SAAB

9000

SERVICE MANUAL

Preliminary Issue

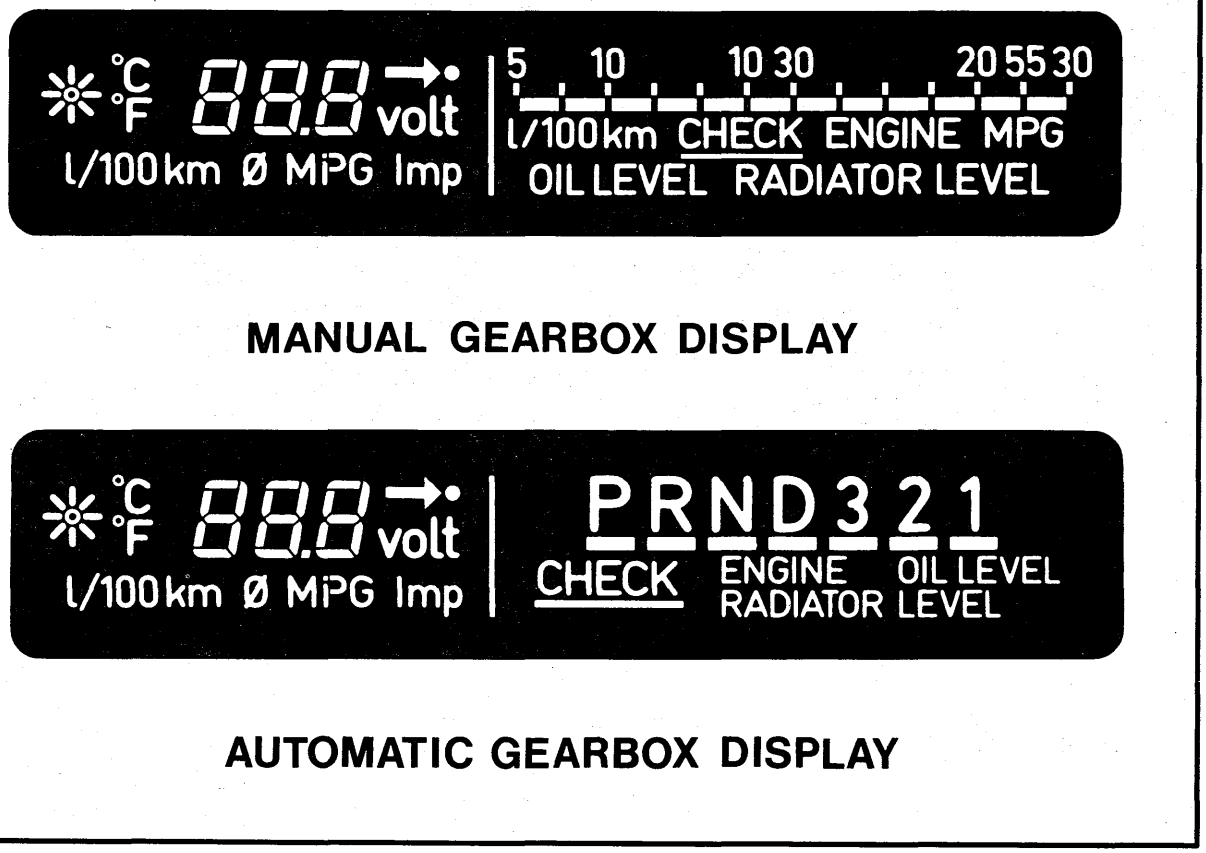
3:1 Programmable EDU

Introduction to Programmable EDU

Contents

Introduction to Programmable EDU

Introduction



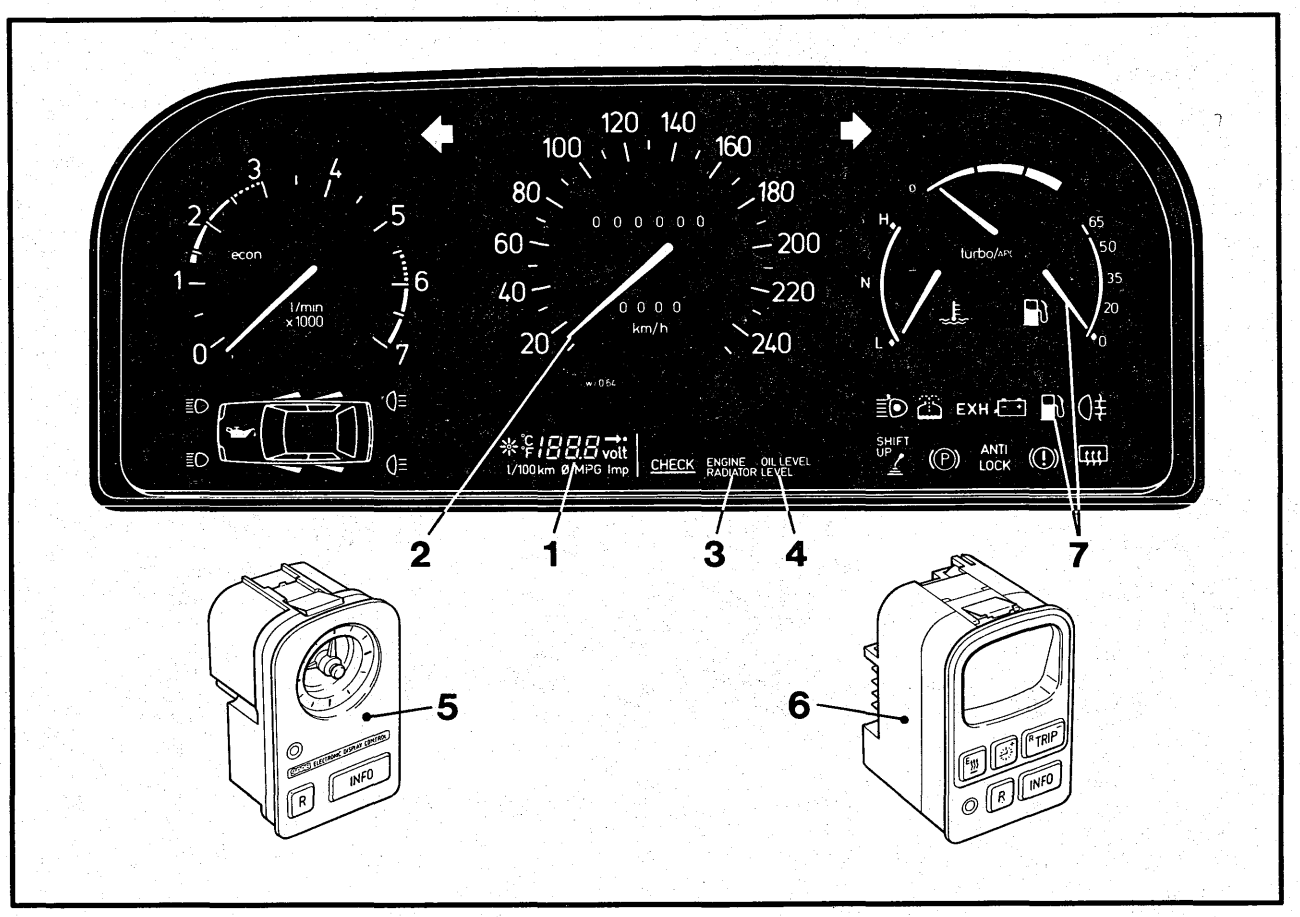
The new programmable Electronic Display Unit (EDU) appears to the driver to be similar to the EDU 2 used in previous models. However, the programmable EDU incorporates several advantages:

- Fault tracing of the EDU using the ISAT tester.
- Calibration adjustments of the temperature, fuel, range and voltage indications using ISAT.
- Simplified spare parts inventory as only two versions (one for manual transmission, one for automatic) are required. The EDU can be programmed to be compatible with different fuel systems or display variants (EDU 1 or EDU 2).

Note: Throughout this manual you will find the British term "earth" used in place of the American term "ground."

Introduction to Programmable EDU

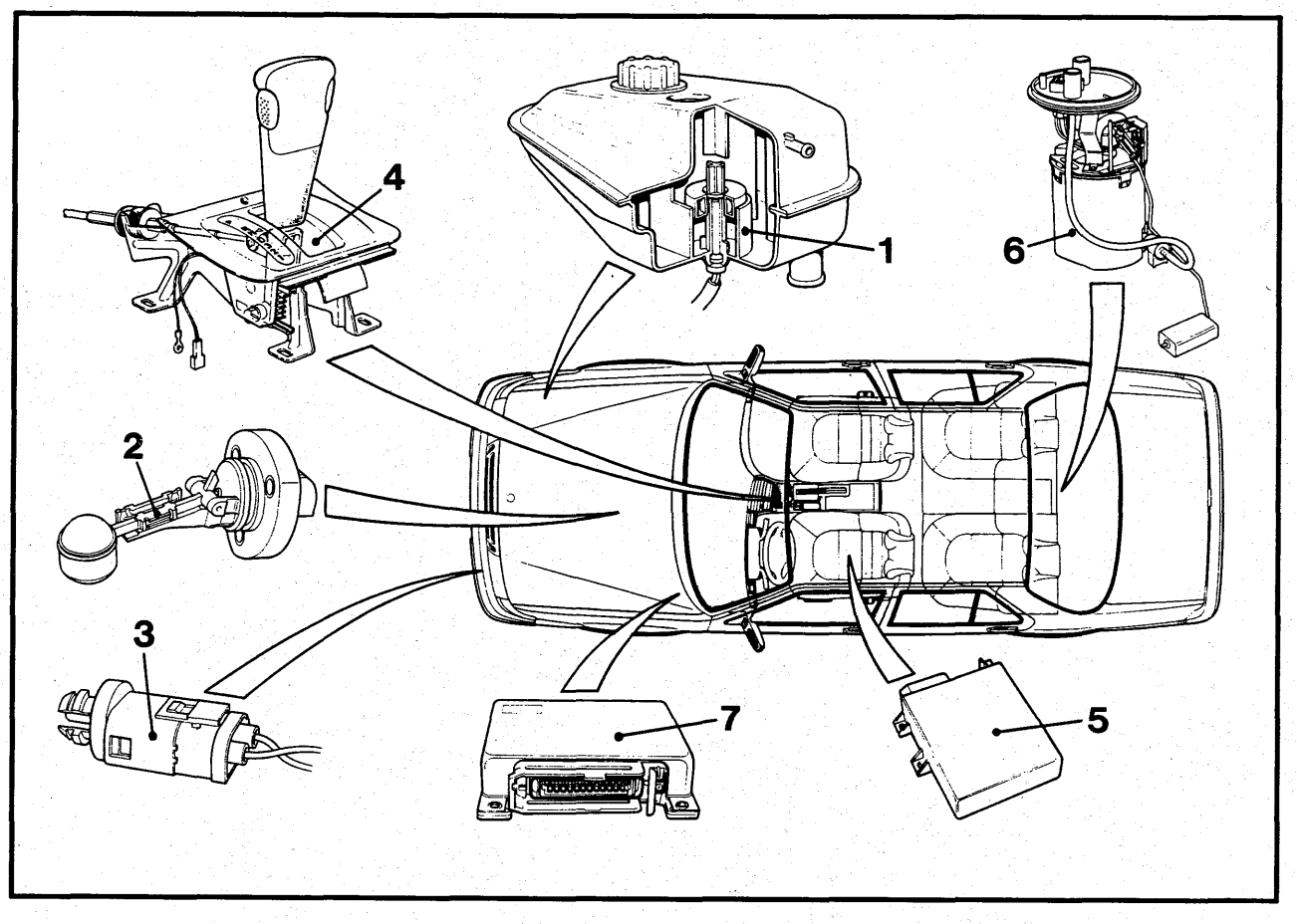
Programmable EDU and Associated Units



1. Programmable electronic display unit
2. Electronic speedometer
3. Radiator level – Driver warning signal
4. Engine oil level – Driver warning signal
5. Clock – INFO and R push buttons
6. DCC (optional) INFO and R push buttons
7. Fuel gauge and low fuel level warning indicator

