch (C, **Figure 149**) from the crankcase.
5. Apply a light coat of gasket sealer to the switch threads prior to installation. Install the switch and tighten securely.
6. Connect the oil pressure sending switch wire and tighten the screw securely.
7. Move the rubber boot back into place on the switch. Make sure it is installed correctly to protect the switch from moisture and corrosion.
8. Refill the engine with the specified type and quantity engine oil.

## ELECTRICAL COMPONENTS

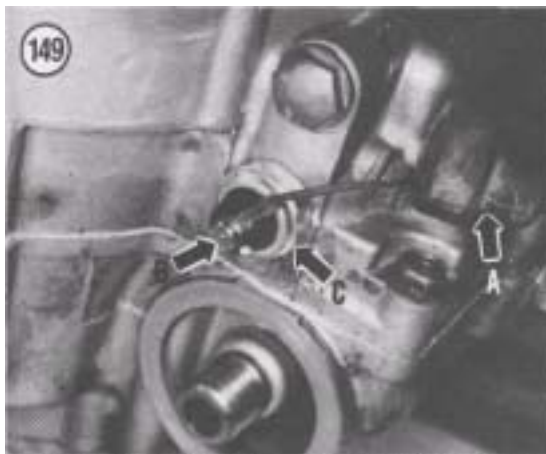
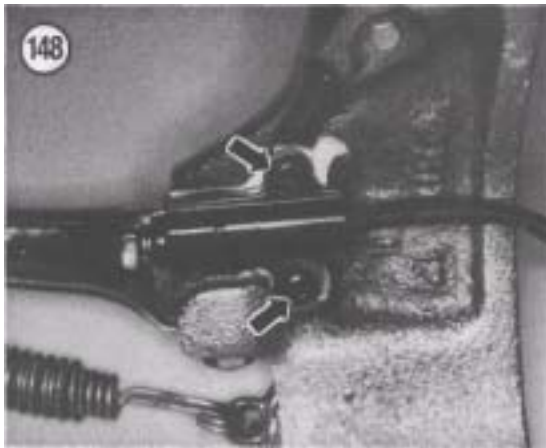
This section contains information on electrical components other than switches. Some of the test procedures covered in this section instruct taking a meter reading within the electrical connector while



it is still attached to a specific part. Under these conditions make sure that the meter test lead has penetrated the connector and is touching the bare metal wire *not* the insulation on the wire. If the test lead does not touch the bare metal wire the readings will be false and may lead to the unnecessary purchase of an expensive electrical part that cannot be returned for a refund. Most dealers and parts houses will not accept any returns on electrical parts.

If you are having trouble with some of these components, perform some quick preliminary checks and they may save you a lot of time.

- a. Disconnect each electrical connector and check that there are no bent metal pins on the male side of the electrical connector. A bent pin will not connect to its mating receptacle in the female end of the connector causing an open circuit.



- b. Check each female end of the connector. Make sure that the metal connector on the end of each wire is pushed in all the way into the plastic connector. If not, carefully push them in with a narrow bladed screwdriver.
- c. Check all electrical wires where they enter the individual metal connector in both the male and female plastic connector.
- d. After all is checked out, push the connectors together and make sure they are fully engaged and locked together.

## Battery Case Removal/Installation

Refer to **Figure 150** for this procedure.

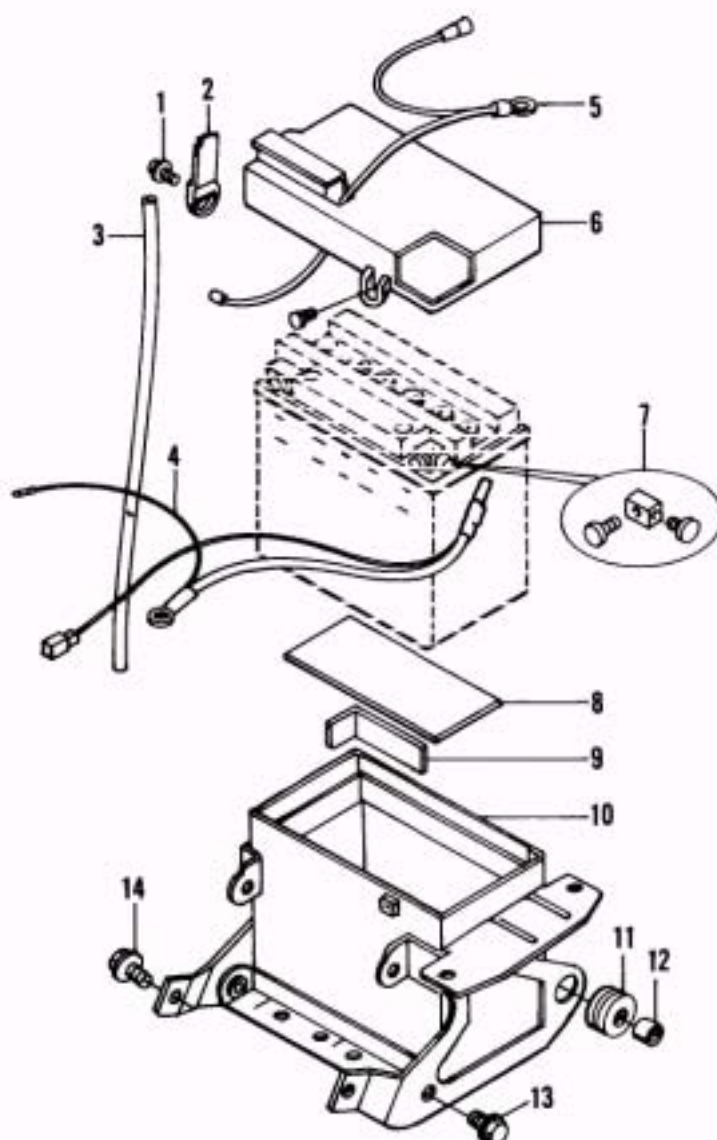
1. Remove the battery as described under *Battery* in Chapter Three.
2. Remove the trim panel (Figure 135) at the rear of the rear brake pedal.
3. On the left-hand side of the bike, remove the bolts securing the voltage regulator/rectifier (A, **Figure 151**) and tie it up out of the way.
4. Remove the bottom bolt (B, **Figure 151**) from each side that secures the battery case to the frame.
5. Remove the top bolt (**Figure 152**) from each side that secures the battery case to the frame.
6. Lower the battery case down and out of the frame.
7. If the battery case is corroded by electrolyte spillage, thoroughly clean with baking soda and water and rinse thoroughly. Then clean with solvent and dry completely. Repaint any areas of bare metal.
8. Install by reversing these removal steps.

