

Chapter 9

Electrical system

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Degrees of difficulty

Easy , suitable for novice with little experience		Fairly easy , suitable for beginner with some experience		Fairly difficult , suitable for competent DIY mechanic		Difficult , suitable for experienced DIY mechanic		Very difficult , suitable for expert DIY or professional	
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Specifications

Battery

Capacity	
TDM and TRX models	12V, 10Ah
XTZ models	12V, 14Ah
Voltage – TDM and TRX models	
Fully charged	12.8V
Requires charging	below 12.5V
Specific gravity – XTZ models	
Fully charged	1.280
Requires charging	below 1.280
Charging time – TDM and TRX models	until fully charged (12.8V) (max 6.5 hrs for a flat battery)
Charging rate – XTZ models	0.4A for 10 hrs

Charging system

Current leakage limit	1mA (max)
Regulated voltage output (no load)	14.3 to 15.3V @ 5000 rpm
Alternator nominal output	
TDM and XTZ models	14V, 25A @ 5000 rpm
TRX models	14V, 23.5A @ 5000 rpm
Alternator stator coil resistance	
1991 to 1995 TDM models and XTZ models	0.20 to 0.30 ohms @ 20°C
1996-on TDM models	0.23 to 0.35 ohms @ 20°C
TRX models	0.22 to 0.32 ohms @ 20°C

Starter motor

Brush length	
Standard	12.5 mm
Service limit (min)	5 mm
Commutator diameter	
Standard	28 mm
Service limit (min)	27 mm
Mica depth	0.7 mm
Armature coil resistance	0.01 ohms @ 20°C

Fuses

1991 to 1995 TDM models	
Main	30A
Headlight	20A
Signals	10A
Ignition	10A
Fan	10A
1996 to 1998 TDM models	
Main	30A
Headlight	15A
Signals	15A
Ignition	7.5A
Fan	7.5A
1999 TDM models	
Main	30A
Headlight	15A
Signals	15A
Ignition	10A
Auxiliary light and hazard	10A
Fan	7.5A
Back-up	5A
TRX models	
Main	30A
Headlight	15A
Signals	15A
Ignition	7.5A
Fan	7.5A
XTZ models	
Main	30A
Fan	10A

Bulbs

Headlight	
1991 to 1995 TDM models	35/35W halogen x 2
1996-on TDM models	55W halogen H3 x 2
TRX models	60/55W halogen x 1
XTZ models	35/35W halogen x 2
Auxiliary light	
TDM models	5.0W x 1
TRX models	3.4W x 1
XTZ models	3.4W x 2
Brake/tail light	21/5W
Turn signal lights	21W
Instrument and warning lights – TRX, XTZ and 1991 to 1998 TDM models	
Instrument lights	3.4W, 1.7W
Turn signal indicator light	3.4W
Neutral indicator light	3.4W
High beam indicator light	3.4W
Instrument and warning lights – 1999 TDM models	
Instrument lights	2.0W
Turn signal indicator light	1.4W
Neutral indicator light	1.4W
High beam indicator light	1.4W
Coolant warning light	1.4W
Fuel level warning light	2.0W

Torque settings

Transmission output shaft retainer plate bolts	10 Nm
Starter motor mounting bolts	10 Nm
Alternator rotor screws	7 Nm
Pick-up coil screws	4 Nm
Alternator rotor bolt	130 Nm

1 General information

All models have a 12-volt electrical system charged by a three-phase alternator with a separate regulator/rectifier.

The regulator maintains the charging system output within the specified range to prevent overcharging, and the rectifier converts the ac (alternating current) output of the alternator to dc (direct current) to power the lights and other components and to charge the battery. The alternator rotor is mounted on the left-hand end of the crankshaft.

The starter motor is mounted on the bottom of the engine. The starting system includes the motor, the battery, the relay and the various wires and switches. A safety cut-out circuit prevents the starter motor operating unless the transmission is in neutral or the clutch lever is pulled in and the sidestand is up.

Note: Keep in mind that electrical parts, once purchased, cannot be returned. To avoid unnecessary expense, make very sure the faulty component has been positively identified before buying a new part.

2 Electrical system – fault finding



Warning: To prevent the risk of short circuits, the ignition (main) switch must always be OFF and the battery negative (-ve)

terminal should be disconnected before any of the bike's other electrical components are disturbed. Don't forget to reconnect the terminal securely once work is finished or if battery power is needed for circuit testing.

1 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, refer to the wiring diagrams at the end of this Chapter.

2 Before tackling any troublesome electrical circuit, first study the wiring diagram (see end of Chapter) 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 earth connection, as several circuits often are routed through the same fuse and earth connections.

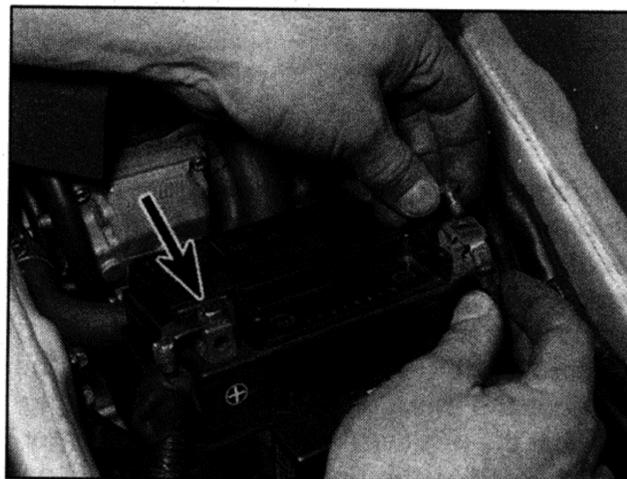
3 Electrical problems often stem from simple causes, such as loose or corroded connections or a blown fuse. Prior to any electrical fault finding, always visually check the condition of the fuse, wires and connections in the problem circuit. Intermittent failures can be especially frustrating, since 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.

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

5 The basic tools needed for electrical fault finding include a battery and bulb test circuit, a continuity tester, a test light, and a jumper wire. A multimeter capable of reading volts, ohms and amps is also very useful as an alternative to the above, and is necessary for performing more extensive tests and checks.



Refer to Fault Finding Equipment in the Reference section for details of how to use electrical test equipment.



3.2a Detach the negative lead first, then the positive (arrowed) . . .

3 Battery – removal, installation, inspection and maintenance



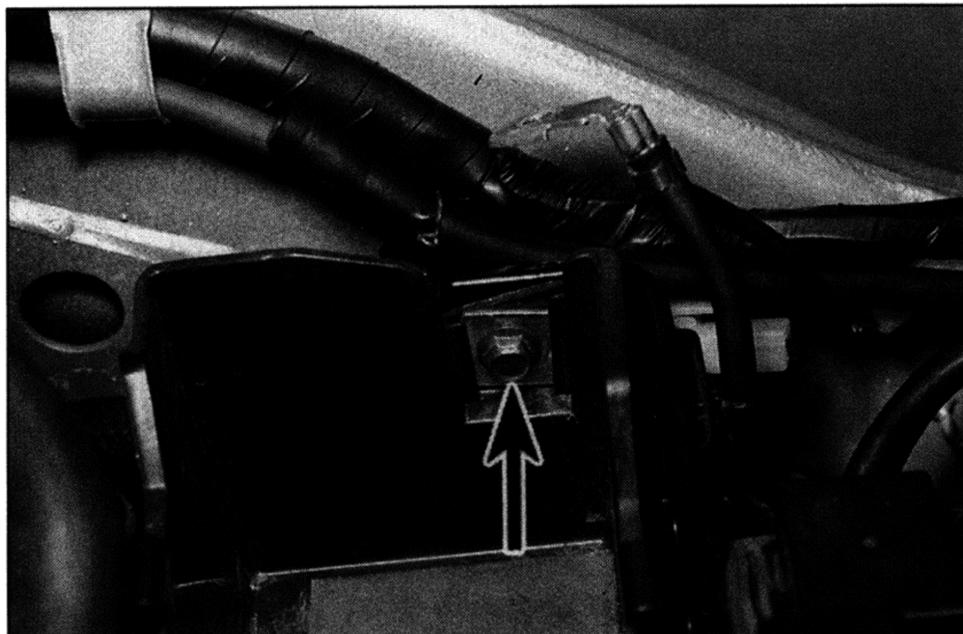
Caution: Be extremely careful when handling or working around the battery. The electrolyte is very caustic and an explosive gas (hydrogen) is given off when the battery is charging.

Removal and installation

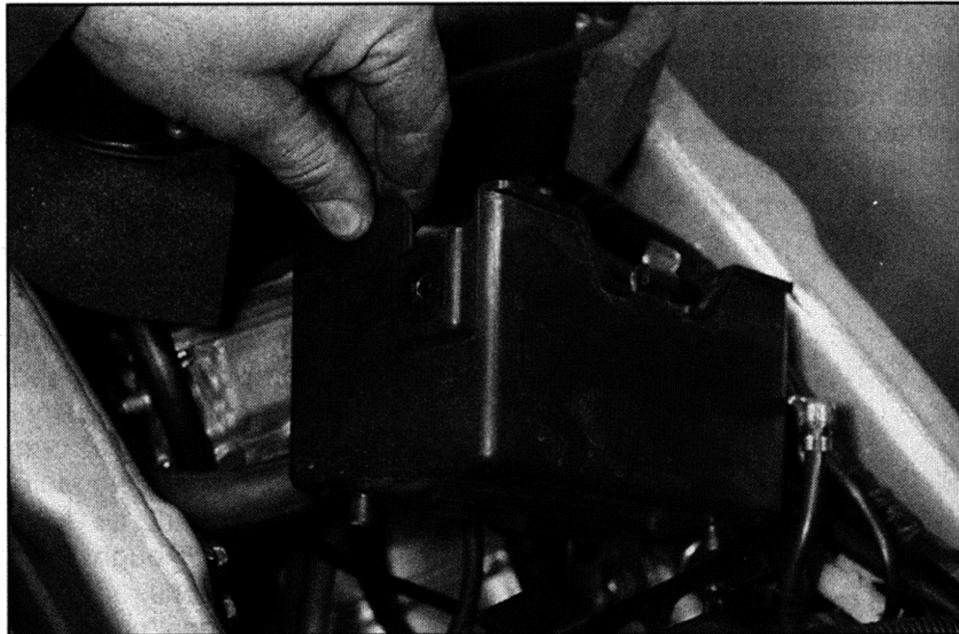
- 1 Remove the seat(s) (see Chapter 8).
- 2 On 1991 to 1995 TDM models, TRX and XTZ models, unscrew the negative (-ve) terminal bolt first and disconnect the lead from the battery (see illustration). Lift up the insulating cover to access the positive (+ve) terminal, then unscrew the bolt and disconnect the lead. Release the battery strap or holder, where fitted, and remove the battery from the bike (see illustration).
- 3 On 1996-on TDM models, lift the insulating cover from the battery negative (-ve) lead terminal on the frame, then remove the terminal screw and detach the lead. Lift the insulating cover from the battery positive (+ve) lead terminal on the starter relay, then remove the terminal screw and detach the lead. Fit the insulating covers back over the lead ends and tape them in place to prevent the lead ends contacting each other and shorting the battery when it is being manoeuvred out of the frame. Remove the two screws securing the battery box, then manoeuvre the box around the right-hand side of the shock absorber and draw it out of the bike. If required, disconnect the leads from the battery, noting which fits where, and lift the battery out of its box.
- 4 On 1991 to 1995 TDM models, if required,



3.2b . . . and remove the battery



3.4a Unscrew the bolt (arrowed) on each side . . .



3.4b . . . and lift out the box

unscrew the two bolts securing the battery box and lift out the box (see illustrations).

5 On installation, clean the battery terminals and lead ends with a wire brush or knife and emery paper. Reconnect the leads, connecting the positive (+ve) terminal first.



Battery corrosion can be kept to a minimum by applying a layer of petroleum jelly to the terminals after the cables have been connected.

6 Install the seat(s) (see Chapter 8).

Inspection and maintenance

7 The battery fitted to XTZ models is of the conventional lead/acid type, requiring regular checks of the electrolyte level, as described in Chapter 1, in addition to those detailed below.

8 The battery fitted to TDM and TRX models is of the maintenance free (sealed) type, therefore requiring no specific maintenance. However, the following checks should still be regularly performed.

9 Check the battery terminals and leads for tightness and corrosion. If corrosion is evident, unscrew the terminal screws and disconnect the leads from the battery, disconnecting the negative (-ve) terminal first, and clean the terminals and lead ends with a wire brush or knife and emery paper. Reconnect the leads, connecting the negative (-ve) terminal last, and apply a thin coat of petroleum jelly to the connections to slow further corrosion.

10 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. Rinse the battery thoroughly, then dry it.

11 Look for cracks in the case and renew the battery if any are found. If acid has been spilled on the frame or battery box, neutralise it with a baking soda and water solution, dry it

thoroughly, then touch up any damaged paint.

12 If the motorcycle sits unused for long periods of time, disconnect the cables from the battery terminals, negative (-ve) terminal first. Refer to Section 4 and charge the battery once every month to six weeks.

13 The condition of the battery can be assessed by measuring the voltage present at the battery terminals. Connect the voltmeter positive (+ve) probe to the battery positive (+ve) terminal, and the negative (-ve) probe to the battery negative (-ve) terminal. When fully charged there should be more than 12.5 volts present. If the voltage falls below 12.5 volts the battery must be removed, disconnecting the negative (-ve) terminal first, and recharged as described in Section 4.

14 On XTZ models, if available, an hydrometer should be used to measure the specific gravity of the electrolyte. Remove the battery and its cell caps, then measure each cell in turn. If the reading is below the level specified, the battery should be recharged.



Refer to 'Fault Finding Equipment' in the Reference section for more information on battery voltage and specific gravity checks.

4 Battery - charging

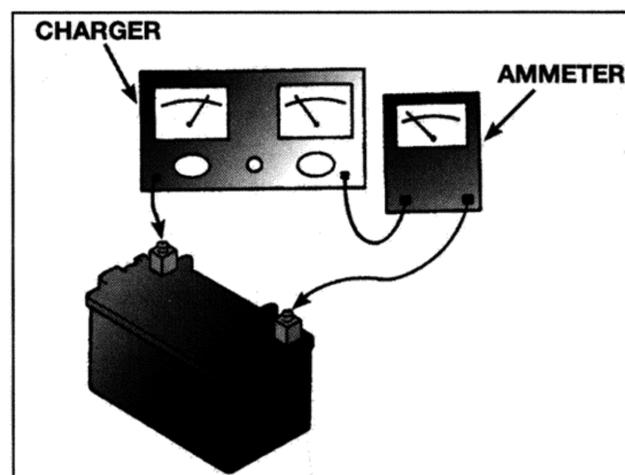


Caution: Be extremely careful when handling or working around the battery. The electrolyte is very caustic and an explosive gas (hydrogen) is given off when the battery is charging.

1 Remove the battery (see Section 3). Connect the charger to the battery, making sure that the positive (+ve) lead on the charger is connected to the positive (+ve) terminal on the battery, and the negative (-ve) lead is connected to the negative (-ve) terminal.

2 If the battery is fully discharged, Yamaha recommend that the battery should be charged for a maximum of 6.5 hours (TDM and TRX models) or at a maximum rate of 0.4 amps for 10 hours (XTZ models). If the battery was partially charged, the battery should be charged until the voltage across the terminals reaches 12.8 V, or on XTZ models until the specific gravity is at its correct reading (see above). Exceeding this can cause the battery to overheat, buckling the plates and rendering it useless. Few owners will have access to an expensive current controlled charger, so if a normal domestic charger is used check that after a possible initial peak, the charge rate falls to a safe level (see illustration). If the battery becomes hot during charging stop. Further charging will cause damage. **Note: In emergencies the battery can be charged at a higher rate of around 3.0 amps for a period of 1 hour. However, this is not recommended and the low amp charge is by far the safer method of charging the battery.**

3 If the recharged battery discharges rapidly if left disconnected it is likely that an internal short caused by physical damage or sulphation has occurred. A new battery will be required. A sound item will tend to lose its charge at about 1% per day.



4.2 If the charger doesn't have ammeter built in, connect one in series as shown. **DO NOT** connect the ammeter between the battery terminals or it will be ruined



5.1a Fusebox – TDM models



5.1b Fusebox – TRX models

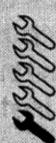


5.1c Cooling fan fuse – XTZ models

4 Install the battery (see Section 3).

5 If the motorcycle sits unused for long periods of time, charge the battery once every month to six weeks and leave it disconnected.

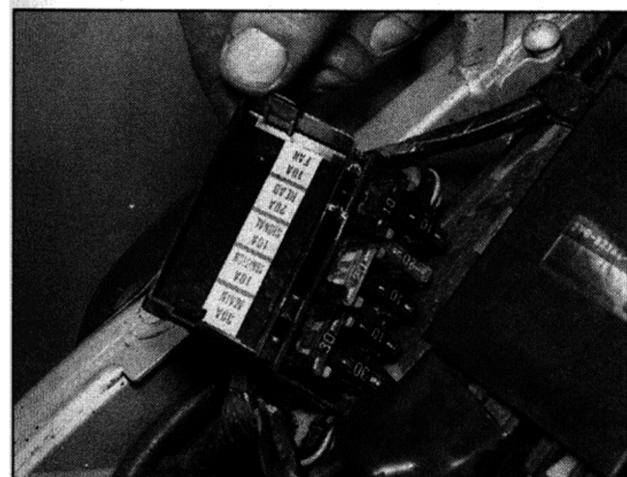
5 Fuses – check and renewal



1 The electrical system is protected by fuses of different ratings. On TDM and TRX models, the fuses are housed in the fusebox, which is located under the seat (**see illustration**), although on 1996-on TDM and all TRX models the main fuse is located on the starter relay (see Section 27). On XTZ models, the main fuse is housed in the battery bracket on the front of the battery, while the cooling fan fuse is fitted in line with the wiring for the fan (**see illustration**).

2 To access the fuses on TDM and TRX models, remove the seat (see Chapter 8) and unclip the fusebox lid (**see illustration**). On XTZ models, remove the left-hand side cover to access the main fuse (see Chapter 8), and the fuel tank to access the cooling fan fuse (see Chapter 4).

3 The fuses can be removed and checked visually. If you can't pull the fuse out with your fingertips, use a pair of suitable pliers. TDM and TRX models use flat-blade type fuses and the XTZ model uses glass cartridge type fuses. A blown fuse is easily identified by a break in the element (**see illustration**). Each



5.2 On TDM and TRX models, unclip the fusebox lid to access the fuses

fuse is clearly marked with its rating and must only be replaced by a fuse of the correct rating. A spare fuse of each rating is housed in the fusebox on TDM and TRX models, and a spare main fuse in the battery bracket on XTZ models. If a spare fuse is used, always renew it so that a spare of each rating is carried on the bike at all times.



Warning: Never put in a fuse of a higher rating or bridge the terminals with any other substitute, however temporary it may be. Serious damage may be done to the circuit, or a fire may start.

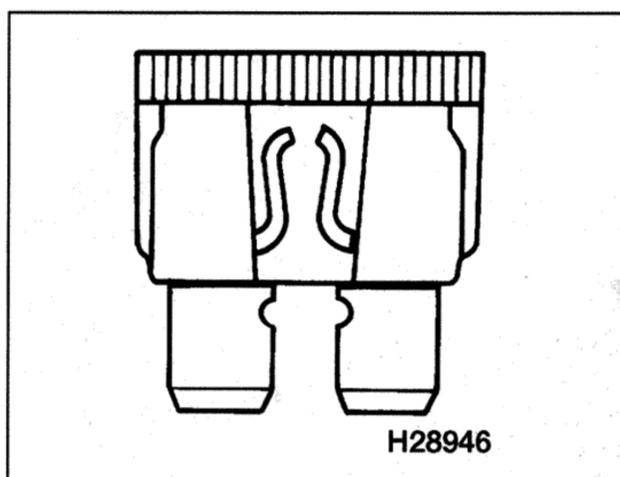
4 If a fuse blows, be sure to check the wiring circuit very carefully for evidence of a short-circuit. Look for bare wires and chafed, melted or burned insulation. If the fuse is renewed before the cause is located, the new fuse will blow immediately.

5 Occasionally a fuse will blow or cause an open-circuit for no obvious reason. Corrosion of the fuse ends and fusebox 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.

6 Lighting system – check



1 The battery provides power for operation of the headlight, tail light, brake light, turn



5.3 A blown fuse can be identified by a break in its element – flat-blade type fuse

signals and instrument cluster lights. If none of the lights operate, always check battery voltage before proceeding. Low battery voltage indicates either a faulty battery or a defective charging system. Refer to Section 3 for battery checks and Sections 30 and 31 for charging system tests. Also, check the condition of the fuses. When checking for a blown filament in a bulb, it is advisable to back up a visual check with a continuity test of the filament as it is not always apparent that a bulb has blown. When testing for continuity, remember that on tail light and turn signal bulbs it is often the metal body of the bulb which is the earth.

Headlight

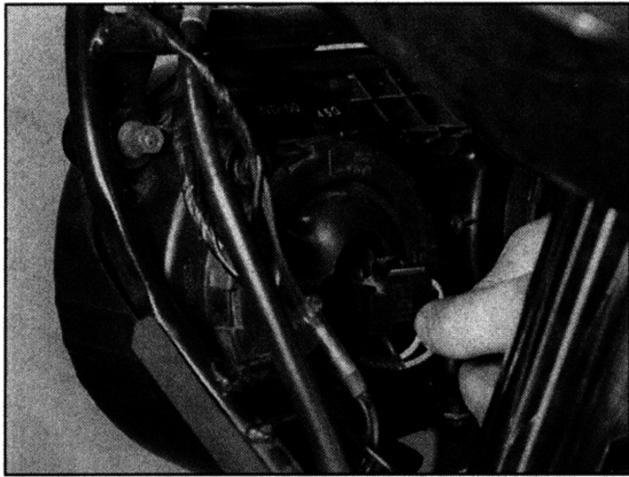
2 If the headlight fails to work, first check the fuse with the key ON (see Section 5), and then the bulb (see Section 7). If they are both good, use jumper wires to connect the bulb directly to the battery terminals. If the light comes on, the problem lies in the wiring or one of the switches in the circuit. Refer to Section 19 for the switch testing procedures, and also the wiring diagrams at the end of this Chapter.

3 On 1996 to 1998 TDM models, a diode is fitted in the headlight circuit (see *Wiring Diagrams* at the end of the Chapter). To test the diode, disconnect it from the harness. Using an ohmmeter or continuity tester, connect the positive (+ve) probe to the female terminal of the diode and the negative (-ve) probe to the male terminal. The diode should show continuity. Now reverse the probes. The diode should show no continuity. If it doesn't behave as stated, renew the diode. The diode is located on the left-hand side of the headlight assembly.

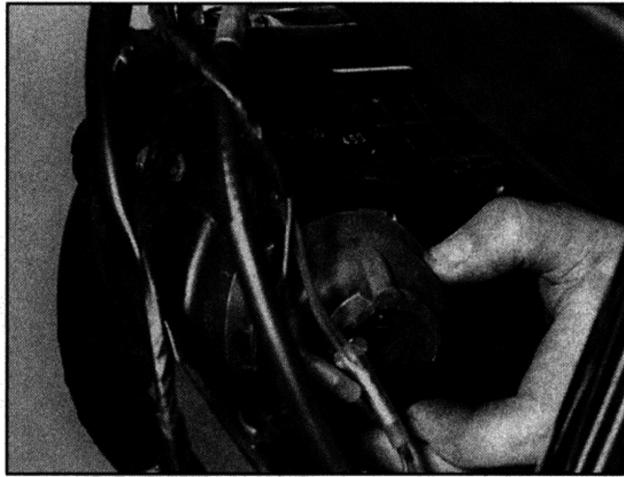
Tail light

4 If the tail light fails to work, check the bulbs and the bulb terminals first (see Section 9), then the fuse, then check for battery voltage at the blue/red (TDM and XTZ models), or blue (TRX models) terminal on the supply side of the tail light wiring connector. If voltage is present, check the earth circuit for an open or poor connection.

5 If no voltage is indicated, check the wiring between the tail light and the ignition switch,



7.2a Disconnect the wiring connector . . .



7.2b . . . and remove the dust cover

then check the switch. Also check the lighting switch.

Brake light

6 If the brake light fails to work, check the bulbs and the bulb terminals first (see Section 9), then the fuse, then check for battery voltage at the yellow (TDM and TRX models) or green/yellow (XTZ models) terminal on the supply side of the tail light wiring connector, with the brake lever pulled in or the pedal depressed. If voltage is present, check the earth circuit for an open or poor connection.

7 If no voltage is indicated, check the brake light switches, then the wiring between the tail light and the switches.

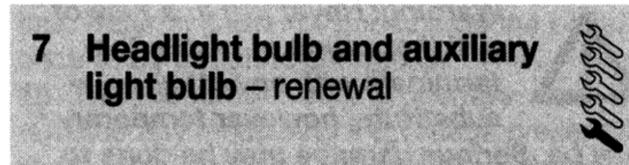
8 See Section 14 for brake switch check and Section 9 for tail light bulb renewal.

Instrument and warning lights

9 See Section 17 for instrument and warning light bulb renewal.

Turn signal lights

10 See Section 11 for turn signal circuit check.



Note: The headlight bulb is of the quartz-halogen type. Do not touch the bulb glass as skin acids will shorten the bulb's service life. If the bulb is accidentally touched, it

should be wiped carefully when cold with a rag soaked in methylated spirit and dried before fitting.



Warning: Allow the bulb time to cool before removing it if the headlight has just been on.

Headlight

1 For best access to the headlight bulb(s), remove the fairing on TDM models and the relevant fairing side panel on XTZ models (see Chapter 8).

2 Disconnect the relevant wiring connector from the back of the headlight assembly and remove the rubber dust cover, noting how it fits (see illustrations).

3 Release the bulb retaining ring or clip, noting how it fits, then remove the bulb (see illustrations).

4 Fit the new bulb, bearing in mind the information in the **Note** above. Make sure the tabs on the bulb fit correctly in the slots in the bulb housing, and secure it in position with the retaining ring or clip.

5 Install the dust cover, making sure it is correctly seated and with the TOP mark at the top, and connect the wiring connector.

6 Check the operation of the headlight.



Always use a paper towel or dry cloth when handling new bulbs to prevent injury if the bulb should break and to increase bulb life.



7.3a Remove the ring . . .

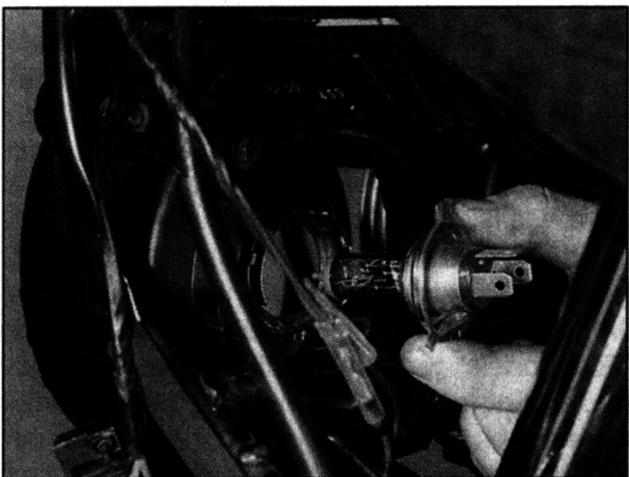


7.3b . . . or release the clip . . .

Auxiliary light

7 On TDM models, remove the screws securing the auxiliary light lens and remove the lens (see illustration). Carefully pull the bulb out of its holder and install the new one, then refit the lens (see illustration). Do not overtighten the screws as the lens could crack.

