Chapter 9
Electrical system

Contents

Specifications

Battery type

VT600	12 V, 8 Ah
VT750C/CD	12 V, 14 Ah
VT750DC	12 V, 12 Ah

Fuse specifications

Main fuse	30 amps
All others	
1988 and 1989 VT600 models	Six 10-amp and one 15-amp
1990-on VT600 models	Three 10-amp and one 15-amp
VT750 models	Four 10-amp and one 15-amp

Bulb specifications

Headlight bulb	60/55W
Brake light/taillight bulbs	
1988, 1989, 1991 through 1996 VT600	32/3 cp or 27/8W
1997 on VT600	32/3 cp
VT750C/CD	32/3 cp
VT750DC	21/5W
Front turn signal bulbs	
1988, 1989, 1991 through 1996 VT600	32/3 cp or 23/8W
1997 and 1998 VT600	32/3 cp
1999-on VT600, VT750	21/5W
Rear turn signal bulbs	
1988, 1989, 1991 through 1996 VT600	32 cp or 23W
1997 and 1998 VT600	32 cp
1999-on VT600, VT750	21W
License plate bulb	
VT600	4cp
VT750	5W
Speedometer light bulb	3.4W
Indicator bulbs (turn signal, high beam, neutral)	
VT600	1.7W
VT750C/CD	3.4W
VT750D	LED

Charging system

Stator coil resistance	
VT600, VT750DC	0.1 to 1.0 ohms
VT750C/CD	0.1 to 0.3 ohms
Charging system output	
VT600, VT750C/CD	345 watts at 5,000 rpm
VT750DC	333 watts at 5,000 rpm
Regulated voltage output	
1988, 1989, 1991 through 1996 VT600	14.3 to 15.1 volts at 5,000 rpm
1997 on VT600	13.5 to 14 volts at 5,000 rpm
VT750C/CD	14 to 15 volts at 4,000 rpm
VT750DC	Less than 15.5 volts
Maximum current leakage	
VT600	1.3 mA
VT750	1.0 mA

Starter

Starter brush length	
Standard	12.5 mm (0.49 inch)
Minimum	6.5 mm (0.26 inch)
Starter driven gear hub	
VT600	
Inside diameter	37.10 mm (1.461 inches)
Outside diameter	57.60 mm (2.268 inches)
VT750	
Inside diameter	40.10 mm (1.579 inches)
Outside diameter	57.73 mm (2.273 inches)

Torque specifications

Neutral switch	12 Nm (108 in-lbs)
Oil pressure switch	10 Nm (84 in-lbs)
Sidestand switch retaining bolt	
VT600	9 Nm (78 in-lbs)
VT750	10 Nm (84 in-lbs)
Rotor (rotor) bolt	128 Nm (94 ft-lbs)
Stator assembly retaining bolts	12 Nm (108 in-lbs)
Left crankcase cover bolts	12 Nm (108 in-lbs)
Rotor-to-clutch housing bolts	29 Nm (22 ft-lbs)

1 General information

The machines covered by this manual are equipped with a 12-volt electrical system.

The charging system uses an alternator consisting of a rotor (rotor) with permanent magnets that rotates around a stator coil of copper wire. The alternator produces alternating current, which is converted to direct current by the regulator/rectifier. The regulator/rectifier also controls the charging system output.

An electric starter mounted behind the rear cylinder is standard equipment. The starter has four brushes. The starting system includes the motor, the battery, the starter relay switch and the wiring harnesses and switches. When the engine kill switch and the ignition switch are both in the On position, the starter relay switch allows the starter motor to operate only if the transmission is in Neutral (Neutral switch on) or the clutch lever is pulled in (clutch switch on) and the sidestand is up (sidestand switch on). **Note:** *Keep in mind that electrical parts, once purchased, can't be returned. To avoid unnecessary expense, make very sure the faulty component has been positively identified before buying a replacement part.*

2 Electrical troubleshooting

A typical electrical circuit consists of an electrical component, the switches, relays, etc. related to that component and the wiring and connectors that hook the component to both the battery and the frame. To aid in locating a problem in any electrical circuit, complete wiring diagrams of each model are included at the end of this Chapter.

Before tackling any troublesome electrical circuit, first study the appropriate diagrams thoroughly to get a complete picture of what makes up that individual circuit. Trouble spots, for instance, can often be narrowed down by noting if other components related to that circuit are operating properly or not. If several components or circuits fail at one time, chances are the fault lies in the fuse or ground connection, as several circuits often are routed through the same fuse and ground connections.

Electrical problems often stem from simple causes, such as loose or corroded connections or a blown fuse. Prior to any electrical troubleshooting, always visually check the condition of the fuse, wires and connections in the problem circuit. Intermittent failures can be especially frustrating, since you can't always duplicate the failure when it's convenient to test. In such situations, a good practice is to clean all connections in the affected circuit, whether or not they appear to be good. All of the connections and wires should also be wiggled to check for looseness which can cause intermittent failure.

If testing instruments are going to be utilized, use the diagrams to plan where you will make the necessary connections in order to accurately pinpoint the trouble spot.

The basic tools needed for electrical troubleshooting include a test light or voltmeter, a continuity tester (which includes a bulb, battery and set of test leads) and a jumper wire, preferably with a circuit breaker incorporated, which can be used to bypass electrical components. Specific checks described later in this Chapter may also require an ohmmeter.

Voltage checks should be performed if a circuit is not functioning properly. Connect one lead of a test light or voltmeter to either the negative battery terminal or a known good ground. Connect the other lead to a connector in the circuit being tested, preferably nearest to the bat-

tery or fuse. If the bulb lights, voltage is reaching that point, which means the part of the circuit between that connector and the battery is problem-free. Continue checking the remainder of the circuit in the same manner. When you reach a point where no voltage is present, the problem lies between there and the last good test point. Most of the time the problem is due to a loose connection. Keep in mind that some circuits only receive voltage when the ignition key is in the On position.

One method of finding short circuits is to remove the fuse and connect a test light or voltmeter in its place to the fuse terminals. There should be no load in the circuit (it should be switched off). Move the wiring harness from side-to-side while watching the test light. If the bulb lights, there is a short to ground somewhere in that area, probably where insulation has rubbed off a wire. The same test can be performed on other components in the circuit, including the switch.

A ground check should be done to see if a component is grounded properly. Disconnect the battery and connect one lead of a self-powered test light (continuity tester) to a known good ground. Connect the other lead to the wire or ground connection being tested. If the bulb lights, the ground is good. If the bulb does not light, the ground is not good.

A continuity check is performed to see if a circuit, section of circuit or individual component is capable of passing electricity through it. Disconnect the battery and connect one lead of a self-powered test light (continuity tester) to one end of the circuit being tested and the other lead to the other end of the circuit. If the bulb lights, there is continuity, which means the circuit is passing electricity through it properly. Switches can be checked in the same way.

Remember that all electrical circuits are designed to conduct electricity from the battery, through the wires, switches, relays, etc. to the electrical component (light bulb, motor, etc.). From there it is directed to the frame (ground) where it is passed back to the battery. Electrical problems are basically an interruption in the flow of electricity from the battery or back to it.

3 Battery - removal, inspection, maintenance and installation

1 Most battery damage is caused by heat, vibration, and/or low electrolyte levels, so make sure the battery is securely mounted, check the electrolyte level frequently (if the battery is a conventional unit) and make sure the charging system is functioning properly.

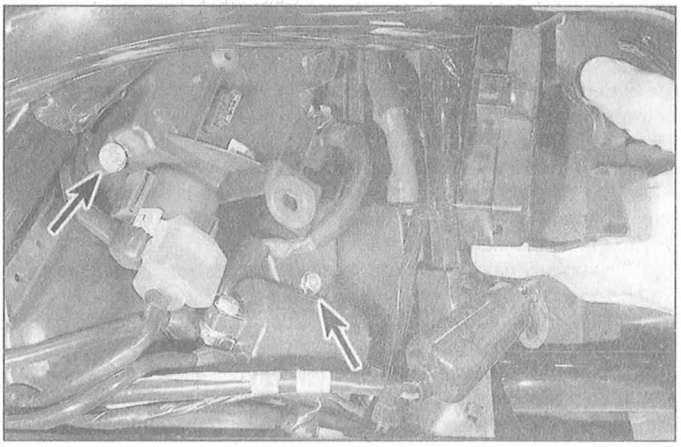
Removal and installation

VT600 models

Refer to illustrations 3.3, 3.4a and 3.4b

2 Remove the left and right side covers (see Chapter 8).

3 On the right side, peel back the protective rubber cover from the fuse box (see Section 5), pull off the fuse box and remove the battery case cover screws (see illustration).



3.3 To remove the battery case cover on VT600 models, remove these two screws (arrows)

4 Lift up the cover and disconnect the battery cables from the battery terminals, negative cable (left terminal) first, then positive **(see illustrations).**

5 Remove the battery from the battery case and inspect it (see below).

6 Installation is the reverse of removal. Be sure to attach the positive cable (right terminal) first, then negative. Tighten the cables securely. Don't forget to put the protective cap back on the positive terminal.

VT750 models

7 Remove the seat (see Chapter 8).

8 Remove the ignition control module from the battery case cover (see Chapter 5).

9 Remove the three battery case cover screws.

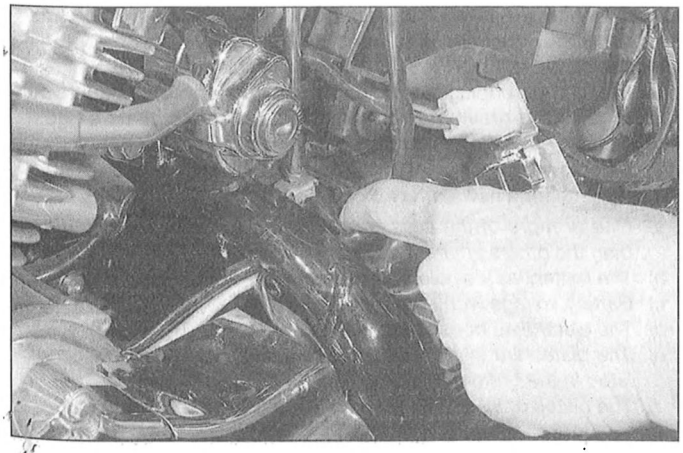
10 Disconnect the battery cables from the battery terminals, negative cable (right terminal) first, then positive.

11 Lift the battery out of the battery case and inspect it (see below).

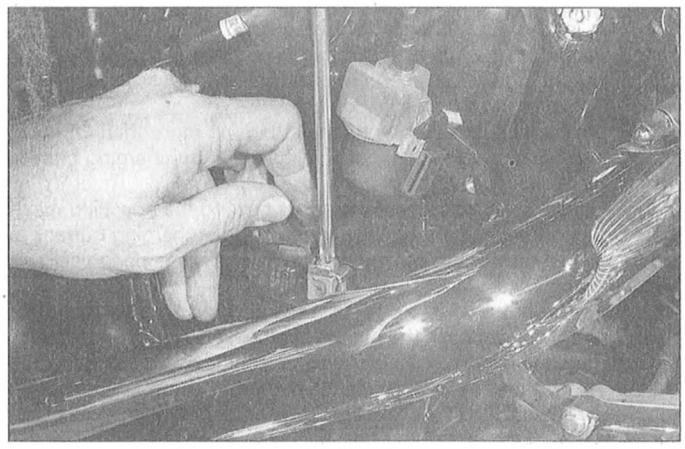
12 Installation is the reverse of removal. Be sure to attach the positive cable (left terminal) first, then negative. Tighten the cables securely. Don't forget to put the protective cap back on the positive terminal.

Inspection and maintenance

13 All machines covered in this manual are originally equipped with maintenance-free batteries. However, if you or a previous owner have installed a conventional battery, check the electrolyte level and specific gravity (see Chapter 1).



3.4a On VT600 models, disconnect the negative cable (left terminal) first . . .



3.4b . . . then disconnect the positive cable (right terminal)

14 Check around the base inside of the battery for sediment, which is the result of sulfation caused by low electrolyte levels. These deposits will cause internal short circuits, which can quickly discharge the battery. Look for cracks in the case and replace the battery if either of these conditions is found.
15 Check the battery terminals and cable ends for tightness and corrosion. If corrosion is evident, remove the cables from the battery and clean the terminals and cable ends with a wire brush or knife and emery paper. Reconnect the cables and apply a thin coat of petroleum jelly to the connections to slow further corrosion.
16 The battery case should be kept clean to prevent current leakage, which can discharge the battery over a period of time (especially when it sits unused). Wash the outside of the case with a solution of baking soda and water. Do not get any baking soda solution in the battery cells. Rinse the battery thoroughly, then dry it.
17 If acid has been spilled on the frame or battery box, neutralize it with the baking soda and water solution, dry it thoroughly, then touch up any damaged paint. If the battery is equipped with a vent tube, make sure it's correctly routed and is not kinked or pinched.
18 If the motorcycle sits unused for long periods of time, disconnect the cables from the battery terminals. Charge the battery about once a month (see Section 4).

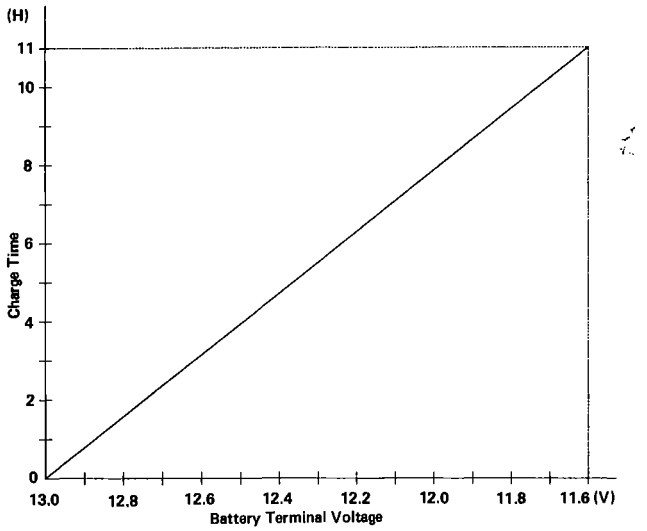
4 Battery - charging

1 If the machine sits idle for extended periods or if the charging system malfunctions, the battery can be charged from an external source.

Maintenance-free batteries

Refer to illustration 4.5

2 Charging the maintenance-free battery used on these models requires a digital voltmeter and a variable-voltage charger with a built-in ammeter.
3 When charging the battery, always remove it from the machine and be sure to check the electrolyte level by looking through the translucent battery case before hooking up the charger. If the electrolyte level is low, the battery must be discarded; never remove the sealing plug to add water.
4 Disconnect the battery cables (negative cable first), then connect a digital voltmeter between the battery terminals and measure the voltage.
5 If terminal voltage is 12.6 volts or higher, the battery is fully charged. If it's lower, recharge the battery. Refer to the accompanying illustration for charging rate and time **(see illustration)**.
6 A quick charge can be used in an emergency, provided the maximum charge rates and times are not exceeded (exceeding the maximum rate or time may ruin the battery). A quick charge should always be followed as soon as possible by a charge at the standard rate and time.
7 Hook up the battery charger leads (positive lead to battery positive terminal, negative lead to battery negative terminal), then, and only then, plug in the battery charger. **Warning:** *The hydrogen gas escaping from a charging battery is explosive, so keep open flames and sparks well away from the area. Also, the electrolyte is extremely corrosive and will damage anything it comes in contact with.*
8 Start charging at a high voltage setting (no more than 25 volts) and watch the ammeter for about 5 minutes. If the charging current doesn't increase, replace the battery.
9 When the charging current increases beyond the specified maximum, reduce the charging voltage to reduce the charging current to the rate listed in this Chapter's Specifications. Do this periodically as the battery charges.
10 Allow the battery to charge for the specified time listed in this Chapter's Specifications. If the battery overheats or gases excessively, the charging rate is too high. Either disconnect the charger or lower the charging rate to prevent damage to the battery.
11 After the specified time, unplug the charger first, then disconnect the leads from the battery.
12 Wait 30 minutes, then measure voltage between the battery terminals. If it's 12.6 volts or higher, the battery is fully charged. If it's between 12.0 and 12.6 volts, charge the battery again (refer to this Chapter's Specifications and illustration 4.5 for charge rate and time). If it's less than 12.0 volts, it's time for a new battery.
13 When the battery is fully charged, unplug the charger first, then disconnect the leads from the battery. Wipe off the outside of the battery case and install the battery in the bike.