## Speedometer and Indicator Lamp Housing Removal/Installation

Refer to **Figure 153** for this procedure.

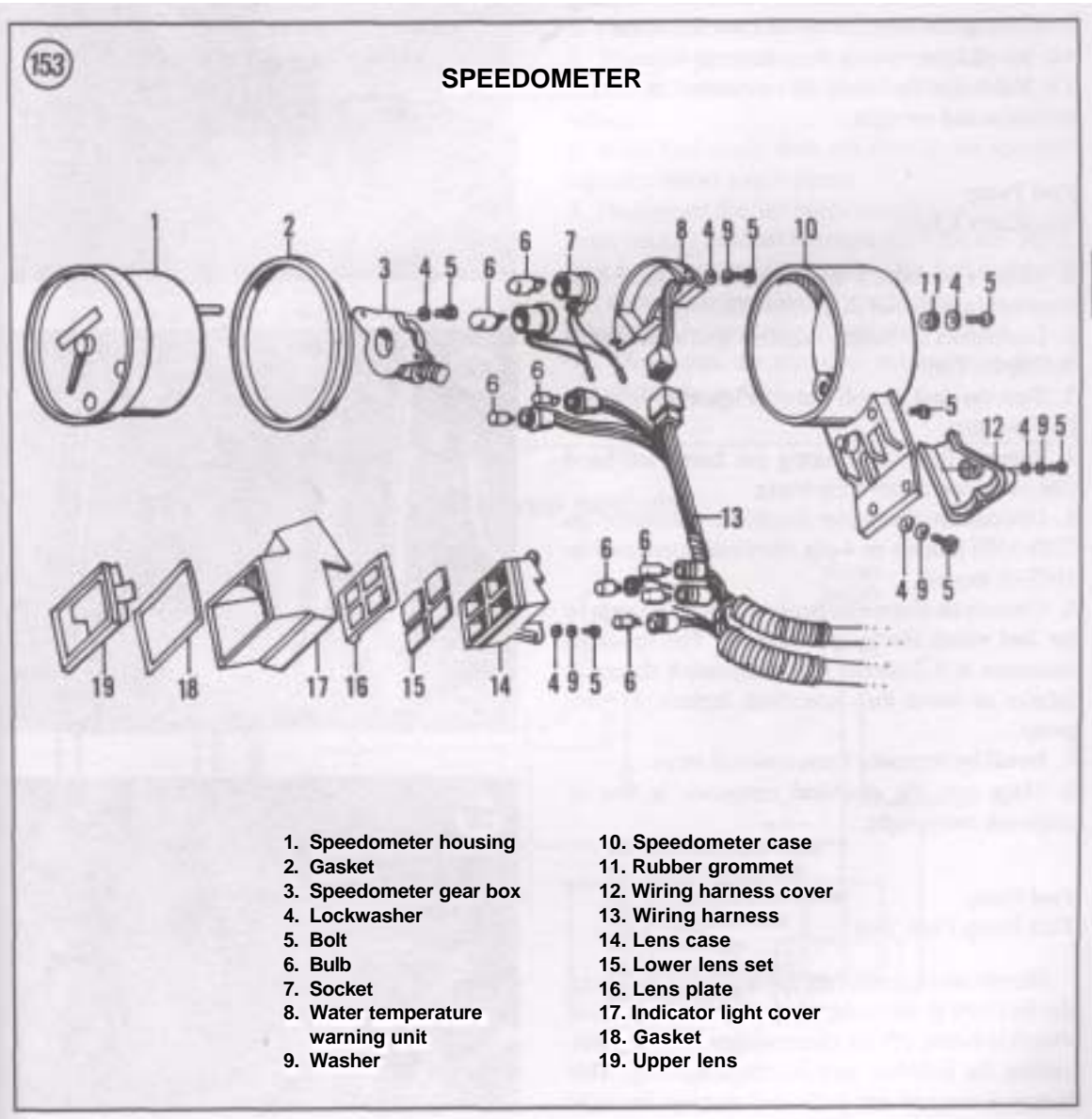
1. Remove the fuel tank as described under *Fuel Tank Removal/Installation* in Chapter Seven.
2. Disconnect the battery negative lead as described in Chapter Three.
3. Remove the screws securing both the right- and left-hand frame head side covers (**Figure 154**). Remove both side covers.
4. Remove the bolts securing the fuel tank mounting bracket (**Figure 155**) and remove the bracket.
5. Remove the headlight case (A, **Figure 156**) as described in this chapter. Move it out of the way.

