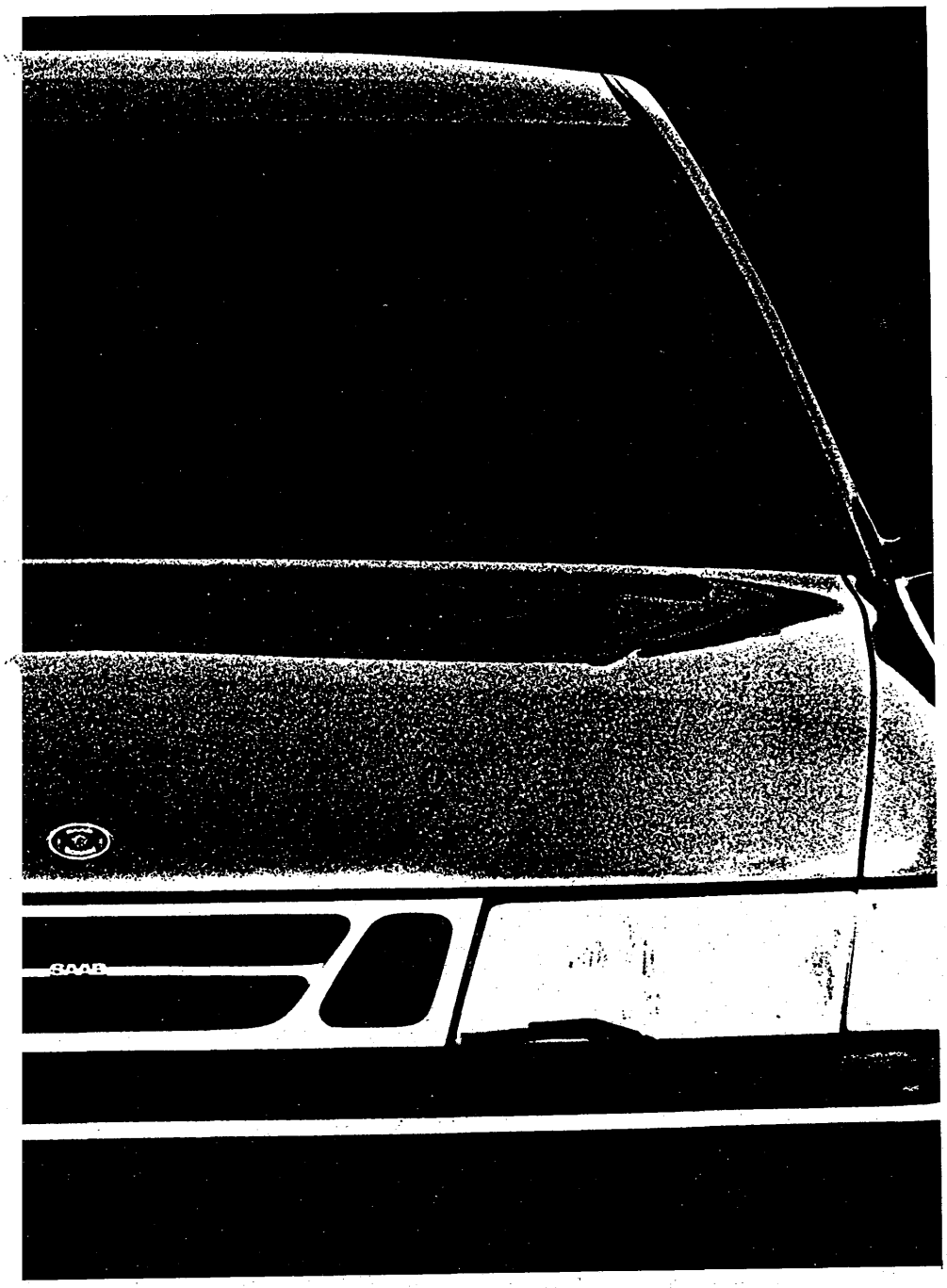
Saab 900/9000

Service Manual



Issue 1995

ENG

1:4 ISAT

Saab

SERVICE MANUAL

1:4 ISAT

Issue 1995

Preface

The **ISAT** scan tool– The **I**ntelligent **SA**ab **T**ester is a test and diagnostics instrument designed for fault diagnosis in the car. The ISAT scan tool can be continuously upgraded with new software to deal with fault diagnosis on new models and when modifications are made to the car's electronics.

This service manual replaces Service Informations: 101–1100
101–1347
101–1308

Current information about ISAT scan tool developments will be continuously sent to the workshops affected.

All information and illustrations in this workshop manual are based on information and data which is correct at the time of going to press. Technical data and equipment may be changed without prior notice.

Saab Automobile AB

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RECYCABLE PAPER

Warning, Important and Note

The headings "Warning", "Important" and "Note" occur from time to time in the Service Manual. They are used to draw the attention of the reader to information of special interest and seriousness. The importance of the information is indicated by the three different headings and the difference between them is explained below.

⚠ WARNING

Warns of the risk of material damage and grave injury to mechanics and the driver, as well as serious damage to the car.

Important

Points out the risk of minor damage to the car and also warns the mechanic of difficulties and time-wasting mistakes.

Note

Hints and tips on how the work can be done in a way that saves time and labour. This information is not supplied for reasons of safety.

Market codes

The codes refer to market specifications

AT	Austria	GB	Great Britain
AU	Australia	GR	Greece
BE	Belgium	IS	Iceland
CA	Canada	IT	Italy
CH	Switzerland	JP	Japan
DE	Germany	ME	Middle East
DK	Denmark	NL	Netherlands
ES	Spain	NO	Norway
EU	Europe	SE	Sweden
FE	Far East	US	USA
FI	Finland	UC	US California
FR	France		

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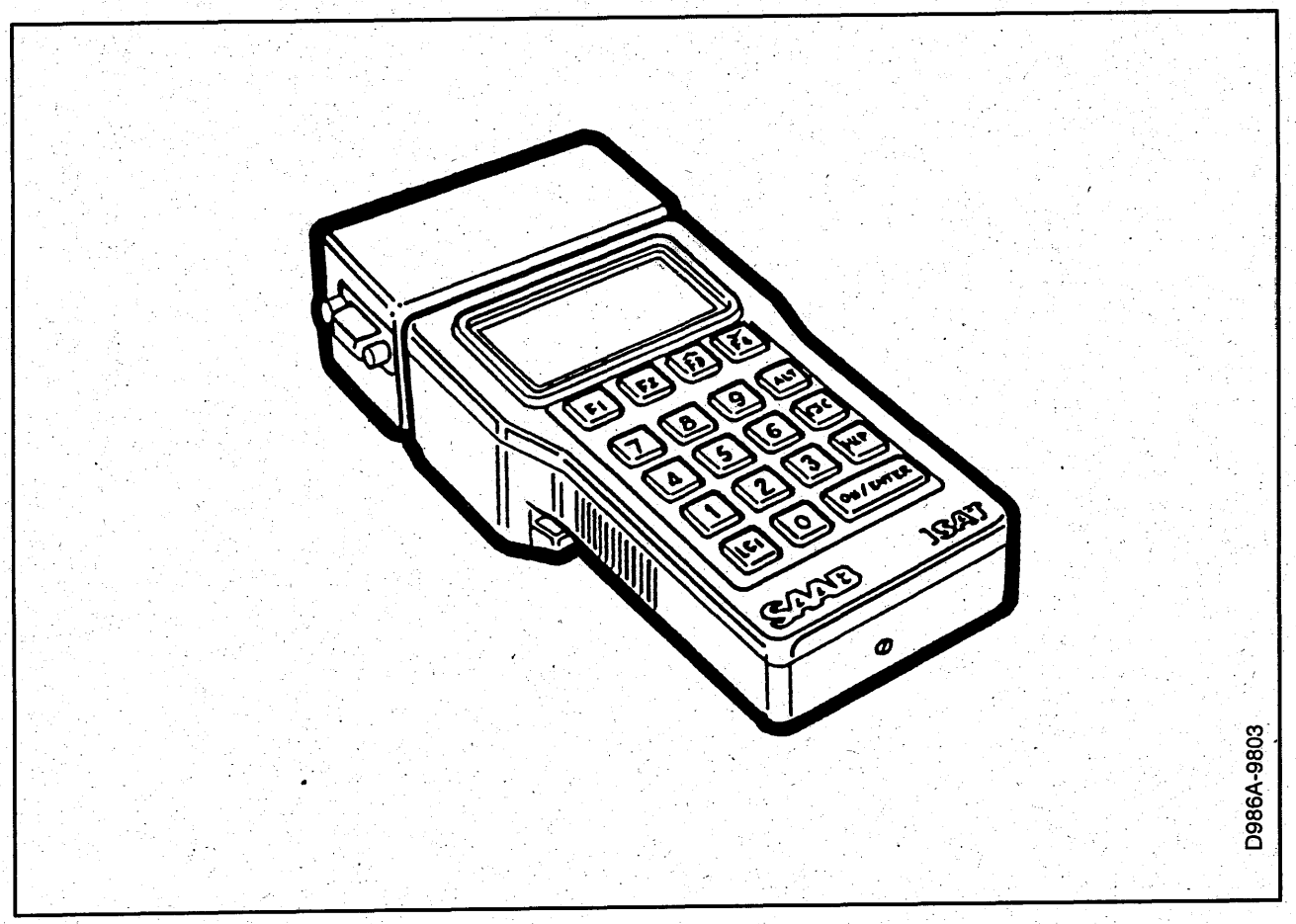
Production: Service Support, Saab Automobile AB, Trollhättan, Sweden

Introduction



General

The **ISAT** scan tool – **I**ntelligent **SA**ab **T**ester, is a test and diagnostics instrument, designed for great flexibility and to be used for a wide range of functions in the car's electronics system.

The ISAT scan tool is principally for troubleshooting electronic systems which are constructed with self–diagnosis. In this type of system faults are detected and stored in the system's control module (ECM). The ISAT scan tool is used to read the system's stored fault information and the fault is presented in the form of a diagnostic trouble code with text showing the source and cause of the fault. Using the ISAT scan tool the selected system can be checked using the read and activate commands. Control modules can be adjusted and programmed.

There is a description of the fault diagnosis routines for the chosen system in the appropriate service manual.

The usefulness of the ISAT scan tool in other diagnostic work can be increased by connecting external sensors such as temperature and pressure sensors.

The ISAT scan tool can also be used as a multimeter if no dedicated instrument is available. The multimeter can read voltage, current, resistance, pulse ratio and pulse length as well as frequency.

Additional modules which can be connected to the ISAT scan tool provide an increased range of features. The TSI – **T**iming **S**ervice **I**nstrument makes it possible to set the ignition timing. Using the SIM – **S**AAB **I**nterface **M**odule. it is possible to take readings from the control module pins. both automatically and manually. In addition. readings normally taken using a BOB – **B**reak **O**ut **B**ox can be taken using the ISAT–SIM.

The SDA II – **S**AAB **D**iagnostic **A**dapter is a connecting module which should generally be fitted to the ISAT scan tool in order to ensure correct communication with the car's data link connector.

Technical data

Operation

Internal battery, rechargeable	Volts	9
External	Volts	12

TSI readings

Ignition advance	degrees	all
Dwell angle	degrees	all
Engine speed	rpm	all
Oxygen sensor signal (Lambda)	ratio	yes
Fuel injection system, CI	pulse ratio	yes
Fuel injection system. LH	integrator	yes
IAC valve	pulse ratio	yes

Readings with external sensors

Temperature	°C (F)	–40 to +400 (–40 to +755)
Pressure	bar (psi)	0 – 200 (0 – 2900) there are various sensors
Compression	bar (psi)	0 – 200 (0 – 2900) there are various sensors

Readings, multimeter

Voltage	Volt (DC)	0 ±126
Current	Ampere (DC)	0 ± 100
		0 ± 600 using current clamp
Resistance	kohm	0 – 256
Pulse and frequency	Hz	1 – 10 000 (time min. 13 μs)
5 Hz sampling gives reading time	sec.	200
10 Hz		100
20 Hz		50
100Hz		10

Technical data (contd.)

SIM module

Equivalent data to multimeter. Accuracy corresponds to that of a commercial multimeter.

Operating conditions

Storage temperature	°C (F)	–20 to +70 (–4 to +158)
Operating temperature	°C (F)	–5 to +70 (+23 to +158)

Display

ISAT scan tool	LCD	4 lines of 20 characters
ISAT II scan tool	LCD	8 lines of 30 characters

Technical description

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ISAT/ISAT II scan tool with SDA II 6
Connector, ISAT scan tool with SDA II 7
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Summary of combinations 9
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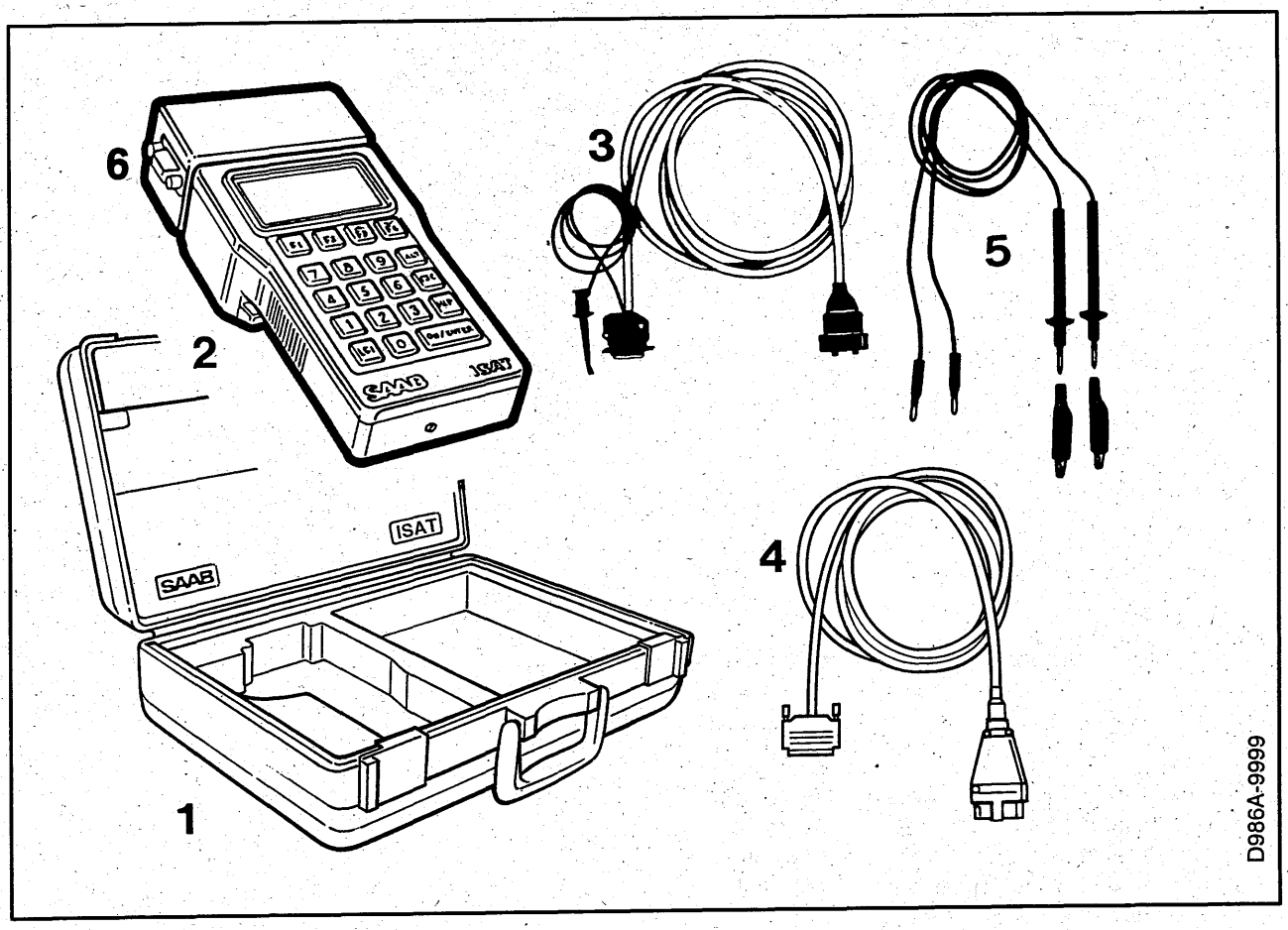
ISAT scan tool basic version



The basic version of the ISAT scan tool is supplied with the following equipment:

1 Storage and carrying case.

2 ISAT II scan tool instrument with rechargeable battery and memory module (part No. (16) 86 11 998) fitted.

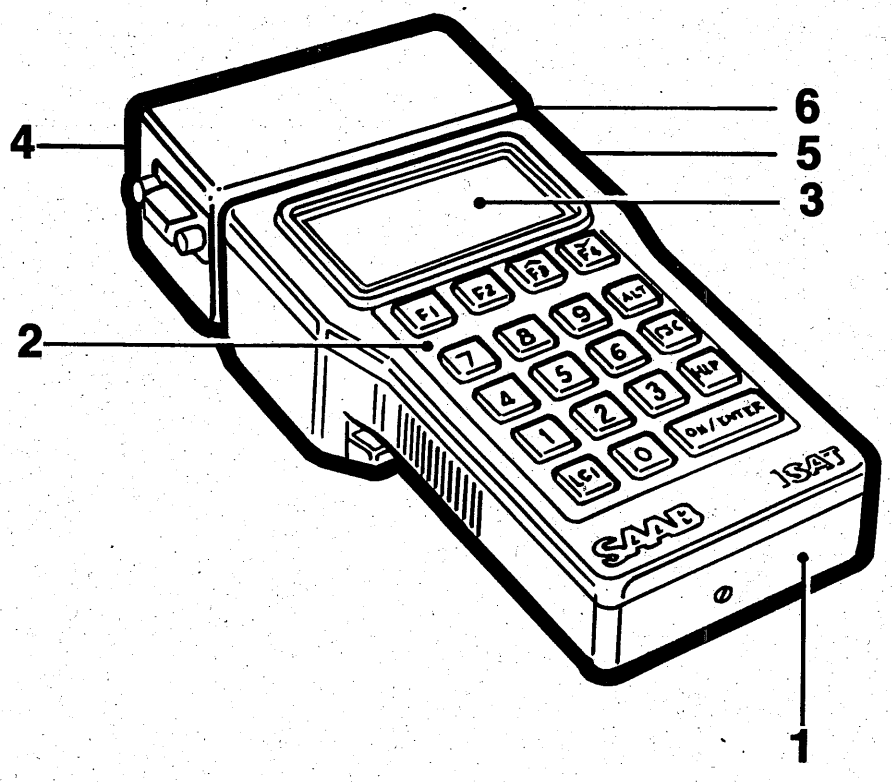
3 Data link, 10–pole, part No. (16) 86 10 701.

4 Data link, 16–pole, part No. (16) 86 12 004.

5 Test cable for multimeter features with part No. (16) 86 10 719.

6 SAAB Diagnostic Adapter (SDA II) with part No. (16) 86 11 436.

ISAT/ISAT II scan tool with SDA II



D101W-9340

1 Cover over memory module and rechargeable battery.

2 Keyboard.

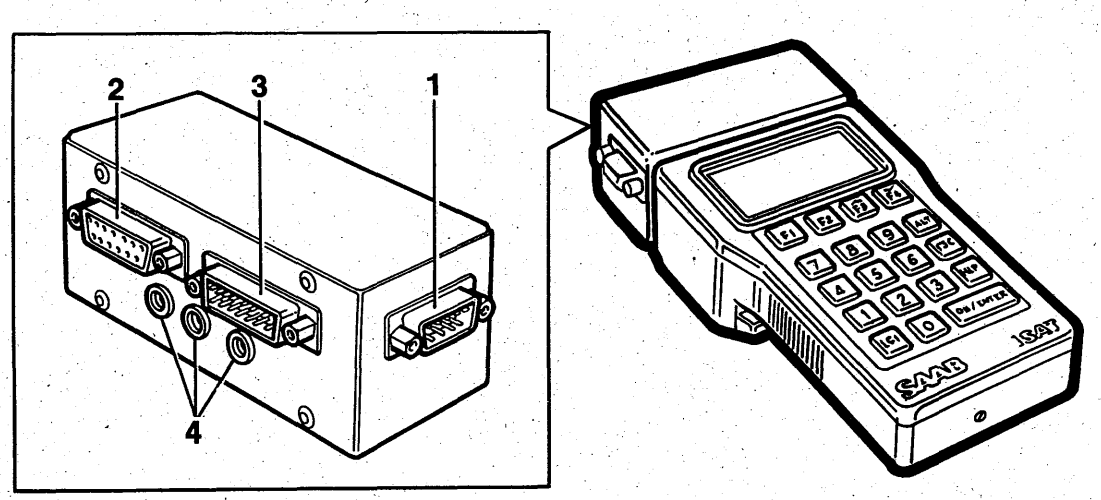
3 Display:
ISAT II is an updated version of the ISAT scan tool and it is fully functionally compatible. One external change is a new display with improved contrast and viewing angle. Max. display size:
ISAT, 4 lines of 20 characters.
ISAT II, 8 lines of 30 characters.

4 The SDA II is required for all measurements except temperature and when using the TSI module.

5 Connector for linking to temperature sensors.

6 Connector for linking the TSI module. The SDA II must not be connected when the TSI is used.

Connector, ISAT scan tool with SDA II



D101W-9341

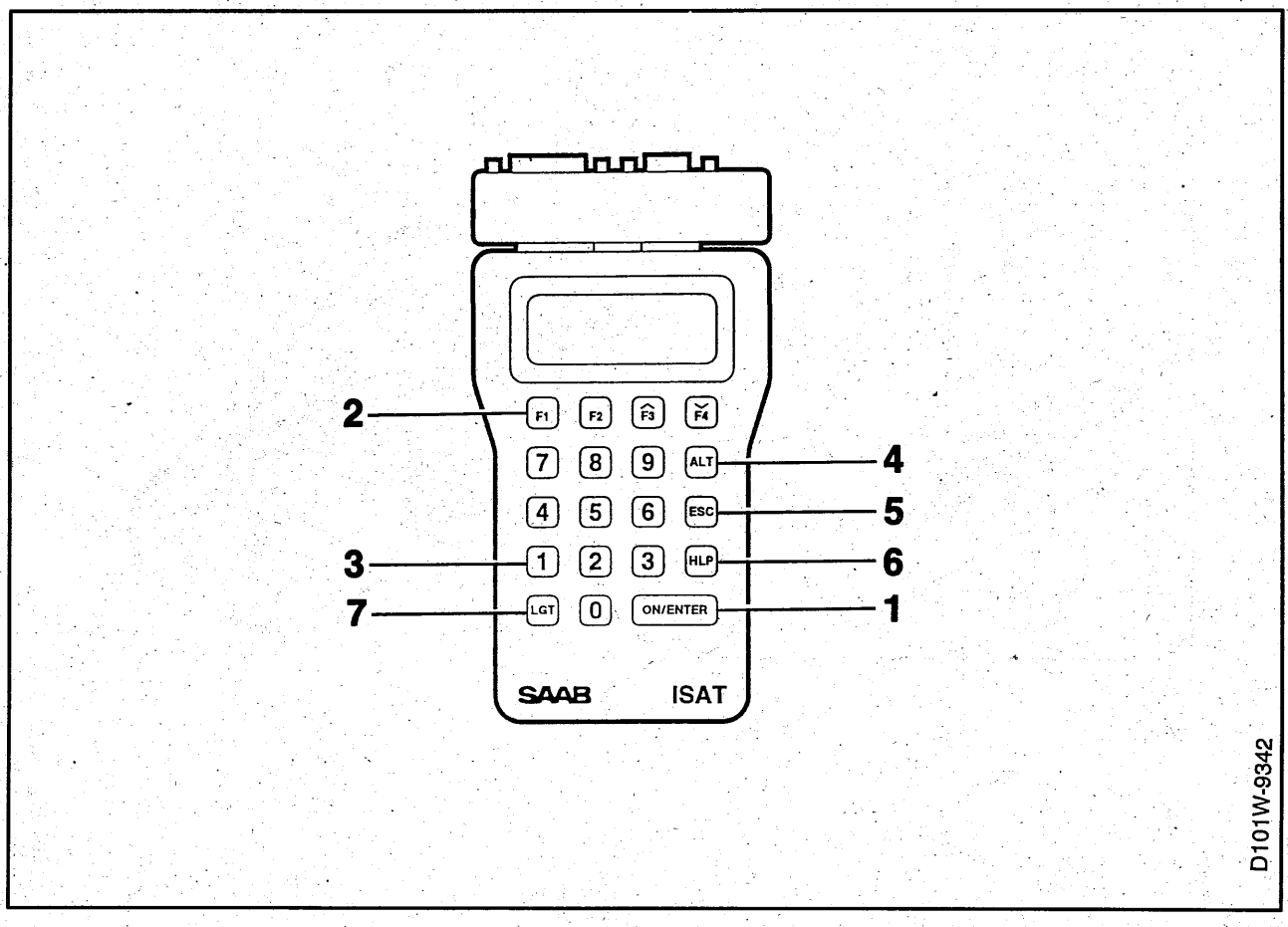
1 Connector, 9–pin D–Sub for communication with the SIM module, external PC or printer.

2 Connector, 15–pin D–Sub for communication with the car's 16–pin diagnostic connector (900 M94–, 9000 M96–)

3 Connector, 15–pin D–Sub for communication with the car's 10–pin diagnostic connector (900 –M93, 9000 –M95)

4 Banana jacks for multimeter readings. Volts, amperes, resistance and pulse as well as PWM readings.

Keyboard



The keyboard comprises 19 keys in transparent rubber.

1 "ON/ENTER" is used to switch the instrument on. This key functions as a confirmation at certain menu levels or sometimes to proceed at the same level.

2 "F1 – F4" are function keys and select the desired menu shown on the display at each key. The "F3" and "F4" keys can also be used to scroll up and down menu lists (e.g. a list of diagnostic trouble codes which is too long to be shown on the display).

3 The numerical keys are used to enter data and commands as instructed on the display.

4 "ALT" allows the user to move to the right in the menu tree on the same level, thus making it an extension of the function keys.

5 "ESC" is used to jump back in the menu tree or to cancel the current command. The "ESC" key can be considered as an "Undo" key.

6 "HLP" which stands for HELP allows access to an additional explanation of the menu function at the current level in the menu tree.

7 "LGT" has no function.

In order to switch off the ISAT scan tool, go to the main menu and select "SWITCH OFF ISAT" and then press "ON/ENTER".

A summary of menus can be found on pages13 and thereafter.

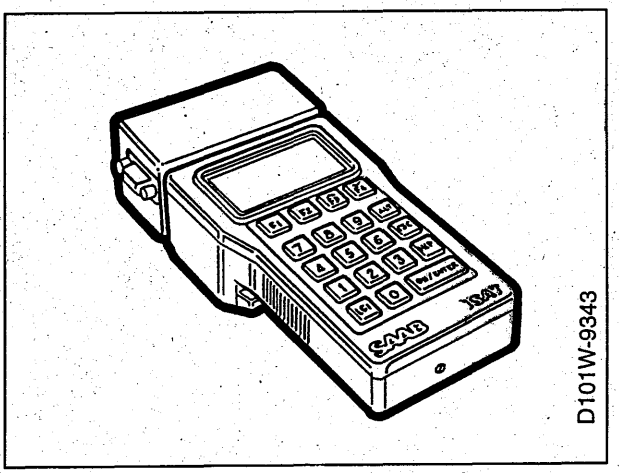
Summary of combinations

The following is a compilation of what the ISAT scan tool can read when used in combination with different modules:

ISAT scan tool + SDA II

SDA II – The Saab Diagnostic Adapter should be fitted in order for the ISAT scan tool to be able to communicate with all Saab year models. Scope of functions:

- Diagnostics/fault–tracing
- Reading diagnostic trouble codes
- Reading and activating commands
- Multimeter (voltage, current, resistance, pulse and PWM)
- Temperature

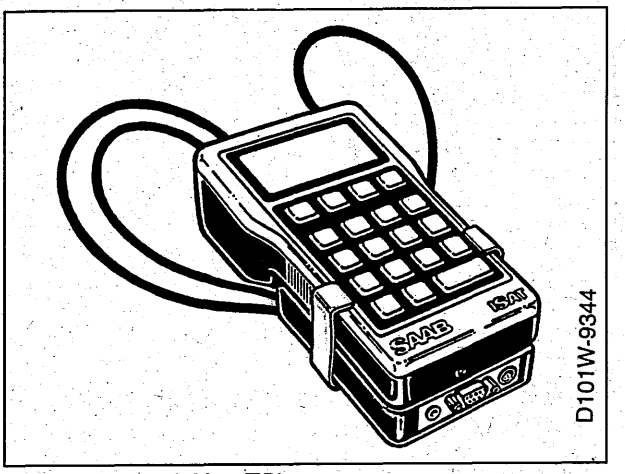


ISAT SCAN TOOL + SDA II

ISAT scan tool + TSI

In order to be able to take readings from the car's ignition and fuel systems, the TSI is used – Timing Service Instrument as a complement to the ISAT scan tool. Scope of functions:

- Ignition timing
- Dwell angle
- Engine speed
- Pulse ratio, IAC
- Lambda

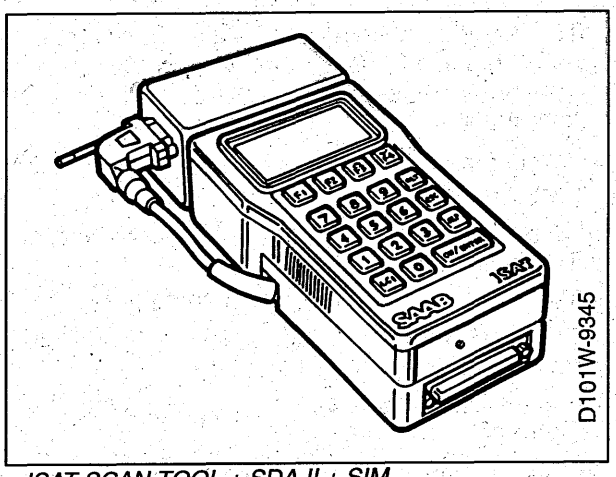


ISAT SCAN TOOL + TSI

ISAT scan tool + SDA II + SIM

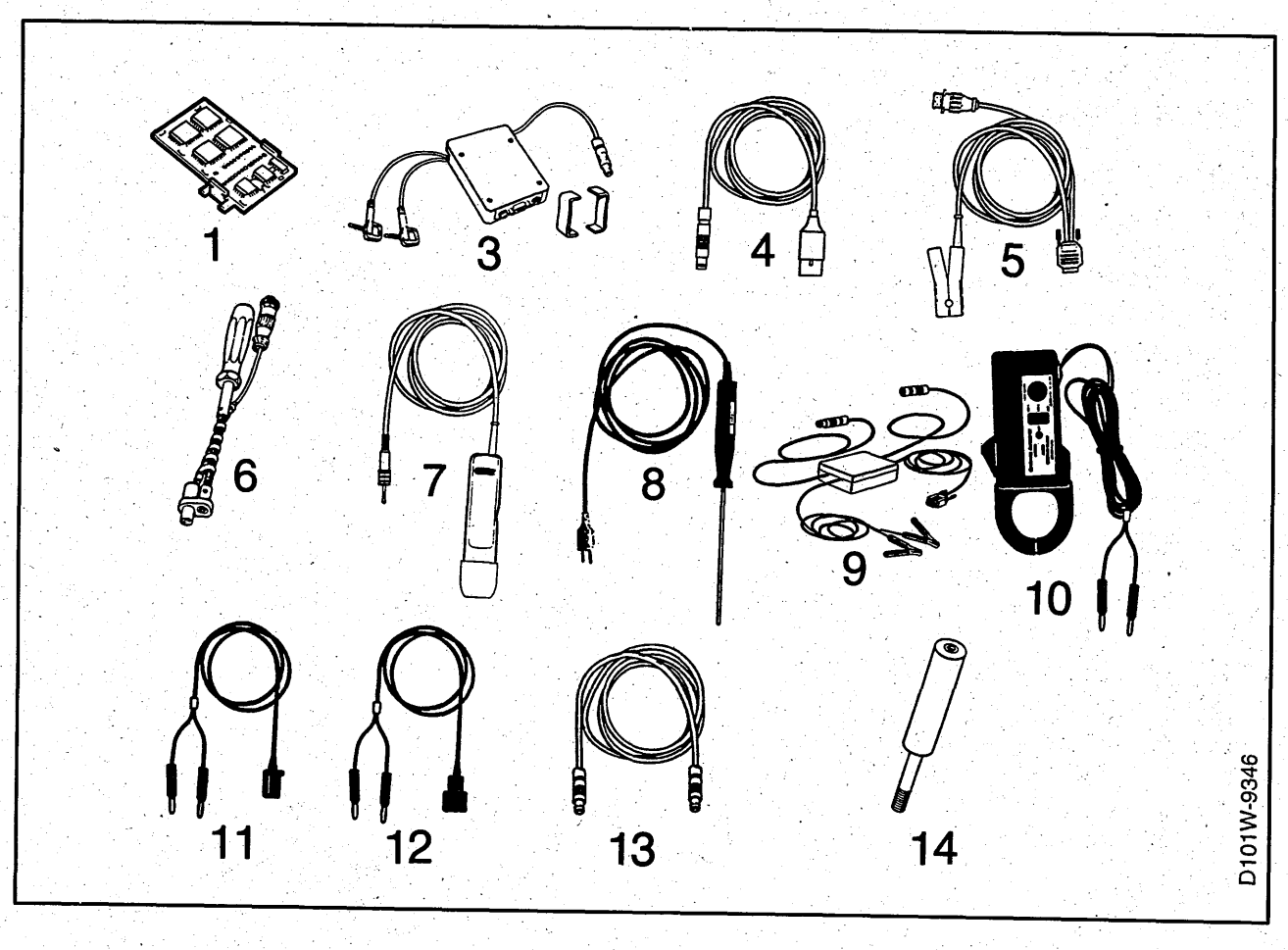
SIM – The Saab Interface Module enables the user to read control module inputs and outputs. Readings can be automatic or manual. Scope of function:

- Active grounding point test
- Automatic/manual test
- Operational test for detecting intermittent faults
- Multimeter with calibration



ISAT SCAN TOOL + SDA II + SIM

Accessories



Accessories available for order:

1 Memory module for upgrading to M96, part number (16) 86 11 998.

2 TSI module, complete, comprising items 3–7, part number (16) 86 10 925

3 TSI module including connections and attachment brackets, part number (16) 86 10 941. Attachment brackets, separate, part number (16) 86 10 933.