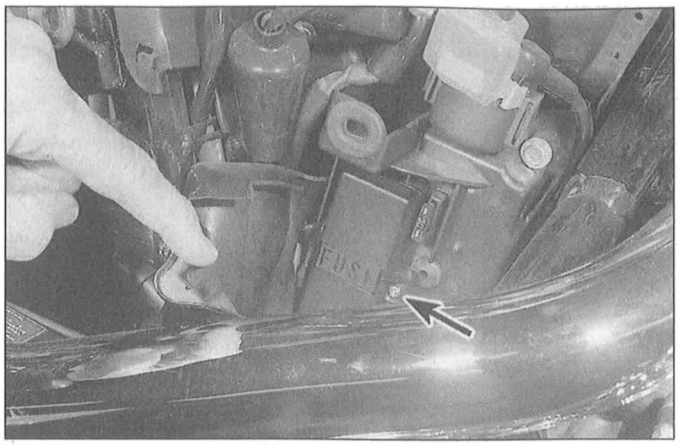
4.5 Battery charge-time table (maintenance-free batteries)

Conventional batteries

14 To properly charge the battery, you will need a charger of the correct rating, a hydrometer, a clean rag and a syringe for adding distilled water to the battery cells.
15 The maximum charging rate for any battery is 1/10 of the rated amp/hour capacity. As an example, the maximum charging rate for a 12 amp/hour battery would be 1.2 amps and the maximum charging rate for a 14 amp/hour battery would be 1.4 amps. If the battery is charged at a higher rate, it could be damaged.
16 Do not allow the battery to be subjected to a so-called quick charge (high rate of charge over a short period of time) unless you are prepared to buy a new battery.
17 When charging the battery, always remove it from the machine and be sure to check the electrolyte level before hooking up the charger. Add distilled water to any cells that are low.
18 Loosen the cell caps, hook up the battery charger leads (red to positive, black to negative), cover the top of the battery with a clean rag, then, and only then, plug in the battery charger. **Warning:** *Remember, the gas escaping from a charging battery is explosive, so keep open flames and sparks well away from the area. Also, the electrolyte is extremely corrosive and will damage anything it comes in contact with.*
19 Allow the battery to charge until the specific gravity is as specified (refer to Chapter 1 for specific gravity checking procedures). The charger must be unplugged and disconnected from the battery when making specific gravity checks. If the battery overheats or gases excessively, the charging rate is too high. Either disconnect the charger or lower the charging rate to prevent damage to the battery.
20 It's time for a new battery if:

a) One or more of the cells is significantly lower in specific gravity than the others after a long slow charge.
b) The battery as a whole doesn't seem to want to take a charge.
c) Battery voltage won't increase.
d) The electrolyte doesn't bubble.
e) The plates are white (indicating sulfation) or debris has accumulated in the bottom of a cell.
f) The plates or insulators are warped or buckled.

21 When the battery is fully charged, unplug the charger first, then disconnect the leads from the battery. Install the cell caps and wipe any electrolyte off the outside of the battery case.



5.2 The VT600 fuse box is located behind the right side cover; to open the fuse box, remove this screw (arrow); the main (30A) fuse is located right above the fuse box

5 Fuses - check and replacement

Refer to illustration 5.2

1 Some fuses are located in the fuse block, which is located on the right side of the bike, behind the right side cover. Remove the right side cover (see Chapter 8).

2 On VT600 models, peel back the protective rubber cover **(see illustration)** and remove the fuse cover screw. The fuse box houses six 10-amp fuses and one 15-amp fuse (1988 and 1989 models) or three 10-amp fuses and one 15-amp fuse (1990 and later VT600 models). The main (30-amp) fuse is located right above the fuse box.

3 On VT750 models, remove the cover from the fuse box. The fuse box houses four 10-amp fuses (headlight, ignition-starter and fan motor) and one 15-amp fuse (front turn signal lights, rear brake light, speedometer). The main (30-amp) fuse is on the left side. To check or replace it, remove the left side cover (see Chapter 8).

4 Other fuses (turn signal/dimmer/horn switch, fan motor switch, oil pressure switch, neutral switch, sidestand switch, brake light switches, fuel pump, etc.) are installed inline, often near the electrical connector for each circuit device. Most of these fuses are easy to find when troubleshooting a circuit. For further help in locating inline fuses, refer to the wiring diagrams at the end of this Chapter.

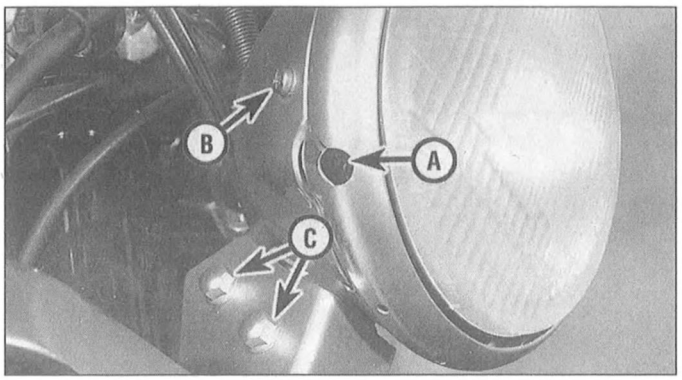
5 If you have a test light, all of the fuses can be checked without removing them. Turn the ignition key to the On position, connect one end of the test light to a good ground, then probe each terminal on top of the fuse. If the fuse is good, there will be voltage available at both terminals. If the fuse is blown, there will only be voltage present at one of the terminals.

6 The fuses can also be tested with an ohmmeter or self-powered test light. Remove the fuse and connect the tester to the ends of the fuse. If the ohmmeter shows continuity or the test lamp lights, the fuse is good. If the ohmmeter shows infinite resistance or the test lamp stays out, the fuse is blown.

7 The fuses can be removed and checked visually. If you can't pull the fuse out with your fingertips, use a pair of needle-nose pliers. A blown fuse is easily identified by a break in the element.

8 If a fuse blows, be sure to check the wiring harnesses very carefully for evidence of a short circuit. Look for bare wires and chafed, melted or burned insulation. If a fuse is replaced before the cause is located, the new fuse will blow immediately. Occasionally a fuse will blow or cause an open circuit for no obvious reason. Corrosion of the fuse ends and fuse block terminals may occur and cause poor fuse contact. If this happens, remove the corrosion with a wire brush or emery paper, then spray the fuse end and terminals with electrical contact cleaner.

9 Fuse ratings are listed in this Chapter's Specifications. Fuse ratings are also marked on the fuses themselves. Never, under any circumstances, use a higher rated fuse or bridge the fuse block terminals, as damage to the electrical system could result.



7.1 VT600 headlight assembly

A) Headlight adjusting screw (1 of 2)
B) Headlight retaining screw (1 of 2)
C) Headlight assembly nuts and bolts

6 Lighting system - check

1 The battery provides power for operation of the headlight, taillight, brake light, license plate light, instrument and warning lights. If none of the lights operate, always check battery voltage before proceeding. Low battery voltage indicates either a faulty battery, low battery electrolyte level or a defective charging system. If the bike has a conventional battery, check the battery electrolyte level and the specific gravity (see Chapter 1). Inspect the battery; make sure it's fully charged (see Sections 3 and 4). Check the condition of the fuses and replace any blown fuses (see Section 5). Check the charging system (see Sections 29 and 30).

Headlight

2 If the headlight is out when the engine is running, check the fuse first with the key or switch On (see Section 5), then unplug the electrical connector for the headlight and use jumper wires to connect the bulb directly to the battery terminals (see Section 7). If the light comes on, the problem lies in the wiring (see the wiring diagrams at the end of this Chapter).

Turn signal lights/brake light/taillight/license plate light

3 If a light fails to work, check the bulb and the bulb terminal first, then check for battery voltage at the electrical connector. If voltage is present, check the ground circuit for an open or poor connection.

4 If no voltage is indicated, check the wiring between the taillight and the ignition switch, then check the switch.

Brake light switches

5 See Section 12 for the brake light switch checking procedure.

Speedometer light and indicator lights

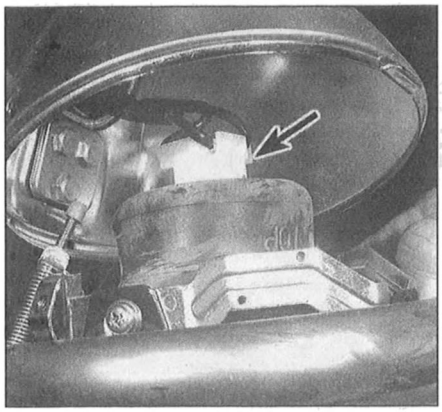
6 If the speedometer light fails to operate when the key switch is On, check the fuse (see Section 5) and the bulb (see Section 16). If the bulb and fuses are in good condition, check for battery voltage at the connector. If the turn signal indicator light fails to operate when the turn signal switch is in the LEFT or RIGHT position, or if the high-beam indicator light fails to operate when the dimmer switch is in the HI position, see Section 18. If the neutral indicator light fails to operate when the transmission in Neutral, see Section 20.

7 Headlight bulb - replacement

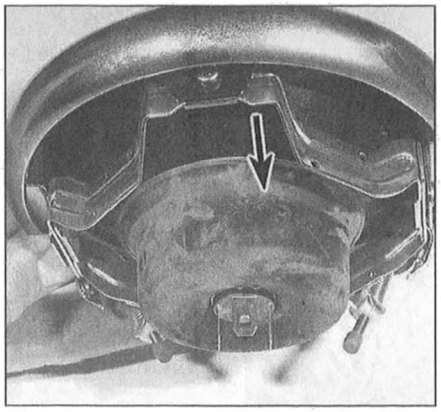
Refer to illustrations 7.1, 7.2, 7.3, 7.4 and 7.5

Warning: *If the bulb has just burned out, allow it to cool. It will be hot enough to burn your fingers.*

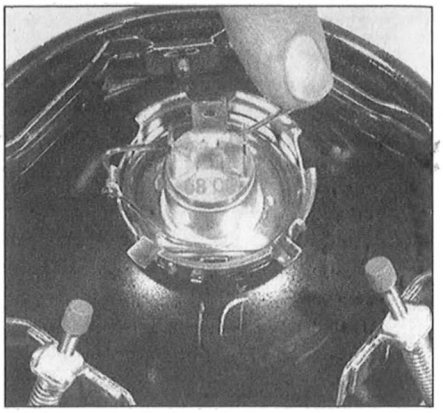
1 Remove the headlight retaining screws **(see illustration).**



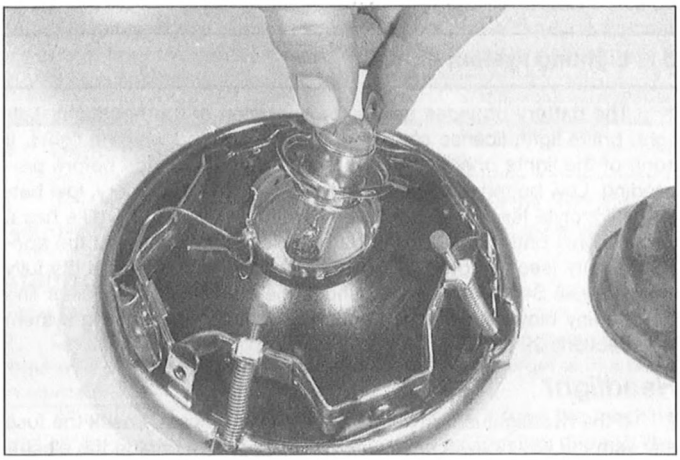
7.2 Tilt the headlight out and disconnect the wiring connector (arrow)



7.3 The TOP mark on the dust cover (arrow) goes upward

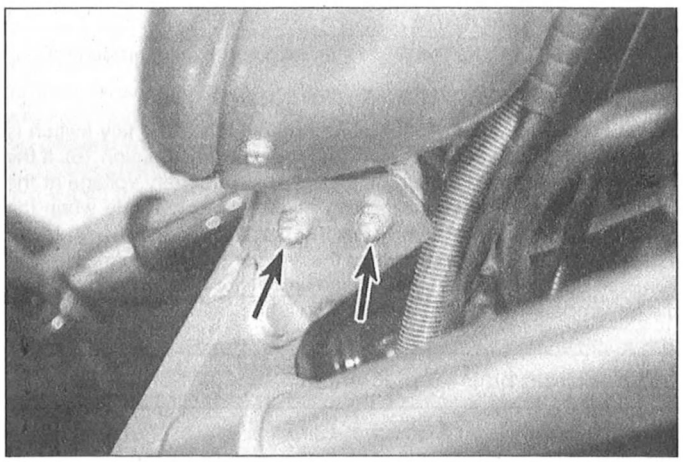


7.4 Remove the headlight bulb retainer

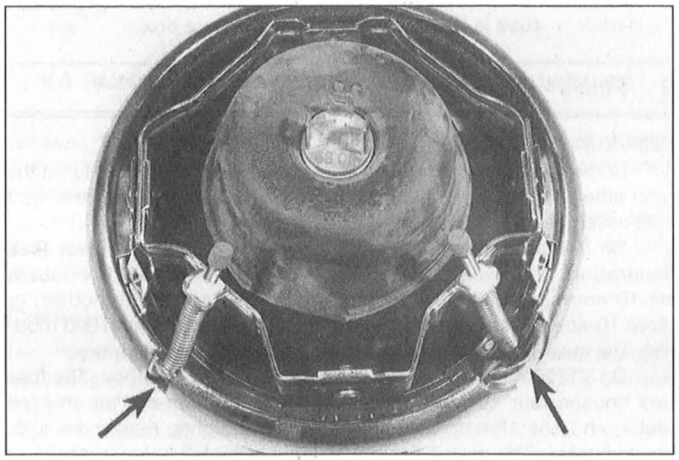


7.5 Lift out the bulb; don't touch the glass on the new bulb

2 Tilt the headlight forward out of the headlight housing and unplug the electrical connector **(see illustration)**.
3 Remove the dust cover **(see illustration)**.
4 Remove the bulb retainer **(see illustration)**.
5 Remove the bulb **(see illustration)**.
6 Installation is the reverse of removal. Be sure not to touch the bulb glass with your fingers - oil from your skin will cause the bulb to overheat and fail prematurely. If you do touch the bulb, wipe it off with a clean rag dampened with rubbing alcohol.



9.3 To detach the headlight housing from the bracket, remove these two nuts (arrows) and pull out the bolts (VT600 models)



8.3 The headlight adjusting screws are located on either side of the headlight assembly (headlight removed for clarity; the screws can be adjusted without removing the headlight)

8 Headlight aim - check and adjustment

Refer to illustration 8.3

1 An improperly adjusted headlight may cause problems for oncoming traffic or provide poor, unsafe illumination of the road ahead. Before adjusting the headlight, be sure to consult with local traffic laws and regulations.
2 The headlight beam can be adjusted both vertically and horizontally. Before performing the adjustment, make sure the fuel tank is at least half full and have an assistant sit on the seat.
3 The adjusting screws are located in the lower edge of the headlight **(see illustration)**.

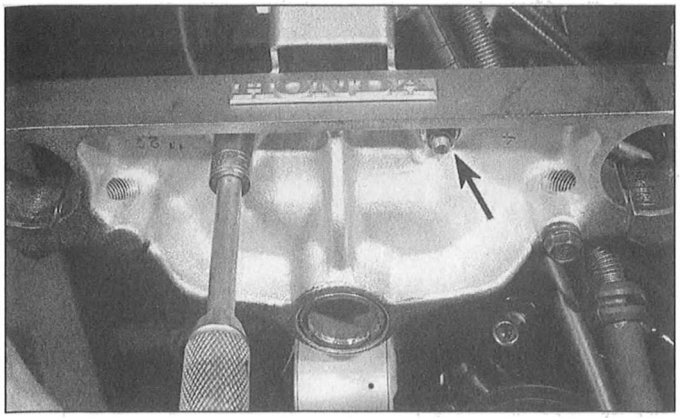
9 Headlight assembly - removal and installation

1 Remove the headlight (see Section 7).
2 Clearly label, then disconnect, all electrical connectors inside the headlight housing, then remove the wiring from the housing. Be careful not to cut any wires when pulling them through the holes in the housing.

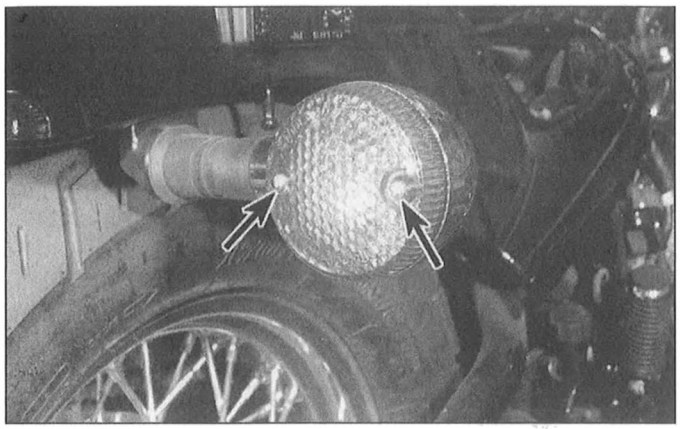
VT600 models

Refer to illustrations 9.3, 9.4 and 9.5

3 If you just want to remove the headlight housing itself, remove the bracket-to-housing nuts **(see illustration)** and bolts **(see illustration 7.1)** and remove the housing.
4 If you want to remove the headlight housing bracket from the lower triple clamp, remove the nuts **(see illustration)** from the bracket



9.4 To detach the headlight housing bracket from the lower triple clamp, remove these two nuts (VT600 models)



10.1 Remove the turn signal lens retaining screws (arrows) and remove the lens

studs on the underside of the lower triple clamp.

5 Remove the collars and bushings from the bracket **(see illustration)**, clean and inspect them, remove any corrosion, lubricate them lightly and reassemble.

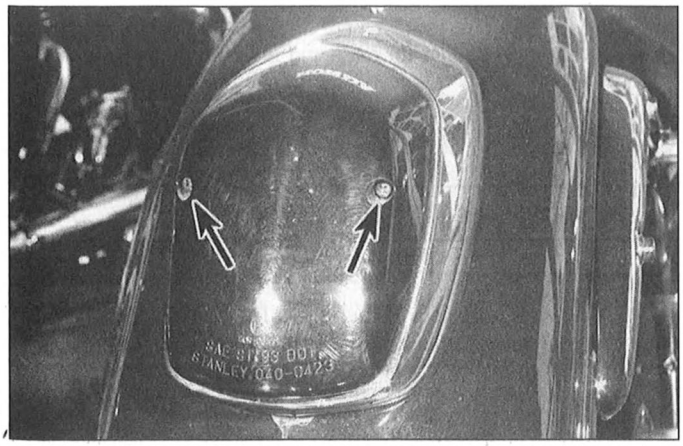
6 Installation is the reverse of removal.