## BATTERY CASE



- |                            |                    |
|----------------------------|--------------------|
| 1. Screw                   | 8. Cushion         |
| 2. Positive terminal cover | 9. Cushion         |
| 3. Vent tube               | 10. Case           |
| 4. Negative (-) cable      | 11. Rubber grommet |
| 5. Positive (+) cable      | 12. Collar         |
| 6. Cover                   | 13. Bolt           |
| 7. Cable connector         | 14. Bolt           |





6. Unscrew the speedometer drive cable (B, **Figure 156**) from the left-hand side of the speedometer case.
7. Remove the screws and washers securing the wiring harness cover (C, **Figure 156**) from the base of the case.
8. Follow both electrical wiring harnesses back through the top of the frame and disconnect the multi-pin and individual electrical connectors.
9. Carefully pull the wiring harnesses out through the steering head area.
10. Remove the screws and washers securing the headlight and indicator lamp assembly to the base of the upper fork bridge.
11. Remove the speedometer and indicator lamp assembly and wiring harnesses from the frame.
12. Install by reversing these removal steps.
13. Make sure the electrical connectors are free of corrosion and are tight.

### **Fuel Pump Resistance Check**

1. Remove the rider's seat as described under *Seat Removal/Installation* in Chapter Thirteen.
2. Disconnect the battery negative lead as described in Chapter Three.
3. Turn the fuel shutoff valve (**Figure 157**) to the OFF position.
4. Remove the bolt securing the frame left-hand side cover and remove the cover.
5. Disconnect the 2-pin electrical connector on 1985-1986 models or 4-pin electrical connector on 1987-on models.
6. Connect an ohmmeter between both terminals of the fuel pump electrical connector. The specified resistance is 1-2 ohms. If the resistance shown is infinity or lower than specified; replace the fuel pump.
7. Install by reversing these removal steps.
8. Make sure the electrical connector is free of corrosion and is tight.

### **Fuel Pump Fuel Pump Flow Test**

The electromagnetic fuel pump pumps fuel from the fuel tank to the carburetors. When the ignition switch is turned ON the electromagnet is energized, pulling the armature and the diaphragm up. This causes a vacuum and pulls fuel through the inlet



**Figure 158** is a schematic of the fuel pump circuit.

1. Remove the fuel pump as described under *Fuel Pump Removal/Installation* in Chapter Seven.

*Perform this test with **kerosene**. Do not use gasoline due to the extreme fire hazard.*

*The fuel pump should pump over 600 ml (1.27 US. pints) of fuel in 1 minute. Have sufficient kerosene in the container and use a graduated beaker large enough to contain this amount of fuel. If you have a smaller graduated beaker, run the test for only 30 seconds and multiply the amount of fuel delivered by 2 to achieve the same results.*

- # FUEL PUMP CIRCUIT
- 
- 158
- FUEL PUMP CIRCUIT
- Ignition switch
- No.1 ignition coil
- Fuel pump relay
- Fuel pump
- Starter switch
- To battery
- Ignitor
- Battery
- Starter motor
- Control circuit
- Color Code
- B/Y Black/Yellow  
O/W Orange/White  
Y/G Yellow/Green  
Br/B Brown/Black

### Fan Motor Thermo Switch Removal/Testing/Installation

The fan motor thermo switch controls the radiator fan according to engine coolant temperature. This switch is attached to the upper rear side of the radiator next to the inlet hose.

**Figure 159** is a schematic of the fan motor thermo switch circuit.

#### NOTE

*If the cooling fan is not operating correctly, make sure that the cooling fan fuse has not blown prior to starting this test. Also clean off any rust or corrosion from the electrical terminals on the thermostatic switch.*