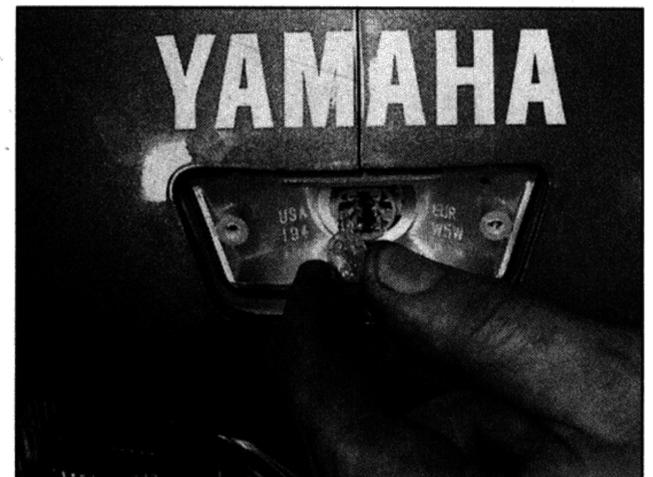
8 On XTZ models, for best access remove the relevant fairing side panel (see Chapter 8). On TRX and XTZ models, release the bulbholder from its socket in the base of the headlight, then press the bulb in and twist it anti-



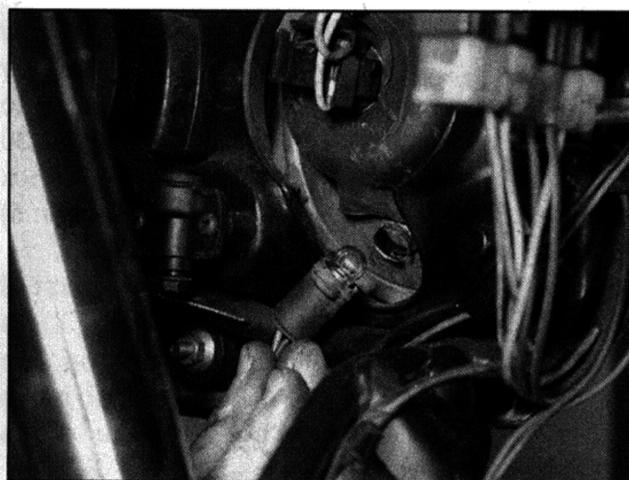
7.3c . . . and remove the bulb



7.7a Remove the screws (arrowed) and the lens . . .



7.7b . . . and pull out the bulb



7.8 Pull the bulbholder out of the base of the headlight



8.2a Removing the headlight – TRX models



8.2b Removing the headlight – XTZ models

clockwise to release it from the holder (see illustration). Install the new bulb in the bulbholder, then install the bulbholder in the headlight. Make sure the rubber cover is correctly seated.

9 Check the operation of the auxiliary light.

8 Headlight assembly – removal and installation

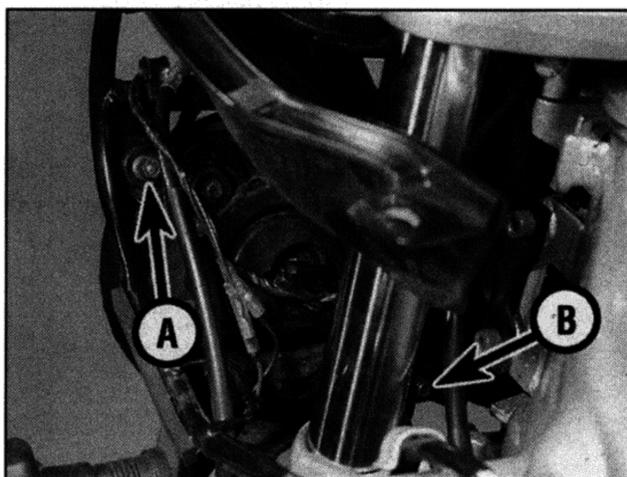


Removal

- 1 Remove the fairing (see Chapter 8).
- 2 On 1996-on TDM models, TRX and XTZ models, lift the headlight out of the fairing (see illustration).
- 3 On 1991 to 1995 TDM models, disconnect the headlight wiring connectors (see illustration 7.2a), then unscrew the three nuts securing the headlight assembly to the bracket and draw the assembly forward and off the bracket (see illustrations).
- 4 On 1991 to 1995 TDM models and XTZ models, the headlight can be disassembled and the lights renewed individually if required.

Installation

5 Installation is the reverse of removal. Make sure all the wiring is correctly connected and secured. Check the operation of the headlight



8.3a Unscrew the nut on each side (A), and the central nut on the bottom (B) . . .

and auxiliary light. Check the headlight aim (see Chapter 1).



8.3b . . . and remove the headlight assembly

withdraw it from the tail light (see illustration).

3 Push the bulb into the holder and twist it anti-clockwise to remove it (see illustration). Check the socket terminals for corrosion and clean them if necessary. Line up the pins of the new bulb with the slots in the socket, then push the bulb in and turn it clockwise until it locks into place. **Note:** The pins on the bulb are offset so it can only be installed one way. It is a good idea to use a paper towel or dry cloth when handling the new bulb to prevent injury if the bulb should break and to increase bulb life.

4 Install the bulbholder into the tail light and turn it clockwise to secure it.

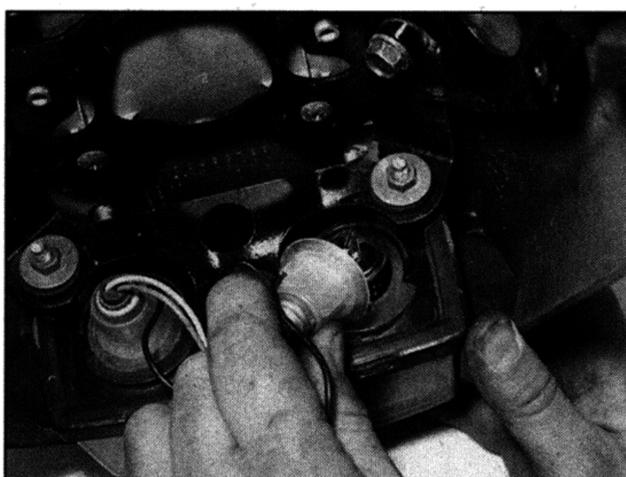
9 Brake/tail light bulb – renewal



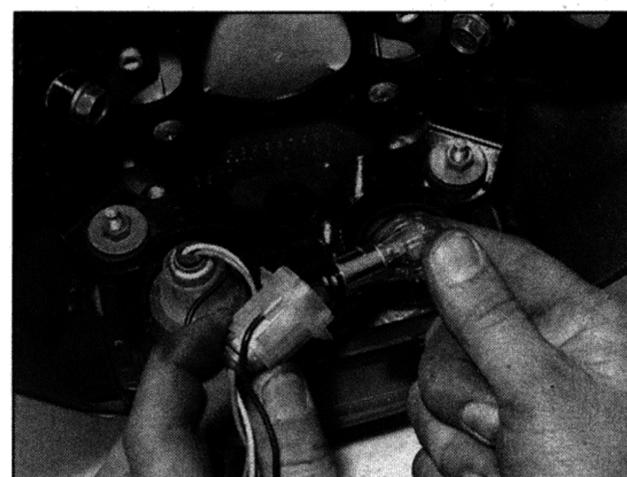
- 1 On TDM models, remove the seat (see Chapter 8). On TRX models, remove the passenger seat, though best access is obtained by removing the side covers as well (see Chapter 8). On XTZ models open the storage compartment cover behind the seat and remove the cover (see illustration).
- 2 Turn the bulbholder anti-clockwise and



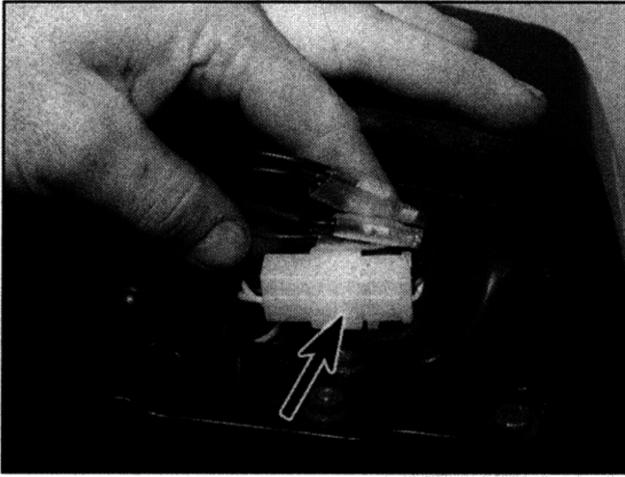
9.1 On XTZ models, remove the storage cover to access the bulbs



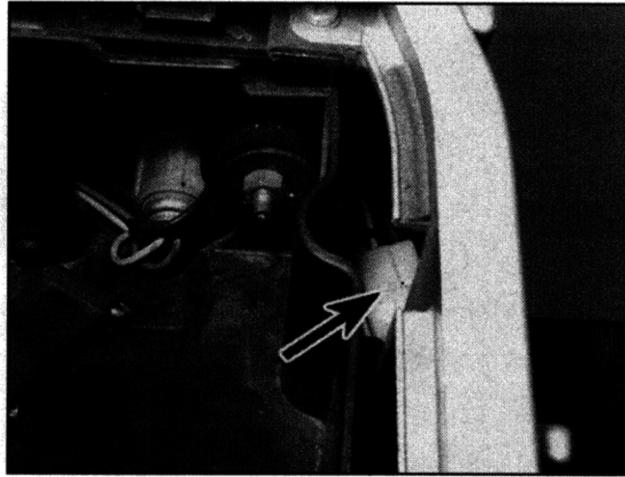
9.2 Release the bulbholder . . .



9.3 . . . and remove the bulb



10.2a Tail light wiring connector (arrowed) - TRX models

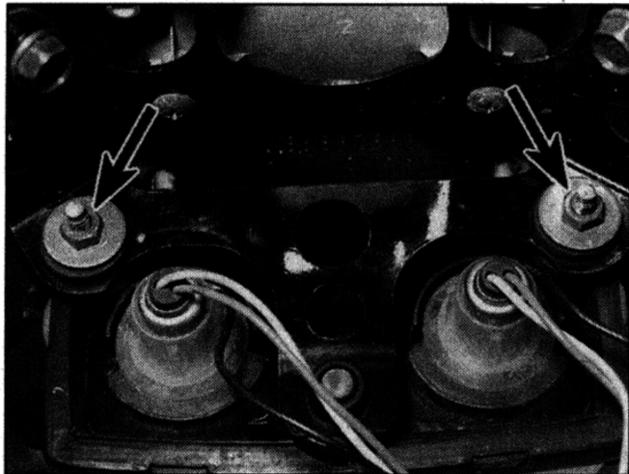


10.2b Tail light wiring connector (arrowed) - XTZ models

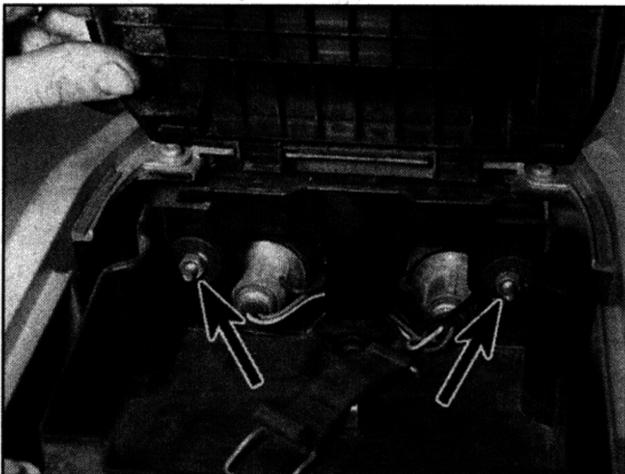
10 Tail light assembly - removal and installation

Removal

- 1 On TDM and TRX models remove the side covers (see Chapter 8). On XTZ models open the storage compartment cover behind the seat and remove the cover (see illustration 9.1).
- 2 On TRX and XTZ models, disconnect the tail light wiring connector (see illustrations).
- 3 Unscrew the nuts securing the tail light assembly to either the side cover assembly (TDM models) or the frame (TRX and XTZ models) and carefully remove it noting how it



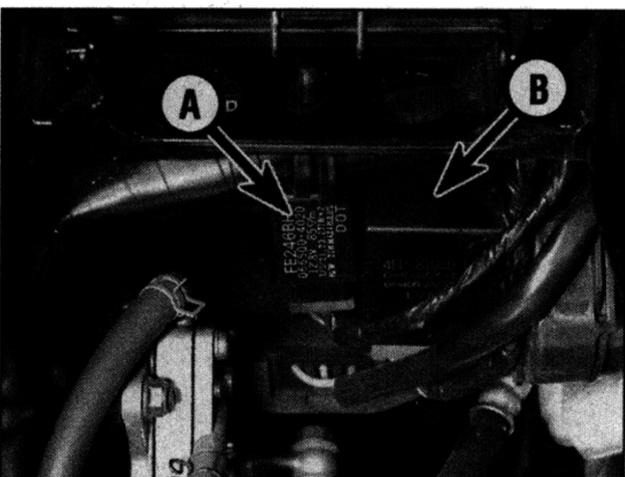
10.3a Tail light assembly nuts (arrowed) - TDM models



10.3b Tail light assembly nuts (arrowed) - XTZ models



11.3a Turn signal relay (arrowed) - TDM models



11.3b Turn signal relay (A), starter circuit cut-off relay (B) - TRX models

always check the battery voltage first. Low battery voltage indicates either a faulty battery or a defective charging system. Refer to Section 3 for battery checks and Sections 30 and 31 for charging system tests. Also, check the fuse (except XTZ models) (see Section 5) and the switch (see Section 19).

2 Most turn signal problems are the result of a burned out bulb or corroded socket. This is especially true when the turn signals function properly in one direction, but fail to flash in the other direction. Check the bulbs and the sockets (see Section 12).

3 The relay is mounted under the seat on TDM and TRX models, and behind the fairing on XTZ models (see illustrations). Remove the seat or fairing for access (see Chapter 8). If the bulbs and sockets are good, check for voltage at the turn signal relay brown wire (brown/red on 1997-on UK models) with the ignition ON. If no voltage is present, using the appropriate wiring diagram at the end of this Chapter check the wiring between the relay and the ignition (main) switch. On 1999 TDM models, if there's no voltage check the hazard relay as described below.

4 If voltage was present, check for voltage at the relay brown/white wire with the ignition ON. If no voltage is present, renew the relay. If voltage is present, check the wiring between the relay, turn signal switch and turn signal lights for continuity. Turn the ignition OFF when the check is complete.

Hazard relay (1999 TDM models)

5 If there's no voltage at the flasher relay brown/red wire (see Step 3) check for voltage at the hazard relay brown wires with the ignition ON. If no voltage is shown check the signal fuse and the wiring between the fuse and hazard relay for a break or bad connection.

6 Also check for voltage at the hazard relay blue/red wire with the ignition ON; if no voltage is shown check the hazard fuse and the wiring between the hazard fuse and hazard relay. Finally check the brown/red wire from the hazard relay to the flasher relay for a break or bad connection. If the fault still exists, renew the hazard relay.

fits (see illustrations). If required, turn the bulbholders anti-clockwise and withdraw them from the tail light.

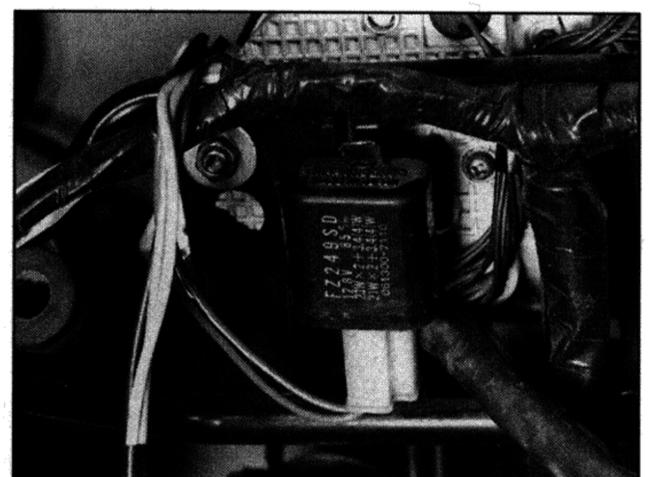
Installation

4 Installation is the reverse of removal. Check the operation of the tail light and the brake light.

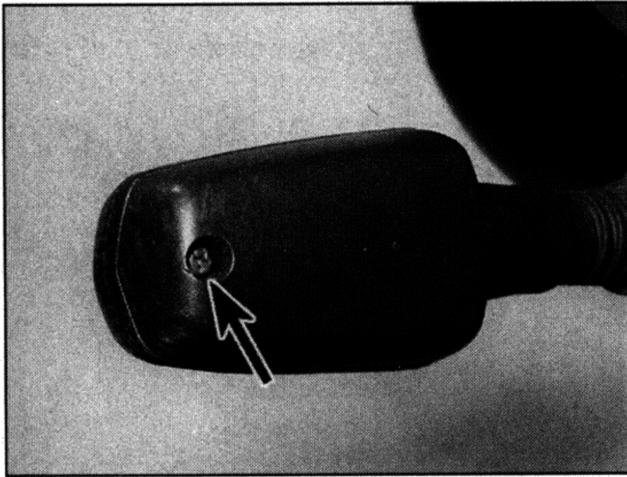
11 Turn signal circuit - check

Flasher relay

1 The battery provides power for operation of the turn signal lights, so if they do not operate,



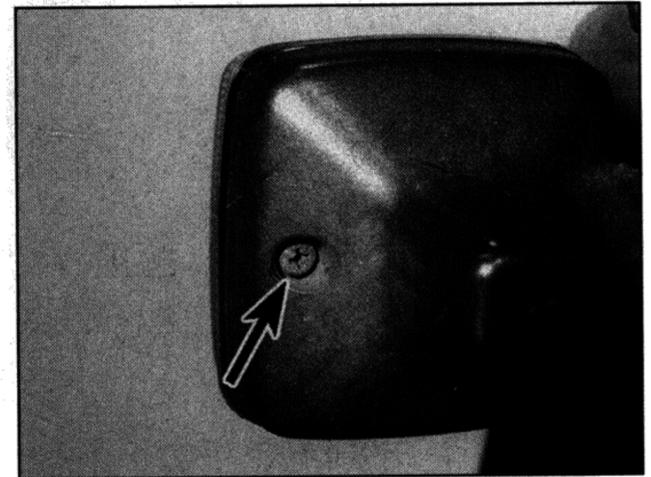
11.3c Turn signal relay (arrowed) - XTZ models



12.1a Turn signal lens screw (arrowed) – TDM models



12.1b Turn signal lens screw (arrowed) – TRX models



12.1c Turn signal lens screw (arrowed) – XTZ models

12 Turn signal bulbs – renewal



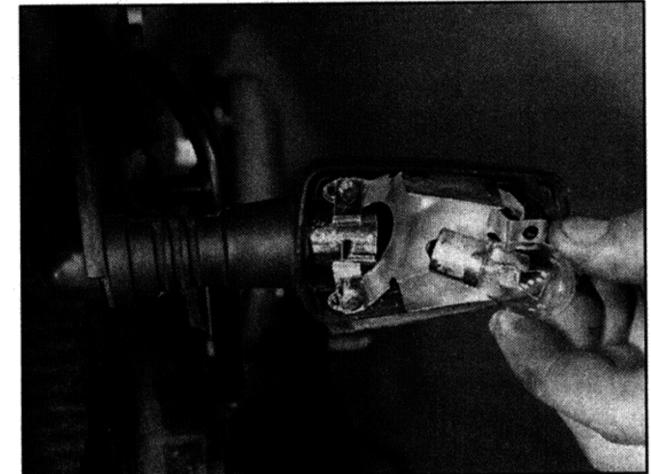
1 Remove the screw securing the turn signal lens and remove the lens, noting how it fits (see illustrations).

2 Push the bulb into the holder and twist it anti-clockwise to remove it (see illustration). Check the socket terminals for corrosion and clean them if necessary. Line up the pins of the new bulb with the slots in the socket, then push the bulb in and turn it clockwise until it locks into place.

3 Fit the lens onto the holder. Do not overtighten the screw as the lens or threads could be damaged.



12.1d Remove the screw and detach the lens ...



12.2 ... and remove the bulb

13 Turn signal assemblies – removal and installation

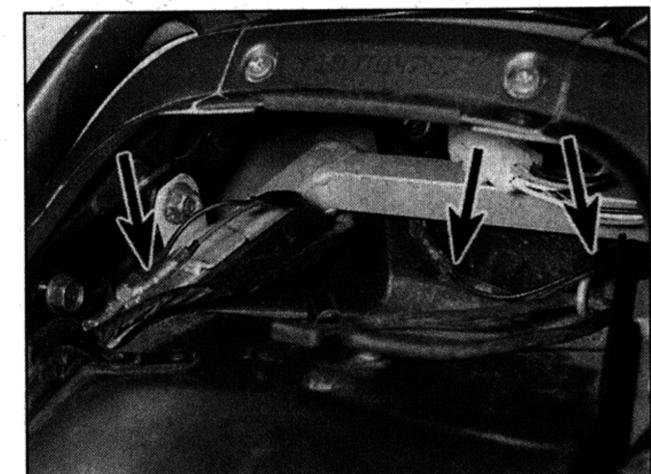


Removal

1 Disconnect the turn signal wiring connectors. On the front turn signals, they are on the inside of the fairing (see illustrations). On TDM models remove the fairing, and on XTZ models the fairing side panel(s) for best access (see Chapter 8). On the rear turn signals, remove the seat (see Chapter 8) (see illustrations).



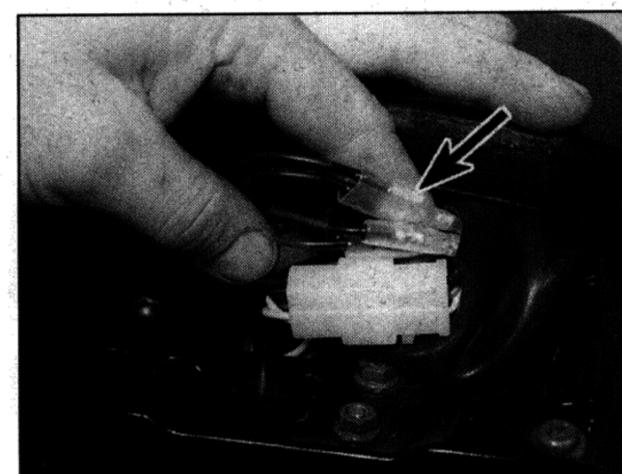
13.1a Front turn signal wiring connectors – TDM models



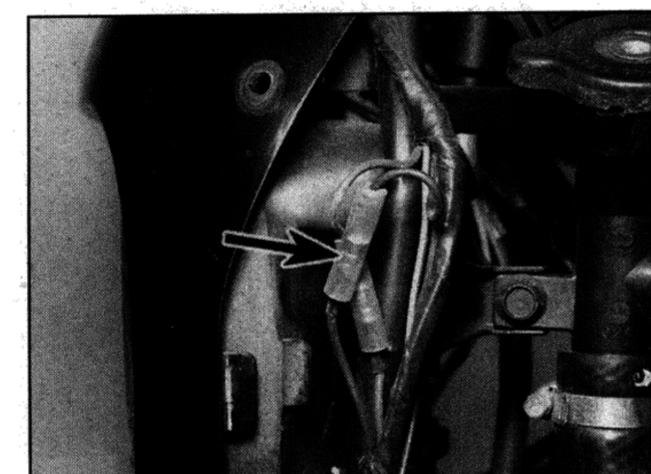
13.1b Rear turn signal wiring connectors (arrowed) – TDM models



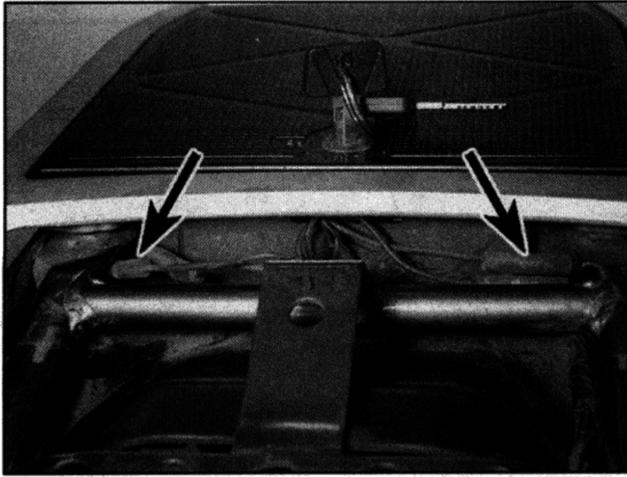
13.1c Front turn signal wiring connectors – TRX models



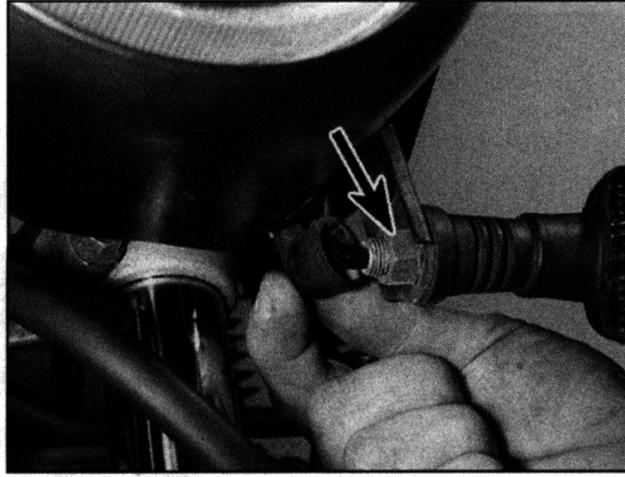
13.1d Rear turn signal wiring connectors – TRX models



13.1e Front turn signal wiring connectors – XTZ models



13.1f Rear turn signal wiring connectors – XTZ models



13.2a Front turn signal mounting nut (arrowed) – TDM models



13.2b Rear turn signal mounting nut (arrowed) – XTZ models

2 On TDM and XTZ models, pull back the rubber boot and unscrew the nut securing the turn signal (see illustration). Remove the assembly, taking care not to snag the wiring.

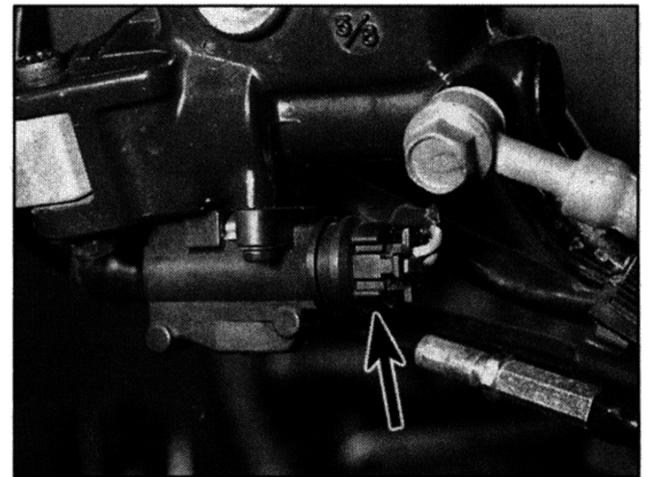
3 On TRX models, remove the screw or nut securing the assembly to either the inside of the fairing or rear mudguard (see illustration). Remove the mounting plate, noting how it fits, and withdraw the turn signal, taking care not to snag the wiring.

Installation

4 Installation is the reverse of removal. Check the operation of the turn signals.



13.3 Front turn signal mounting screw and plate – TRX models



14.7a Front brake switch wiring connector (arrowed) – TDM models

14 Brake light switches – check and replacement

Circuit check

1 Before checking any electrical circuit, check the bulbs (see Section 9) and fuses (see Section 5).

2 On XTZ models, remove the fuel tank to access the front brake switch wiring connector (see Chapter 4). On all models, remove the seat to access the rear brake switch connector (see Chapter 8).

3 Using a multimeter or test light connected to a good earth, check for voltage at the brake light switch brown or black/red

wire (as applicable) connector with the ignition ON (connector halves remain joined). If there's no voltage present, check the wire between the switch and the ignition switch (see the *wiring diagrams* at the end of this Chapter).

4 If voltage is available; touch the probe of the test light to the other terminal of the switch, then pull the brake lever in or depress the brake pedal. If no reading is obtained or the test light doesn't light up, renew the switch.

5 If a reading is obtained or the test light does light up, check the wiring between the switch and the brake light bulb (see the *wiring diagrams* at the end of this Chapter).

Switch replacement
Front brake lever switch

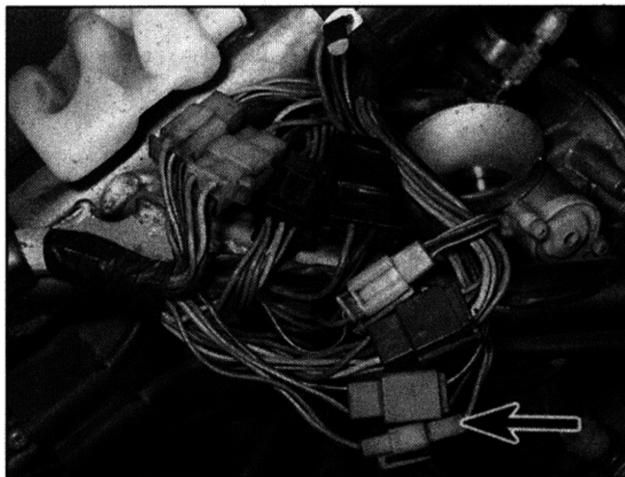
6 The switch is mounted on the underside of the brake lever bracket on TDM and TRX models, and is a push-fit into the bracket on XTZ models. On XTZ models remove the fuel tank to access the wiring connector.