Introduction to Programmable EDU

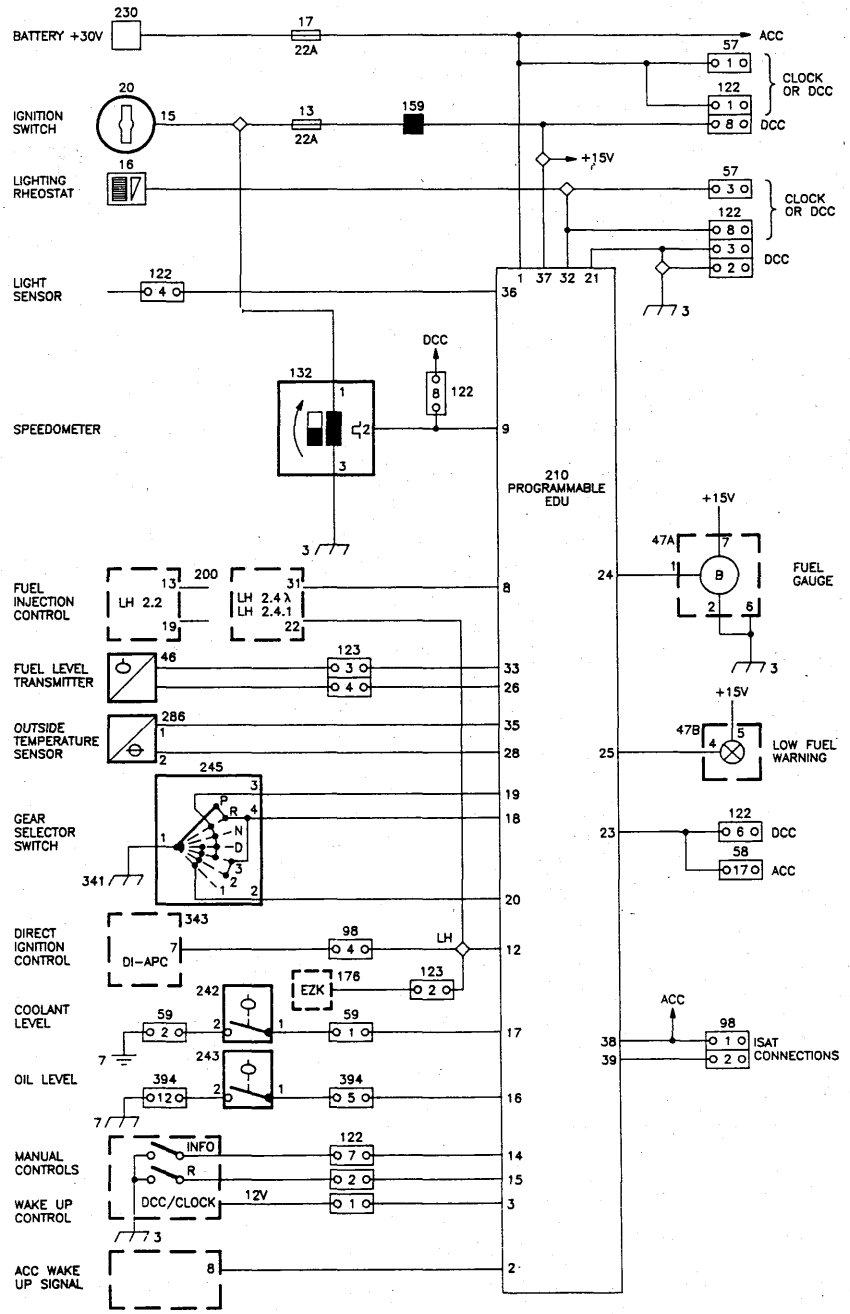
Programmable EDU and Associated Units



1. Radiator Level Switch - Driver Warning Signal
2. Engine Oil Level Switch - Driver Warning Signal
3. Outside temperature sensor
4. Gear Selector Lever Switch (automatic)
5. Direct Ignition Unit (DI-APC) check engine signal
6. Tank Unit - Fuel Level Signal
7. Fuel Injection Unit (LH) - Injector Pulses and check Engine Signal

Introduction to Programmable EDU

Diagram EDU System



3 Ground, dash

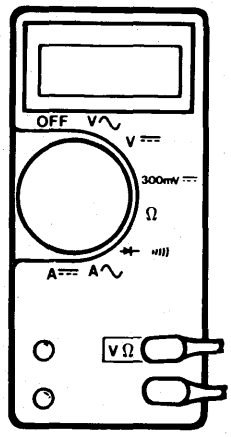
7 Ground, left hand wheel housing

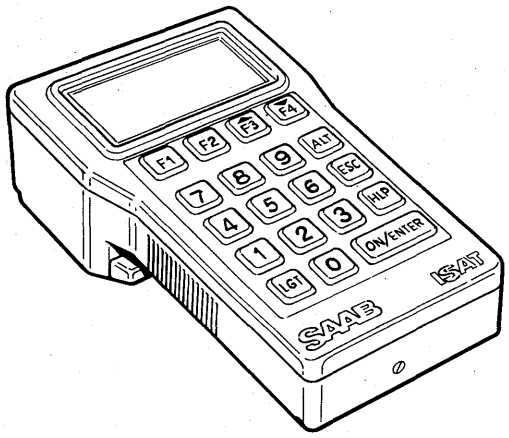
341 Ground, left hand front seat member

For a complete wiring diagram with component information, see page 32 of Service Manual Sec. 0, "1990 News."

Introduction to Programmable EDU

Fault Finding





Permanent	Intermittent	System Number 1
		No faults
69992	69992	EDU internal fault
46322	26322	Outside temperature sensor open circuit
45522	25522	Fuel level transmitter open circuit
45532	25532	Fuel level transmitter short circuit
45362	25362	Gear selection indicator fault (automatics)

Fault finding aids for SAAB cars are undergoing constant development with a view to eliminating the need for expensive workshop equipment. The aim is to use the microprocessor to monitor, as well as control operations, and store a fault code when an error is detected. USE ISAT FIRST WHEN FAULT FINDING.

The processors fitted in the cars are interrogated for fault codes using ISAT, and in certain cases ISAT can also be used to measure signals.

The fault finding aids currently available for the EDU are:

- Fault codes which for certain fault conditions can identify the cause of the failure.
- Lamp and display test facilities which enable the backlighting and all the display segments to be lit for test purposes using ISAT.

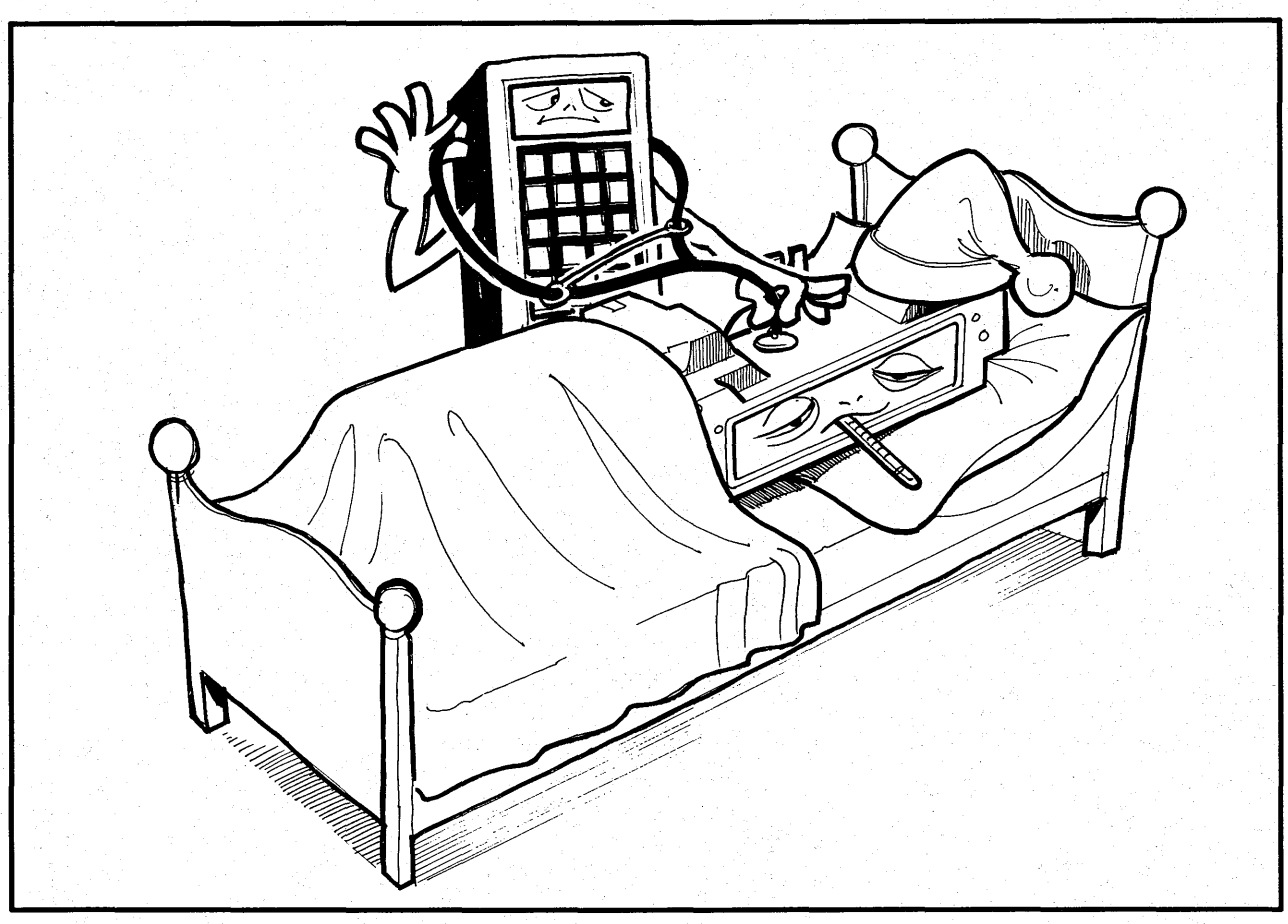
Certain faults also cause the affected display to indicate Err.

CHECK THE PROGRAMMING BEFORE ASSUMING INCORRECT OPERATION IS DUE TO A FAULT.

NOTE:
Connecting ISAT to the EDU will interrupt communication between the EDU and the ACC. This interruption can induce a fault code in the ACC unit (either fault code 46391 or 26391, "No outside temperature pulse to ACC") which must be reset using ISAT. Failure to remove this fault code will result in the ACC unit showing an error message in the temperature display for a short time after startup.

Introduction to Programmable EDU

Fault Finding



Points to note:

When fault finding on microprocessor systems areas of memory may become corrupted causing unusual symptoms. To clear any strange symptoms:

Switch ignition off - remove and refit the +30 fuse - switch ignition on

The supply remains switched on for 5 minutes after ignition off. Remove the +30 fuse if a quick switch off is required to carry out a test.

When fault finding on car electronics, it is always good practice to first of all check that the power supply lines are present and that the earth to the unit is sound.

When first detected all fault codes are permanent, (fault code begins with '4'). The code changes to intermittent (fault code begins with '2') when the fault disappears. To erase a fault code, ISAT must be used.

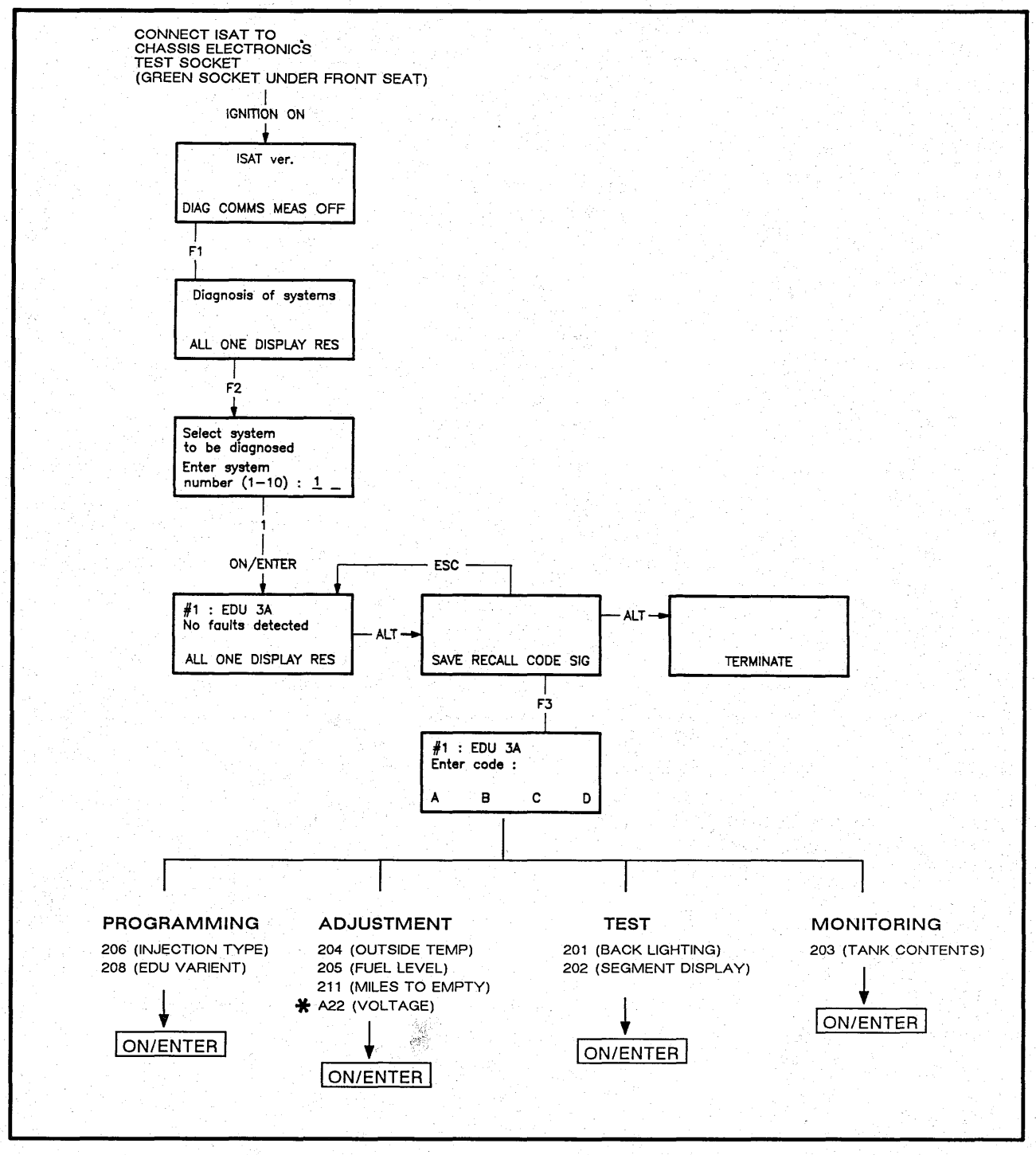
The voltage levels given in the signal level table are all measured using a Digital multimeter. This is not the best instrument for measuring pulsed signals but should be available in most workshops.