1. Remove the screws securing the radiator cover (**Figure 160**) and remove the cover.

2. Disconnect the fan motor thermo switch black electrical connector (**Figure 161**).

3. Place a jumper wire between the fan motor thermo switch black electrical connector and a good ground.

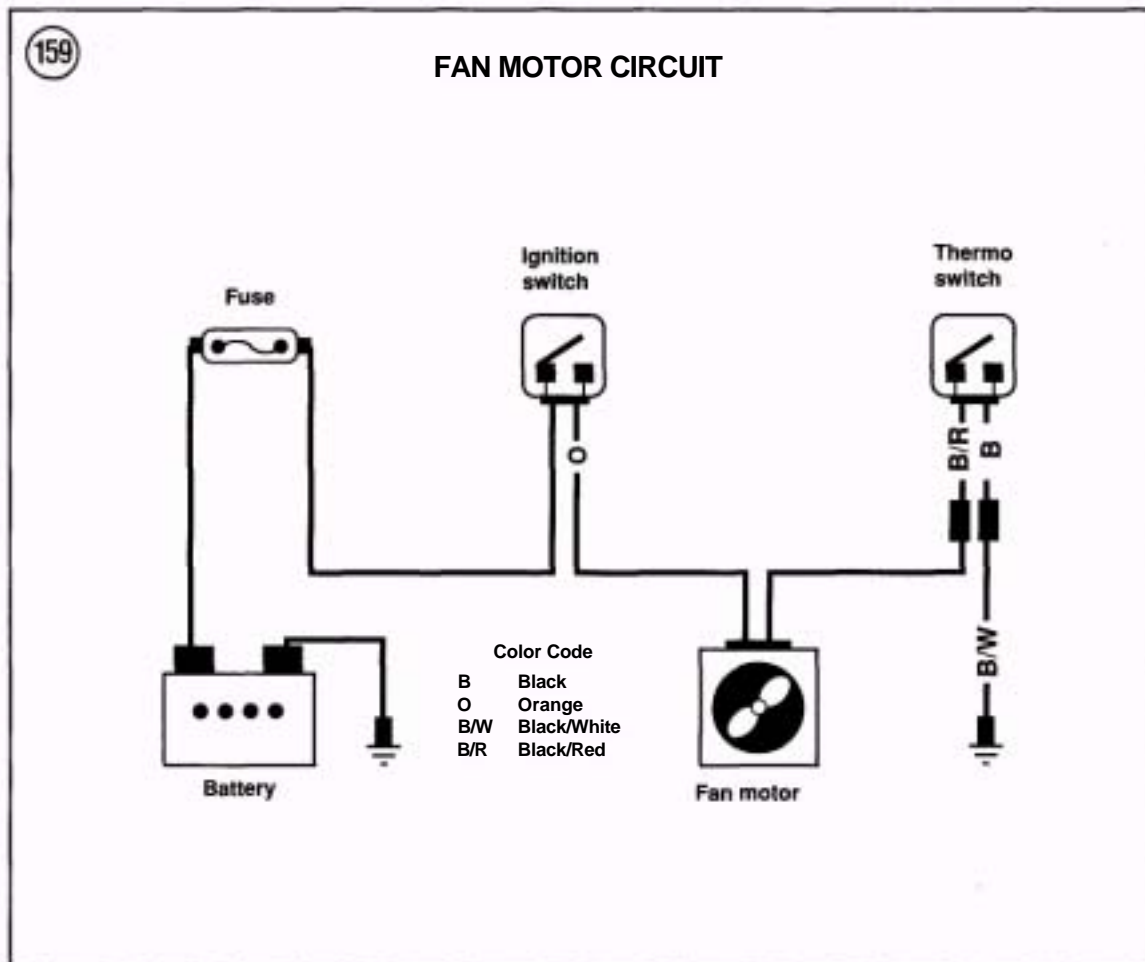
4. Turn the ignition switch ON, the cooling fan should start running.

5. If the fan does not run, either the fan or the wiring to the fan is faulty.

6. If the fan now runs, the fan motor thermo switch may be defective; test the fan motor thermo switch as follows.

#### NOTE

*The fan motor thermo switch is located in such a cramped work area that it is easier to first remove the radiator, then remove the switch from the radiator.*



7. Remove the radiator as described under *Radiator Removal/Installation* in Chapter Nine.

8. Pull back the rubber boot (A, **Figure 162**) and disconnect the electrical connector from the fan motor thermo switch.

9. Unscrew the fan motor thermo switch (B, **Figure 162**) and O-ring from the radiator.

10. Attach ohmmeter leads to the electrical connectors of the fan motor thermo switch. At room tem-

perature there should be no continuity (infinite resistance).

11. Suspend the fan motor thermo switch in a small pan of 50:50 mixture of distilled water and anti freeze. The fan motor thermo switch must be positioned so that all of its threads are submerged in the coolant.

12. Place a thermometer in the pan of coolant (use a cooking or candy thermometer that is rated for temperatures higher than the test temperature). Do not let the switch or the thermometer touch the pan as it will give a false readings.

#### WARNING

*Wear safety glasses or goggles and gloves during this test. Protect yourself accordingly as the coolant is heated to a high temperature.*

13. Heat the coolant slowly until the temperature reaches 110° C (230° F).

14. Maintain this temperature for at least 3 minutes before taking a reading. A sudden change in temperature will cause a different ohmmeter reading. After this 3 minute interval is completed, check the ohmmeter; there should be continuity (low resistance).

15. Turn the heat off and keep the ohmmeter test leads attached. When the coolant reaches 104° C (219° F), check the ohmmeter; there should be no continuity (infinite resistance).

16. If the switch fails either of these tests the switch must be replaced. If the fan motor thermo switch tests okay, it can be reinstalled.

17. Allow switch to cool and remove it from the small pan.

18. Make sure the O-ring seal is in place on the fan motor thermo switch.

19. Apply a light coat of silicone based sealant to the threads of the fan motor thermo switch and install the switch in the radiator.