7 Disconnect the wiring connector(s), then either remove the screws and detach the switch or withdraw the switch from the bracket, according to model (see illustrations). On XTZ models, free the wiring from any clips or ties.

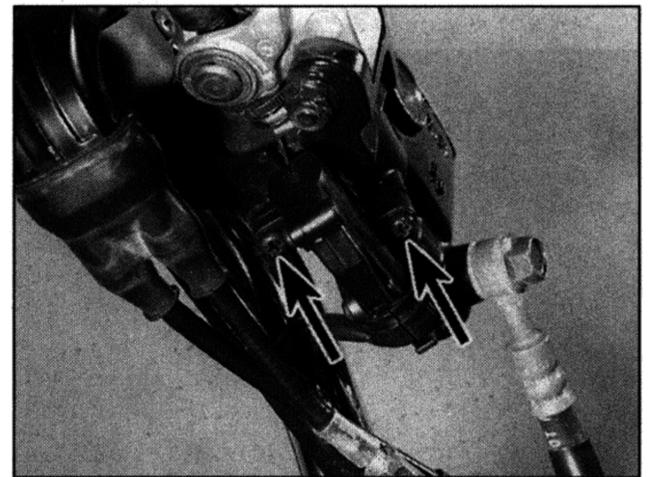
8 Installation is the reverse of removal. The switch isn't adjustable.



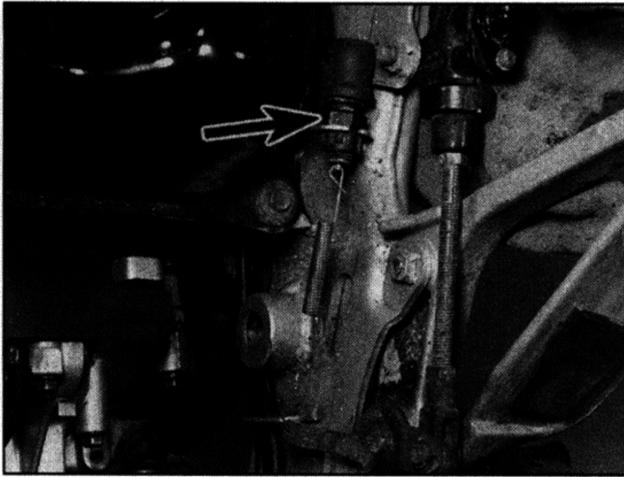
14.7b Front brake switch wiring connectors (A), mounting screw (B) – TRX models



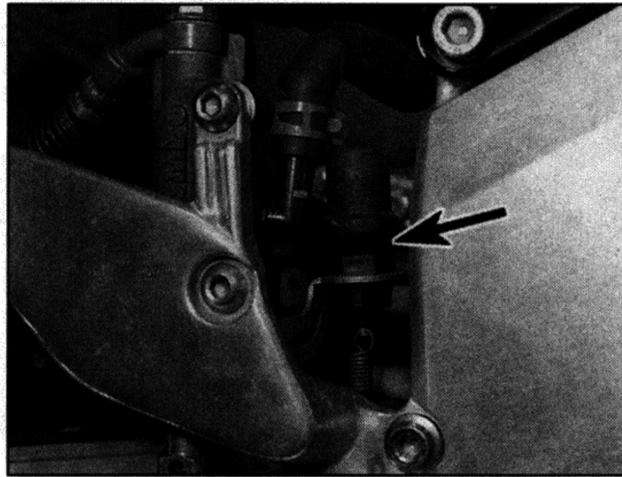
14.7c Front brake switch wiring connector (arrowed) – XTZ models



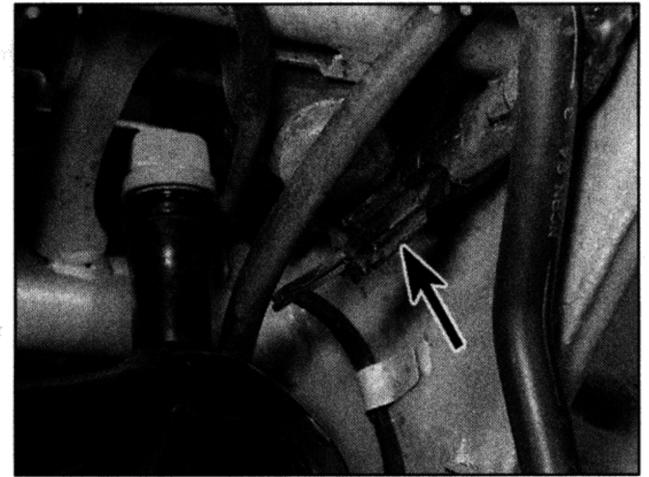
14.7d Front brake switch screws (arrowed) – TDM models



14.9a Rear brake light switch (arrowed) – TDM models



14.9b Rear brake light switch (arrowed) – TRX models



14.9c Rear brake switch wiring connector (arrowed) – TDM models

Rear brake pedal switch

9 The switch is mounted on the inside of the right-hand footrest bracket (see illustrations). Remove the seat for access to the connector (see Chapter 8). Trace the wiring from the switch and disconnect it at the connector (see illustration). Free the wiring from any clips or ties.

10 Detach the lower end of the switch spring from the brake pedal, then unscrew and remove the switch.

11 Installation is the reverse of removal. Make sure the brake light is activated just before the rear brake pedal takes effect. If adjustment is necessary, hold the switch and

turn the adjusting ring on the switch body until the brake light is activated when required.

15 Instrument cluster and speedometer cable – removal and installation

Instrument cluster

Removal

1 Remove the fairing (see Chapter 8). On TRX models, remove the fuel tank and air filter housing for best access to the wiring connectors (see Chapter 4). On XTZ models,

release the clips on the instrument cluster surround from the grommets on the cluster and remove the surround (see illustration). On TRX models, remove the screws securing the trim cover to free the wiring loom (see illustration).

2 On all except 1999 TDM models, unscrew the knurled ring securing the speedometer cable to the back of the speedometer and detach the cable (see illustration 15.6a).

3 Disconnect the instrument cluster wiring connector(s) (see illustrations).

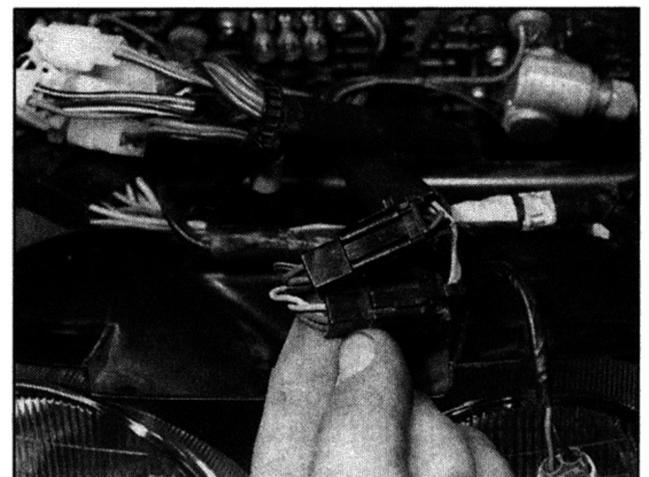
4 Unscrew the nuts securing the instrument cluster to the bracket and lift the cluster off, noting how it fits (see illustrations).



15.1a Release the clips from the grommets and remove the surround



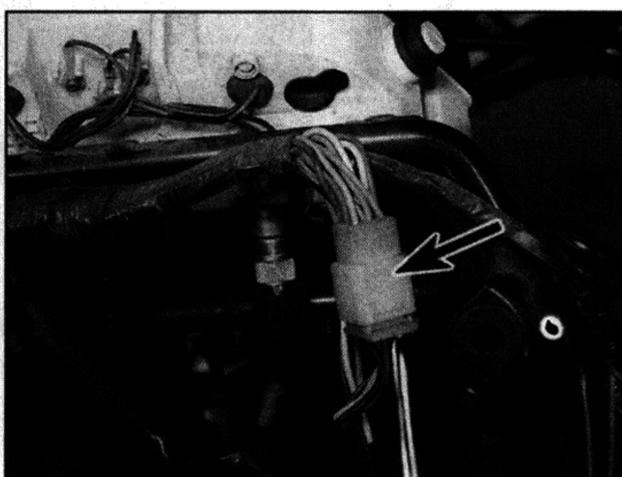
15.1b On TRX models, remove the trim that houses the wiring loom



15.3a Instrument cluster wiring connectors – TDM models



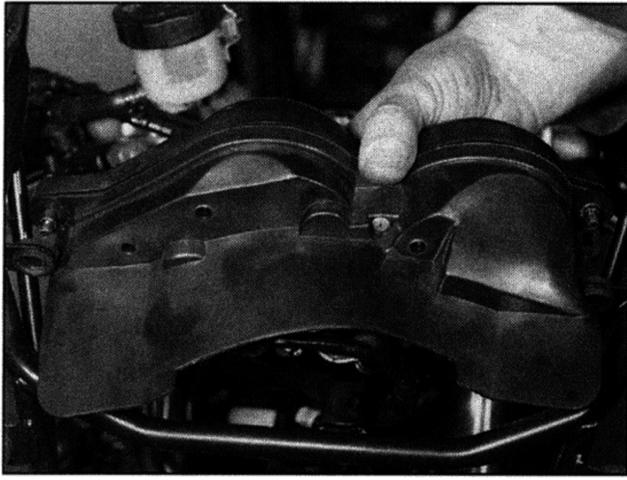
15.3b On TRX models, the wiring connectors are located behind the steering head



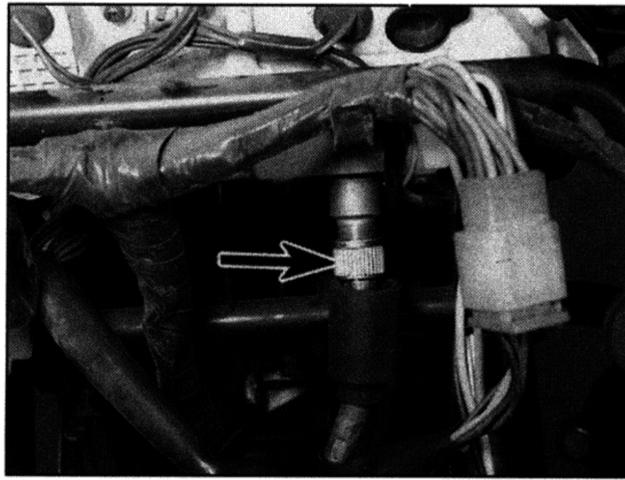
15.3c Instrument cluster wiring connector (arrowed) – XTZ models



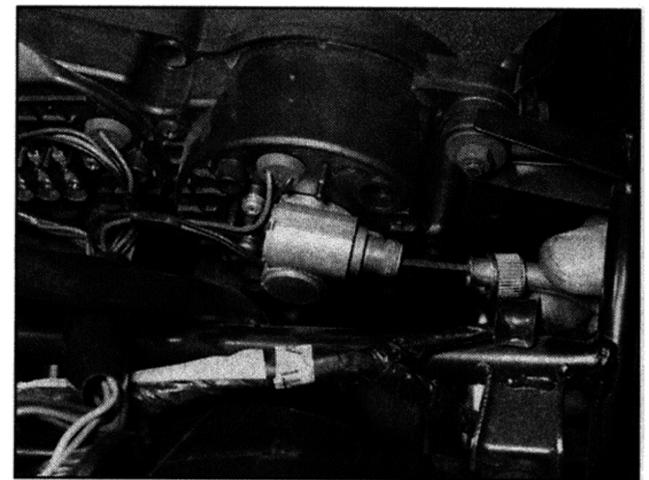
15.4a Unscrew the nuts (arrowed) . . .



15.4b ... and remove the cluster (TRX shown)



15.6a Unscrew the ring (arrowed) (XTZ shown) ...



15.6b ... and detach the cable (TDM shown)

Installation

5 Installation is the reverse of removal. Make sure that the speedometer cable and wiring connectors are correctly routed and secured.

Speedometer cable (TRX, XTZ and 1991 to 1998 TDM models)

Removal

6 Remove the fairing (see Chapter 8). Unscrew the knurled ring securing the speedometer cable to the back of the speedometer and detach the cable (see illustration). On TRX models, access is restricted due to the surround, so if required, displace the instrument cluster (see illustrations 15.4a and b), then remove the screw securing the surround and remove the surround (see illustration 16.2).

7 Unscrew the knurled ring securing the lower end of the cable to the drive housing on the front wheel and detach the cable (see illustrations).

8 Withdraw the cable, releasing it from its guides, and remove it from the bike, noting its correct routing.

Installation

9 Route the cable up through its guides to the back of the instrument cluster.

10 Connect the cable upper end to the speedometer and tighten the retaining ring securely (see illustrations 15.6b and a).

11 Connect the cable lower end to the drive housing and tighten the retaining ring securely (see illustrations 15.7b and a).

12 Check that the cable doesn't restrict steering movement or interfere with any other components.

16 Instruments – check, replacement and bulbs



Speedometer

Check (TRX, XTZ and 1991 to 1998 TDM models)

1 Special instruments are required to properly check the operation of this meter. If it is believed to be faulty, take the motorcycle to a Yamaha dealer for assessment. Check that the fault is not due to a broken cable.

Check (1999 TDM models)

2 The electronic speedometer is supplied with wheel speed information by a sensor on

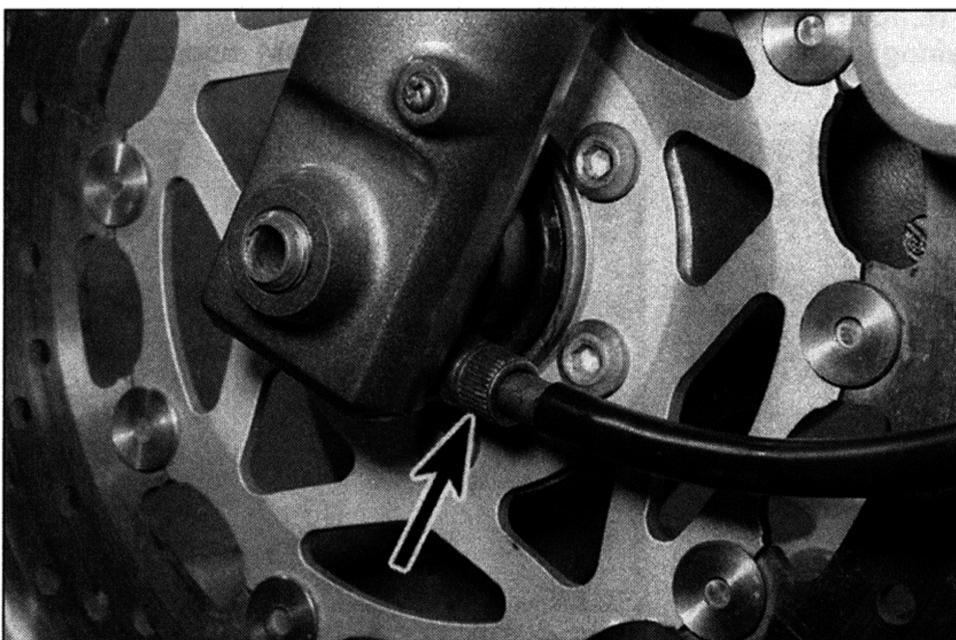
the front wheel. To test the sensor, disconnect its 3-pin connector and make the following test on the sensor side of the connector. Set a multimeter to the 0 to 20 volts DC scale and connect its positive (+ve) probe to the white wire terminal and its negative (-ve) probe to the black wire terminal. Now connect a fully charged 12V battery: positive lead to the red wire terminal and negative lead to the black wire terminal. Position the bike on an auxiliary stand and support it under the crankcase so that the front wheel is off the ground. Slowly rotate the front wheel and note the reading on the meter. If the sensor is operating correctly, it should read 5V four times per wheel revolution.

3 If the speed sensor doesn't produce the correct reading it must be renewed. If the reading is correct, the fault must lie in the speedometer or the wiring between the sensor and speedometer.

4 If the electronic clock/odometer is faulty note that it is only available as part of the speedometer and tachometer assembly.

Replacement – all models

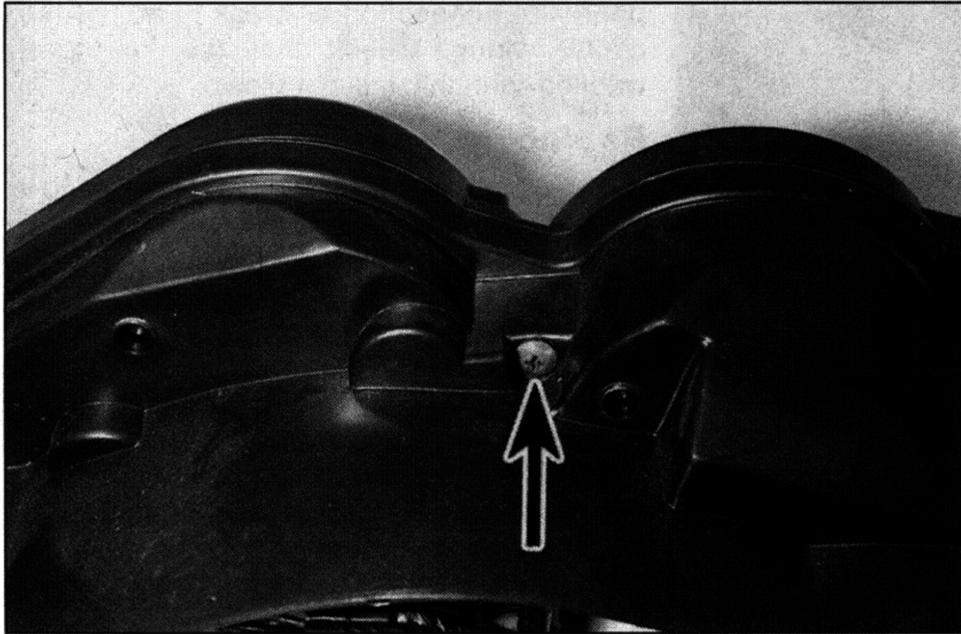
5 Remove the instrument cluster (see Section 15). On TRX models, remove the screw



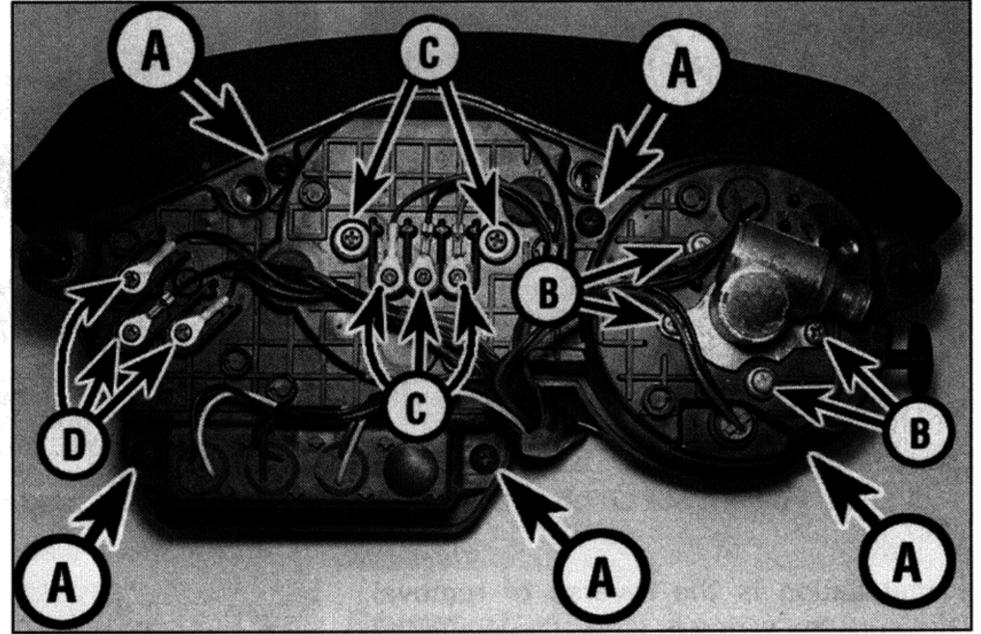
15.7a Unscrew the ring (arrowed) ...



15.7b ... and detach the cable



16.5 Remove the screw and detach the surround



16.6a Casing screws (A), speedometer screws (B), tachometer screws (C), temperature gauge screws (D) – 1991 to 1998 TDM models

securing the surround and remove the surround (see illustration).

6 On TRX, XTZ and 1991 to 1998 TDM models, remove the casing screws from the back of the cluster and lift off the front cover assembly (see illustrations). On 1999 TDM models, remove the seven screws from the base of the cluster and separate the upper and lower covers from the instrument assembly; note that the speedometer and tachometer are only available as a unit with their housing – remove the fuel gauge and transfer it to the new assembly.

7 On 1991 to 1998 TDM and all TRX models, remove the two screws securing the speedometer gearbox and lift off the box.

8 Remove the two screws securing the speedometer to the casing. Carefully withdraw the speedometer from the front.

9 Installation is the reverse of removal.

Tachometer

Check

10 Special instruments are required to properly check the operation of this meter. If it

is believed to be faulty, take the motorcycle to a Yamaha dealer for assessment.

Replacement

11 Remove the instrument cluster (see Section 15). On TRX models, remove the screw securing the surround and remove the surround (see illustration 16.5).

12 On TRX, XTZ and 1991 to 1998 TDM models, remove the casing screws from the back of the cluster and lift off the front cover assembly (see illustrations 16.6a, b or c). On 1999 TDM models, remove the seven screws from the base of the cluster and separate the upper and lower covers from the instrument assembly; note that the speedometer and tachometer are only available as a unit with their housing – remove the fuel gauge and transfer it to the new assembly.

13 Remove the screws securing the three tachometer wires and detach the wires, noting which fits where.

14 Remove the two screws securing the tachometer to the casing. Carefully withdraw the tachometer from the front.

15 Installation is the reverse of removal.

Make sure the wiring is correctly connected. As you look at the back of the cluster, the brown wire is for the left-hand terminal, the black for the middle terminal, and the grey for the right-hand terminal.

Coolant temperature gauge (TRX, XTZ and 1991 to 1998 TDM models)

Check

16 See Chapter 3.

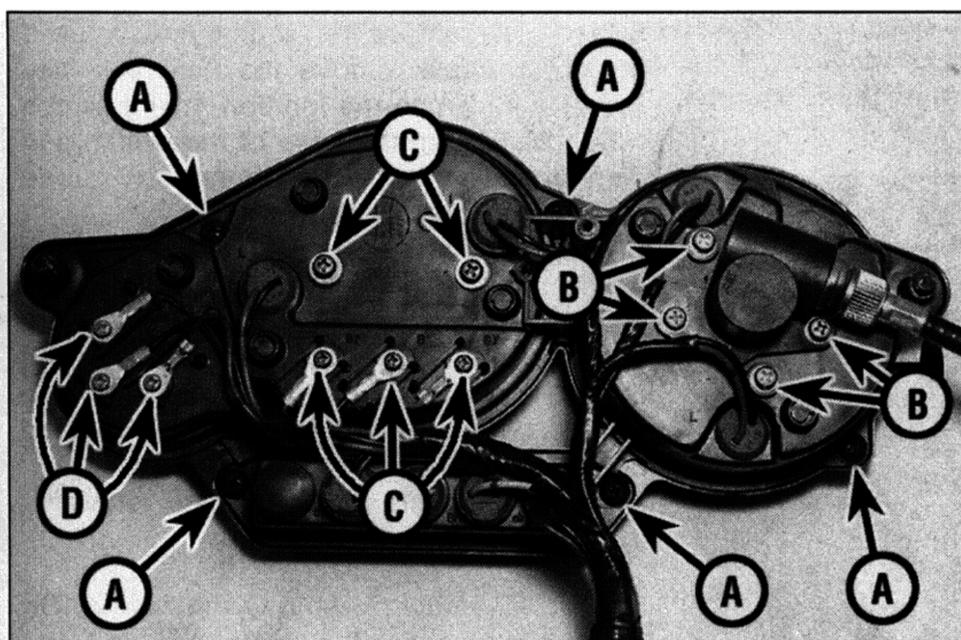
Replacement

17 Remove the instrument cluster (see Section 15). On TRX models, remove the screw securing the surround and remove the surround (see illustration 16.5).

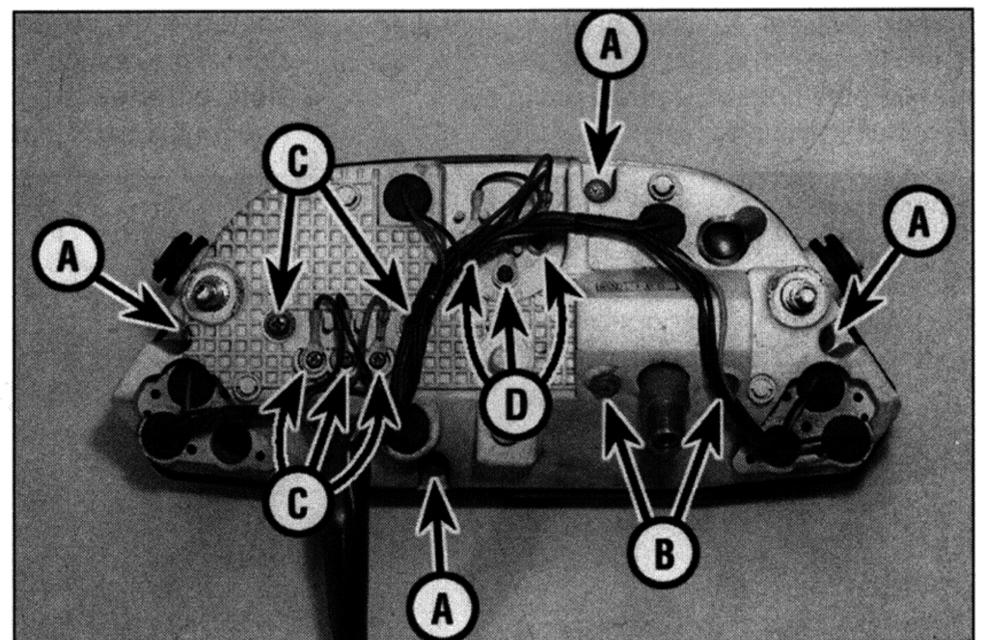
18 Remove the casing screws from the back of the cluster and lift off the front cover assembly (see illustrations 16.6a, b or c).

19 Remove the screws securing the three temperature gauge wires and detach the wires, noting which fits where.

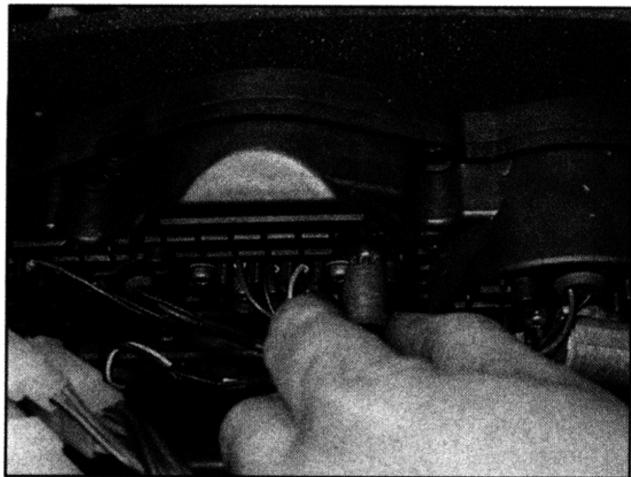
20 Carefully withdraw the temperature gauge from the front.



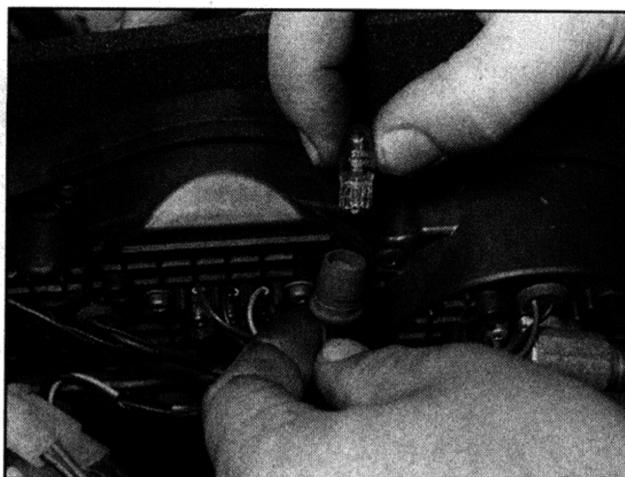
16.6b Casing screws (A), speedometer screws (B), tachometer screws (C), temperature gauge screws (D) – TRX models



16.6c Casing screws (A), speedometer screws (B), tachometer screws (C), temperature gauge screws (D) – XTZ models



16.26a Pull out the bulbholder . . .