4 Wiring for connection to the car's TSI connector, part number (16) 86 10 727.

5 Clamp sensor including wiring and connectors for TDC sensor, part number (16) 86 10 735.

6 TDC sensor, part number (16) 88 19 958.

7 Stroboscopic lamp including wiring and connector, part number (16) 86 10 958.

8 Temperature sensor with cable, part number (16) 86 10 750.

9 Pressure sensor module* for connecting to pressure sensors, part number (16) 86 10 990.

10 Current clamp for measuring current up to 600 amperes, part number (16) 86 10 743.

11 Connecting cable for oxygen sensors (lambda), CI, part number (16) 86 10 776.

12 Connecting cable for oxygen sensors (lambda), LH, part number (16) 86 10 784.

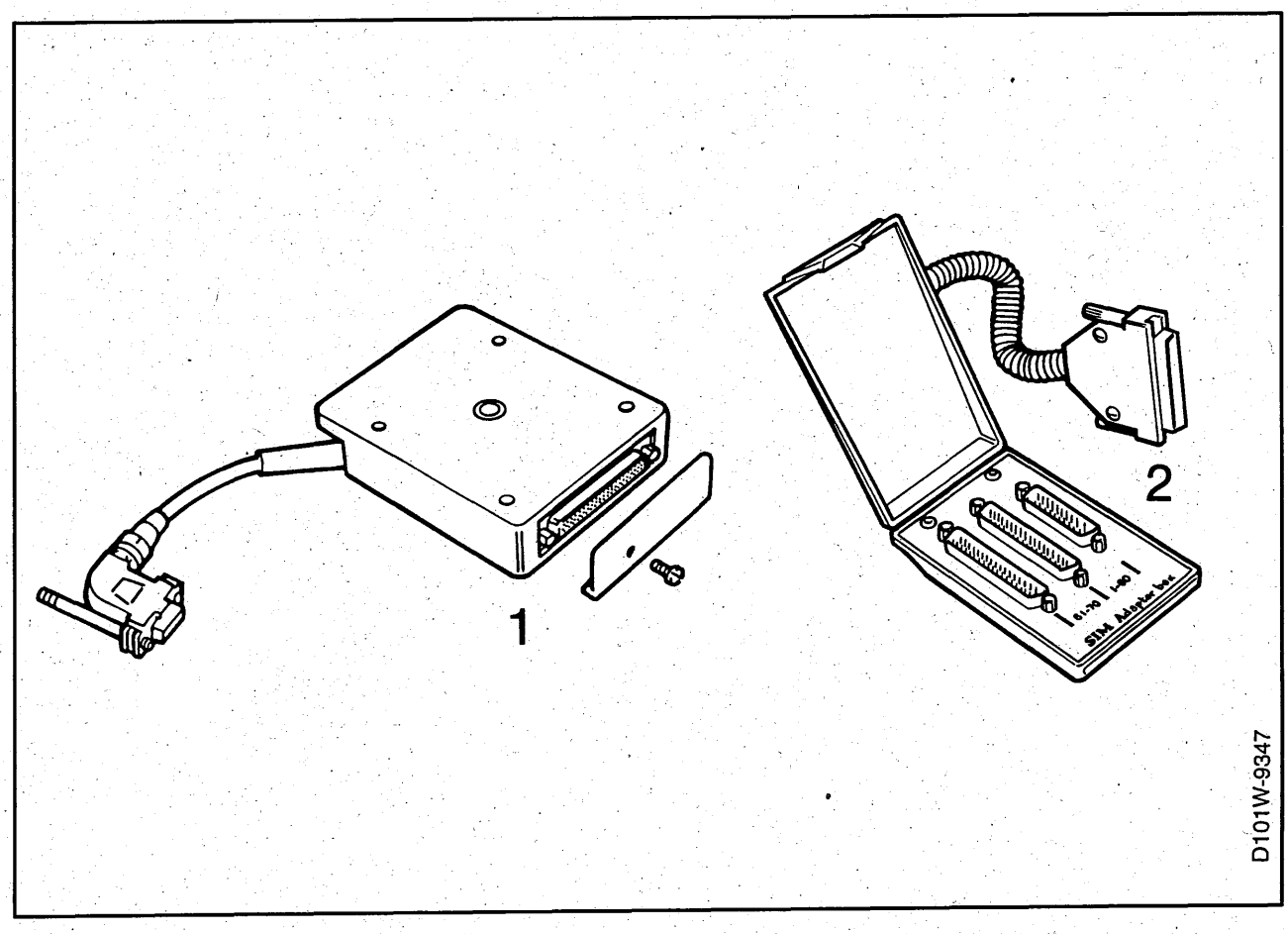
13 Adapter cable for compression testing, part number (16) 86 10 982.

14 Compression tester, sensor, part number (16) 86 10 974.

*The pressure sensor module can be used for the following systems:

- Pressure sensor for ABS tester with part number (16) 89 96 522.
- Pressure sensor for LH tester with part number (16) 83 94 355.

Accessories (contd.)



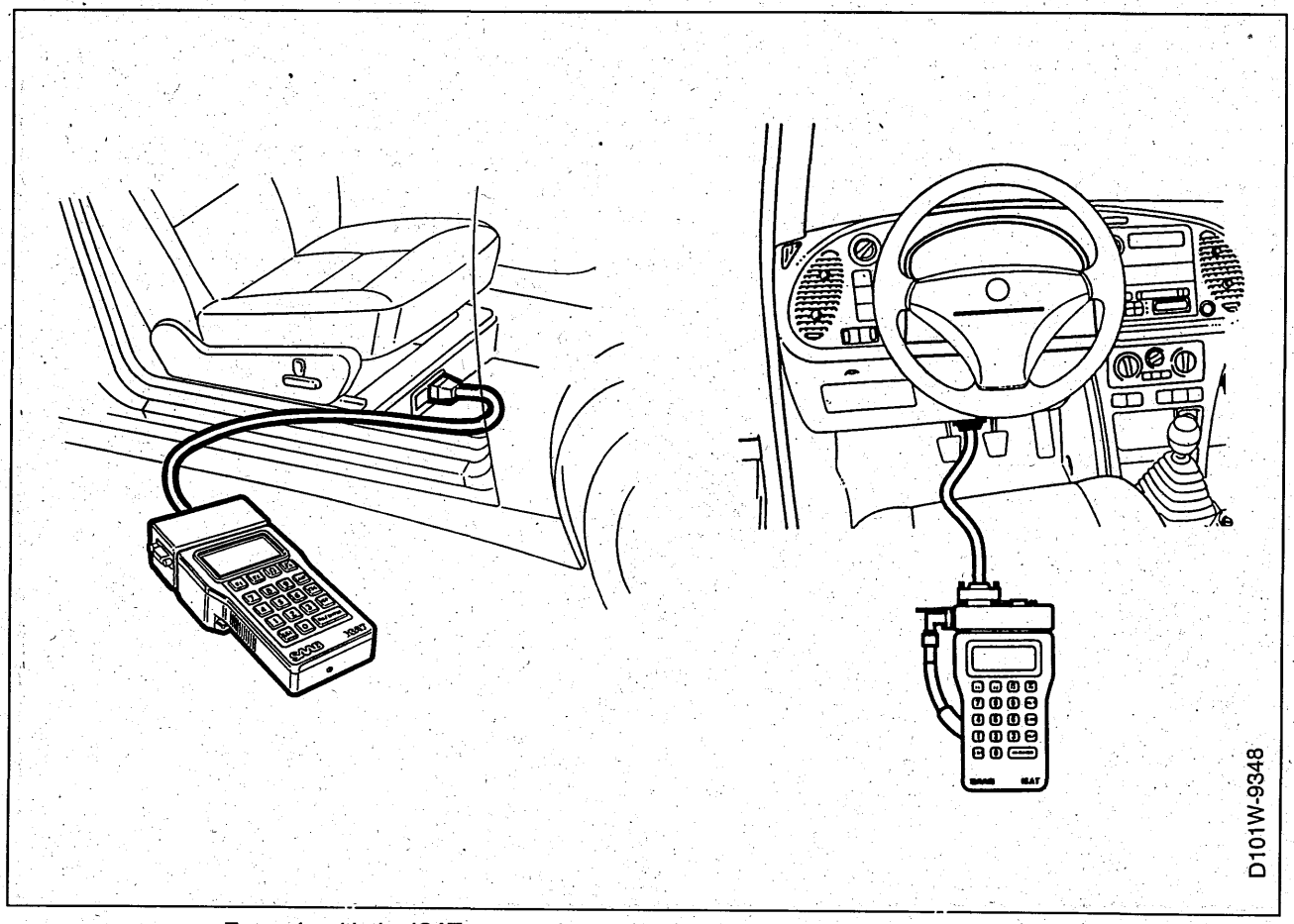
SIM accessories:

1 SIM module with holder, part number (16) 86 11 949.

2 Adapter cable, part number (16) 86 11 956.

Complete kit comprising SIM module with holder and adapter cable, part number (16) 86 11 972.

Using the ISAT scan tool



Example with the ISAT scan tool connected to the car via the data link connector.

The ISAT scan tool is used and connected to the car according to the instructions given in the fault diagnosis sections of the service manuals.

The menus in the ISAT scan tool are described down to system level in this manual. In addition to this, the service manuals apply.

If an incorrect (not valid) command is given the ISAT scan tool can:

- Freeze and the screen go out
- Freeze with the display remaining
- Attempt to execute the command, locking the ISAT scan tool until time–out (a predetermined time before new commands can be given).

Press **ESC** for 10 seconds after time–out.

If the problem remains disconnect and reconnect the data link.

As a last resort, remove and refit the ISAT scan tool's internal battery.

Note

Poor ISAT scan tool communication can be due to a poorly charged internal battery. A discharged battery takes about 14 hours to recharge.

Using the menus

Introduction 13
Self–test, PC, upgrading and language 14

Introduction

When the ISAT scan tool is switched on or is connected to the car and thus supplied with a voltage, you will see a number of intermediate menus before the main menu is displayed. The ISAT scan tool carries out and internal test of the software. See page14 for the SELF TEST menus.

The intermediate menus give:

- The serial number of the ISAT scan tool.
- The version number of the ISAT scan tool software.
- The date of the version number.
- Messages concerning whether the ISAT scan tool software complies with the internal program test.

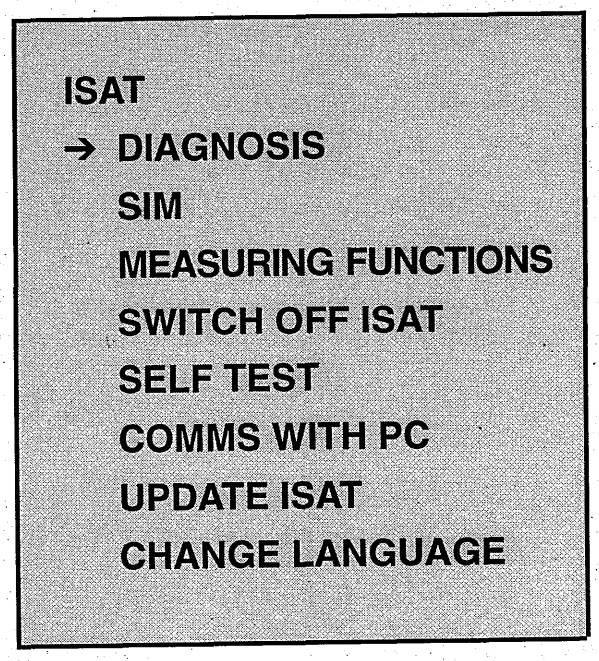
If the software does not complete the internal test "SELF TEST NOT OK" is shown on the display.

The desired function is selected from the main menu.

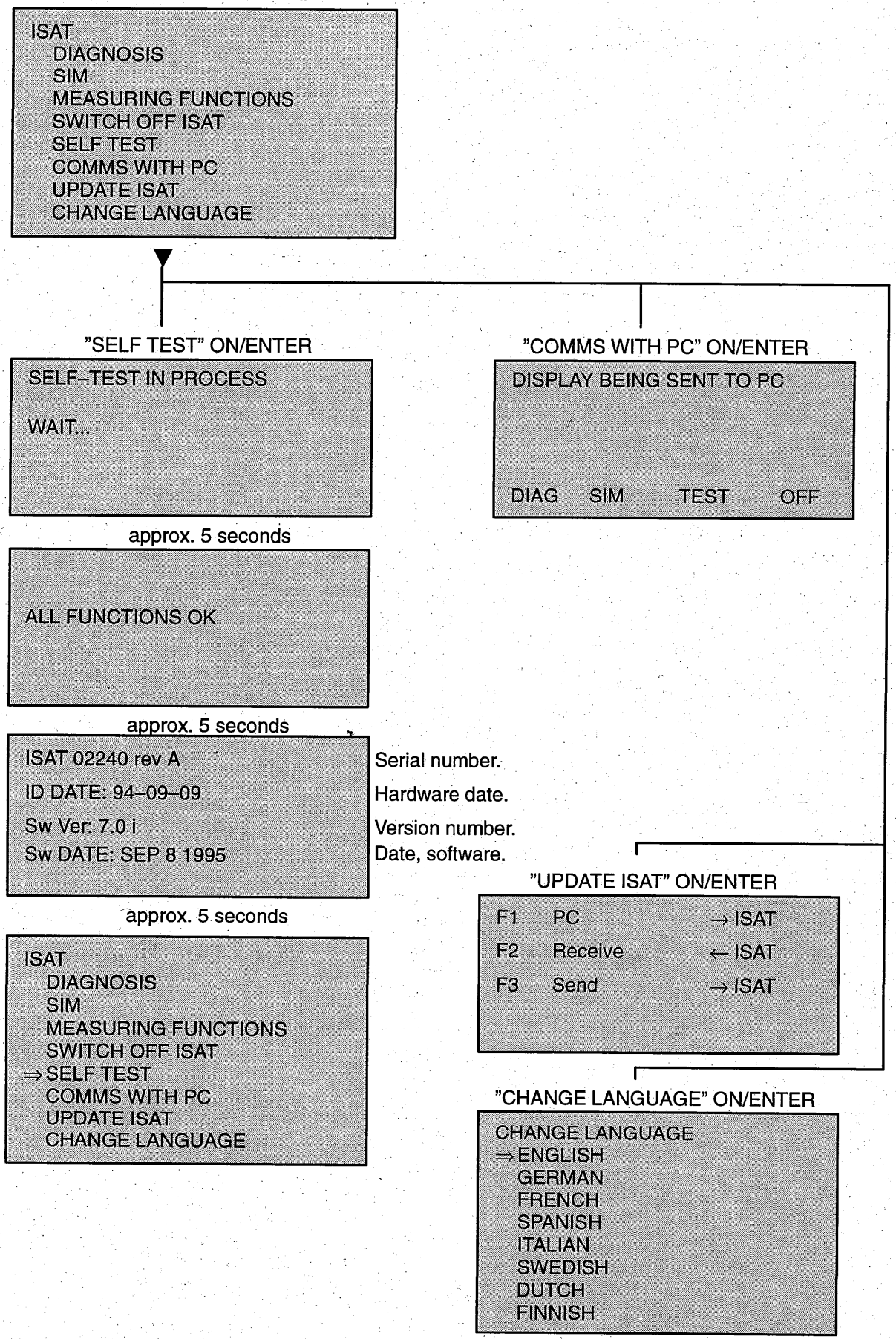
There may be functions in addition to those currently shown on the display. These can be accessed by scrolling the menu using **F3** and **F4**. Pressing **ON/ENTER** selects the function the arrow is pointing to.

The ISAT scan tool has the following functions:

- DIAGNOSIS: Communication with the desired control module via the car's data link connector.
- SIM: Communication via the SIM module and its functions.
- MEASURING FUNCTIONS: Analogue multimeter functions.
- SWITCH OFF ISAT: On and off.
- SELF TEST: Internal test of the ISAT scan tool software.
- COMMS WITH PC: ISAT scan tool communication with a PC (personal computer).
- UPDATE ISAT: Updating the software version in the ISAT scan tool using a PC or another ISAT scan tool.
- CHANGE LANGUAGE: Selection of language.



Self–test, PC, upgrading and language



Menus, scan tool diagnostics

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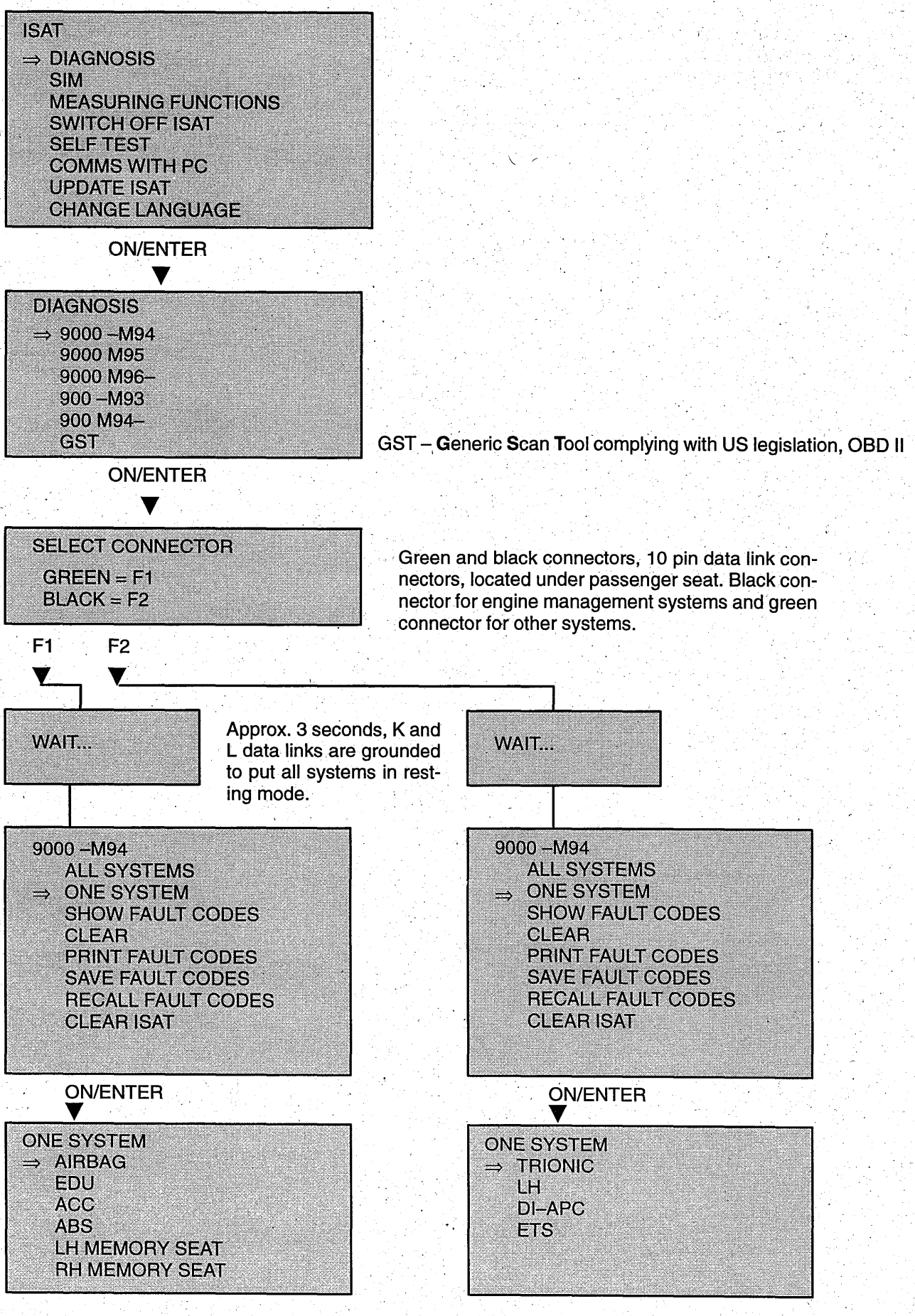
Diagnostics, 9000 M95 17
Diagnostics, 9000 M96– 18
Diagnostics, 900 –M93 19
Diagnostics, 900 M94– 20

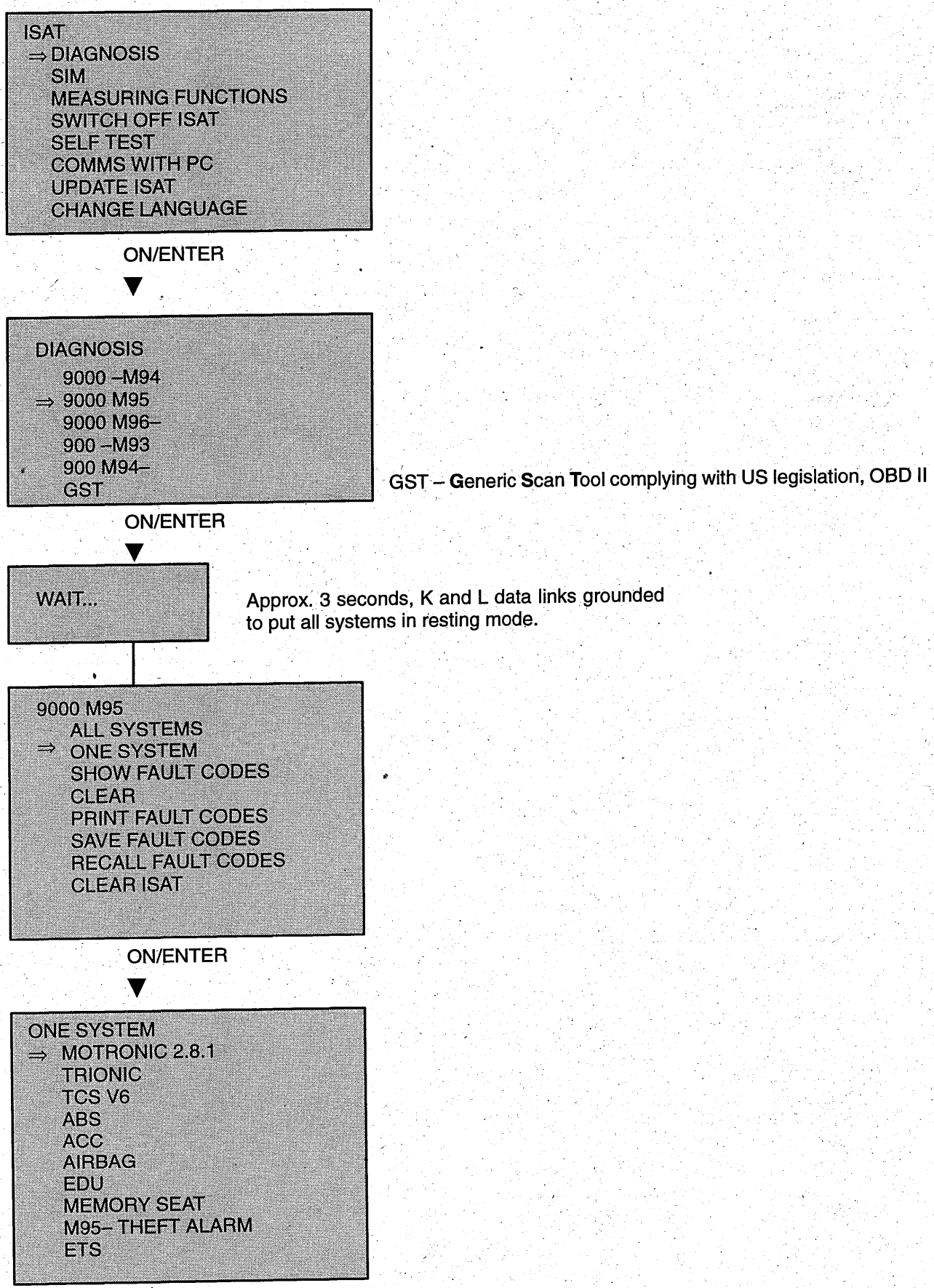
Diagnostics, 9000 –M94



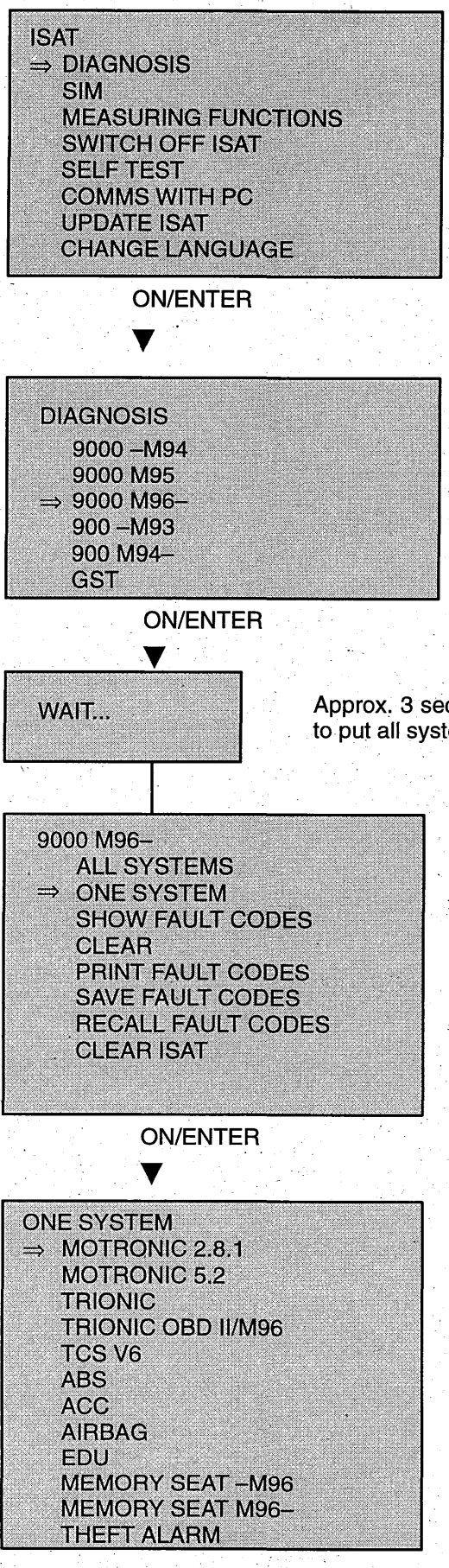
GST – **G**eneric **S**can **T**ool complying with US legislation, OBD II

Green and black connectors, 10 pin data link connectors, located under passenger seat. Black connector for engine management systems and green connector for other systems.

Diagnostics, 9000 M95



Diagnostics, 9000 M96–

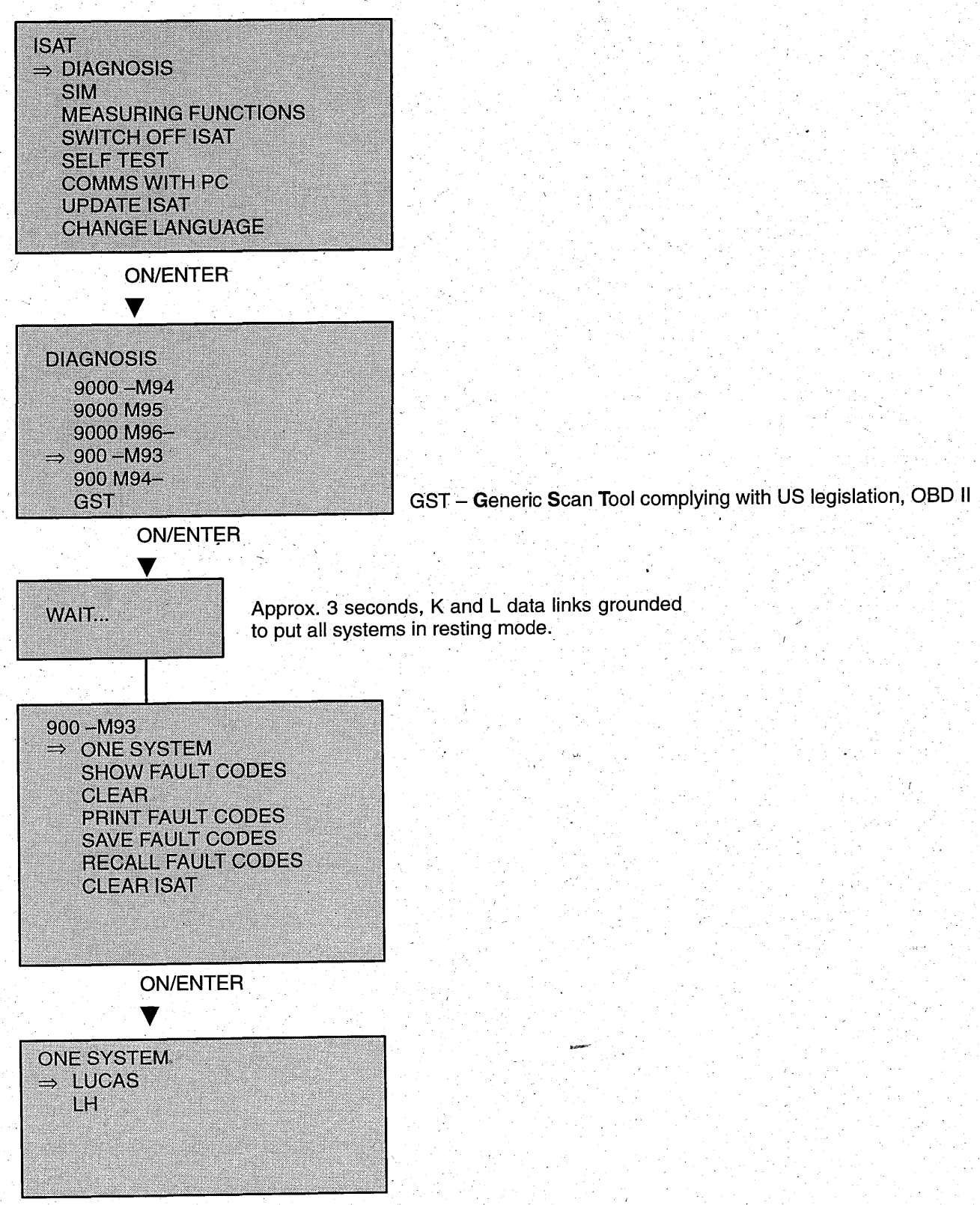


GST – **G**eneric **S**can **T**ool complying with US legislation, OBD II

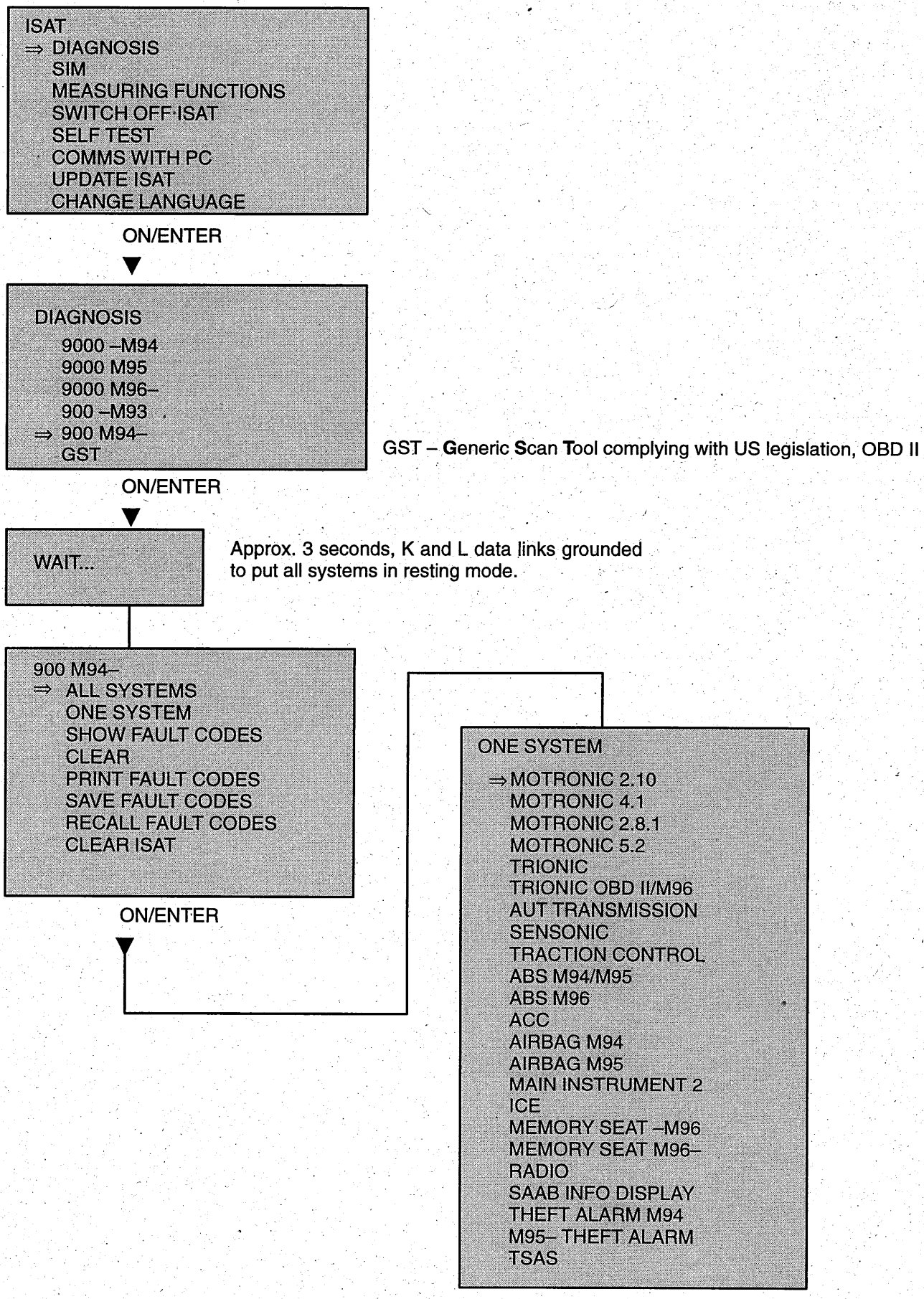
Approx. 3 seconds, K and L data links grounded to put all systems in resting mode.

Memory seat: There are two versions when a rationalized memory seat is introduced in series production M96.