20. Tighten the fan motor thermo switch to the torque specification listed in **Table 1**.

21. Install the radiator as described in Chapter Seven.

22. Refill the cooling system with the recommended type and quantity of coolant. Refer to Chapter Three.

23. Attach the electrical wires to the fan motor thermo switch. Make sure the connections are tight and free from oil and corrosion.

24. Install the radiator cover.





## Thermo Sensor Removal/Testing/Installation

The coolant thermo sensor is attached to the thermostat housing and controls the temperature gauge on the instrument cluster.

1. Remove the fuel tank as described under *Fuel Tank Removal/Installation* in Chapter Seven.
2. Partially drain the cooling system as described under *Coolant Change* in Chapter Three. Drain just enough coolant to lower the coolant level in the radiator to below the radiator upper hose. This will reduce the amount of coolant lost while removing the sensor.
3. Remove the bolts securing the cylinder head trim cover (A, **Figure 163**) on the left-hand side.
4. Pull the rubber boot and the electrical connector (B, **Figure 163**) from the end of the thermo sensor.

### NOTE

*Figure 164 is shown with the engine removed from the frame for clarity.*

5. Unscrew the thermo sensor from the coolant inlet fitting (**Figure 164**) of the front cylinder head.

### WARNING

*Wear safety glasses or goggles and gloves during this test. Protect yourself accordingly as the coolant is heated to a very high temperature and can result in severe burns if not handled properly.*

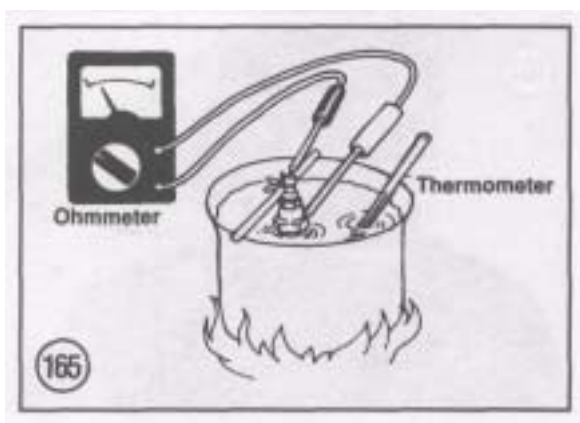
6. Suspend the thermo sensor in a small pan of 50:50 mixture of distilled water and coolant. The sensor must be positioned so that all of its threads are submerged in the coolant.
7. Place a thermometer in the pan of coolant (use a cooking or candy thermometer that is rated for temperatures higher than the test temperature). Do not let the thermo sensor or the thermometer touch the pan as it will give a false readings.
8. Heat the coolant slowly and check the resistance readings as shown in **Figure 165**.
9. If the sensor readings do not correspond to those listed in **Table 5** during any of the temperature ranges the sensor must be replaced.
10. Apply a light coat of a silicone based sealant to the threads of the thermo sensor and install the sensor in the thermostat housing. Tighten the thermo sensor to the torque specification listed in **Table 1**.

11. Connect the electrical connector and rubber boot onto the thermo sensor. Make sure the connection is tight and free from corrosion.

12. Refill the cooling system as described under *Coolant Change* in Chapter Three.

13. Install the cylinder head trim cover (A, **Figure 163**) on the left-hand side and tighten the bolts securely.

14. Install the fuel tank as described in Chapter Seven.



## Sidestand Check Switch (1987-on Models)

The sidestand check switch system is provided on 1987 and later models. This system prevents the engine from being started with the sidestand down and the transmission in gear. A special circuit between the battery and ignition coil consists of a relay, neutral indicator lamp, diode and switches decides whether the ignition circuit can be completed to allow starting of the engine.