Signal voltages of 12V listed in the following tables are approximate. The condition and charge of the vehicle battery will affect this reading and slight differences from 12V should be considered normal.

Also note that the 0V readings listed may register slightly above 0V on a sensitive digital multimeter.

Introduction to Programmable EDU

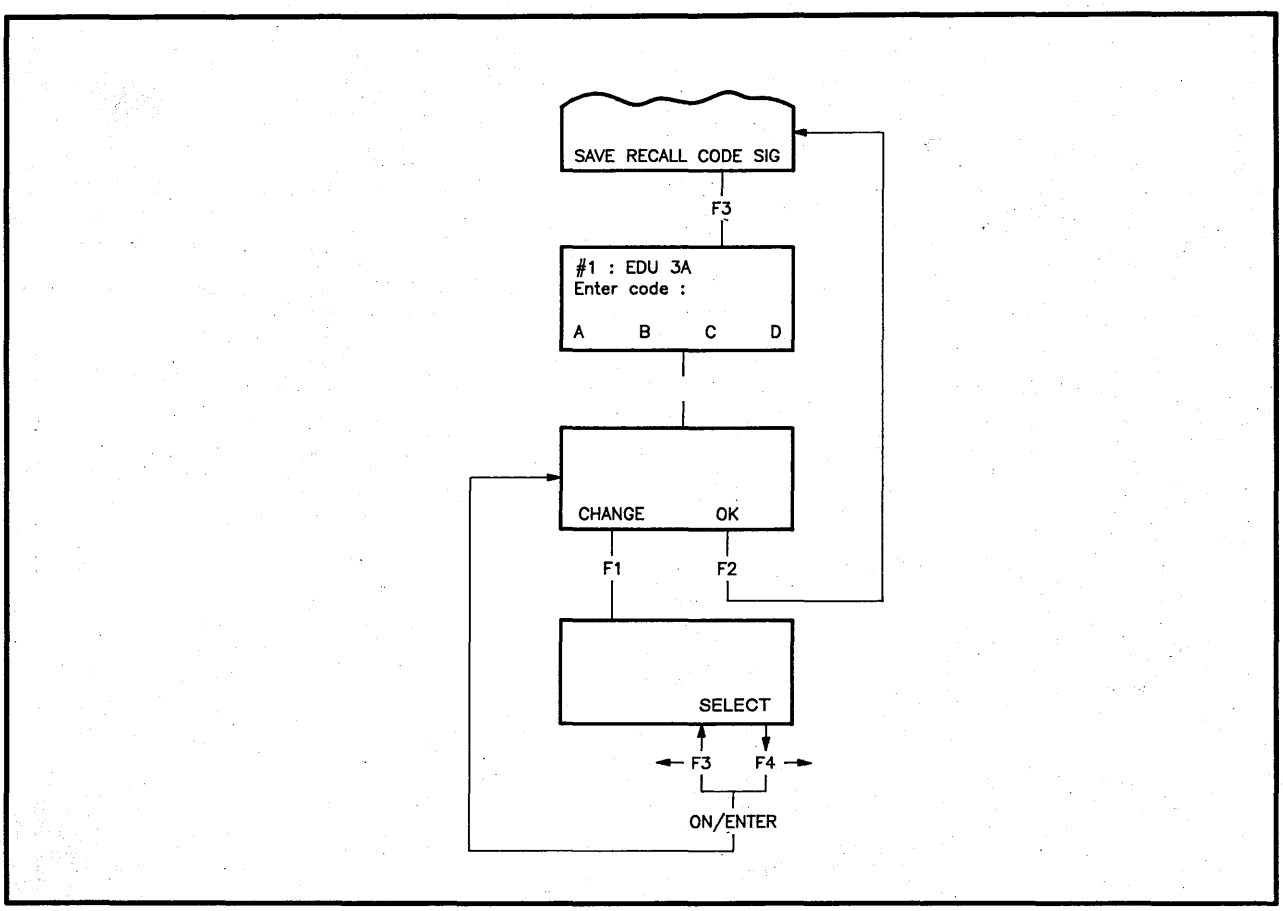
ISAT Command Codes For The EDU



* When a command code begins with a letter, press the function button under the appropriate letter.

Introduction to Programmable EDU

Programming



Programming is carried out by moving to the SELECT menu, displaying the option required by means of the F3 and F4 keys and then selecting the option using the ON/ENTER key. The options for the various commands are as follows:

206 Type of fuel system.

With cat. 2.0/2.3 injection

With cat. 2.0 turbo

Non cat. turbo

Non cat. injection

NOTE

Always check the EDU programming when installing a replacement unit or when troubleshooting a problem. An EDU which has been programmed for the wrong fuel injection system or equipment variant will not function properly.

208 Select the appropriate EDU and equipment type.

EDU 2 UDCC (without optional DCC trip computer) *

EDU 2 MDCC (with optional DCC trip computer) **

EDU 1 2.0 I/UDCC

EDU 1 2.0 I/MDCC

EDU 1 2.3 I/UDCC

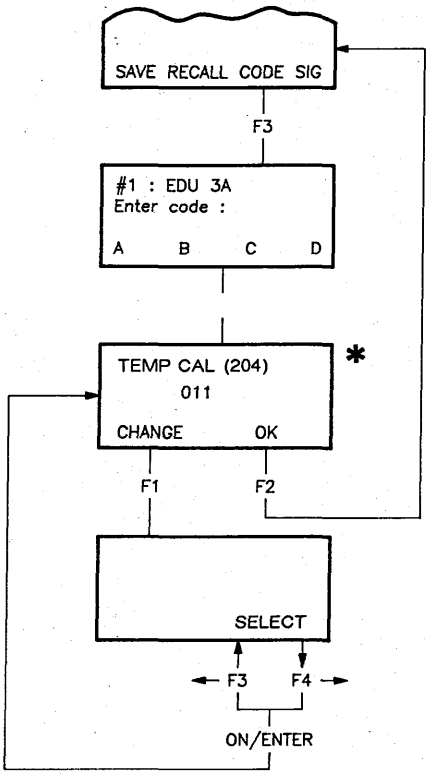
EDU 1 2.3 I/MDCC

* Normal U.S. program

** Optional U.S. program for cars with accessory DCC trip computer

Introduction to Programmable EDU

Adjustments



* *NOTE: The baseline calibration from the factory may be indicated by various three-digit programming codes. These codes represent a minor adjustment from the zero calibration and should not be reset to zero unless there is an owner complaint.*

Calibrations are carried out by moving to the SELECT menu, displaying the option required by means of the F3 and F4 keys then selecting the option using the ON/ENTER key. The options for the various commands are as follows:

204 Outside temperature setting

- 5°C to + 5°C in steps of 1°C

- 9°F to + 9°F in steps of 2°F except between 8° and 9°F

205 Fuel level calibration

Litres:	- 7 to + 7 in steps of 1 litre
USA gallon:	- 2 to + 2 in steps of 0.5 gallon
Imp gallon:	- 1.5 to + 1.5 in steps of 0.5 gallon

211 Fuel remaining when range (distance to empty) indicates 0

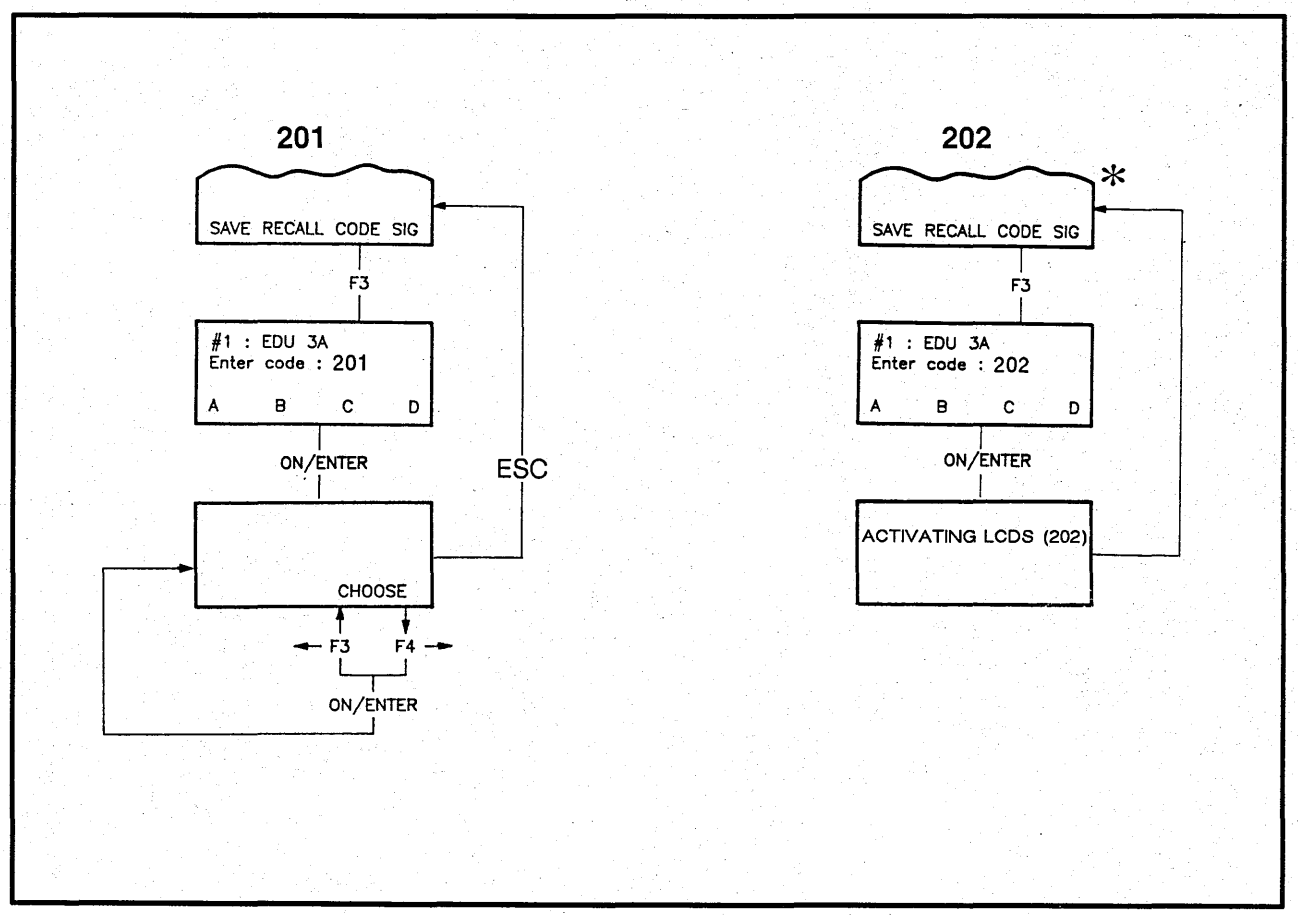
Litres:	0 to + 4 in steps of 1 litre
USA gallon:	0 to + 1 in steps of 0.5 gallon
Imp gallon:	0 to + 1 in steps of 0.5 gallon

A22 voltage - 12% to +12% in steps of 1%.

Always check the EDU calibration before replacing a gauge or sending unit. All systems should normally be at the baseline setting unless a specific calibration has been requested by the owner.