Diagnostics, 900 –M93



Diagnostics, 900 M94–



Menus, reading

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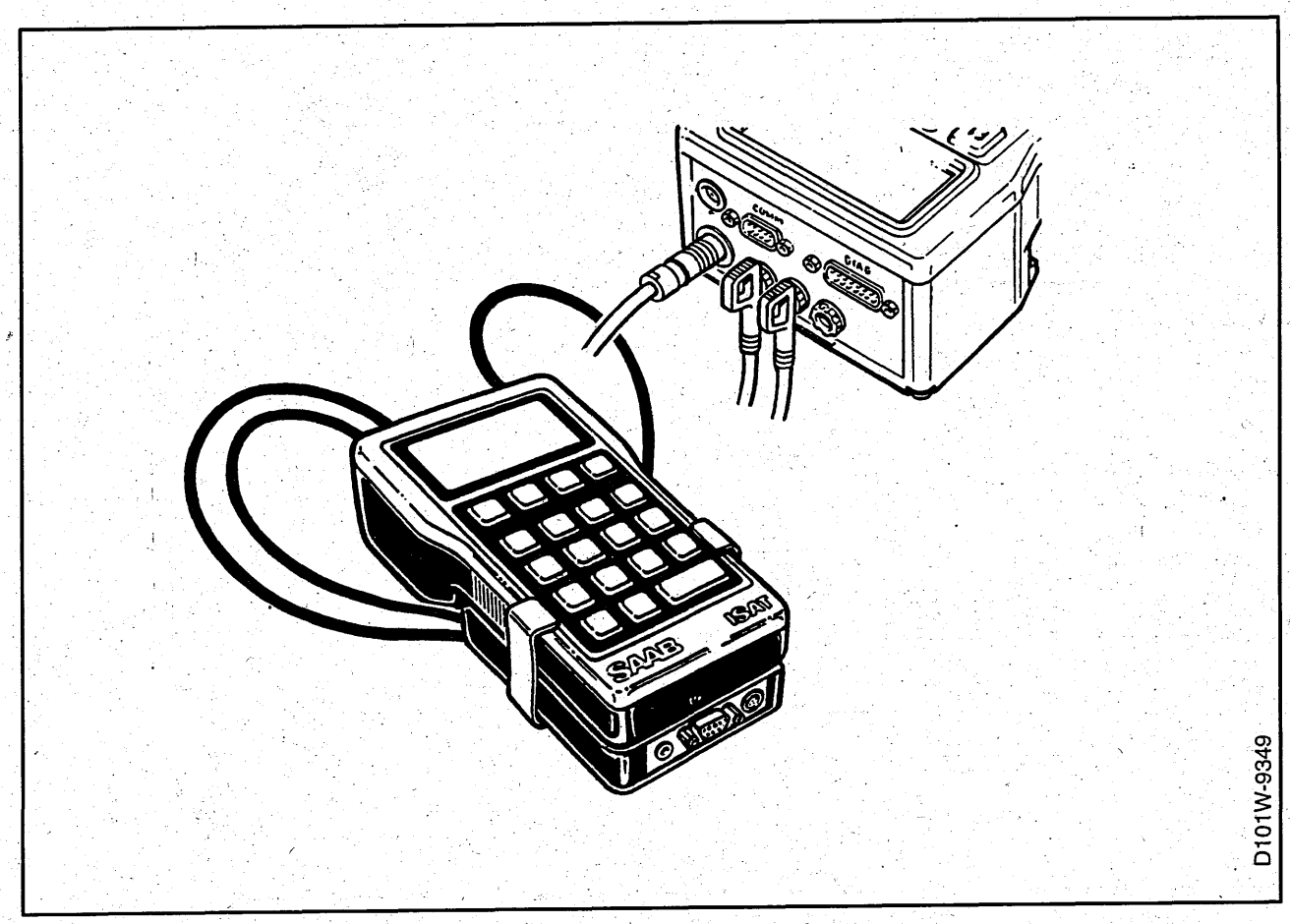
Reading V, I, R, pulse and PWM 23
Reading temperature, pressure and compression 24

Connection, TSI



When taking readings from the car's ignition system, the TSI module should be connected to the ISAT scan tool. The SDA II module is not used in this case.

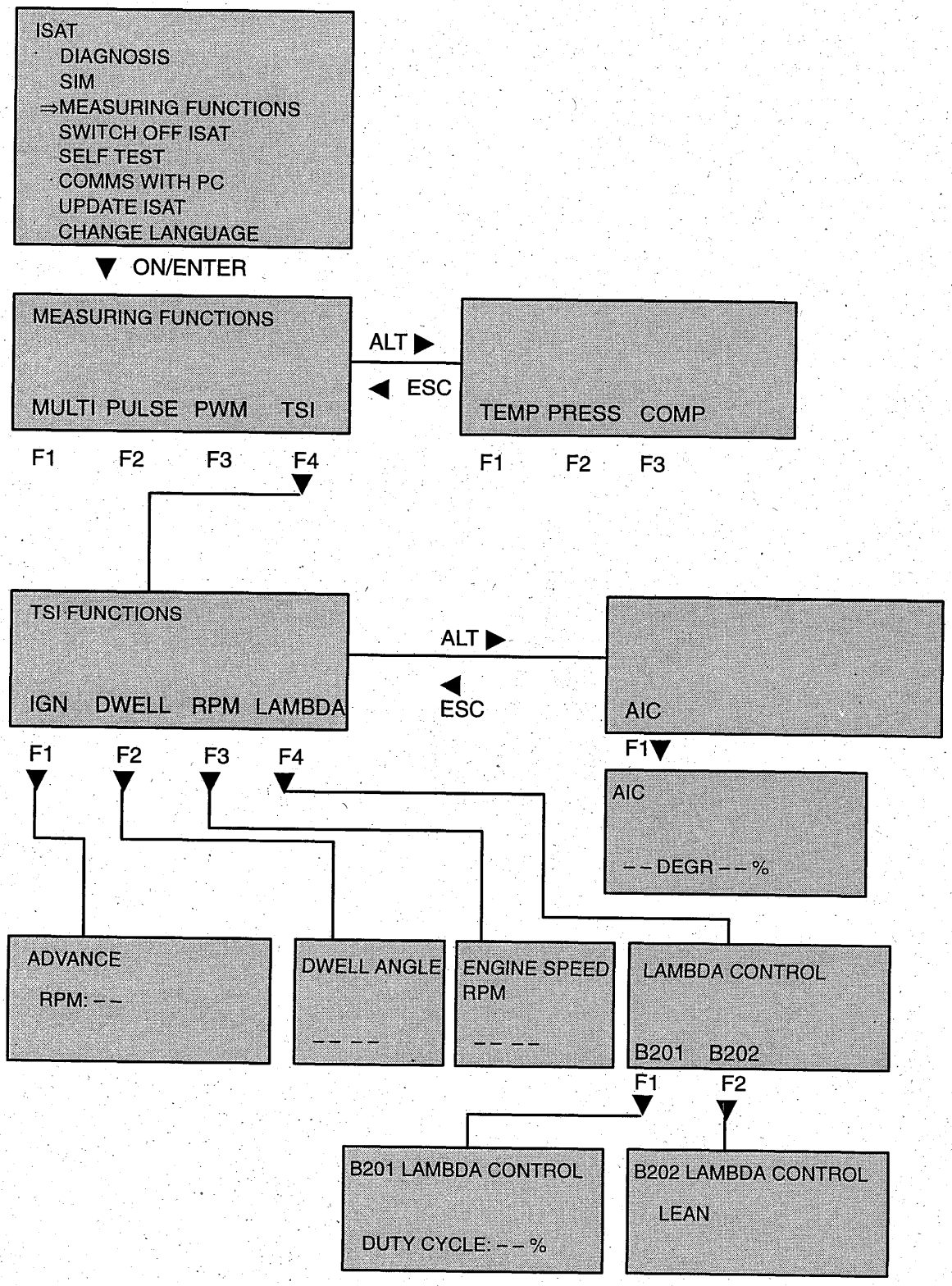
Connect the TSI module as follows:

1 Place the TSI module on the underside of the ISAT scan tool. Secure the module with the clips.

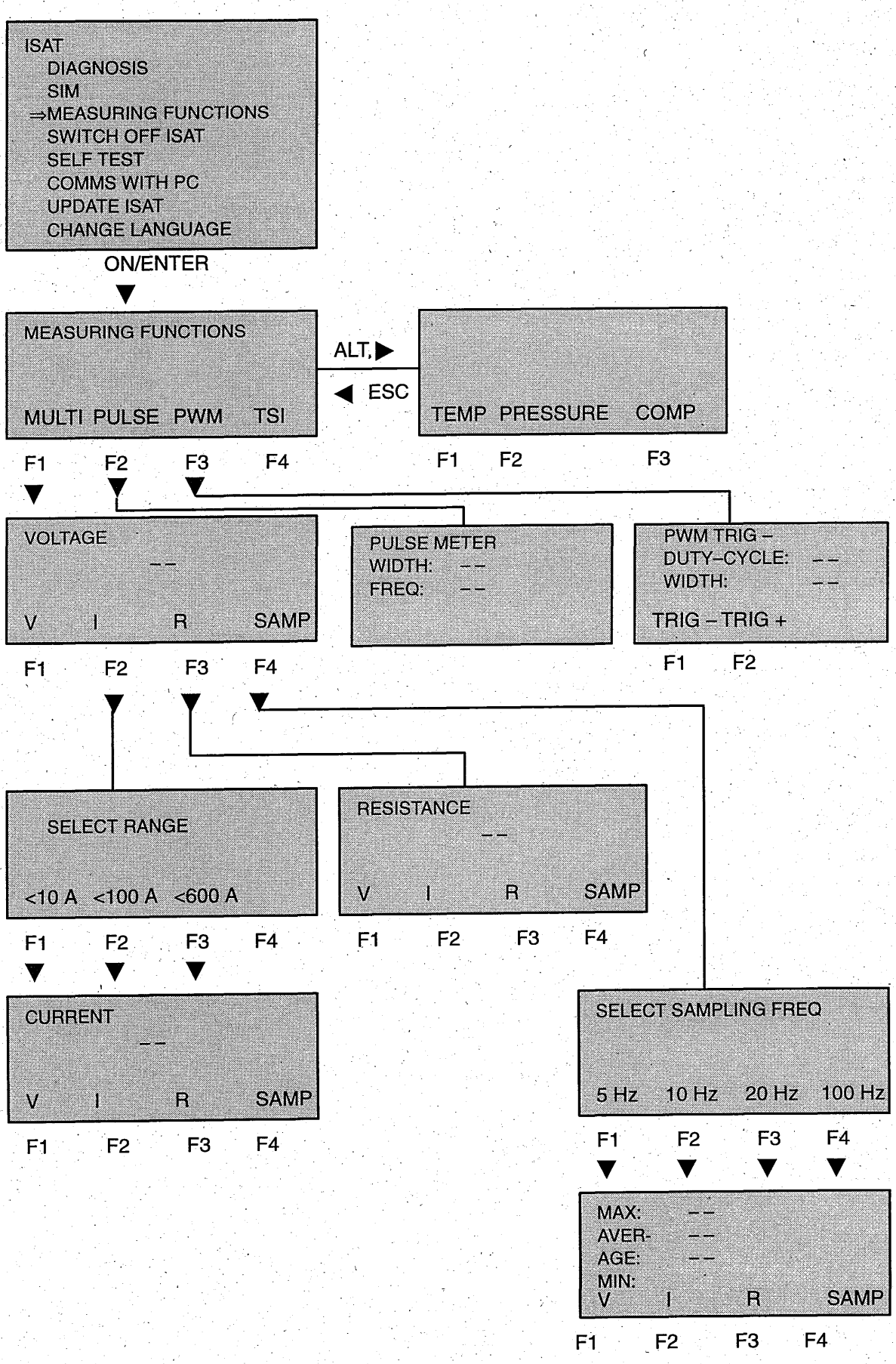
2 Connect the leads from the module to the ISAT scan tool's TSI connector and to the red and black connectors.

3 Then connect the TSI wiring between the car's TSI socket and the corresponding socket on the module. Connect the inductive clamp sensor and TDC sensor to the module's D–9 connector. The strobe lamp is connected to the third socket on the module.

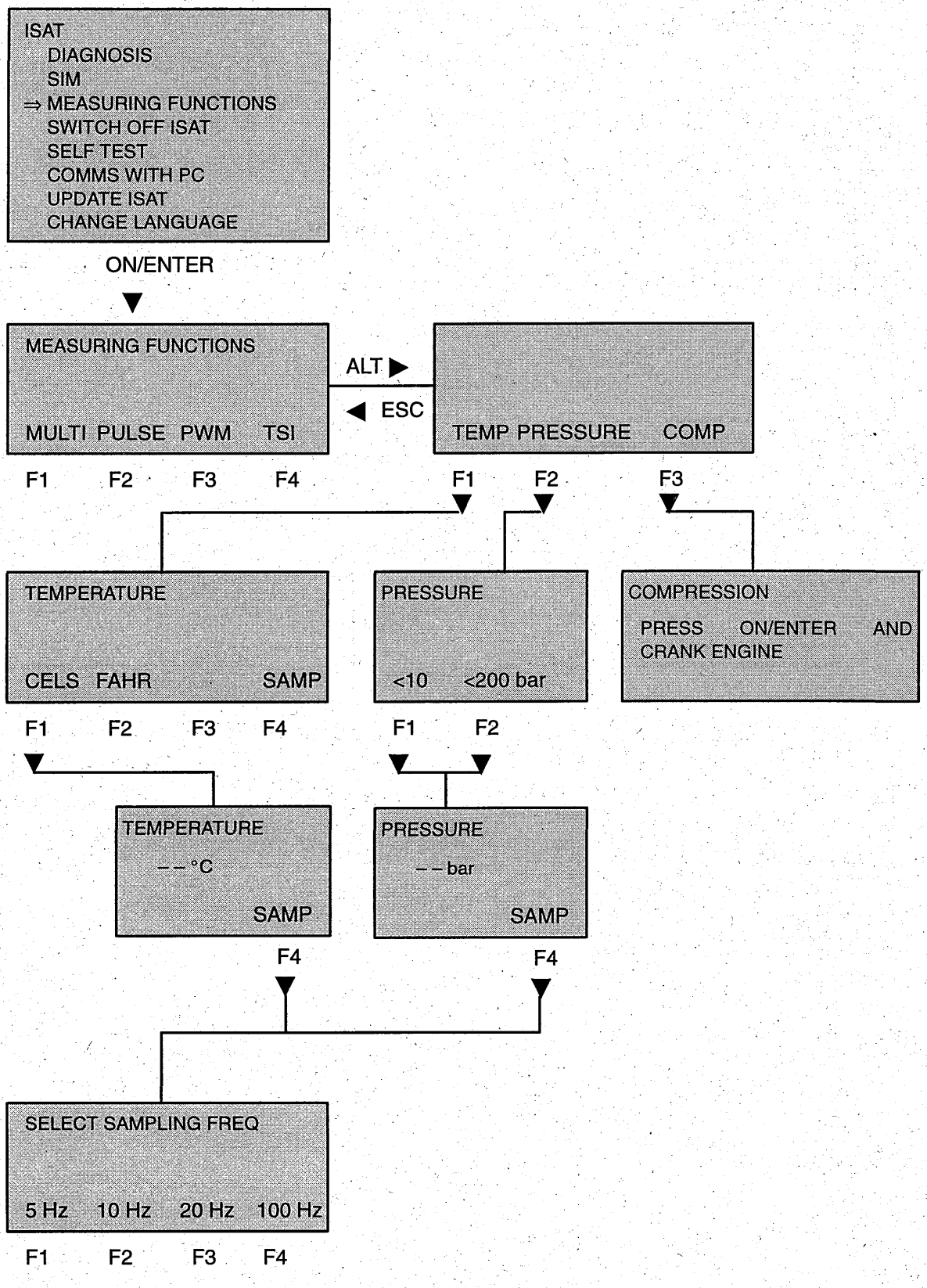
Reading TSI functions



Reading V, I, R, pulse and PWM



Reading temperature, pressure and compression



Menus, ISAT scan tool – SIM

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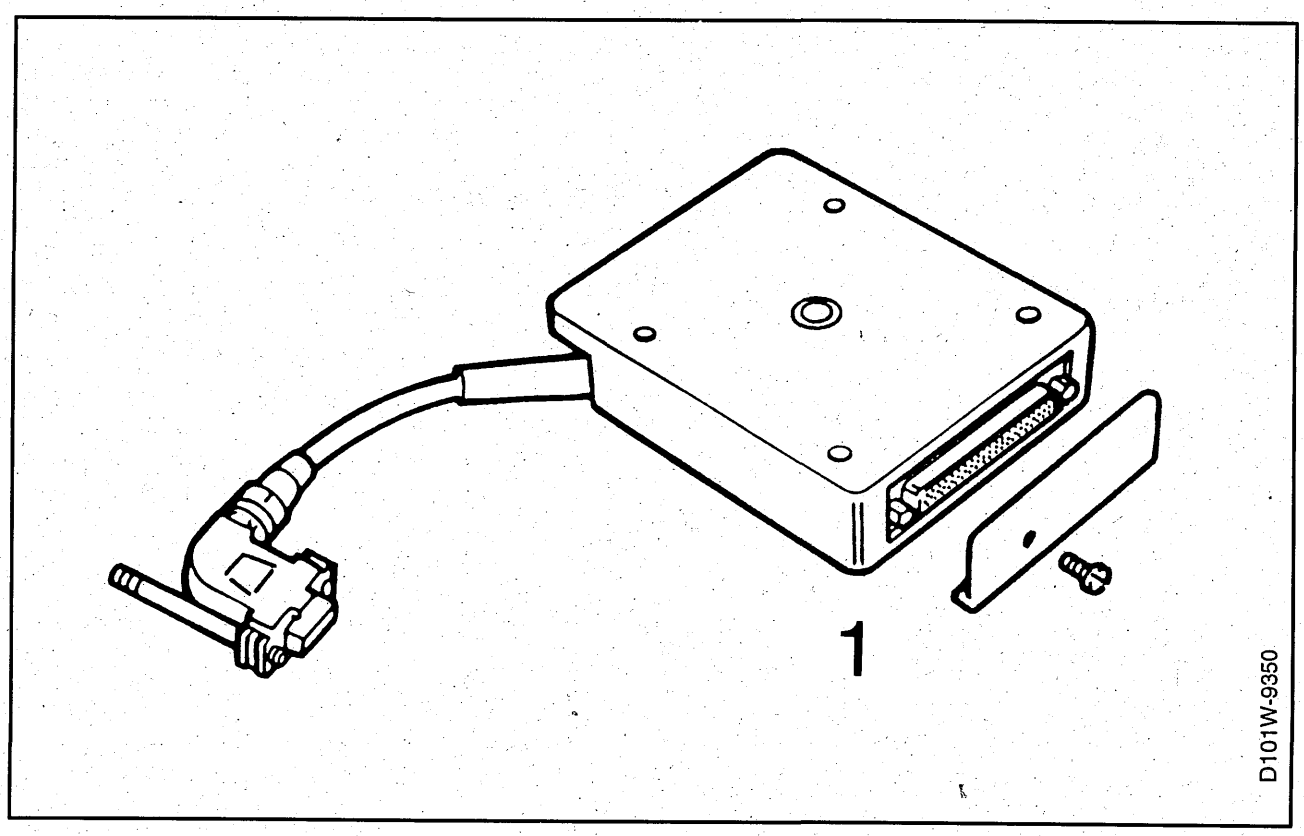
SIM module



1 SIM module

SIM module

The SIM module has the following main functions:

Automatic test

Reads the control module pins in logical order according to a predetermined sequence. The sampling speed between the pins is less than 10 milliseconds.

Manual test

Identical to the automatic test but with manual control which makes it possible to take a continuous reading from any individual pin.

BOB test method

Reads any three ECM pins at the same time or three different units on the same pin; voltage, frequency or pulse time/pulse ratio.

Test while driving

Automatic test of the control module pins while driving in order to detect intermittent faults. The test runs continuously until a fault is detected.

Active test on grounding points

A quick automatic function for testing grounding points in relation to battery negative. The SIM loads the particular grounding point with about 1–2 amperes.

System readings

Continuously measures four pre–programmed parameters. These parameters are selected by the mechanic before each test.

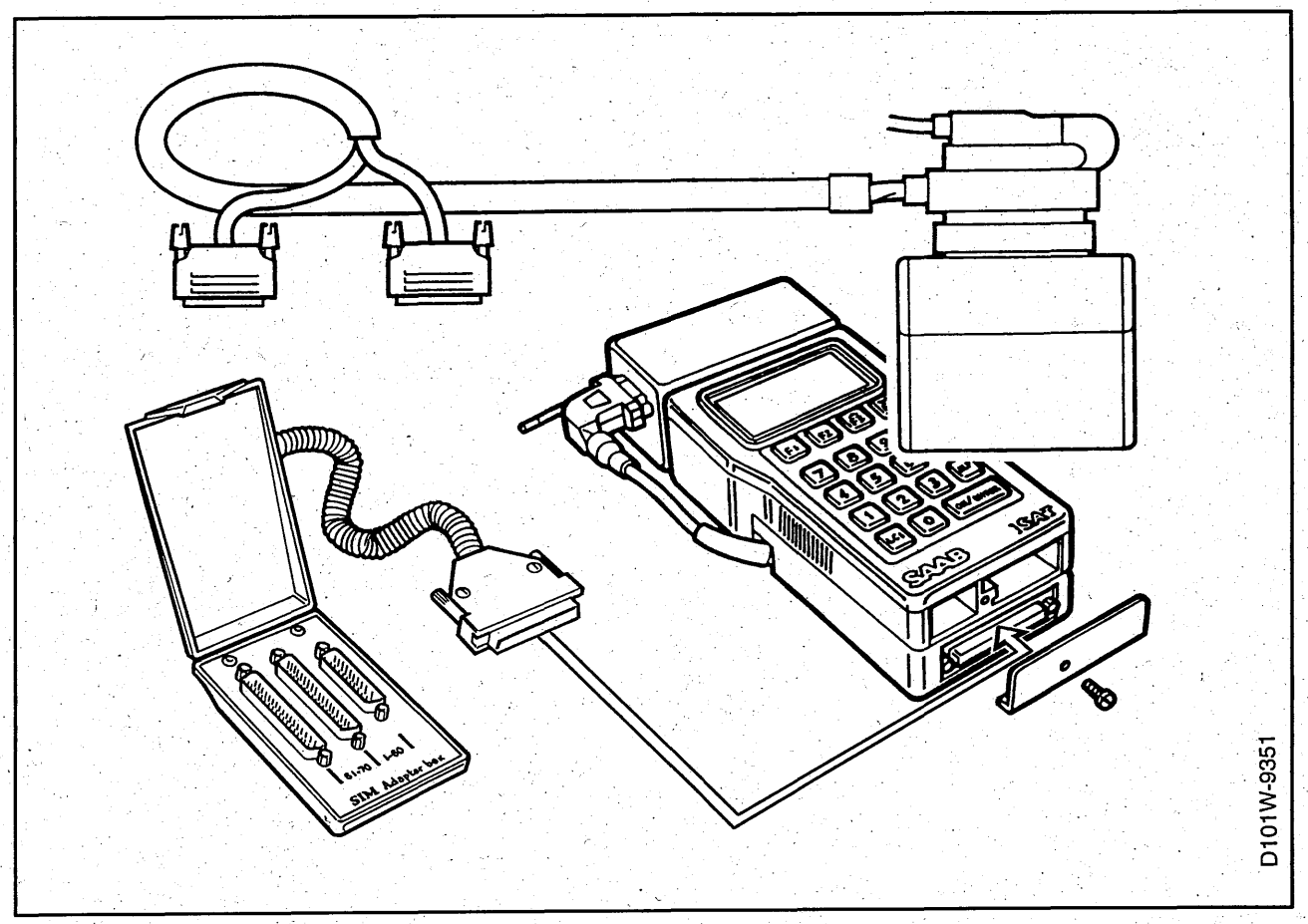
Multimeter feature

A complete multimeter feature is included in the software with a calibration feature for accuracy comparable to commercially available multimeters.

Printout feature

Ability to print from a printer.

Connection, SIM



In order to use the SIM and its features, connect as follows:

Connection to the car's control module with the appropriate BOB lead is required. The BOB lead acts as a link between the car's wiring harness and the control module's connector. This allows all control module inputs and outputs to be read.

1 Place the SIM module on the underside of the ISAT scan tool. Secure the module using the plate.

2 Connect the SIM module connector (9 pin D sub) to the SDA II connector for communication.

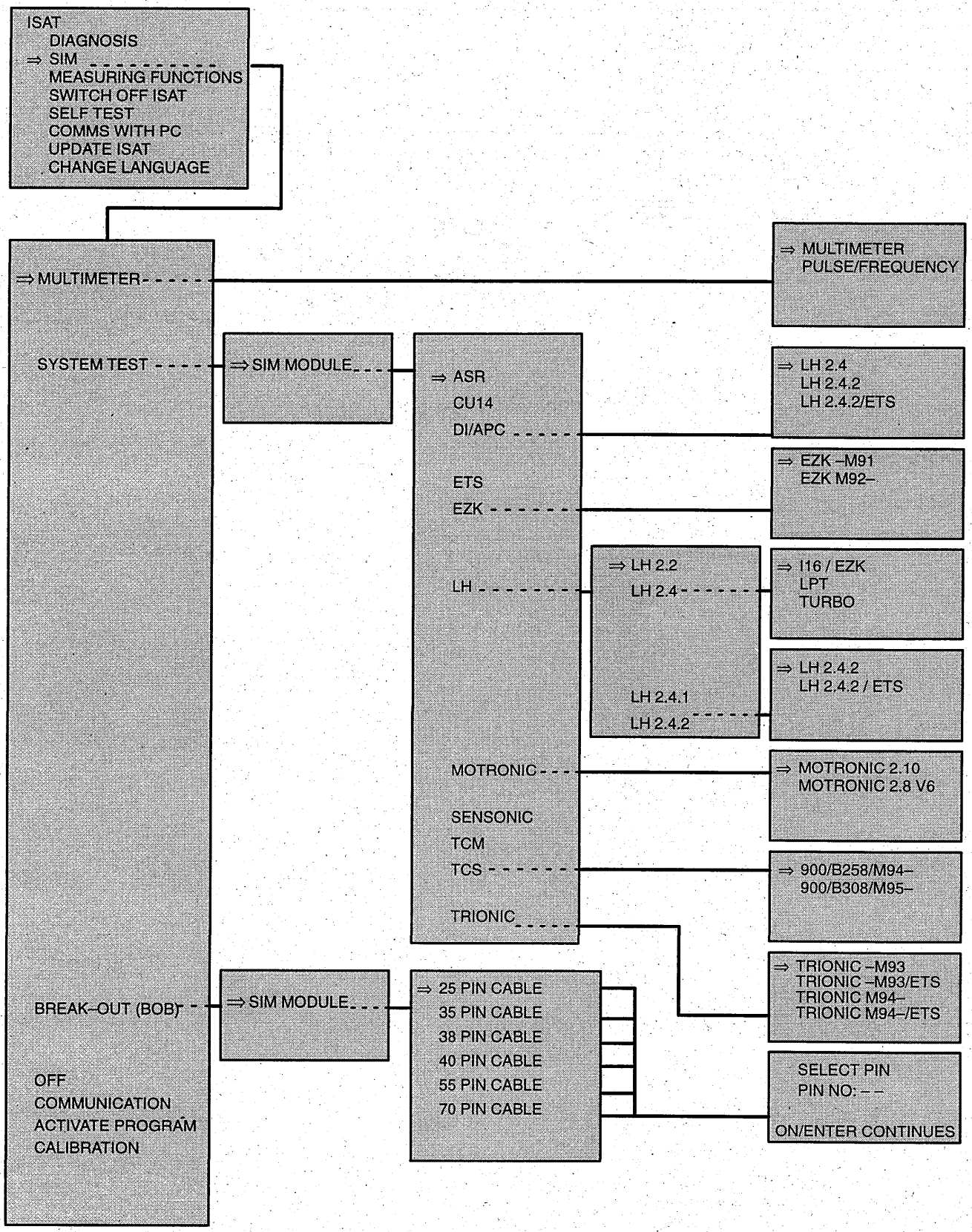
3 Connect the SIM adapter cable to the SIM module.

4 Connect the appropriate test cable (BOB cable) to the chosen control module.

5 Connect the test cable (BOB cable) to the SIM adapter (25 pin and 37 pin D sub).

6 Power the ISAT–SIM by connecting the particular data link to the car's data link connector.

Menu overview

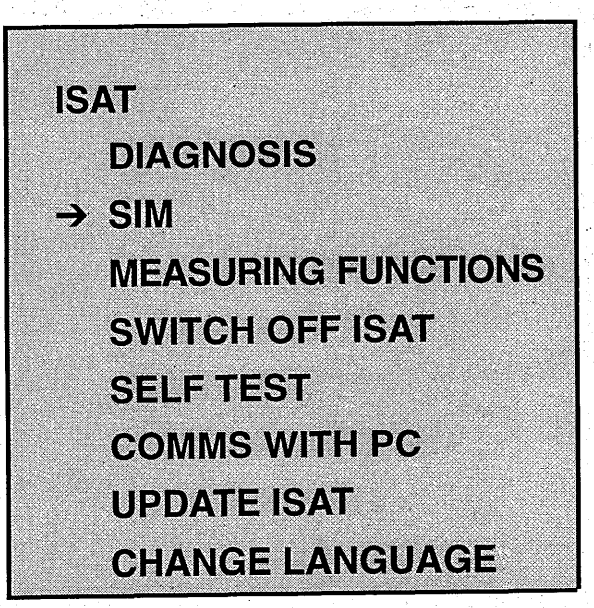


Activating the SIM

In order to use the features of the SIM, the SIM module must be connected to the ISAT scan tool. See page 27.

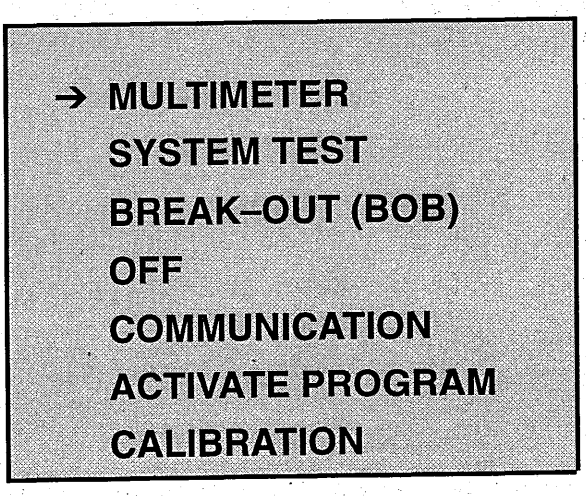
Select SIM from the main ISAT scan tool menu and press **ON/ENTER**

The message WAIT... is displayed for 5 seconds and the display then switches to the main SIM menu.



Main SIM menu

F3 and **F4** are used to browse in the menu.

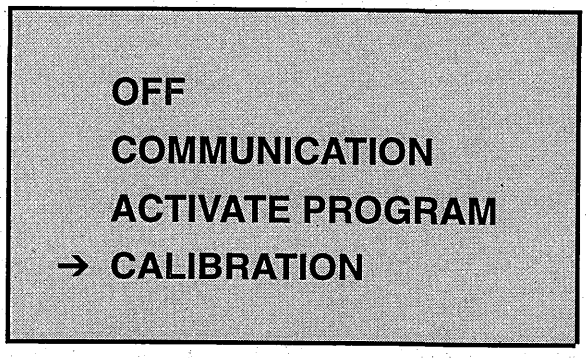


Calibration

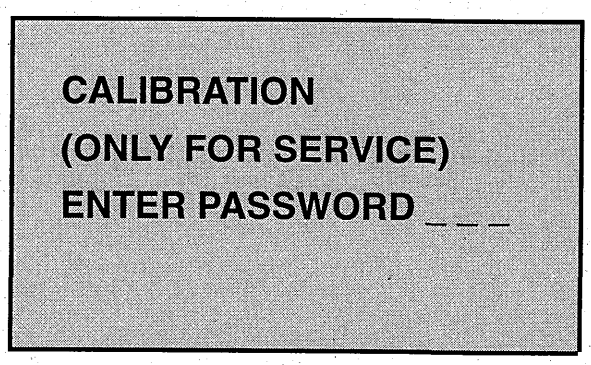
Important

Calibration must be carried out each time the memory module is changed.

Select CALIBRATION and press **ON/ENTER**.



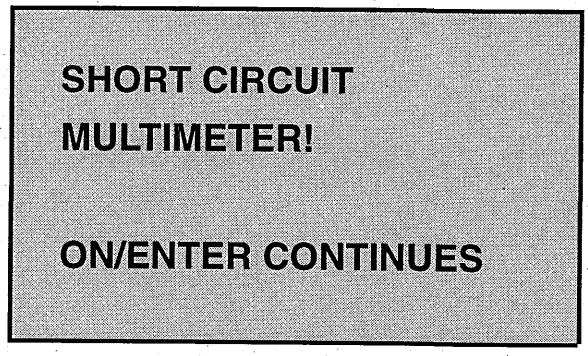
Enter the number 1, 6, 0 and press **ON/ENTER**.



In order to proceed, connect a bridge (short circuit) between the black and red banana sockets on the SDA II.

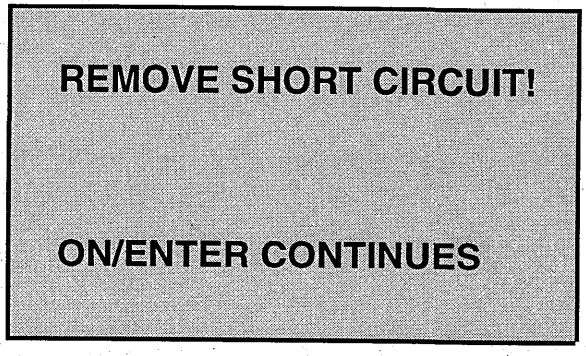
Press **ON/ENTER**.

The message WAIT... will be displayed for 5 seconds.



Wait until the display to the right is shown.

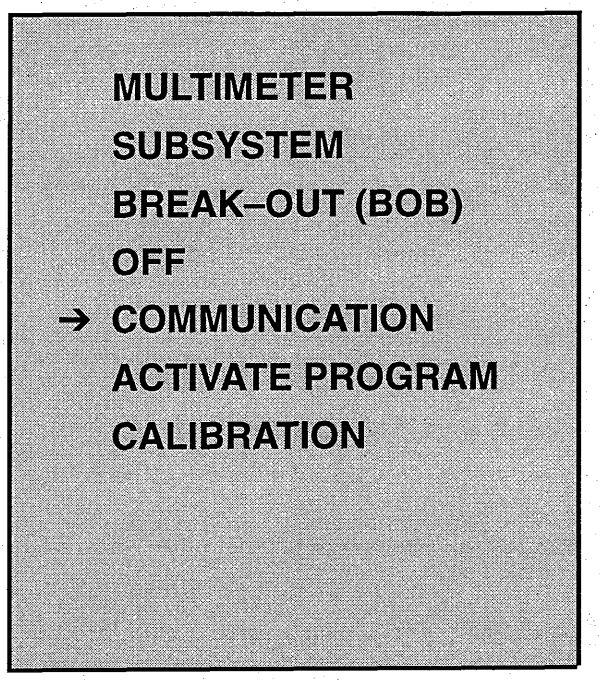
Calibration is now complete. All analogue reading features under the MULTIMETER and BOB menus are calibrated. Calibration is henceforth automatic when SIM is selected.