16.26b . . . and remove the bulb

21 Installation is the reverse of removal. Make sure the wiring is correctly connected. As you look at the back of the cluster, the green/red wire is for the left-hand terminal, the black for the middle terminal, and the brown for the right-hand terminal.

Fuel gauge (1999 TDM models)

Check

22 See Section 17.

Replacement

23 Remove the instrument cluster (see Section 15). Remove the seven screws from the base of the cluster and separate the upper and lower covers from the instrument assembly. The fuel gauge is retained by three screws.

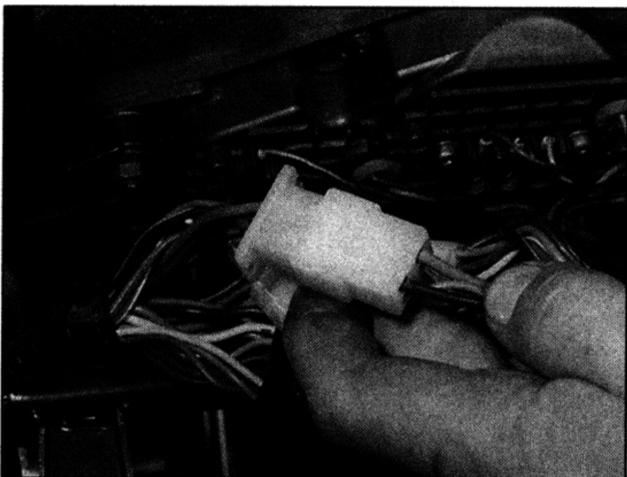
24 Installation is the reverse of removal.

Bulb renewal

25 Remove the fairing (see Chapter 8). The bulbs are accessible with the instrument cluster in place, but access is quite restricted. If it is too restricted, unscrew the nuts securing the instrument cluster and displace it as required to improve access (see Section 15).

26 Gently pull the bulbholder out of the instrument casing, then pull the bulb out of the bulbholder (see illustrations). If the socket contacts are dirty or corroded, scrape them clean and spray with electrical contact cleaner before a new bulb is installed. Carefully push the new bulb into the holder and push the holder into the casing.

27 Install the fairing (see Chapter 8).



18.1a Ignition switch wiring connector – TDM models

17 Fuel gauge and sender unit – check and replacement (1999 TDM models)

Check

1 If the fuel gauge fails to operate or the warning light doesn't come on when the fuel level falls to a low level, the fuel sender unit in the tank may be at fault. Remove the fuel sender unit from the tank as described below.

2 Reconnect the sender wiring, then turn the ignition ON and manually raise its float. With the float fully raised the gauge needle should swing over to the F on the gauge. Now lower the float and check that the needle swings over to the E on the gauge. Turn the ignition OFF when the check is complete. If the gauge does not operate as described it should be renewed.

3 Make the following test with the sender unit disconnected from the bike and on the bench. Using a multimeter set to the ohms x 1 range, connect the meter's positive probe to the green/red wire terminal of the wire connector and its negative probe to the black wire terminal of the connector. With the float in the down position, 90 to 100 ohms should be indicated on the meter. Raise the float up to its highest position and check the meter reading – 4 to 10 ohms should now be indicated. If the sender unit does not produce the correct readings it must be renewed.

4 Before renewing the fuel gauge or the sender unit, check that the fault is not due to a



18.1b Ignition switch wiring connector (arrowed) – XTZ models

poor wire connection or break in any of the circuit wiring. Check that the fuel level warning light bulb has not blown.

Replacement

5 Refer to Section 16 for renewal of the fuel gauge and warning light bulb.

6 To access the sender unit, first remove the fuel tank as described in Chapter 4 and drain all fuel from the tank into a suitable container.

7 Remove the four bolts which retain the sender unit to the base of the tank. Withdraw the sender unit very carefully so that its float and arm are not bent. Check that the float is not punctured and that the arm moves smoothly.

8 When installing the sender unit, always use a new gasket between the sender and tank and make sure that the washers are in place on the four retaining bolts.



Warning: Petrol is extremely flammable, so take extra precautions when you work on any part of the fuel system.

Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance is present. If you spill any fuel on your skin, rinse it off immediately with soap and water. When you perform any kind of work on the fuel system, wear safety glasses and have a fire extinguisher suitable for a class B type fire (flammable liquids) on hand.

18 Ignition (main) switch – check, removal and installation



Warning: To prevent the risk of short circuits, disconnect the battery negative (-ve) lead before making any ignition (main) switch checks.

Check

1 On TDM models, remove the fairing. On TRX models remove the air filter housing, and on XTZ models remove the fuel tank (see Chapter 4). Trace the ignition (main) switch wiring back from the base of the switch and disconnect it at the connector (see illustrations and 15.3b).

2 Using an ohmmeter or a continuity tester, check the continuity of the connector terminal pairs (see the wiring diagrams at the end of this Chapter). Continuity should exist between the terminals connected by a solid line on the diagram when the switch is in the indicated position.

3 If the switch fails any of the tests, renew it.

Removal

4 On TDM models, remove the fairing. On TRX models remove the air filter housing, and on XTZ models remove the fuel tank (see Chapter 4). Trace the ignition (main) switch



18.8 Ignition switch bolts (arrowed)

wiring back from the base of the switch and disconnect it at the connector (see illustrations 18.1a and b and 15.3b). Draw the wiring through to the switch, freeing it from any clips or ties and noting its routing.

5 On 1996-on TDM models, unscrew the bolts securing the choke knob and the cable guide to the top yoke. On TRX models, unscrew the bolt securing the master cylinder reservoir to the top yoke. On XTZ models, unscrew the bolt securing the cable guide to the top yoke.

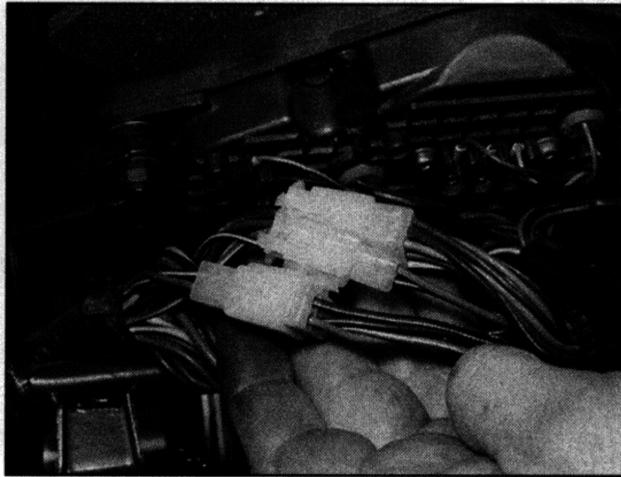
6 Displace the handlebars from the top yoke (see Chapter 6).

7 Slacken the fork clamp bolts in the top yoke. Unscrew the steering stem nut or bolt and remove it along with its washer, where fitted. Lift the top yoke off the steering stem and remove it.

8 Two shear-head bolts mount the ignition switch to the underside of the top yoke (see illustration). The heads of the bolts must be drilled off before the switch can be removed. Mount the yoke in a vice equipped with soft jaws and padded out with rags and drill off the heads. Remove the bolts and withdraw the switch from the top yoke.

Installation

9 Installation is the reverse of removal. Tighten the new bolts until the heads shear



19.3 Handlebar switch wiring connectors – TDM models

off. Make sure the wiring connector is securely connected and correctly routed.

19 Handlebar switches – check

1 Generally speaking, the switches are reliable and trouble-free. Most troubles, when they do occur, are caused by dirty or corroded contacts, but wear and breakage of internal parts is a possibility that should not be overlooked. If breakage does occur, the entire switch and related wiring harness will have to be renewed, as individual parts are not available.

2 The switches can be checked for continuity using an ohmmeter or a continuity test light. Always disconnect the battery negative (-ve) cable, which will prevent the possibility of a short circuit, before making the checks.

3 On TDM models, remove the fairing (see Chapter 8). On TRX models remove the air filter housing, and on XTZ models remove the fuel tank (see Chapter 4). Trace the wiring harness of the switch in question back to its connector and disconnect it (see illustration and 18.1b and 15.3b).

4 Check for continuity between the terminals of the switch harness with the switch in the various positions (ie switch off – no continuity,

switch on – continuity) – see the *wiring diagrams* at the end of this Chapter.

5 If the continuity check indicates a problem exists, refer to Section 20, remove the switch and spray the switch contacts with electrical contact cleaner. If they are accessible, the contacts can be scraped clean with a knife or polished with crocus cloth. If switch components are damaged or broken, it will be obvious when the switch is disassembled.

20 Handlebar switches – removal and installation

Removal

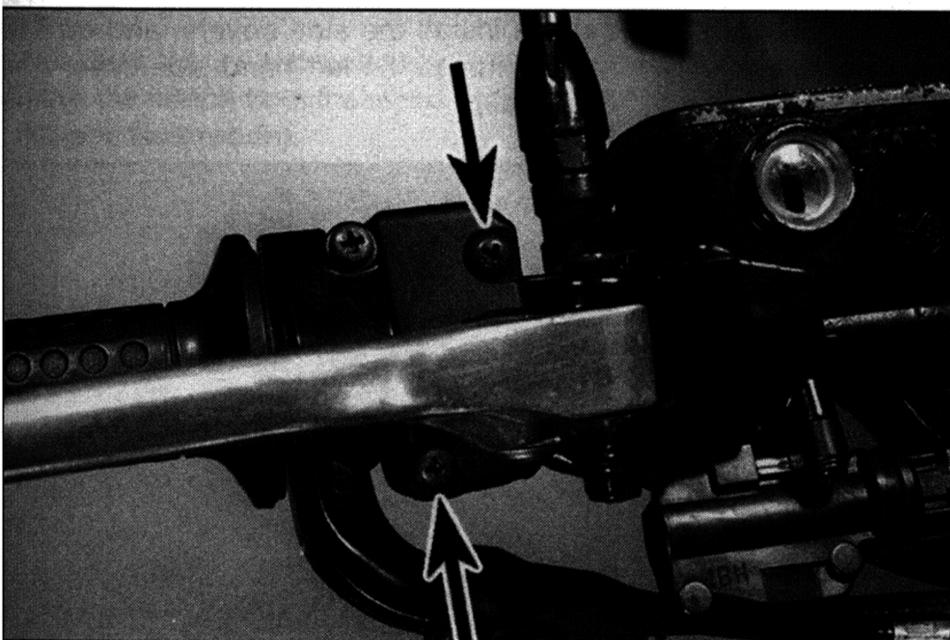
1 If the switch is to be removed from the bike, rather than just displaced from the handlebar, trace the wiring harness of the switch in question back to its connector(s) and disconnect it/them. On TDM models, remove the fairing (see Chapter 8). On TRX models remove the air filter housing, and on XTZ models remove the fuel tank (see Chapter 4). Trace the wiring harness of the switch in question back to its connector and disconnect it (see illustrations 19.3, 18.1b and 15.3b). Work back along the harness, freeing it from all the relevant clips and ties, whilst noting its correct routing.

2 On TDM and TRX models, disconnect the wiring connector(s) from the brake light switch (if removing the right-hand switch) or the clutch switch (if removing the left-hand switch) (see illustrations 14.7a and b, or 23.2a).

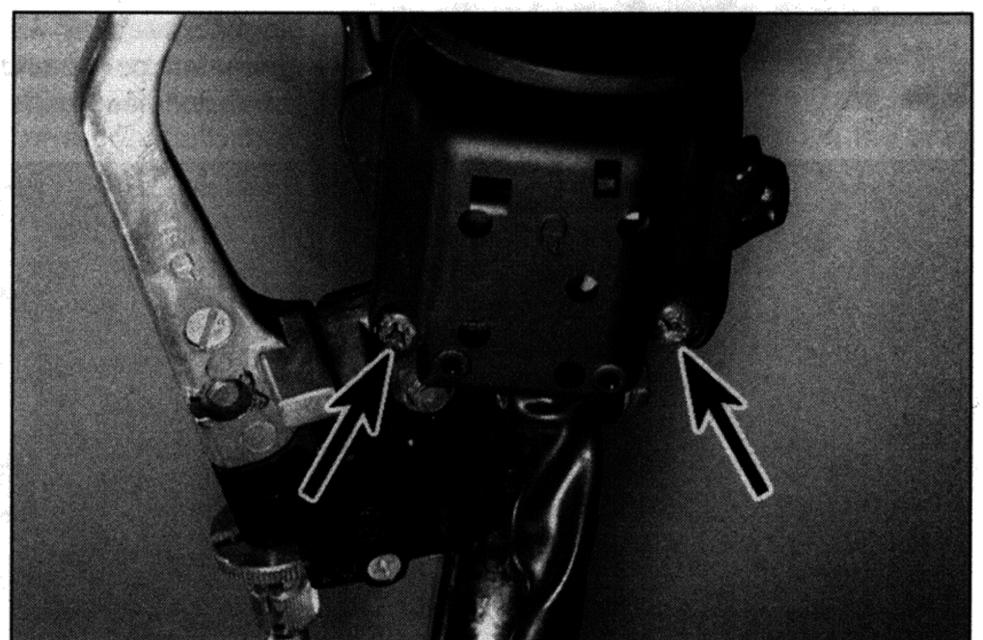
3 Unscrew the handlebar switch screws and free the switch from the handlebar by separating the halves (see illustrations).

Installation

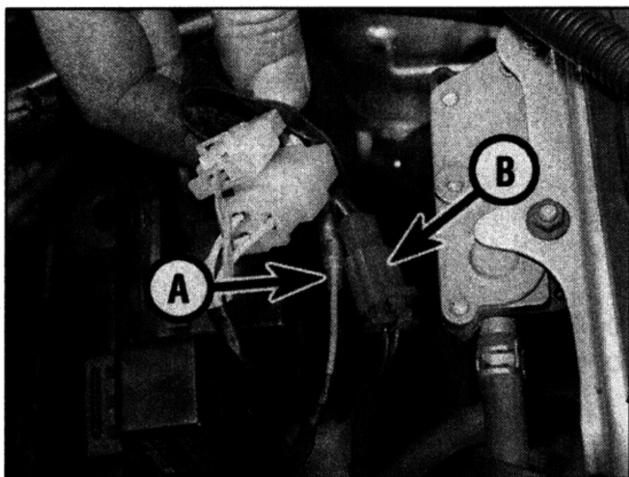
4 Installation is the reverse of removal. Make sure the locating pin in the switch housing locates in the hole in the handlebar and on 1999 TDM models ensure that the choke lever locates correctly.



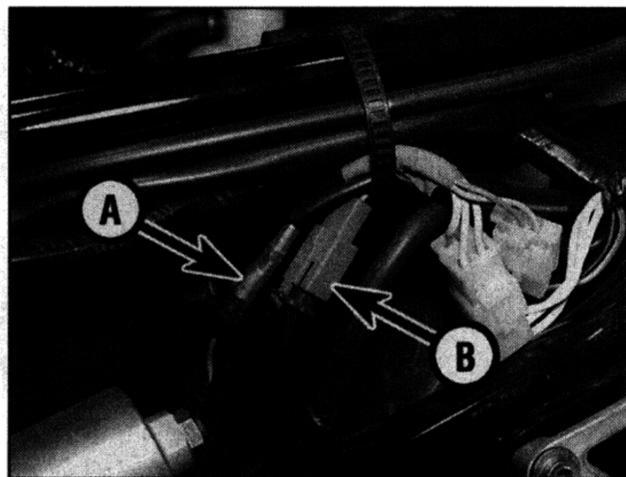
20.3a Right-hand switch housing screws (arrowed) – TDM models



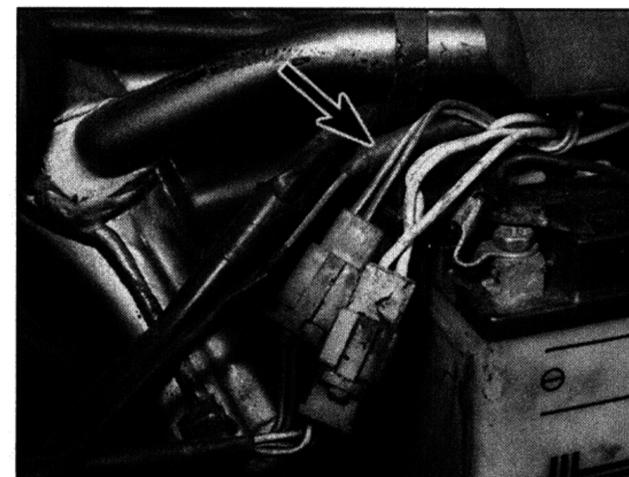
20.3b Left-hand switch housing screws (arrowed) – TDM models



21.2a Neutral switch wiring connector (A), sidestand switch wiring connector (B) – TDM models



21.2b Neutral switch wiring connector (A), sidestand switch wiring connector (B) – TRX models



21.2c Neutral switch wiring connector (arrowed) – XTZ models

21 Neutral switch – check, removal and installation

Check

- 1 Before checking the electrical circuit, check the bulb (see Section 16) and fuse (see Section 5).
- 2 The switch is located in the left-hand side of the transmission casing above the front sprocket. To access the wiring connector, on TDM models remove the seat, on TRX models remove the side covers, and on XTZ models remove the left-hand side cover (see Chapter 8). Trace the single light blue wire from the top of the alternator cover and disconnect it at

the connector (see illustrations). Make sure the transmission is in neutral.

3 With the connector disconnected and the ignition switched ON, the neutral light should be out. If not, the wire between the connector and instrument cluster must be earthed at some point.

4 Check for continuity between the wire terminal on the switch side of the wiring connector and the crankcase. With the transmission in neutral, there should be continuity. With the transmission in gear, there should be no continuity. If the tests prove otherwise, then the switch is faulty.

5 If the continuity tests prove the switch is good, check for voltage at the terminal on the wiring loom side of the wiring connector using a test light with the ignition ON. If there's no voltage present, check the wire between the connector, the instrument cluster and fusebox (see the *wiring diagrams* at the end of this Chapter). Turn the ignition OFF.

7 Remove the alternator cover (see Section 32).

8 Unscrew the bolts securing the transmission output shaft retainer plate to the left-hand side of the crankcase and remove the plate (see illustration).

9 Pull the wiring grommet from its cutout in the crankcase (see illustration).

10 Remove the screws securing the switch and detach it from the casing (see illustration). Discard the O-ring as a new one must be used.

Installation

11 Fit a new O-ring onto the switch (see illustration), then install the switch and tighten its screws securely (see illustration 21.9).

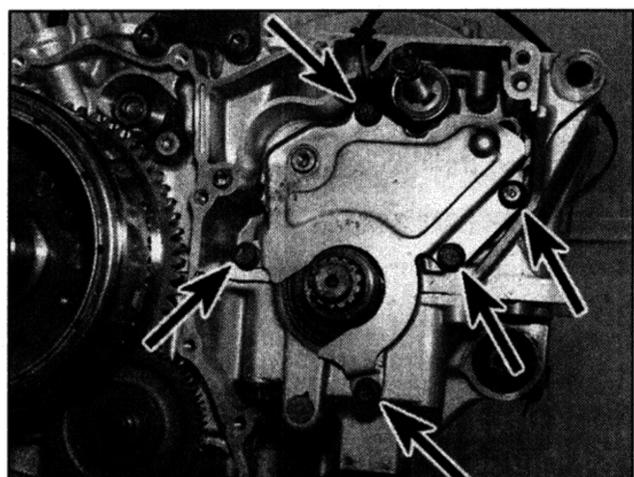
12 Press the wiring grommet into its cutout in the crankcase (see illustration 21.9).

13 Install the transmission output shaft retainer plate onto the left-hand side of the crankcase (see illustration 21.8). Apply a suitable non-permanent thread locking compound to the threads of the bolts and tighten them to the specified torque setting.

14 Connect the wiring connector (see illustrations 21.2a, b and c). Check the operation of the neutral light.

15 Install the alternator cover (see Section 8).

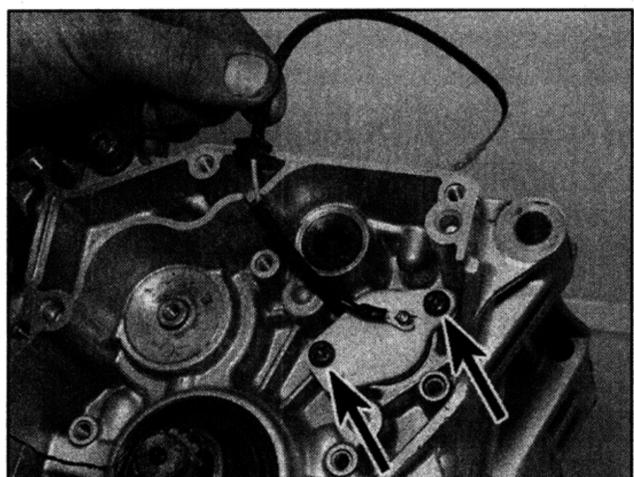
16 On TDM models install the seat, on TRX models install the side covers, and on XTZ models install the left-hand side cover (see Chapter 8).



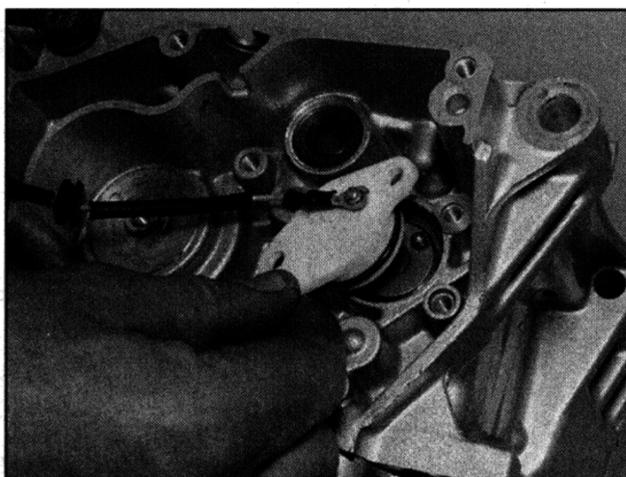
21.8 Unscrew the bolts (arrowed) and remove the plate

Removal

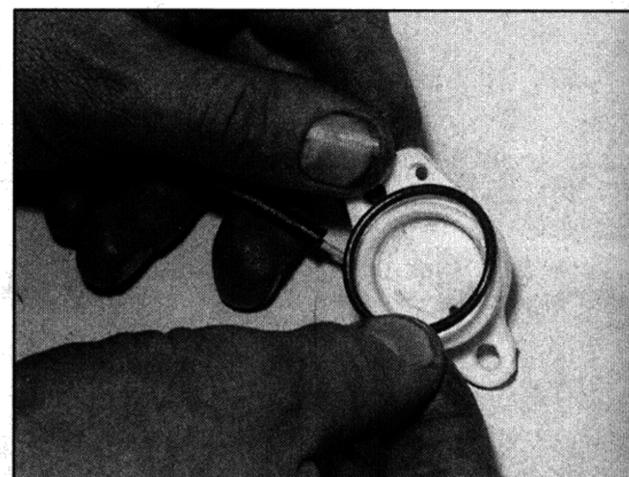
6 Make sure the transmission is in neutral. The switch is located in the left-hand side of the transmission casing above the front sprocket. To access the wiring connector, on TDM models remove the seat, on TRX models remove the side covers, and on XTZ models remove the left-hand side cover (see Chapter 8). Trace the single light blue wire from the top of the alternator cover and disconnect it at the connector (see illustrations 21.2a, b and c).



21.9 Detach the wiring grommet and remove the screws (arrowed) . . .



21.10 . . . and remove the switch



21.11 Fit a new O-ring onto the switch

22 Sidestand switch – check and replacement



Check

1 The sidestand switch is mounted on the sidestand. The switch is part of the safety cut-out circuit which only allows the starter motor to operate if the transmission is in neutral or the clutch lever is pulled in and the sidestand is up. Before checking the electrical circuit, check the fuse (see Section 5).

2 To access the wiring connector, on TDM models remove the seat, on TRX models remove the side covers, and on XTZ models remove the left-hand side cover (see Chapter 8). Trace the wiring back from the switch and disconnect it at the connector (see illustration and 21.2a and b).

3 Check the operation of the switch using an ohmmeter or continuity test light. Connect the meter probes to the terminals on the switch side of the connector. With the sidestand up there should be continuity (zero resistance) between the terminals, and with the stand down there should be no continuity (infinite resistance).

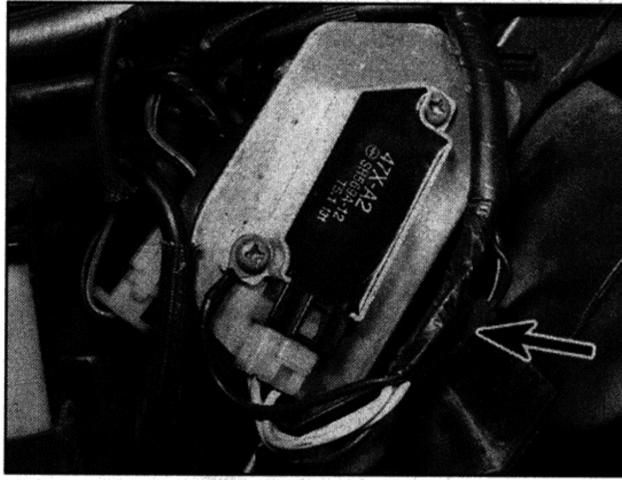
4 If the switch does not perform as expected, it is defective and must be renewed.

5 If the switch is good, check the wiring between the various components in the starter safety circuit (see the *wiring diagrams* at the end of this book).

Replacement

6 The sidestand switch is mounted on the sidestand. To access the wiring connector, on TDM models remove the seat, on TRX models remove the side covers, and on XTZ models remove the left-hand side cover (see Chapter 8). Trace the wiring back from the switch to its connector and disconnect it (see illustrations 21.2a and b and 22.2). Work back along the switch wiring, freeing it from any relevant retaining clips and ties, noting its correct routing.

7 Unscrew the switch bolts or screws and remove the switch from the stand, noting how it fits (see illustration).



22.2 Sidestand switch wiring connector – XTZ models

8 Fit the new switch onto the sidestand, making sure the plunger locates correctly, and tighten the bolts or screws securely.

9 Make sure the wiring is correctly routed up to the connector and retained by all the necessary clips and ties.

10 Reconnect the wiring connector and check the operation of the sidestand switch.

11 On TDM models install the seat, on TRX models install the side covers, and on XTZ models install the left-hand side cover (see Chapter 8).

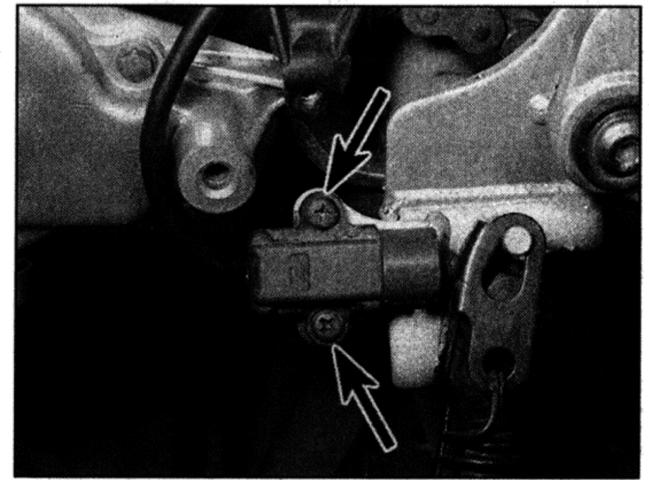
23 Clutch switch – check and replacement



Check

1 The clutch switch is mounted on the underside of the clutch lever bracket on TDM and TRX models, and is a push-fit into the bracket on the XTZ models. The switch is part of the safety circuit which prevents or stops the engine running if the transmission is in gear whilst the sidestand is down, and prevents the engine from starting if the transmission is in gear unless the sidestand is up and the clutch lever is pulled in. The switch isn't adjustable.

2 On XTZ models, to access the switch wiring connector, remove the fuel tank (see Chapter 4). To check the switch, disconnect the wiring connector(s) (see illustrations). Connect the probes of an ohmmeter or a continuity test



22.7 Sidestand switch screws (arrowed) – TDM shown

light to the two switch terminals. With the clutch lever pulled in, continuity should be indicated. With the clutch lever out, no continuity (infinite resistance) should be indicated.

3 If the switch is good, check the other components in the starter circuit as described in the relevant sections of this Chapter. If all components are good, check the wiring between the various components (see the *wiring diagrams* at the end of this book).

Replacement

4 The clutch switch is mounted on the underside of the clutch lever bracket on TDM and TRX models, and is a push-fit into the bracket on XTZ models. On XTZ models, to access the switch wiring connector, remove the fuel tank (see Chapter 4).