Introduction to Programmable EDU

Test Functions



Two different EDU display test functions may be performed by entering ISAT command codes:

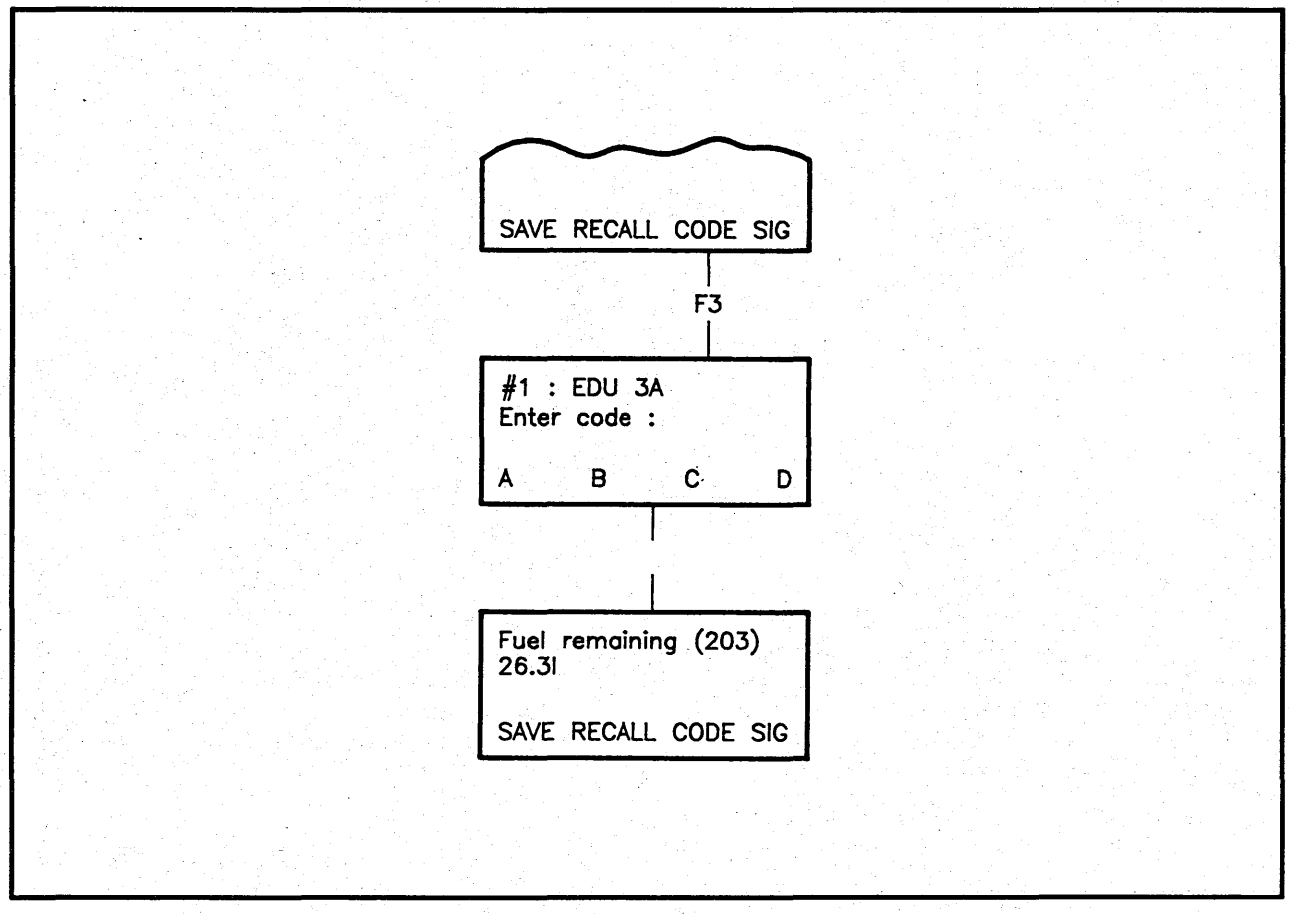
201 Display Back Lighting Test

The back lighting can be tested by pressing ON/ENTER. Pressing F3 or F4 followed by ON/ENTER will select different back lighting levels from 100% to 0% in steps of 25%. Pressing ESC will allow you to enter other command codes, but the last selected back light level will be maintained until communication is terminated (Press ALT then F1) or the ignition key is switched off.

202 Display Segments Test

Entering command code 202 will progressively illuminate segments of the display until all segments are illuminated.

* The ISAT will automatically revert to this screen which will allow you to enter other command codes. However, the full display illumination of the EDU will be maintained until communication is terminated (Press ALT, then F1), or the ignition key is switched off.



203 Check fuel level in tank.

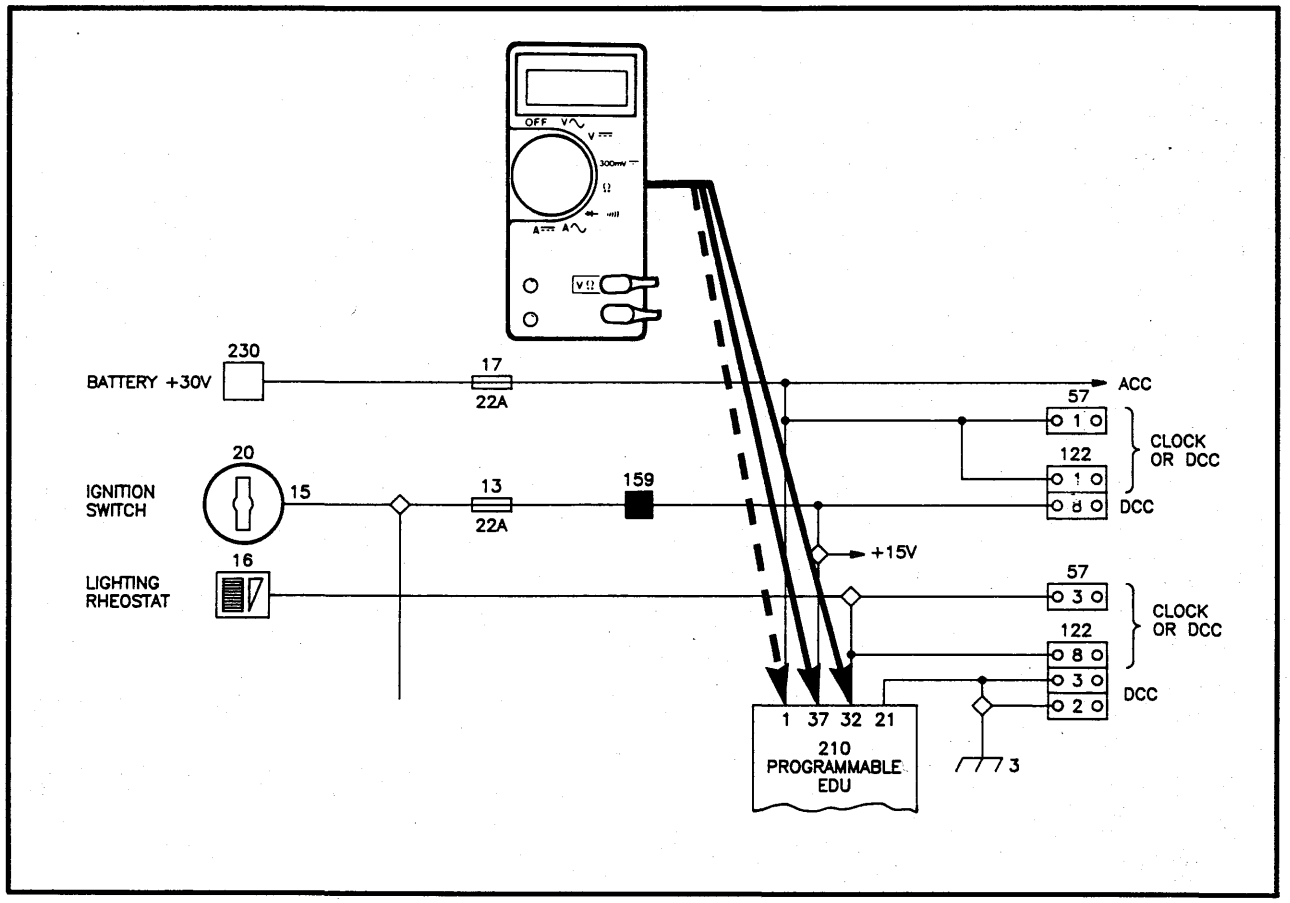
Immediately the code is selected, the tank contents are displayed in tenths of a litre.

USA gallon = 3.6 litres Imp gallon = 4.5 litres

207 Not applicable to the U.S. market

Introduction to Programmable EDU

Power Supply Fault Finding



Symptom 1

Blank display. Note: The lamps and display can be illuminated for test purposes using ISAT, provided that the +15 supply voltage and the ground are normal (see page 10).

1. Check the fuses.

2. Check the +30 across pins 1 & 21 and the +15 across pins 37 & 21.

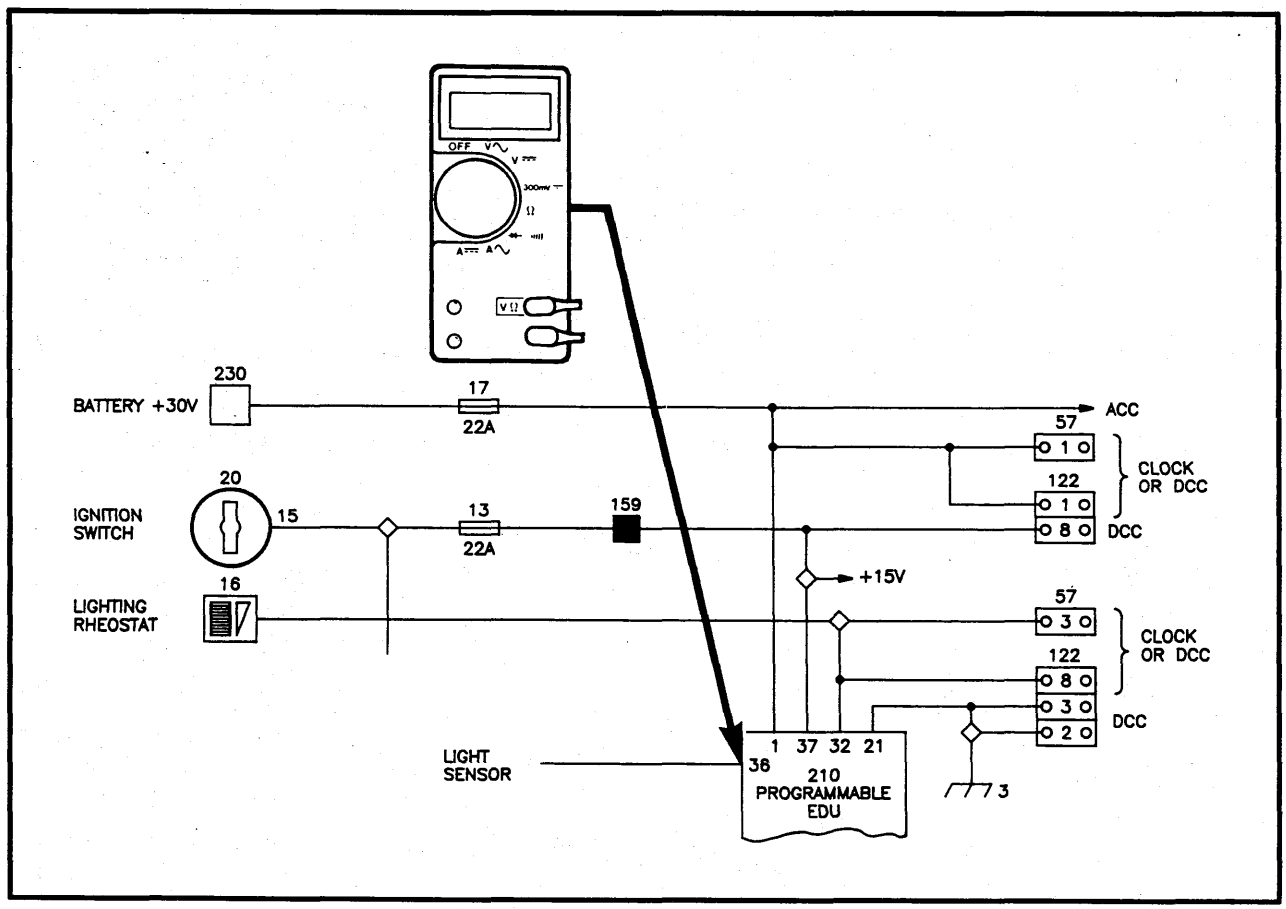
3. Check if other instrument lamps which are controlled by the rheostat, are also not lit. If other lamps are also effected the rheostat is most likely to be at fault.

4. Check the rheostat supply. If the supply is normal the fault is either the EDU lamps or the EDU. If the supply is not normal, check the wiring.