Communication

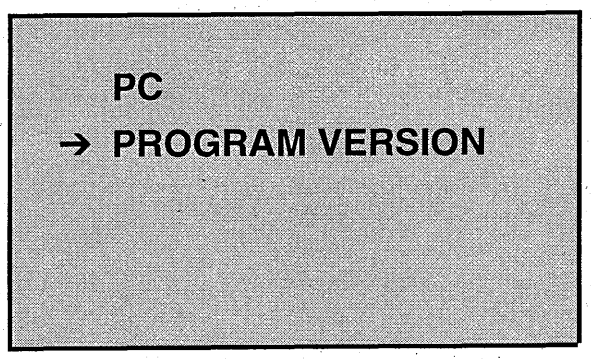
The communications part of the SIM confers the ability the transfer the test result to a PC and to show the status of the SIM.

Use **F3** and **F4** to browse in the main SIM menu.
Select COMMUNICATION and press **ON/ENTER**.

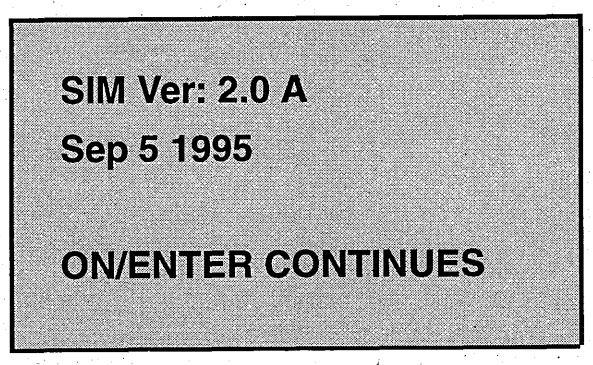


Selecting PC and pressing **ON/ENTER** starts downloading the test result to a PC.

Select PROGRAM VERSION and press **ON/ENTER**.



SIM status is displayed together with the version number of the software and its date.
The adjacent menu is one example.

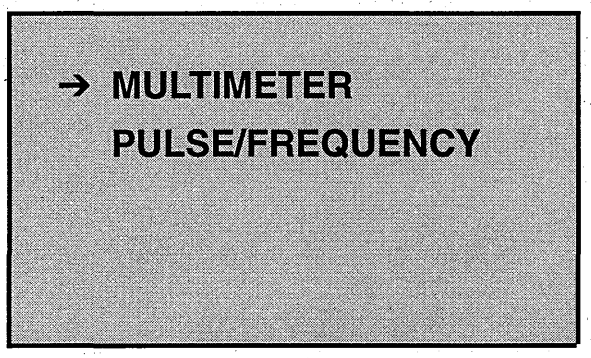


Multimeter

The multimeter feature is included in the SIM software, with a calibration feature which provides test accuracy comparable to commercially available multimeters. The following is a list of the available features.

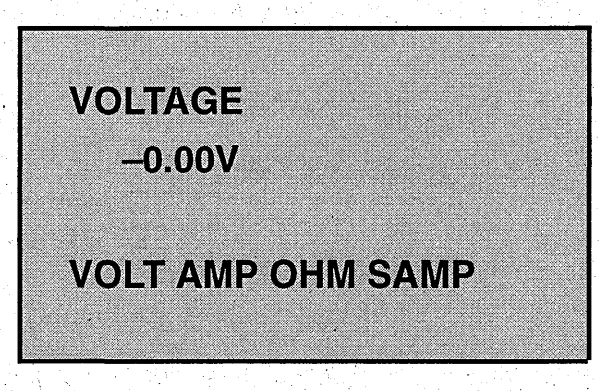
Select multimeter from the main menu and press **ON/ENTER**.

Select multimeter from this menu too and press **ON/ENTER**.



The SIM measures voltage using the red and the black cables connected to the SDA II module.

Example: Press **F2** to measure current.



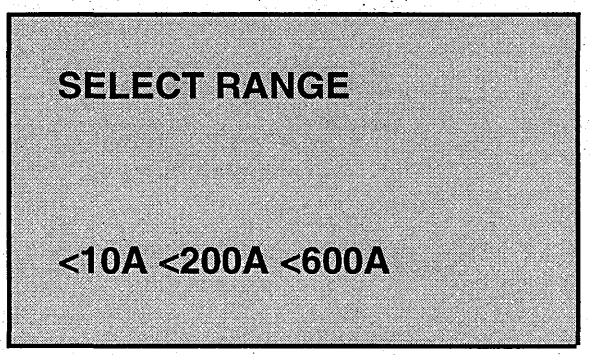
Select the appropriate range by pressing:

F1 (<10) = 0 – 10 amperes

F2 (<200) = 10 – 200 amperes

F3 (<600) = 200 – 600 amperes

Use the red and the black connectors on the SDA II module.



Important

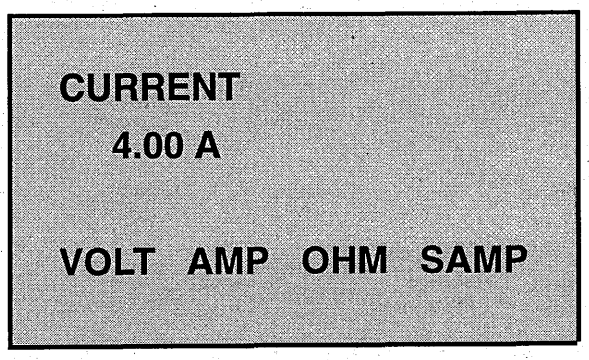
Use only lead 86 10 719 in order to prevent damage to the ISAT scan tool.

When measuring current above 10 amperes, current clamp 86 10 743 must be used.

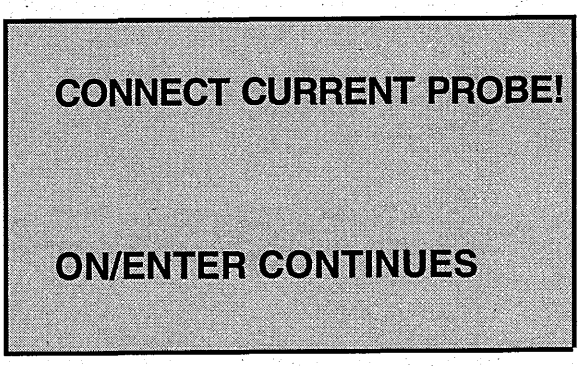
The ISAT scan tool is equipped with a 10 ampere fuse in the red socket on the SDA II.

Multimeter (contd.)

If the range <10A is selected, the display may appear as in the figure to the right.



If range <200A or <600A is selected, the display will appear as in the figure to the right.

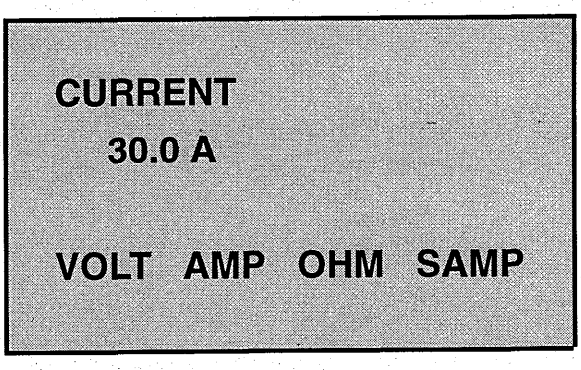


Important

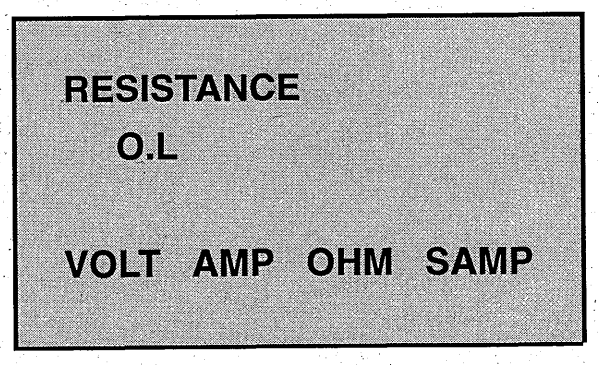
Current clamp 86 10 743 should be connected before **ON/ ENTER** is pressed in order to proceed.

Press **ON/ENTER** to proceed.

The display may appear as in the figure to the right. Resistance can be measured by pressing **F3**.

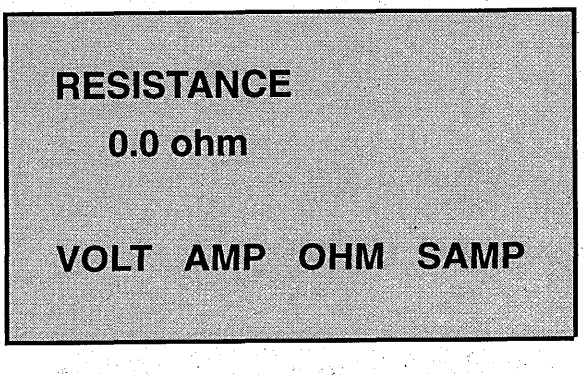


The resistance feature automatically selects range and the red and black socket on the SDA II module should therefore be used.



For a quick and simple test before taking a reading, short circuit the cables with each other and check whether a zero level is achieved.

If a zero level is not achieved, check that the fuse is intact and spray the contacts with Kontakt 61.



Multimeter (contd.)

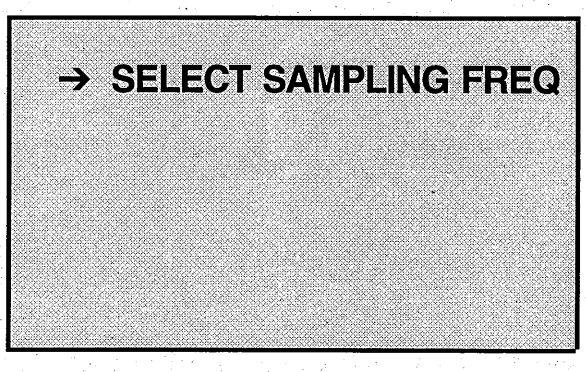
For all multimeter features; voltage, current and resistance, there is the capability of taking several readings over a certain time period (sampling). This method of taking readings can provide more reliable readings and can detect interference from external sources.

When sampling, the quantity being measured (voltage, current or resistance) is first selected.

Press the function key for sampling.

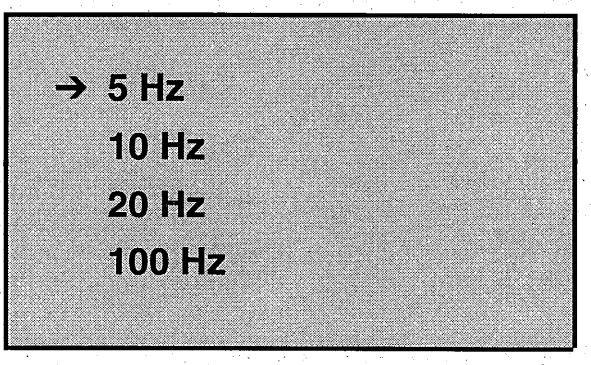
Then select SELECT SAMPLING FREQ

Press **ON/ENTER**.



Then select the sampling frequency you consider appropriate.

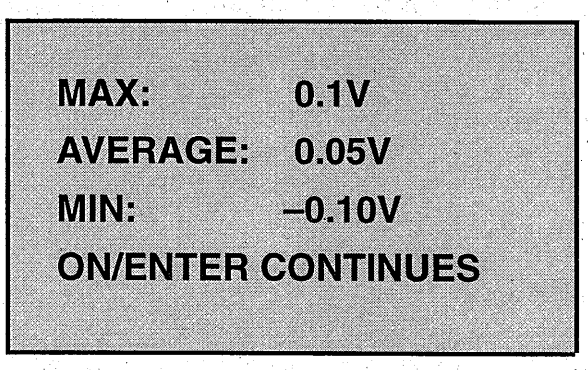
Press **ON/ENTER**.



Test measurement can be stopped by pressing **ESC**. If this is not done, the result is automatically displayed when reading is complete. The time to take readings depends on the sampling range selected and can vary between 10 and 200 seconds.

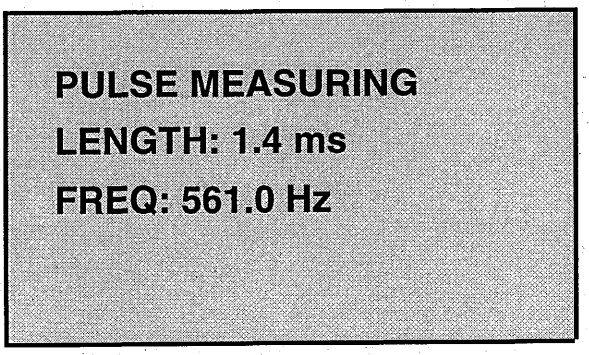
After readings are complete, the display is as in the example to the right.

Press **ESC** to access the multimeter menu.



Multimeter (contd.)

Select Pulse/frequency and press **ON/ENTER**.
The figure to the right shows a display example.



In order to measure pulse width and frequency, cables 86 10 719 should be connected to the SDA II.

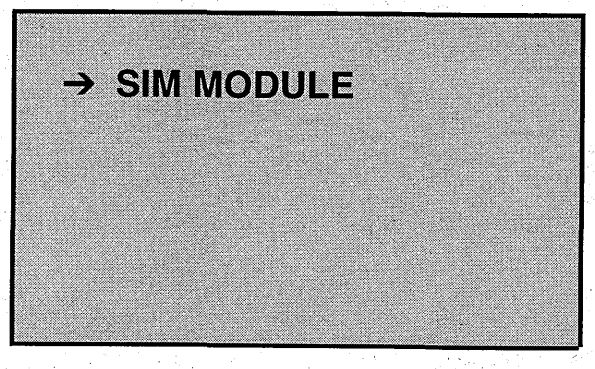
Press **ESC** to get back to the multimeter menu.
Press **ESC** to get to the main menu.

System test

The system test is the main SIM function.
All electronic engine and gearbox systems up to M95 are under the System test menu.

Select SYSTEM TEST from the SIM main menu and press **ON/ENTER**.

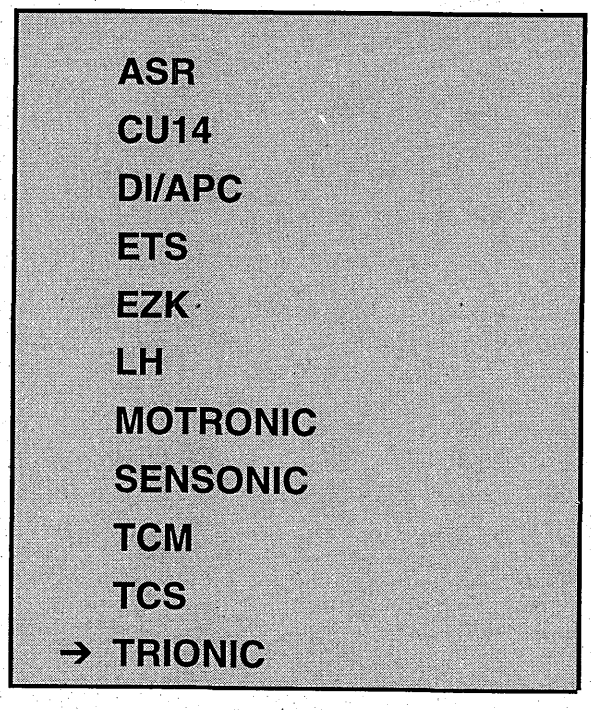
Press **ON/ENTER**.



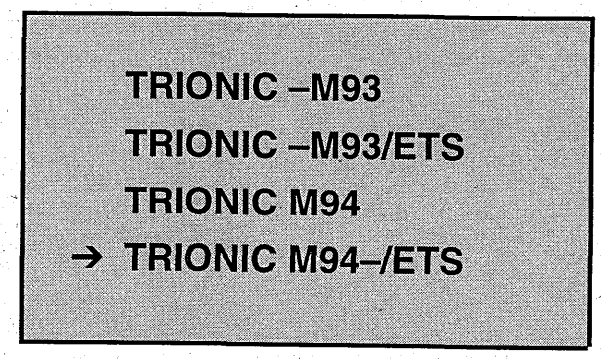
Select the system to be tested.

Example

Select Trionic and press **ON/ENTER**.



Select Trionic M94–/ETS and press **ON/ENTER**.



System test (contd.)

This is the SYSTEM TEST menu.

Use **F3** and **F4** to browse in the menu.

The menu alternatives below require that one of the test modes is carried out. If this is not the case, the following message is displayed/sent:
No test in memory!

DISP. TEST RESULTS: Displays the result.

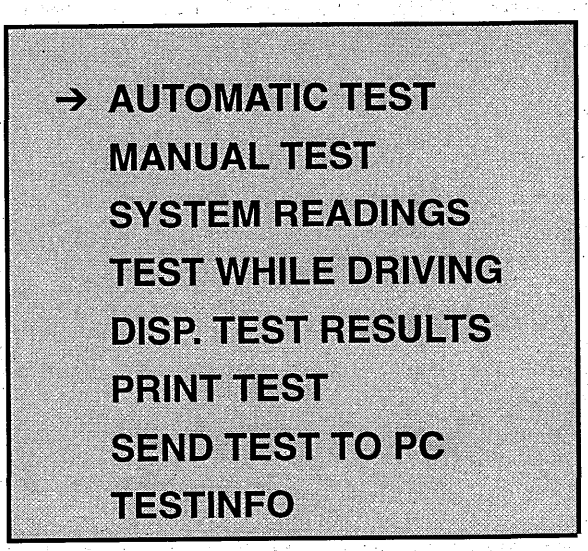
PRINT TEST: All or only faulty readings are downloaded to the printer.

SEND TEST TO PC: All test readings are sent to the PC.

TESTINFO: Selected systems will be displayed.

Other menu selections are given in the list of contents.

Select the required test version and press **ON/ENTER** to proceed. The appropriate Service Manual takes over at this point.



Automatic test

The automatic test is used to quickly check the functions of a control system. The control module inputs and outputs are automatically read.

Active pins are checked in a predetermined sequence. While the readings are being taken, questions will be asked and information will be shown on the display. For example "Ignition on!", "Manual gearbox?". Answer the questions and execute the commands.

Use **F1** to answer YES and **F2** to answer NO.

When the ISAT scan tool is taking readings, the display will show "WAIT...". If the readings are outside the range, the result is presented, the ISAT scan tool starts to bleep, the reading flashes and the message "ALARM" is displayed. For more details, see page 40. If no command is given within 20 seconds, the ISAT scan tool will bleep again. Press **F1** to proceed.

Note

All measured parameters require that the engine has reached its operating temperature.

If tests are carried out before the engine has reached its normal operating temperature, some systems such as the oxygen sensors and EVAP canister may not be active. This causes the readings to be interrupted until the particular system becomes active.

If the car is equipped with an alarm, this can influence the readings, especially is the alarm is self–arming. If this is the case, the alarm should be switched off or disconnected.

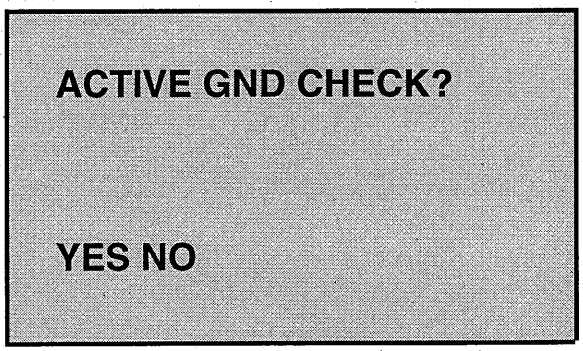
Automatic test (contd.)

Example

The following procedure is one example of how an automatic test may look. The test varies according to the system selected.

Important

When an active ground test is being carried out, the ISAT scan tool allows about 2 amperes to flow through the relevant grounding points in order to detect loss of power or resistances which are too high.



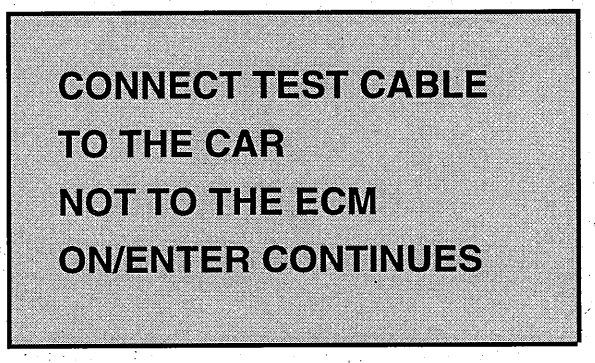
Press **F1** for **yes** and the display shows the following:

Press **F2** for **no** if the test is not to be carried out.

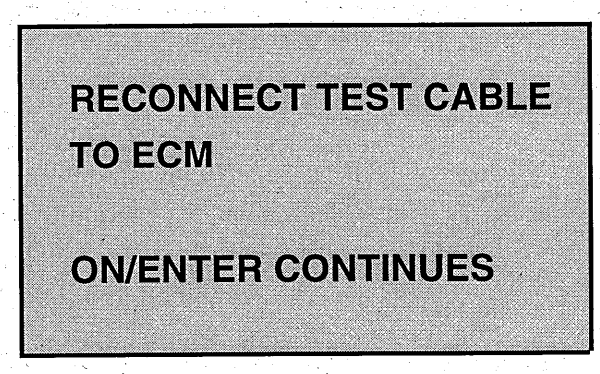
The BOB wiring should be connected to the car's wiring harness but **not** to the ECM. This is to prevent damage during the active grounding point test.

When the BOB wiring is connected to the car but **not** to the ECM, press **ON/ENTER** and the active ground test takes about 2 seconds.

The ISAT scan tool provides a warning if the reading does not comply with the specification for the particular model of car.

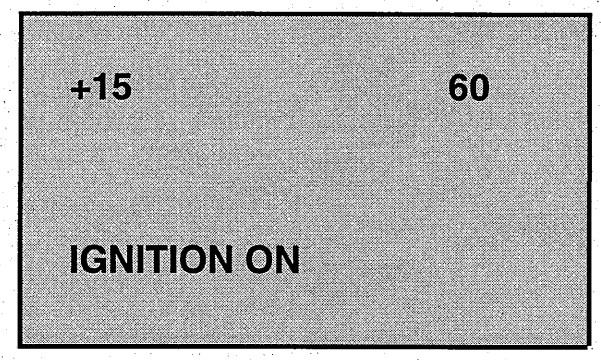


Connect the BOB wiring to the ECM and press **ON/ENTER** and the automatic test continues.



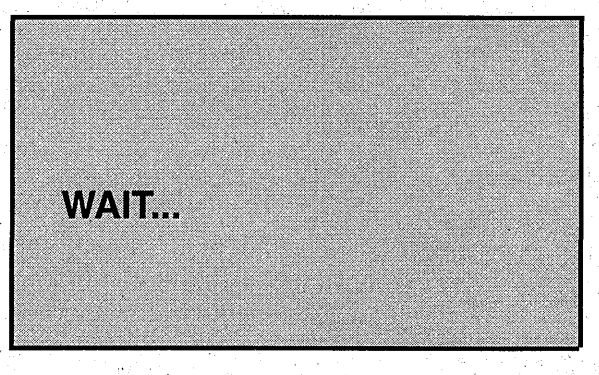
Automatic test (contd.)

A command on the display may appear as in the adjacent figure. When the ignition is set to ON, the automatic test continues.

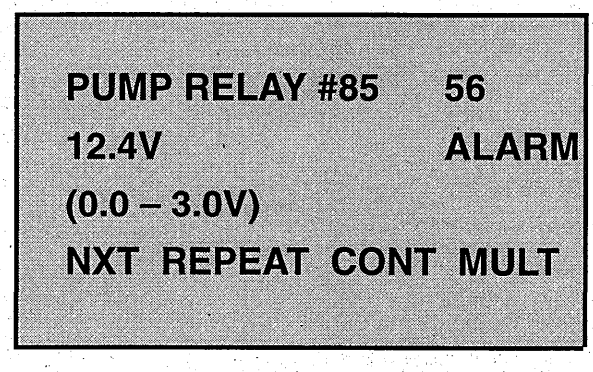


The display shows the message "WAIT" while readings are being taken.

If you wish to end the test, press **ESC** and confirm by pressing **F1** for yes.



The test is carried out automatically. If any reading is outside the nominal limits, the test is interrupted and the following example may be shown on the display.



The first line shows what it is in the car which is being measured and which control module pin numbers the component has. In this case, 56.

The second line shows the actual reading. The reading flashes if it is outside the ISAT scan tool nominal limits and the message "ALARM" is displayed.

The third line shows what nominal limits apply.

The fourth line presents the following choice:

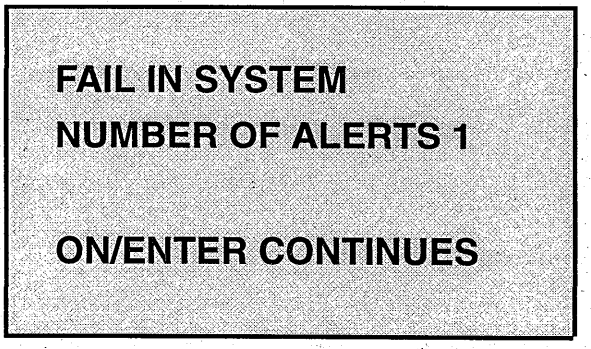
NXT – continues test or jumps to the next pin during the manual test.

REPEAT – repeats the pin test.

CONT – gives continuous reading on the selected pin and shows lowest and highest readings as well as current reading.

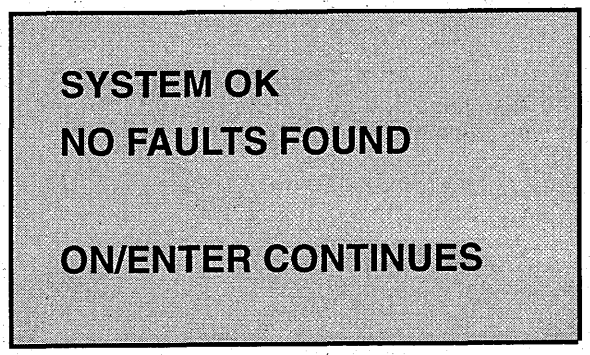
MULT –allows access to the multimeter and BOB functions.

If any of the readings is outside the range, the number of faults is shown. Press **ON/ENTER** to proceed.

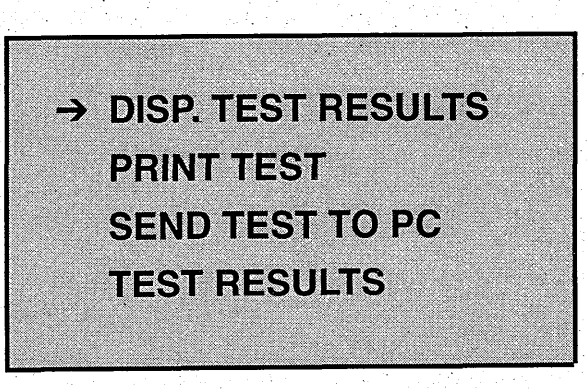


Automatic test (contd.)

When the test is completed and the system has been demonstrated to be free of faults, this is shown on the display. Press **ON/ENTER** to proceed.



Select DISP. TEST RESULTS.
Press **ON/ENTER.**

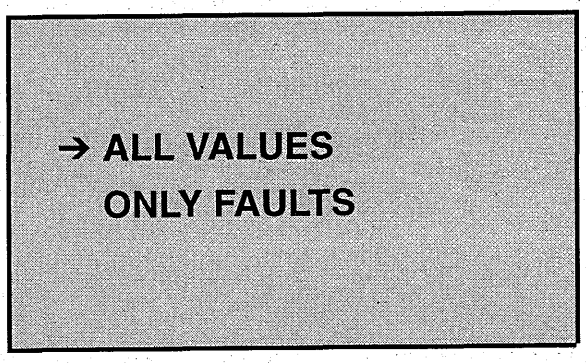


If there are readings stored, the following is displayed:

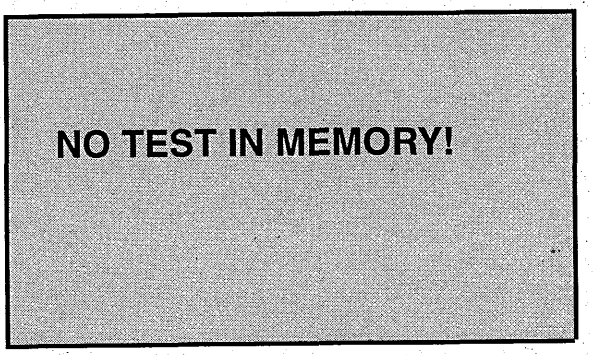
ALL VALUES – retrieves readings from each pin.

ONLY FAULTS – shows only the readings outside nominal limits.

Press **ON/ENTER** to view stored readings. When all faults have been displayed, the number of faults is also shown. The ISAT scan tool then automatically returns to the system menu.



If there are no readings, the message below is displayed for about 5 seconds, after which the system menu is displayed.



Manual test

The manual test follows the same procedure as the automatic one but shows all readings during the reading sequence. As with the automatic test, questions are displayed which require a response.

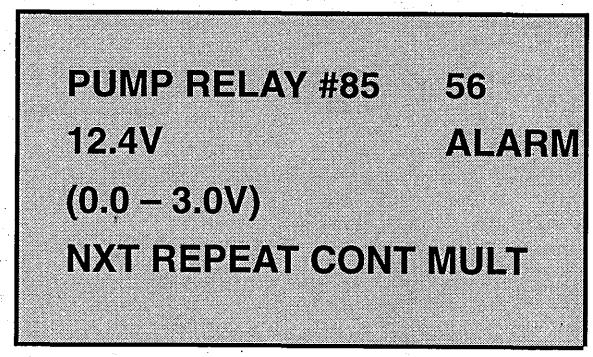
Unlike the automatic test, **F1** must be pressed after each reading has been displayed in order for the test to continue.

If there is any confusion about the current reading, repeat the measurement by pressing **F2** for REP.

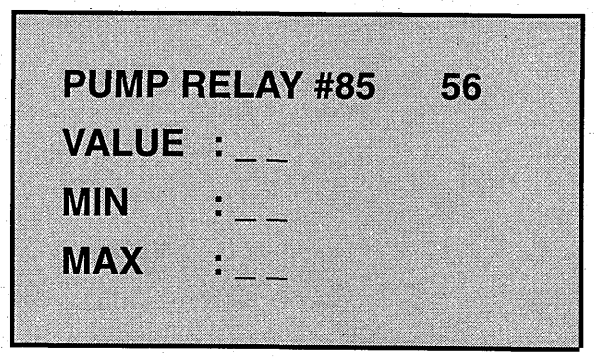
CONT – the unit being measured is continuously displayed as well as highest, lowest and current readings. See the display to the right below.

MULT – normal multimeter function activated.

For a more detailed explanation of the adjacent display, see page 40.



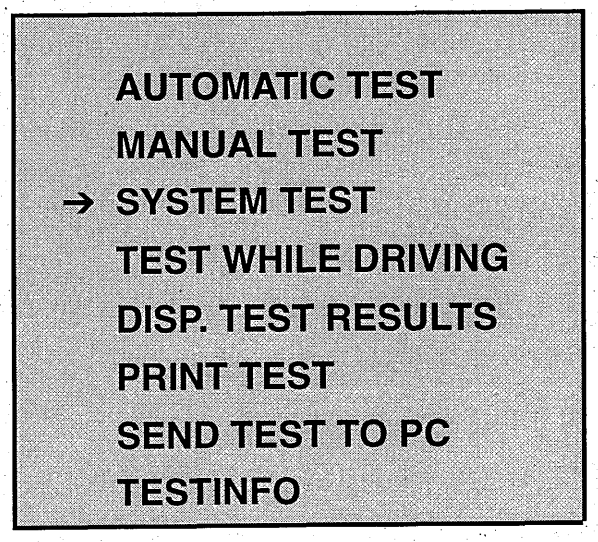
Continuous display of e.g. pump relay. Highest, lowest and current readings are displayed.



System readings

System readings contains a predetermined test program to facilitate fault diagnosis on the car. Testing includes engine speed, mass air flow signal, engine coolant temperature and oxygen sensor signal.

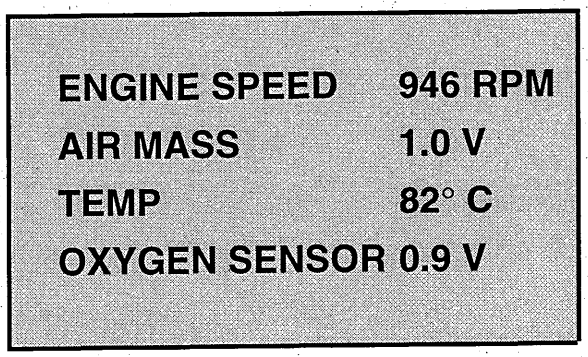
- Select SYSTEM TEST from the system test menu and press **ON/ENTER**.



Start the engine and read the test values.

The program is predetermined and cannot be modified.

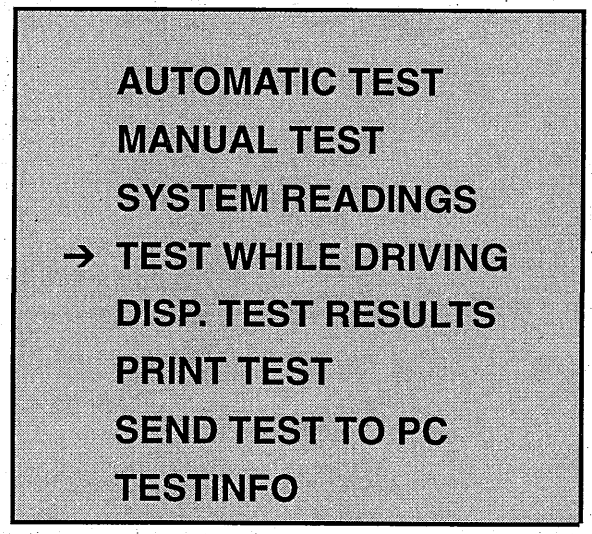
Press **ESC** to return to the system menu.



Test while driving

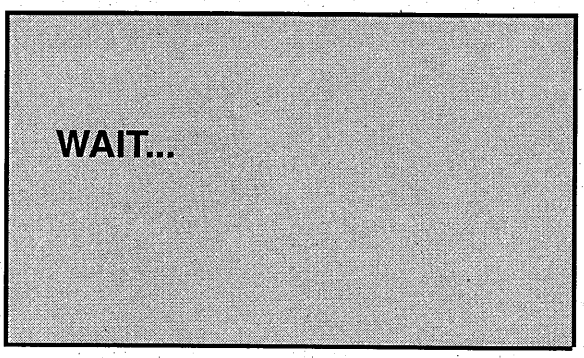
Automatic continuous test of ECM pins during the test drive in order to detect intermittent faults.

