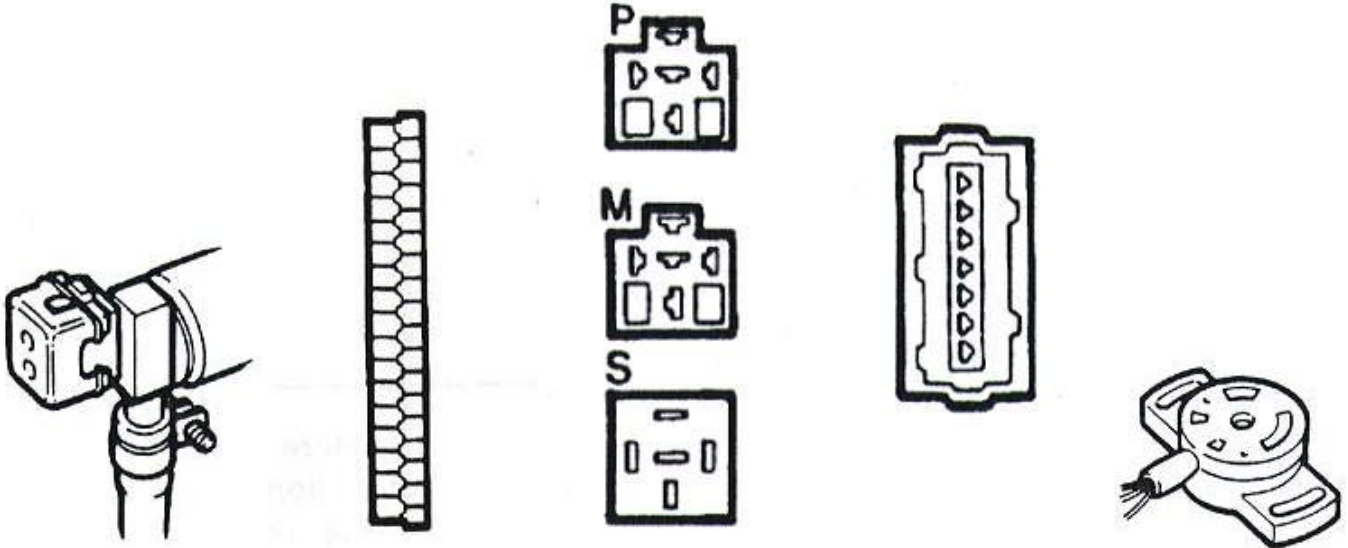


ECU's on fuel Injected Engines

at the example of the 3.9 Range Rover engine

Sorry for the sometimes not absolute correct names, text translated from french

This procedure should be similar on any engines using an flap for measuring the air flow. Those who use Lucas ECU box and an Hot Wire to monitor air flow are slightly different. We used this procedure successfully on many different cars. But it's at your risc. And you may well damage a component beyond repair if you screw it up.