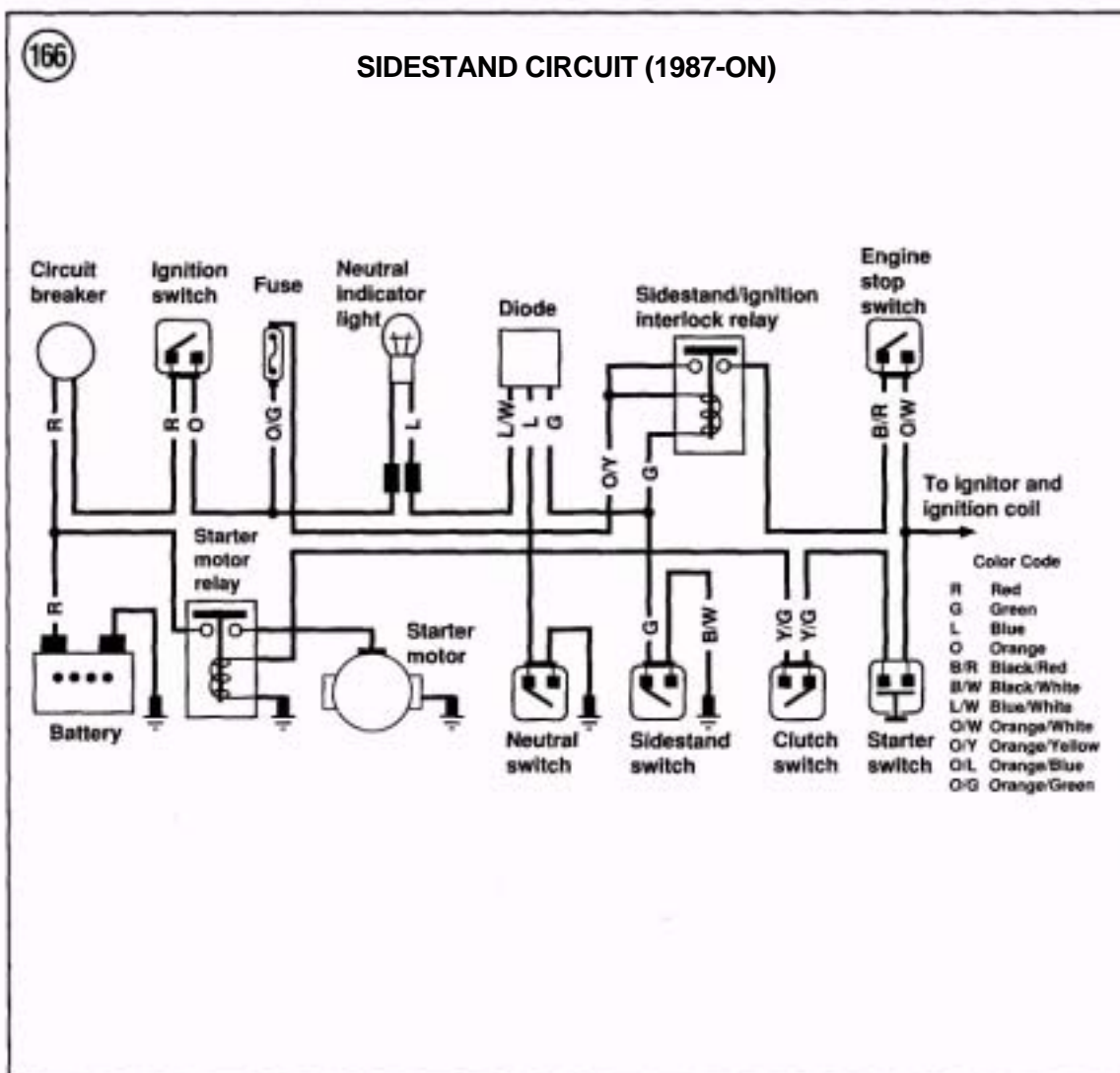
**Figure 166** is a schematic of the sidestand check switch circuit.

The ignition circuit is completed under the 2 following different situations:

- The transmission in NEUTRAL and the sidestand DOWN.
- The transmission in GEAR and the sidestand UP.

### Diode testing

- Remove the seat as described under *Seat Removal/Installation* in Chapter Thirteen.
- Locate the diode on top of the frame rail adjacent to the rear air filter case.
- Disconnect the 3-pin electrical connector containing 3 wires (1 blue/white, 1 blue, 1 green) from the diode.



4. Use an ohmmeter and check for continuity between one of the end terminals on the diode and the center terminal. There should be continuity (low resistance) in one direction and no continuity (infinite resistance) with the test leads reversed.
5. Repeat Step 4 with the other end terminal and the center terminal.
6. If the diode fails either of these tests, the diode is defective and must be replaced.
7. Attach the electrical connector to the diode and make sure the electrical connector is free of corrosion and is tight.

#### *Switch testing*

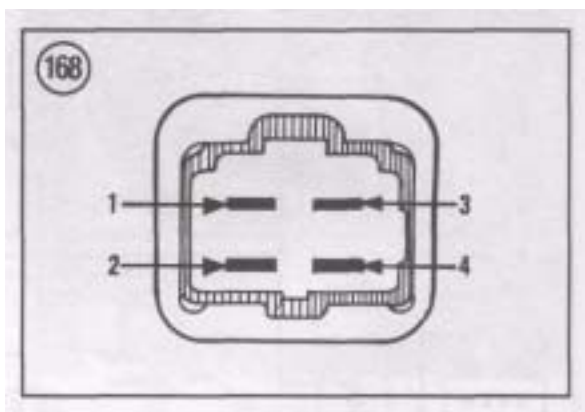
1. Remove the seat as described under *Seat Removal/Installation* in Chapter Thirteen.
2. Disconnect the sidestand check switch electrical connector.
3. Use an ohmmeter and check for continuity between the 2 terminals (1 green, 1 black/white) on the switch side of the connector as follows:
  - a. With the sidestand DOWN, there should be no continuity (infinite resistance).
  - b. With the sidestand UP, there should be continuity (low resistance).
4. Either replace the switch as described in this chapter or reconnect the electrical connector to the switch. Make sure the electrical connector is free of corrosion and is tight.
5. Install the seat as described in Chapter Thirteen.

#### *Relay testing*

1. Remove the seat as described under *Seat Removal/Installation* in Chapter Thirteen.
2. Disconnect the electrical connector and remove the relay from the mounting bracket under the seat (Figure 167).
3. Refer to Figure 168 and perform the following:
  - a. Connect an ohmmeter between terminals No. 1 and No. 2. There should be no continuity (infinite resistance).
  - b. Connect a 12 volt battery positive (+) cable to the No. 3 terminal and the battery negative (-) cable to the No. 4 terminal.
  - c. With battery voltage applied to the No. 3 and No. 4 terminals; reconnect an ohmmeter between terminals No. 1 and No. 2. This time

there should be continuity (indicated resistance).