Signal levels

Signal Measured	EDU Pins	Condition	Voltage
+30	1 & 21	Normal	7.5 to *16V
+15	37 & 21	Normal	7.5 to *16V
Rheostat	32 & 21	Off Full	0V 12V

* Display extinguishes at 15.3V to protect the lamps but the EDU continues to operate. Check the EDU voltage calibration since the display may go blank at less than 15.3V if the unit has been recalibrated to +12%.



Symptom 2

Dim display on bright sunny days.

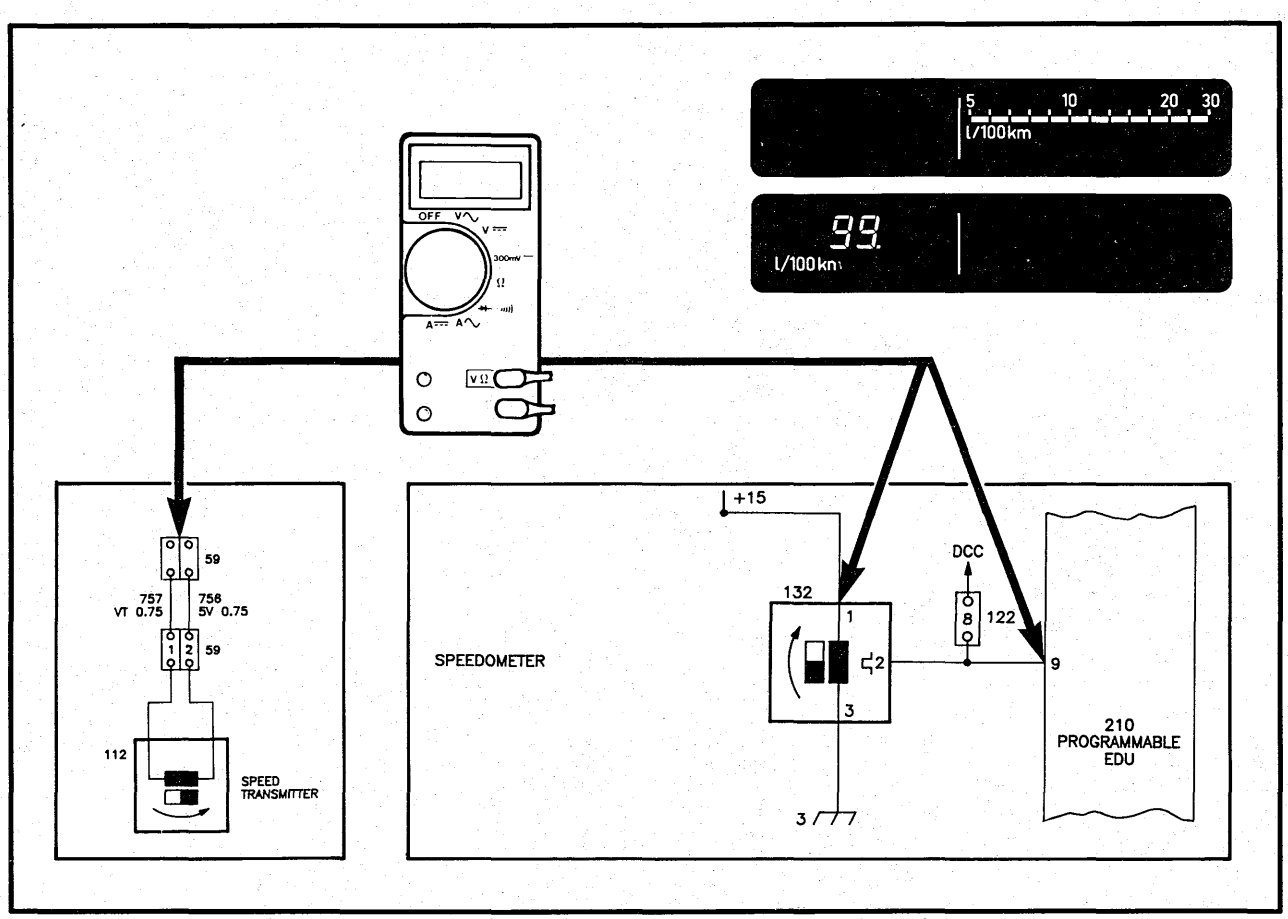
Check the light sensor input by shining a light onto it to simulate bright conditions. If the signal is normal, the fault is in the EDU. If not, either the sensor or the wiring is at fault. The sensor is the most likely cause.

Signal levels

Signal Measured	EDU Pins	Condition	Voltage
Light sensor	36 & earth	Max brightness Min brightness	11V 0V

Introduction to Programmable EDU

Fuel Consumption Indication Fault Finding



WARNING - IF IT IS NECESSARY TO LIFT THE DRIVING WHEELS TO OBTAIN SPEED PULSES FOR TESTING, ENSURE THAT A HOIST IS USED AND ADEQUATE PRECAUTIONS ARE TAKEN TO PREVENT CONTACT WITH THE DRIVING WHEELS.

NOTE:
To obtain an accurate rotating test the driving wheels should be clear of the ground, the engine switched on, and a gear selected.

Symptom 1

Instantaneous fuel consumption indicator or bar display shows maximum when driving.

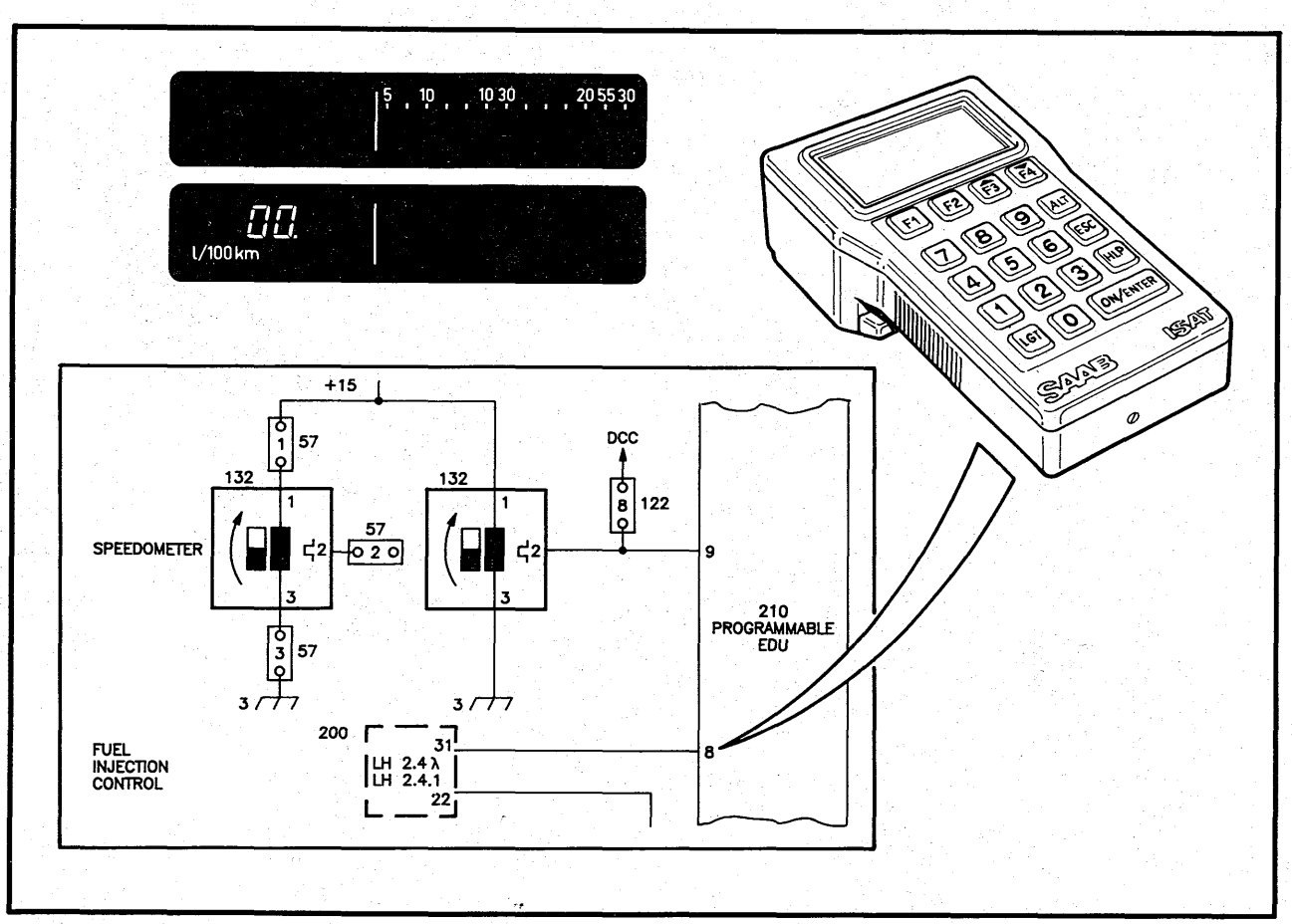
1. Check if the speedometer is working. If not disconnect the 2-pin speedometer plug and check the signal from the gearbox speed transmitter. Use a multimeter set to the AC range. Meter should read 0 to 5V as speed increases.
2. Check whether other units which use the speed pulses are operating correctly. If they are, the fault must be in the wiring or the EDU. If not, check for power at pin 1 of the speedometer and earth at pin 3.
3. Check the speed pulses at either the speedometer (pin 2) or the EDU (pin 9) while the engine is running and the drive wheels are either rotating or stationary.

   To achieve this apply the footbrake to stop the driving wheels, then release the brake and let the driving wheels rotate again. Repeat this operation until a correct reading is obtained.

   Reading should be 0 or 10V DC (wheels stopped) depending on the stopping position on the sensor, and 5V DC (wheels rotating).
4. If speed pulses at the EDU are correct, replace the EDU.

Introduction to Programmable EDU

Fuel Consumption Indication Fault Finding



Symptom 2

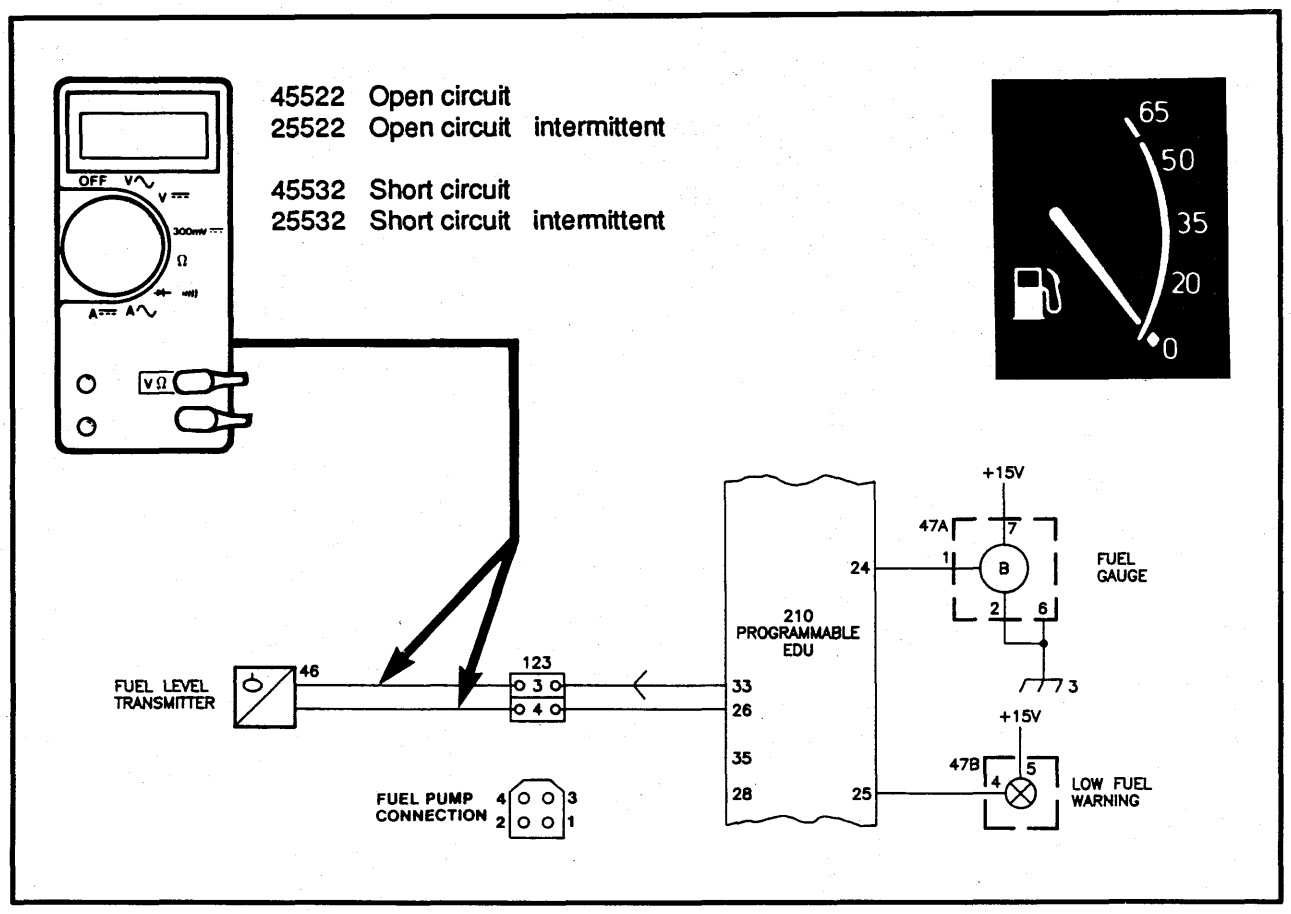
Instantaneous fuel consumption indicator or bar display shows minimum.