P= pump relais

Cold start enrichment

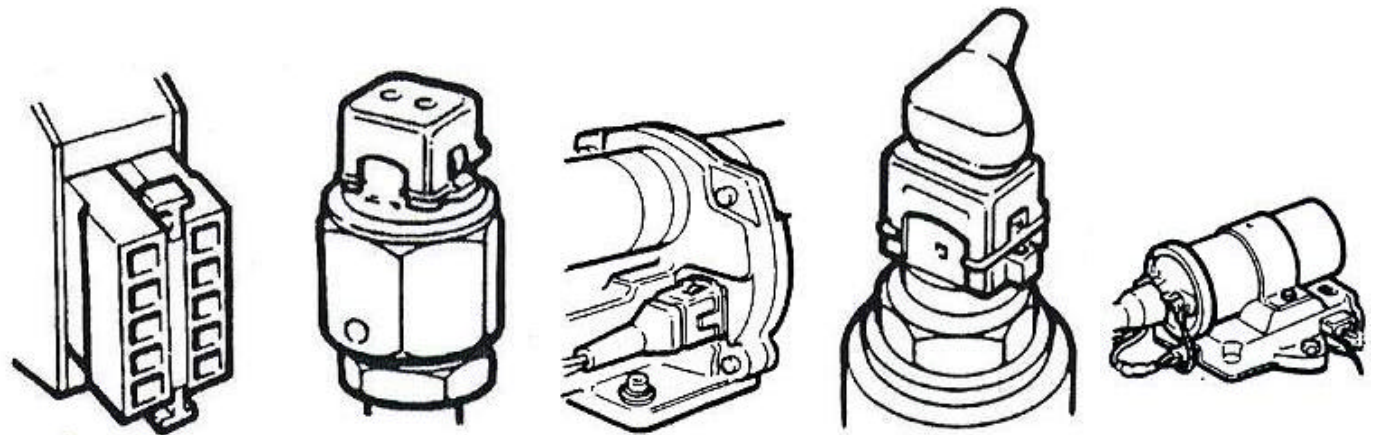
Connector to the ECU

M=main relais

Air flow sensor -
connector

Flap position sensor

S=steering relais



Resistance box

Timed thermal contact

Air mixture valve

Coolant temperature
sensor

Constant energy coil

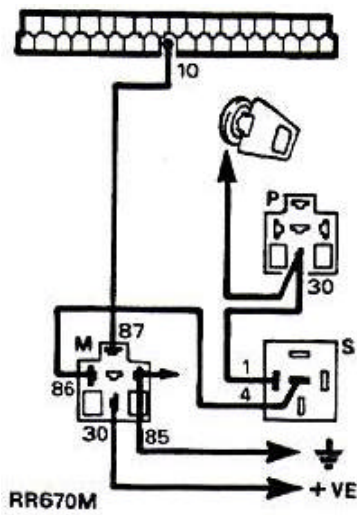
**Feeding of the electronic
regulator**

(This is the ECU box)

Possible fault:

No reading: Check cables and
connectors, check Main relais by
substitution of a new unit (this is
genuine LR instructions...)

Connect Voltmetre between

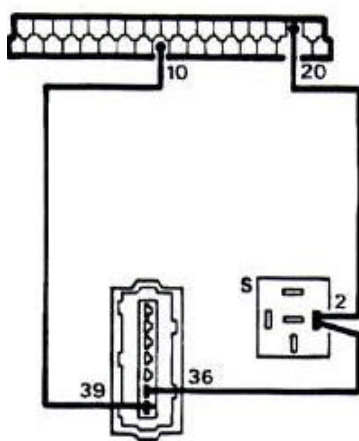


Pin 10 and ground. Contact.

Lower than 11 V: Check cables and connectors for a bad or corroded contact

Normal result:

11-12.5 Volts



Fuel pump contacts

Possible fault:

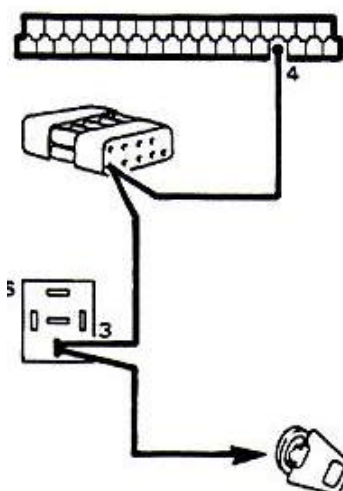
When closed: Something else than =V when flap closed: check switch on air meter (flap) housing

When moving: No reading: Check wire harness from relais to air metre, then from air metre to relais of fuel pump. Check the relais by substitution of a new one. Check the pump by connecting a wire directly from battery + and - to the pump

Connect Voltmetre between Pin 20 and ground. Contact. Air flap closed

Normal result:

0 V when closed, 11-12.5V when flap moving



Starter rotation signals

Possible fault:

No reading but starter turns: Check wiring harness from ECU to relais and electronic regulator

No reading and starter does not turn: check starter and starter relais.

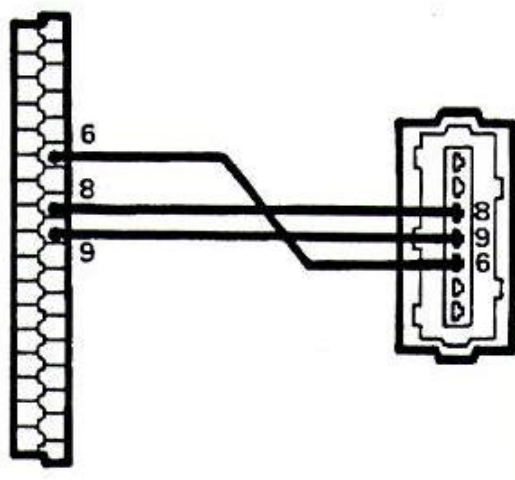
Reading under 8V: check batterie (connect another one) and starter

Connect Voltmetre between Pin 4 and ground. Turn the engine over with the starter.