5 Disconnect the wiring connector(s) (see illustrations 23.2a and b), then either remove the screw(s) and detach the switch or withdraw the switch from the bracket, according to model (see illustration).

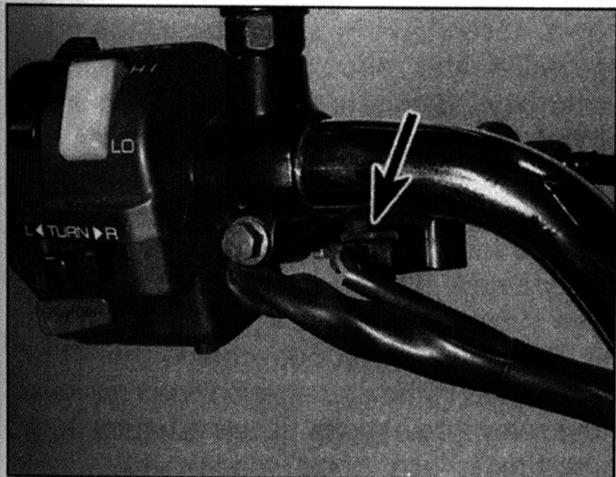
6 Installation is the reverse of removal.

24 Diode (XTZ models) – check and replacement

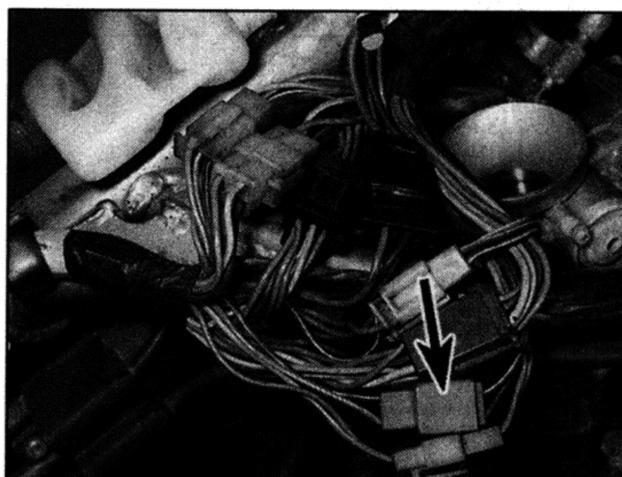


Check

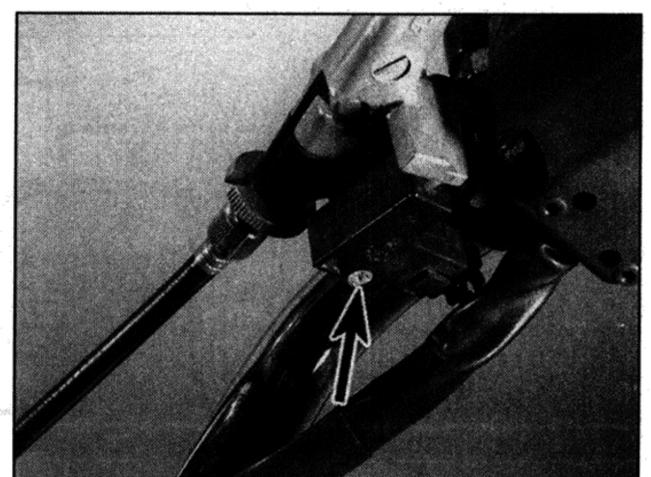
1 The diode is a small block that plugs into the main wiring harness (see *Wiring Diagrams* at the end of the Chapter). Remove the seat



23.2a Clutch switch wiring connector (arrowed) – TDM models



23.2b Clutch switch wiring connector (arrowed) – XTZ models



23.5 Clutch switch screw (arrowed) – TDM models

and fuel tank for access (see Chapters 8 and 4). The diode is part of the safety circuit which prevents or stops the engine running if the transmission is in gear whilst the sidestand is down, and prevents the engine from starting if

the transmission is in gear unless the sidestand is up and the clutch lever is pulled in.

2 Disconnect the diode from the harness. The diode is situated on the left-hand side of the

frame in the area where the fuel tank and side cover meet.

3 Using an ohmmeter or continuity tester, connect the positive (+ve) probe to one terminal of the diode and the negative (-ve) probe to the other terminal. Now reverse the probes. The diode should show continuity in one direction and no continuity in the other direction. If it doesn't behave as stated, renew the diode.

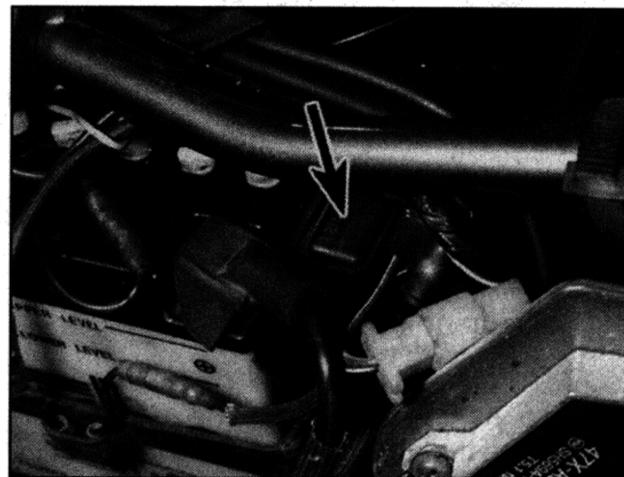
4 If the diode is good, check the other components in the starter circuit as described in the relevant sections of this Chapter. If all components are good, check the wiring between the various components (see the *wiring diagrams* at the end of this book).

Replacement

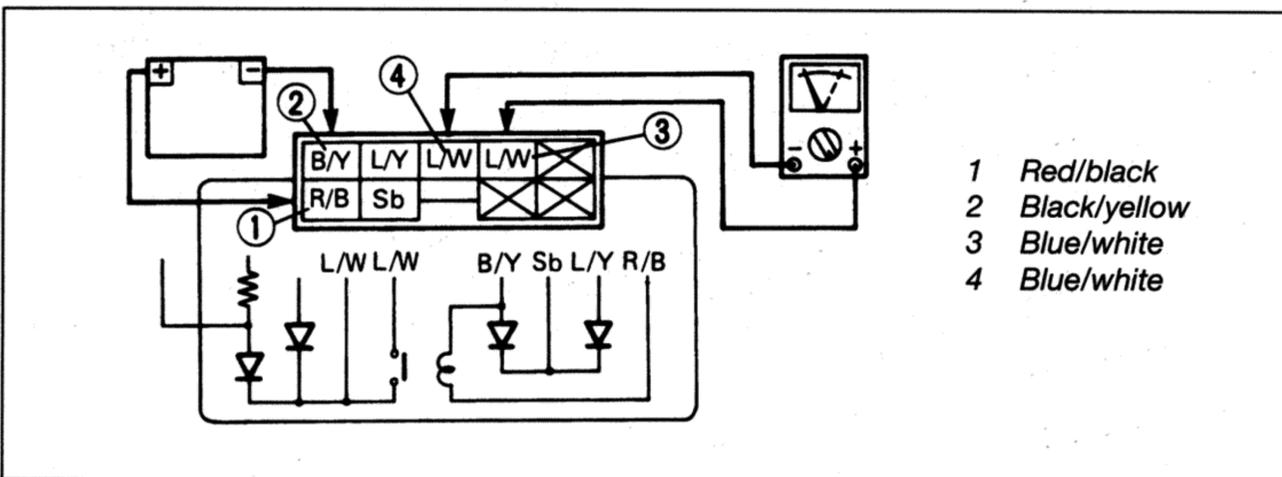
5 The diode is a small block that plugs into the main wiring harness on the left-hand side of the frame in the area where the fuel tank and side cover meet. Remove the seat and fuel tank for access (see Chapters 8 and 4). Disconnect the diode from the harness and connect the new one.



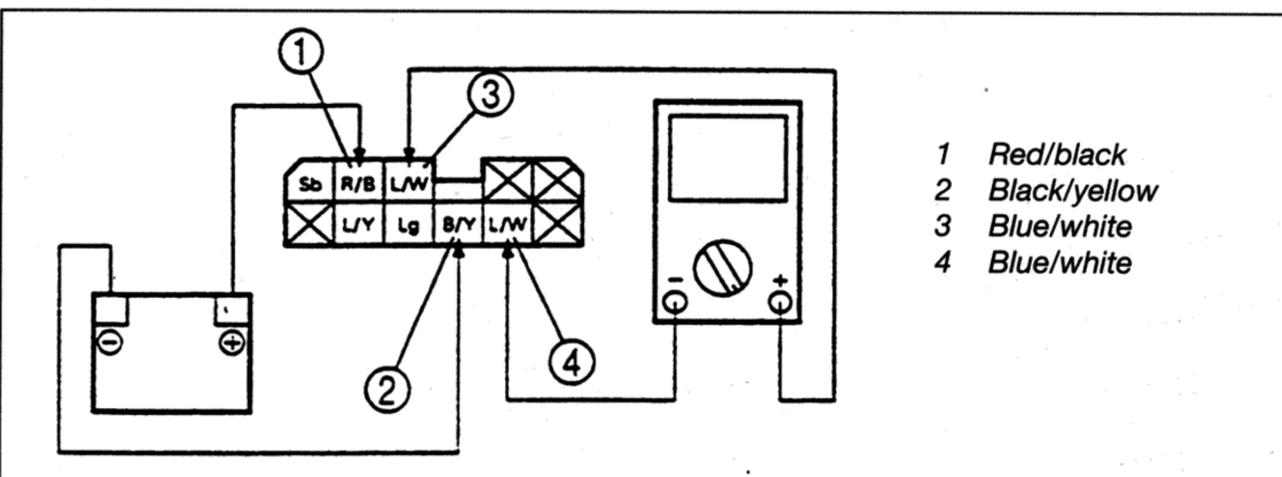
25.2a Starter circuit cut-off relay (arrowed) - TDM models



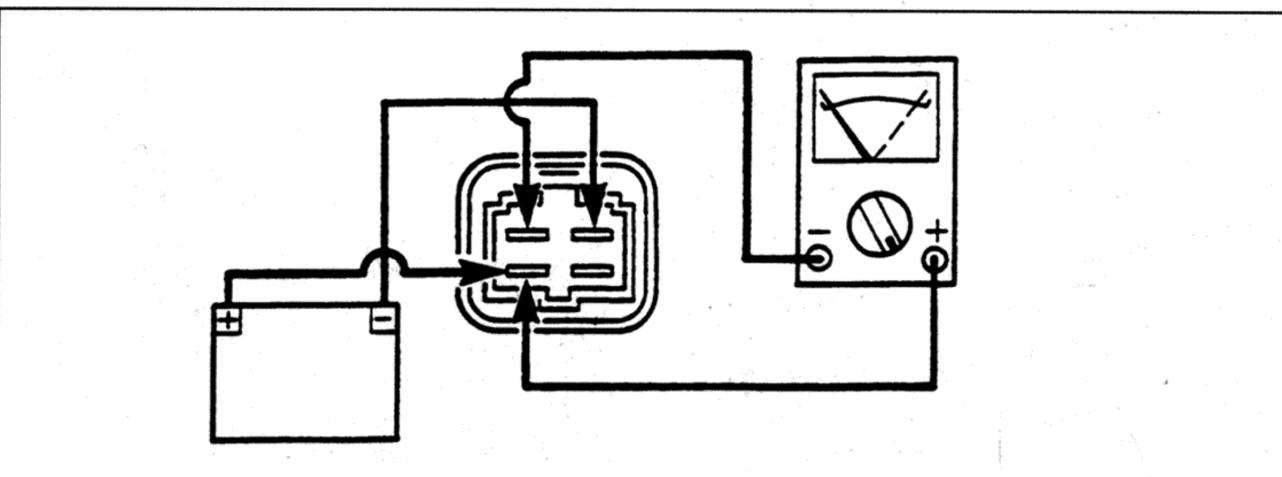
25.2b Starter circuit cut-off relay (arrowed) - XTZ models



25.3a Starter circuit cut-off relay test set-up - 1991 to 1995 TDM models



25.3b Starter circuit cut-off relay test set-up - 1996 to 1998 TDM models and TRX models



25.3c Starter circuit cut-off relay test set-up - XTZ models

25 Starter circuit cut-off relay - check and replacement

Check

1 The starter circuit cut-off relay is part of the safety circuit which prevents or stops the engine running if the transmission is in gear whilst the sidestand is down, and prevents the engine from starting if the transmission is in gear unless the sidestand is up and the clutch lever is pulled in.

2 If the starter circuit is faulty, first check the fuse (see Section 5). The starter cut-off relay is located under the seat on all except 1996-on TDM models, where it is behind the fairing. Remove the seat or fairing for access (see Chapter 8). Disconnect the relay wiring connector and remove the relay (see **illustrations and 11.3b**).

3 Set a multimeter to the ohms x 1 scale and connect it across the relay's terminals as shown, according to your model (see **illustrations**). Using a fully-charged 12 volt battery and two insulated jumper wires, connect the battery to the relay's terminals as shown, according to your model. At this point the multimeter should show zero ohms (continuity). If this is the case the relay is proved good. If the relay indicates no continuity (infinite resistance) across its terminals, it is faulty and must be renewed. **Note:** No test details are available for the 1999 TDM model - the relay can only be checked by the substitution of a new relay.

4 If the relay is good, check the other components in the starter circuit as described in the relevant sections of this Chapter. If all components are good, check the wiring between the various components (see the *wiring diagrams* at the end of this book).

Replacement

- 5 The starter cut-off relay is located under the seat on all except 1996-on TDM models, where it is behind the fairing. Remove the seat or fairing for access (see Chapter 8). Disconnect the relay wiring connector and remove the relay (see illustrations 25.2a and b, and 11.3b).
- 6 Installation is the reverse of removal.

26 Horn – check and replacement



Check

- 1 If the horn, doesn't work, first check the fuse (see Section 5) and the battery (see Section 3).
- 2 The horn is mounted behind the fairing side panels or the fairing, depending on model. On TDM and TRX models, remove the fairing, and on XTZ models remove the left-hand fairing side panel (see Chapter 8).
- 3 Unplug the wiring connectors from the horn (see illustrations). Using two jumper wires, apply battery voltage directly to the terminals on the horn. If the horn sounds, check the switch (see Section 19) and the wiring between the switch and the horn (see the wiring diagrams at the end of this Chapter).
- 4 If the horn doesn't sound, renew it.

Replacement

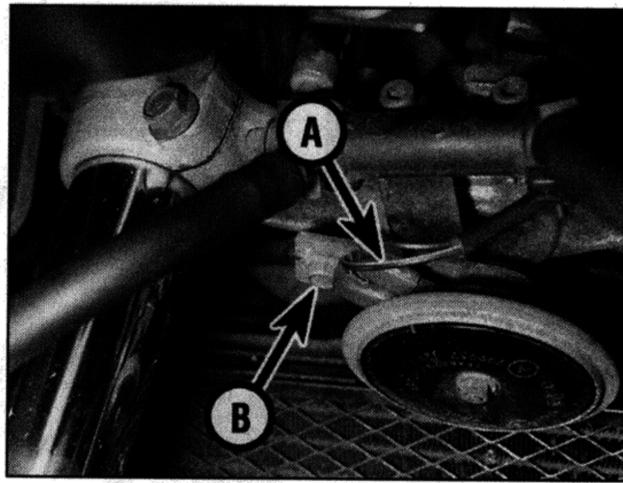
- 5 The horn is mounted behind the fairing side panels or the fairing, depending on model. On TDM and TRX models, remove the fairing, and on XTZ models remove the left-hand fairing side panel (see Chapter 8).
- 6 Unplug the wiring connectors from the horn, then unscrew the bolt(s) securing the horn and remove it from the bike (see illustrations 26.3a, b, c and d).
- 7 Install the horn and securely tighten the bolt(s). Connect the wiring connectors to the horn.

27 Starter relay – check and replacement

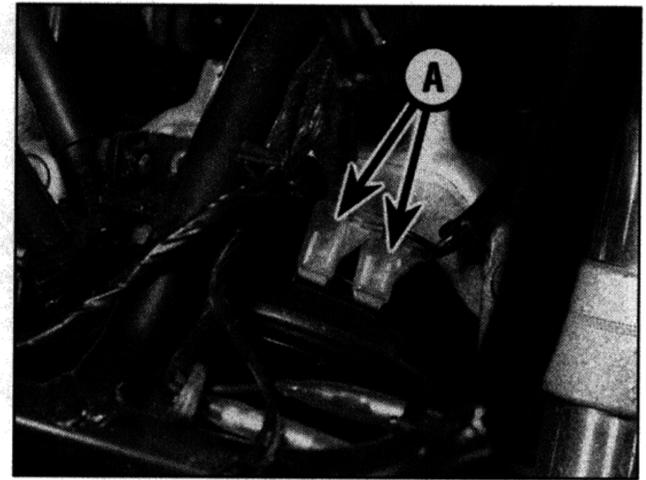


Check

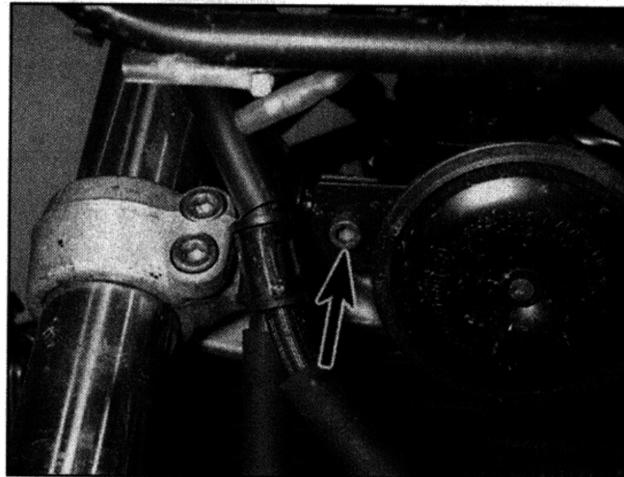
- 1 If the starter circuit is faulty, first check the fuse (see Section 5).
- 2 The starter relay is located under the seat. Remove the seat for access (see Chapter 8). Lift the rubber terminal cover and unscrew the bolt securing the starter motor lead (see illustration); position the lead away from the relay terminal. With the ignition switch ON, the engine kill switch in the RUN position, the transmission in



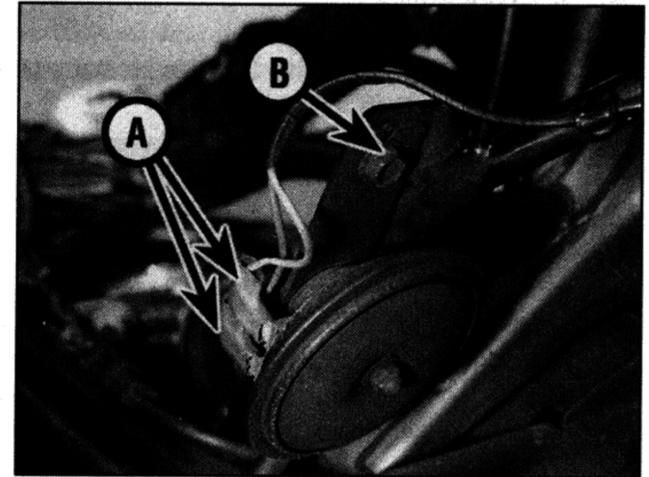
26.3a Horn wiring connectors (A) and mounting bolt (B) – TDM models



26.3b Horn wiring connectors (A) ...



26.3c ... and mounting bolt (B) – TRX models



26.3d Horn wiring connectors (A) and mounting bolt (B) – XTZ models

neutral and the clutch pulled in, press the starter switch. The relay should be heard to click.

3 If the relay doesn't click, switch off the ignition and remove the relay as described below; test it as follows.

4 This test is made with the relay removed from the bike and on the bench. Set a multimeter to the ohms x 1 scale and connect it across the relay's starter motor and battery lead terminals. Using a fully-charged 12 volt battery and two insulated jumper wires, connect the jumper leads as follows according to the model being worked on:

1991 to 95 TDM	Battery positive lead to the red wire terminal of the relay, negative lead to the blue/white terminal
1996-on TDM	Battery positive lead to the red/white wire terminal of the relay, negative lead to the blue/white terminal
TRX	Battery positive lead to the blue/white wire terminal of the relay, negative lead to the red terminal
XTZ	Battery positive lead to the blue/white wire terminal of the relay, negative lead to the red/white terminal

At this point the relay should be heard to click and the multimeter read 0 ohms (continuity). If this is the case the relay is proved good. If the relay does not click when battery voltage is applied and indicates no continuity (infinite resistance) across its terminals, it is faulty and must be renewed.

5 If the relay is good, check the other components in the starter circuit as described in the relevant sections of this Chapter. If all components are good, check the wiring between the various components (see the wiring diagrams at the end of this book).

Replacement

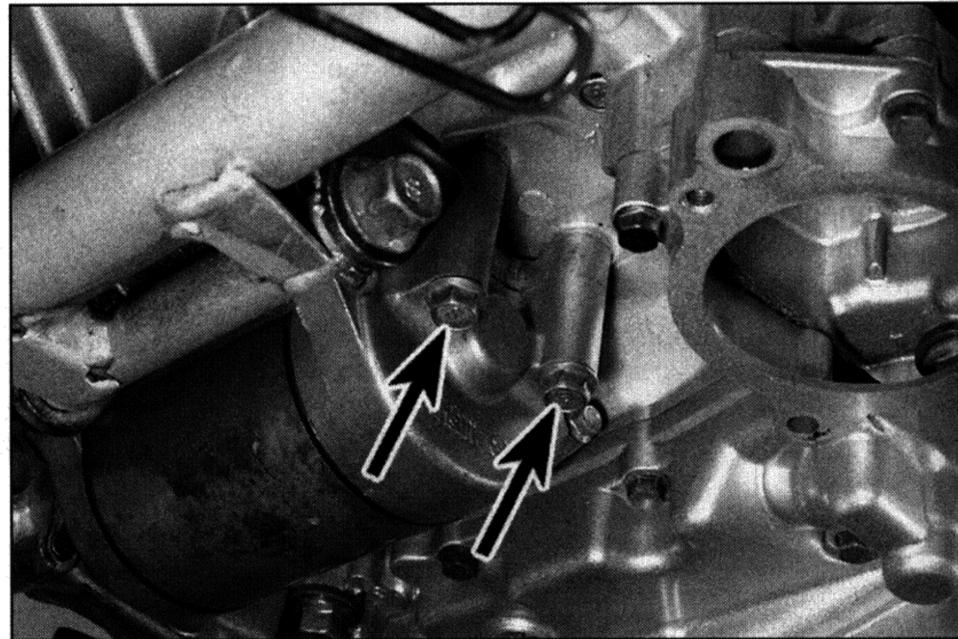
- 6 Remove the seat (see Chapter 8).
- 7 Disconnect the relay wiring connector, and unscrew the two nuts securing the starter motor and battery leads to the relay and



27.2 Detach the starter motor lead from the relay



27.7 Pull back the covers to access the terminal nuts



28.4a Unscrew the bolts (arrowed) . . .

detach the leads (**see illustration**). Remove the relay with its rubber sleeve from its mounting lug on the frame.

8 Installation is the reverse of removal. Make sure the terminal nuts are securely tightened. Connect the negative (-ve) lead last when reconnecting the battery.

28 Starter motor – removal and installation



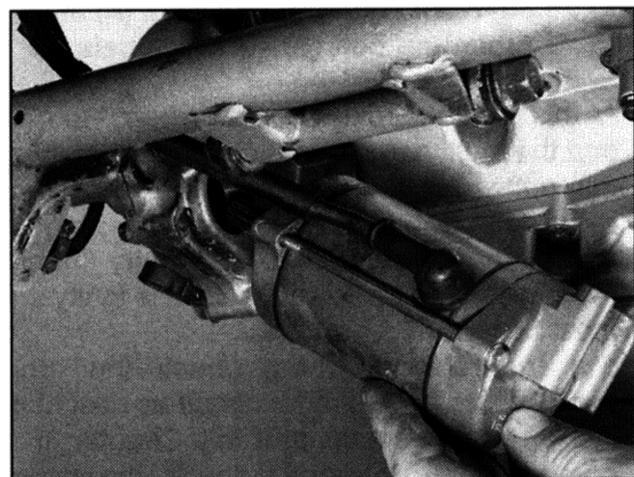
Removal

- 1 Remove the seat (see Chapter 8). Disconnect the battery negative (-ve) lead.
- 2 The starter motor is mounted underneath the engine.
- 3 Peel back the rubber terminal cover and remove the nut securing the starter lead to the starter relay (**see illustration 27.2**). Detach the lead and feed it through to the starter motor.
- 4 Unscrew the two bolts securing the starter motor to the crankcase (**see illustration**). Slide the starter motor out from the crankcase and remove it from the machine (**see illustration**).
- 5 Remove the O-ring on the end of the starter

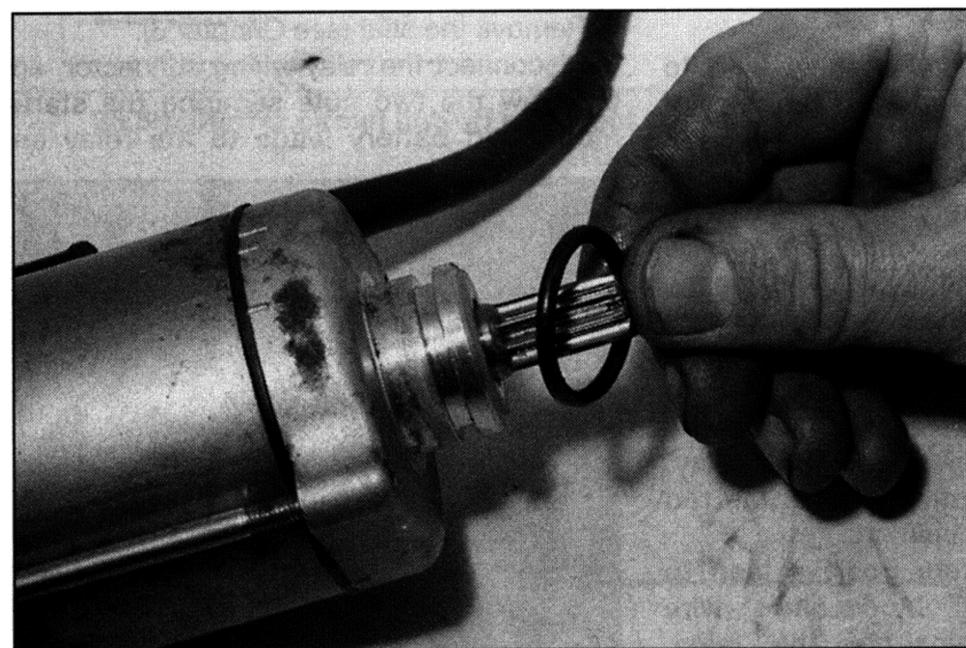
motor and discard it as a new one must be used.

Installation

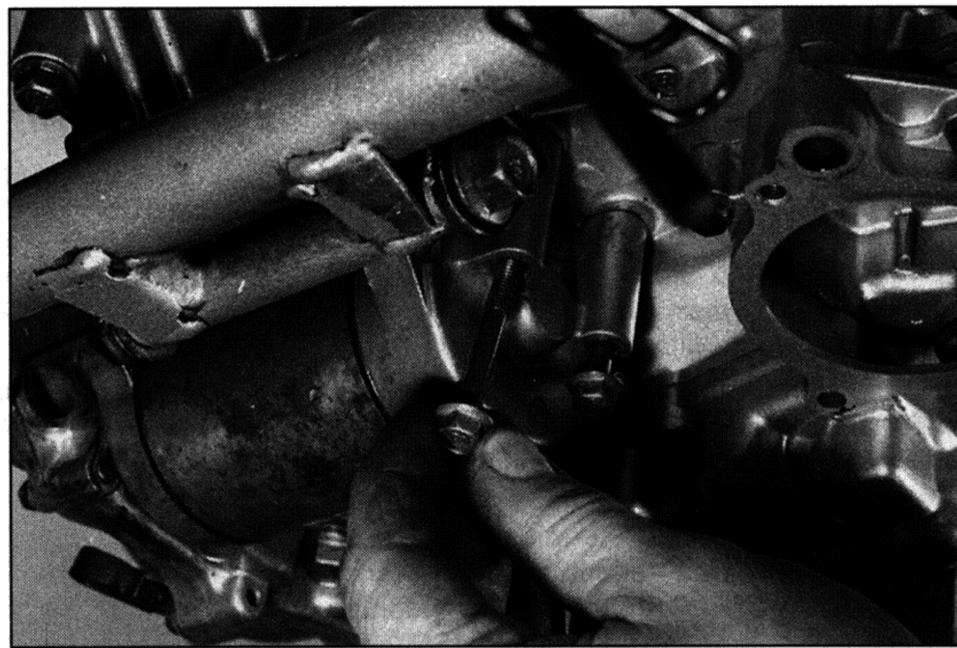
- 6 Install a new O-ring on the end of the starter motor and ensure it is seated in its groove (**see illustration**). Apply a smear of engine oil to the O-ring to aid installation.
- 7 Manoeuvre the motor into position and slide it into the crankcase (**see illustration 28.4b**). Ensure that the starter motor teeth mesh correctly with those of the starter idle/reduction gear. Install the mounting bolts and tighten them to the torque setting specified at the beginning of the Chapter (**see illustration**).
- 8 Connect the starter lead to the starter relay and secure it with the nut (**see illustration 27.2**). Make sure the rubber cover is correctly seated over the terminal.
- 9 Connect the battery negative (-ve) lead and install the seat (see Chapter 8).