VT750 models

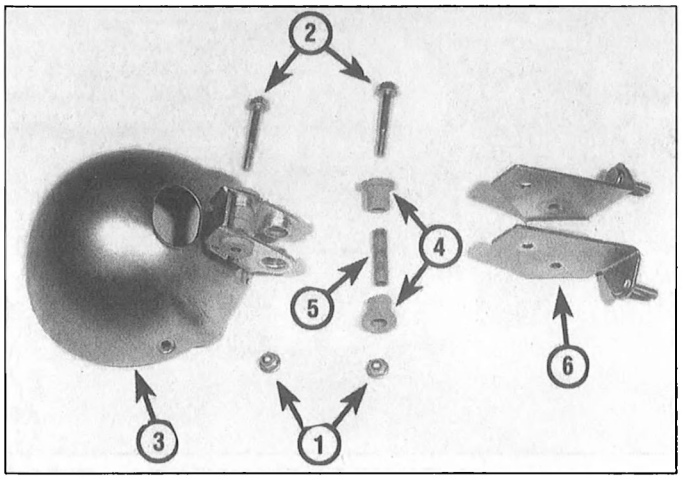
7 Remove the handlebar and the upper triple clamp (see Chapter 6).

8 Remove the headlight and turn signal assembly. Lift the assembly's mounting posts out of the grommets in the lower triple clamp.

9 If you're replacing a turn signal assembly, or if you're replacing



10.5 Remove the brake/taillight lens screws (arrows) (VT600 shown) and take off the lens



9.5 Headlight housing assembly (VT600 models)

1	*Nuts*	4	*Collars*
2	*Bolts*	5	*Bushing*
3	*Headlight housing (with one bushing and set of collars assembled)*	6	*Headlight housing bracket*

the headlight assembly itself, remove the turn signal(s).

10 Installation is the reverse of removal.

10 Turn signal, tail/brake light and license plate bulbs - replacement

Turn signal bulbs

Refer to illustration 10.1

1 To replace a turn signal bulb, remove the lens retaining screws **(see illustration)**.

2 Push the bulb in and turn it counterclockwise to remove it.

3 Check the socket terminals for corrosion and clean them if necessary. Line up the pins on the new bulb with the slots in the socket, push in and turn the bulb clockwise until it locks in place.

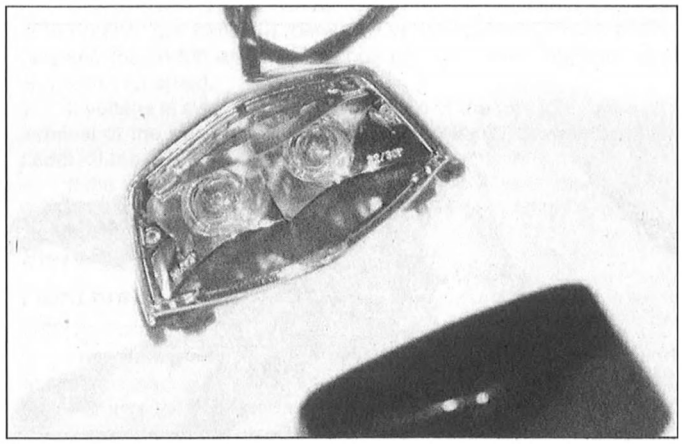
4 Position the lens on the housing and install the screws. Be careful not to overtighten them or the lens will crack.

Tail/brake light bulbs

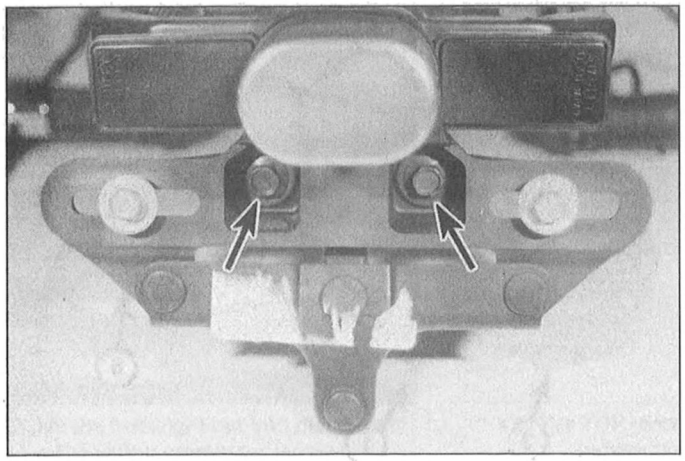
Refer to illustrations 10.5 and 10.6

5 Remove the lens screws **(see illustration)** and take the lens off.

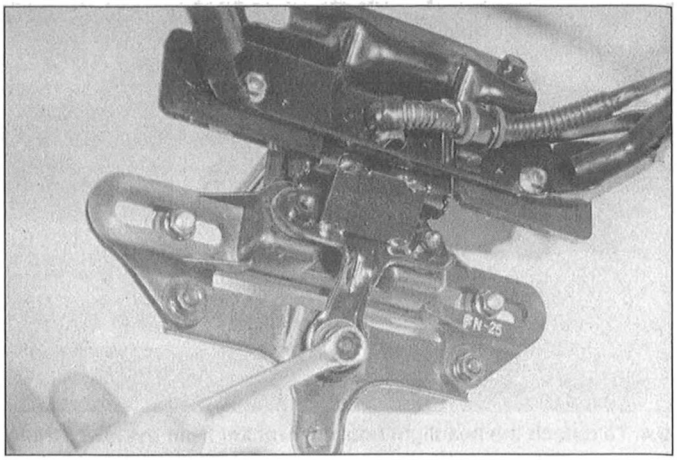
6 To remove a brake or taillight bulb, push the bulb in and turn it



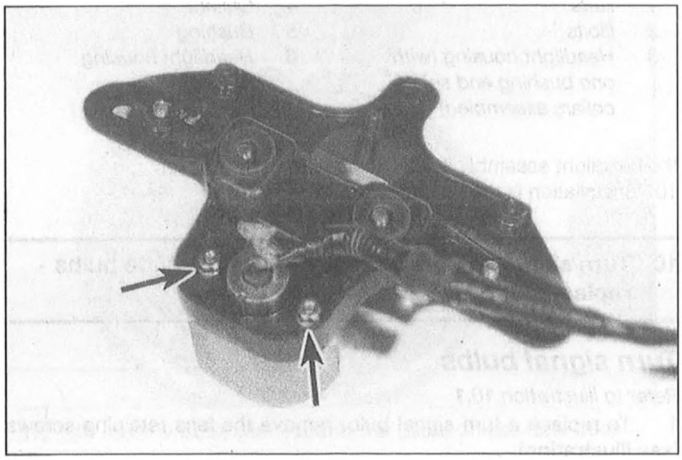
10.6 To remove a brake or taillight bulb, press the bulb into its socket and turn it counterclockwise



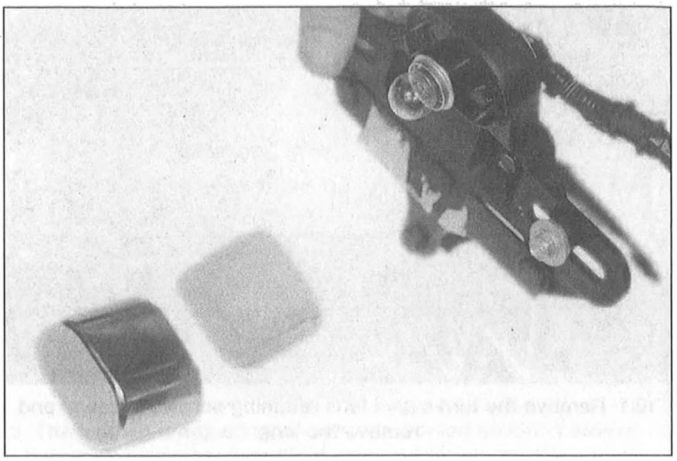
10.8a To remove the license plate bracket from the rear subframe on VT600 models, remove these two bolts (arrows) . . .



10.8b . . . and remove this nut from the back



10.9 License plate lens and housing bolts (VT600; VT750 uses two nuts)



10.10 Remove the license plate lens and housing from the license plate bracket

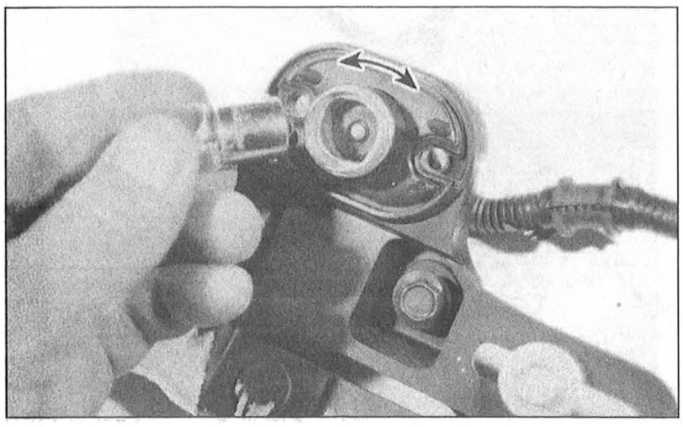
counterclockwise **(see illustration)**.
7 Install the bulb (see Steps 3 and 4).

License plate bulb

VT600 models

Refer to illustrations 10.8a, 10.8b, 10.9, 10.10 and 10.11

8 Remove the license plate bracket **(see illustrations)**.
9 Remove the two license plate lens/housing retaining bolts from the back of the license plate bracket **(see illustration)**.
10 Remove the lens and the housing **(see illustration)**.
11 Push the bulb in, turn it counterclockwise and remove it **(see illustration)**.
12 Installation is the reverse of removal.



10.11 To remove the license plate bulb, push it in and turn it counterclockwise; to install it, push it in and turn it clockwise

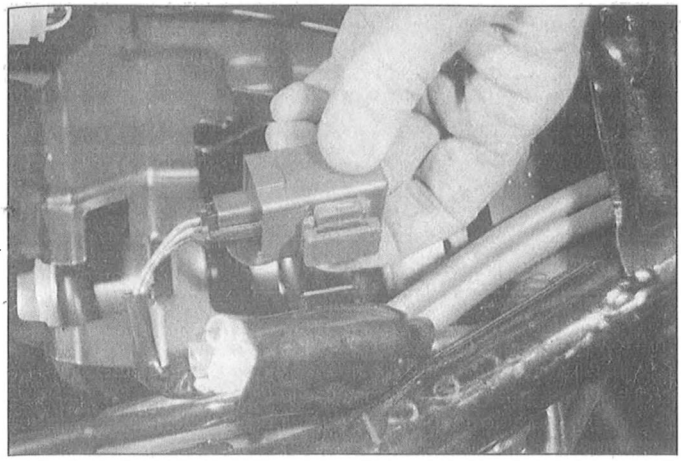
VT750C/CD models

13 Remove the license light cover screws and remove the license light cover.
14 License plate bulb replacement on a VT750 model is otherwise identical to the procedure for replacing the bulb on a VT600 model (except that the lens and housing are retained by two nuts instead of two bolts). Refer to Steps 9, 10 and 11 above.
15 Installation is the reverse of removal.

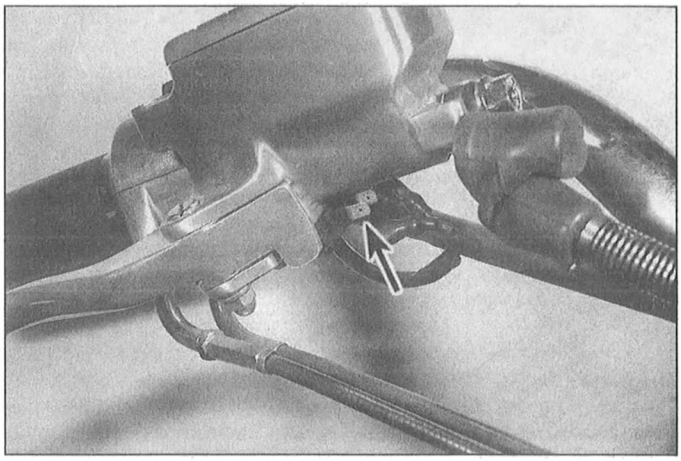
11 Turn signal circuit and relay - check

Circuit

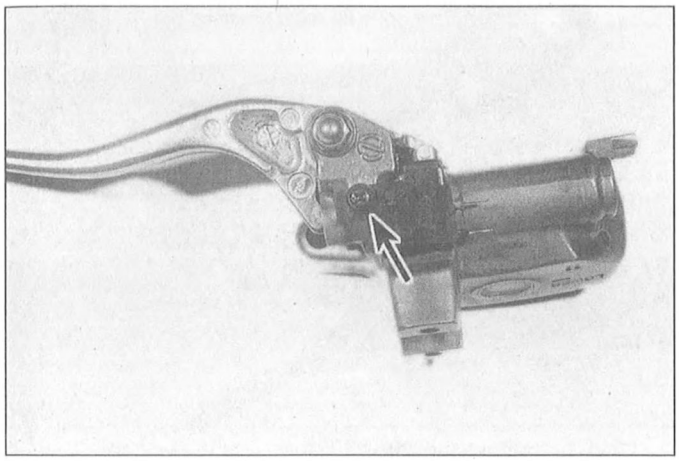
1 Battery voltage powers the turn signal lights, so if they don't operate, check battery voltage first and, on bikes with a conventional battery, the electrolyte level and specific gravity (see Chapter 1). Low battery voltage indicates either a defective battery (see Sections 3 and 4) or a malfunction in the charging system (see Sections 29 and 30). Also, check the fuses (see Section 5).
2 Most turn signal problems are the result of a burned out bulb or corroded socket. This is even more likely when the turn signal lights



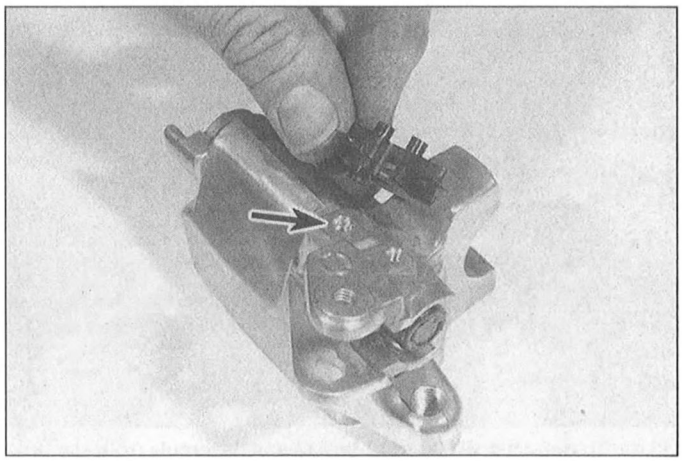
11.4 The turn signal relay is located under the seat on VT600 models



12.5 Disconnect the two electrical leads from the front brake light switch (VT600 shown, VT750 similar)



12.6 To detach the front brake light switch from the master cylinder, remove this retaining screw (arrow) (VT600 shown, VT750 similar)



12.7 Make sure that the positioning pin on the brake switch is aligned with the hole (arrow) in the master cylinder (VT600 shown, VT750 similar)

flash correctly on one side but not on the other. Check the bulbs and the sockets (see Section 10).

3 If the bulbs and sockets check out okay, check the turn signal relay.

Turn signal relay

Refer to illustration 11.4

4 On VT600 models, remove the seat (see Chapter 8) and detach the turn signal relay **(see illustration)**.

5 On VT750 models, remove the headlight (see Section 7) and remove the turn signal relay from the headlight housing.

6 Locate the terminals of the turn signal relay connector for the black/brown wire (fuse side of circuit) and the gray wire (switch side of circuit) (on 1988 and 1989 VT600 models, there's a white/green wire, instead of a black/brown wire). Connect the two terminals together with a jumper wire.

7 Turn the ignition switch to ON and operate the turn signal switch.

8 If the turn signal lights *don't* come on, check the turn signal switch for an open circuit (see Section 18). If the turn signal switch is okay, look for an open circuit in the black/brown (green/white) wire or in the gray wire.

9 If the turn signal lights *do* come on, check for continuity between the terminal for the green wire and the ground terminal at the connector. If there is no continuity, there is an open circuit in the green wire. If there is continuity, either there's a loose (intermittent) or poor contact in the turn signal relay connector, or the turn signal relay is defective.

12 Brake light switches - check and replacement

Circuit check

1 Before checking any electrical circuit, check the fuses (see Section 5).

2 Using a test light connected to a good ground, check for voltage at the brake light switch. If there's no voltage present, check the wire between the switch and the fuse box (see the wiring diagrams at the end of this Chapter).

3 If voltage is available, touch the probe of the test light to the other terminal of the switch, then pull the brake lever or depress the brake pedal - if the test light doesn't light up, replace the switch.

4 If the test light does light, check the wiring between the switch and the brake lights (see the wiring diagrams at the end of this Chapter).