Normal result:

8-12V

Air metering valve Possible fault:



Connect Ohmmetre:

between Pin 6 and 8:
360 ohms

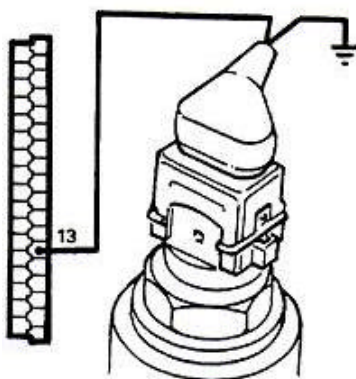
between Pin 6 and 9:
560 ohms

between Pin 8 and 9:
200 ohms

Differing values: check cables with ohmmetre, check air metering valve but make sure it's completely closed.

Normal result:

above values + 10 ohms



Water temperature sensor Possible fault:

Connect Ohmmetre between
Pin 13 and ground

Differing values: Check cables and connector, change sensor if readings still differ

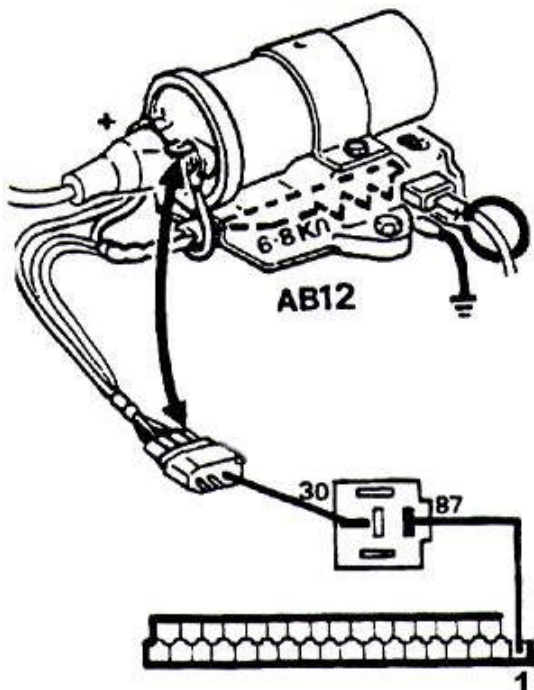
Take only short readings as sensor may be damaged by heat from current from ohmmetre

-10°C = 7-11,6 kohms

Normal result:

+20°C = 2,1 to 2,9 kohms

+80°C = 0,27 to 0,39 kohms



RPM signal

Possible fault:

(constant energy ignition)

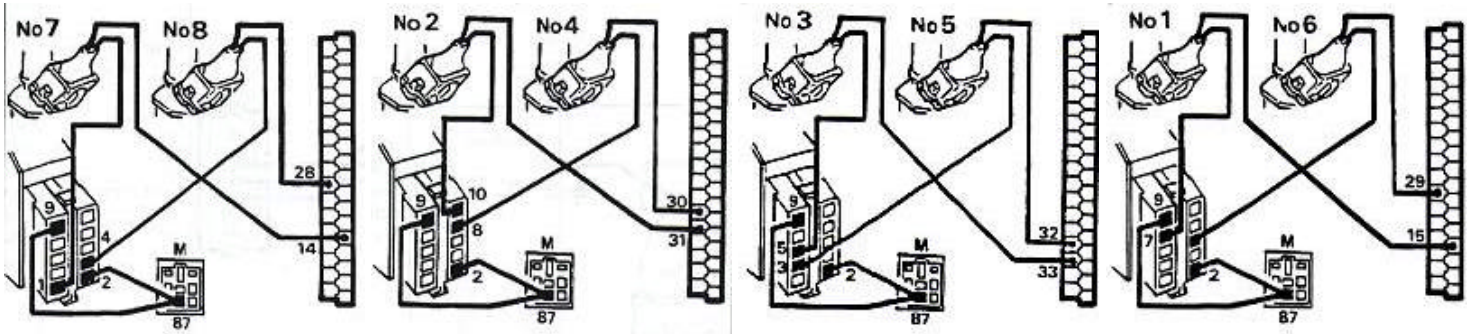
Make a connection between - of the coil and Pin 1. Connect voltmeter between Pin 1 and ground