28.4b . . . and remove the starter motor



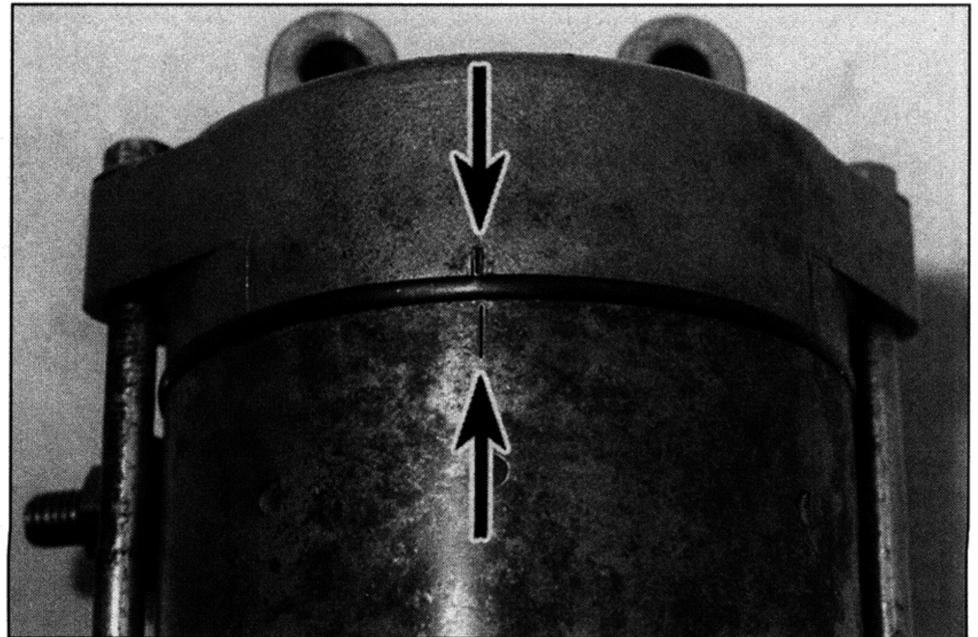
28.6 Fit a new O-ring into the groove



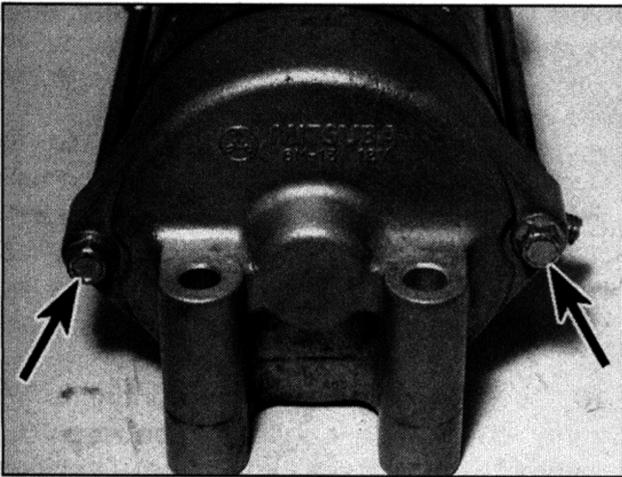
28.7 Install the bolts and tighten them to the specified torque



29.1 Unscrew the terminal nut and detach the lead



29.2 Note the alignment marks (arrowed), or make your own



29.3 Unscrew the long bolts (arrowed)



29.4a Remove the front cover . . .



29.4b . . . and slide off the shims

29 Starter motor – disassembly, inspection and reassembly



Disassembly

1 Remove the starter motor (see Section 28). Pull back the rubber terminal cover, then unscrew the nut and detach the lead from the terminal bolt (see illustration).

2 Note the alignment marks between the

main housing and the front and rear covers, or make your own if they aren't clear (see illustration).

3 Unscrew the two long bolts and withdraw them from the starter motor (see illustration).

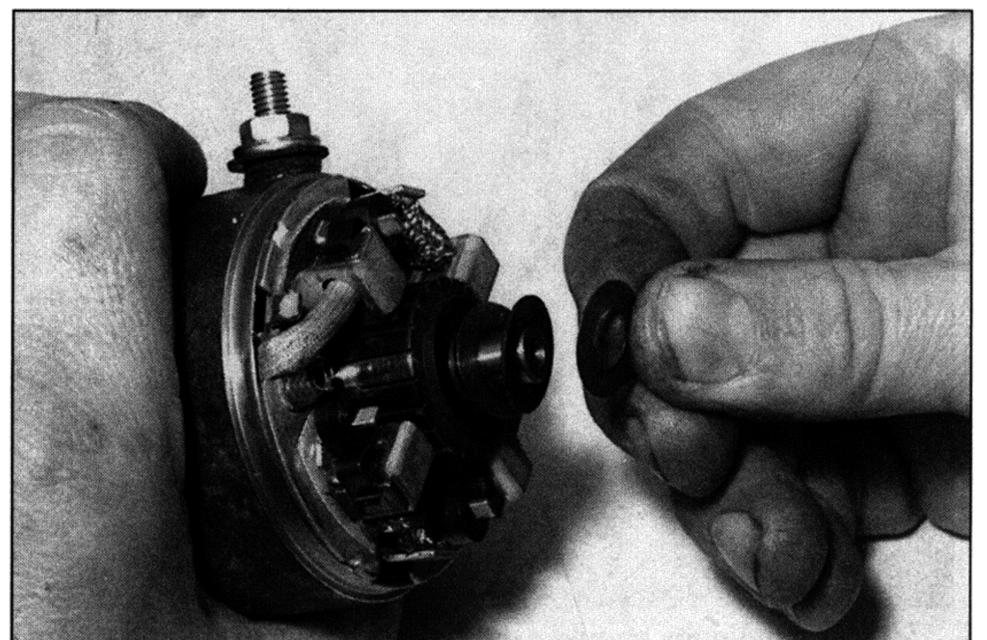
4 Wrap some insulating tape around the teeth on the end of the starter motor shaft – this will protect the oil seal from damage as the front cover is removed. Remove the front cover from the motor (see illustration). Remove the cover O-ring from the main housing and discard it as a new one must be used.

Remove the shims from the front end of the armature shaft or the inside of the front cover, noting their correct fitted locations (see illustration). Also remove the tabbed thrust washer from the front cover (see illustration 29.20b).

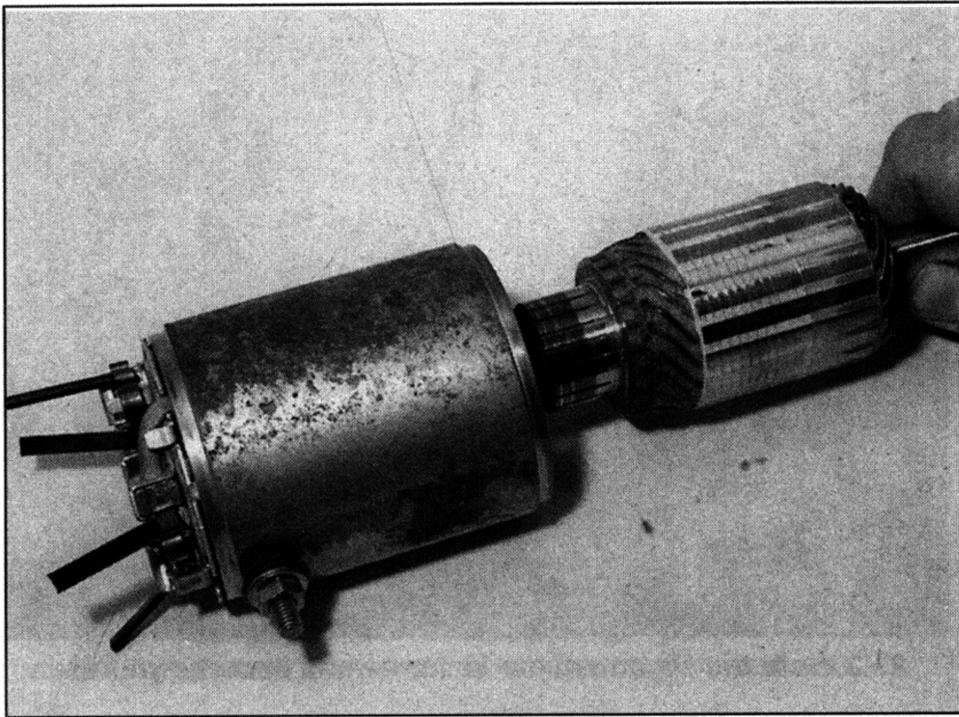
5 Remove the rear cover from the motor (see illustration). Remove the cover O-ring from the main housing and discard it as a new one must be used. Remove the shims from the rear end of the armature shaft or from inside the rear cover (see illustration).



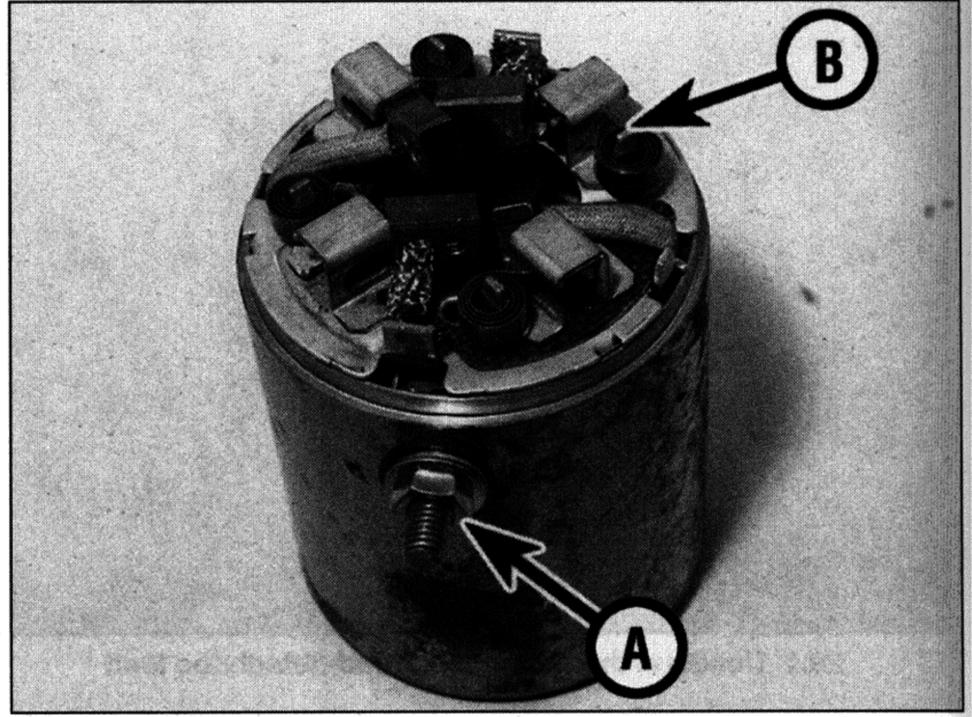
29.5a Remove the rear cover . . .



29.5b . . . and slide off the shims



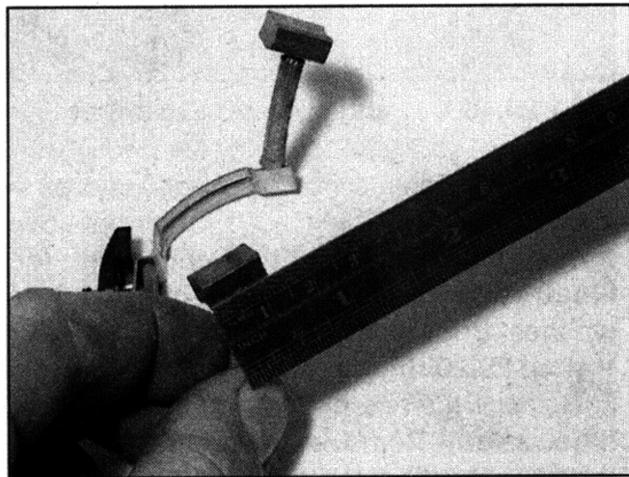
29.6 Withdraw the armature



29.7 Unscrew the terminal nut (A) and remove the washers, then lift out the brushplate (B)

6 Withdraw the armature from the main housing (see illustration).

7 Noting the correct fitted location of each component, unscrew the terminal nut and remove it along with its washer and the insulating washers (see illustration). Withdraw the brushplate assembly and



29.8 Measure the length of each brush

terminal bolt from the main housing. Remove the brushplate seat (see illustration 29.15a).

Inspection

8 The parts of the starter motor that are 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 service limit, renew the brush assembly. If the brushes are not worn excessively, nor cracked, chipped, or otherwise damaged, they may be re-used.

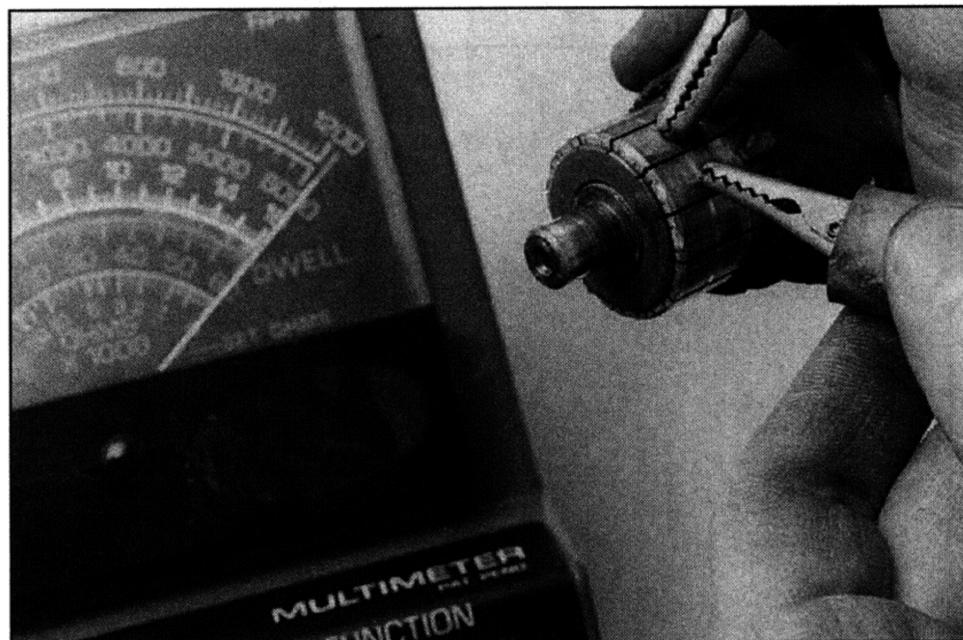
9 Inspect the commutator bars on the armature for scoring, scratches and discoloration. The commutator can be cleaned and polished with crocus cloth, but do not use sandpaper or emery paper. After cleaning, wipe away any residue with a cloth soaked in electrical system cleaner or denatured alcohol. Measure the diameter of

the commutator and compare it to the specifications. If it has worn below the wear limit, renew the starter motor. Measure the depth of the insulating Mica below the surface of the commutator bars. If the Mica is less than the depth specified, scrape it away until the specified depth is reached.

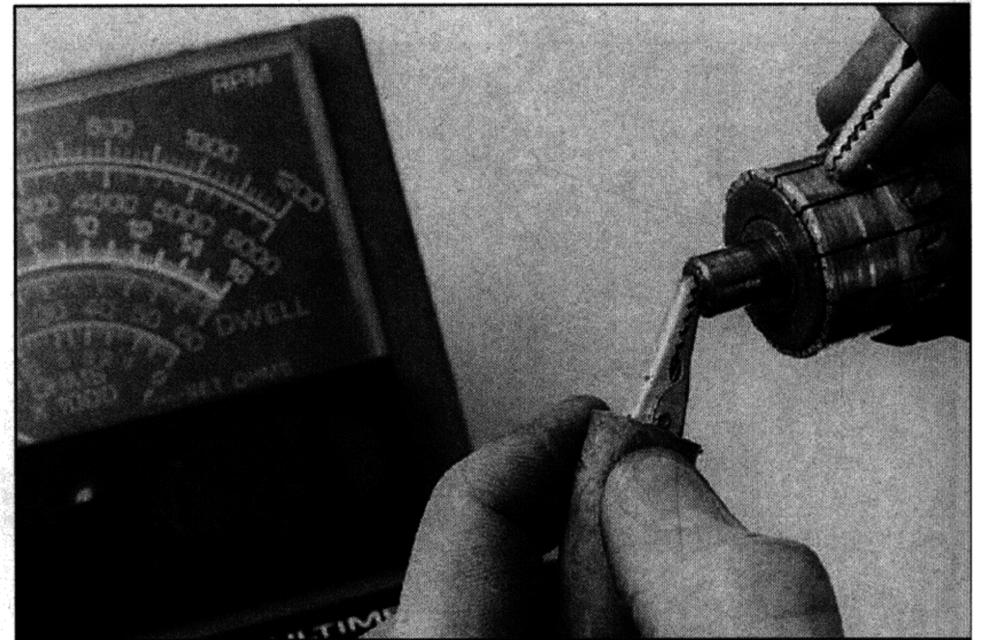
10 Using an ohmmeter or a continuity test light, check for continuity between the commutator bars (see illustration). Continuity should exist between each bar and all of the others. Also, check for continuity between the commutator bars and the armature shaft (see illustration). There should be no continuity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

11 Check for continuity between the terminal bolt and the housing (when assembled). There should be no continuity (infinite resistance).

12 Check the front end of the armature shaft for worn, cracked, chipped and broken teeth.



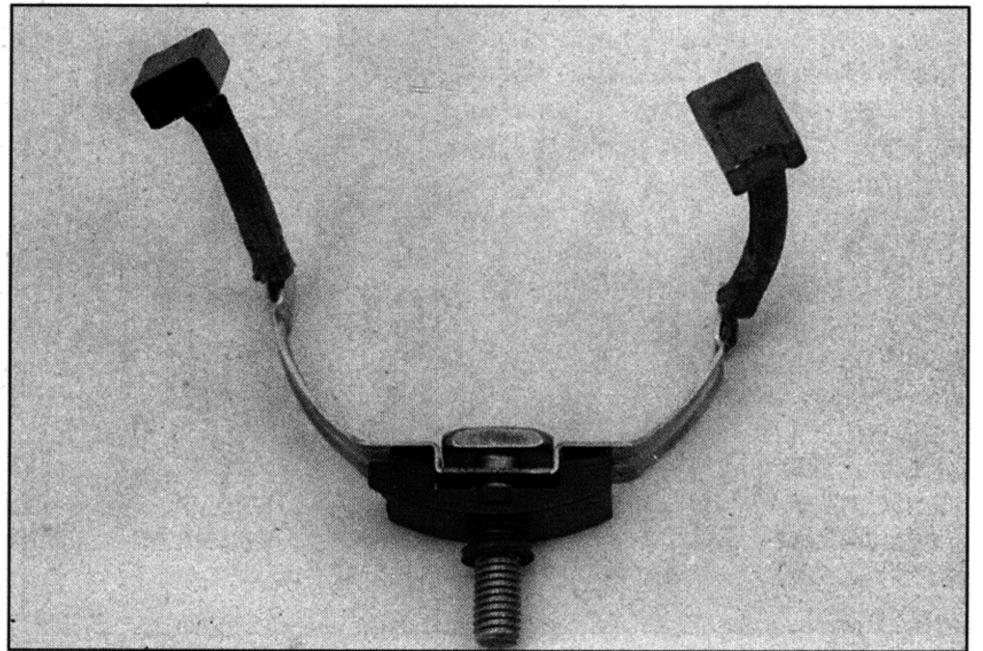
29.10a Continuity should exist between the commutator bars



29.10b There should be no continuity between the commutator bars and the armature shaft



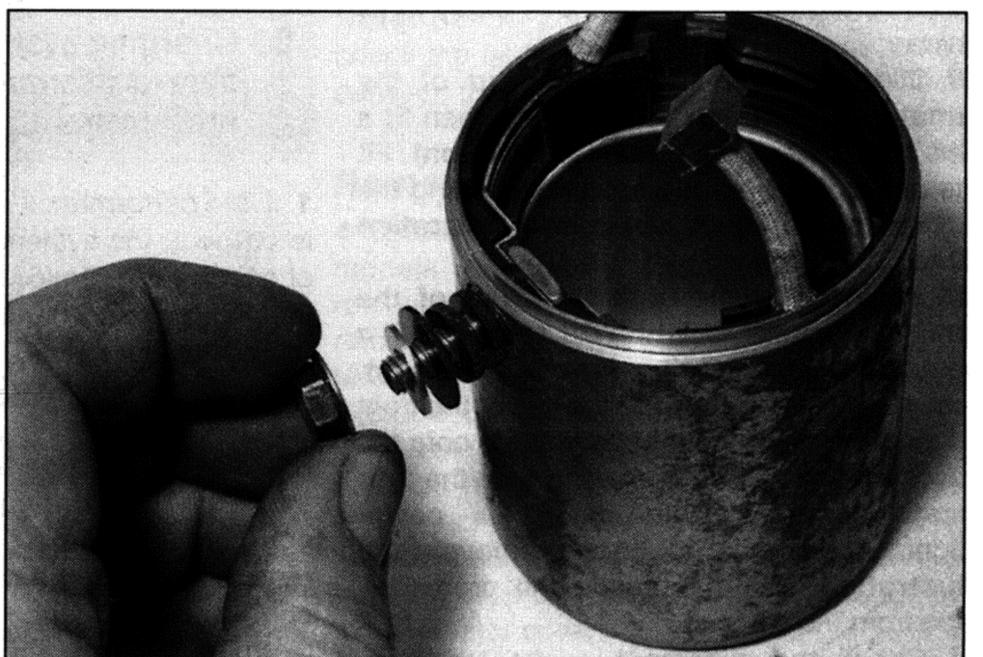
29.15a Fit the brushplate seat



29.15b Make sure the insulators are in place . . .



29.15c . . . then install the terminal bolt assembly into the housing and brushplate seat . . .



29.15d . . . and fit the washers and nut

If the shaft is damaged or worn, renew the armature.

13 Inspect the end covers for signs of cracks or wear. Inspect the magnets in the main housing and the housing itself for cracks.

14 Inspect the insulating washers and front cover oil seal for signs of damage and renew them if necessary.

Reassembly

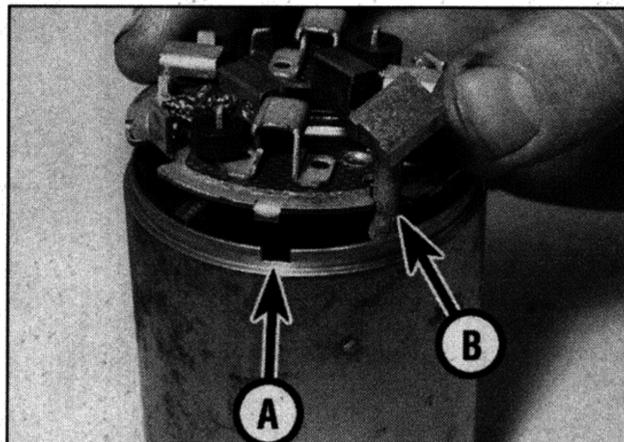
15 Fit the brushplate seat into the main housing (**see illustration**). Ensure that the inner rubber insulator and O-ring are in place on the terminal bolt, then insert the bolt through the main housing and locate the arms into the brushplate seat (**see illustrations**). Fit the insulating washers over the terminal, then fit the standard washer and the nut (**see illustration**).

16 Fit the brushplate assembly onto the main housing, locating the terminal bolt brush wires in the cutouts and making sure the tab on the plate locates in the cutout in the housing (**see illustration**).

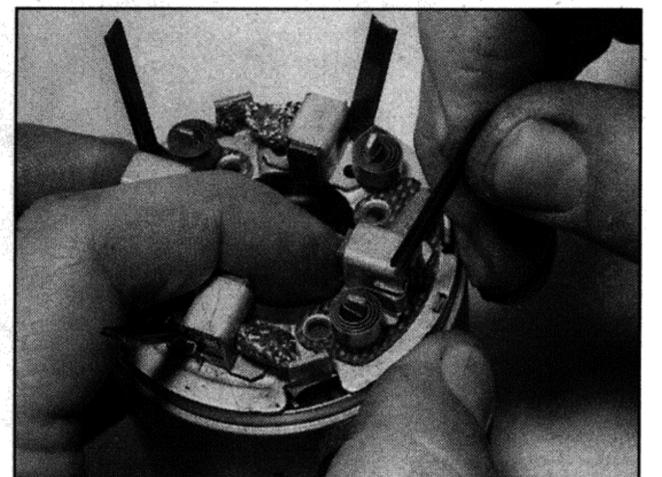
17 Fit each brush into its holder and press it back against the spring, then lock it in that position by inserting a strip of plastic (such as the cut-off end of a cable tie) between the spring end and the holder, preventing the spring from pushing the brush back out (**see illustration**). This provides the clearance necessary for the armature to be installed

without becoming entangled with the exposed brush ends.

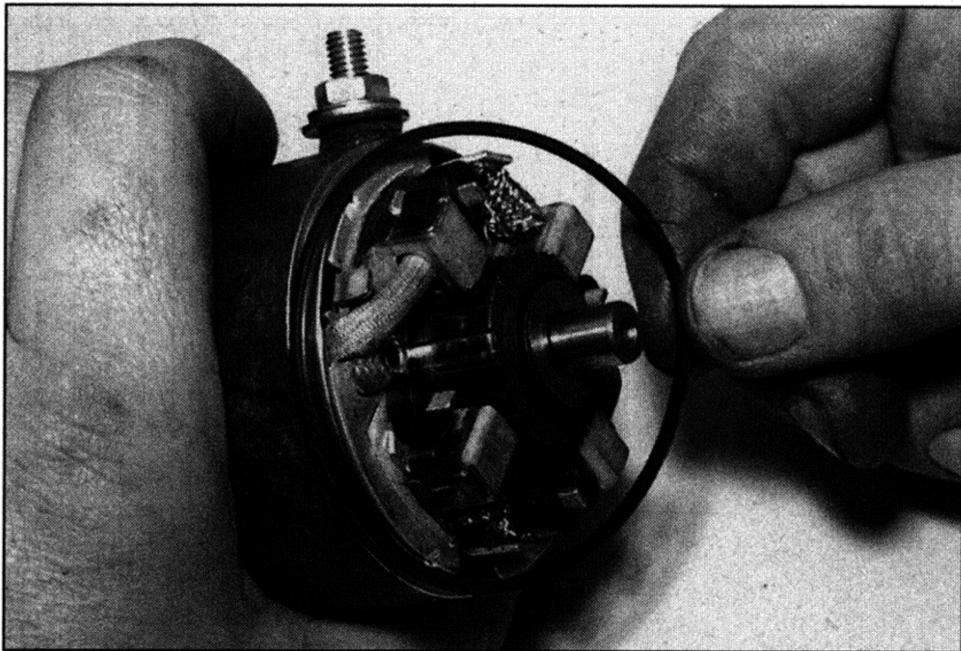
18 Insert the armature into the main housing, noting that it will be forcibly drawn in by the attraction of the magnets (**see illustration 29.6**). Remove the strips securing the brushes. Check that each brush is securely pressed against the commutator



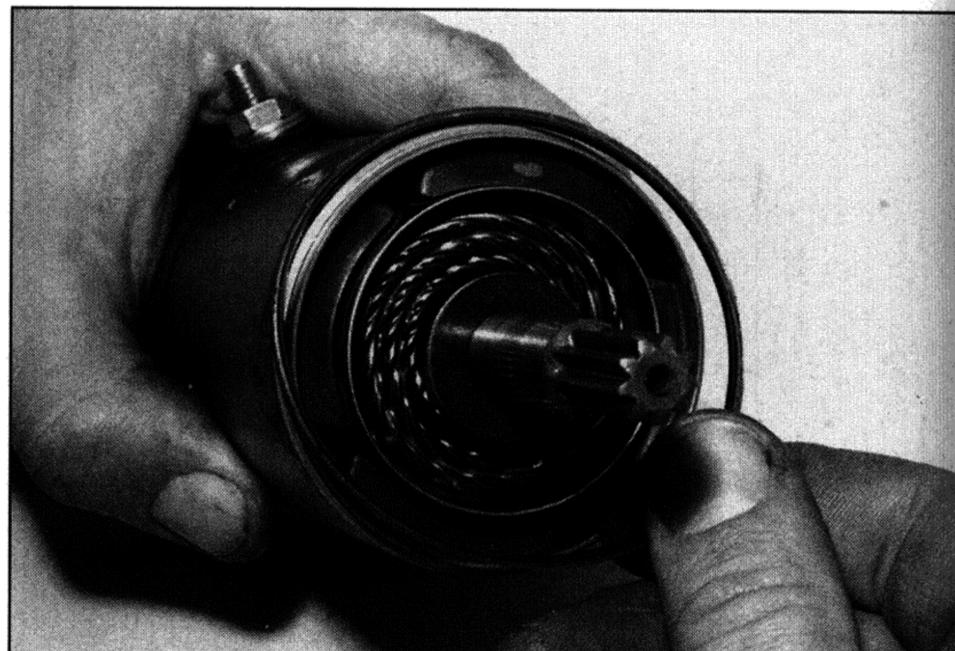
29.16 Fit the brushplate, locating the tab in the notch (A) the brush wires in the cutouts (B)



29.17 Lock the brushes into their holders as described and shown



29.19 Fit a new O-ring onto the rear of the housing



29.20a Fit a new O-ring onto the front of the housing . . .

by its spring and is free to move easily in its holder.