Select TEST WHILE DRIVING
Press **ON/ENTER**.



Execute the commands shown on the display.
Start the engine.

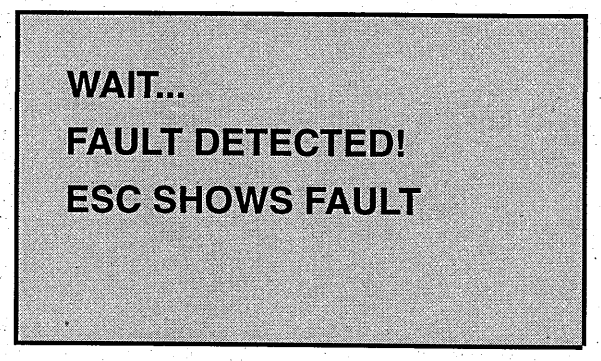
The display continues to show WAIT until a reading exceeds the nominal limits.



When a fault arises, a message is displayed. Press **ESC** in order to find out what is wrong.

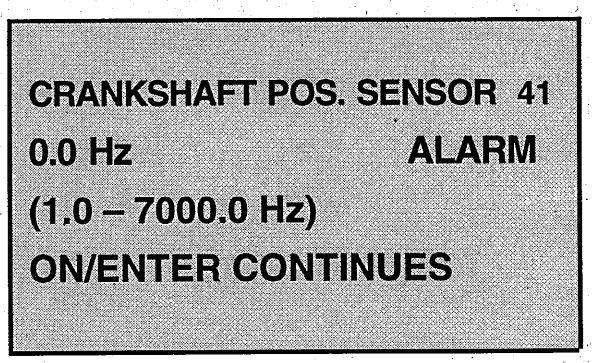
Note

The engine must be running. If this is not the case, **ESC** means return to subsystem menu.



Test while driving (contd.)

Component name, reading and nominal limits are shown on the display which in this example is for the crankshaft position sensor.



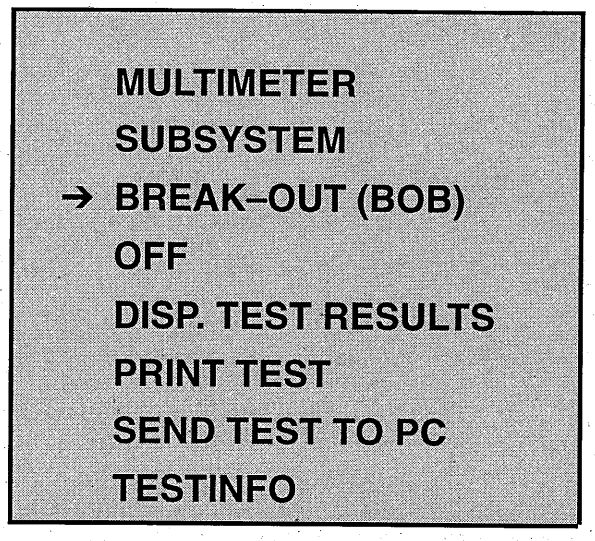
Press **ON/ENTER** to return to the subsystem menu.

When a fault arises, a primary fault, the Test while driving stops. Rectify the fault in order for the Test while driving to continue a search for more faults.

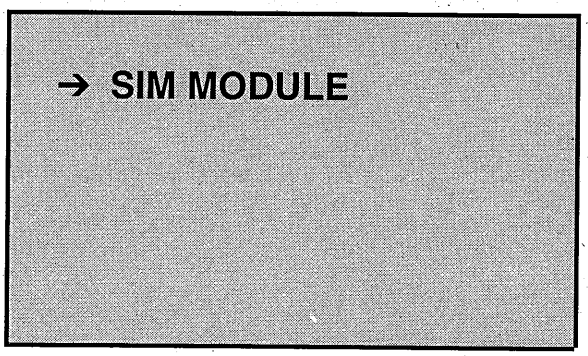
BOB test

Testing using a breakout box makes it possible to test systems where neither of the alternatives for manual or automatic testing is programmed. For test readings, refer to the readings and control module connections section of the appropriate service manual.

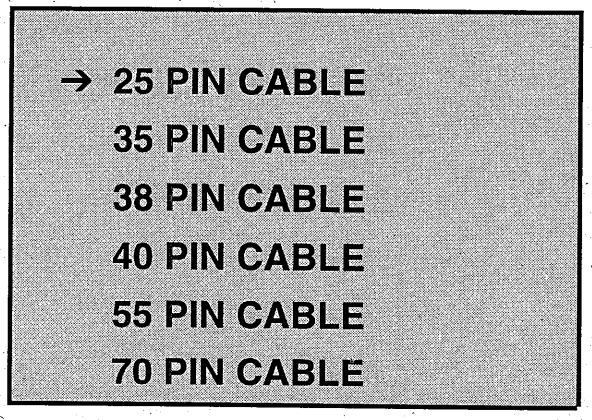
Select BREAK–OUT (BOB).
Press **ON/ENTER**.



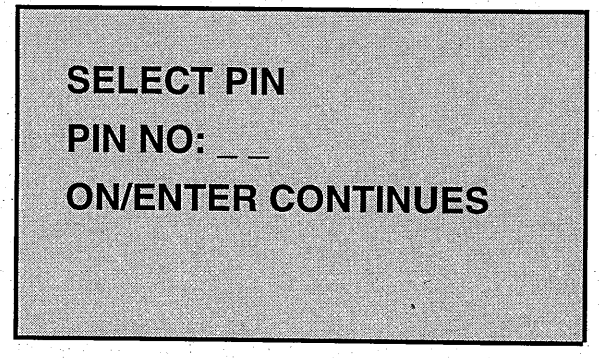
Press **ON/ENTER**.



Check the number of pins on the ECM in order to determine which wiring should be used.
Use **F3** and **F4** to browse in the menu.
Choose the wiring and press **ON/ENTER**.



It is now possible to select the pin to be tested. Enter the number and press **ON/ENTER**.

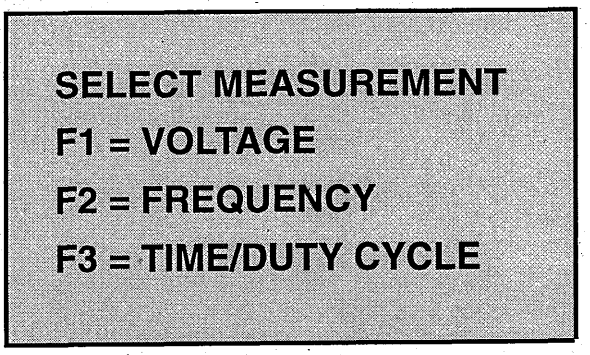


BOB test (contd.)

Select the correct units and press the appropriate function key.

Example

Select VOLTAGE and press **F1**.

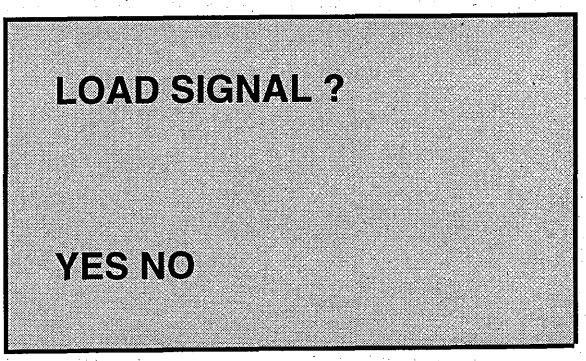


You will be asked whether the selected pin can take a load. The following components must not be subjected to a load: Oxygen sensors, mass air flow sensor and MAP sensor.

These components may be damaged or produce an incorrect reading.

Engine operation may be affected.

Press **F1** for yes.



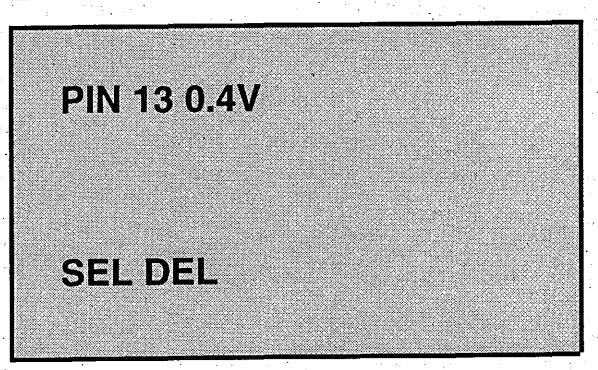
Note

In this of test, the ISAT scan tool allows a weak current to flow through the selected pin number.

F1 = SEL allows you to select a further two pins for simultaneous readings.

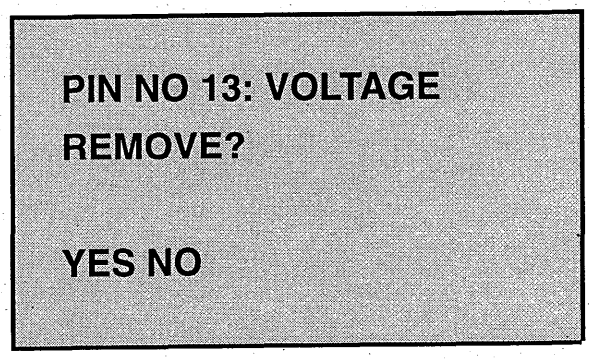
F2 = DEL excludes the selected pin from the test.

Press **F2** to exclude.



F1 = for Yes to exclude.

F2 = for No which saves.



Press **ESC** to get to the main menu.

Press **F4** to close down the system.

Readings, SIM

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Saab 900 V6, M94, TCM, aut. 102
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Saab 9000 2.3 turbo, M93. ETS, man. 109
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Saab 900i 2.1, M91, EZK–91 124

Saab 9000 2.0 turbo, M91, man., DI/APC

Parameter	Pin	Example	Limits	Basic requirement
Main ground	13	0.0 V	0.0–0.2 V	Active ground test
+30	22	12 V	8–15 V	"
Ground, knock sensor	30	0.0 V	0 – 0.2 V	ECM reconnected
Ground, crankshaft position	15	0.0 V	0 – 0.2 V	"
Ground, intake air temperature	17	0.0 V	0 – 0.2 V	"
+ 15	21	0.0 V	0 – 0.2 V	Ignition off
Main relay	35	0.0 V	0 – 0.2 V	"
Crankshaft position +5	6	0.8 V	0 – 0.2 V	"
+ 15	21	12 V	8 – 15 V	Ignition on
Main relay	35	12 V	8 – 15 V	"
Crankshaft position +5	6	12 V	8 – 15 V	"
Throttle position switch	8	0.0 V	0.0 – 2.0 V	Ignition on and wide open throttle
Throttle position switch	27	0.0 V	0.0 – 2.0 V	Ignition on and closed throttle
Trigg cyl.1	19	12 V	8 – 15 V	"
Trigg cyl.2	38	12 V	8 – 15 V	"
Trigg cyl.3	37	12 V	8 – 15 V	"
Trigg cyl.4	18	12 V	8 – 15 V	"
Brake light switch	32	12 V	8 – 15 V	Ignition on and depress brake pedal
Brake light switch	32	0.0 V	0.0 – 3.0 V	Ignition on and release brake pedal
Boost Pressure Control Valve, BPC	10	40.0 Hz	1 – 110 Hz	Ignition on
Boost Pressure Control Valve, BPC	33	3.30 Hz	1 – 110 Hz	"
Intake air temperature	14	2.31 V	0.1 – 4.0 V	Ignition on
Wheel speed	34	8.21 Hz	1 – 300 Hz	Ignition on, raise car and rotate front wheels *(Not LPT)*
Crankshaft position sensor	23	44.3 Hz	30 – 100 Hz	Engine running
Ground	13	0.0 V	0.0 – 0.2 V	"
Ground	30	0.0 V	0.0 – 0.2 V	"
Ground	15	0.0 V	0.0 – 0.2 V	"

Saab 9000 2.0 turbo, M91, man., DI/APC (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Ground, intake air temperature	17	0.0 V	0.0 – 0.2 V	Engine running
Ignition pulses	29	932 RPM	500–2000 RPM	"
Trigg cyl.1	19	7.59 Hz	5 – 20 Hz	"
Trigg cyl.1	19	0.34 ms	0.1 – 50 ms	"
Trigg cyl.2	38	7.34 Hz	5 – 20 Hz	"
Trigg cyl.2	38	0.33 ms	0.1 – 50 ms	"
Trigg cyl.3	37	7.64 Hz	5 – 20 Hz	"
Trigg cyl.3	37	0.34 ms	0.1 – 50 ms	"
Trigg cyl.4	18	7.52 Hz	5 – 20 Hz	"
Trigg cyl.4	18	0.37 ms	0.1 – 50 ms	"
Torque limitation	36	451 Hz	200 – 2000 Hz	"
Detect. cyl 1+2	5	32 Hz	10 – 100 Hz	"
Detect. cyl 3+4	25	32.9 Hz	10 – 100 Hz	"
Boost Pressure Control Valve, BPC	10	39.5 Hz	30 – 110 Hz	Vary engine speed
Boost Pressure Control Valve, BPC	10	8.16 ms	1 – 20 ms	"
Boost Pressure Control Valve, BPC	33	92.3 Hz	30 – 110 Hz	"
Boost Pressure Control Valve, BPC	33	1.64 ms	1 – 20 ms	"
Knock sensor	11	0.41 V	0.0 –5.0 V	"
Intake air temperature	14	2.14 V	0.1 – 4.0 V	Engine running
CHECK ENGINE (MIL)	7	12 V	8 –15 V	"
+15	21	0.0 V	0.0 – 2.0 V	Ignition off

Saab 9000i 2.3, M91, aut., ACC, DI

Parameter	Pin	Example	Limits	Basic requirement
Main ground	13	0.0 V	0.0 – 0.2 V	Active ground test
+30	22	12 V	8 – 15 V	"
Ground	30	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground	15	0.0 V	0.0 – 0.2 V	"
+ 15	21	0.0 V	0.0 – 2.0 V	Ignition off
Main relay	23	0.0 V	0.0 – 2.0 V	"
Crankshaft position +5	6	0.8 V	0.0 – 2.0 V	"
+ 15	21	12 V	8 – 15 V	Ignition on
Main relay	35	12 V	8 – 15 V	"
Crankshaft position +5	6	12 V	8 – 15 V	"
Trigg cyl.1	19	12 V	8 – 15 V	"
Trigg cyl.2	38	12 V	8 – 15 V	"
Trigg cyl.3	37	12 V	8 – 15 V	"
Trigg cyl.4	18	12 V	8 – 15 V	"
Throttle position signal	31	97.6 Hz	90 – 110 Hz	"
Throttle position signal	31	3.47 ms	1 –4 ms	Ignition on and wide open throttle
Throttle position signal	31	9.66 ms	5 – 10 ms	Ignition on and closed throttle
Crankshaft position +5	23	32 Hz	30 – 100 Hz	Engine running
Main ground	13	0.0 V	0.0 – 0.2 V	"
Ground	30	0.0 V	0.0 – 0.2 V	"
Ground	15	0.0 V	0.0 – 0.2 V	"
Ignition pulses	29	1300RPM	500–2000 RPM	"
Trigg cyl.1	19	15 Hz	5 – 20 Hz	Engine running
Trigg cyl.1	19	32.5 ms	5 – 50 ms	"
Trigg cyl.2	38	15 Hz	5 – 20 Hz	"
Trigg cyl.2	38	34.5 ms	5 – 50 ms	"
Trigg cyl.3	37	8 Hz	5 – 20 Hz	"
Trigg cyl.3	37	17.5 ms	5 – 50 ms	"
Trigg cyl.4	18	14.5 Hz	5 – 20 Hz	"
Trigg cyl.4	18	34.2 ms	5 – 50 Hms	"
Torque limitation	36	425 Hz	200–2000 Hz	"

Saab 9000i 2.3, M91, aut., ACC, DI (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Detect.cyl 1+2	5	55.5 Hz	10 – 100 Hz	Engine running
Detect.cyl 3+4	25	48.6 Hz	10 – 100 Hz	"
DI signal	26	14.3 Hz	5 – 400 Hz	"
Knock sensor	11	0.0 V	0.0 – 5.0 V	"
CHECK ENGINE (MIL)	7	12 V	8 – 15 V	"
+ 15	21	0.0 V	0.0 – 2.0 V	Ignition off

Saab 9000 2.3 turbo, M92, aut., TCS (ETS), DI/APC

Parameter	Pin	Example	Limits	Basic requirement
Main ground	13	0.0 V	0.0 – 0.2 V	Active ground test
+30	22	12 V	8 – 15 V	"
Ground, knock sensor	30	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, crankshaft position	15	0.0 V	0.0 – 0.2 V	"
Ground, intake air temperature	17	0.0 V	0.0 – 0.2 V	"
+ 15	21	0.0 V	0.0 – 2.0 V	Ignition off
Main relay	35	0.0 V	0.0 – 2.0 V	"
Crankshaft position +5	6	0.8 V	0.0 – 2.0 V	"
+ 15	21	12 V	8 – 15 V	Ignition on
Main relay	35	12 V	8 – 15 V	"
Crankshaft position +5	6	12 V	8 – 15 V	"
Trigg cyl.1	19	12 V	8 – 15 V	"
Trigg cyl.2	38	12 V	8 – 15 V	"
Trigg cyl.3	37	12 V	8 – 15 V	"
Trigg cyl.4	18	12 V	8 – 15 V	"
Brake light switch	32	12 V	8 – 15 V	Ignition on, depress brake pedal
Brake light switch	32	0.0 V	0.0 – 3.0 V	Ignition on, release brake pedal
Boost Pressure Control Valve, BPC	10	38.5 Hz	1 – 110 Hz	Ignition on
Boost Pressure Control Valve, BPC	33	3.42 Hz	1 – 110 Hz	"
Throttle position signal	31	99.5 Hz	90 – 110 Hz	"
Throttle position signal	31	2.99 ms	0.1 – 4 ms	Ignition on and wide open throttle
Throttle position signal	31	9.36 ms	5 – 10 ms	Ignition on and closed throttle
Intake air temperature	14	2.03	0.1 – 4.0 V	Ignition on
Wheel speed	34	4.90 Hz	1 – 300 Hz	Ignition on, raise car and rotate front wheels
Crankshaft position sensor	23	53 Hz	30 – 100 Hz	Engine running
Ground	13	0.0 V	0.0 – 0.2 V	"
Ground	30	0.0 V	0.0 – 0.2 V	"
Ground	15	0.0 V	0.0 – 0.2 V	"
Ground, intake air temperature	17	0.0 V	0.0 – 0.2 V	"
Ignition pulses	29	895 RPM	500–2000 RPM	"

Saab 9000 2.3 turbo, M92, aut., TCS (ETS), DI/APC (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Trigg cyl.1	19	7.29 Hz	5 –20 Hz	Engine running
Trigg cyl.1	19	33.9 ms	5 – 50 ms	”
Trigg cyl.2	38	7.35 Hz	5 –20 Hz	”
Trigg cyl.2	38	33.6 ms	5 – 50 ms	”
Trigg cyl.3	37	8 Hz	5 –20 Hz	”
Trigg cyl.3	37	17.5 ms	5 – 50 ms	”
Trigg cyl.4	18	5.5 Hz	5 –20 Hz	”
Trigg cyl.4	18	35 ms	5 – 50 ms	”
Torque limitation	36	440 Hz	200 – 2000 Hz	”
Detect. cyl 1+2	5	41 Hz	10 – 100 Hz	”
Detect. cyl 3+4	25	95.8 Hz	10 – 100 Hz	”
Boost Pressure Control Valve, BPC	10	40.5 Hz	30 – 110	Vary engine speed
Boost Pressure Control Valve, BPC	10	8.16 ms	1 – 20 ms	”
Boost Pressure Control Valve, BPC	33	92.3 Hz	30 – 110	”
Boost Pressure Control Valve, BPC	33	1.63 ms	1 – 20 ms	”
Knock sensor	11	0.58 V	0.0 5.0 V	Engine running
Intake air temperature	14	1.95 V	0.1 – 4.0 V	”
CHECK ENGINE (MIL)	7	12 V	8 – 15 V	”
+ 15	21	0.0 V	0.0 – 2.0 V	Ignition off

Saab 9000i 2.0 , M91, man., ACC, LH 2.4

Parameter	Pin	Example	Limits	Basic requirement
Main ground	5	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	17	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	6	0.0 V	0.0 – 0.2 V	"
+30	4	12 V	8 –15 V	"
+15	35	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	21	12.8 V	8 –15 V	"
Main relay #87	9	0.0 V	0.0 2.0 V	"
Fuel pump relay #85	20	0.0 V	0.0 – 3.0 V	"
Intake mass air flow	7	0.0 V	0.0 – 1.0 V	"
+1 5	35	12.2 V	8 –15 V	Ignition on
Main relay #85	21	1.33 V	0.0 – 4.0 V	"
Main relay #87	9	11.7 V	8 – 15 V	"
Fuel pump relay #85	20	11.8 V	8 – 15 V	"
Injectors	18	11.8 V	8 – 15 V	"
Code, cold start speed	15	11.8 V	8 – 15 V	"
Cold starting valve	32	11.9 V	8 – 15 V	"
Throttle position switch	3	0.0 V	0.0 – 2.0 V	"
Throttle position switch	2	0.0 V	0.0 – 2.0 V	"
Engine coolant temp.	13	0.68 V	0.1 – 4.0 V	"
Ignition pulses	1	427 RPM	400–2000 RPM	Engine running
Main ground	5	0.0 V	0.0 – 0.2 V	"
Main ground	17	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	6	0.0 V	0.0 – 0.2 V	"
Fuel pump relay #85	20	1.02 V	0.0 – 4.0 V	"
Intake mass air flow	7	2.44 V	1.5 – 3.0 V	"
Injectors	18	16.7 Hz	10 – 25 Hz	"
Injectors	18	3.19 ms	1 – 10 ms	"
Engine load signal	25	14.4 Hz	1 – 200 Hz	"
Intake mass air flow	7	3.43 V	3.0 – 4.0 V	Actuate throttle 3000 RPM
IAC valve	33	97.5 Hz	90 – 110 Hz	Engine idling
IAC valve	33	3.67 ms	1 – 10 ms	"

Saab 9000i 2.0 , M91, man., ACC, LH 2.4 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
A/C – In	14	11.1 V	8 – 15 V	Engine running and switch **on** A/C
A/C – In	14	1.45 V	0.0 – 3.0 V	Engine running and switch **off** A/C
Fuel consumption pulse	31	110 Hz	5 – 1000 Hz	Engine idling
CHECK ENGINE (MIL)	22	11.1 V	8 – 15 V	"
Oxygen sensor	24	0.29 V	0.0 – 0.3 V	"
Oxygen sensor	24	0.76 V	0.6 – 1.0 V	"
Ignition pulses	1	3190 RPM	3000–5000 RPM	Actuate throttle above 3000 RPM *(This applies only to burn off test of mass air flow)*
Engine coolant temp.	13	0.60 V	0.1 – 0.7 V	Engine running, ISAT scan tool waits until the engine coolant temperature sensor gives a signal below 0.7 V
Burn off air mass	8	4.25 V	3.3 – 5.0 V	Ignition off, ISAT scan tool waits for burn off signal
+ 15	35	0.0 V	0.0 – 3.0 V	Ignition off

Saab 9000i 2.3 , M90, man., ACC, LH 2.4.1

Parameter	Pin	Example	Limits	Basic requirement
Main ground	5	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	17	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	6	0.0 V	0.0 – 0.2 V	"
+ 30	4	12 V	8 – 15 V	"
+ 15	35	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	21	12 V	8 – 15 V	"
Main relay #87	9	12 V	8 – 15 V	"
Fuel pump relay #85	20	0.0 V	0.0 – 3.0 V	"
Intake mass air flow	7	0.0 V	0.0 – 1.0 V	"
+ 15	35	12.2 V	8 –15 V	Ignition on
Main relay #85	21	1.16 V	0.0 – 4.0 V	"
Main relay #87	9	11.7 V	8 – 15 V	"
Fuel pump relay #85	20	11.9 V	8 – 15 V	"
Injectors	18	11.8 V	8 – 15 V	"
Throttle position switch	3	0.0 V	0.0 – 2.0 V	Ignition on and wide open throttle
Throttle position switch	2	0.0 V	0.0 – 2.0 V	Ignition on and closed throttle
Engine coolant temp.	13	0.68 V	0.1 – 4.0 V	Ignition on
Ignition pulses	1	1050 RPM	400–2000 RPM	Engine running
Main ground	5	0.0 V	0.0 – 0.2 V	"
Main ground	17	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	6	0.0 V	0.0 – 0.2 V	"
Fuel pump relay #85	20	1.02 V	0.0 – 4.0 V	"
Intake mass air flow	7	2.5 V	1.5 – 3.0 V	"
Injectors	18	16.3 Hz	10 – 25 Hz	"
Injectors	18	2.09 ms	1 –10 ms	"
Engine load signal	25	14.4 Hz	1 – 200 Hz	"
Intake mass air flow	7	3.43 V	3.0 – 4.0 V	Actuate throttle 3000 RPM
IAC valve	33	97.5 Hz	90 – 110 Hz	Engine idling
IAC valve	33	3.67 ms	1 – 10 ms	"
A/C – In	14	11.1 V	8 – 15 V	Engine running and switch **on** A/C
A/C Relay #85	11	0.0 V	0.0 – 3.0 V	"

Saab 9000i 2.3 , M90, man., ACC, LH 2.4.1 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
A/C – In	14	0.56 V	0.0 – 3.0 V	Engine running and switch **off** A/C
A/C Relay #85	11	12 V	8 – 15 V	"
Fuel consumption pulse	31	24 Hz	5 – 1000 Hz	Engine running at idling speed
CHECK ENGINE (MIL)	22	11.1 V	8 – 15 V	"
Oxygen sensor	24	0.29 V	0.0 – 0.3 V	"
Oxygen sensor	24	0.76 V	0.6 – 1.0 V	"
Ignition pulses	1	3190RPM	3000–5000RPM	Actuate throttle above 3000 RPM *(This applies only to burn off test of air mass)*
Engine coolant temp.	13	0.44 V	0.1 – 0.7 V	Engine running, ISAT scan tool waits until the engine coolant temperature sensor gives a signal below 0.7 V
Burn off air mass	8	3.95 V	3.3 – 5.0 V	Ignition off, ISAT scan tool waits for burn off signal
+ 15	35	0.0 V	0.0 – 3.0 V	Ignition off

Saab 9000i 2.3, M91, aut., ACC, LH 2.4.2

Parameter	Pin	Example	Limits	Basic requirement
Main ground	5	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	17	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	6	0.0 V	0.0 – 0.2 V	"
+30	4	12 V	8 – 15 V	"
+ 15	35	0.0 V	8 – 15 V	Ignition off
Main relay #85	21	12.8 V	8 – 15 V	"
Main relay #87	9	0.0 V	0.0 – 2.0 V	"
Fuel pump relay #85	20	0.0 V	0.0 – 3.0 V	"
Intake mass air flow	7	0.0 V	0.0 – 1.0 V	"
+ 15	35	12.2 V	8 – 15 V	Ignition on
Main relay #85	21	1.33 V	0.0 – 4.0 V	"
Main relay #87	9	11.7 V	8 – 15 V	"
Fuel pump relay #85	20	11.8 V	8 –15 V	"
Injectors	18	11.8 V	8 – 15 V	"
IAC valve	15	97.7 Hz	90 – 110 Hz	"
IAC valve	15	2.52 ms	1.0 – 10.0 ms	"
IAC valve	33	97.6 Hz	90 – 110 Hz	"
IAC valve	33	7.62 ms	1.0 – 10.0 ms	"
Throttle position +5 V	10	4.98 V	4.6 – 5.4 V	"
Throttle position sensor	2	OK		Ignition on, depress and release the accelerator pedal
Throttle position signal	3	97.7 Hz	90 – 110 Hz	Ignition on
Throttle position signal	3	1.57 ms	1.0 – 4.0 ms	Ignition on and wide open throttle
Throttle position signal	3	5.72 ms	5.0 – 10.0 ms	Ignition on and closed throttle
Engine coolant temp.	13	0.68 V	0.1 – 4.0 V	Ignition on
A/C – In	14	9.67 V	8 – 15 V	Ignition on, switch **on** A/C
A/C Relay #85	11	11.2 V	8 –15 V	"
A/C – In	14	0.10 V	0.0 – 3.0 V	Ignition on, switch **off** A/C
Wheel speed	34	6.02 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel
Ignition pulses	1	950 RPM	400–2000 RPM	Engine running
Main ground	5	0.0 V	0.0 – 0.2 V	"

Saab 9000i 2.3, M91, aut., ACC, LH 2.4.2 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Main ground	17	0.0 V	0.0 – 0.2 V	Engine running
Ground, mass air flow	6	0.0 V	0.0 – 0.2 V	"
Fuel pump relay #85	20	1.02 V	0.0 – 4.0 V	"
Intake mass air flow	7	2.44 V	1.5 – 3.0 V	"
Injectors	18	16.7 Hz	10 – 25 Hz	"
Injectors	18	3.19 ms	1 – 10 ms	"
Engine load signal	25	14.4 Hz	1 – 200 Hz	"
Intake mass air flow	7	3.20 V	3.0 – 4.0 V	Actuate throttle 3000 RPM
IAC valve	15	97.6 Hz	90 – 110 Hz	Engine idling
IAC valve	15	5.28 ms	1 – 10 ms	"
IAC valve	33	97.5 Hz	90 – 110 Hz	"
IAC valve	33	4.76 m	1 – 10 ms	"
Drive	30	13.2 V	8 – 15 V.	Engine running, gear in position R, D, 3, 2, 1
Drive	30	0.0 V	0.0 – 5.0 V	Engine running, gear in parking position (P)
DI signal	28	15.2 Hz	5 – 400 Hz	Engine running
Fuel consumption pulse	31	29.5 Hz	5 – 1000 Hz	"
CHECK ENGINE (MIL)	22	11.1 V	5 – 15 V	"
Oxygen sensor	24	0.29 V	0.0 – 0.3 V	"
Oxygen sensor	24	0.76 V	0.6 – 1.0 V	Engine running
Ignition pulses	1	3190 RPM	3000–5000RPM	Actuate throttle above 3000 RPM *(This applies only to burn off test of air mass)*
Engine coolant temp.	13	0.60 V	0.1 – 0.7 V	Engine running, ISAT scan tool waits until the engine coolant temperature sensor gives a signal below 0.7 V
Mass air flow temp.	8	4.25 V	3.5 – 5.0 V	Ignition off. ISAT scan tool waits for a signal for burn–off
+ 15	35	0.0 V	0.0 – 3.0 V	Ignition off

Saab 9000 turbo 2.3, M92, aut., TCS (ETS), LH 2.4.2

Parameter	Pin	Example	Limits	Basic requirement
Main ground	5	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	17	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	6	0.0 V	0.0 – 0.2 V	"
+ 30	4	12 V	8 – 15 V	"
+ 15	35	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	21	12.8 V	8 – 15 V	"
Main relay #87	9	0.0 V	0.0 – 2.0 V	"
Fuel pump relay #85	20	0.0 V	0.0 – 3.0 V	"
Intake mass air flow	7	0.0 V	0.0 – 1.0 V	"
+ 15	35	12.2 V	8 – 15 V	Ignition on
Main relay #85	21	1.33 V	0.0 – 4.0 V	"
Main relay #87	9	11.7 V	8 – 15 V	"
Fuel pump relay #85	20	11.8 V	8 – 15 V	"
Injectors	18	11.8 V	8 – 15 V	"
Throttle position signal	3	99.5 Hz	90 – 110 Hz	Ignition on
Throttle position signal	3	3.77 ms	1.0 – 4.0 ms	Ignition on and wide open throttle
Throttle position signal	3	9.39 ms	5.0 – 10.0 ms	Ignition on and closed throttle
Engine coolant temp.	13	0.60 V	0.1 – 4.0 V	Ignition on
Wheel speed	34	4.88 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel
Ignition pulses	1	950 RPM	400–2000 RPM	Engine running
Main ground	5	0.0 V	0.0 – 0.2 V	"
Main ground	17	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	6	0.0 V	0.0 – 0.2 V	"
Fuel pump relay #85	20	1.02 V	0.0 – 4.0 V	"
Intake mass air flow	7	2.44 V	1.5 – 3.0 V	"
Injectors	18	16.7 Hz	10 – 25 Hz	"
Injectors	18	3.19 ms	1 – 10 ms	"
Engine load signal	25	14.4 Hz	1 – 200 Hz	"
Intake mass air flow	7	3.20 V	3.0 – 4.0 V	Actuate throttle 3000 RPM
Drive	30	13.2 V	8 – 15 V	Engine running and transmission range R, D, 3, 2, 1

Saab 9000 turbo 2.3, M92, aut., TCS (ETS), LH 2.4.2 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Drive	30	0.0 V	0.0 – 5.0 V	Engine running and transmission set to parking (P)
DI signal	28	15.2 Hz	5 – 400 Hz	Engine running
Fuel consumption pulse	31	29.5 Hz	5 – 1000 Hz	"
CHECK ENGINE (MIL)	22	11.1 V	8 – 15 V	"
Oxygen sensor	24	0.29 V	0.0 – 0.3 V	"
Oxygen sensor	24	0.76 V	0.6 – 1.0 V	Engine running
Ignition pulses	1	3190 RPM	3000–5000RPM	Actuate throttle above 3000 RPM *(This applies only to burn off test of air mass)*
Engine coolant temp.	13	0.60 V	0.1 – 0.7 V	Engine running, ISAT scan tool waits until the engine coolant temperature sensor gives a signal below 0.7 V
Burn off air mass	8	3.49 V	3.3 – 5.0 V	Ignition off, ISAT scan tool waits for burn off signal
+15	35	0.0 V	0.0 – 3.0 V	Ignition off