No reading: check the connectors between coil and regulator

Normal result:

Fluctuates between 6 and 9V

Injectors



Injector 7

Injector 8

Injector 2

Injector 4

Injector 3

Injector 5

Injector 1

Injector 6

Connect ohmmetre between Pin 14 and 87 of main relais

Connect ohmmetre between Pin 28and 87 of main relais

Connect ohmmetre between Pin 31 and 87 of main relais

Connect ohmmetre between Pin 30and 87 of main relais

Connect ohmmetre between Pin 33 and 87 of main relais

Connect ohmmetre between Pin 32 and 87 of main relais

Connect ohmmetre between Pin 15 and 87 of main relais

Connect ohmmetre between Pin 29 and 87 of main relais

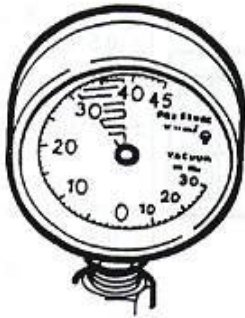
Possible fault:

Reading below normal:
Disconnect one after another the injectors until you find the one with low or 0 resistance. Replace.

If all are OK you must check the wiring harness and connectors as well as the resistance bloc

Normal result:**Between 7 and 10 ohms**

Injection ramp



Mount the manometre on the flexible line to the cold start enrichment injector. Contact and move the air flap to close the electric circuit of the fuel pump

Possible fault:

Pression 0: Check if fuel pump gets 12V, if not so replace the relais of the pump and then the main relais.

If the pump gets 12 V check it's ground (a common fault) by laying a wire directly to the ground. If it still does nothing chances are good the pump is shot. Take it out and check it again on the bench.

Pression out of limits (above or below): Check for leaks on the complete circuit, coloring around line connections and leaking injectors, then pressure regulator and anti-return valve- in this order.

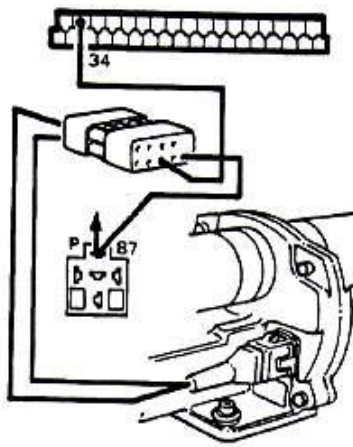
Normal result:**2,4 to 2,6 kg/cm2**

Air Mixture Thermovalve

Possible fault:

Connect ohmmetre between Pin 34 and 87 of the fuel pump relais

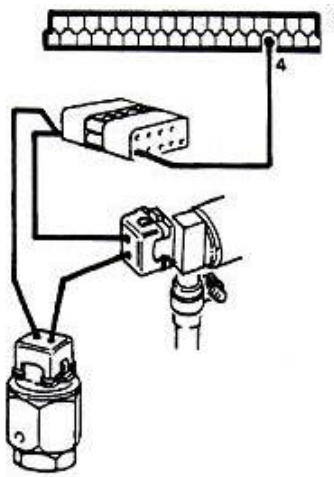
No reading: Check wiring and connectors between fuel pump relais and air mix valve as well as electronic regulator. Than disconnect valve and check it by



Normal result:

30 - 40 ohms

ohmmetre



Normal result:

0 - 5,0 ohms

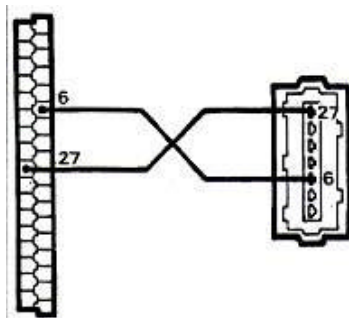
Cold Start enrichment injector

Disconnect timed thermocontact. Successively ground the wires. Connect ohmmetre between Pin 4 and ground

Possible fault:

No reading: Check wiring and connectors between ECU, cold start injector and temporised thermocontact.