Check by using ISAT that pulses are being received by the EDU. To isolate the fault to either the LH unit or the wiring, check, using ISAT, that pulses are actually being transmitted by the LH unit. If the wiring is suspected, check for continuity.

Signal levels

Signal Measured	EDU Pins	Condition	Voltage
Speed pulses	9 & ground	Pulses (wheels turning) No pulses (stopped)	5V DC 0 or 10V DC
Injection pulses	8 & ground	Pulses (engine running) No pulses (stopped) *	ISAT ISAT

***NOTE:** When using ISAT to test injector pulses **DO NOT** connect to the diagnostic plug on the car. Use ISAT's multimeter leads to perform this test.



Symptom 1

Fault codes. Fuel gauge zero. Fuel warning indicator lit. Range pointer flashing or error indication when range selected.

1. Disconnect the tank unit plug and check the resistance across pins 3 and 4 on the tank unit. Reading should be between 35 and 350 ohms. If the resistance is incorrect replace the fuel level transmitter.

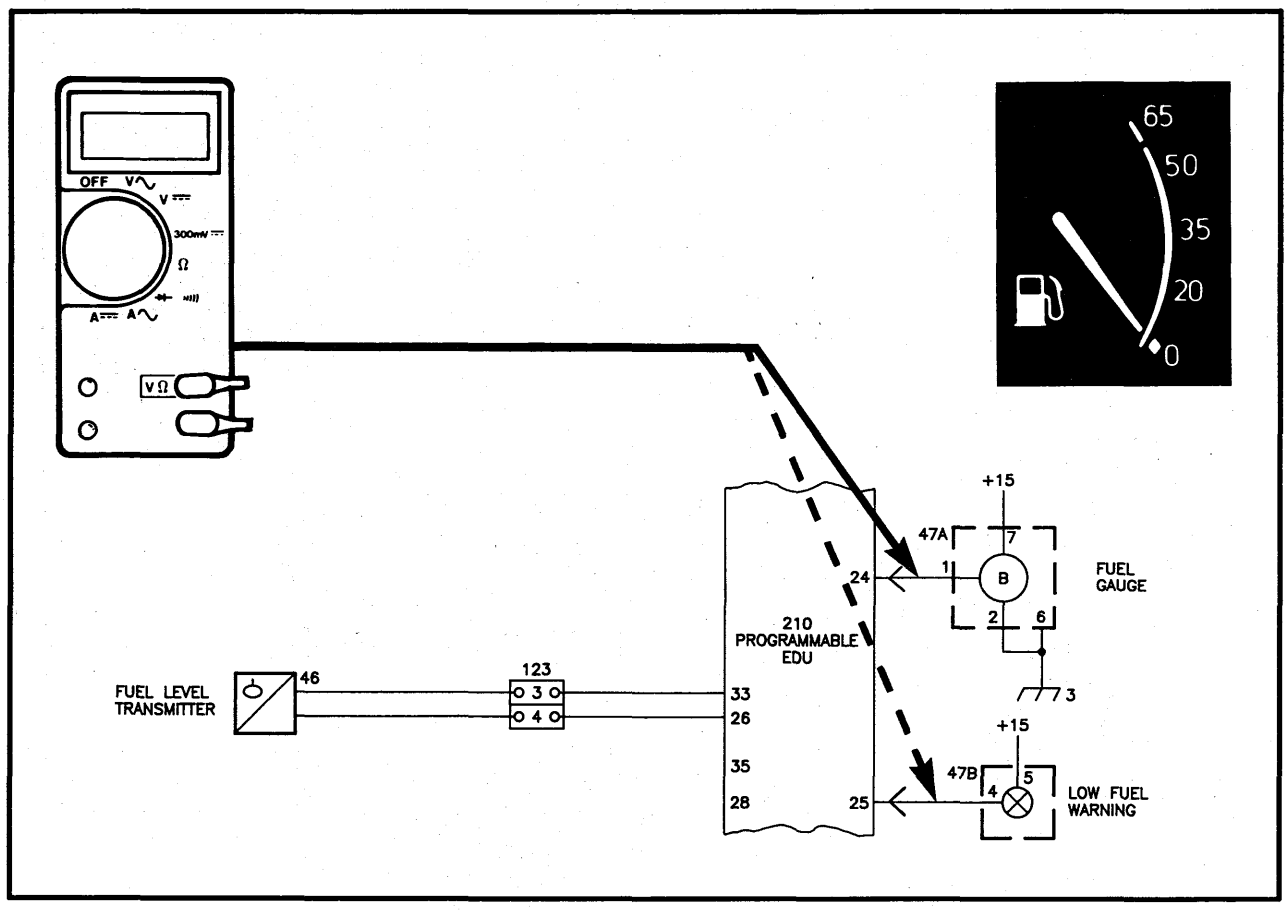
2. If the resistance is correct check the voltage at pin 3 of the disconnected tank unit plug. The reading should be battery voltage. If incorrect, check the wire for breaks.

3. Check for continuity to earth at pin 4 of the disconnected tank unit harness connector. If earth test reads open circuit, check the wire for breaks.

4. If none of the above checks locates the fault, replace the EDU.

Introduction to Programmable EDU

Fuel Level And Range Indication Fault Finding



Symptom 2

No fault codes. Zero indications on fuel gauge. Range indicator normal. Low fuel indicator normal. Fuel level transmitter signal normal.

Disconnect the EDU plug and check for 12V from the fuel gauge at pin 24 of the plug. If the voltage is incorrect, check the wiring for continuity and the fuel gauge supply to isolate the fault to either the wiring or the gauge. If the voltage is correct the fault is in the EDU.

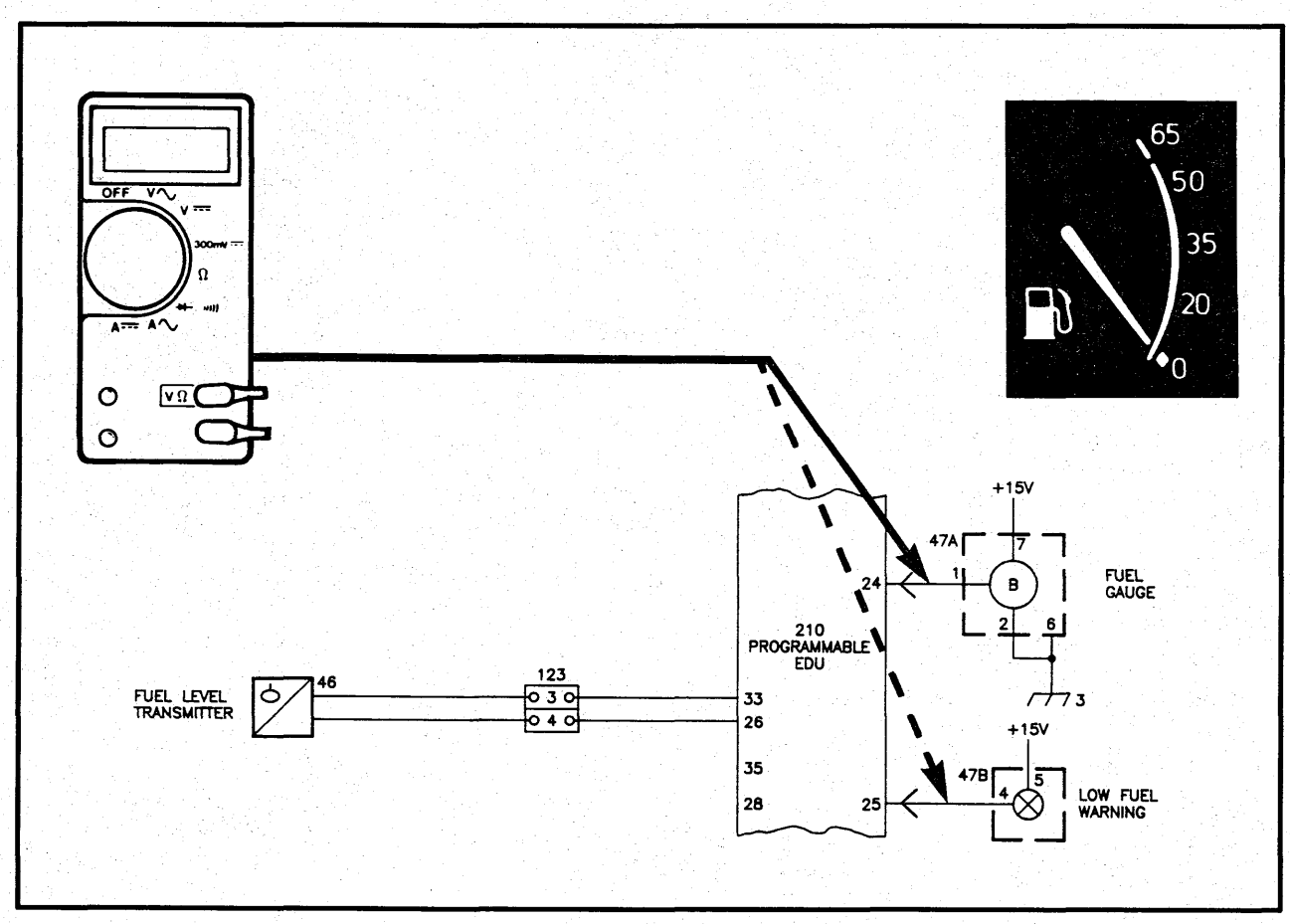
Symptom 3

No fault codes. Fuel warning indicator fails to light or permanently lit. Fuel gauge normal.

Check the low fuel warning output at pin 25 of the EDU. Note the supply for the lamp originates from the supplies at the fuel gauge so check these supplies and interconnections before assuming that the fault is in the EDU.

Introduction to Programmable EDU

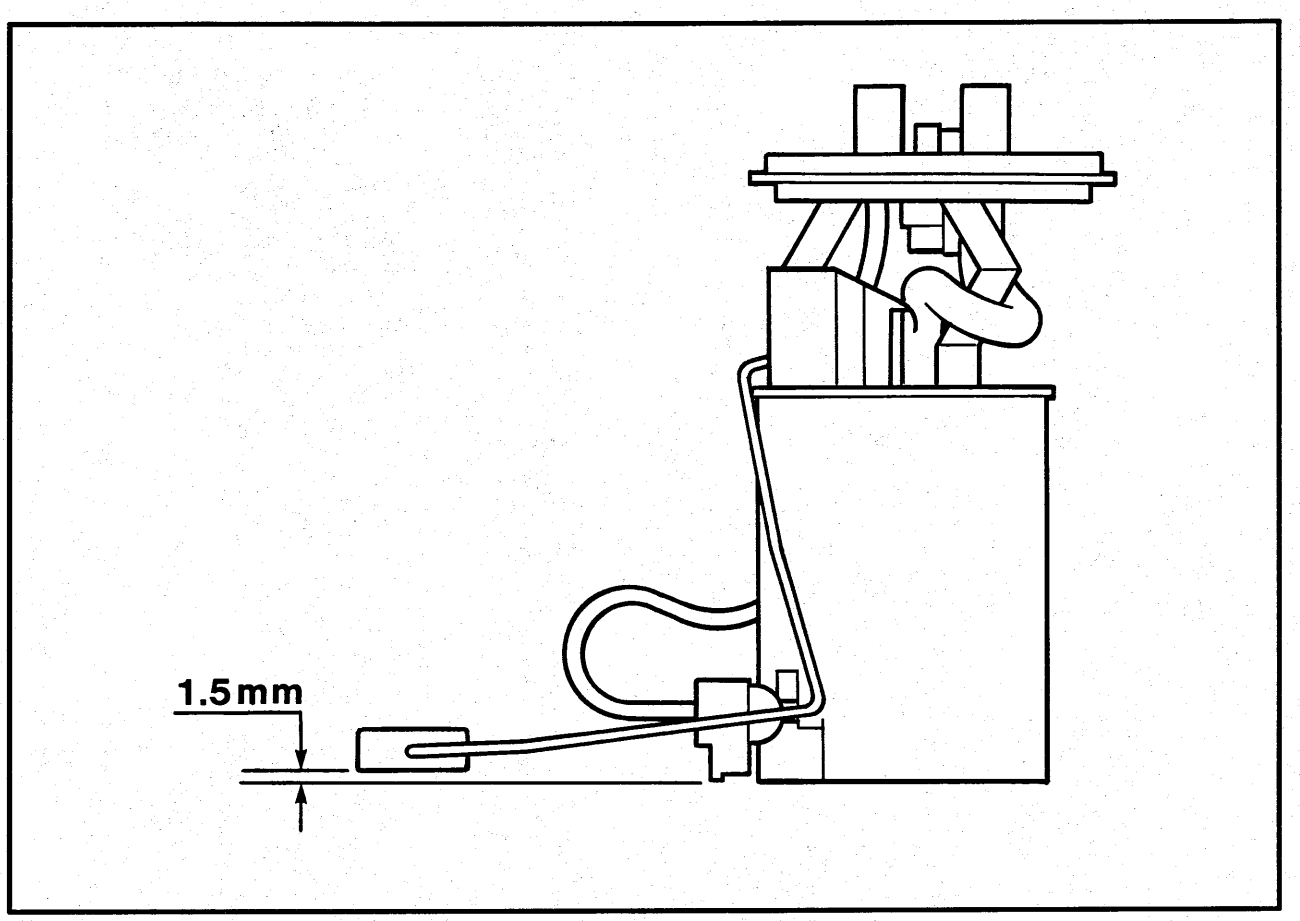
Fuel Level And Range Indication Fault Finding