Switch replacement

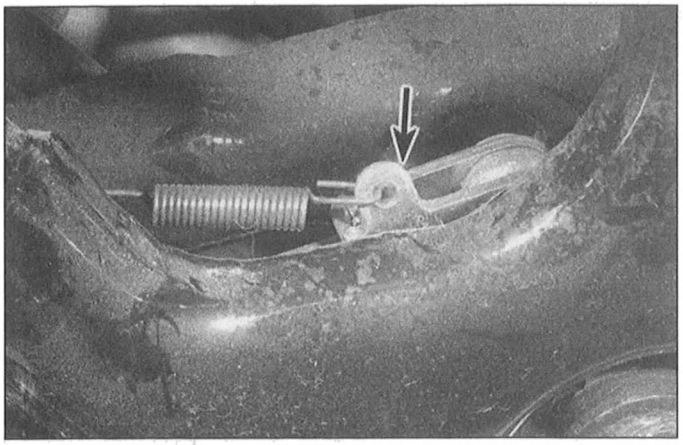
Front brake lever switch

Refer to illustrations 12.5, 12.6 and 12.7

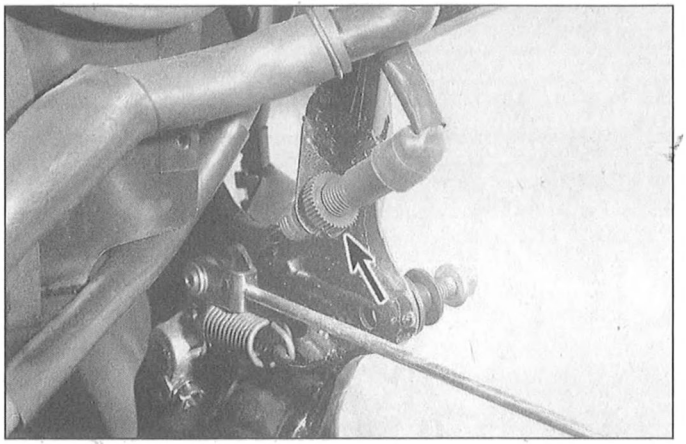
5 Disconnect the two electrical leads from the switch **(see illustration)**.

6 Remove the switch retaining screw **(see illustration)**.

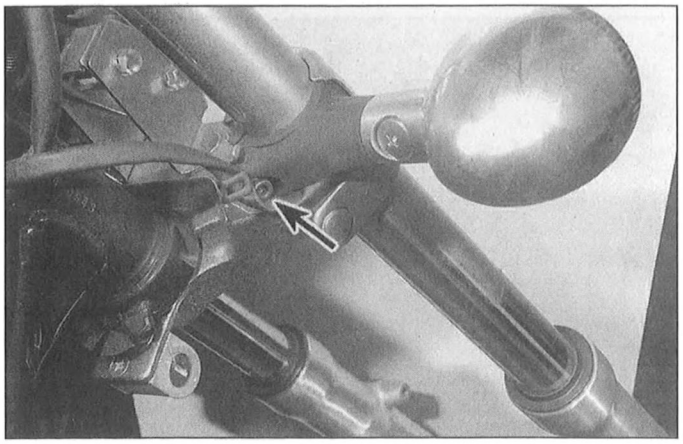
7 Installation is the reverse of removal. Make sure that the positioning pin on the switch is aligned with the hole in the master cylinder **(see illustration)**.



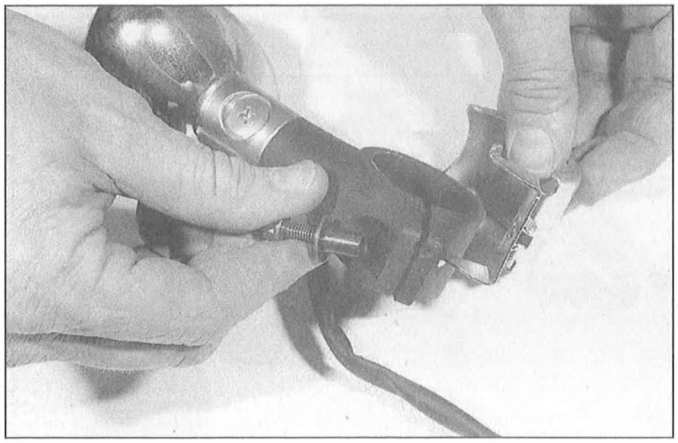
12.10 On VT600 models, disengage the rear brake light switch return spring from the middle brake arm (arrow)



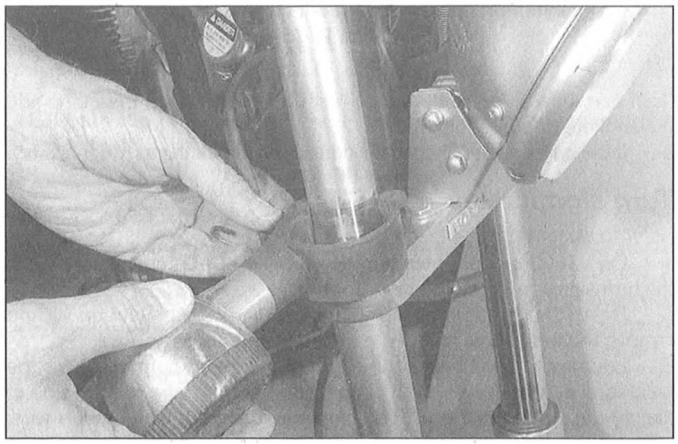
12.11 To remove the rear brake light switch, turn the adjusting nut (arrow), not the switch, and take the switch out of the bracket



13.4a To detach a VT600 front turn signal assembly from the fork tube, remove this pinch bolt (arrow) . . .



13.4b . . . remove the chrome cover (note the bolt collar). . .



13.4c . . . and pull off the turn signal assembly

Rear brake pedal switch

VT600 models

Refer to illustrations 12.10 and 12.11

8 Remove the right side cover (see Chapter 8).

9 Unplug the switch electrical connector (it can be identified by its wire colors, referring to wiring diagrams at the end of the book).

10 Unhook the switch spring **(see illustration)**.

11 Back off the switch locknut and slide the switch out of its mounting bracket **(see illustration)**.

12 Installation is the reverse of removal.

13 Adjust the switch (see Chapter 1).

VT750 models

14 The switch used on VT750 models is identical in design to the switch used on VT600 models, except that it's located up front, next to the rear brake pedal **(see illustration 3.4 in Chapter 8)**.

15 To replace the switch on a VT750 model, follow the procedure outlined above for VT600 models. The electrical connector for the switch is a black two-pin connector. On VT750C/CD models, it's behind the seat. On VT750DC models, remove the right side radiator mounting bolt and pull the grille forward for access to the connector.

13 Turn signal assembly - removal and installation

Front turn signals

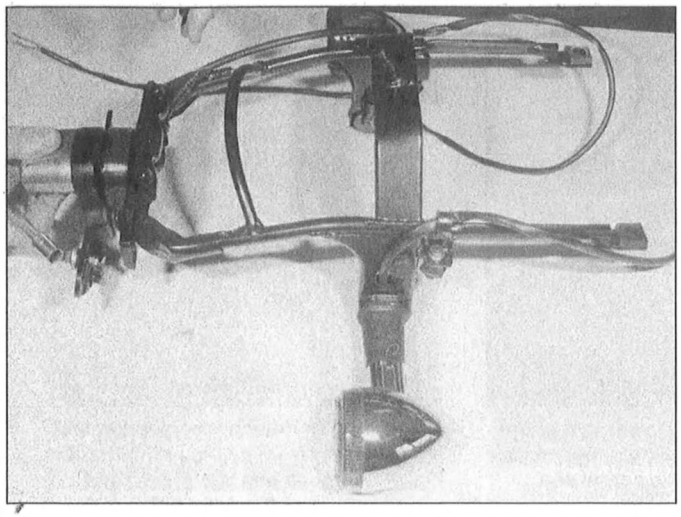
Refer to illustrations 13.4a, 13.4b and 13.4c

1 On VT600 models, the front turn signal wires and connectors are located right behind the steering head. Remove the fuel tank (see Chapter 4) and the steering head covers (see Chapter 8).

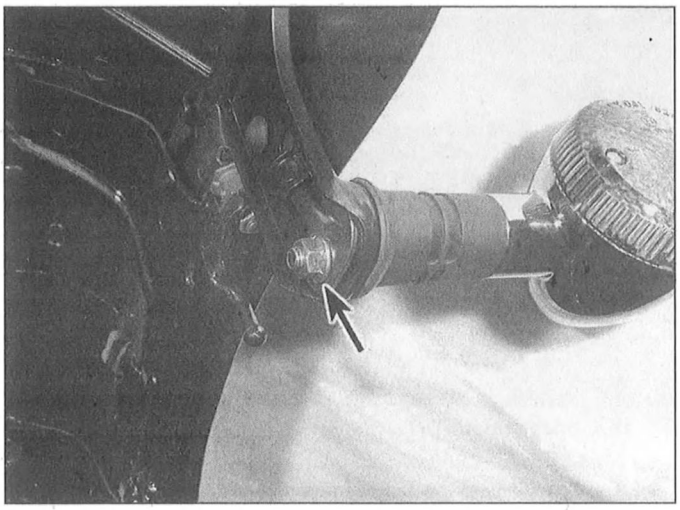
2 On VT750 models, the front turn signal wires and connectors are located inside the headlight housing. Remove the headlight from the housing (see Section 7).

3 Locate the electrical leads for the front turn signals. On all models, the three left turn signal wires are green, orange and orange/white; the three right turn signal wires are green, light blue and light blue/white. Unplug the leads for the turn signal you are removing.

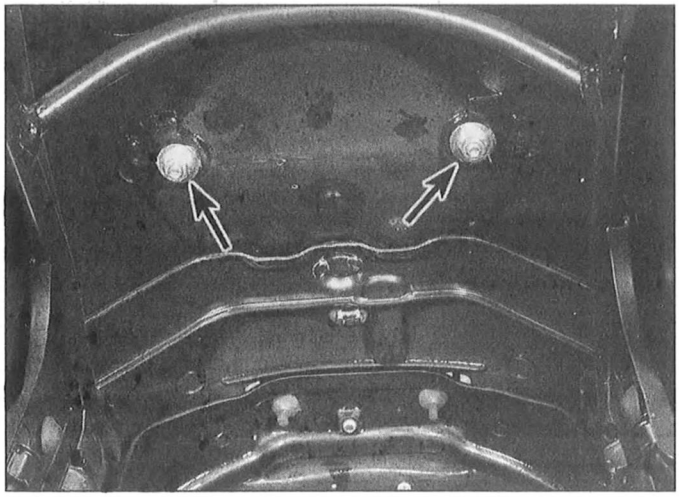
4 On VT600 models, remove the turn signal assembly pinch bolt,



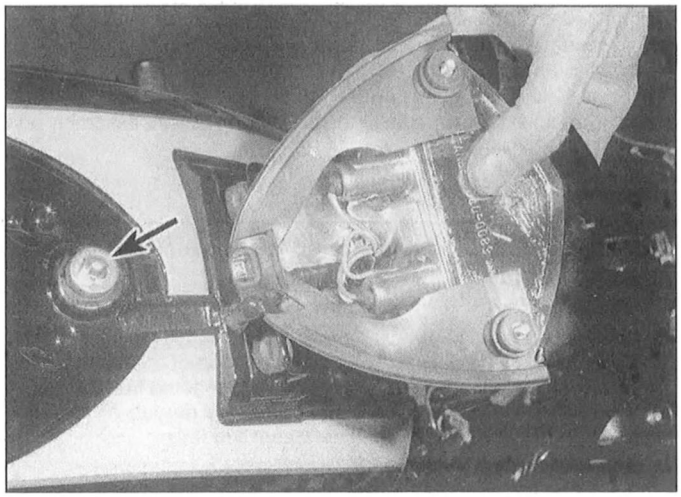
13.10a To detach a VT600 rear turn signal assembly, detach the wiring harness from all clips and clamps . . .



13.10b . . . and remove the turn signal assembly mounting nut (note how the harness is routed through the hole in the bracket)



14.4a To detach the VT600 brake light/taillight assembly from the rear fender, remove these two nuts (arrows) . . .



14.4b . . . lift the assembly out of the fender and carefully pull the wire harness out (pull on the harness, not the taillight) (there's a fender mounting nut (arrow) under the taillight)

remove the chrome cover and pull the turn signal assembly from the fork tube **(see illustrations)**.

5 On VT750 models, remove the turn signal assembly together with the headlight assembly (see Section 9).

6 Installation is the reverse of removal.

Rear turn signals

Refer to illustrations 13.10a and 13.10b

7 On VT600 models, the rear turn signal wires and connectors are located on under the seat. Remove the seat (see Chapter 8).

8 On VT750 models, the rear turn signal wires and connectors are located behind the right side cover. Remove the right side cover (see Chapter 8).

9 Locate the electrical leads for the rear turn signals. On all models, the two left turn signal wires are green and orange; the two right turn signal wires are green and light blue. Unplug the leads for the turn signal you are removing.

10 On VT600 models, trace the routing of the harness back to the turn signal, detach the harness from all clips and clamps on the frame, then remove the turn signal assembly mounting nut **(see illustrations)**.

11 On VT750 models, remove two screws from the underside of the license light cover and lift the cover off. Disconnect the wires running to each turn signal stalk and remove the stalk mounting nut.

12 Installation is the reverse of removal.

14 Brake light/taillight assembly - removal and installation

VT600 models

Refer to illustrations 14.4a and 14.4b

1 Remove the seat (see Chapter 8).

2 The wires for the brake light and tail light are brown, green and green/yellow. Trace the wires to the electrical connector(s) in the dust boot to the right of the fuel pump. Unplug the connector.

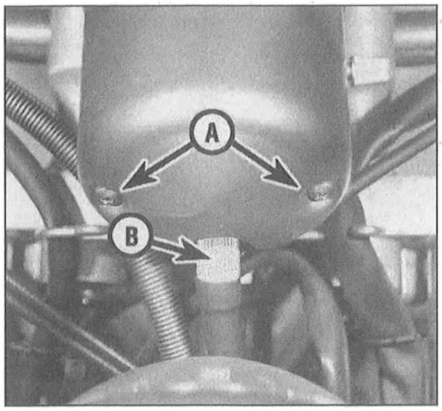
3 Trace the harness back to the brake light/taillight assembly and detach all clips and clamps.

4 From underneath the fender, remove the brake light/taillight assembly mounting nuts **(see illustration)** and remove the brake light/taillight assembly **(see illustration)** and pull out the harness.

5 Installation is the reverse of removal.

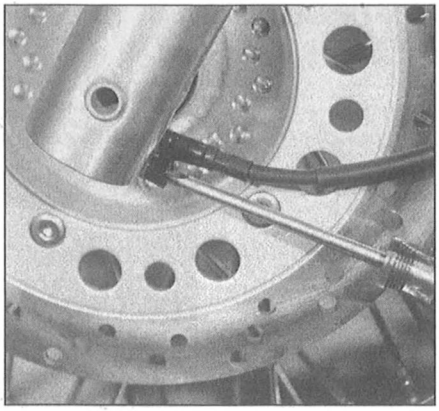
VT750 models

6 Remove the right side cover (see Chapter 8).

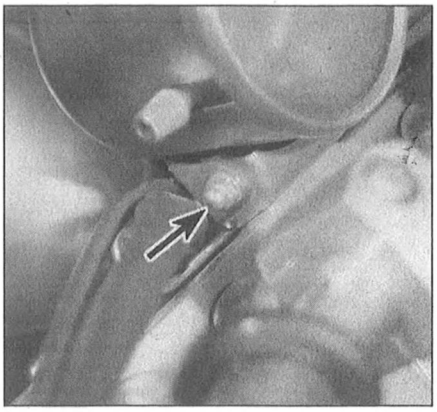


15.1 Speedometer (VT600 shown; VT750 similar)

A Speedometer housing screws
B Speedometer cable nut



15.2 To disconnect the lower end of the speedometer cable from the speedometer gearbox, remove this screw and pull out the cable



15.11 To detach the speedometer assembly from its mounting bracket, remove this nut (arrow) and pull out the bolt

7 The wires for the brake light and tail light are brown, green and green/yellow. Trace the wires to the electrical connector(s) in the dust boot behind the right side cover. Unplug the connector.
8 Trace the harness back to the brake light/taillight assembly and detach all clips and clamps.
9 From underneath the fender, remove the brake light/taillight assembly mounting nuts, remove the brake light/taillight assembly and pull out the harness.
10 Installation is the reverse of removal.

15 Speedometer and cable or speed sensor - removal and installation

1 Depending on model, the speedometer is either mounted on the upper triple clamp and driven by a cable, or on top of the fuel tank and connected by a wiring harness to a speed sensor at the front wheel.

Speedometer cable

Refer to illustrations 15.2 and 15.3

2 Unscrew the upper speedometer cable end from the speedometer **(see illustration)** and detach the cable from the speedometer.
3 Note how it's routed, then unscrew the speedometer cable from the speedometer gear box at the front fork **(see illustration)**.
4 Installation is the reverse of the removal steps. Be sure the speedometer cable is routed so that it doesn't cause the steering to bind or interfere with other components. The squared-off ends of the cable must fit into their spindles in the speedometer and gearbox.

Speed sensor

5 Remove the mounting screw at the bottom of the speed sensor and take it off the front fork leg.
6 To test the speed sensor, follow the wiring harness to the connector and disconnect it (it's inside the headlight housing on VT750DC models). Connect a voltmeter to the terminals in the speed sensor side of the connector. Place a screwdriver in the sensor slot and spin it. The voltmeter should indicate pulsing voltage between zero and 5 volts. If not, and if the wires are good, replace the sensor.
7 Installation is the reverse of the removal steps.

Speedometer

Mounted on triple clamp

Refer to illustration 15.11

8 Disconnect the cable from the speedometer **(see illustration 15.2)**.
9 On VT600 models, remove the fuel tank (see Chapter 4) and the steering head covers (see Chapter 8). Follow the speedometer wires to the black six-pin connector behind the steering head and unplug the connector. Also, unplug the connector for the yellow/black wire.
10 On VT750 models, remove the headlight (see Section 7). Follow the speedometer wires to the black six-pin connector behind the steering head and unplug the connector.
11 Remove the bolt and nut **(see illustration)** and detach the speedometer from the mounting bracket.