Saab 900 V6, man., ACC, Motronic M2.8.1

Parameter	Pin	Example	Limits	Basic requirement
Ground, ignition	2	0.0 V	0.0 – 0.2 V	Active ground test
Ground, oxygen sensor	10	0.0 V	0.0 – 0.2 V	"
Ground, injector	14	0.0 V	0.0 – 0.2 V	"
Ground, ECM	19	0.0 V	0.0 – 0.2 V	"
Ground, driver stage	24	0.0 V	0.0 – 0.2 V	"
+ 30	18	12 V	8.0 – 15.0 V	"
Ground, sensor	30	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, crankshaft position	48	0.0 V	0.0 – 0.2 V	"
+ 15	27	0.0 V	0.0 – 3.0 V	Ignition off
Main relay #85	46	12 V	8 – 15 V	"
Main relay #87	37	0.0 V	0.0 – 3.0 V	"
Fuel pump relay #85	3	0.0 V	0.0 – 3.0 V	"
Throttle position +5V	12	0.0 V	0.0 – 1.0 V	"
+ 15	27	12 V	8 – 15 V	Ignition on
Main relay #85	46	0.0 V	0.0 – 3.0 V	"
Main relay #87	37	12 V	8 – 15 V	"
Fuel pump relay #85	3	12 V	8 – 15 V	"
Throttle position +5V	12	5 V	4.8 – 5.2 V	"
Injector, cyl. 1	17	12 V	8 – 15 V	"
Injector, cyl. 2	16	12 V	8 – 15 V	"
Injector, cyl. 3	35	12 V	8 – 15 V	"
Injector, cyl. 4	34	12 V	8 – 15 V	"
Injector, cyl. 5	15	12 V	8 – 15 V	"
Injector, cyl. 6	33	12 V	8 – 15 V	"
Ignition coil, cyl. 1+4	1	12 V	8 – 15 V	"
Ignition coil, cyl. 2 + 5	20	12 V	8 – 15 V	"
Ignition coil, cyl. 3 + 6	21	12 V	8 – 15 V	"
Throttle position sensor	53	OK		Ignition on, depress and release the accelerator pedal
Throttle position signal	54	100 Hz	90 – 110 Hz	Ignition on
Intake mass air flow	7	0.05 V	0.0 – 0.5 V	"
TCS test signal	38	31 Hz	29 – 33 Hz	"
EVAP valve	5	12 V	8 – 15 V	"
IAC valve	4	12 V	8 – 15 V	"

Saab 900 V6, man., ACC, Motronic M2.8.1 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Engine coolant temp.	45	1.88 V	0.1 – 4.5 V	Ignition on
Intake air temperature	44	3.79 V	0.1 – 4.5 V	"
CHECK ENGINE (MIL)	22	0.0 V	0.0 – 3.0 V	"
Torque limitation	51	12 V	8 – 15 V	"
Wheel speed	9	10 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel
Crankshaft position input	49	808 Hz	500–2000 Hz	Engine running
Camshaft position sensor	8	7 Hz	3.0 – 20.0 Hz	"
Ground, ignition	2	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	10	0.0 V	0.0 – 0.2 V	"
Ground, injector	14	0.0 V	0.0 – 0.2 V	"
Ground, ECM	19	0.0 V	0.0 – 0.2 V	"
Ground, driver stage	24	0.0 V	0.0 – 0.2 V	"
Ground, sensor	30	0.0 V	0.0 – 0.2 V	Engine running
Ground, crankshaft position	48	0.0 V	0.0 – 0.2 V	"
Fuel pump relay #85	3	0.0 V	0.0 – 3.0 V	"
Ignition coil, cyl. 1+4	1	16 Hz	5 – 25 Hz	"
Ignition coil, cyl. 2 + 5	20	16 Hz	5 – 25 Hz	"
Ignition coil, cyl. 3 + 6	21	15 Hz	5 – 25 Hz	"
Intake mass air flow	7	0.87 V	0.2 – 2.0 V	"
Injector, cyl. 1	17	7.03 Hz	2.0 – 20 Hz	"
Injector, cyl. 1	17	3.94 ms	1.0 – 20.0 ms	"
Injector, cyl. 2	16	6.72 Hz	2.0 – 20 Hz	"
Injector, cyl. 2	16	3.40 ms	1.0 – 20.0 ms	"
Injector, cyl. 3	35	6.55 Hz	2.0 – 20 Hz	"
Injector, cyl. 3	35	3.34 ms	1.0 – 20.0 ms	"
Injector, cyl. 4	34	6.67 Hz	2.0 – 20 Hz	"
Injector, cyl. 4	34	3.27 ms	1.0 – 20.0 ms	"
Injector, cyl. 5	15	7.33 Hz	2.0 – 20 Hz	"
Injector, cyl. 5	15	3.89 ms	1.0 – 20.0 ms	"
Injector, cyl. 6	33	6.53 Hz	2.0 – 20 Hz	"
Injector, cyl. 6	33	3.18 ms	1.0 – 20.0 ms	"

Saab 900 V6, man., ACC, Motronic M2.8.1 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
EVAP valve	5	12 V	8 – 15 V	Engine running
IAC valve	4	12 V	8 – 15 V	"
IAC valve	4	100 Hz	90 – 110 Hz	"
IAC valve	4	4.55 ms	1.0 –10.0 ms	"
Throttle position signal	54	100 Hz	90 –110 Hz	"
Throttle position signal	54	9.06 ms	0.5 – 10 ms	"
Intake mass air flow	7	1.45 V	1.4 – 3.0 V	Actuate throttle 2500 RPM
Knock sensor 1–3–5	11	0.41 V	0.1 – 5.0 V	Engine idling
Knock sensor 2–4–6	29	1.29 V	0.1 – 5.0 V	"
A/C – In	40	12.7 V	8 – 15 V	Engine running and switch **on** A/C
A/C Relay #85	25	0.17 V	0.0 – 2.0 V	"
A/C – In	40	0.19 V	0.0 – 2.0 V	Engine running and switch **off** A/C
A/C Relay #85	25	13.2 V	8 – 15 V	"
Front heated oxygen sensor (OS1)	28	0.0 V	0.0 – 0.3 V	Engine running
Front heated oxygen sensor (OS1)	28	0.71 V	0.7 – 1.0 V	"
Rear heated oxygen sensor (oxygen sensor 2)	47	0.13 V	0.0 – 0.3 V	"
Rear heated oxygen sensor (oxygen sensor 2)	47	0.73 V	0.7 – 1.0 V	"
EVAP valve	5	15.0 Hz	14 – 16 Hz	"
Engine coolant temp.	45	1.01 V	0.1 – 4.5 V	"
Intake air temperature	44	3.71 V	0.1 – 4.5 V	"
Engine RPM	43	771 RPM	500–2000 RPM	"
CHECK ENGINE (MIL)	22	13.1 V	8 – 15 RPM	"
+ 15	27	0.19 V	0.0 – 3.0 V	Switch off the engine

Saab 900, V6, aut., ACC, Motronic M2.8.1

Parameter	Pin	Example	Limits	Basic requirement
Ground, ignition	2	0.0 V	0.0 – 0.2 V	Active ground test
Ground, oxygen sensor	10	0.0 V	0.0 – 0.2 V	"
Ground, injector	14	0.0 V	0.0 – 0.2 V	"
Ground, ECM	19	0.0 V	0.0 – 0.2 V	"
Ground, driver stage	24	0.0 V	0.0 – 0.2 V	"
+ 30	18	12 V	8.0 – 15.0 V	"
Ground, sensor	30	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, crankshaft position	48	0.0 V	0.0 – 0.2 V	"
+ 15	27	0.0 V	0.0 – 3.0 V	Ignition off
Main relay #85	46	12 V	8 – 15 V	"
Main relay #87	37	0.0 V	0.0 – 3.0 V	"
Fuel pump relay #85	3	0.0 V	0.0 – 3.0 V	"
Throttle position +5V	12	0.0 V	0.0 – 1.0 V	"
+ 15	27	12 V	8 – 15 V	Ignition on
Main relay #85	46	0.0 V	0.0 – 3.0 V	"
Main relay #87	37	12 V	8 – 15 V	"
Fuel pump relay #85	3	12 V	8 – 15 V	"
Throttle position +5V	12	5 V	4.8 – 5.2 V	"
Injector, cyl. 1	17	12 V	8 – 15 V	"
Injector, cyl. 2	16	12 V	8 – 15 V	"
Injector, cyl. 3	35	12 V	8 – 15 V	"
Injector, cyl. 4	34	12 V	8 – 15 V	"
Injector, cyl. 5	15	12 V	8 – 15 V	Ignition on
Injector, cyl. 6	33	12 V	8 – 15 V	"
Ignition coil, cyl. 1+4	1	12 V	8 – 15 V	"
Ignition coil, cyl. 2 + 5	20	12 V	8 – 15 V	"
Ignition coil, cyl. 3 + 6	21	12 V	8 – 15 V	"
Throttle position sensor	53	OK		Ignition on, depress and release the accelerator pedal
Throttle position signal	54	100 Hz	90 – 110 Hz	Ignition on
Intake mass air flow	7	0.05 V	0.0 – 0.5 V	"
TCS test signal	38	31 Hz	29 – 33 Hz	"

Saab 900, V6, aut., ACC, Motronic M2.8.1 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
EVAP valve	5	12 V	8 – 15 V	Ignition on
IAC valve	4	12 V	8 – 15 V	"
Engine coolant temp.	45	0.9 V	0.1 – 4.5 V	"
Intake air temperature	44	3.76 V	0.1 – 4.5 V	"
CHECK ENGINE (MIL)	22	0.14 V	0.0 – 3.0 V	"
Torque limitation	51	12 V	8 – 15 V	"
Wheel speed	9	20.5 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel
Crankshaft position input	49	1380 Hz	500–2000 Hz	Engine running
Camshaft position sensor	8	7 Hz	3.0 – 20.0 Hz	Engine running
Ground, ignition	2	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	10	0.0 V	0.0 – 0.2 V	"
Ground, injector	14	0.0 V	0.0 – 0.2 V	"
Ground, ECM	19	0.0 V	0.0 – 0.2 V	"
Ground, driver stage	24	0.0 V	0.0 – 0.2 V	"
Ground, sensor	30	0.0 V	0.0 – 0.2 V	Engine running
Ground, crankshaft position	48	0.0 V	0.0 – 0.2 V	"
Fuel pump relay #85	3	0.0 V	0.0 – 3.0 V	"
Ignition coil, cyl. 1+4	1	16 Hz	5 – 25 Hz	"
Ignition coil, cyl. 2 + 5	20	16 Hz	5 – 25 Hz	"
Ignition coil, cyl. 3 + 6	21	15 Hz	5 – 25 Hz	"
Intake mass air flow	7	0.87 V	0.2 – 2.0 V	"
Injector, cyl. 1	17	7.03 Hz	2.0 – 20 Hz	"
Injector, cyl. 1	17	3.94 ms	1.0 – 20.0 ms	"
Injector, cyl. 2	16	6.72 Hz	2.0 – 20 Hz	"
Injector, cyl. 2	16	3.40 ms	1.0 – 20.0 ms	"
Injector, cyl. 3	35	6.55 Hz	2.0 – 20 Hz	"
Injector, cyl. 3	35	3.34 ms	1.0 – 20.0 ms	"
Injector, cyl. 4	34	6.67 Hz	2.0 – 20 Hz	"
Injector, cyl. 4	34	3.27 ms	1.0 – 20.0 ms	"
Injector, cyl. 5	15	7.33 Hz	2.0 – 20 Hz	"
Injector, cyl. 5	15	3.89 ms	1.0 – 20.0 ms	"

Saab 900, V6, aut., ACC, Motronic M2.8.1 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Injector, cyl. 6	33	6.53 Hz	2.0 – 20 Hz	Engine running
Injector, cyl. 6	33	3.18 ms	1.0 – 20.0 ms	"
IAC valve	4	100 Hz	90 – 110 Hz	"
IAC valve	4	4.55 ms	1.0 –10.0 ms	"
Throttle position signal	54	100 Hz	90 –110 Hz	"
Throttle position signal	54	9.06 ms	0.5 – 10 ms	"
Intake mass air flow	7	1.45 V	1.4 – 3.0 V	Actuate throttle 2500 RPM
Knock sensor 1–3–5	11	0.41 V	0.1 – 5.0 V	Engine idling
Knock sensor 2–4–6	29	1.29 V	0.1 – 5.0 V	"
A/C – In	40	12.7 V	8 – 15 V	Engine running and switch **on** A/C
A/C Relay #85	25	0.17 V	0.0 – 2.0 V	"
A/C – In	40	0.19 V	0.0 – 2.0 V	Engine running and switch **off** A/C
A/C Relay #85	25	13.2 V	8 – 15 V	"
	42	11.4 V	8 – 15 V	Engine running and transmission set to R, D, 3, 2, 1
	42	0.39 V	0.0 – 2.0 V	Engine running and transmission set to P or N
Front heated oxygen sensor (OS1)	28	0.0 V	0.0 – 0.3 V	Engine running
Front heated oxygen sensor (OS1)	28	0.71 V	0.7 – 1.0 V	"
Rear heated oxygen sensor (oxygen sensor 2)	47	0.13 V	0.0 – 0.3 V	"
Rear heated oxygen sensor (oxygen sensor 2)	47	0.73 V	0.7 – 1.0 V	"
EVAP valve	5	15.0 Hz	14 – 16 Hz	"
Engine coolant temp.	45	1.01 V	0.1 – 4.5 V	"
Intake air temperature	44	3.71 V	0.1 – 4.5 V	"
Engine RPM	43	771 RPM	500–2000 RPM	"
CHECK ENGINE (MIL)	22	13.1 V	8 – 15 RPM	"
+ 15	27	0.19 V	0.0 – 3.0 V	Switch off the engine

Saab 900, man., A/C, Motronic M2.10.2

Parameter	Pin	Example	Limits	Basic requirement
Ground, ignition	2	0.0 V	0.0 – 0.2 V	Active ground test
Ground, oxygen sensor	10	0.0 V	0.0 – 0.2 V	"
Ground, injector	14	0.0 V	0.0 – 0.2 V	"
Ground, ECM	19	0.0 V	0.0 – 0.2 V	"
Ground, driver stage	24	0.0 V	0.0 – 0.2 V	"
+ 30	18	12 V	8.0 – 15.0 V	"
Ground, mass air flow	26	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, sensor	30	0.0 V	0.0 – 0.2 V	"
Ground, crankshaft position	48	0.0 V	0.0 – 0.2 V	"
+ 15	27	0.0 V	0.0 – 3.0 V	Ignition off
Main relay #85	36	12 V	8 – 15 V	"
Main relay #87	37	0.0 V	0.0 – 3.0 V	"
Fuel pump relay #85	3	0.0 V	0.0 – 3.0 V	"
Throttle position +5V	12	0.0 V	0.0 – 1.0 V	"
+ 15	27	12 V	8 – 15 V	Ignition on
Main relay #85	36	0.0 V	0.0 – 3.0 V	"
Main relay #87	37	12 V	8 – 15 V	"
Fuel pump relay #85	3	12 V	8 – 15 V	"
Throttle position +5V	12	5 V	4.8 – 5.2 V	"
Injector, cyl. 1	17	12 V	8 – 15 V	"
Injector, cyl. 2	34	12 V	8 – 15 V	"
Injector, cyl. 3	16	12 V	8 – 15 V	"
Injector, cyl. 4	35	12 V	8 – 15 V	Ignition on
Ignition coil	1	12 V	8 – 15 V	"
Throttle position sensor	53			Ignition on, depress and release the accelerator pedal
Throttle position signal	54	100 Hz	99 – 101 Hz	Ignition on
Intake mass air flow	7	0.01 V	0.0 – 0.5 V	"
EVAP valve	5	12 V	8 – 15 V	"
IAC valve	4	100 Hz	90 – 110 Hz	"
IAC valve	4	2.44 ms	1 – 10 ms	"
IAC valve	22	100 Hz	90 – 110 Hz	"

Saab 900, man., A/C, Motronic M2.10.2 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
IAC valve	22	7.42 ms	1 – 10 ms	Ignition on
Engine coolant temp.	45	1.15 V	0.1 – 4.5 V	"
CHECK ENGINE (MIL)	22	0.85 V	0.0 – 3.0 V	"
Torque limitation	51	4.31 V	4.5 – 5.5 V	"
Electrical load	44	12 V	8 – 15 V	"
Wheel speed	9	9.74 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel
Crankshaft position input	49	846 Hz	500–2000 Hz	Engine running
Camshaft position sensor	8	7.28 Hz	3.0 – 20.0 Hz	"
Ground, ignition	2	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	10	0.0 V	0.0 – 0.2 V	"
Ground, injector	14	0.0 V	0.0 – 0.2 V	"
Ground, ECM	19	0.0 V	0.0 – 0.2 V	"
Ground, driver stage	24	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	26	0.0 V	0.0 – 0.2 V	"
Ground, sensor	30	0.0 V	0.0 – 0.2 V	Engine running
Ground, crankshaft position	48	0.0 V	0.0 – 0.2 V	"
Fuel pump relay #85	3	0.14 V	0.0 – 3.0 V	"
Ignition coil	1	30.7 Hz	5 – 25 Hz	"
Intake mass air flow	7	0.79 V	0.2 – 2.0 V	"
Injector, cyl. 1	17	7.56 Hz	2.0 – 20 Hz	"
Injector, cyl. 1	17	4.24 ms	1.0 – 20.0 ms	"
Injector, cyl. 2	34	7.18 Hz	2.0 – 20 Hz	"
Injector, cyl. 2	34	4.16 ms	1.0 – 20.0 ms	"
Injector, cyl. 3	16	7.25 Hz	2.0 – 20 Hz	"
Injector, cyl. 3	16	4.10 ms	1.0 – 20.0 ms	"
Injector, cyl. 4	35	7.50 Hz	2.0 – 20 Hz	"
Injector, cyl. 4	35	4.14 ms	1.0 – 20.0 ms	"
IAC valve	4	100 Hz	90 – 110 Hz	"
IAC valve	4	3.59 ms	1.0 –10.0 ms	"
IAC valve	22	100 Hz	90 – 110 Hz	"
IAC valve	22	6.28 ms	1.0 – 10.0 ms	"

Saab 900, man., A/C, Motronic M2.10.2 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Throttle position signal	52	100 Hz	90 –110 Hz	Engine running
Throttle position signal	52	6.92 ms	0.5 – 10 ms	"
Intake mass air flow	7	1.90 V	1.4 – 3.0 V	Actuate throttle 2500 RPM
Knock sensor	11	1.58 V	0.1 – 5.0 V	Engine idling
Electrical load	44	12 V	8 – 15 V	Engine idling
A/C – In	41	13.6 V	8 – 15 V	Engine running and switch **on** A/C
A/C Relay #85	33	0.07 V	0.0 – 2.0 V	"
A/C – In	41	0.94 V	0.0 – 2.0 V	Engine running and switch **off** A/C
A/C Relay #85	33	12 V	8 – 15 V	"
Code, automatic transmission	40	0.53 V	0.0 – 2.0 V	Engine running
Oxygen sensor	28	0.29 V	0.0 – 0.3 V	"
Oxygen sensor	28	0.73 V	0.7 – 1.0 V	"
EVAP valve	5	15.0 Hz	14 – 16 Hz	Engine running
Engine coolant temp.	45	1.01 V	0.1 – 4.5 V	"
Engine RPM	43	771 RPM	500–2000 RPM	"
CHECK ENGINE (MIL)	22	13.1 V	8 – 15 RPM	"
+ 15	27	0.19 V	0.0 – 3.0 V	Switch off the engine

Saab 900, aut., Motronic M2.10.2

Parameter	Pin	Example	Limits	Basic requirement
Ground, ignition	2	0.0 V	0.0 – 0.2 V	Active ground test
Ground, oxygen sensor	10	0.0 V	0.0 – 0.2 V	"
Ground, injector	14	0.0 V	0.0 – 0.2 V	"
Ground, ECM	19	0.0 V	0.0 – 0.2 V	"
Ground, driver stage	24	0.0 V	0.0 – 0.2 V	"
+ 30	18	12 V	8.0 – 15.0 V	"
Ground, mass air flow	26	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, sensor	30	0.0 V	0.0 – 0.2 V	"
Ground, crankshaft position	48	0.0 V	0.0 – 0.2 V	"
+ 15	27	0.0 V	0.0 – 3.0 V	Ignition off
Main relay #85	36	12 V	8 – 15 V	"
Main relay #87	37	0.0 V	0.0 – 3.0 V	"
Fuel pump relay #85	3	0.0 V	0.0 – 3.0 V	"
Throttle position +5V	12	0.0 V	0.0 – 1.0 V	"
+ 15	27	12 V	8 – 15 V	Ignition on
Main relay #85	36	0.0 V	0.0 – 3.0 V	"
Main relay #87	37	12 V	8 – 15 V	"
Fuel pump relay #85	3	12 V	8 – 15 V	"
Throttle position +5V	12	5 V	4.8 – 5.2 V	"
Injector, cyl. 1	17	12 V	8 – 15 V	"
Injector, cyl. 2	34	12 V	8 – 15 V	"
Injector, cyl. 3	16	12 V	8 – 15 V	"
Injector, cyl. 4	35	12 V	8 – 15 V	"
Ignition coil	1	12 V	8 – 15 V	"
Throttle position sensor	53	OK		Ignition on, depress and release the accelerator pedal
Throttle position signal	54	100 Hz	99 – 101 Hz	Ignition on
Intake mass air flow	7	0.01 V	0.0 – 0.5 V	"
EVAP valve	5	12 V	8 – 15 V	"
IAC valve	4	100 Hz	90 – 110 Hz	"
IAC valve	4	1.84 ms	1 – 10 ms	"
IAC valve	22	100 Hz	90 – 110 Hz	"
IAC valve	22	7.44 ms	1 – 10 ms	"

Saab 900, aut., Motronic M2.10.2 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Engine coolant temp.	45	1.15 V	0.1 – 4.5 V	Ignition on
CHECK ENGINE (MIL)	22	0.85 V	0.0 – 3.0 V	"
Torque limitation	51	4.31 V	4.5 – 5.5 V	"
Electrical load	44	12 V	8 – 15 V	"
Wheel speed	9	9.74 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel
Crankshaft position input	49	662 Hz	500–2000 Hz	Engine running
Camshaft position sensor	8	12.3 Hz	3.0 – 20.0 Hz	"
Ground, ignition	2	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	10	0.0 V	0.0 – 0.2 V	"
Ground, injector	14	0.0 V	0.0 – 0.2 V	"
Ground, ECM	19	0.0 V	0.0 – 0.2 V	"
Ground, driver stage	24	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	26	0.0 V	0.0 – 0.2 V	"
Ground, sensor	30	0.0 V	0.0 – 0.2 V	Engine running
Ground, crankshaft position	48	0.0 V	0.0 – 0.2 V	"
Fuel pump relay #85	3	0.14 V	0.0 – 3.0 V	"
Ignition coil	1	30.7 Hz	5 – 25 Hz	"
Intake mass air flow	7	0.79 V	0.2 – 2.0 V	"
Injector, cyl. 1	17	7.56 Hz	2.0 – 20 Hz	"
Injector, cyl. 1	17	4.24 ms	1.0 – 20.0 ms	"
Injector, cyl. 2	34	7.18 Hz	2.0 – 20 Hz	"
Injector, cyl. 2	34	4.16 ms	1.0 – 20.0 ms	"
Injector, cyl. 3	16	7.25 Hz	2.0 – 20 Hz	"
Injector, cyl. 3	16	4.10 ms	1.0 – 20.0 ms	"
Injector, cyl. 4	35	7.50 Hz	2.0 – 20 Hz	"
Injector, cyl. 4	35	4.14 ms	1.0 – 20.0 ms	"
IAC valve	4	100 Hz	90 – 110 Hz	"
IAC valve	4	3.59 ms	1.0 –10.0 ms	"
IAC valve	22	100 Hz	90 – 110 Hz	"
IAC valve	22	6.28 ms	1.0 – 10.0 ms	"
Throttle position signal	52	100 Hz	90 –110 Hz	"
Throttle position signal	52	6.92 ms	0.5 – 10 ms	"

Saab 900, aut., Motronic M2.10.2 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Intake mass air flow	7	1.90 V	1.4 – 3.0 V	Actuate throttle 2500 RPM
Knock sensor	11	1.58 V	0.1 – 5.0 V	Engine idling
Electrical load	44	12 V	8 – 15 V	"
Code, automatic transmission	40	12 V	8 – 15 V	"
Drive	47	12 V	8 – 15 V	Engine running and transmission set to R,D,3,2,1
Drive	47	0.39 V	0.0 – 2.0 V	Engine running and transmission set to P or N
Oxygen sensor	28	0.29 V	0.0 – 0.3 V	"
Oxygen sensor	28	0.73 V	0.7 – 1.0 V	"
EVAP valve	5	15.0 Hz	14 – 16 Hz	Engine running
Engine coolant temp.	45	1.01 V	0.1 – 4.5 V	"
Engine RPM	43	771 RPM	500–2000 RPM	"
CHECK ENGINE (MIL)	22	13.1 V	8 – 15 RPM	"
+ 15	27	0.19 V	0.0 – 3.0 V	Switch off the engine

Saab 9000 2.3 turbo, M93, man., ACC, Trionic with APC

Parameter	Pin	Example	Limits	Basic requirement
Main ground	24	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	25	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
Ground, ECM	1	12 V	8 – 15 V	"
+ 30	18	12 V	8 – 15 V	"
+ 30	48	12 V	8 – 15 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
+ 15	60	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	31	12.8 V	8 – 15 V	"
Fuel pump relay #85	56	0.0 V	0.0 – 3.0 V	"
+ 15	60	12.2 V	8 – 15 V	Ignition on
Main relay #85	31	12.6 V	8 – 15 V	"
Fuel pump relay #85	56	12.4 V	8 – 15 V	"
Injector, cyl. 1	3	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 2	4	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 3	5	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 4	6	0.0 V	0.0 – 3.0 V	"
Pressure sensor	22	1.82 V	1.0 – 3.0 V	"
EVAP valve	21	0.0 V	0.0 – 3.0 V	"
EVAP valve	27	0.85 V	0.0 – 3.0 V	"
Engine coolant temp.	68	0.47 V	0.1 – 4.0 V	"
Intake air temperature	46	1.95 V	0.1 – 4.0 V	"
Throttle position +5V	42	5.00 V	4.5 – 5.5 V	Ignition on
Pressure sensor +5V	43	5.03 V	4.5 – 5.5 V	"
Throttle position sensor	45	OK		Ignition on, depress and release accelerator pedal
Brake light switch	15	12 V	8 – 15 V	Ignition on, depress brake pedal
Brake light switch	15	0.0 V	0.0 – 3.0 V	Ignition on, release accelerator pedal
Torque limitation	13	12 V	8 – 15 V	Ignition on and engage a gear
Torque limitation	13	0.32 V	0.0 – 1.0 V	Ignition on and disengage gear

Saab 9000 2.3 turbo, M93, man., ACC, Trionic with APC (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Wheel speed	39	4.7 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel
Crankshaft position sensor	41	40.7 Hz	20–200 Hz	Engine running
Main ground	24	0.0 V	0.0 – 0.2 V	"
Main ground	25	0.0 V	0.0 – 0.2 V	Engine running
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	"
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
Main relay #85	31	0.22 V	0.0 – 3.0 V	"
Trigg cyl.1	9	7.42 Hz	5.0 – 10.0 Hz	"
Trigg cyl.1	9	11.3 ms	5.0 – 10.0 Hz	"
Trigg cyl.2	10	7.33 Hz	5.0 – 10.0 Hz	"
Trigg cyl.2	10	11.4 ms	5.0 – 15.0 ms	"
Trigg cyl.3	11	7.34 Hz	5.0 – 10.0 Hz	"
Trigg cyl.3	11	11.4 ms	5.0 – 15.0 ms	"
Trigg cyl.4	12	7.26 Hz	5.0 – 10.0 Hz	"
Trigg cyl.4	12	11.7 ms	5.0 – 15.0 ms	"
Fuel pump relay #85	56	0.22 V	0.0 – 3.0 V	Engine running
Pressure sensor	22	0.88 V	0.5 – 2.5 V	"
Injector, cyl. 1	3	7.12 Hz	5.0 – 20 Hz	"
Injector, cyl. 1	3	4.01 ms	1.0 – 10 ms	"
Injector, cyl. 2	4	7.34 Hz	5.0 – 20 Hz	"
Injector, cyl. 2	4	4.01 ms	1.0 – 10 ms	"
Injector, cyl. 3	5	7.50 Hz	5.0 – 20 Hz	"
Injector, cyl. 3	5	3.90 ms	1.0 – 10 ms	"
Injector, cyl. 4	6	7.30 Hz	5.0 – 20 Hz	"
Injector, cyl. 4	6	3.86 ms	1.0 – 10 ms	"
IAC valve	49	501 Hz	499 – 501 Hz	"
IAC valve	49	0.76 ms	0.5 – 1.0 ms	"
Pressure sensor	22	1.70 V	1.5 – 4.0 V	Actuate throttle 2500 RPM
Detect cyl1+2	17	38.6 Hz	10 – 40 Hz	Engine idling
Detect cyl3+4	18	35.4 Hz	10 – 40 Hz	"

Saab 9000 2.3 turbo, M93, man., ACC, Trionic with APC (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Boost Pressure Control Valve, BPC	2	90 Hz	89 – 91 Hz	Engine running at idling speed
Boost Pressure Control Valve, BPC	2	1.75 ms	1.5 – 2.1 ms	"
Boost Pressure Control Valve, BPC	26	90 Hz	89 – 91 Hz	Actuate throttle
Boost Pressure Control Valve, BPC	26	1.80 ms	1.5 – 2.1 ms	"
Knock sensor	44	1.79 V	0.1 – 5.0 V	Engine idling
EVAP valve	21	8.0 Hz	7 – 9 Hz	"
EVAP valve	21	107 ms	15 – 150 ms	"
EVAP valve	27	8.12 Hz	7 – 9 Hz	Engine idling
EVAP valve	27	107 ms	15 – 150 ms	"
Fuel consumption pulse	34	7.37 V	5 – 1000 Hz	"
Engine RPM	58	865 RPM	500–4000 RPM	"
Engine coolant temp.	68	0.49 V	0.1 – 4.0 V	"
Intake air temperature	46	1.85 V	0.1 – 4.0 V	"
Oxygen sensor preheater	50	0.19 V	0.0 – 2.0 V	"
Oxygen sensor	23	0.20 V	0.0 – 0.3 V	"
Oxygen sensor	23	0.66 V	0.6 – 1.0 V	Vary engine speed if necessary
A/C – In	59	12 V	8 – 15 V	Engine running and switch **on** A/C
A/C Relay #85	54	0.99 V	0.0 – 3.0 V	"
A/C – In	59	0.99 V	0.0 3.0 V	Engine running and switch **off** A/C
A/C Relay #85	59	12 V	8 – 15 V	"
Fan control relay	38	12 V	8 – 15 V	Engine running
CHECK ENGINE (MIL)	32	11.4 V	8 – 15 V	"
+ 15	60	0.0 V	0.0 – 2.0 V	Switch off the engine

Saab 9000 2.3 turbo, M93, aut., ACC, Trionic with APC and ETS

Parameter	Pin	Example	Limits	Basic requirement
Main ground	24	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	25	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
+ 30	1	12 V	8 – 15 V	"
+ 30	48	12 V	8 – 15 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
+ 15	60	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	31	12.8 V	8 – 15 V	"
Fuel pump relay #85	56	0.0 V	0.0 – 3.0 V	"
+ 15	60	12.2 V	8 – 15 V	Ignition on
Main relay #85	31	12.6 V	8 – 15 V	"
Fuel pump relay #85	56	12.4 V	8 – 15 V	"
Injector, cyl. 1	3	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 2	4	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 3	5	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 4	6	0.0 V	0.0 – 3.0 V	"
Pressure sensor	22	1.82 V	1.0 – 3.0 V	"
EVAP valve	21	0.0 V	0.0 – 3.0 V	"
EVAP valve	27	0.0 V	0.0 – 3.0 V	"
Engine coolant temp.	68	0.47 V	0.1 – 4.0 V	"
Intake air temperature	46	1,44V	0.1 – 4.0 V	"
Pressure sensor +5V	43	5.03 V	4.5 – 5.5 V	Ignition on
Throttle position signal	57	200 Hz	190 – 210 Hz	"
Brake light switch	15	12 V	8 – 15 V	Ignition on, depress brake pedal
Brake light switch	15	0.0 V	0.0 – 3.0 V	Ignition on, release accelerator pedal
Wheel speed	39	4.7 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel
Crankshaft position input	41	45.9 Hz	20–200 Hz	Engine running
Main ground	24	0.0 V	0.0 – 0.2 V	"
Main ground	25	0.0 V	0.0 – 0.2 V	"

Saab 9000 2.3 turbo, M93, aut., ACC, Trionic with APC and ETS (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	Engine running
Ground, sensor	66	0.0 V	0.0 – 0.2 V	"
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
Main relay #85	31	0.22 V	0.0 – 3.0 V	"
Trigg cyl.1	9	7.42 Hz	5.0 – 10.0 Hz	"
Trigg cyl.1	9	11.3 ms	5.0 – 10.0 Hz	"
Trigg cyl.2	10	7.33 Hz	5.0 – 10.0 Hz	"
Trigg cyl.2	10	11.4 ms	5.0 – 15.0 ms	"
Trigg cyl.3	11	7.34 Hz	5.0 – 10.0 Hz	"
Trigg cyl.3	11	11.4 ms	5.0 – 15.0 ms	"
Trigg cyl.4	12	7.26 Hz	5.0 – 10.0 Hz	"
Trigg cyl.4	12	11.7 ms	5.0 – 15.0 ms	"
Fuel pump relay #85	56	0.22 V	0.0 – 3.0 V	Engine running
Pressure sensor	22	0.88 V	0.5 – 2.5 V	"
Injector, cyl. 1	3	7.12 Hz	5.0 – 20 Hz	"
Injector, cyl. 1	3	4.01 ms	1.0 – 10 ms	"
Injector, cyl. 2	4	7.34 Hz	5.0 – 20 Hz	"
Injector, cyl. 2	4	4.01 ms	1.0 – 10 ms	"
Injector, cyl. 3	5	7.50 Hz	5.0 – 20 Hz	"
Injector, cyl. 3	5	3.90 ms	1.0 – 10 ms	"
Injector, cyl. 4	6	7.30 Hz	5.0 – 20 Hz	"
Injector, cyl. 4	6	3.86 ms	1.0 – 10 ms	"
Pressure sensor	22	1.70 V	1.5 – 4.0 V	Actuate throttle 2500 RPM
Engine load signal	35	30.5 Hz	10 – 100 Hz	Engine running at idling speed
Detect cyl1+2	17	38.6 Hz	10 – 40 Hz	"
Detect cyl3+4	18	35.4 Hz	10 – 40 Hz	"
Boost Pressure Control Valve, BPC	2	90 Hz	89 – 91 Hz	"
Boost Pressure Control Valve, BPC	2	1.75 ms	1.5 – 2.1 ms	"
Boost Pressure Control Valve, BPC	25	90 Hz	89 – 91 Hz	Actuate throttle
Boost Pressure Control Valve, BPC	26	1.80 ms	1.5 – 2.1 ms	"
Knock sensor	44	1.79 V	0.1 – 5.0 V	Engine running at idling speed

Saab 9000 2.3 turbo, M93, aut., ACC, Trionic with APC and ETS (contd.)

