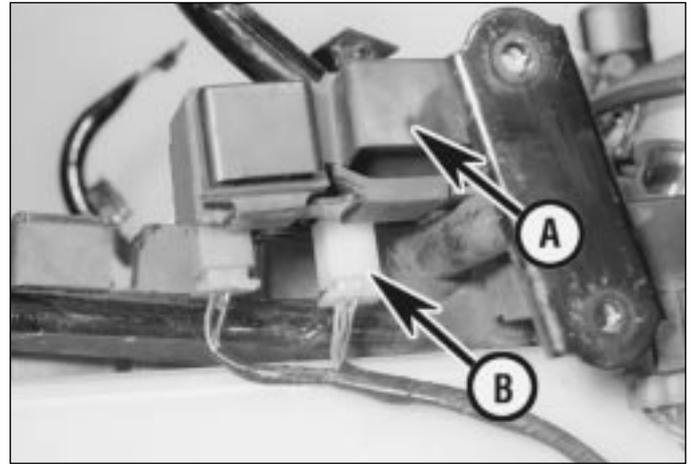


17.2 In-tank fuel pump (Honda ST1100)



17.3a Fuel cut-off relay (A) and its wiring connector (B)

angle sensor (sometimes known as a lean angle sensor) for switching off the fuel supply in emergency.

2 If the fuel pump is to be checked, the following test procedure will cover most types. Using the Honda Pan European ST1100 (see illustration 17.2) as an example, note that the fuel pump is controlled through the cut-off relay so that it runs whenever the ignition is switched on and the ignition is operative (ie, only when the engine is turning over).

3 First switch on the ignition and start the engine if possible. It should be possible to hear the pump humming (it may be necessary to remove the seat to hear it). If there is no noise from the pump and the engine will not run, check the circuit fuse also the relay and pump for loose or corroded connections. If all these are in order, switch off the ignition and unplug the fuel pump relay (see illustration 17.3a).

Connect a jumper wire across the terminals of the relay wiring connector from the supply wire to the pump feed wire (see illustration

17.3b). Switch on the ignition; the pump should operate. If it does work then the relay or the wiring is faulty.

4 Test the wiring by checking for full battery voltage at the relay supply terminal with the ignition switched on. If there is no voltage then there must be a wiring fault between the relay and the fuse.

5 Disconnect the wiring connectors from the relay, fuel pump and the ignition control module. Check the harness continuity from the relay to the ignition control module and from the relay to the pump. Finally check the continuity from the (green) wire at the relay connector and earth. Continuity should be indicated in all the tests. Rectify any breaks or other faults found.

6 If the pump still does not work then turn to the pump itself. Disconnect the wiring connectors at the tank (see illustration 17.6) and connect a 12 volt battery to the pump directly through two jumper wires. If the pump does not work it must be replaced (repairs are not possible).

7 If the pump works and all the relevant wiring and connectors are good, then the relay is at fault. The only solution is to substitute a good relay. There is one last possibility and that is that the ignition control module is faulty.

8 If the pump works but it is suspected of not giving enough output of fuel then it can be proved by running the pump with a jumper wire across the relay. Disconnect the fuel outlet hose from the tank side of the fuel filter and run fuel into a measuring beaker for 5 seconds then multiply the amount by 12 to give the pump output in cc per minute (see illustration 17.8).

In the case of the ST1100 it should be 640 cc per minute minimum, for a BMW R850/1100 it should be 1830 cc per minute. Bear in mind that the latter case refers to a fuel injection system where surplus fuel is returned to the tank.

External fuel pumps

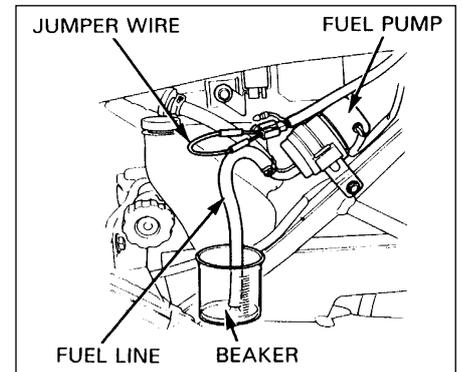
9 The electromagnetic pump shown in illustration 17.9 produces a low pressure fuel input to carburettors.



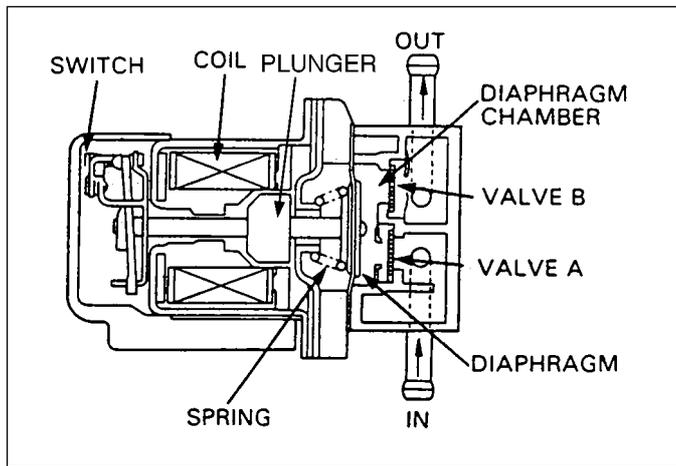
17.3b Connector a jumper wire between the specified terminals of the relay wiring connector



17.6 Disconnect the fuel pump wiring connectors



17.8 Fuel pump flow rate (output) test



17.9 Electromagnetic fuel pump

When the engine turns over, the pump is switched on by the fuel cut-off relay. Current flows through the coil and the magnetic action on the plunger is to pull it towards the coil centre. The plunger is attached to a diaphragm which creates a vacuum as it moves to the left in the diagram, opening the valve A and sucking fuel into the diaphragm chamber.