Mounted on fuel tank

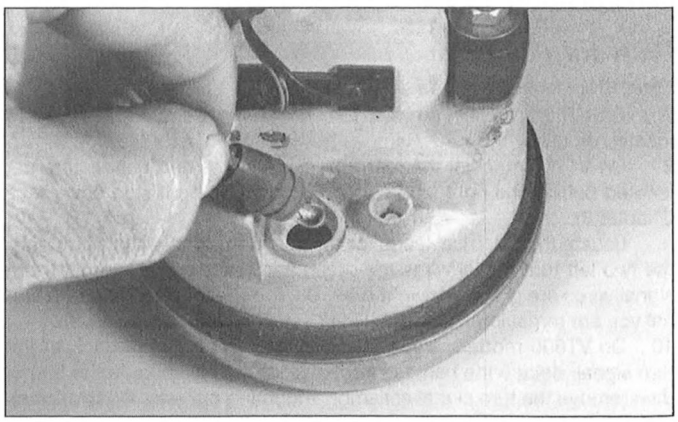
12 If you're working on a VT750C/CD model, unbolt the fuel tank, lift it up and disconnect the speedometer connector. Remove two bolts from the front of the speedometer cover and two bolts from the top rear. Remove the fuel tank cap and lift the speedometer off.
13 If you're working on a VT750DC model, remove the two bolts at the top rear of the speedometer cover. Slide the speedometer forward to disengage its front retainer from the tank, then lift the speedometer and disconnect its electrical connector.
14 Installation is the reverse of the removal steps. If you're working on a VT750DC model, be sure the rubber mounting pad is in position on the tank bracket.

16 Speedometer light and indicator lights - replacement

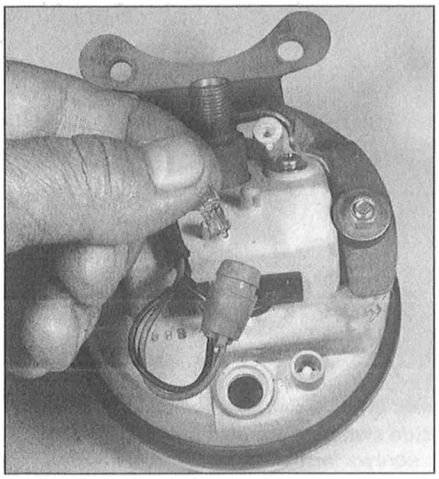
Speedometer light bulb

Refer to illustrations 16.4a and 16.4b

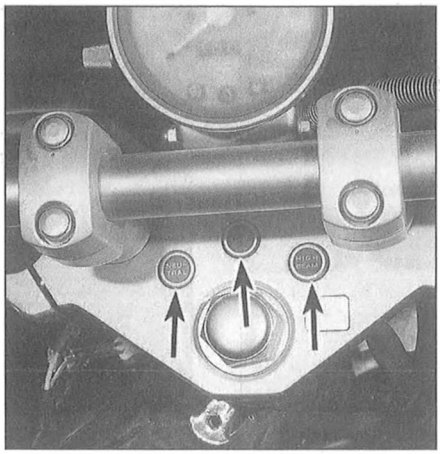
1 The speedometer illumination bulb on VT600 and VT750C/CD models can be replaced. On VT750DC models, speedometer illumination is provided by a light-emitting diode that can't be replaced.



16.4a To replace the light bulb that illuminates the speedometer face, pull the bulb socket out of the speedometer assembly . . .



16.4b . . . then pull the bulb out of the socket



16.8 The bulbs for the indicator lights (arrows) are accessible from the underside of the triple clamp

17.9 To remove the ignition switch cover, remove its retaining screw (arrow)

2 Remove the speedometer (see Section 15).
3 Remove the speedometer cover screws **(see illustration 15.2)** and remove the cover.
4 Remove the bulb socket **(see illustration)**, then pull the bulb out of the socket **(see illustration)**. If the socket contacts are dirty or corroded, they should be scraped clean and sprayed with electrical contact cleaner before new bulbs are installed.
5 Carefully push the new bulb into position, then push the socket into the speedometer.
6 Installation is otherwise the reverse of removal.

Indicator lights

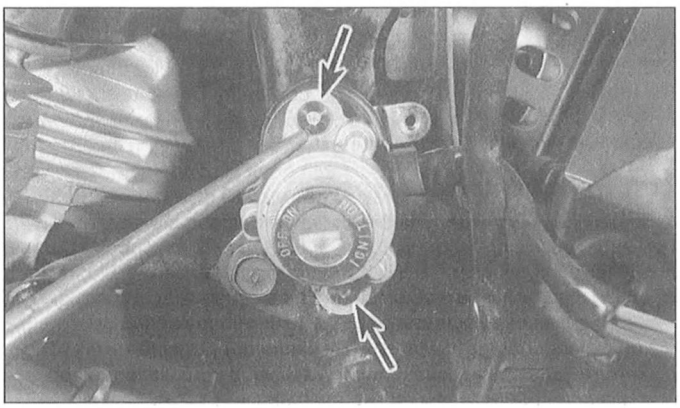
Refer to illustration 16.8

7 The indicator lights (turn signal, neutral and high beam) on VT600 and VT750C/CD models are located in the upper triple clamp. The bulbs can be replaced. On VT750DC models, the indicator lights are light emitting diodes that can't be replaced.
8 To replace an indicator light bulb on a VT600, pull down the socket for the bulb you wish to replace **(see illustration)**, pull out the bad bulb from the socket, install a new bulb in the socket and install the new bulb and socket into its receptacle in the triple clamp. Make sure it's firmly seated.
9 To replace an indicator light bulb on a VT750C/CD, remove the indicator light lens and pull the socket out of the triple clamp and replace the bulb as described in the previous step.

17 Ignition main (key) switch - check and replacement

Check

1 Remove the left side cover (see Chapter 8).
2 Trace the wiring harness from the ignition switch to the four-pin white connector and disconnect it. The wires between the ignition switch are red, red/black and blue/orange (these are, respectively, the battery, ignition and fan motor wires). On 1988 and 1989 VT600 models, there's also a brown/white wire to this connector, and two more wires, brown and yellow/blue, lead to a black two-pin connector which must be disconnected (the extra wires on these models are for the Park position, which was eliminated after 1989).
3 Using an ohmmeter, check the continuity of the terminal pairs indicated in the following steps. Connect the ohmmeter to the *switch* side of the connector, not the wiring harness side.
4 In the OFF position, there should be no continuity between any of the wires.
5 In the ON position, there should be continuity between the red, red/blue and blue/orange wires (and, on 1988 and 1989 VT600 models, between the brown/white and brown wires).



17.10 To detach the ignition switch from its mounting bracket, drill out these two "break-off bolts"

6 In the PARK position, on 1988 and 1989 VT600 models, there should be continuity between the red and yellow/blue wires.
7 If the switch fails any of the tests, replace it.

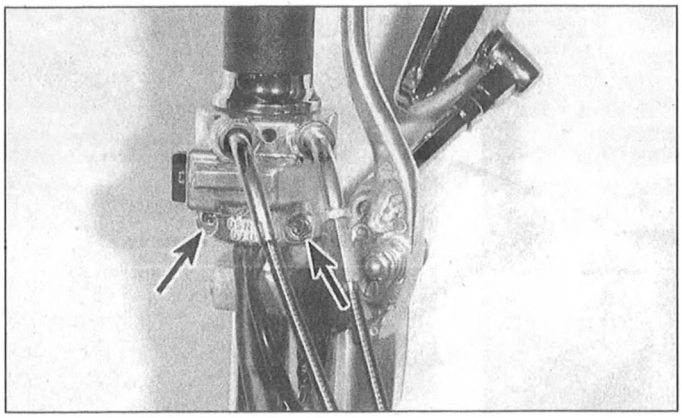
Replacement

Refer to illustration 17.9 and 17.10

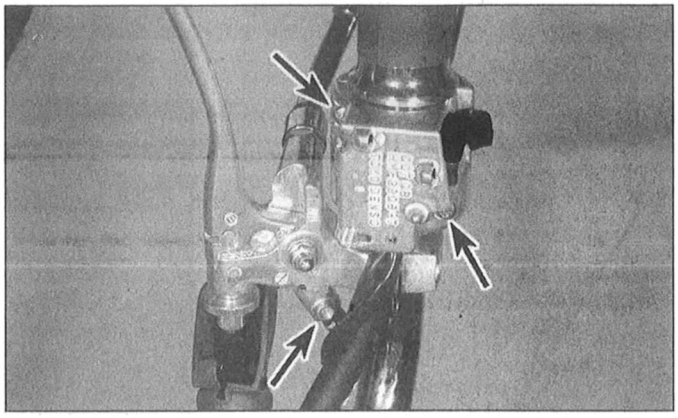
8 Disconnect the electrical connector, if you haven't already done so. Free the wiring harness from any clips or retainers.
9 Remove the ignition switch cover screw **(see illustration)** and remove the cover.
10 Drill out the two "break-off bolts" **(see illustration)** and remove the ignition switch.
11 Installation is the reverse of removal. Be sure to use new break-off bolts (available at the dealer parts department). Tighten them until their heads snap off.

18 Handlebar switches - check

1 Most handlebar switch problems are caused by dirty or corroded contacts, or by worn or broken internal parts. If some part of a switch breaks, the switch assembly must be replaced. Individual parts are not available.
2 If a handlebar switch malfunctions, check it for continuity with an ohmmeter or a continuity test light. Be sure to disconnect the battery negative cable to prevent a short circuit, before making the checks.
3 On VT600 models, remove the fuel tank (see Chapter 4) and the steering head covers (see Chapter 8).
4 On VT750 models, remove the headlight (see Section 7).



19.1a The handlebar switches are held together by screws (arrows); this is the throttle side . . .



19.1b . . . the clutch side switches are also held together by screws (arrows)

5 Trace the wiring harness from the suspect switch and unplug the electrical connector(s). All models use nine-pin connectors for the handlebar switches. The left handlebar switch has an extra two-pin connector for the horn. On 1988, 1989 and 1991 through 1996 VT600 models, all left handlebar switches use white connectors and the right switches use red connectors. On other models, the color may vary.

6 Using an ohmmeter, check the continuity of the terminal pairs indicated in the following steps. Connect the ohmmeter to the *switch* side of the connector, not the wiring harness side.

Left handlebar switches

7 The wire colors for the **left** handlebar switches are as follows:

a) *The **dimmer switch** wires are blue/white, blue and white on all models.*

b) *The **turn signal switch** wires on 1988, 1989 and 1991 VT600 models are green, light blue, orange, brown/blue, orange/white and light blue/white.*

c) *The **turn signal switch** wires on all other models are green, light blue, orange, brown/blue, light blue/white and orange/white (yes, they're the same colors, but the last two wire colors are switched, which is important to remember when making the following continuity tests).*

d) *The **horn switch** wires on 1988, 1989 and 1991 VT600 models are white/green and light green.*

e) *The **horn switch** wires on all other models are black/brown and light green.*

Dimmer switch

8 LO position - continuity between blue/white and white.

9 HI position - continuity between blue/white and blue.

Turn signal switch

1988, 1989 and 1991 VT600 models

10 LEFT - continuity between green and orange, and between brown/black and orange/white.

11 RIGHT - continuity between green and light blue, and between brown/black and light blue/white.

All other models

12 LEFT - continuity between green and orange, and between brown/black and light blue/white.

13 RIGHT - continuity between green and light blue, and between brown/black and orange/white.

Horn switch

1988, 1989 and 1991 VT600 models

14 RELEASED - no continuity.

15 DEPRESSED - continuity between white/green and light green.

All other models

16 RELEASED - no continuity.

17 DEPRESSED - continuity between black/brown and light green.

Right handlebar switches

18 The wire colors for the **right** handlebar switches are as follows:

a) *The **starter switch** wires on 1988, 1989 and 1991 through 1993 VT600 models are black, yellow/red, black/red and blue/white.*

b) *The **starter switch** wires on 1994 through 1996 VT600 models are black/white, yellow/red, black/red and blue/white.*

c) *The **starter switch** wires on all other models are black/white and yellow/red.*

d) *The **kill switch** wires on 1988, 1989 and 1991 through 1993 VT600 models are black and black/white.*

e) *The **kill switch** wires on all other models are black/green and black/white.*

Starter switch

1988, 1989 and 1991 through 1993 VT600 models

19 RELEASED - continuity between black/red and blue/white.

20 DEPRESSED - continuity between black and yellow/red.

1994 through 1996 VT600 models

21 RELEASED - continuity between black/red and blue/white.

22 DEPRESSED - continuity between black/white and yellow/red.

All other models

23 RELEASED - no continuity.

24 DEPRESSED - continuity between black/white and yellow/red.

Kill switch

1988, 1989 and 1991 through 1993 VT600 models

25 OFF - no continuity.

26 RUN - continuity between black and black/white.

All other models

27 OFF - no continuity.

28 RUN - continuity between black/green and black/white.

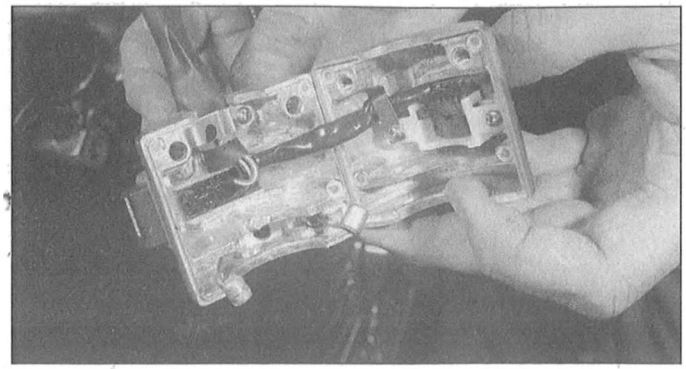
29 If any continuity check indicates a problem, remove the switch (see Section 19), spray the switch contacts with electrical contact cleaner, then retest. The contacts can also be scraped clean with a knife or polished with crocus cloth, if they're accessible. If the switch still fails to check out as described above, or if it's obviously damaged or broken, replace the switch.

19 Handlebar switches - removal and installation

Refer to illustrations 19.1a, 19.1b and 19.1c

1 The handlebar switches are composed of two halves that clamp around the bars. They are easily removed for cleaning or inspection by taking out the clamp screws and pulling the switch halves away from the handlebars **(see illustrations)**.

2 To completely remove the switches, the electrical connectors in the wiring harness should be unplugged.



19.1c Separate the switch halves for access to the individual switches

3 When installing the switches, make sure the wiring harnesses are properly routed to avoid pinching or stretching the wires.

20 Neutral switch - check and replacement

Check

Refer to illustrations 20.3 and 20.5

1 Make sure the transmission is in neutral.

2 On VT600 models, remove the left side cover; on VT750 models, remove the right side cover (see Chapter 8).

3 The neutral switch connector has two pins and is black (VT600 and VT750C/CD) or red (VT750DC) **(see illustration)**. On most VT600 models, it's located right on top of the voltage regulator/rectifier; on some VT600 models, it's behind the regulator/rectifier, so you may have to remove the regulator/rectifier to get to it (see Section 32). On VT750C/CD models, the connector is sandwiched between the white two-pin fuel pump connector and the three-pin sidestand connector. On VT750DC models, the connector is located inside a rubber boot behind the rear engine cylinder. There are two wires to the connector; the light green or light green/red wire is for the neutral switch.

4 Ground the terminal on the harness side of the connector to bare metal on the motorcycle frame with a short length of wire. The neutral indicator light on the upper triple clamp should come on.

5 If the light doesn't come on, check the bulb (if equipped) (see Section 16) and the wiring between the ignition switch and the neutral switch (see wiring diagrams at the end of this Chapter). Remove the left rear cover (see "Drive chain - removal, cleaning and installation" in Chapter 7) and locate the switch, right in front of the drive sprocket **(see illustration)**. Make sure that the electrical lead is connected to the switch.

6 If the neutral indicator light comes on, the neutral switch might be bad. Connect an ohmmeter between the terminal on the switch side of the connector and ground. Shift through the gears. The ohmmeter should indicate continuity in neutral and no continuity in all other gears.

7 If the neutral switch doesn't operate as described, replace it.

Replacement

8 Remove the left rear cover (see "Drive chain - removal, cleaning and installation" in Chapter 7).

9 Locate the neutral switch, right in front of the drive sprocket **(see illustration 20.5)** and disconnect the electrical lead.

10 Some oil is going to come out when you unscrew the switch and remove it from the crankcase, so be prepared to catch it with a drain pan.

11 Apply thread sealant to the threads of the new switch and tighten it to the torque listed in this Chapter's Specifications.

12 Installation is otherwise the reverse of removal. Be sure to route the wire harness for the oil pressure switch and the neutral switch correctly so that it's not damaged by the drive chain.

21 Oil pressure switch - check and replacement

Check

Refer to illustration 21.3

1 When the ignition switch is turned to ON, the oil pressure warning light on the speedometer should come on. This verifies that the oil pressure switch and circuit are functioning normally.

2 If the oil pressure warning light doesn't come on when the ignition switch is turned to ON, remove the left rear cover (see "Drive chain - removal, cleaning and installation" in Chapter 7).

3 Locate the oil pressure switch **(see illustration 20.5)**, right behind the water pump. Remove the dust boot, remove the electrical lead retaining screw **(see illustration)** and detach the lead from the switch.

4 Short the switch lead to ground with a jumper wire. Turn the ignition switch to ON. The oil pressure warning indicator light should now come on.

5 If the oil pressure warning light still doesn't come on, check the 10A inline mini-fuse and check the switch circuit for an open circuit somewhere.

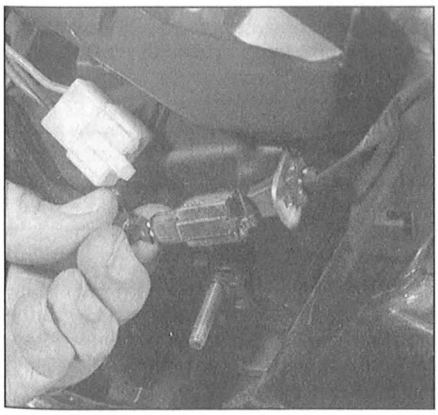
6 Start the engine and verify that the oil pressure warning light goes out.