19 Slide the shims onto the end of the armature (see illustration 29.5b), then fit a new rear cover O-ring (see illustration). Fit the rear cover onto the housing, aligning the marks noted or made earlier (see illustration 29.5a).

20 Slide the shims onto the front of the armature (see illustration 29.4b), then fit a new front cover O-ring (see illustration). Apply a smear of grease to the lips of the front cover oil seal. Fit the tabbed washer onto the cover (see illustration), making sure the tabs locate correctly, then install the cover, aligning the marks made on removal (see illustration 29.4a). Remove the protective tape from the shaft end.

21 Check the alignment marks made on removal are correctly aligned, then install the long bolts and tighten them securely (see illustration).

22 Fit the starter motor lead onto the terminal bolt, then secure it with the nut and cover it with the rubber boot (see illustration 29.1).

23 Install the starter motor (see Section 28).

30 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. **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 a multimeter (with voltage, current and resistance checking facilities).

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.

4 If a multimeter is not available, the job of checking the charging system should be left to a Yamaha dealer.

31 Charging system – leakage and output test

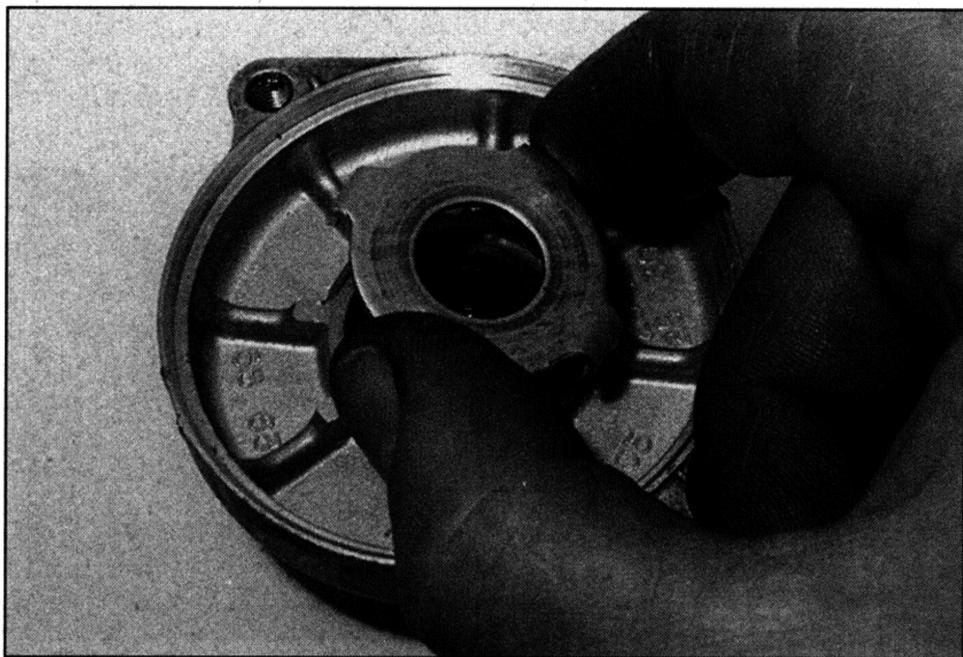
1 If the charging system of the machine is thought to be faulty, remove the seat (see Chapter 8) and perform the following checks.

Leakage test

Caution: *Always connect an ammeter in series, never in parallel with the battery, otherwise it will be damaged. Do not turn the ignition ON or operate the starter motor when the ammeter is connected – a sudden surge in current will blow the meter's fuse.*

2 Turn the ignition switch OFF and disconnect the lead from the battery negative (-ve) terminal.

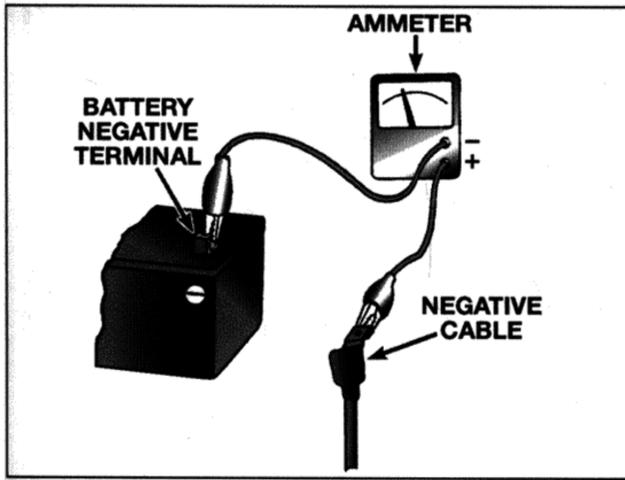
3 Set the multimeter to the Amps function and connect its negative (-ve) probe to the battery negative (-ve) terminal, and positive (+ve) probe to the disconnected negative (-ve) lead (see



29.20b . . . and fit the tabbed washer into the cover



29.21 Install and tighten the long bolts



31.3 Checking the charging system leakage rate – connect the ammeter as shown

illustration). Always set the meter to a high amps range initially and then bring it down to the mA (milli Amps) range; if there is a high current flow in the circuit it may blow the meter's fuse.

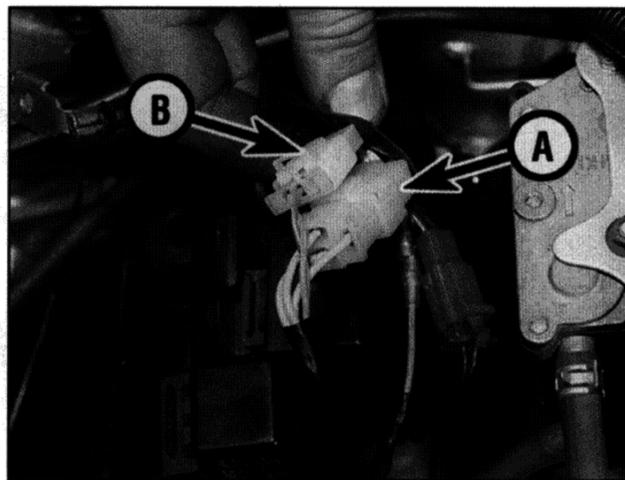
4 If the current leakage indicated exceeds the amount specified at the beginning of the Chapter, there is probably a short circuit in the wiring. Disconnect the meter and connect the negative (-ve) lead to the battery, tightening it securely,

5 If leakage is indicated, use the wiring diagrams at the end of this book to systematically disconnect individual electrical components and repeat the test until the source is identified.

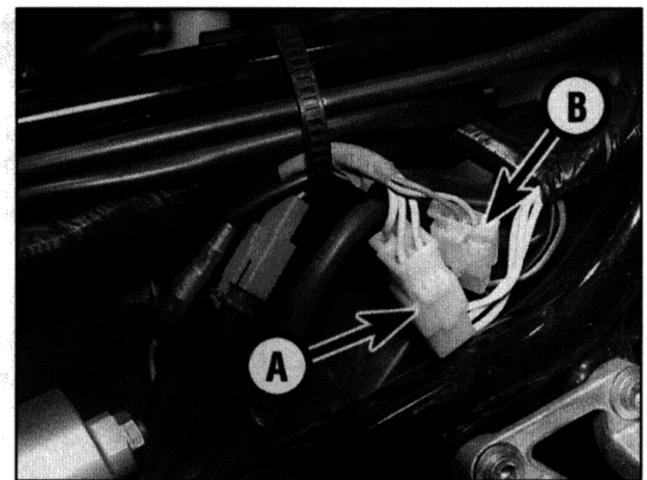
Output test

6 Start the engine and warm it up to normal operating temperature. Remove the seat (see Chapter 8).

7 To check the regulated voltage output, allow the engine to idle and connect a multimeter set to the 0 to 20 volts DC scale (voltmeter) between the terminals of the battery (meter positive (+ve) lead to battery positive terminal, meter negative (-ve) lead to battery negative terminal). Slowly increase the engine speed to 5000 rpm and note the reading obtained. The regulated voltage should be as specified at the beginning of the Chapter. If the voltage is outside these limits, check the alternator and the regulator (see Sections 32 and 33).



32.2a Alternator wiring connector (A), pick-up coil wiring connector (B) – TDM models



32.2b Alternator wiring connector (A), pick-up coil wiring connector (B) – TRX models

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Clues to a faulty regulator are constantly blowing bulbs, with brightness varying considerably with engine speed, and battery overheating.

32 Alternator – check, removal and installation

Check

1 To access the wiring connectors, on TDM models remove the seat, on TRX models remove the side covers, and on XTZ models remove the left-hand side cover (see Chapter 8).

2 Trace the wiring back from the top of the alternator cover on the left-hand side of the engine and disconnect it at the white connector containing the three white wires (see illustrations).

3 Using a multimeter set to the ohms x 1 (ohmmeter) scale measure the resistance between each of the white wires on the alternator side of the connector, taking a total of three readings, then check for continuity between each terminal and earth. If the stator coil windings are in good condition the three readings should be within the range shown in the Specifications at the start of this Chapter

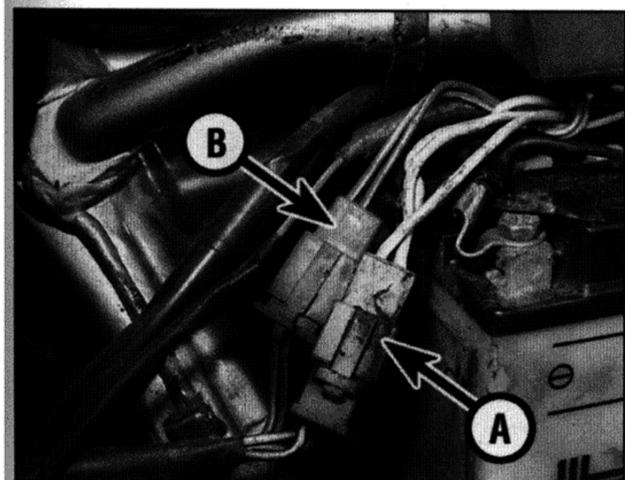
and there should be no continuity (infinite resistance) between any of the terminals and earth. If not, the alternator stator coil assembly is at fault and should be renewed.
Note: Before condemning the stator coils, check the fault is not due to damaged wiring between the connector and coils.

Removal

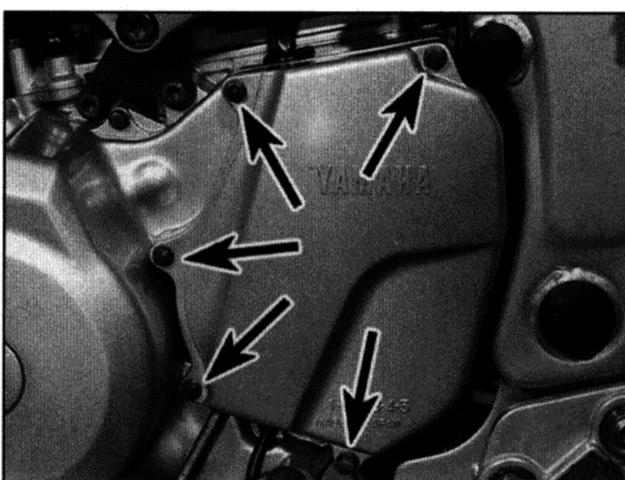
4 To access the wiring connectors, on TDM models remove the seat, on TRX models remove the side covers, and on XTZ models remove the left-hand side cover (see Chapter 8).

5 Trace the alternator/pick-up coil wiring back from the top of the alternator cover on the left-hand side of the engine and disconnect it at the two white connectors (see illustrations 32.2a, b and c). Free the wiring from any clips or guides and feed it through to the alternator cover.

6 On TDM and XTZ models, unscrew the bolts securing the outer front sprocket cover and remove the cover (see illustration). Unscrew the gearchange lever linkage arm pinchbolt and remove the arm from the shaft, noting the alignment of the punch mark with the slit in the clamp (see illustration). If no mark is visible, make your own before removing the arm so that it can be correctly aligned with the shaft on installation. Unscrew the bolts securing the inner sprocket cover, on TDM models noting the clip secured by the



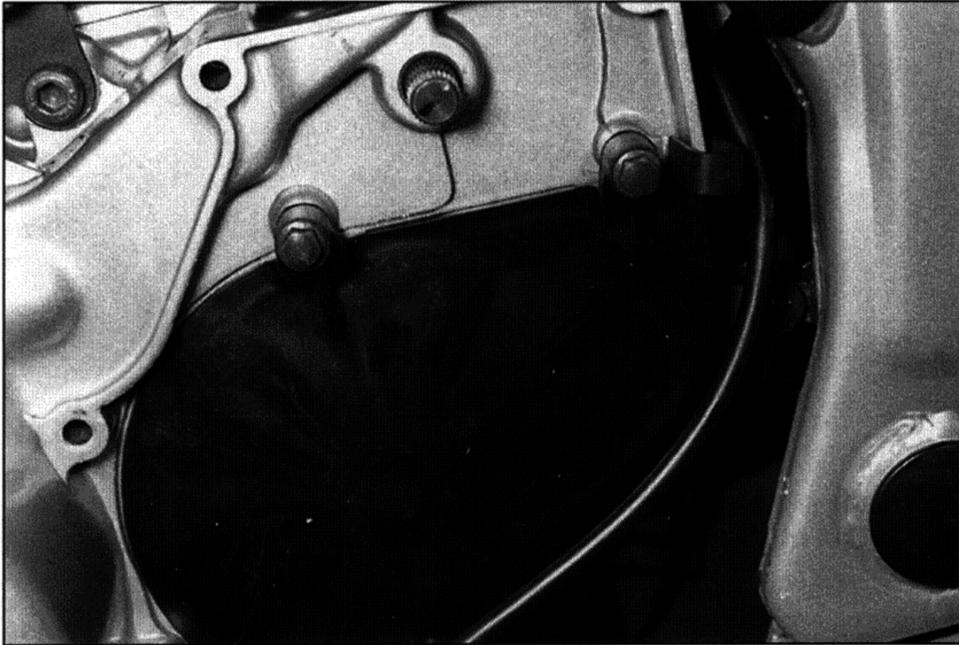
32.2c Alternator wiring connector (A), pick-up coil wiring connector (B) – XTZ models



32.6a Unscrew the bolts (arrowed) and remove the cover



32.6b Gearchange arm/shaft alignment – TDM models



32.6c Unscrew the two bolts and remove the inner cover



32.7 Gearchange arm/shaft alignment – TRX models

top rear bolt, and remove the cover (see illustration).

7 On TRX models, unscrew the gearchange lever linkage arm pinchbolt and remove the arm from the shaft, noting the alignment of the punch mark with the slit in the clamp (see illustration). If no mark is visible, make your own before removing the arm so that it can be correctly aligned with the shaft on installation.

Unscrew the bolts securing the outer front sprocket cover and remove the cover, then unscrew the bolts securing the inner sprocket cover, noting the clip secured by the top rear bolt, and remove the cover.

8 Working in a criss-cross pattern, unscrew the bolts securing the alternator cover and remove the cover (see illustration). Discard the gasket as a new one must be used. Note

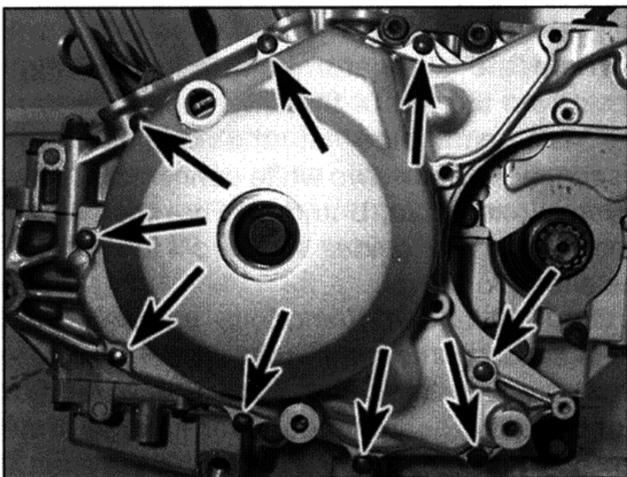
the position of the dowels and remove them if loose.

9 Withdraw the shaft from the starter idle/reduction gear and remove the gear, noting how it fits (see illustration).

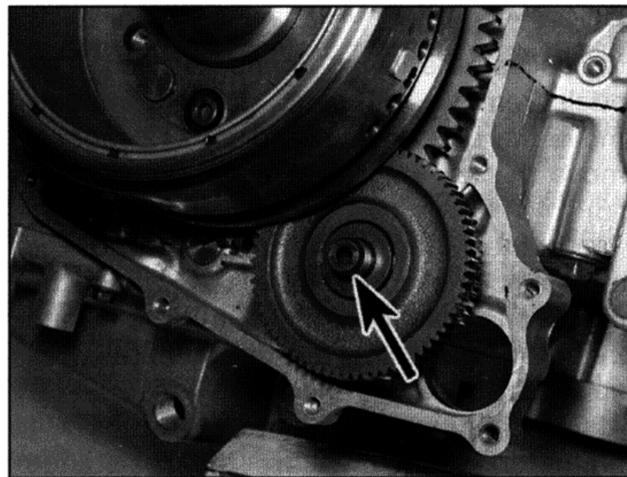
10 To remove the rotor bolt it is necessary to stop the rotor from turning. If a rotor holding strap or tool is not available, and if the engine is still in the frame, place the transmission in gear and have an assistant apply the rear brake, then unscrew the bolt (see illustration).

11 To remove the rotor from the shaft it is necessary to use a rotor puller. Yamaha provide a special tool (Pt. Nos. 90890-01362 and 90890-01382, or alternatively a similar tool can be set up as shown, using the threaded holes in the rotor (see illustration). After the rotor has been removed, remove the Woodruff key from the slot in the crankshaft for safekeeping if loose (see illustration 32.14a).

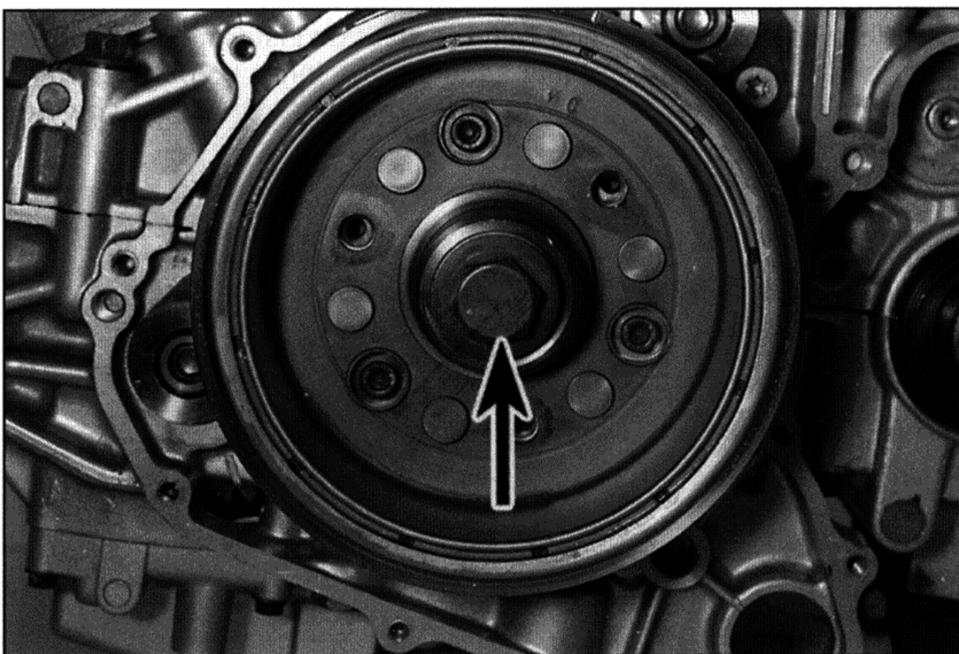
12 To remove the stator from the cover, remove the three screws securing the stator, and the two screws securing the pick-up coil,



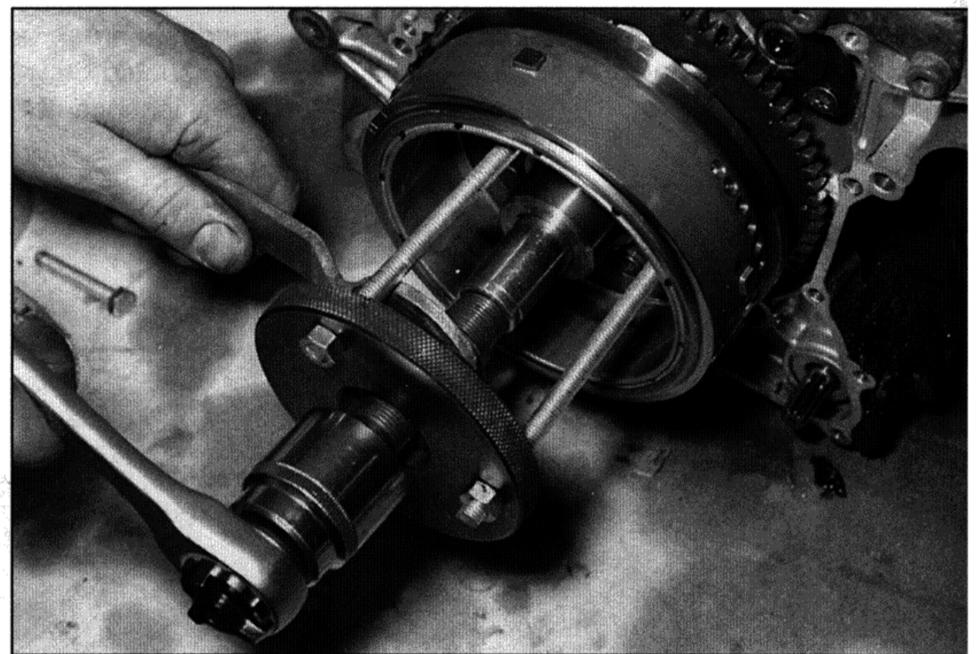
32.8 Unscrew the bolts (arrowed) and remove the cover



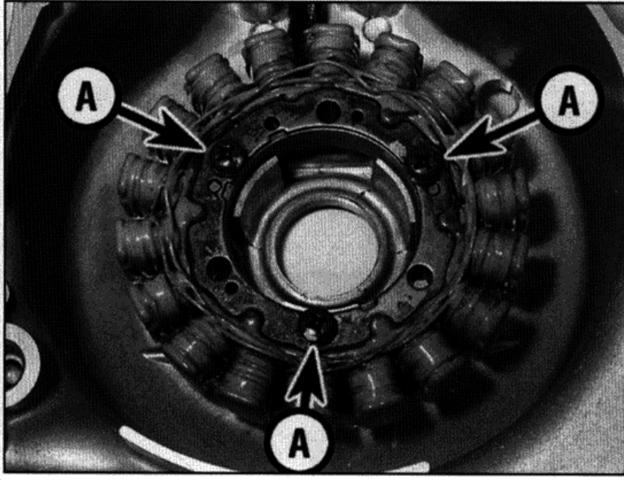
32.9 Withdraw the shaft (arrowed) and remove the gear



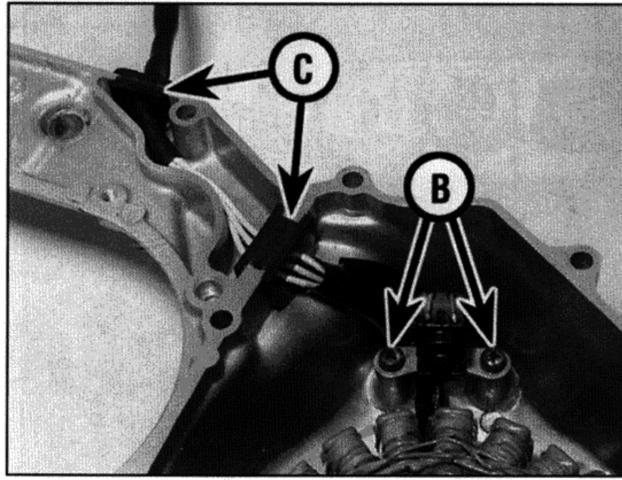
32.10 Unscrew the rotor bolt (arrowed)



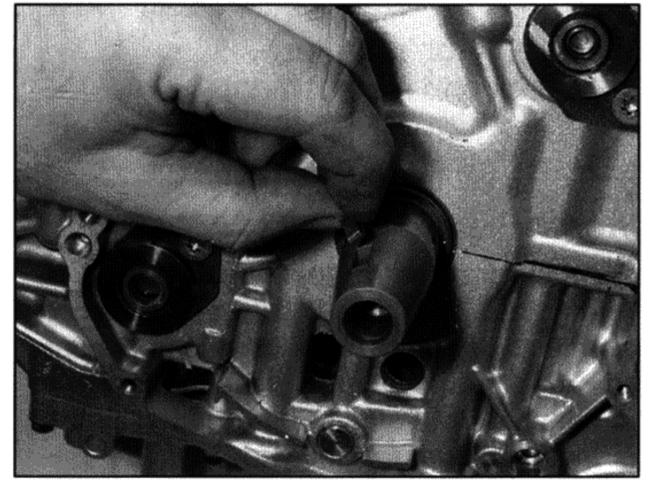
32.11 Drawing the rotor off the shaft using a puller



32.12a Remove the rotor screws (A) . . .



32.12b . . . and the pick-up coil screws (B), and free the wiring grommets (C)



32.14a If removed, fit the Woodruff key into its slot . . .

then remove the assembly, noting how the rubber wiring grommets fit (see illustrations).

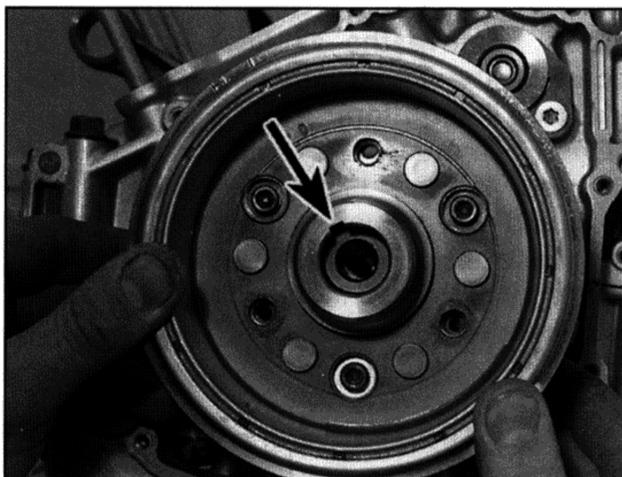
Installation

13 Install the stator and the pick-up coil in the cover, aligning the rubber wiring grommets with the grooves (see illustrations 32.12a and b). Apply a suitable non-permanent thread locking compound to the stator and pick-up coil screw threads, then install the screws and tighten them to the torque settings specified at the beginning of the Chapter. Apply a suitable sealant to the wiring grommets, then press them into the cut-outs in the cover.

14 Clean the tapered end of the crankshaft and the corresponding mating surface on the inside of the rotor with a suitable solvent. Fit the Woodruff key into its slot in the crankshaft (see illustration). Make sure that no metal objects have attached themselves to the magnet on the inside of the rotor, then install the rotor onto the shaft, making sure the slot is correctly aligned with the key (see illustration).