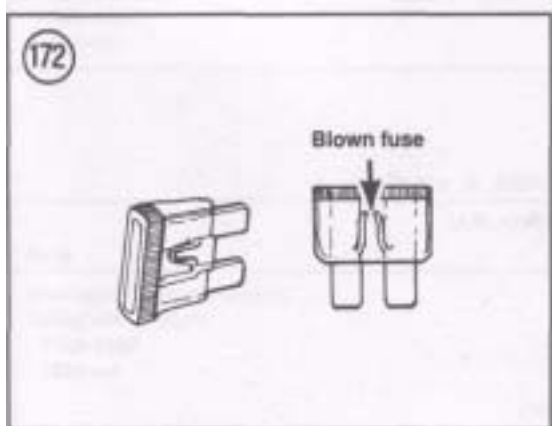
4. If the relay fails either one of these tests it is defective and must be replaced.
5. Reinstall the relay into the mounting bracket under the seat.
6. Reconnect the electrical connector to the relay. Make sure the electrical connector is free of corrosion and is tight.
7. Install the fuel tank as described in Chapter Seven.



8. Install the seat as described in Chapter Thirteen.

### Horn Testing

1. Disconnect horn wires from harness.
2. Connect a 12 volt battery to the horn.
3. If the horn is good it will sound. If not, replace it.



### Horn Removal/Installation

1. Disconnect the electrical connectors from the horn.
2. Remove the bolts, washers and nuts securing the horn (**Figure 169**) to the steering stem. Remove the horn.
3. Install by reversing these removal steps. Make sure the electrical connectors are free of corrosion and are tight.

### FUSES

The fuse panel is located under the frame left-hand side cover.

Whenever the fuse blows, find out the reason for the failure before replacing the fuse. Usually, the trouble is a short circuit in the wiring. This may be caused by worn-through insulation or a disconnected wire shorted to ground.

#### CAUTION

*Never substitute metal foil or wire for a fuse. Never use a higher amperage fuse than specified. An overload could result in a fire and complete loss of the bike.*

#### CAUTION

*When replacing a fuse, make sure the ignition switch is in the OFF position. This will lessen the chance of a short circuit.*

### Fuse Replacement

1. Remove the rider's seat as described under *Seat Removal/Installation* in Chapter Thirteen.
2. Remove the frame left-hand side cover.
3. Remove the screw (A, **Figure 170**) attaching the fuse panel cover and remove the cover (B, **Figure 170**).
4. Remove the fuse (**Figure 171**) with your fingers and inspect it. If the fuse is blown there will be a break in the element (**Figure 172**). Inside the cover is a spare fuse (**Figure 173**).
5. Install the new fuse and push it all the way down until it seats completely, then install the cover and screw. Tighten the screw securely but don't over-tighten it as the cover may fracture.
6. Install the seat.

### Fuse Panel Removal/Installation

1. Remove the rider's seat as described under *Seat Removal/Installation* in Chapter Thirteen.
2. Remove the frame left-hand side cover.
3. Remove the directional signal relay (A, **Figure 174**) from the mounting bracket on the frame.
4. Disconnect the electrical connector (B, **Figure 174**) from the base of the fuse panel.
5. Remove the screw securing the fuse panel (C, **Figure 174**) to the frame and remove it.
6. Install by reversing these removal steps.
7. Make sure the electrical connector is free of corrosion and is tight.

### CIRCUIT BREAKER

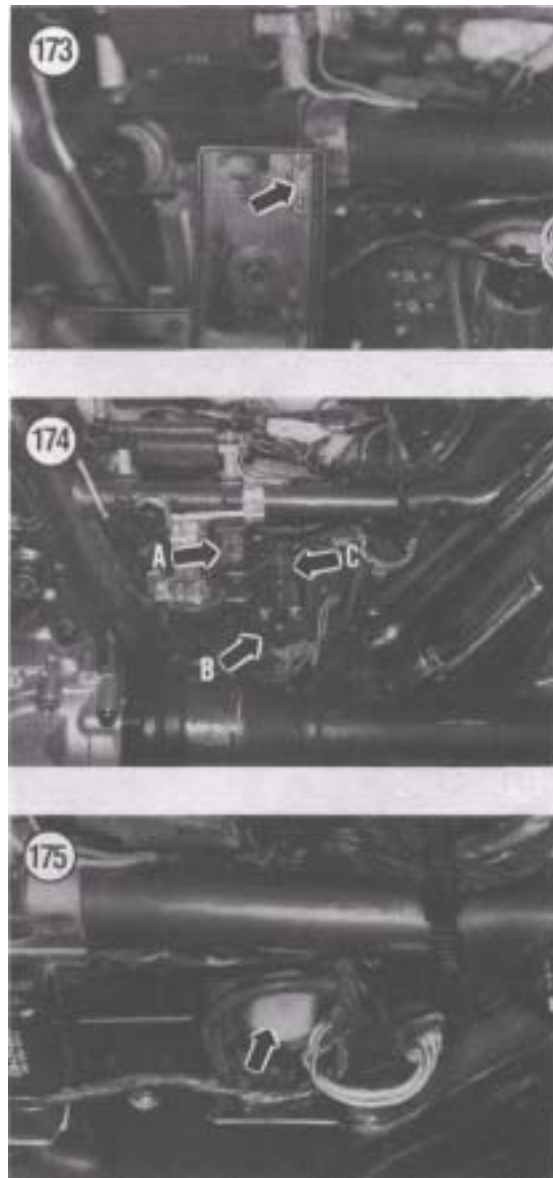
The wiring harness is protected by a circuit breaker. The circuit breaker protects the electrical system when the main circuit load exceeds the rated amperage. When an overload occurs, the red button pops out on the breaker face panel and the circuit is open. The circuit will remain open until the problem is solved and the breaker is re-set.