7 If the oil pressure warning light doesn't go out, have the oil pressure checked by a Honda dealer service department.

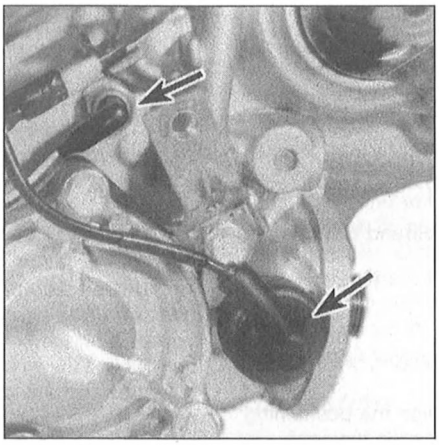
8 If the oil pressure is normal, replace the oil pressure switch.

Replacement

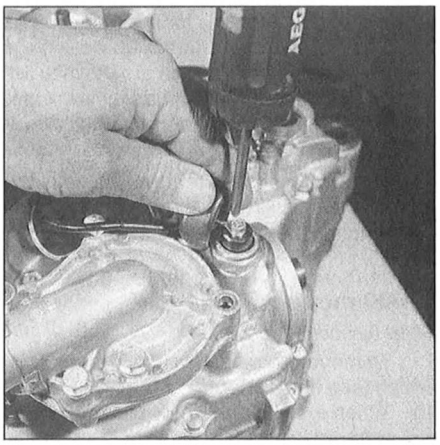
9 On VT600 models, remove the left side cover; on VT750 models,



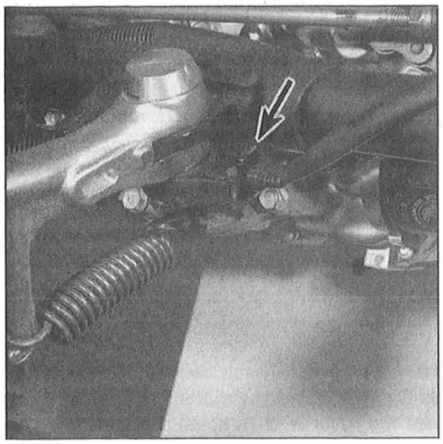
20.3 VT600 neutral switch connector (this is also the connector for the oil pressure switch)



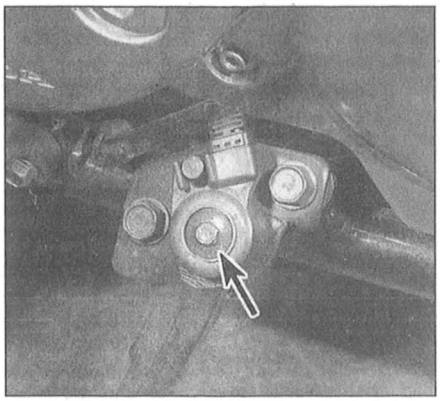
20.5 Neutral switch (left arrow) and oil pressure switch (right arrow)



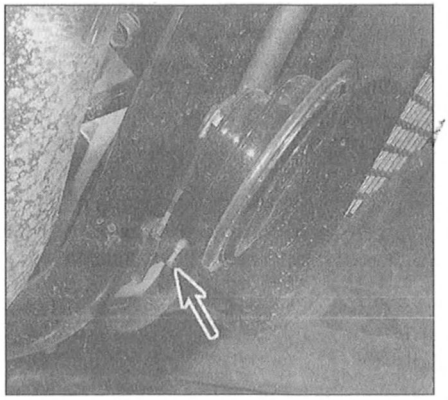
21.3 Remove the screw to disconnect the oil pressure switch wire



22.9 VT600 sidestand switch



22.13 To remove the VT750 sidestand switch, remove this bolt (arrow) and pull off the switch



24.1 Unplug the electrical connectors from the horn and remove its mounting bolt (arrow)

remove the right side cover (see Chapter 8).
10 Unplug the electrical connector for the oil pressure switch. It's the same electrical connector the neutral switch uses (see Section 20).
11 Remove the left rear cover (see "Drive chain - removal, cleaning and installation" in Chapter 7).
12 Locate the oil pressure switch **(see illustration 20.5)**, right behind the water pump. Remove the dust boot, remove the electrical lead retaining screw and disconnect the lead from the switch.
13 Some oil is going to come out when you unscrew the switch, so be prepared to catch it with a drain pan.
14 Apply thread sealant to the threads of the new switch, install the switch and tighten it to the torque listed in this Chapter's Specifications.
15 Installation is otherwise the reverse of removal. Be sure to route the wire harness for the oil pressure switch and the neutral switch correctly so that it's not damaged by the drive chain.

22 Sidestand switch - check and replacement

Check

1 On VT600 models, remove the left side cover; on VT750 models, remove the right side cover (see Chapter 8).
2 The wires in the sidestand switch circuit are green/white, yellow/black and green. Follow the wiring harness from the switch (at the upper end of the sidestand) to the green three-pin electrical connector, then unplug the connector.
3 Connect the leads of an ohmmeter to the terminals for the indicated wire colors.
4 With the sidestand in the down position, there should be continuity between the terminals for the yellow/blue and green wires.
5 With the sidestand in the up position, there should be continuity between the terminals for the green/white and green wires.
6 If the sidestand switch fails either of these tests, replace it.

Replacement

7 On VT600 models, remove the left side cover; on VT750 models, remove the right side cover (see Chapter 8).
8 Unplug the electrical connector for the sidestand switch (see Step 2).

VT600 models

Refer to illustration 22.9

9 Remove the sidestand switch bolt, switch holder, washer and switch **(see illustration)**.
10 When installing the new sidestand switch, align the positioning pin on the switch with the hole in the sidestand and align the groove in the switch with the pin on the sidestand.
11 Install the sidestand switch holder, install the retaining bolt and tighten it to the torque listed in this Chapter's Specifications.
12 Installation is otherwise the reverse of the removal procedure. Be sure to route the electrical lead correctly.

VT750 models

Refer to illustration 22.13

13 Remove the sidestand switch bolt (see **illustration)** and remove the switch.
14 When installing the new sidestand switch, align the positioning pin on the switch with the hole in the sidestand and align the groove in the switch with the pin on the sidestand.
15 Install the sidestand switch retaining bolt and tighten it to the torque listed in this Chapter's Specifications.
16 Installation is otherwise the reverse of the removal procedure. Be sure to route the electrical lead correctly.

23 Clutch switch - check and replacement

Check

1 Disconnect the electrical connectors from the clutch switch **(see illustration 19.1b)**.
2 Connect an ohmmeter to the terminals of the clutch switch. With the clutch lever pulled in, the ohmmeter should show continuity. With the lever out, the ohmmeter should show no continuity.
3 If the switch doesn't check out as described, replace it.

Replacement

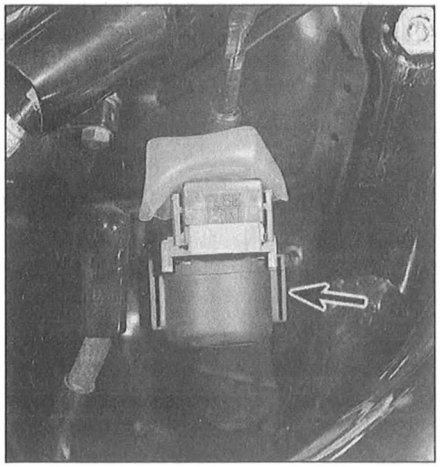
4 Disconnect the electrical connectors from the clutch switch **(see illustration 19.1b)**.
5 Remove the clutch switch from the handlebar bracket.
6 Installation is the reverse of removal.

24 Horn - check and replacement

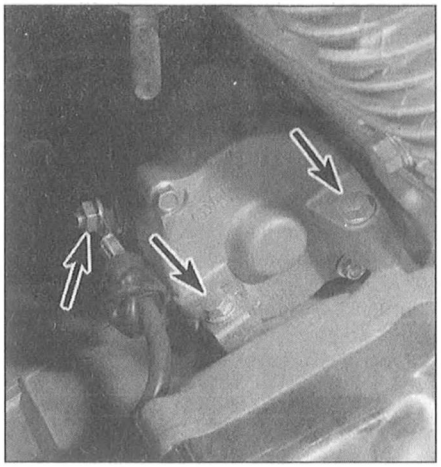
Check

Refer to illustration 24.1

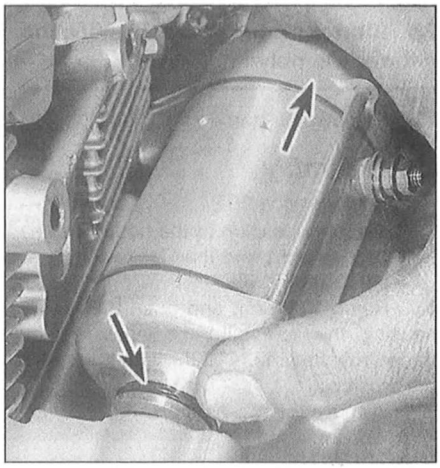
1 Disconnect the electrical connectors from the horn **(see illustration)**. Using two jumper wires, apply battery voltage directly to the terminals on the horn. If the horn sounds, check the switch (see Section 18) and the wiring between the switch and the horn (see the wiring diagrams at the end of this Chapter). The horn wiring harness is connected to the main harness at a black two-pin connector (same connector as the fan motor) behind the steering head. To get to it, remove the steering head covers (see Chapter 8).
2 If the horn doesn't sound, replace it.



25.4 The starter relay (arrow) is mounted in a rubber holder



27.2 Starter cable nut and mounting bolts (arrows); the left bolt secures a ground wire



27.4 Lift the right end of the starter slightly and slide it out to the right; inspect the O-ring (arrow)

Replacement

3 Disconnect the electrical connectors and unbolt the horn **(see illustration 24.1)**.
4 Installation is the reverse of removal.

25 Starter relay switch - check and replacement

Check

Refer to illustration 25.4

1 Make sure the battery is fully charged.
2 Remove the right side cover (see Chapter 8).
3 **Warning:** *Make sure the transmission is in neutral for this step.* Turn the ignition switch to ON and the engine kill switch to RUN. When you push the starter button, the starter relay switch should click.
4 If the starter relay switch doesn't click, unplug the starter relay switch 4-pin electrical connector **(see illustration)** and check for continuity between the terminal for the green/red wire (on the harness side of the connector) and ground.
5 If there is continuity when the transmission is in Neutral or when the clutch is disengaged and the sidestand is up (sidestand switch closed), the ground circuit is okay (you will note a slight resistance in the circuit because of the clutch diode).
6 Reconnect the starter relay switch electrical connector, shift the transmission into Neutral and, using a voltmeter, measure the voltage between the terminal for the yellow/red wire (backprobe the connector) and ground. Battery voltage should be indicated when the starter button is pushed with the ignition switch ON.
7 Unplug the starter relay switch connector again, remove the cable attaching bolts or nuts and disconnect the cables from the relay. Using jumper wires, hook up the positive terminal of a 12-volt battery to the starter relay switch terminal for the yellow/red wire and hook up the negative terminal of the battery to the starter relay terminal for the green/red wire. Using an ohmmeter hooked up to the starter relay cable terminals, verify that there is continuity when the battery is connected to the relay. Disconnect the battery from the relay and verify that there is no continuity across the relay terminals.
8 If the starter relay switch fails any of these tests, replace it.

Replacement

9 Disconnect the battery negative cable.
10 Remove the right side cover (see Chapter 8).
11 Unplug the starter relay switch electrical connector **(see illustration 25.4)**.
12 Remove the cable attaching bolts or nuts and disconnect the cables from the starter relay switch.
13 Remove the starter relay switch.
14 Installation is the reverse of removal. Reconnect the negative battery cable after all the other electrical connections are made.

26 Clutch diode - check and replacement

1 The clutch diode on VT600 models is located in the wiring harness and covered with tape. On VT750 models, it's mounted in the fuse box.
2 The clutch diode has three terminals, one for the green/red wire, one for the light green/red wire and one for the light green wire. The clutch diode allows current to flow through the first two terminals and out the third terminal, but it does not allow current the flow the other way. Think of the first two terminals (green/red wire and light green/red wire) as the "in" terminals; think of the third terminal (light green wire) as the "out" terminal.
3 Using an ohmmeter, verify that there is continuity between each of the "in" terminals and the "out" terminal in one direction, but NOT in the other direction.
4 If the clutch diode fails either of these tests, replace it.
5 Installation is the reverse of removal.

27 Starter motor - removal and installation

Removal

Refer to illustrations 27.2 and 27.4

1 Disconnect the cable from the negative terminal of the battery.
2 Pull back the rubber cover, remove the nut retaining the starter cable to the starter and disconnect the cable **(see illustration)**.
3 Remove the starter mounting bolts.
4 Lift the end of the starter slightly and disengage the starter from the crankcase by pulling it out to the right **(see illustration)**.
5 Inspect the O-ring on the end of the starter and replace it if necessary. Also inspect the teeth on the starter pinion gear and on the reduction gear; make sure the gear teeth are neither chipped nor excessively worn. (With a flashlight, you can inspect the reduction gear teeth through the hole in the case for the starter.)

Installation

6 Apply a little engine oil to the O-ring. Installation is otherwise the reverse of removal. Tighten the starter mounting bolts to the torque listed in this Chapter's Specifications.

28 Starter motor - disassembly, inspection and reassembly

1 Remove the starter motor (see Section 27).

Disassembly

Refer to illustration 28.2

2 Mark the position of the housing to each end cover. Remove the two through-bolts and their lockwashers and detach both end covers **(see illustration)**.

3 Remove the nut and push the terminal bolt through the starter housing, then reinstall the washers and nut on the bolt so you don't forget how they go. Pull the armature out of the housing and remove the brush plate.

4 Remove the two brushes with the plastic holder from the housing.

Inspection

Refer to illustrations 28.5, 28.6, 28.7a, 28.7b, 28.8 and 28.9

5 The parts of the starter motor most likely to require attention are the brushes. Measure the length of the brushes and compare the results to the brush length listed in this Chapter's Specifications **(see illustration)**. If any of the brushes are worn beyond the specified limits, replace the brush holder assembly. If the brushes are not worn excessively, cracked, chipped, or otherwise damaged, they may be re-used.

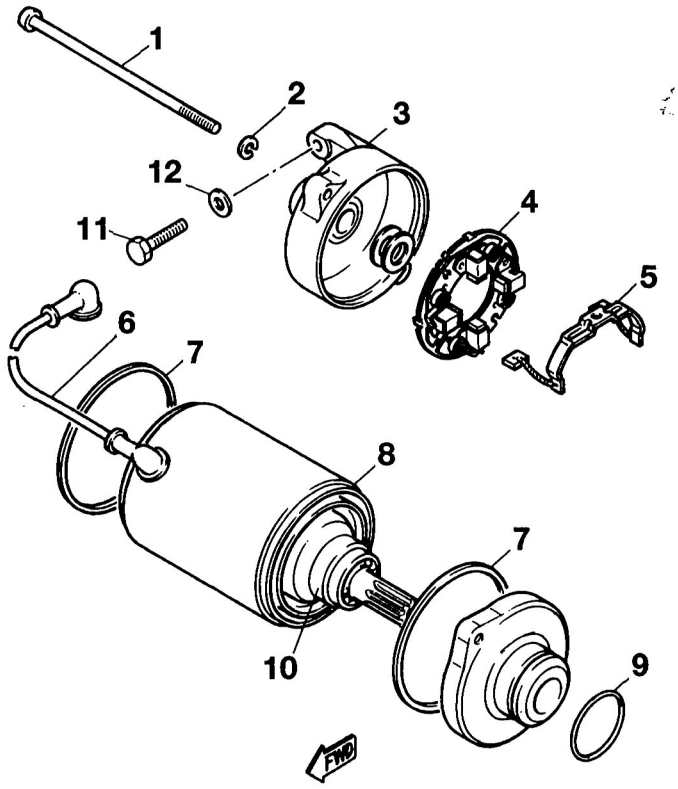
6 Inspect the commutator **(see illustration)** for scoring, scratches and discoloration. The commutator can be cleaned and polished with crocus cloth, but do not use sandpaper or emery paper. After cleaning, wipe away any residue with a cloth soaked in an electrical system cleaner or denatured alcohol. Measure the commutator diameter and compare it to the diameter listed in this Chapter's Specifications. If it is less than the service limit, the motor must be replaced.

7 Using an ohmmeter or a continuity test light, check for continuity between the commutator bars **(see illustration)**. Continuity should exist between each bar and all of the others. Also, check for continuity between the commutator bars and the armature shaft **(see illustration)**. There should be no continuity between the commutator and the shaft. If the checks indicate otherwise, the armature is defective.

8 Check for continuity between the brush plate and the brushes **(see illustration)**. The meter should read close to 0 ohms. If it doesn't, the brush plate has an open and must be replaced.

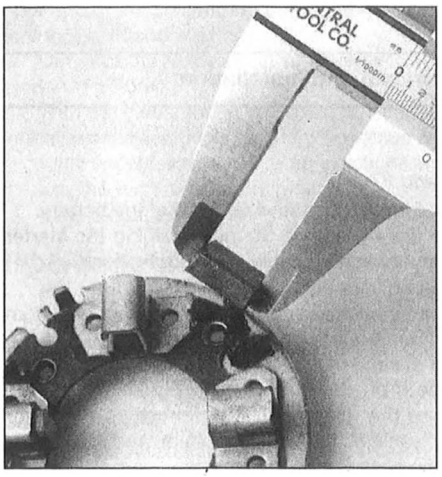
9 Using the highest range on the ohmmeter, measure the resistance between the brush holders and the brush plate **(see illustration)**. The reading should be infinite. If there is any reading at all, replace the brush plate.