Signal levels

Signal Measured	EDU Pins	Condition	Voltage
Fuel level transmitter	33 & 26	Empty to full	0.4 to 3V
Fuel gauge	24 & earth	Full to empty	9 to 12V
Fuel level low warning	25 & earth	Indicator on	0V
		Indicator off	battery voltage

Tank Transmitter Float Arm Position



With the tank unit on a flat surface, to obtain a reading of 35 ohms, the clearance between the surface and the bottom of the float should be 1.5 mm. The resistance tolerances are:

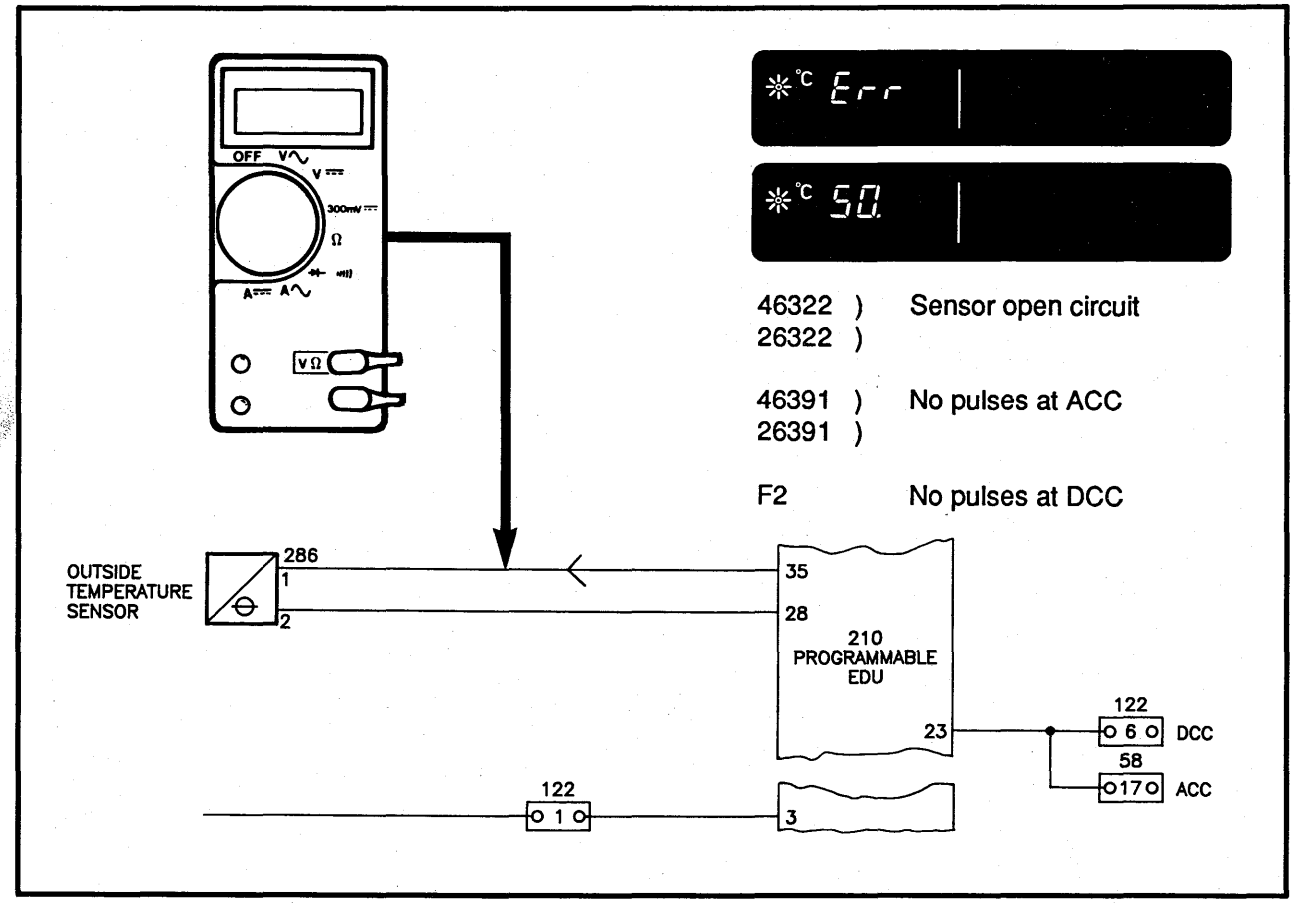
Empty = 35 ohms (+5 −1.5 ohms)

Full = 350 ohms (+5.5 −1.4 ohms)

Low Fuel Level Light = 75 ohms (± 8 ohms)

Introduction to Programmable EDU

Outside Temperature Indication Fault Finding



Symptom 1

EDU and ACC fault codes.

1. Disconnect the sensor plug. Check the wiring by measuring the voltage at pin 1 of the plug (5V). Also check for earth continuity at pin 2 (with ignition switched off). If the wiring test suggests a fault, check for continuity between the EDU and the sensor to isolate the fault to either the wiring or the EDU.

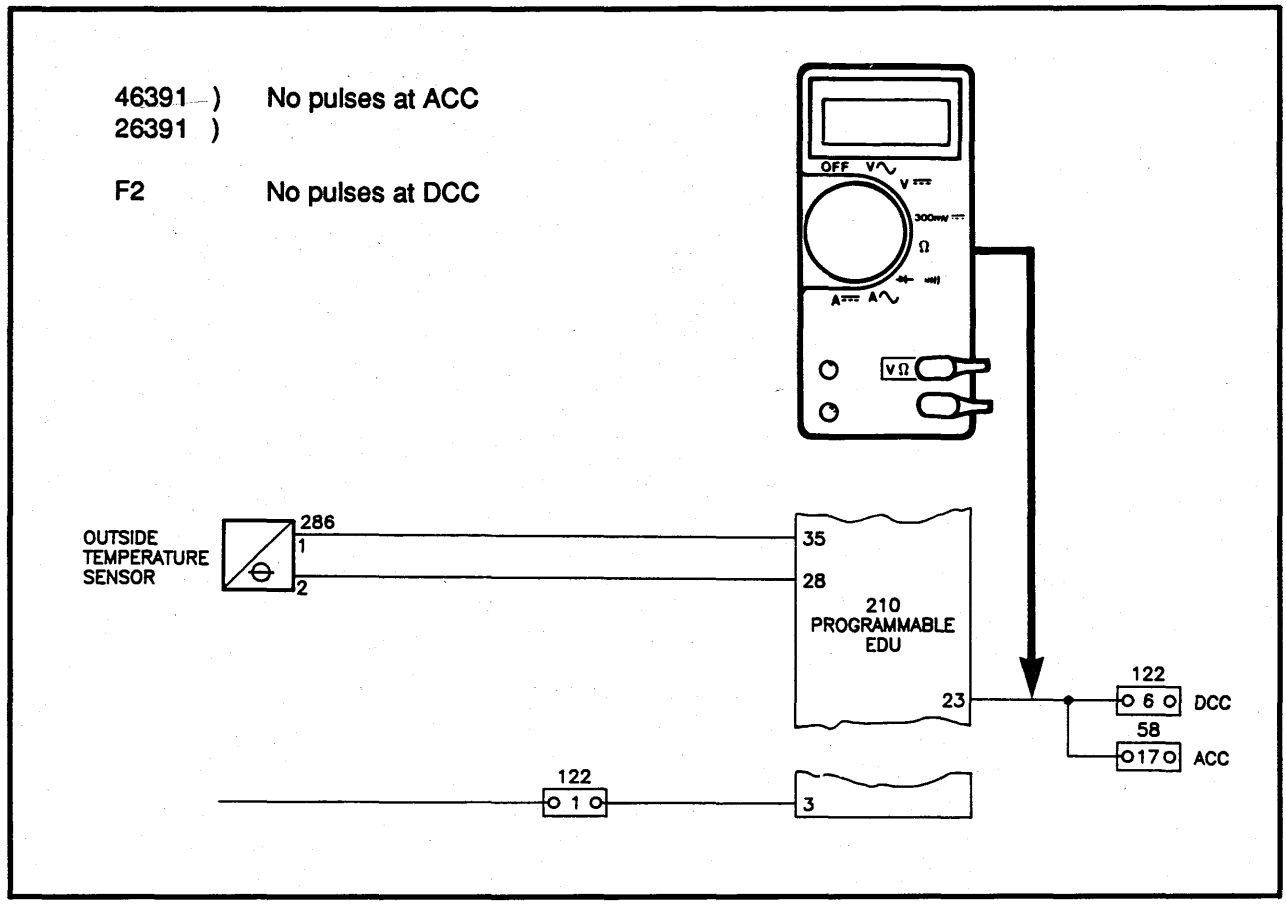
2. With plug disconnected, check the resistance of the sensor. This varies between approximately 43 kohms and 1.0 kohms over the temperature range -40°C to +45°C. The reading between 0°and 30°C should be between approximately 6.0 kohms and 1.8 kohms.

3. If the sensor resistance is correct and the wiring is normal, the fault must be in the EDU.

Symptom 2

No error codes. Permanent high temperature indication (+50°C)

Check the sensor resistance as described in 2 above and the wiring for short circuits.



Symptom 3

ACC fault code. Temperature indication normal.

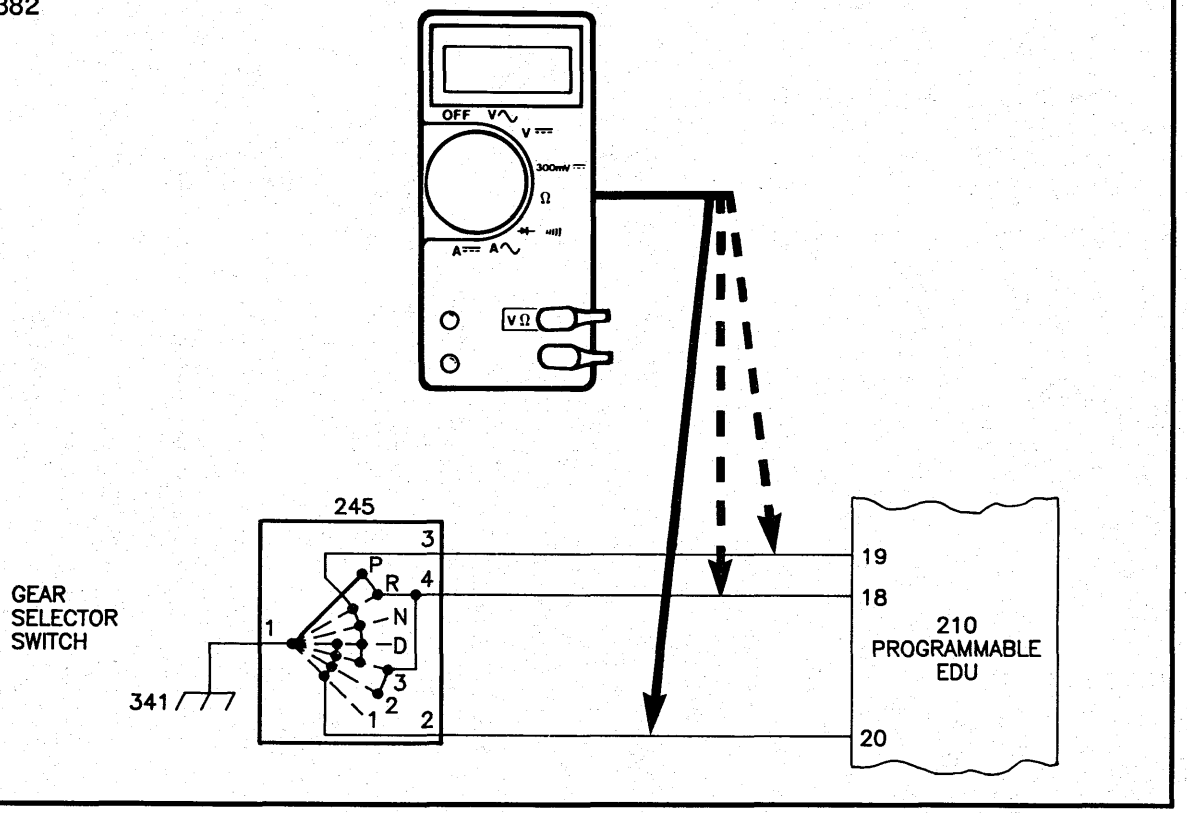
1. Check the temperature indication pulses. If pulses are present the fault must be in the ACC.