The motion of the plunger also trips the switch contacts and the coil current is cut off. The magnetic field disappears and the spring returns the diaphragm back to the right. This pushes the fuel out through valve B and on to the carburettor.

Some versions of this pump have a built-in fuel cut-off relay and others have a relay which is separate from the pump.

10 Generally trouble-free, this pump can, however, suffer from contacts sticking together. There are no spares available and the makers always state that a faulty pump

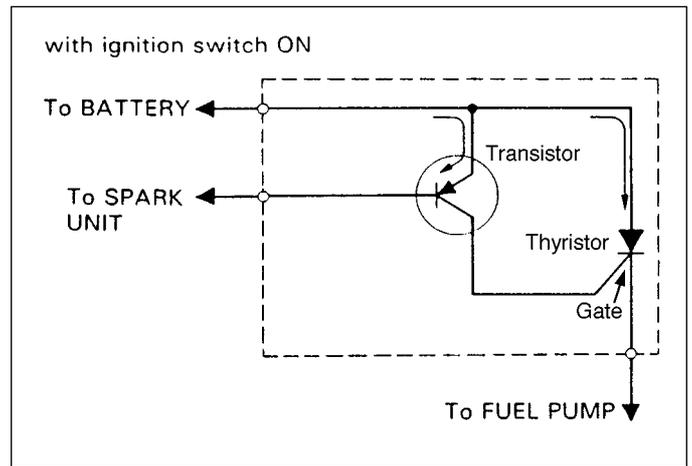
must be replaced. However it is sometimes possible after removing the end cover to separate the contacts and dress them clean with fine glasspaper (never emery paper) and to apply a touch of contact cleaner obtainable from electronics stores. Some readers may see the general similarity to the SU fuel pump used for many years on British cars.

Fuel cut-off relay

11 These come in two types, the electromagnetic relay and the electronic relay.

12 Electromagnetic relays operate by the magnetic effect of a coil which serves to pull in a metal armature and so closing or opening contacts.

Testing consists of checking the coil for continuity and seeing that the contacts operate and do not have undue roughness or burning. Generally if an electromagnetic relay is giving trouble it is better to replace it for there is no technical information available.



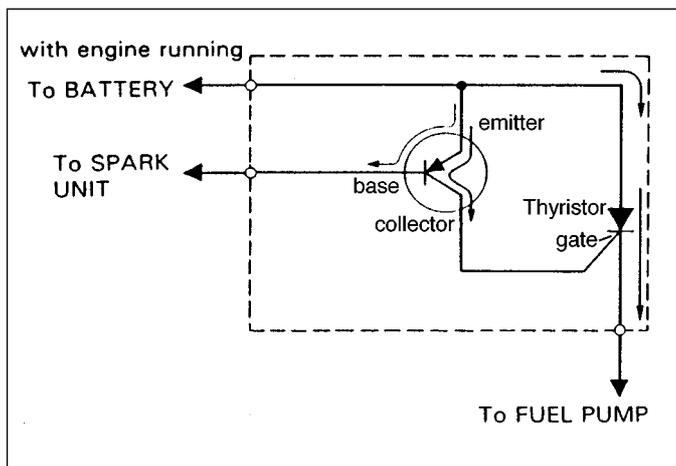
17.13a Electronic fuel cut-off relay – ignition on but engine stopped

13 The electronic relay utilises the current switching capability of the thyristor (see Chapter 2). In illustration 17.13a, with the ignition on but the engine not yet running, there is no current flow through the thyristor because its gate is not supplied with current from the transistor. The transistor will operate only when receiving pulses from the spark unit (ECU or ignition control unit etc). Some variants of this type do have a timer function which sends a pump operating current through for a few seconds to fill the carburettor float chambers.

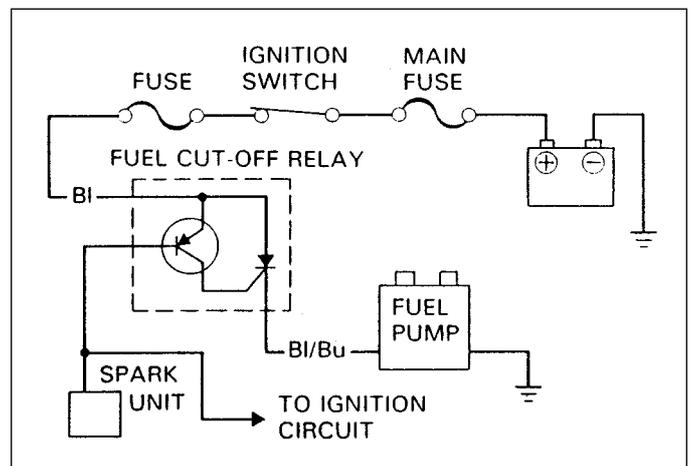
When the engine starts, pulses are sent from the spark unit to the ignition coil(s) and to the base of the relay transistor (illustration 17.13b). This now permits current flow from the emitter to the collector and onto the gate terminal of the thyristor, which switches on the pump current.

Fault finding

14 Using illustration 17.14a we see the fuel cut-off relay as a separate item from the pump



17.13b Relay passes current to pump when ignition pulses are received



17.14a Fuel cut-off relay circuit (separate relay and pump)