10 Check the starter pinion gear for worn, cracked, chipped and broken teeth. If the gear is damaged or worn, replace the starter motor.

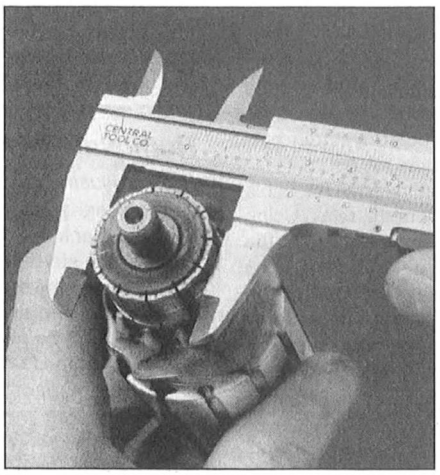


28.2 Starter - exploded view

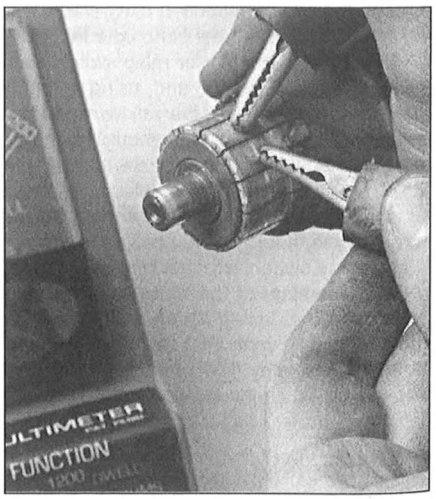
1	*Through-bolt*	6	*Cable*
2	*Lockwasher*	7	*O-rings*
3	*Brush end cover*	8	*Starter housing*
4	*Brush plate*	9	*O-ring*
5	*Plastic brush housing*	10	*Armature*



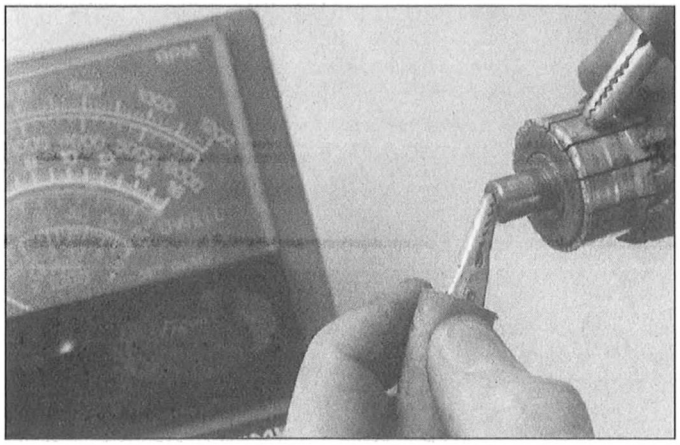
28.5 Measure the length of the brushes and compare the length of the shortest brush with the length listed in this Chapter's Specifications



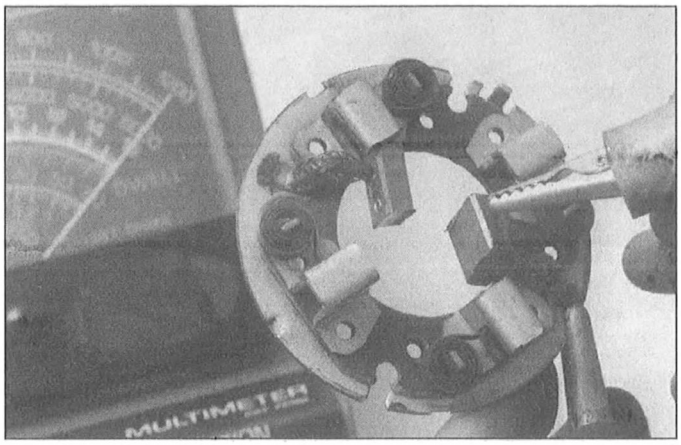
28.6 Check the commutator for cracks and discoloring, then measure the diameter and compare it with the minimum diameter listed in this Chapter's Specifications



28.7a Continuity should exist between the commutator bars



28.7b There should be no continuity between the commutator bars and the armature shaft



28.8 There should be almost no resistance (0 ohms) between the brushes and the brush plate

Reassembly

Refer to illustration 28.14

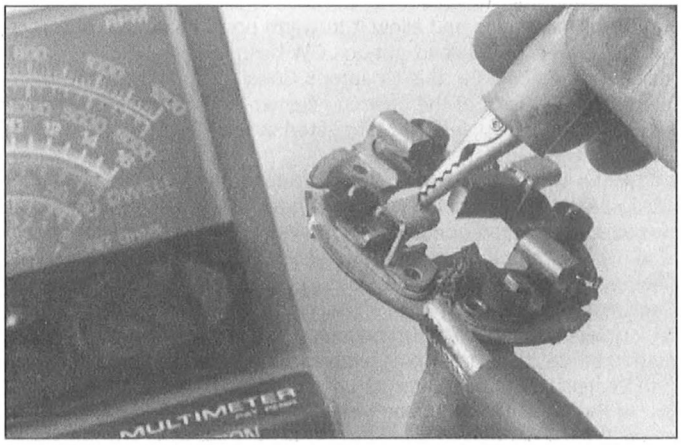
11 Install the brush holder into the housing. Make sure the terminal bolt and washers are assembled in their original order. Tighten the terminal nut securely.

12 Detach the brush springs from the brush plate (this will make armature installation much easier). Install the brush plate into the housing, routing the brush leads into the notches in the plate. Make sure the tongue on the brush plate fits into the notch in the housing.

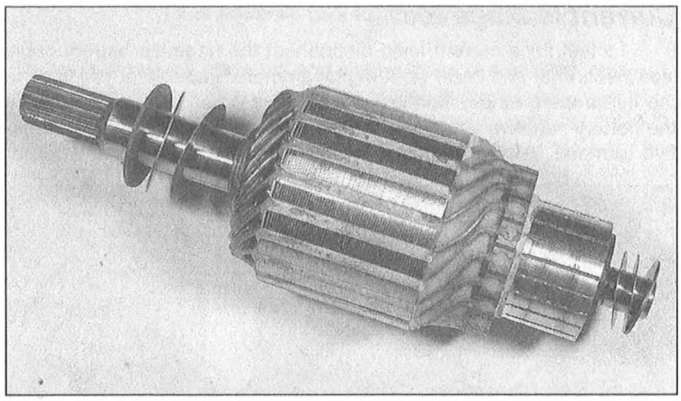
13 Install the brushes into their holders and slide the armature into place. Install the brush springs.

14 Install any washers that were present on the end of the armature shaft **(see illustration)**.

15 Install the end covers, aligning the previously applied match marks (be sure to install the large O-rings between the starter housing and end covers). Install the O-rings and washers (if equipped) on the two through-bolts, then install the through-bolts and tighten them securely.



28.9 There should be no continuity between the brush plate and the brush holders (the resistance reading should be infinite)



28.14 Be sure the shims and washers are in place on both ends of the armature shaft

29 Charging system testing - general information and precautions

1 If the performance of the charging system is suspect, the system as a whole should be checked first, followed by testing of the individual components (the alternator and the voltage regulator/rectifier). **Note:** *Before beginning the checks, make sure the battery is fully charged and that all system connections are clean and tight.*

2 Checking the output of the charging system and the performance of the various components within the charging system requires the use of special electrical test equipment. A voltmeter or a multimeter are the absolute minimum tools required. In addition, an ohmmeter is generally required for checking the remainder of the system.

3 When making the checks, follow the procedures carefully to prevent incorrect connections or short circuits, as irreparable damage to electrical system components may result if short circuits occur. Because of the special tools and expertise required, it is recommended that the job of checking the charging system be left to a dealer service department or a reputable motorcycle repair shop.

30 Charging system - check

Caution: *Never disconnect the battery cables from the battery while the engine is running. If the battery is disconnected, the alternator and regulator/rectifier will be damaged.*

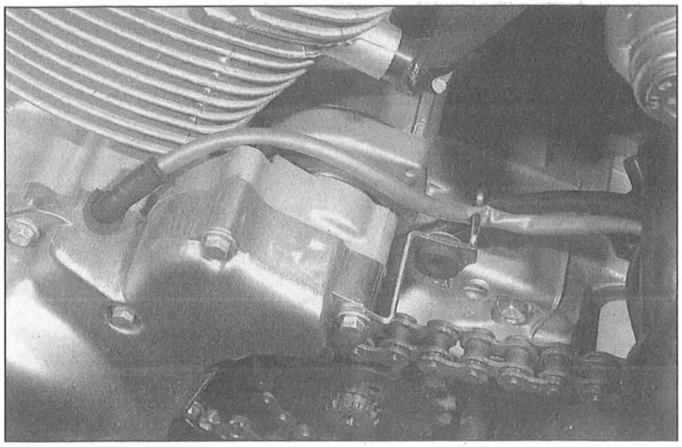
1 To check the charging system output, you will need a voltmeter or a multimeter with a voltmeter function.

2 On VT600 models, remove both side covers; on VT750 models, remove the front seat (see Chapter 8).

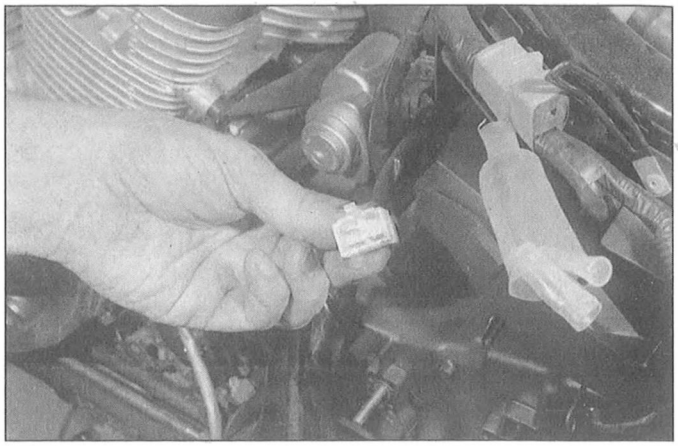
3 The battery must be fully charged (charge it from an external source if necessary) and the engine must be at normal operating temperature to obtain an accurate reading.

Regulated voltage output test

4 Attach the positive (red) voltmeter lead to the positive (+) battery terminal and the negative (black) lead to the battery negative (-) terminal. The voltmeter selector switch (if equipped) must be in a DC volt



31.2a Alternator wire harness routing



31.2b The alternators on all models use a white, three-pin connector located on the left side of the bike, in the area covered by the left side cover

range greater than 15 volts.

5 Start the engine and allow it to warm up to its normal operating temperature. With the headlight on LOW beam and the engine running at the rpm indicated in this Chapter's Specifications, note the regulated voltage output of the charging system and compare your measurement to the regulated output listed in this Chapter's Specifications. Turn off the engine.

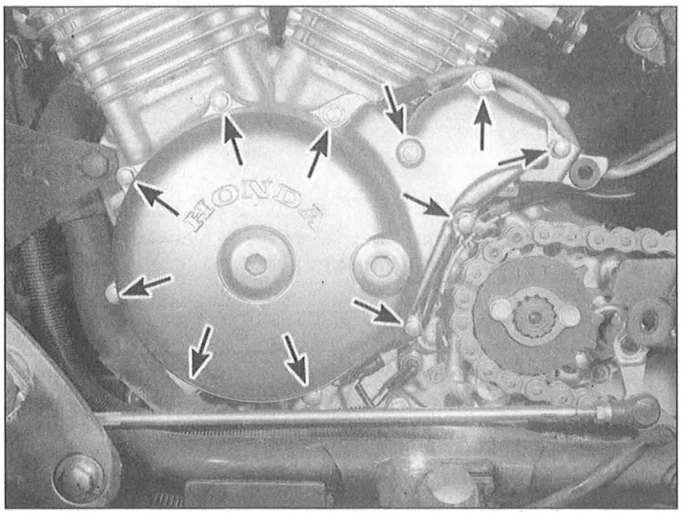
6 If the charging system fails to produce the specified regulated voltage output, there could be an open or a short circuit, or a loose, corroded or shorted connector, somewhere in the charging system wire harness; there could be an open or short in the alternator (see Section 31); or the voltage regulator/rectifier could be defective (see Section 32).

7 If the charging system produces a higher-than-specified voltage output, the regulator/rectifier is either poorly grounded or it's defective (see Section 32), or the battery is defective (see Section 3).

8 If the indicated regulated voltage output is within the specified range, but the battery is frequently discharged, this is an indication that the battery is probably worn out. But it's also possible that there's a current leak.

Current leakage test

9 To test for a current leak, disconnect the negative battery cable (see Section 3) and hook up a digital ammeter capable of readings in the milliampere range. Connect the positive probe of the ammeter to the battery negative cable and the negative probe to the battery negative terminal. With the ignition switch turned to OFF, note whether there is any current leakage. If there is, compare your reading to the permissible current leakage listed in this Chapter's Specifications.



31.8a To remove the left crankcase cover, remove these 11 bolts (arrows) evenly, in a criss-cross fashion

10 If the indicated current leakage exceeds the specified allowable maximum, there's a short circuit somewhere. To locate the circuit where the short is occurring, unplug the harness electrical connectors one by one until the leak stops.

11 If the indicated current leakage is less than the specified allowable maximum, but the battery is frequently discharged, replace the battery (see Section 3).

31 Alternator - check and replacement

Check

Refer to illustrations 31.2a and 31.2b

1 Remove the left side cover (see Chapter 8) and the engine sprocket cover (see Chapter 7).

2 Trace the three-wire harness (all three wires are yellow on all models) from the alternator, on the left side of the engine, to the three-pin white electrical connector and disconnect the connector **(see illustrations)**.

3 Using an ohmmeter, measure the resistance between each terminal and each of the other two terminals of the connector (on the alternator side of the connector, not the wiring harness side). Compare your measurements to the stator coil resistance listed in this Chapter's Specifications.

4 If the reading between any two terminals is outside the range listed in this Chapter's Specifications, replace the stator.

5 If the reading is within the Specifications, refer to the wiring diagrams at the end of the book and check the charging circuit for breaks or poor connections. If the wiring is good, check the voltage regulator/rectifier (see Section 32).

Replacement

Stator

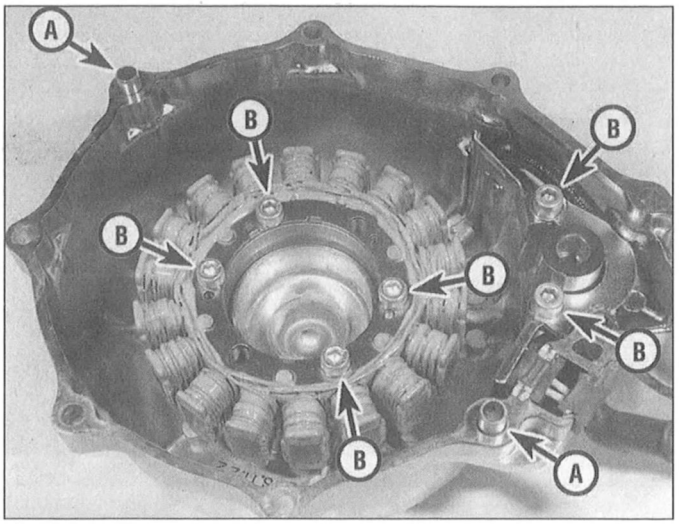
Refer to illustrations 31.8a, 31.8b and 31.15

6 Remove the left side cover (see Chapter 8).

7 Trace the three-wire harness (all three wires are yellow on all models) from the alternator, on the left side of the engine, to the three-pin white electrical connector and disconnect the connector **(see illustrations 31.2a and 31.2b)**.

8 Loosen the left crankcase cover mounting bolts **(see illustration)** evenly in a criss-cross pattern and remove the cover. Remove the dowel pins **(see illustration)**.

9 Remove the two stator wire holder retaining bolts **(see illustration 31.8b)** and remove the stator wire holder. Note how the wire har-



31.8b The stator is mounted inside the left crankcase cover

A Cover dowels *B Stator Allen bolts*

ness is routed in the cover, then disengage it from the cover. Remove the stator retaining bolts and remove the stator assembly.

10 Thoroughly clean the left engine cover with solvent and blow it dry with compressed air.

11 Insert the wire harness and grommets in the cover, install the stator wire holder and the holder bolts, and tighten the holder bolts securely. Install the stator retaining bolts and tighten them to the torque listed in this Chapter's Specifications.

12 Clean all traces of old gasket sealer from the cover and its mating surface on the engine.

13 Make sure there are no metal particles stuck to the rotor magnets.

14 Install the dowel pins. Position a new gasket over the dowels.

15 Install the cover and tighten the cover bolts evenly, in a criss-cross pattern, to the torque listed in this Chapter's Specifications. Route the wiring harness across the top of the crankcase and through the guide attached to the left rear cover bracket **(see illustration)**. Connect the electrical connector.