The circuit breaker is located just behind the fuse panel (**Figure 175**).

To reset, wait approximately 10 minutes for the circuit breaker to cool down, then push the red button in. If the red button pops out again—the problem still exists in the electrical system and must be corrected.

### WIRING DIAGRAMS

Wiring diagrams for all models are located at the end of this book.





**Table 1 ELECTRICAL SYSTEM TIGHTENING TORQUES**

| Item  | N.m     | n.-ib.      |
|---|---------|-------------|
| Alternator rotor bolt                       | 140-160 | 101.5-115.5 |
| Starter clutch retainer<br>6 mm Allen bolts | 23-28   | 16.5-20.0   |
| Front footpeg assembly bolts                | 15-25   | 11-18       |
| Fan motor thermo switch                     | 10-15   | 7-11.0      |
| Thermo sensor                               | 12-15   | 8.5-11.0    |

**Table 2 IGNITION TROUBLESHOOTING**

|  |  |
|--|--|
| Symptoms                                   | Probable cause   |
| Weak spark                                 | Poor connections in circuit (clean and retighten all connections)  |
| High voltage leak (replace defective wire) | Defective ignition coil (replace coil) No spark  |
| Broken wire (replace wire)                 | Defective ignition coil (replace coil) Defective signal generator (replace signal generator assembly) Defective ignitor unit (replace ignitor unit) Faulty engine stop switch (replace switch) |

**Table 3 ELECTRICAL SYSTEM SPECIFICATIONS**

|  |  |
|--|--|
| Regulator/rectifier                      | Transistorized, non-adjustable           |
| Regulated voltage                        | 1 4-1 5 V at 5,000 rpm Alternator        |
| no-load voltage                          | More than 65 V at 5,000 rpm Battery Type |
| designation                              | YB16B-A Capacity                         |
| 12V/16amphour Starter motor              | Brush length limit 9                     |
| mm (0.35 in.) Commutator under cut limit | 0.2 mm (0.008 in.)                       |
| Starter relay resistance                 | 2-6 ohms Ignition signal                 |
| generator resistance                     | 50-200 ohms Ignition                     |
| coil resistance Primary resistance       | 2-6 ohms                                 |
| Secondary resistance                     | 10,000-25,000 ohms Stator coil           |
| resistance 1985-1989                     | 0.2-0.5 ohms 1 990-on                    |
| 0.1-1 .0 ohms                            |  |

**Table 4 REPLACEMENT BULBS**

|                                |            |
|--------------------------------|------------|
| U.S. and Canadian Models Item  |            |
| Voltage/wattage                |            |
| Headlight (high/low beam)      | 12V 60/55W |
| Taillight/brakelight 1986-1987 |            |
| 12V8/23W 1988-on               | 12V 5/21 W |
| (continued)                    |            |

**Table 4 REPLACEMENT BULBS (continued)**

| U.S. and Canadian Models (continued)  |                 |
|---|-----------------|
| Item  | Voltage/wattage |
| Directional signal  |                 |
| 1986-1987   |                 |
| Front   | 12V8/23W        |
| Rear  | 12V23W          |
| 1988-on   |                 |
| Front   | 12V 5/21 W      |
| Rear  | 12V 21W         |
| License plate light   | 12V8W           |
| High beam indicator light   | 12V 1.7 W       |
| Instrument and all other indicator lights   | 12V3W           |
| Other than U.S. and Canadian Models   |                 |
| Item*   | Voltage/wattage |
| Headlight (high/low beam)   | 12V60/55W       |
| Parking light   |                 |
| E-02, E-24  | 12V3.4W         |
| E-15, E-16, E-18, E-22  | 12V4W           |
| Taillight/brakelight  |                 |
| E-02, E-15, E-16, E-18, E-22  | 12V 5/21 W      |
| E-24  | 12V8/23W        |
| License plate light   |                 |
| E-02, E-15, E-16, E-18, E-22  | 12V5W           |
| E-24  | 12V8W           |
| Directional signal  |                 |
| E-02, E-15, E-16, E-18, E-22  | 12V 21W         |
| E-24  | 12V23W          |
| Speedometer light   | 12V 21W         |
| High beam indicator light   | 12V1.7W         |
| All other indicator lights  | 12V3W           |
| * E-02= England, E-15= Finland, E-16 Norway, E-18= Switzerland, E-22= West Germany, E-24= Austria |                 |

**Table 5 TEMPERATURE GAUGE THERMO SENSOR READINGS**

| Temperature  | Resistance (ohms) |
|--------------|-------------------|
| 50°C(122°F)  | 156               |
| 80°C(176°F)  | 53 28             |
| 100°C(212°F) |                   |