2. If the temperature indication signal is a steady 10V and the connection from the ACC or DCC is normal, the fault is probably in the EDU. If no reading is obtained, the fault is either in the ACC or in the wiring between the two units.

Signal levels

Signal Measured	EDU Pins	Condition	Voltage
Outside temperature	35 & 28	Normal	5V
Temperature indication pulses	23 & earth	Pulses	≈10V Fluctuating

45362 Gear selection indication fault
25382



Symptom

Fault codes and/or incorrect selector indication.

Check that earth signals are obtained according to the table below. A '1' indicates the corresponding pin should be at earth and a '0' indicates 10 to 11V. If all signals are 10 to 11V the fault is probably the earth connection to the selector switch. If only selected signals are incorrect the wiring or the selector switch may be at fault. If all signals are correct the EDU is faulty.

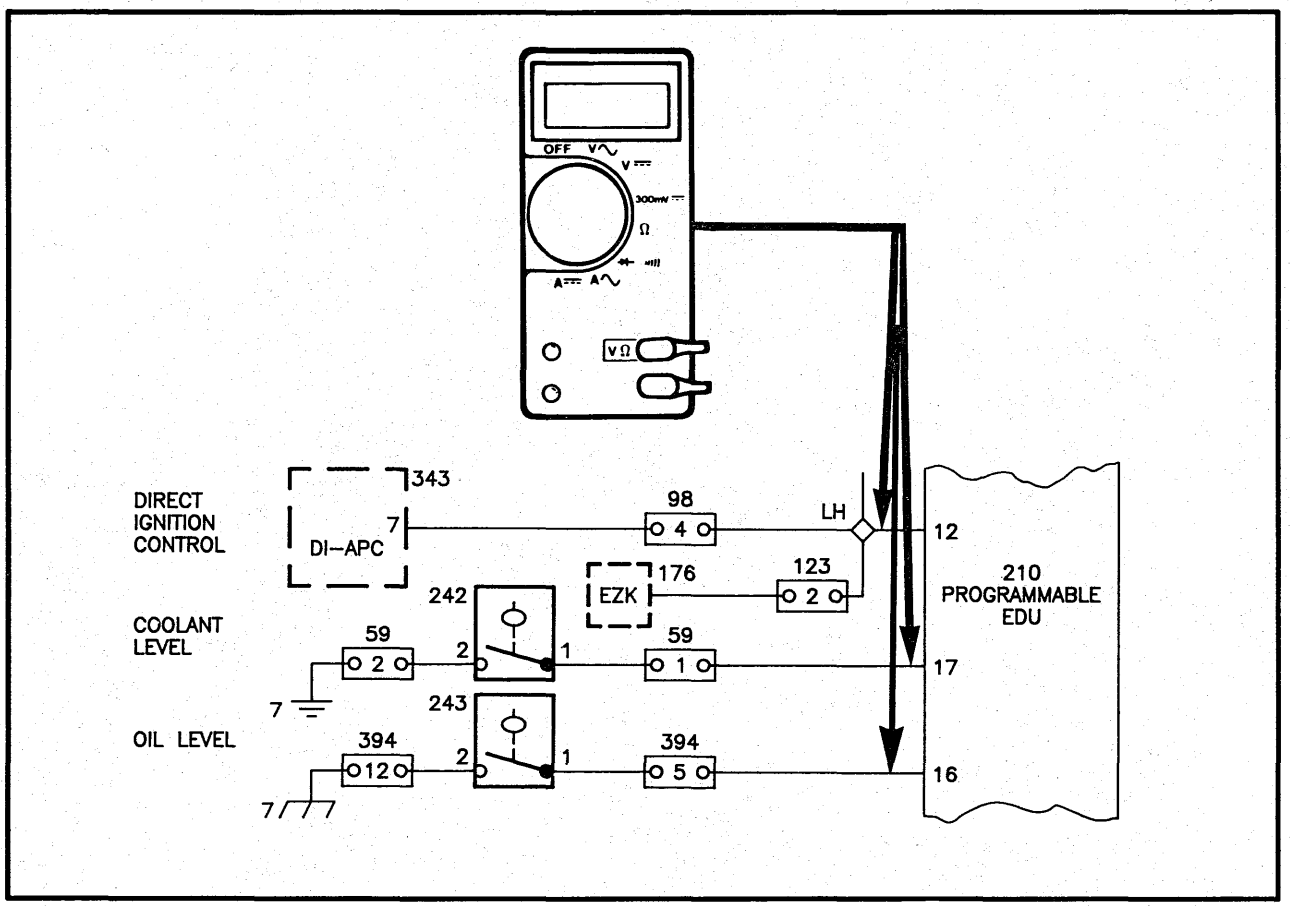
	EDU Connection Pin		
	20	19	18
Selection			
P	0	0	1
R	0	1	1
N	0	1	0
D	1	1	0
3	1	1	1
2	1	0	1
1	1	0	0
Manual Gearbox	0	0	0

1 = EARTH (0 Volts)
0 = 10 to 11V

Note: A fault must occur for a number of gear selections before a fault code is recorded. Checks should be made with the EDU connected and ignition switched on.

Introduction to Programmable EDU

Driver Checks And Manual Controls Fault Finding



Driver check and manual control signals are all produced by applying an 0V or earth signal to the corresponding input of the EDU. This should enable the fault to be isolated to either the source device, the system wiring or the EDU.

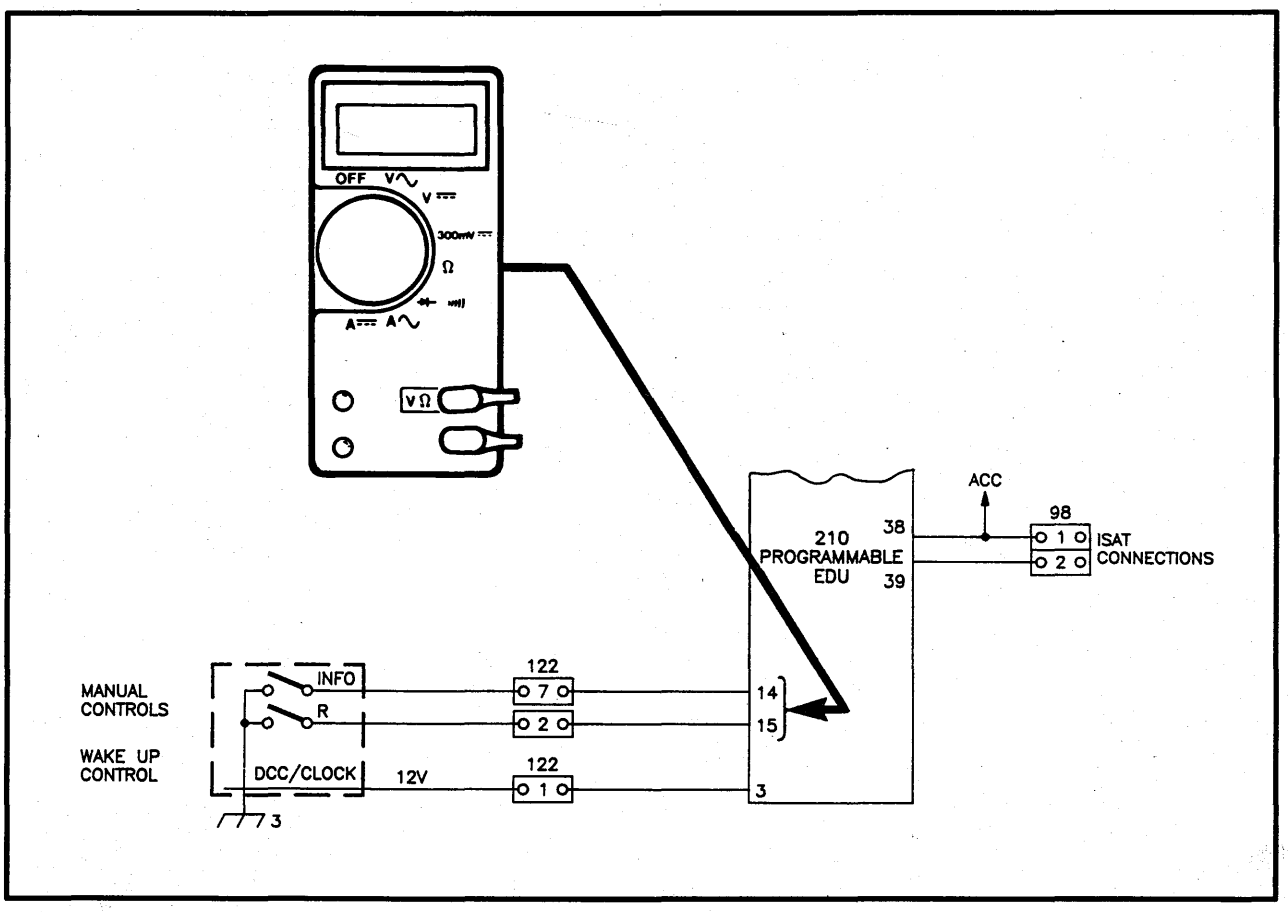
Symptom 1

Driver check indications fail to light when the ignition is first switched on or fail to extinguish when the engine is started with the engine check conditions normal.

Note: When checking the low oil level indication, remember that the signal is prevented from producing an indication after the ignition is switched on again less than five minutes after switch off. To enable an immediate test to be carried out, remove and refit the +30 fuse.

Signal levels

Signal Measured	EDU Pins	Condition	Voltage
DI or LH fault	12 & earth	Indicator on	0V
		Indicator off	10 to 12V
Coolant level	17 & earth	Indicator on	0V
		Indicator off	10 to 12V
Oil level	16 & earth	Indicator on	0V
		Indicator off	10 to 12V



Symptom 2

EDU fails to respond to manual selections.

Signal levels

Signal Measured	EDU Pins	Condition	Voltage
INFO button	14 & earth	Pushbutton pressed Pushbutton released	0V 10 to 12V
R. button	15 & earth	Pushbutton pressed Pushbutton released	0V 10 to 12V

Introduction to Programmable EDU

Summary Of EDU Signal Levels

Signal Measured	EDU Pins	Condition	Voltage
1. +30 Wiring +15 Wiring	1 & 21 37 & 21	Normal	7.5 to 16V
2. Rheostat	32 & 21	Off Full	0V 12V
3. Light sensor	36 & earth	Max brightness Min brightness	11V 0V
4. Speed pulses	9 & earth	Pulses (wheels turning) No pulses (stopped)	5V 0 or 10V
5. Injection pulses	8 & earth	Pulses (engine running) No pulses (stopped)	ISAT ISAT
6. Fuel level transmitter	33 & 26	Empty to full	0.4 to 3V
7. Outside temperature	35 & 28	Normal	5V
8. Gear selector switch	18 & earth 19 & earth 20 & earth	Normal	0 or 10 to 11V
9. DI or LH fault	12 & earth	Indicator on Indicator off	0V 10 to 12V
10. Coolant level 11. Oil level	17 & earth 16 & earth	Indicator on Indicator off	0V 10 to 12V
12. INFO button	14 & earth	Pushbutton pressed Pushbutton released	0V 10 to 12V
13. R button	15 & earth	Button pressed Button released	0V 10 to 12V
14. Wake up	3 & earth 2 & earth	Wake up (DCC) Wake up (ACC)	12V 12V
15. Fuel gauge	24 & earth	Full to empty	9 to 12V
16. Fuel level low warning	25 & earth	Indicator on Indicator off	12V B-volts
17. Temperature indication	23 & earth	Pulses	≈10V Fluctuating

SAAB

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