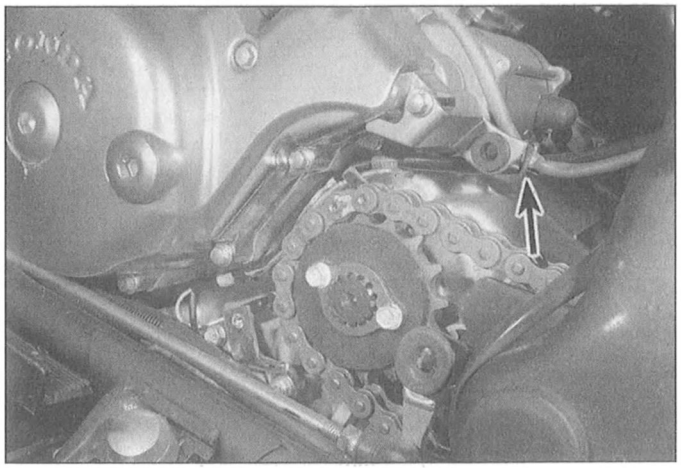
Rotor (flywheel)

Refer to illustrations 31.17, 31.18a, 31.18b and 31.18c

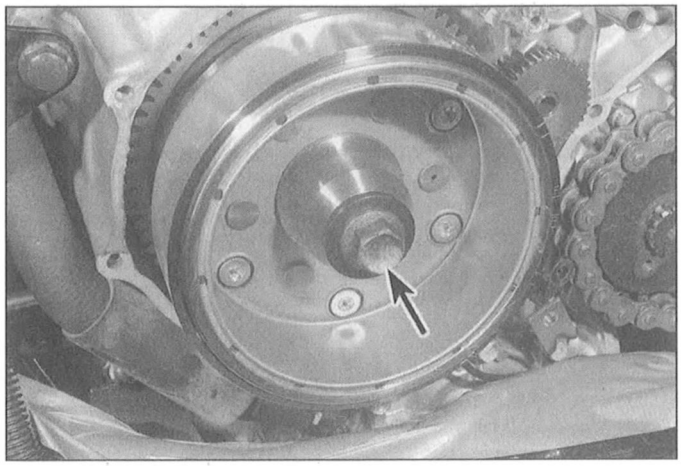
16 Remove the left crankcase cover (see Steps 6, 7 and 8).

17 Install a rotor holder tool (Honda 07725-0040000, or equivalent) to lock the rotor in place. If you don't have a suitable rotor holder tool, shift the transmission into gear and have an assistant apply the rear brake. Remove the rotor bolt and washer **(see illustration)**. **Note:** *The rotor bolt is reverse thread; turn it clockwise to loosen it.*

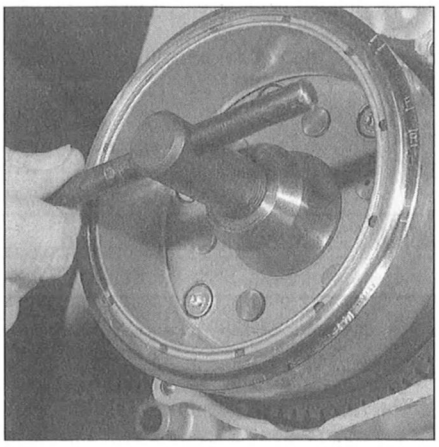
18 Thread a rotor puller (Honda 07733-0020001, or 07933-3290001, or equivalent) into the rotor **(see illustration)**. Remove the rotor from the end of the crankshaft and take the Woodruff key out of its slot **(see illustrations)**.



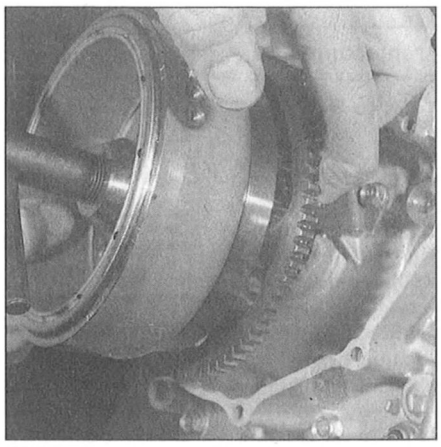
31.15 Note the harness routing under the cover; place the alternator harness in its clip (arrow)



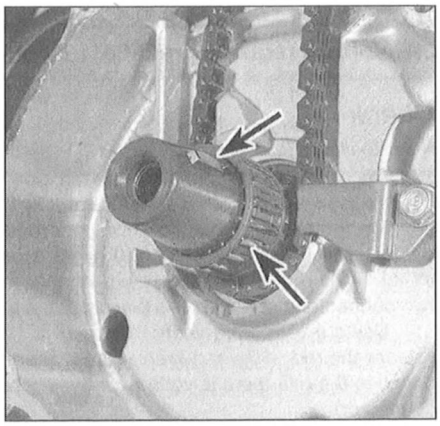
31.17 To detach the rotor (flywheel) from the crankshaft, remove this (reverse-thread) bolt arrow . . .



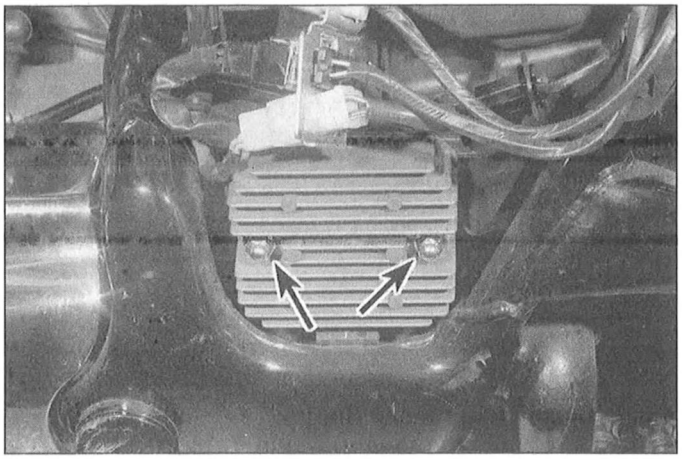
31.18a . . . use a tool like this one to separate the rotor from the crankshaft . . .



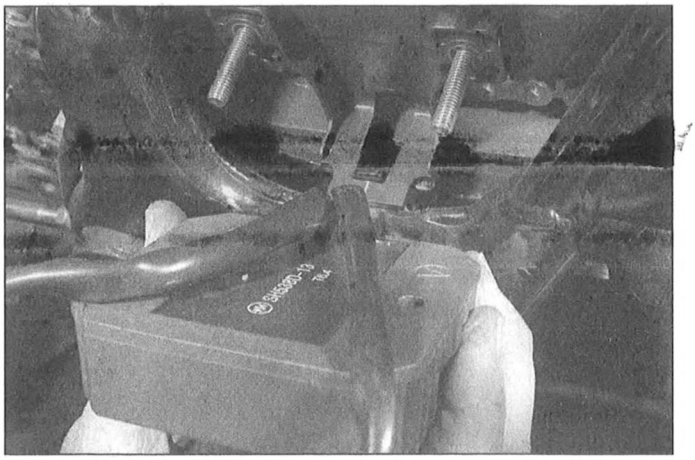
31.18b . . . then take the rotor off . . .



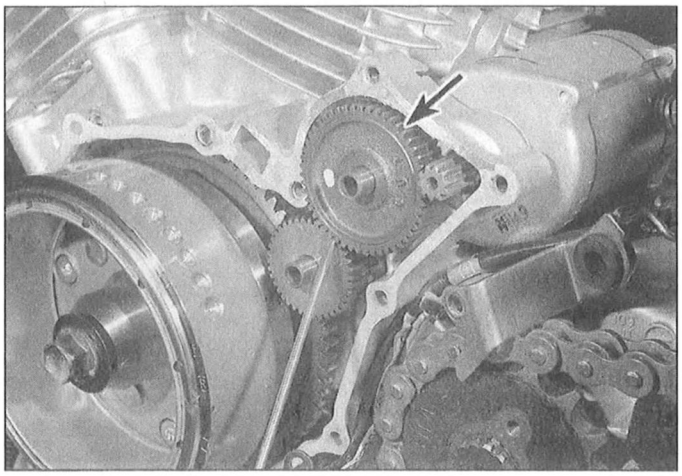
31.18c . . . and lift the Woodruff key (arrow) out of its slot; as long as the rotor is removed, this is a good time to inspect the starter clutch needle bearing (arrow)



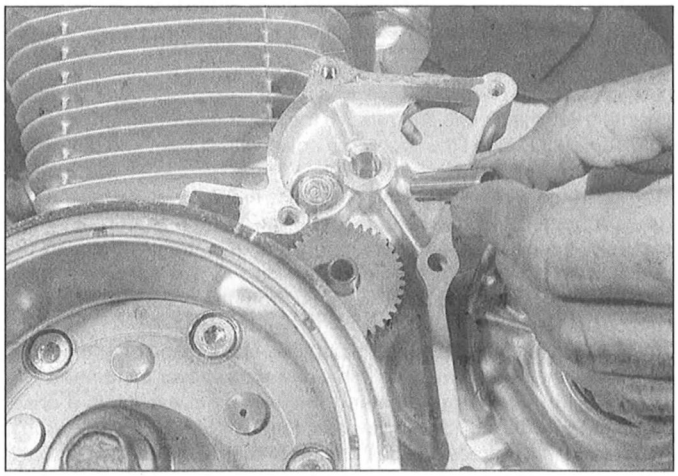
32.2 On VT600 models, remove the regulator/rectifier mounting nuts (arrows) . . .



32.7 . . . and remove the unit



33.2a Remove the starter reduction gear (arrow) . . .



33.2b . . . remove the reduction gear shaft . . .

19 Remove and inspect the starter clutch assembly, if necessary (see Section 33).

20 Installation is the reverse of the removal steps. Be sure to reinstall the Woodruff key. **Caution:** *Make sure no metal objects have stuck to the magnets inside the rotor.* Tighten the rotor bolt to the torque listed in this Chapter's Specifications.

32 Voltage regulator/rectifier - check and replacement

Check

Refer to illustration 32.2

1 On VT600 models, remove the left side cover; on VT750 models, remove the right side cover (see Chapter 8).

2 Trace the wiring harness from the regulator/rectifier to the connector **(see illustration)**. VT600 models use a four-pin connector. VT750C/CD models use a six-pin connector. VT750DC models use two connectors, one with two pins and one with three.

3 Using a voltmeter, verify that there is voltage between the terminals for the red/white and green wires. There shouldn't be any voltage between them (if there is voltage between them, there is a short in the connector).

4 If there is no voltage between the terminals for the red/white and green wires, verify that there *is* voltage between the terminal for the red/white wire and ground. If there is, then you know that there is power to the regulator/rectifier. Finally, using an ohmmeter, verify that there is continuity between the terminal for the green wire and ground. If there is, then you know that the regulator/rectifier output line is good. Replace the voltage regulator/rectifier.

Replacement

Refer to illustration 32.7

5 On VT600 models, remove the left side cover; on VT750 models, remove the right side cover (see Chapter 8).

6 Trace the wiring harness from the regulator/rectifier to the connector(s) (see Step 2).

7 Remove the regulator/rectifier mounting nuts **(see illustration 32.2 and the accompanying illustration)**.

8 Installation is the reverse of removal.

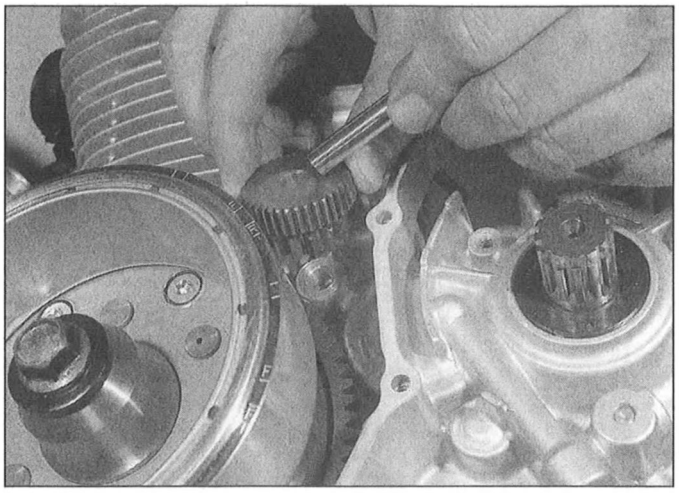
33 Starter clutch assembly - removal, inspection and installation

Refer to illustrations 33.2a, 33.2b, 33.2c, 33.4, 33.6a and 33.6b

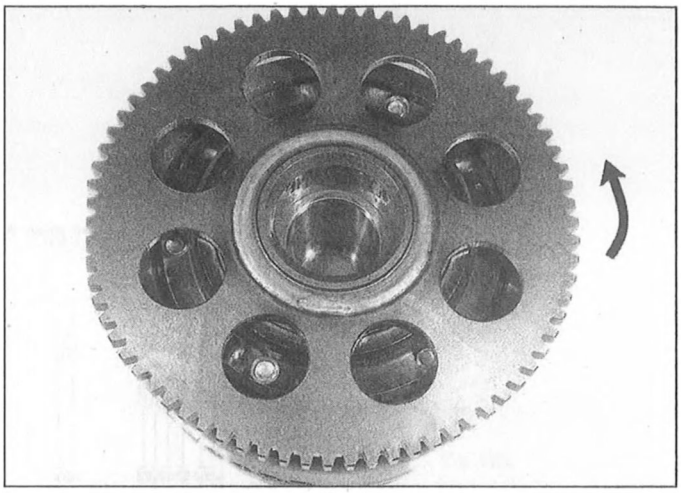
1 Remove the left engine cover (see Section 31).

2 Remove the reduction gear and shaft, and the idle gear and shaft **(see illustrations)**. Inspect the reduction gear and idle gear for wear and chipped teeth. Inspect the gear shafts for scoring and excessive wear. Replace any worn or damaged parts.

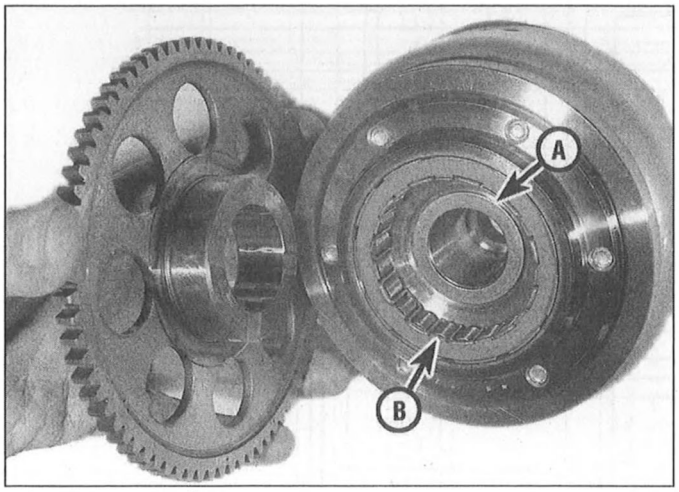
3 Remove the rotor (see Section 31). Remove the needle bearing from the crankshaft **(see illustration 31.18c)**.



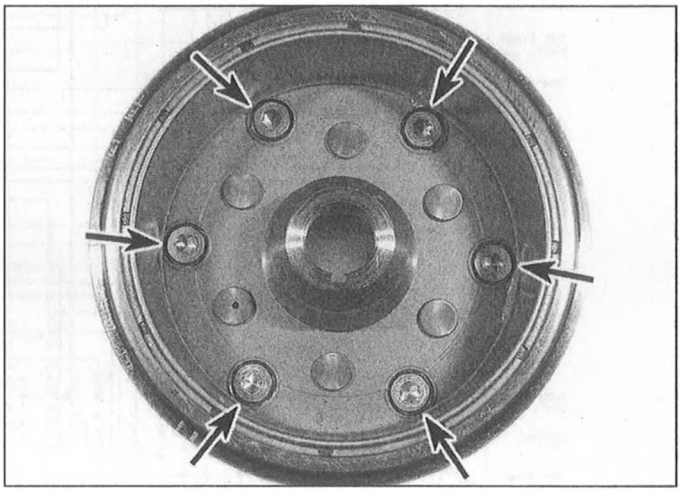
33.2c . . . and remove the idle gear and shaft



33.4 The starter driven gear should turn in one direction only



33.6a Remove the starter driven gear from the rotor, remove the big washer (A) and inspect the sprag (B)



33.6b To detach the clutch housing from the rotor, remove these six Torx bolts

4 Holding the rotor in one hand, with the rotor facing down and the starter clutch facing toward you, verify that the starter clutch turns freely in a counterclockwise direction **(see illustration)**, but not at all in a clockwise direction.

5 If the starter clutch turns in both directions, or will not turn in either direction, remove it from the rotor and inspect the starter clutch assembly.

6 Remove the starter driven gear and the big washer from the rotor **(see illustration)**. Remove the six Torx bolts from the rotor **(see illustration)** and detach the clutch housing and one-way clutch from the rotor. Remove the washer. **Caution:** *On VT750 models, do NOT separate the one-way clutch from the clutch housing unless you are definitely planning to replace it.*

7 Clean all parts thoroughly in clean solvent and blow them dry with compressed air.

8 Inspect the needle bearing, the one-way clutch sprag **(see illustration 33.6a)** and the clutch housing for scoring or other signs of excessive wear. Replace all worn or damaged parts.

9 Measure the inside diameter (I.D.) and outside diameter (O.D.) of the starter driven gear and compare your measurements to the I.D. and O.D. listed in this Chapter's Specifications. If the starter gear hub I.D. is greater than the specified I.D., or if the hub O.D. is less than the specified O.D., replace the starter gear.

10 Apply clean engine oil to the one-way clutch sprags and install the one-way clutch unit into the clutch housing. Install the housing with its flange toward the rotor, install the six Torx bolts and tighten them to the torque listed in this Chapter's Specifications.

11 Lubricate the big washer and install it on the backside of the rotor.

12 Lubricate the outer surface of the starter driven gear hub and install the gear into the clutch housing.

13 The remainder of installation is the reverse of removal.

34 Wiring diagrams

Prior to troubleshooting a circuit, check the fuses to make sure they're in good condition. Make sure the battery is fully charged and check the cable connections.

When checking a circuit, make sure all connectors are clean, with no broken or loose terminals or wires. When unplugging a connector, don't pull on the wires - pull only on the connector housings themselves.

Refer to the table in Chapter 9 for the wire color codes.