Parameter	Pin	Example	Limits	Basic requirement
EVAP valve	21	8.0 Hz	7 – 9 Hz	Engine running at idling speed
EVAP valve	21	107 ms	15 – 150 ms	"
EVAP valve	27	8.12 Hz	7 – 9 Hz	"
EVAP valve	27	107 ms	15 – 150 ms	"
Fuel consumption pulse	34	7.37 V	5 – 1000 Hz	"
Engine RPM	58	865 RPM	500–4000 RPM	"
Engine coolant temp.	68	0.49 V	0.1 – 4.0 V	"
Intake air temperature	46	1.85 V	0.1 – 4.0 V	"
Oxygen sensor preheater	50	0.19 V	0.0 – 2.0 V	"
Drive	14	12 V	8 – 15 V	Engine running, engage reverse (R)
Drive	14	0.0 V	0.0 – 3.0 V	Engine running, engage parking gear (P)
Oxygen sensor	23	0.20 V	0.0 – 0.3 V	"
Oxygen sensor	23	0.66 V	0.6 – 1.0 V	Vary engine speed if necessary
A/C Relay #85	59	0.99 V	0.0 – 3.0 V	Engine running and switch **on** A/C
A/C Relay #85	59	12 V	8 – 15 V	Engine running and switch **off** A/C
Fan control relay	38	12 V	8 – 15 V	Engine running
CHECK ENGINE (MIL)	32	11.4 V	8 – 15 V	"
+ 15	60	0.0 V	0.0 – 2.0 V	Switch off the engine

Saab 9000i 2.3, M94, aut., Trionic

Parameter	Pin	Example	Limits	Basic requirement
Main ground	24	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	25	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
+ 30	1	12 V	8 – 15 V	"
+ 30	48	12 V	8 – 15 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
+ 15	60	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	31	12V	8 – 15 V	"
Fuel pump relay #85	56	0.0 V	0.0 – 3.0 V	"
+ 15	60	12.2 V	8 – 15 V	Ignition on
Main relay #85	31	12.6 V	8 – 15 V	"
Fuel pump relay #85	56	12.4 V	8 – 15 V	"
Injector, cyl. 1	3	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 2	4	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 3	5	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 4	6	0.0 V	0.0 – 3.0 V	"
Pressure sensor	22	1.79 V	1.0 – 3.0 V	"
EVAP valve	21	0.0 V	0.0 – 3.0 V	"
EVAP valve	27	0.0 V	0.0 – 3.0 V	"
Engine coolant temp.	68	0.68 V	0.1 – 4.0 V	"
Intake air temperature	46	1.79 V	0.1 – 4.0 V	"
Throttle position +5 V	42	5.02 V	4.5 – 5.5 V	Ignition on
Pressure sensor +5 V	43	5.03 V	4.5 – 5.5 V	"
Throttle position sensor	45	OK		Ignition on, depress and release the accelerator pedal
Throttle position signal	57	100 Hz	90 – 110 Hz	Ignition on
Brake light switch	15	12 V	8 – 15 V	Ignition on, depress brake pedal
Brake light switch	15	0.0 V	0.0 – 3.0 V	Ignition on, release accelerator pedal
Wheel speed	39	6.62 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel

Saab 9000i 2.3, M94, aut., Trionic (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Crankshaft position sensor	41	928 Hz	500–2000 Hz	Engine running
Main ground	24	0.0 V	0.0 – 0.2 V	"
Main ground	25	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	"
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
Main relay #85	31	0.22 V	0.0 – 3.0 V	"
Trigg cyl.1	9	7.78 Hz	5.0 – 10.0 Hz	"
Trigg cyl.1	9	11.6 ms	5.0 – 10.0 Hz	"
Trigg cyl.2	10	6.59 Hz	5.0 – 10.0 Hz	"
Trigg cyl.2	10	13.1 ms	5.0 – 15.0 ms	"
Trigg cyl.3	11	6.51 Hz	5.0 – 10.0 Hz	"
Trigg cyl.3	11	12.7 ms	5.0 – 15.0 ms	"
Trigg cyl.4	12	6.78 Hz	5.0 – 10.0 Hz	"
Trigg cyl.4	12	12.3 ms	5.0 – 15.0 ms	"
Fuel pump relay #85	56	0.19 V	0.0 – 3.0 V	Engine running
Pressure sensor	22	0.89 V	0.5 – 2.5 V	"
Injector, cyl. 1	3	6.87 Hz	5.0 – 20 Hz	"
Injector, cyl. 1	3	3.91 ms	1.0 – 10 ms	"
Injector, cyl. 2	4	7.34 Hz	5.0 – 20 Hz	"
Injector, cyl. 2	4	4.01 ms	1.0 – 10 ms	"
Injector, cyl. 3	5	7.50 Hz	5.0 – 20 Hz	"
Injector, cyl. 3	5	3.90 ms	1.0 – 10 ms	"
Injector, cyl. 4	6	7.30 Hz	5.0 – 20 Hz	"
Injector, cyl. 4	6	3.86 ms	1.0 – 10 ms	"
IAC valve	49	499 Hz	499 – 501 Hz	"
IAC valve	49	0.74 ms	0.5 – 1.0 ms	"
Pressure sensor	22	1.73 V	1.5 – 4.0 V	Actuate throttle 2500 RPM
Detect cyl1+2	17	38.6 Hz	10 – 40 Hz	Engine running at idling speed
Detect cyl3+4	18	35.4 Hz	10 – 40 Hz	"
Knock sensor	44	1.81 V	0.1 – 5.0 V	"
EVAP valve	21	8.13 Hz	7 – 9 Hz	"

Saab 9000i 2.3, M94, aut., Trionic (contd.)

Parameter	Pin	Example	Limits	Basic requirement
EVAP valve	21	117 ms	15 – 150 ms	Engine running at idling speed
EVAP valve	27	8.12 Hz	7 – 9 Hz	"
EVAP valve	27	114 ms	15 – 150 ms	"
Fuel consumption pulse	34	7.20 V	5 – 1000 Hz	"
Engine RPM	58	865 RPM	500–4000 RPM	"
Engine coolant temp.	68	0.49 V	0.1 – 4.0 V	"
Intake air temperature	46	1.85 V	0.1 – 4.0 V	"
Oxygen sensor preheater	50	0.19 V	0.0 – 2.0 V	"
Drive	14	12 V	8 – 15 V	Engine running and transmission set to R, D, 3, 2, 1
Drive	14	0.1 V	0.0 – 3.0 V	Engine running and transmission set to P or N
Oxygen sensor	23	0.20 V	0.0 – 0.3 V	Engine running at idling speed
Oxygen sensor	23	0.66 V	0.6 – 1.0 V	Vary engine speed if necessary
CHECK ENGINE (MIL)	32	12 V	8 – 15 V	Engine running
+ 15	60	0.0 V	0.0 – 2.0 V	Switch off the engine

Saab 9000 2.3, M94, aut., ACC, Trionic with APC

Parameter	Pin	Example	Limits	Basic requirement
Main ground	24	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	25	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
+ 30	1	12 V	8 – 15 V	"
+ 30	48	12 V	8 – 15 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
+ 15	60	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	31	12.8 V	8 – 15 V	"
Fuel pump relay #85	56	0.0 V	0.0 – 3.0 V	"
+ 15	60	12.2 V	8 – 15 V	Ignition on
Main relay #85	31	12.6 V	8 – 15 V	"
Fuel pump relay #85	56	12.4 V	8 – 15 V	"
Injector, cyl. 1	3	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 2	4	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 3	5	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 4	6	0.0 V	0.0 – 3.0 V	"
Pressure sensor	22	1.82 V	1.0 – 3.0 V	"
EVAP valve	21	0.0 V	0.0 – 3.0 V	"
EVAP valve	27	0.0 V	0.0 – 3.0 V	"
Engine coolant temp.	68	0.47 V	0.1 – 4.0 V	"
Intake air temperature	46	1.95 V	0.1 – 4.0 V	"
Throttle position +5 V	42	5.05 V	4.5 – 5.5 V	"
Pressure sensor +5 V	43	5.03 V	4.5 – 5.5 V	"
Throttle position sensor	45	OK		Ignition on, depress and release the accelerator pedal
Throttle position signal	57	100 Hz	90 – 110 Hz	Ignition on
Brake light switch	15	12 V	8 – 15 V	Ignition on, depress brake pedal
Brake light switch	15	0.0 V	0.0 – 3.0 V	Ignition on, release accelerator pedal
Wheel speed	39	4.7 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel

Saab 9000 2.3, M94, aut., ACC, Trionic with APC (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Crankshaft position sensor	41	850 Hz	500–2000 Hz	Engine running
Main ground	24	0.0 V	0.0 – 0.2 V	"
Main ground	25	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	"
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
Main relay #85	31	0.22 V	0.0 – 3.0 V	"
Trigg cyl.1	9	7.42 Hz	5.0 – 10.0 Hz	"
Trigg cyl.1	9	11.3 ms	5.0 – 10.0 Hz	"
Trigg cyl.2	10	7.33 Hz	5.0 – 10.0 Hz	"
Trigg cyl.2	10	11.4 ms	5.0 – 15.0 ms	"
Trigg cyl.3	11	7.34 Hz	5.0 – 10.0 Hz	"
Trigg cyl.3	11	11.4 ms	5.0 – 15.0 ms	"
Trigg cyl.4	12	7.26 Hz	5.0 – 10.0 Hz	"
Trigg cyl.4	12	11.7 ms	5.0 – 15.0 ms	"
Fuel pump relay #85	56	0.22 V	0.0 – 3.0 V	Engine running
Pressure sensor	22	0.88 V	0.5 – 2.5 V	"
Injector, cyl. 1	3	7.12 Hz	5.0 – 20 Hz	"
Injector, cyl. 1	3	4.07 ms	1.0 – 10 ms	"
Injector, cyl. 2	4	7.34 Hz	5.0 – 20 Hz	"
Injector, cyl. 2	4	4.01 ms	1.0 – 10 ms	"
Injector, cyl. 3	5	7.50 Hz	5.0 – 20 Hz	"
Injector, cyl. 3	5	3.90 ms	1.0 – 10 ms	"
Injector, cyl. 4	6	7.30 Hz	5.0 – 20 Hz	"
Injector, cyl. 4	6	3.86 ms	1.0 – 10 ms	"
IAC valve	49	501 Hz	499 – 501 Hz	"
IAC valve	49	0.76 ms	0.5 – 1.0 ms	"
Pressure sensor	22	1.70 V	1.5 – 4.0 V	Actuate throttle 2500 RPM
Detect cyl1+2	17	38.6 Hz	10 – 40 Hz	Engine running at idling speed
Detect cyl3+4	18	35.4 Hz	10 – 40 Hz	"
Boost Pressure Control Valve, BPC	2	90 Hz	89 – 91 Hz	"
Boost Pressure Control Valve, BPC	2	1.75 ms	1.5 – 2.1 ms	"

Saab 9000 2.3, M94, aut., ACC, Trionic with APC (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Boost Pressure Control Valve, BPC	26	90 Hz	89 – 91 Hz	Actuate throttle
Boost Pressure Control Valve, BPC	26	1.80 ms	1.5 – 2.1 ms	"
Knock sensor	44	1.81 V	0.1 – 5.0 V	Engine running at idling speed
EVAP valve	21	8.13 Hz	7 – 9 Hz	"
EVAP valve	21	117 ms	15 – 150 ms	"
EVAP valve	27	8.12 Hz	7 – 9 Hz	"
EVAP valve	27	114 ms	15 – 150 ms	"
Fuel consumption pulse	34	7.20 V	5 – 1000 Hz	"
Engine RPM	58	865 RPM	500–4000 RPM	"
Engine coolant temp.	68	0.49 V	0.1 – 4.0 V	"
Intake air temperature	46	1.85 V	0.1 – 4.0 V	"
Oxygen sensor preheater	50	0.19 V	0.0 – 2.0 V	"
Drive	14	12 V	8 – 15 V	Engine running and transmission set to R, D, 3, 2, 1
Torque limitation	13	13,2	8 – 15 V	Engine running and transmission set to R, D, 3, 2, 1
Drive	14	0.10 V	0.0 – 3.0 V	Engine running and transmission set to P or N
Torque limitation	13	0.12 V	0.0 – 1.0 V	"
Oxygen sensor	23	0.20 V	0.0 – 0.3 V	Engine running at idling speed
Oxygen sensor	23	0.66 V	0.6 – 1.0 V	Vary engine speed if necessary
A/C – In	59	12 V	0.0 3.0 V	Engine running and switch **on** A/C
A/C Relay #85	54	0.27 V	0.0 – 3.0 V	"
A/C – In	59	0.0 V	0.0 3.0 V	Engine running and switch **off** A/C
A/C Relay #85	54	12 V	8 – 15 V	"
CHECK ENGINE (MIL)	32	11.4 V	8 – 15 V	Engine running
+ 15	60	0.0 V	0.0 – 2.0 V	Switch off the engine

Saab 9000 2.3, M95, man., ACC, Trionic with APC

Parameter	Pin	Example	Limits	Basic requirement
Main ground	24	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	25	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
+ 30	1	12 V	8 – 15 V	"
+ 30	48	12 V	8 – 15 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
+ 15	60	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	31	12.8 V	8 – 15 V	"
Fuel pump relay #85	56	0.0 V	0.0 – 3.0 V	"
+ 15	60	12.2 V	8 – 15 V	Ignition on
Main relay #85	31	12.6 V	8 – 15 V	"
Fuel pump relay #85	56	12.4 V	8 – 15 V	"
Injector, cyl. 1	3	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 2	4	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 3	5	0.0 V	0.0 – 3.0 V	"
Injector, cyl. 4	6	0.0 V	0.0 – 3.0 V	"
Pressure sensor	22	1.82 V	1.0 – 3.0 V	"
EVAP valve	21	0.0 V	0.0 – 3.0 V	"
EVAP valve	27	0.0 V	0.0 – 3.0 V	"
Engine coolant temp.	68	0.47 V	0.1 – 4.0 V	"
Intake air temperature	46	1.95 V	0.1 – 4.0 V	"
Pressure sensor +5 V	43	5.03 V	4.5 – 5.5 V	Ignition on
Throttle position signal	57	100 Hz	90 – 110 Hz	"
Brake light switch	15	12 V	8 – 15 V	Ignition on, depress brake pedal
Brake light switch	15	0.0 V	0.0 – 3.0 V	Ignition on, release accelerator pedal
Torque limitation	13	12 V	8 – 15 V	Ignition on and engage a gear
Torque limitation	13	0.32 V	0.0 1.0 V	Ignition on and disengage gear
Wheel speed	39	4.7 Hz	1 – 300 Hz	Ignition on, raise car and rotate right–hand front wheel

Saab 9000 2.3, M95, man., ACC, Trionic with APC (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Crankshaft position sensor	41	850 Hz	500–2000 Hz	Engine running
Main ground	24	0.0 V	0.0 – 0.2 V	"
Main ground	25	0.0 V	0.0 – 0.2 V	"
Ground, oxygen sensor	47	0.0 V	0.0 – 0.2 V	"
Ground, sensor	66	0.0 V	0.0 – 0.2 V	"
Ground, sensor	67	0.0 V	0.0 – 0.2 V	"
Main relay #85	31	0.22 V	0.0 – 3.0 V	"
Trigg cyl.1	9	7.42 Hz	5.0 – 10.0 Hz	"
Trigg cyl.1	9	11.3 ms	5.0 – 10.0 Hz	"
Trigg cyl.2	10	7.33 Hz	5.0 – 10.0 Hz	"
Trigg cyl.2	10	11.4 ms	5.0 – 15.0 ms	"
Trigg cyl.3	11	7.34 Hz	5.0 – 10.0 Hz	"
Trigg cyl.3	11	11.4 ms	5.0 – 15.0 ms	"
Trigg cyl.4	12	7.26 Hz	5.0 – 10.0 Hz	"
Trigg cyl.4	12	11.7 ms	5.0 – 15.0 ms	"
Fuel pump relay #85	56	0.22 V	0.0 – 3.0 V	Engine running
Pressure sensor	22	0.88 V	0.5 – 2.5 V	"
Injector, cyl. 1	3	7.12 Hz	5.0 – 20 Hz	"
Injector, cyl. 1	3	4.07 ms	1.0 – 10 ms	"
Injector, cyl. 2	4	7.34 Hz	5.0 – 20 Hz	"
Injector, cyl. 2	4	4.01 ms	1.0 – 10 ms	"
Injector, cyl. 3	5	7.50 Hz	5.0 – 20 Hz	"
Injector, cyl. 3	5	3.90 ms	1.0 – 10 ms	"
Injector, cyl. 4	6	7.30 Hz	5.0 – 20 Hz	"
Injector, cyl. 4	6	3.86 ms	1.0 – 10 ms	"
IAC valve	49	501 Hz	499 – 501 Hz	"
IAC valve	49	0.76 ms	0.5 – 1.0 ms	"
Pressure sensor	22	1.70 V	1.5 – 4.0 V	Actuate throttle 2500 RPM
Detect cyl1+2	17	38.6 Hz	10 – 40 Hz	Engine running at idling speed
Detect cyl3+4	18	35.4 Hz	10 – 40 Hz	"
Boost Pressure Control Valve, BPC	2	90 Hz	89 – 91 Hz	"
Boost Pressure Control Valve, BPC	2	1.80 ms	1.5 – 2.1 ms	"

Saab 9000 2.3, M95, man., ACC, Trionic with APC (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Boost Pressure Control Valve, BPC	26	90 Hz	89 – 91 Hz	Actuate throttle
Boost Pressure Control Valve, BPC	26	1.80 ms	1.5 – 2.1 ms	"
Knock sensor	44	1.79 V	0.1 – 5.0 V	Engine running at idling speed
EVAP valve	21	8.00 Hz	7 – 9 Hz	"
EVAP valve	21	107 ms	15 – 150 ms	"
EVAP valve	27	8.12 Hz	7 – 9 Hz	"
EVAP valve	27	107 ms	15 – 150 ms	"
Fuel consumption pulse	34	7.37 V	5 – 1000 Hz	"
Engine RPM	58	865 RPM	500–4000 RPM	"
Engine coolant temp.	68	0.49 V	0.1 – 4.0 V	"
Intake air temperature	46	1.85 V	0.1 – 4.0 V	"
Oxygen sensor preheater	50	0.19 V	0.0 – 2.0 V	"
Oxygen sensor	23	0.20 V	0.0 – 0.3 V	"
Oxygen sensor	23	0.66 V	0.6 – 1.0 V	Vary engine speed if necessary
A/C Relay #85	59	0.99 V	0.0 – 3.0 V	Engine running and switch **on** A/C
A/C Relay #85	59	12 V	8 – 15 V	Engine running and switch **off** A/C
CHECK ENGINE (MIL)	32	11.4 V	8 – 15 V	Engine running
+ 15	60	0.0 V	0.0 – 2.0 V	Switch off the engine

Saab 900 2.0 turbo, M95, Sensonic

Parameter	Pin	Example	Limits	Basic requirement
Main ground	19	0.0 V	0.0 – 0.2 V	Active ground test
+ 30	37	12 V	8 – 15 V	"
Ground, clutch temp.	16	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, clutch actuator unit	17	0.0 V	0.0 – 0.2 V	"
Ground, speed sensor	34	0.0 V	0.0 – 0.2 V	"
Ground, transmission range	35	0.0 V	0.0 – 0.2 V	"
Ground, gear lever	36	0.0 V	0.0 – 0.2 V	"
+ 15	18	0.0 V	0.0 – 2.0 V	Ignition off
Starter relay + 50	5	0.0 V	0.0 – 2.0 V	"
+ 15	18	12 V	9.0 – 15.0 V	Ignition on
Starter relay + 50	5	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor +5 V	10	5 V	4.5 – 5.5 V	"
Gear stick sensor B+	14	12 V	9.0 – 15.0 V	"
CHECK ACS lamp	3	12 V	9.0 – 15.0 V	"
Throttle position signal	12	100 Hz	99 – 101 Hz	"
Throttle position signal	12	9.35 ms	0.5 – 20.0 ms	"
Clutch temp.	30	4.56 V	0.5 – 4.9 V	"
Clutch actuator unit signal	6	6.25 V	5.0 – 6.5 V	"
Clutch actuator unit signal	32	4.46 V	3.0 – 5.0 V	"
Brake light switch	25	10.8 V	9.0 – 15.0 V	Depress the brake pedal
Brake light switch	25	0.0 V	0.0 – 2.0 V	Release the brake pedal
Gear position	27	OK		Potentiometer test 1. Engage 2nd gear 2. Carefully engage 1st gear
Gear position	28	OK		Potentiometer test 1. Engage 1st gear 2. Carefully engage reverse (R)
TCS	9	11.2 V	9.0 – 15.0 V	Engage 1st gear
Brake pedal switch	8	0.3 V	0.0 – 2.0 V	Depress the brake pedal
Brake pedal switch	8	110 V	9.0 – 15.0 V	Release the brake pedal

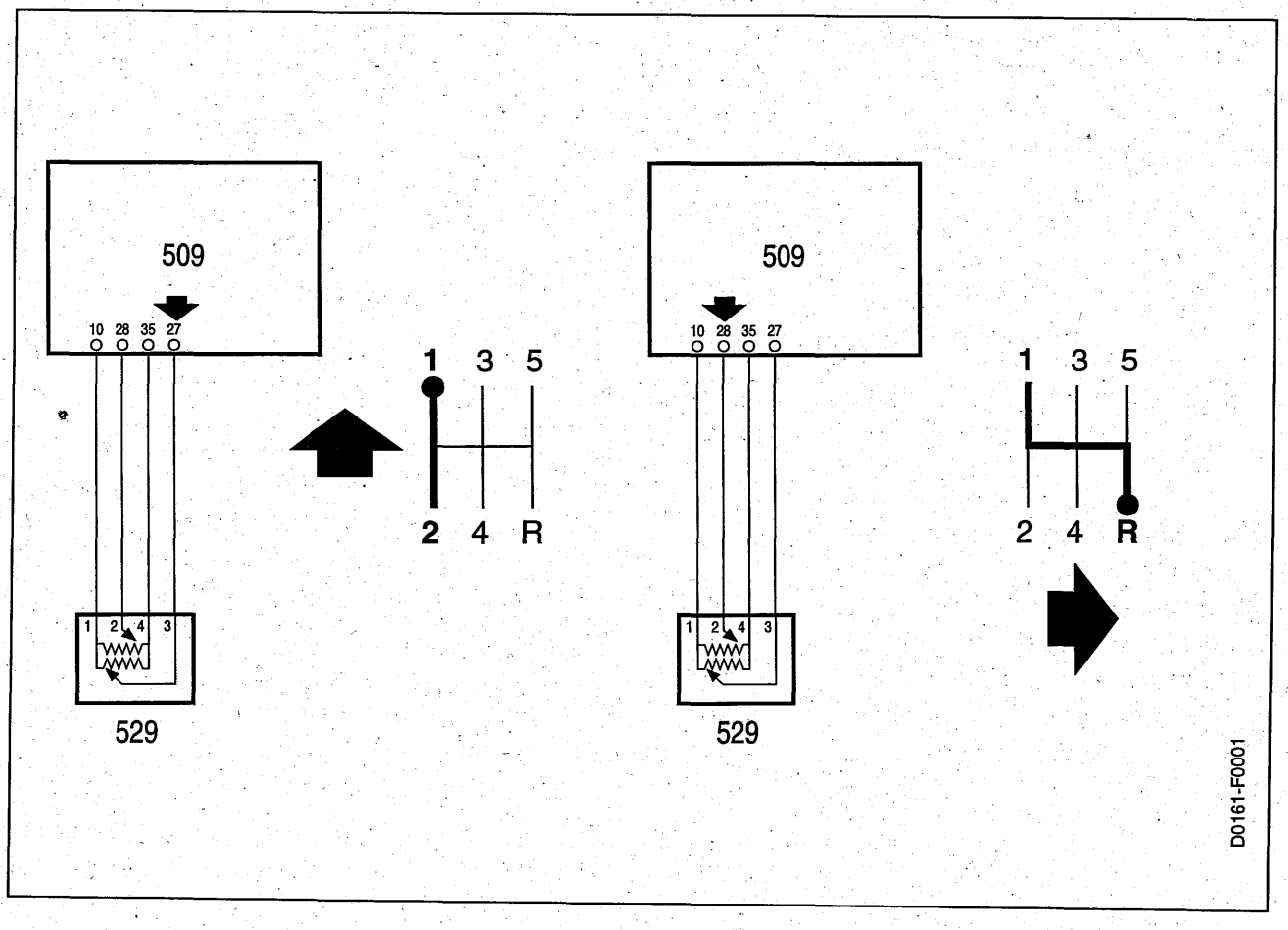
Saab 900 2.0 turbo, M95, Sensonic (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Gear position	27	1.2 V	0.2 – 1.5 V	Engage 1st gear
Gear position	28	4.16 V	3.1 – 4.8 V	"
Gear position	27	3.23 V	3.1 – 4.8 V	Engage 2nd gear
Gear position	28	4.18 V	3.1 – 4.8 V	"
Gear position	27	0.90 V	0.2 – 1.5 V	Engage 3rd gear
Gear position	28	3.27 V	2.4 – 4.8 V	"
Gear position	27	3.88 V	3.1 – 4.8 V	Engage 4th gear
Gear position	28	3.27 V	2.4 – 4.8 V	"
Gear position	27	1.06 V	0.5 – 1.5 V	Engage 5th gear
Gear position	28	2.17 V	0.2 – 2.4 V	"
Gear position	27	3.58 V	3.1 – 4.8 V	Engage reverse (R)
Gear position	28	0.90 V	0.2 – 1.6 V	"
Gear lever	29	2.39 V	2.1 – 2.9 V	"
Gear lever	29	2.52 V	2.5 – 15.0 V	Disengage gear
+ 50 IN	26	9.26 V	9.0 – 15.0 V	Start the engine
+ 15	18	0.0 V	0.0 – 2.0 V	Ignition off
+ 15	18	12.2 V	9.0 – 15.0 V	Ignition on
Gear position	27	3.88 V	3.1 – 4.8 V	Engage reverse (R)
Starter relay + 50	5	9.56 V	9.0 – 15.0 V	Depress the brake pedal
Main ground	19	0.0 V	0.0 – 0.2V	Depress the brake pedal and start the engine
Ground, clutch temp.	16	0.0 V	0.0 – 0.2V	(Engine running)
Ground, clutch actuator unit	17	0.0 V	0.0 – 0.2V	"
Ground, speed sensor	34	0.0 V	0.0 – 0.2V	"
Ground, transmission range	35	0.0 V	0.0 – 0.2V	"
Ground, gear lever	36	0.0 V	0.0 – 0.2V	"
Engine RPM	13	1710RPM	500–4000 RPM	"
Clutch temp.	30	4.56 V	0.5 – 4.9 V	"
Engine load signal	15	23 Hz	10 – 100 Hz	"

Saab 900 2.0 turbo, M95, Sensonic (contd.)

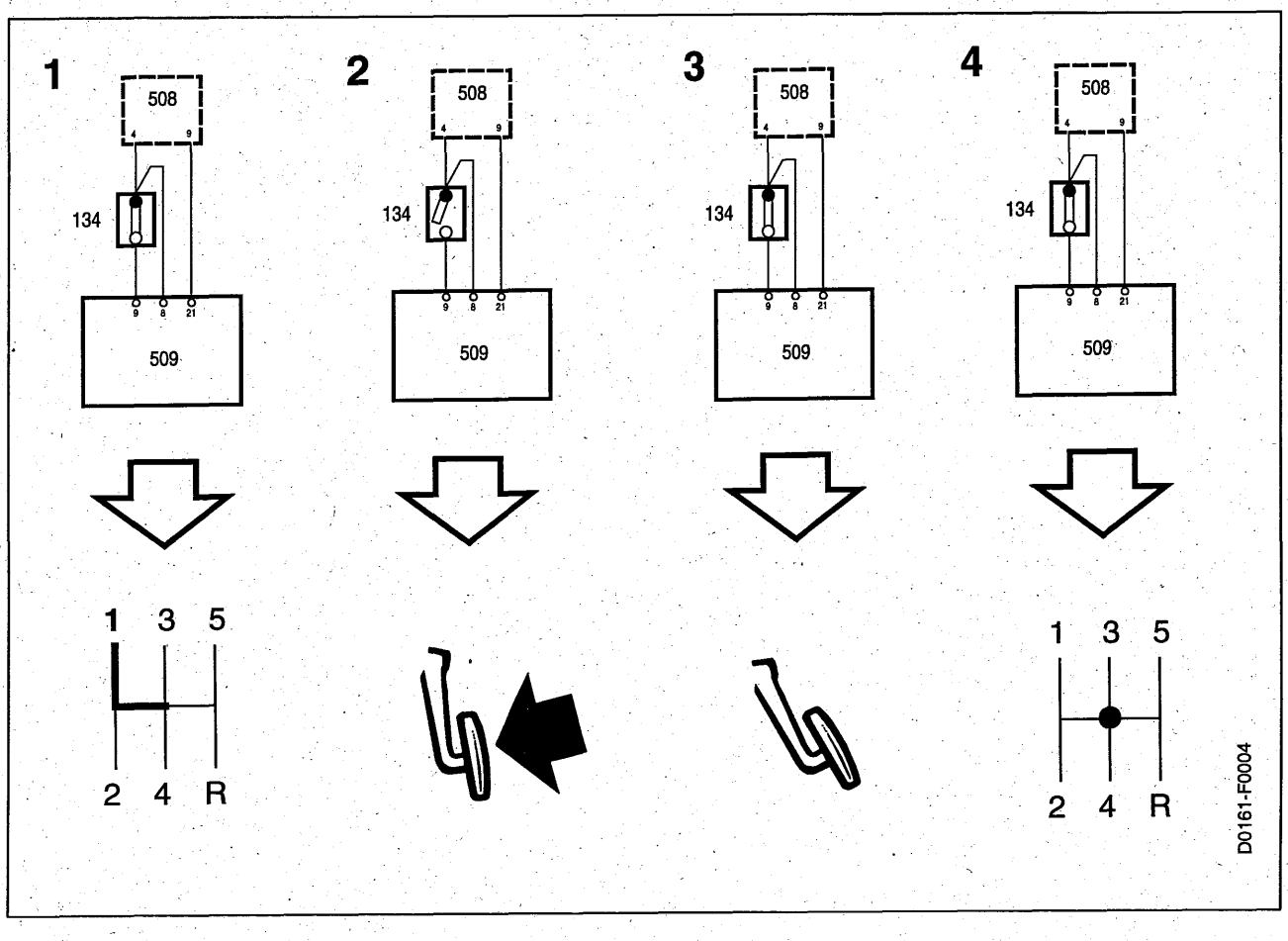
Parameter	Pin	Example	Limits	Basic requirement
Question: TCS fitted? YES/NO (If NO miss out two test stages)				
Cruise Control ON/OFF	21	0.09 V	0.0 – 2.0V	1. Diagnostics, cruise control 2. Press ON/RES!
Cruise Control ON/OFF	21	11.5 V	9.0 – 15.0 V	Release ON/RES!
Question: Wheel test? YES/NO (If NO, miss out three test stages)				
Wheel speed	31	24.5 Hz	15 – 300 Hz	Rotate the left–hand rear wheel
Gear position	27	3.27 V	3.1 – 4.8 V	Engage 2nd gear
Gear selector position sensor	48	195 Hz	50 – 300 Hz	Rotate right–hand front wheel
CHECK ACS lamp	3	14.0 V	9.0 – 15.0 V	
Brake light switch	25	10.8 V	9.0 – 15.0 V	Depress the brake pedal
Gear position	27	0.90 V	0.2 – 1.5 V	Engage 5th gear
SID message	24	YES		Does DOWNSHIFTING light?
Engine RPM	13	0.0 RPM	0.0 – 0.0RPM	Release the brake pedal
SID message	24	YES		Does DISENGAGING light?
+ 15	18	0.0 V	0.0 – 2.0 V	Ignition off

Saab 900 2.0 turbo, M95, Sensonic (contd.)



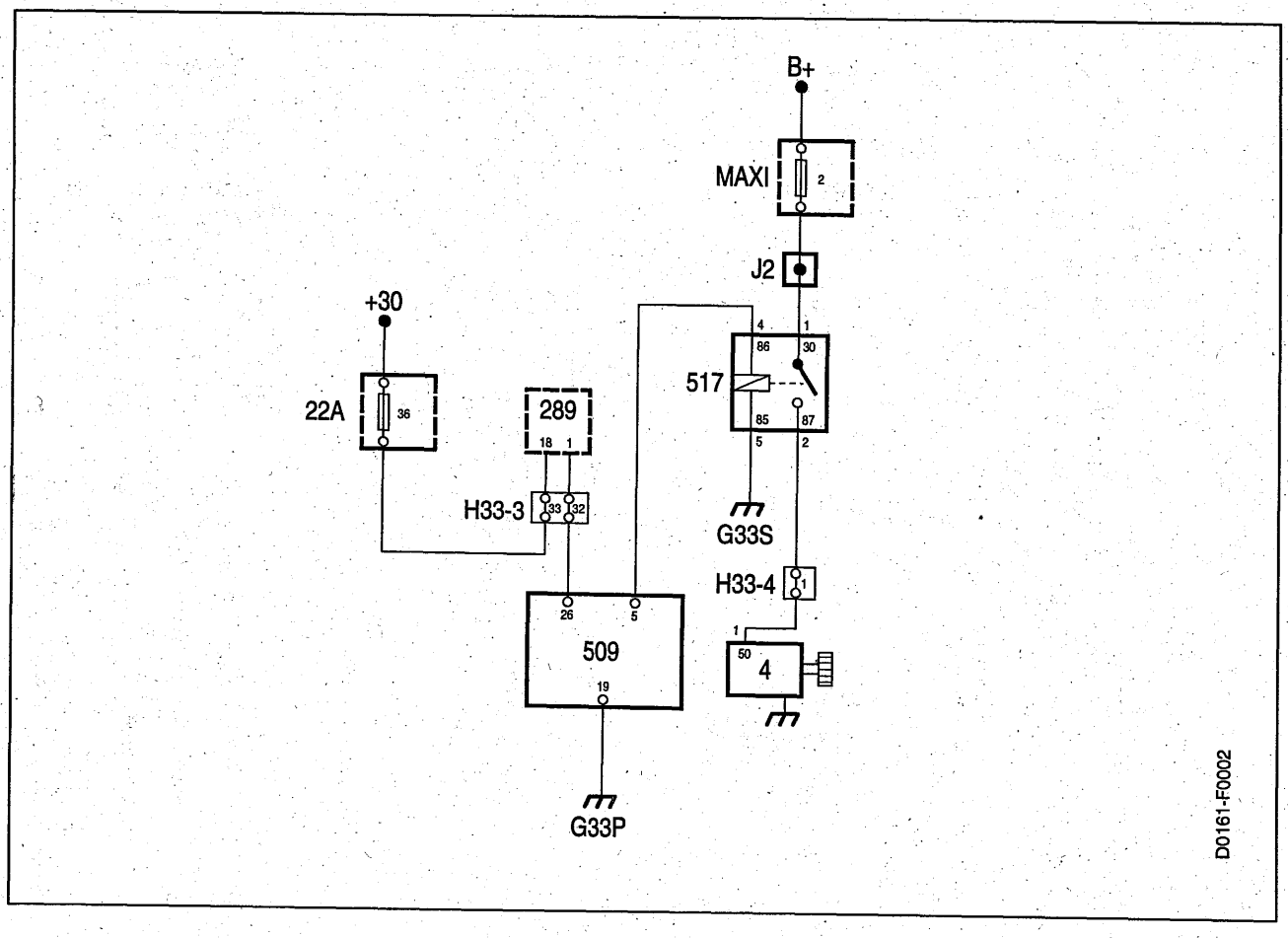
Parameter	Pin	Example	Limits	Basic requirement
Gear position	27	OK		Potentiometer test 1. Engage 2nd gear 2. Carefully engage 1st gear
Gear position	28	OK		Potentiometer test 1. Engage 1st gear 2. Carefully engage reverse (R)

Saab 900 2.0 turbo, M95, Sensonic (contd.)