15 Install the rotor bolt with its washer and tighten it to the torque setting specified at the beginning of the Chapter, using the method employed on removal to prevent the rotor from turning (see illustrations).

16 Lubricate the starter idle/reduction gear shaft with clean engine oil. Install the

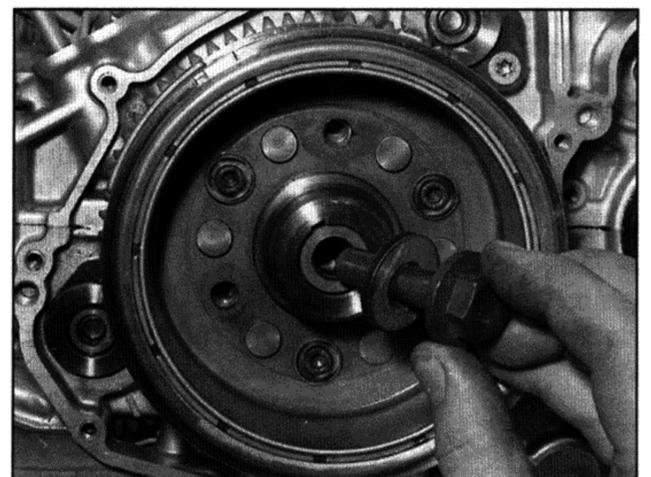


32.14b . . . then slide on the rotor, aligning the slot (arrowed) with the key

idle/reduction gear, making sure it engages correctly with both the starter motor pinion and the starter clutch pinion, and insert the shaft (see illustration 32.9).

17 Install the alternator cover using a new gasket, making sure it locates onto the dowels, and tighten the cover bolts evenly in a criss-cross pattern to the specified torque setting (see illustrations). Connect the alternator and pick-up coil wiring connectors, making sure they are correctly routed and secured by any clips or ties (see illustrations 32.2a, b and c).

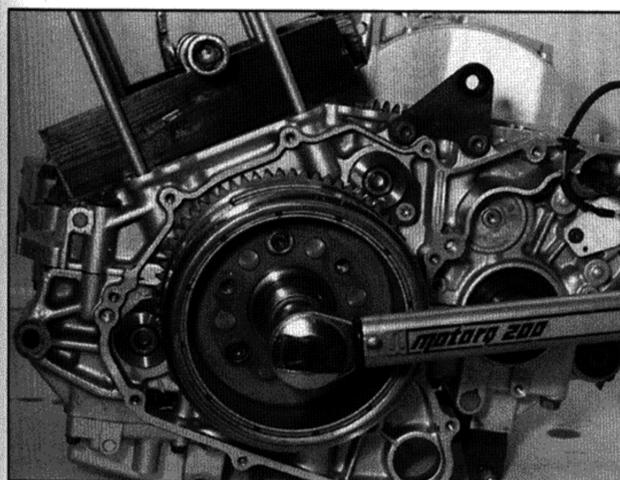
18 On TDM and XTZ models, install the inner sprocket cover, on TDM models not forgetting the clip secured by the top rear bolt, and tighten the bolts securely (see illustration



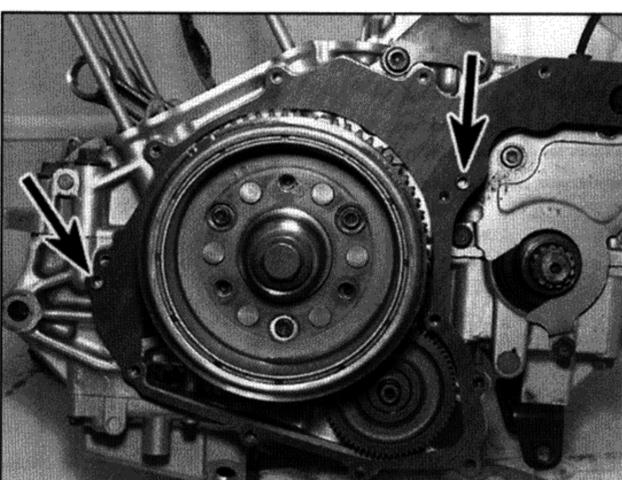
32.15a Install the bolt . . .

32.6c). Align the split in the gearchange linkage arm clamp with the punch mark on the shaft, then fit the arm on the shaft and tighten the pinchbolt to the specified torque setting (see illustration 32.6b). Install the outer sprocket cover and tighten its bolts to the specified torque (see illustration 32.6a).

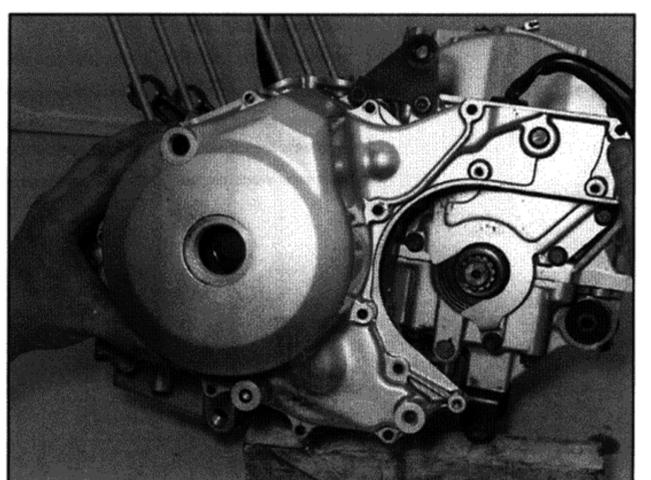
19 On TRX models, install the inner sprocket cover, not forgetting the clip secured by the top rear bolt, and tighten the bolts securely. Install the outer sprocket cover and tighten its bolts to the specified torque. Align the split in the gearchange linkage arm clamp with the punch mark on the shaft, then fit the arm on the shaft and tighten the pinchbolt to the specified torque setting (see illustration 32.7).



32.15b . . . and tighten it to the specified torque



32.17a Locate the gasket onto the dowels (arrowed) . . .



32.17b . . . then install the cover

**33 Regulator/rectifier –
check and replacement**



Check

1 Yamaha provide no test specifications for the regulator/rectifier. If it is suspected of being faulty, first check all other components and wiring in the charging circuit, referring to the relevant Sections in this Chapter and to the wiring diagrams at the end.

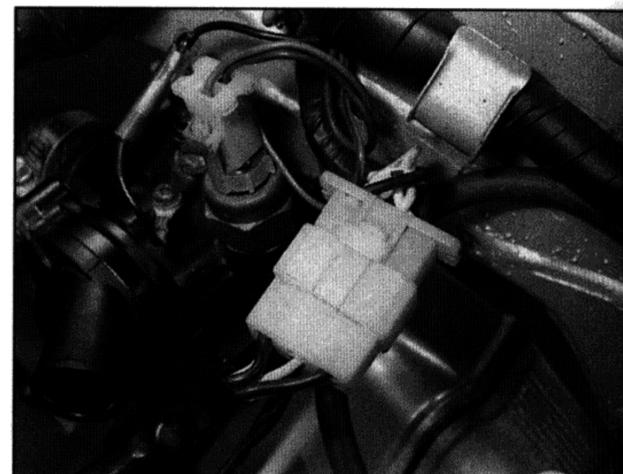
2 If all other components and the wiring are good, then the regulator/rectifier could be faulty. Remove the unit (see below) and take it to a Yamaha dealer for testing. Alternatively, substitute the suspect unit with a known good one and see if the fault is cured.

Replacement

3 On 1991 to 1995 TDM models, the regulator/rectifier is mounted on the outside of the left-hand frame beam (see illustration). On 1996-on TDM models, it is mounted behind the fairing. Remove the fairing for access (see Chapter 8). On 1991 to 1995



**33.3a Regulator/rectifier – 1991 to 1995
TDM models**



**33.3b Regulator/rectifier wiring connector
– 1991 to 1995 TDM models**

models, remove the air filter housing for access to the wiring connector (see Chapter 4) (see illustration).

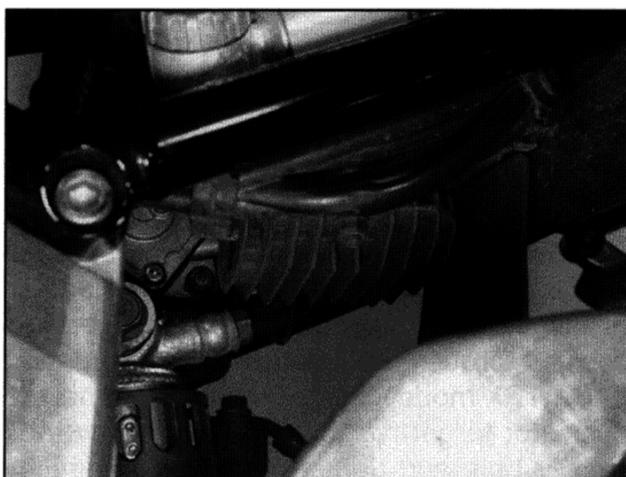
4 On TRX models, the regulator/rectifier is mounted to the underside of the rear mudguard near the top of the shock absorber (see illustration). Remove the rider's seat to access its wiring connector (see Chapter 8) (see illustration).

5 On XTZ models, the regulator/rectifier is mounted behind the left-hand side cover (see illustration). Remove the cover for access (see Chapter 8).

6 Disconnect the wiring connector.

7 Unscrew the two bolts or nuts securing the regulator/rectifier and remove it.

8 Install the new unit and tighten its bolts or nuts securely. Connect the wiring connector.



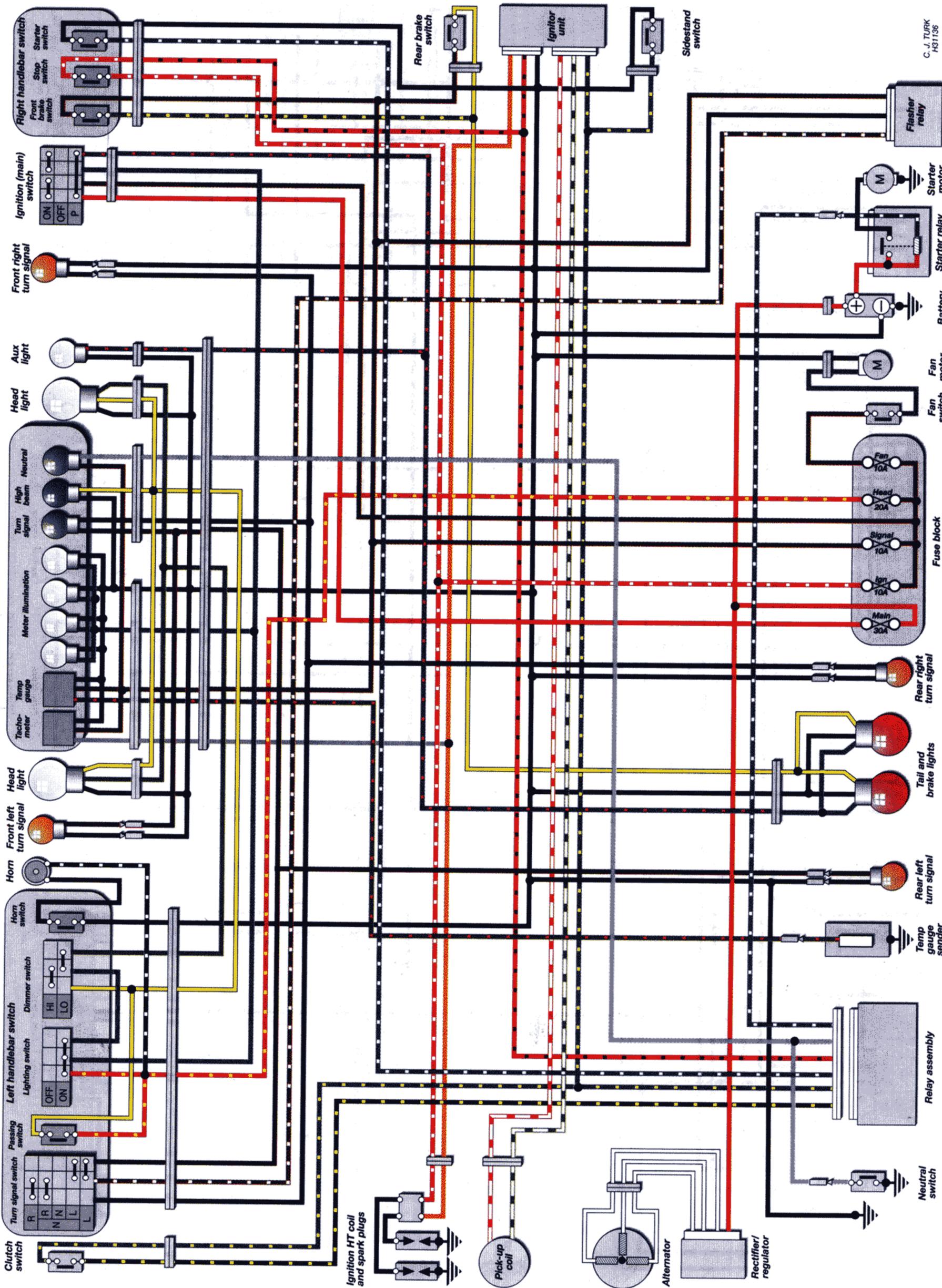
33.4a Regulator/rectifier – TRX models



**33.4b Regulator/rectifier wiring connector
– TRX models**

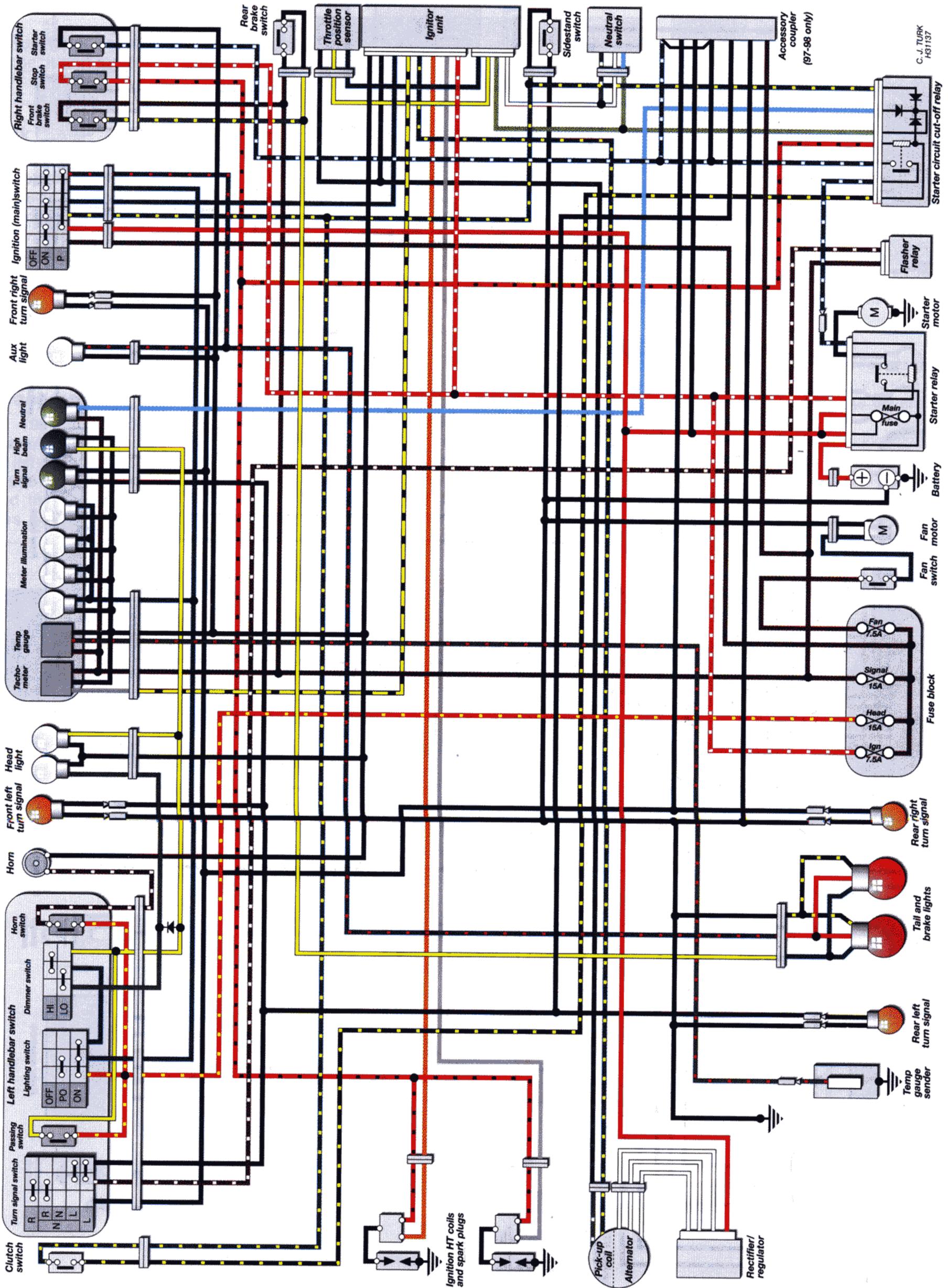


33.5 Regulator/rectifier – XTZ models



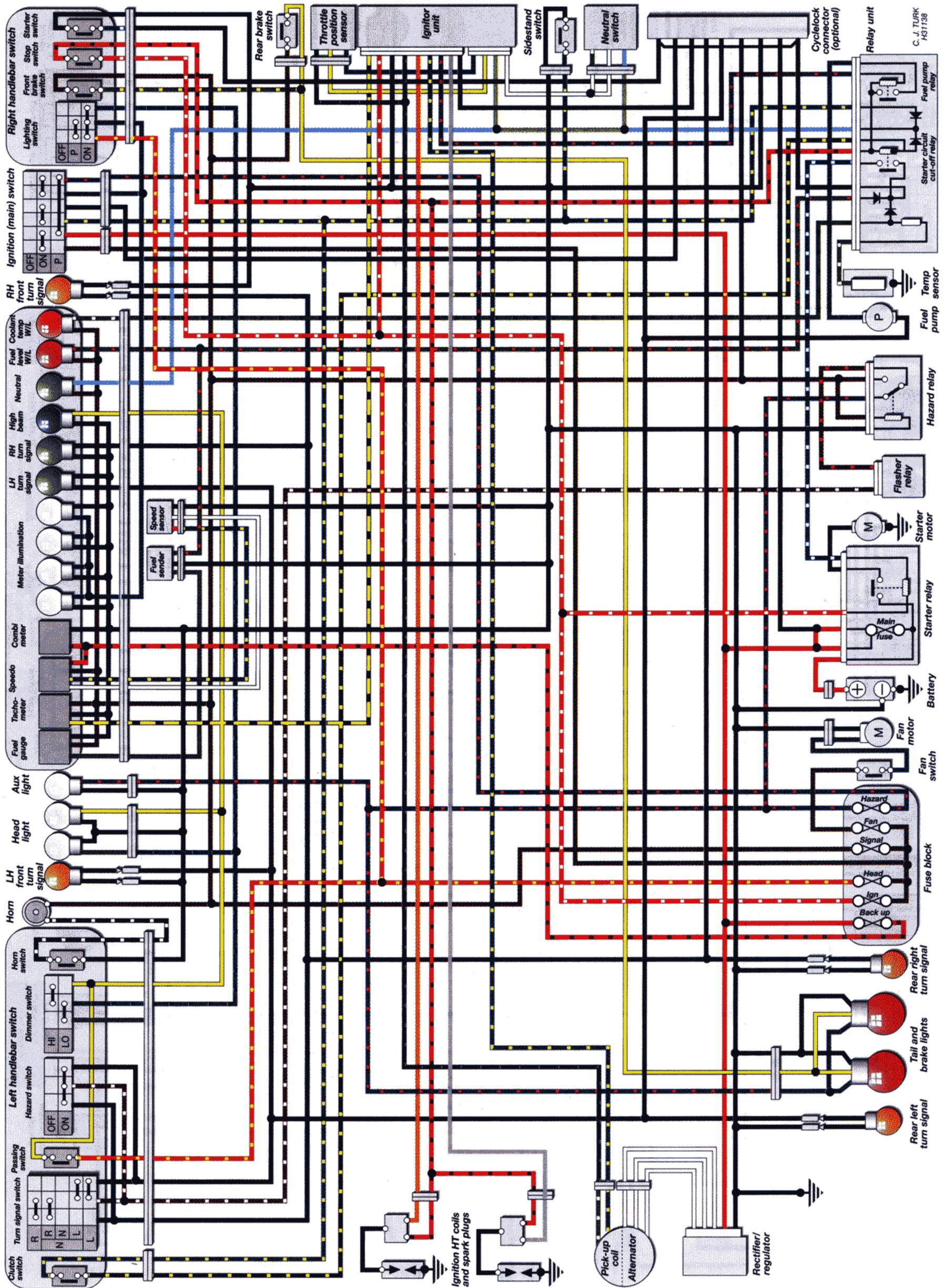
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TDM850 1991 - 95

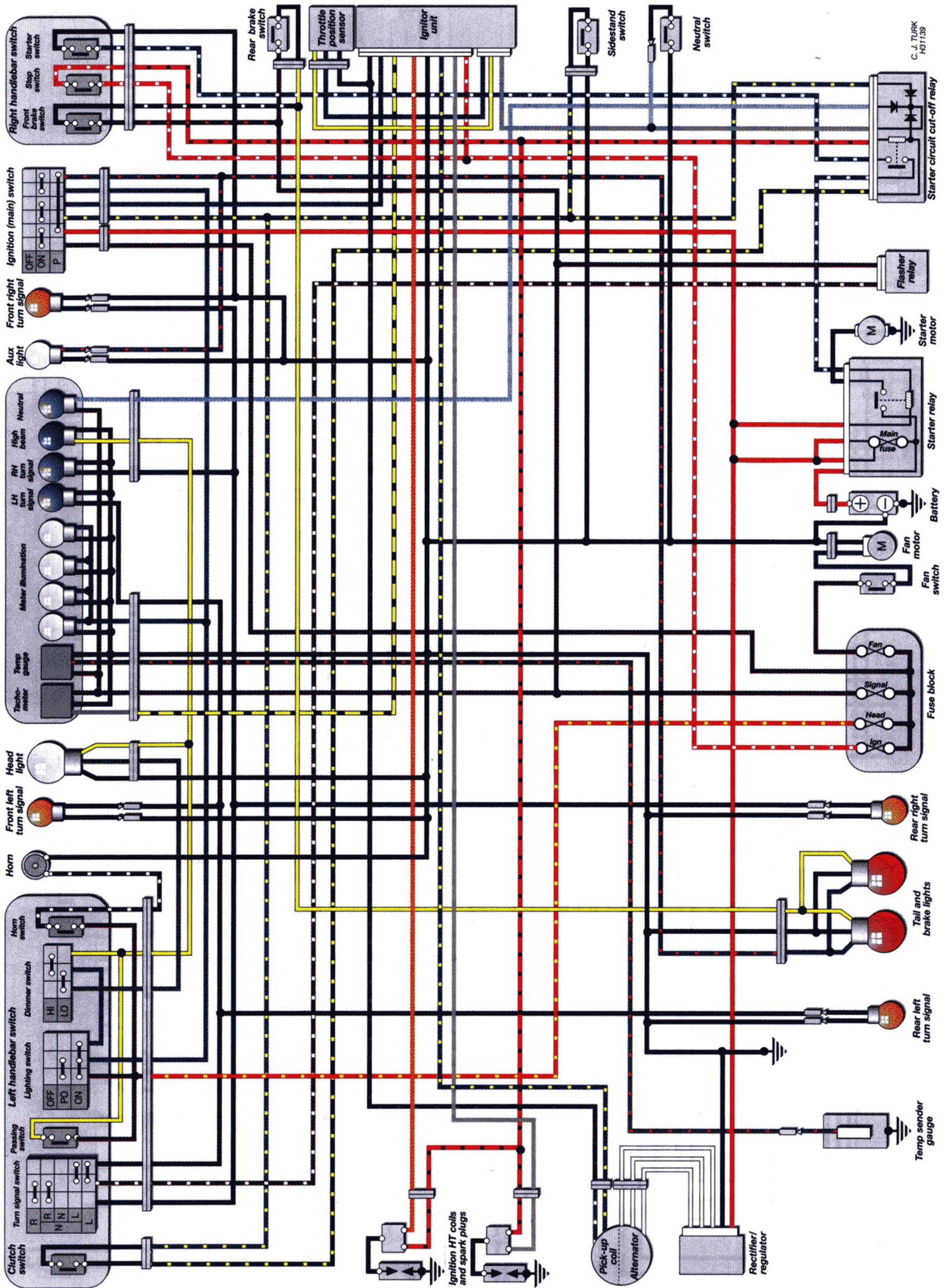


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TDM850 1996-98

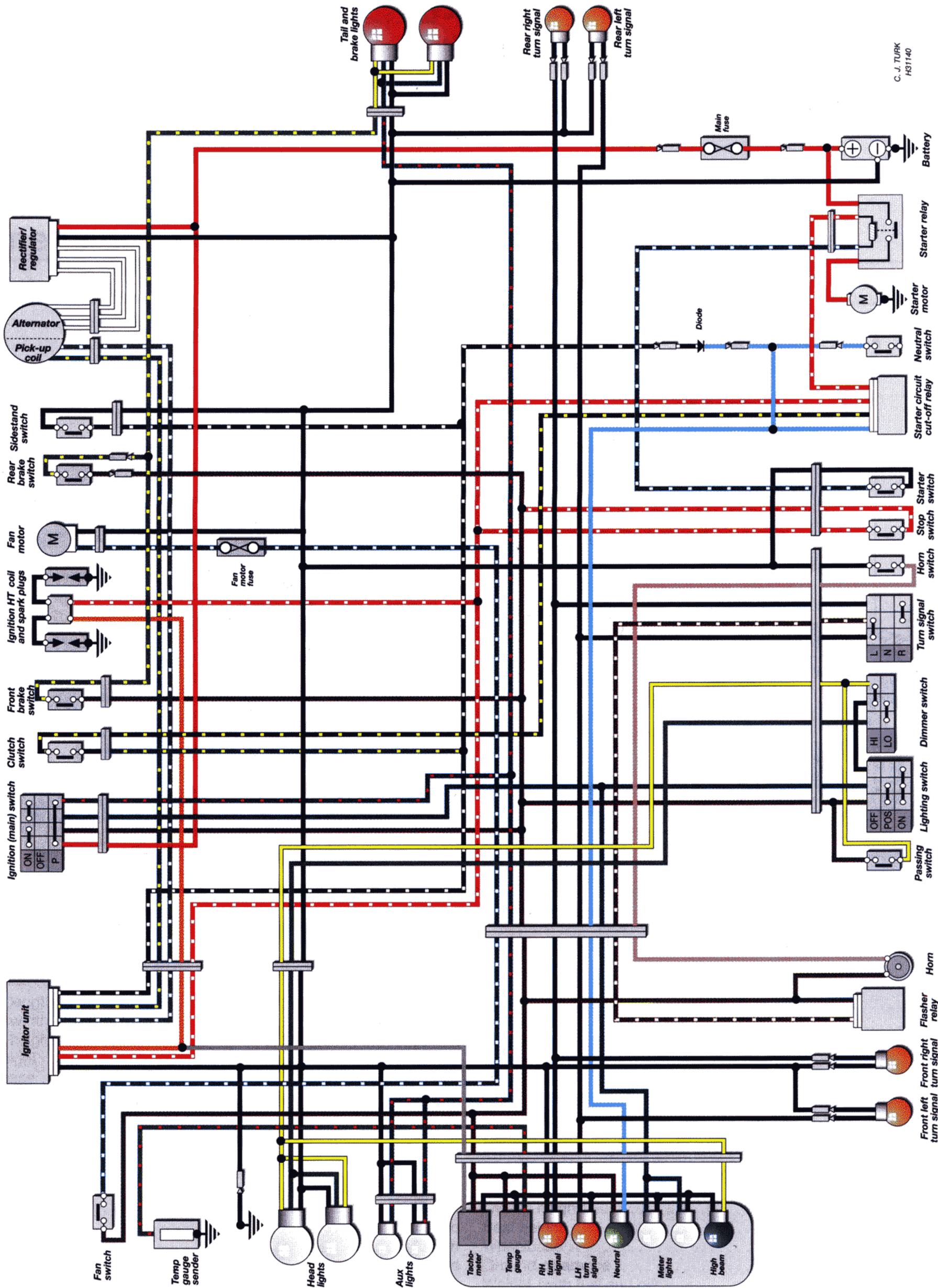


TDM850 1999



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TRX850



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XTZ750