Cut off: Check wires, connectors and cold start injector



Normal result:

Air temperature sensor

Incorporated in the air flow sensor

Connect ohmmetre between Pins 6 and 27

Take only short readings as sensor may be damaged by heat from current from ohmmetre

-10°C: 8,26 to 10,56 kohms

+20°C: 2,28 to 2,72 kohms

+50°C: 0,76 to 0,91 kohms

Possible fault:

Reading unlimited: disconnect flow meter, connect Pins 6 and 27. If reading is now 0 the sensor is faulty. If reading still unlimited check wiring and connectors as well as ECU connector

Air flap position sensor

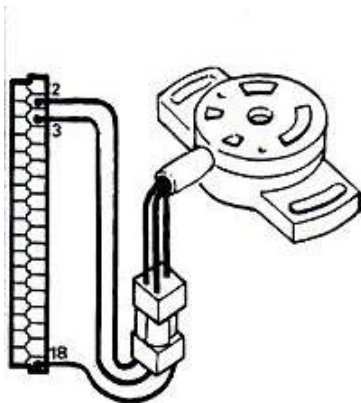
Set multimeter on TENSION, reconnect ECU, contact

Measure tension between green (-) and yellow (+) by the back side of the connector block near the ECU

Possible fault:

4,3 (+ 0,2V)

Lower or 0: check wiring and connectors



Measure tension between green (-) and red (+) by the back side of the connector block near the ECU

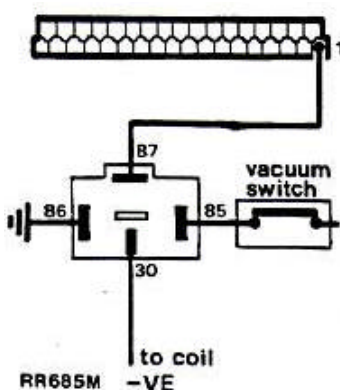
0,325V (+0,35V)

Loosen screws and rotate sensor until reading is correct

The tension must grow progressively in the same manner as you open the air flap

Progressive from 0,3 to 4,5V

If the reading jumps or fluctuates you must change the sensor.



Deceleration shut off relais

Possible fault:

Disconnect the - wire from coil to relais. Contact off. Connect ohmmetre between Pins 1 and 30 of the relais

Unlimited is correct. Anything else: Check wires and connectors, then replace relais by a new one.

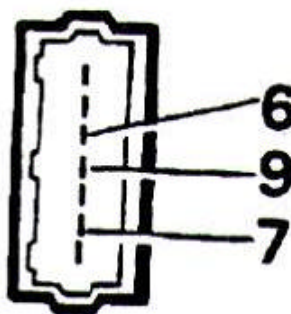
Contact

The resistance must drop to 0. Anything else: Check wires and connectors, maybe even the vacuum switch.

Repeat the measurement at least once.

Air flow sensor

Possible fault:



Reconnect ECU. Contact. Pull back the rubber sleeve on the connector. Connect voltmetre between Pin 6 (+) and Pin 9 (-) 1,55V (+- 9,1V) This figures from the genuine book but I strongly suspect a fault here. I think it should read +-0,1V

Connect voltmetre between Pin 9(-) and Pin 7(+) 3,7V +-0,1V

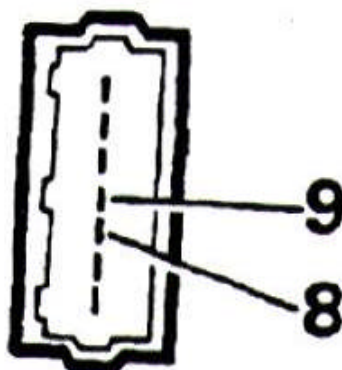
Open the flap slowly: The tension must drop

1,6V +-0,2V

Abnormal results: Change the sensor

Air flow sensor

Possible fault:



Disconnect ECU. Contact. Pull back the rubber sleeve on the connector. Connect voltmetre between Pin 8 (+) and Pin 9 (-)

Abnormal reading: Change sensor

Normal result:

4,3V +- 0,2V