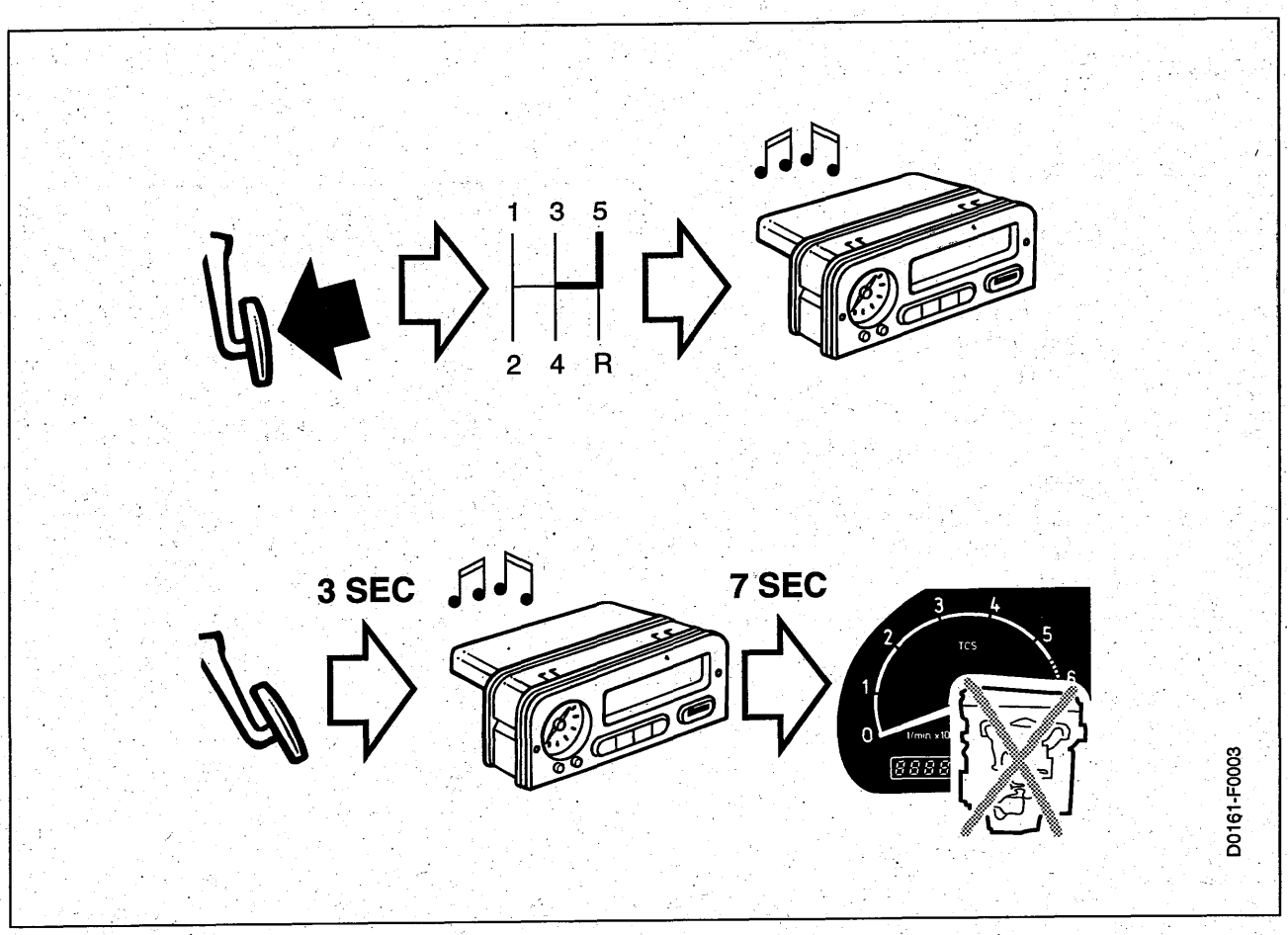
Parameter	Pin	Example	Limits	Basic requirement
Cruise control	9	11.2 V	9.0 – 15.0 V	Engage 1st gear
Brake pedal	8	0.3 V	0.0 – 2.0 V	Depress the brake pedal
Brake pedal switch	8	11.0 V	9.0 – 15.0 V	Release the brake pedal
Cruise control	9	0.30 V	0.0 – 2.0 V	

Saab 900 2.0 turbo, M95, Sensonic (contd.)



Parameter	Pin	Example	Limits	Basic requirement
+ 50 IN	26	9.26 V	9.0 – 15.0 V	Start the engine
+ 15	18	0.0 V	0.0 – 2.0 V	Ignition off
+ 15	18	12.2 V	9.0 – 15.0 V	Ignition on
Gear position	27	3.88 V	3.1 – 4.8 V	Engage reverse (R)
Starter relay + 50	5	9.56 V	9.0 – 15.0 V	Depress the brake pedal and start the engine

Saab 900 2.0 turbo, M95, Sensonic (contd.)

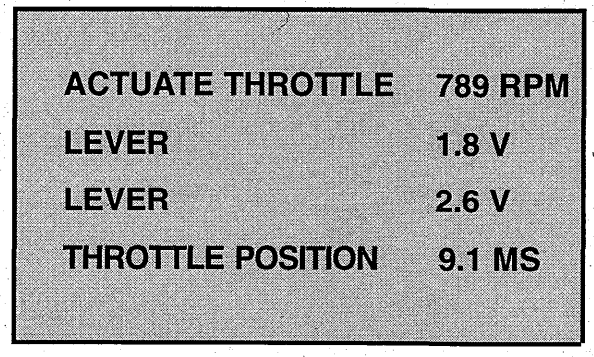


Parameter	Pin	Example	Limits	Basic requirement
Brake light switch	25	10.8 V	9.0 – 15.0 V	Depress the brake pedal
Gear position	2	0.90 V	0.2 – 1.5 V	Engage 5th gear
SID message	24	YES		Does DOWNSHIFTING light?
Engine RPM	13	0.0 RPM	0.0 – 0.0RPM	Release the brake pedal
SID message	24	YES		Does DISENGAGING light?

Saab 900 2.0 turbo, M95, Sensonic (contd.)

Readings

		Pin
Actuate throttle	789 RPM engine speed, signal from Trionic	13
Lever	1.8 V position sensor for gear lever, longitudinal travel	27
Lever	2.6 V position sensor for gear lever, transverse travel	28
Throttle position	9.1 ms Throttle position, signal from Trionic	12



Saab 900 2.0 turbo, M94, TCM, aut.

Parameter	Pin	Example	Limits	Basic requirement
Main ground	22	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	35	0.0 V	0.0 – 0.2 V	"
+30	18	12.5 V	8.0 – 15.0 V	"
Ground, sensor	31	0.0 V	0.0 – 0.2 V	ECM reconnected
+15	17	0.0 V	0.0 – 2.0 V	Ignition off
Brake light switch	26	11.6 V	9.0 – 15.0 V	Depress the brake pedal
Brake light switch	26	0.86 V	0.0 – 2.0 V	Release the brake pedal
+15	17	12.3 V	9.0 – 15.0 V	Ignition on
WINTER switch	21	1.85 V	0.0 – 2.0 V	Press the WINTER switch
WINTER switch	21	11.4 V	9.0 – 15.0 V	Release the WINTER switch
Gear selector position sensor	9	0.0 V	0.0 – 2.0 V	Engage 1st gear
Gear selector position sensor	10	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	28	12.3 V	9.0 – 15.0 V	"
Gear selector position sensor	27	12.3 V	9.0 – 15.0 V	"
Gear selector position sensor	9	12.3 V	9.0 – 15.0 V	Engage 2nd gear
Gear selector position sensor	10	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	28	12.2 V	9.0 – 15.0 V	"
Gear selector position sensor	27	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	10	12.0 V	9.0 – 15.0 V	Engage 3rd gear
Gear selector position sensor	9	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	28	12.3 V	9.0 – 15.0 V	"
Gear selector position sensor	27	12.3 V	9.0 – 15.0 V	"
Gear selector position sensor	9	0.0 V	0.0 – 2.0 V	Engage DRIVE gear (D)
Gear selector position sensor	10	12.3 V	9.0 – 15.0 V	"
Gear selector position sensor	28	12.3 V	9.0 – 15.0 V	"
Gear selector position sensor	27	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	21	0.0 V	0.0 – 2.0 V	Press the WINTER switch
Solenoid valve S1	1	11.1 V	9.0 – 15.0 V	"
Solenoid valve S2	3	0.0 V	0.0 – 2.0 V	"
Solenoid valve S1	1	10.9 V	9.0 – 15.0 V	"
Solenoid valve S2	3	0.0 V	0.0 – 2.0 V	Ignition on

Saab 900 2.0 turbo, M94, TCM, aut. (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Solenoid valve SL	19	0.0 V	0.0 – 2.0 V	Ignition on
Solenoid valve STH	16	4.35 V	4.0 – 5.0 V	"
Solenoid valve STH	34	0.86 V	0.1 – 5.0 V	"
Gear selector position sensor	28	0.39 V	0.0 – 2.0 V	Engage neutral (N)
Gear selector position sensor	9	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	10	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	27	12.2 V	9.0 – 15.0 V	"
Gear selector position sensor	9	11.7 V	9.0 – 15.0 V	Engage reverse (R)
Gear selector position sensor	10	11.7 V	9.0 – 15.0 V	"
Gear selector position sensor	28	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	27	0.0 V	0.0 – 2.0 V	"
Drive	11	11.0 V	8.0 – 15.0 V	"
Gear selector position sensor	10	0.28 V	0.0 – 2.0 V	Engage parking gear (P)
Gear selector position sensor	9	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	28	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	27	12.0 V	9.0 – 15.0 V	"
Drive	11	0.32 V	0.0 – 2.0 V	"
Sport switch	20	0.28 V	0.0 – 2.0 V	Press the SPORT button
SPORT lamp	24	0.28 V	0.0 – 2.0 V	
Sport switch	20	0.0 V	0.0 – 2.0 V	Press the SPORT button
SPORT lamp	24	11.7 V	9.0 – 15.0 V	
Kickdown switch	8	0.57 V	0.0 – 2.0 V	Wide open throttle
Kickdown switch	8	11.1 V	9.0 – 15.0 V	No throttle
Oil temperature	33	1.99 V	0.5 – 4.0 V	
Throttle position signal	25	99.9 Hz	99.0 – 101.0 Hz	
Engine RPM	29	9.94 Hz	5.0 – 2000.0 Hz	Start the engine
Main ground	22	0.14 V	0.0 – 0.2 V	
Main ground	35	0.0 V	0.0 – 0.2 V	
Speed sensor in	12	291 Hz	100–300 Hz	No throttle
CHECK GEARBOX	6	12.0 V	9.0 – 15.0 V	
Speed sensor out	30	102 Hz	100–300 Hz	Raise the car, engage DRIVE, speedometer to 30 km/h

Saab 900 2.0 turbo, M94, TCM, aut. (contd.)

Parameter	Pin	Example	Limits	Basic requirement
WINTER switch	21	1.23 V	0.0 – 2.0 V	Press the WINTER switch
WINTER lamp	7	0.28 V	0.0 – 2.0 V	
WINTER switch	21	0.0 V	0.0 – 2.0 V	Press the WINTER switch
WINTER lamp	7	12.8 V	9.0 – 15.0 V	
Drive	11	0.44 V	0.0 – 2.0 V	Depress the brake pedal Then engage the parking gear (P)
Oil temperature	33	1.71 V	0.5 – 4.0 V	
+15	17	0.84 V	0.0 – 2.0 V	Ignition off

Readings

		Pin
Gear position A	Gear selector position sensor, switch A	9
Gear position B	Gear selector position sensor, switch B	10
Gear position C	Gear selector position sensor, switch C	28
Gear position D	Gear selector position sensor, switch D	27

GEAR POSITION A	0.0 V
GEAR POSITION B	0.0 V
GEAR POSITION C	0.0 V
GEAR POSITION D	0.0 V

Saab 900 V6, M94, TCM, aut.

Parameter	Pin	Example	Limits	Basic requirement
Main ground	22	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	35	0.0 V	0.0 – 0.2 V	"
+30	18	12.3 V	8.0 – 15.0 V	"
Ground, sensor	31	0.0 V	0.0 – 0.2 V	ECM reconnected
+15	17	0.0 V	0.0 – 2.0 V	Ignition off
Brake light switch	26	12.0 V	9.0 – 15.0 V	Depress the brake pedal
Brake light switch	26	0.0 V	0.0 – 2.0 V	Release the brake pedal
+15	17	12.2 V	9.0 – 15.0 V	Ignition on
WINTER switch	21	0.75 V	0.0 – 2.0 V	Press the WINTER switch
WINTER switch	21	11.3 V	9.0 – 15.0 V	Release the WINTER switch
Gear selector position sensor	9	1.46 V	0.0 – 2.0 V	Engage 1st gear
Gear selector position sensor	10	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	28	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	27	12.2 V	9.0 – 15.0 V	"
Gear selector position sensor	9	12.0 V	9.0 – 15.0 V	Engage 2nd gear
Gear selector position sensor	10	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	28	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	27	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	10	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	9	11.9 V	9.0 – 15.0 V	"
Gear selector position sensor	28	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	27	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	9	0.0 V	0.0 – 2.0 V	Engage DRIVE gear (D)
Gear selector position sensor	10	11.8 V	9.0 – 15.0 V	"
Gear selector position sensor	28	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	27	0.0 V	0.0 – 2.0 V	"
WINTER switch	21	0.13 V	0.0 – 2.0 V	Press the WINTER switch
Solenoid valve S1	1	10.6 V	9.0 – 15.0 V	"
Solenoid valve S2	3	0.0 V	0.0 – 2.0 V	"
Solenoid valve S1	1	10.6 V	9.0 – 15.0 V	"
Solenoid valve S2	3	0.0 V	0.0 – 2.0 V	Ignition on

Saab 900 V6, M94, TCM, aut. (CONTD.)

Parameter	Pin	Example	Limits	Basic requirement
Solenoid valve SL	19	0.0 V	0.0 – 2.0 V	Ignition on
Solenoid valve STH	16	4.42 V	4.0 – 5.0 V	"
Solenoid valve STH	34	0.86 V	0.1 – 5.0 V	"
Gear selector position sensor	28	0.28 V	0.0 – 2.0 V	Engage neutral (N)
Gear selector position sensor	9	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	10	12.0 V	9.0 – 15.0 V	"
Gear selector position sensor	27	11.8 V	9.0 – 15.0 V	"
Gear selector position sensor	9	9.97 V	9.0 – 15.0 V	Engage reverse gear (R)
Gear selector position sensor	10	11.4 V	9.0 – 15.0 V	"
Gear selector position sensor	28	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	27	0.0 V	0.0 – 2.0 V	"
Drive	11	10.3 V	8.0 – 15.0 V	"
Gear selector position sensor	10	0.57 V	0.0 – 2.0 V	Engage parking gear (P)
Gear selector position sensor	9	11.7 V	9.0 – 15.0 V	"
Gear selector position sensor	28	0.0 V	0.0 – 2.0 V	"
Gear selector position sensor	27	11.7 V	9.0 – 15.0 V	"
Drive	11	0.28 V	0.0 – 2.0 V	"
Sport switch	20	0.14 V	0.0 – 2.0 V	Press the SPORT button
SPORT lamp	24	0.28 V	0.0 – 2.0 V	
SPORT button	20	0.0 V	0.0 – 2.0 V	Press the SPORT button
SPORT lamp	24	11.4 V	9.0 – 15.0 V	
Kickdown switch	8	0.0 V	0.0 – 2.0 V	Wide open throttle
Kickdown switch	8	10.8 V	9.0 – 15.0 V	No throttle
Oil temperature	33	1.71 V	0.5 – 4.0 V	
Throttle position signal	25	100 Hz	99 – 101 Hz	

Question: V6 engine? YES/NO (if NO, miss out four test stages)

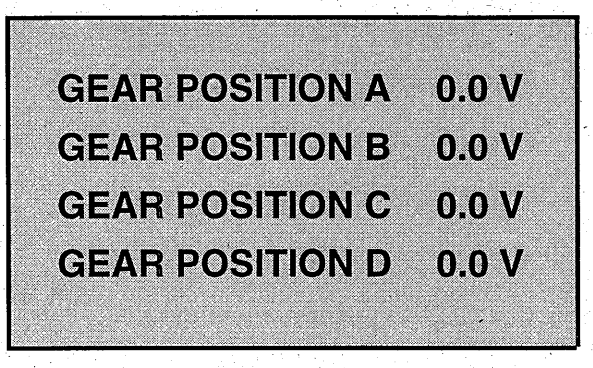
Throttle position signal	15	122 Hz	121–123 Hz	
Throttle position signal	15	0.72 ms	0.1 – 10.0 ms	No throttle

Saab 900 V6, M94, TCM, aut. (CONTD.)

Parameter	Pin	Example	Limits	Basic requirement
TCS lamp	4	11.7 V	9.0 – 15.0 V	
Torque limitation	13	9.97 V	8.0 – 15.0 V	
Engine rpm	29	26.3 Hz	5.0 – 2000.0 Hz	Start the engine
Main ground	22	0.05 V	0.0 – 0.2 V	
Main ground	35	0.0 V	0.0 – 0.2 V	
Speed sensor in	12	287 Hz	100–300 Hz	No throttle
CHECK GEARBOX	6	13.1 V	9.0 – 15.0 V	
Speed sensor out	30	104 Hz	100–300 Hz	Raise the car, engage DRIVE, speedometer at 30 km/h
WINTER switch	21	0.28 V	0.0 – 2.0 V	Press the WINTER switch
WINTER lamp	7	0.28 V	0.0 – 2.0 V	
WINTER switch	21	0.28 V	0.0 – 2.0 V	Press the WINTER switch
WINTER lamp	7	13.1 V	9.0 – 15.0 V	
Drive	11	0.71 V	0.0 – 2.0 V	Depress the brake pedal
Oil temperature	33	1.69 V	0.5 – 4.0 V	
+15	17	0.28 V	0.0 – 2.0 V	Ignition off

Readings

		Pin
Gear position A	Gear selector position sensor, switch A	9
Gear position B	Gear selector position sensor, switch B	10
Gear position C	Gear selector position sensor, switch C	28
Gear position D	Gear selector position sensor, switch D	27



Saab 900 V6, M94, TCS

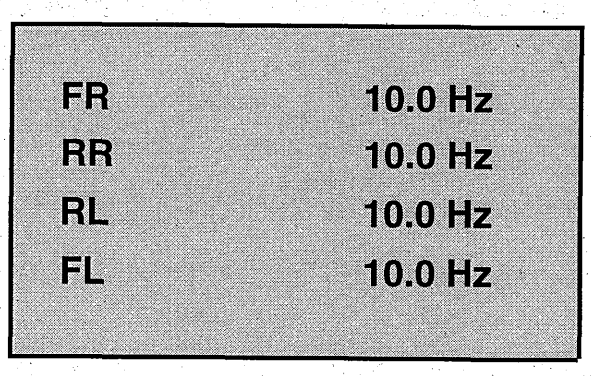
Parameter	Pin	Example	Limits	Basic requirement
Main ground	13	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	30	0.0 V	0.0 – 0.2 V	"
+30	32	12.3 V	8.0 – 15.0 V	"
Ground, throttle position	20	0.0 V	0.0 – 0.2 V	ECM reconnected
+15	28	0.0 V	0.0 – 2.0 V	Ignition off
Brake light switch	23	12.0 V	9.0 – 15.0 V	Depress the brake pedal
Brake light switch	23	0.0 V	0.0 – 2.0 V	Release the brake pedal
+15	28	12.0 V	9.0 – 15.0 V	Ignition on
Throttle position +5V	3	4.91 V	4.7 – 5.3 V	"
Throttle position sensor	27	4.06 V	3.0 – 5.0 V	"
Throttle position signal	4	122 Hz	121–123 Hz	"
Throttle position signal	4	0.97 ms	0.1 – 4.0 ms	No throttle
Throttle actuator motor	18	0.0 V	0.0 – 2.0 V	"
Throttle actuator motor	35	0.0 V	0.0 – 2.0 V	"
Throttle position signal	11	100 Hz	99 – 101 Hz	"
TCS test signal	21	31.1 Hz	29.0 – 33.0 Hz	"
TCS lamp	12	12.0 V	9.0 – 15.0 V	"
Cruise control	5	12.0 V	9.0 – 15.0 V	Depress the brake pedal
Cruise control	5	0.0 V	0.0 – 2.0 V	Release the brake pedal
Wheel speed	7	32.1 Hz	1.0 – 100.0 Hz	Rotate the right–hand front wheel 1/2 revolution per second
Wheel speed	8	10.6 Hz	1.0 – 100.0 Hz	Rotate the right–hand rear wheel 1/2 revolution per second
Wheel speed	24	21.2 Hz	1.0 – 100.0 Hz	Rotate the left–hand rear wheel 1/2 revolution per second
Wheel speed	25	23.1 Hz	1.0 – 100.0 Hz	Rotate the left–hand front wheel 1/2 revolution per second
Engine rpm	6	270 RPM	500–2000 RPM	Start the engine
Main ground	13	0.0 V	0.0 – 0.2 V	
Main ground	30	0.0 V	0.0 – 0.2 V	
Ground, throttle position	20	0.14 V	0.0 – 0.2 V	
TCS lamp	1	0.28 V	0.0 – 0.2 V	Press the TCS button

Saab 900 V6, M94, TCS (contd.)

Parameter	Pin	Example	Limits	Basic requirement
TCS OFF lamp	26	0.57 V	0.0 – 2.0 V	
TCS lamp	1	0.0 V	0.0 – 2.0 V	Press the TCS button
TCS OFF lamp	26	13.4 V	9.0 – 15.0 V	Press the TCS button
Throttle actuator motor	18	501 Hz	499–501 Hz	Raise the car, engage DRIVE, speedometer at 30 km/h
Throttle position sensor	27	1.54 V	0.5 – 2.0 V	
Throttle actuator motor	18	0.0 Hz	0.0 – 1.0 Hz	Depress the brake pedal Then engage the parking gear (P)
+15		0.0 V	0.0 – 2.0 V	Ignition off

Readings

		Pin
FR	Wheel speed, right front, signal from ABS	7
RR	Wheel speed, right rear, signal from ABS	8
RL	Wheel speed, left rear, signal from ABS	24
FL	Wheel speed, left front, signal from ABS	25



Saab 9000 V6, M95, TCS

Parameter	Pin	Example	Limits	Basic requirement
Main ground	13	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	30	0.0 V	0.0 – 0.2 V	"
+30	32	12.5 V	8.0 – 15.0 V	"
Ground, throttle position	20	0.0 V	0.0 – 0.2 V	ECM reconnected
+15	28	0.0 V	0.0 – 2.0 V	Ignition off
Brake light switch	23	11.7 V	9.0 – 15.0 V	Depress the brake pedal
Brake light switch	23	1.92 V	0.0 – 2.0 V	Release the brake pedal
+15	28	9.24 V	9.0 – 15.0 V	Ignition on
Throttle position +5V	3	4.75 V	4.7 – 5.3 V	"
Throttle position sensor	27	4.20 V	3.0 – 5.0 V	"
Throttle actuator motor	18	0.0 V	0.0 – 2.0 V	"
Throttle actuator motor	35	0.0 V	0.0 – 2.0 V	"
Throttle position signal	11	100 Hz	99 – 101 Hz	"
TCS test signal	21	31.1 Hz	29.0 – 33.0 Hz	"
Cruise control	5	12.0 V	9.0 – 15.0 V	Depress the brake pedal
Cruise control	5	0.0 V	0.0 – 2.0 V	Release the brake pedal
Wheel speed	7	7.83 Hz	1.0 – 100.0 Hz	Rotate the right–hand front wheel 1/2 revolution per second
Wheel speed	8	3.51 Hz	1.0 – 100.0 Hz	Rotate the right–hand rear wheel 1/2 revolution per second
Wheel speed	24	2.44 Hz	1.0 – 100.0 Hz	Rotate the left–hand rear wheel 1/2 revolution per second
Wheel speed	25	6.04 Hz	1.0 – 100.0 Hz	Rotate the left–hand front wheel 1/2 revolution per second
Engine rpm	6	859 RPM	500–2000 RPM	Start the engine
Main ground	13	0.0 V	0.0 – 0.2 V	
Main ground	30	0.0 V	0.0 – 0.2 V	
Ground, throttle position	20	0.14 V	0.0 – 0.2 V	
TCS lamp	1	0.84 V	0.0 – 0.2 V	Press the TCS button
TCS OFF lamp	26	0.28 V	0.0 – 0.2 V	
TCS lamp	1	0.57 V	0.0 – 0.2 V	Press the TCS button
TCS OFF lamp	26	13.1 V	9.0 – 15.0 V	Press the TCS button

Saab 9000 V6, M95, TCS (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Throttle actuator motor	18	501 Hz	499–501 Hz	Raise the car, engage DRIVE, speedometer to 30 km/h
Throttle position	27	1.54 V	0.5 – 2.0 V	
Throttle position	18	0.0 Hz	0.0 – 1.0 Hz	Depress the brake pedal Then engage the parking gear (P)
+15	28	0.0 V	0.0 – 2.0 V	Ignition off

Readings

		Pin
FR	Wheel speed, right front, signal from ABS	7
RR	Wheel speed, right rear, signal from ABS	8
RL	Wheel speed, left rear, signal from ABS	24
FL	Wheel speed, left front, signal from ABS	25

FR	10.0 Hz
RR	10.0 Hz
RL	10.0 Hz
FL	10.0 Hz

Saab 9000 2.3 turbo, M93. ETS, man.

Parameter	Pin	Example	Limits	Basic requirement
Main ground	1	0.0 V	0.0 – 0.2 V	Active ground test
Ground, throttle position	4	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, throttle position	5	0.0 V	0.0 – 0.2 V	"
+15	25	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	13	12.0 V	9.0 – 15.0 V	"
Main relay #87	22	0.0 V	0.0 – 2.0 V	"
Brake light switch	15	11.6 V	9.0 – 15.0 V	Depress the brake pedal
Brake light switch	15	0.0 V	0.0 – 2.0 V	Release the brake pedal
Charge air bypass valve	6	0.0 V	0.0 – 2.0 V	
Safety valve	35	0.0 V	0.0 – 2.0 V	
+15	25	11.7 V	9.0 – 15.0 V	Ignition on
Main relay #85	13	1.14 V	0.0 – 2.0 V	"
Main relay #87	22	11.7 V	9.0 – 15.0 V	"
Throttle position +5V	2	4,69	4.5 – 5.3 V	"
Throttle position +5V	3	4.64 V	4.5 – 5.3 V	"
Pedal position sensor	16	1.71 V	0.0 – 2.0 V	Wide open throttle
Throttle position switch	14	7.39 V	6.5 – 15.0 V	"
Throttle position switch	28	7.98 V	6.5 – 15.0 V	"
Pedal position sensor	16	3.71 V	3.5 – 5.0 V	No throttle
Throttle position switch	14	0.86 V	0.0 – 2.0 V	"
Throttle position switch	28	0.77 V	0.0 – 2.0 V	"
Throttle position sensor	17	OK		Potentiometer test 1. Wide open throttle 2. Slowly release the accelerator pedal
Throttle actuator motor	18	0.0 V	0.0 – 2.0 V	
Throttle actuator motor	35	1.16 V	0.0 – 2.0 V	
Charge air bypass valve	6	11.4 V	9.0 – 15.0 V	
Safety valve	35	1.16 V	0.0 – 2.0 V	
Throttle actuator motor	20	396 Hz	1 – 2000 Hz	Ignition on
Throttle actuator motor	21	0.0 Hz	0.0 – 1000.0 Hz	"

Saab 9000 2.3 turbo, M93, ETS, man. (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Question: Man. gearbox? YES/NO (if NO, miss out four test stages)				
Brake+clutch switch	36	0.57 V	0.0 – 2.0 V	Depress the brake pedal
Brake+clutch switch	36	11.7 V	9.0 – 15.0 V	Release the brake pedal
Brake+clutch switch	36	0.48 V	0.0 – 2.0 V	Depress the clutch pedal
Brake+clutch switch	36	11.4 V	9.0 – 15.0 V	Release the clutch pedal
TCS lamp	23	11.4 V	9.0 – 15.0 V	
Cruise control	31	11.4 V	9.0 – 15.0 V	Set cruise control ON
Cruise control	18	11.7 V	9.0 – 15.0 V	Set cruise control RES
Cruise control	19	11.7 V	9.0 – 15.0 V	Set cruise control SET
Cruise control	31	0.0 V	0.0 – 2.0 V	Set cruise control OFF
Throttle position signal	26	200 Hz	199–201 Hz	
Question: Wheel sensor test? YES/NO (if NO, miss out one test stage)				
Wheel speed	10	7.93 Hz	1.0 – 300.0 Hz	Rotate right–hand front wheel
Engine coolant temp.	33	1.31 V	0.1 – 4.5 V	
Comm.ASR/TC–ABS	29	1420 Hz	1 – 3000 Hz	
Comm.ASR/TC–ABS	32	835 Hz	1 – 3000 Hz	
Engine rpm	12	871 RPM	500–2000RPM	Start the engine
Main relay #85	13		0 – 2 V	"
Main relay #87	22		9 – 15 V	"
Engine load Signal	27	28.5 Hz	1.0 – 200.0 Hz	"
Main ground	1	0.0 V	0.0 – 0.2 V	"
Ground, throttle position	4	0.09 V	0.0 – 0.2 V	"
Ground, throttle position	5	0.14 V	0.0 – 0.2 V	"
Engine coolant temp.	33	1.31 V	0.1 – 4.5 V	"

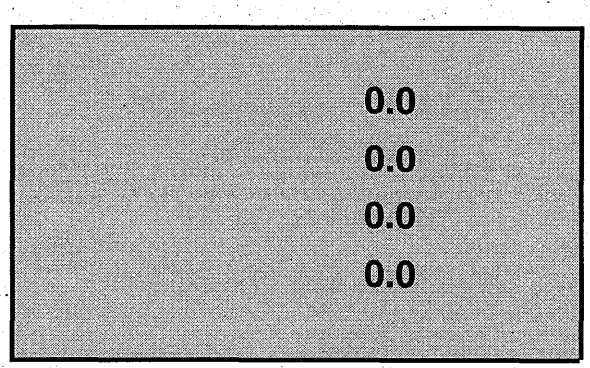
Saab 9000 2.3 turbo, M93, ETS, man. (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Question: Equipment ACC or A/C? YES/NO (if NO, miss out four test stages)				
A/C In	37	10.2 V	8.0 – 15.0 V	Switch on fan and A/C
A/C Relay #85	38	0.83 V	0.0 – 2.0 V	"
A/C In	37	0.0 V	0.0 – 2.0 V	Switch off ACC
A/C Relay #85	38	12.2 V	9.0 – 15.0 V	Switch off ACC
+15	25	0.57 V	0.0 – 2.0 V	Ignition off

Saab 9000 2.3 turbo, M93, ETS, aut.

Readings

There is no system data test for the ETS system



Saab 9000 2.3 turbo, M93, ETS, aut. (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Main ground	1	0.0 V	0.0 – 0.2 V	Active ground test
Ground, throttle position	4	0.0 V	0.0 – 0.2 V	ECM reconnected
Ground, throttle position	5	0.0 V	0.0 – 0.2 V	"
+15	25	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	13	12.3 V	9.0 – 15.0 V	"
Main relay #87	22	0.0 V	0.0 – 2.0 V	"
Brake light switch	15	11.7 V	9.0 – 15.0 V	Depress the brake pedal
Brake light switch	15	0.0 V	0.0 – 2.0 V	Release the brake pedal
Charge air bypass valve	6	0.0 V	0.0 – 2.0 V	
Safety valve	35	0.0 V	0.0 – 2.0 V	
+15	15	11.7 V	9.0 – 15.0 V	Ignition on
Main relay #85	13	1.41 V	0.0 – 2.0 V	"
Main relay #87	22	11.7 V	9.0 – 15.0 V	"
Throttle position +5 V	2	4.92 V	4.5 – 5.3 V	"
Throttle position +5 V	3	4.79 V	4.5 – 5.3 V	"
Pedal position sensor	16	1.71 V	0.0 – 0.2 V	Wide open throttle
Throttle position switch	14	7.41 V	6.5 – 15.0 V	"
Throttle position switch	28	8.27 V	6.5 – 15.0 V	"
Pedal position sensor	16	3.69 V	3.5 – 5.0 V	No throttle
Throttle position switch	14	0.86 V	0.0 – 2.0 V	"
Throttle position switch	28	0.68 V	0.0 – 2.0 V	"
Throttle position sensor	17	OK		Potentiometer test 1. Wide open throttle 2. Slowly release the accelerator pedal
Throttle actuator motor	18	0.0 V	0.0 – 2.0 V	
Throttle actuator motor	35	1.35 V	0.0 – 2.0 V	
Charge air bypass valve	6	11.4 V	9.0 – 15.0 V	
Safety valve	35	1.43 V	0.0 – 2.0 V	
Throttle actuator motor	20	25.1 Hz	1.0 – 2000.0 Hz	Ignition on
Throttle actuator motor	21	0.0 Hz	0.0 – 1000.0 Hz	"

Saab 9000 2.3 turbo, M93, ETS, aut. (contd.)

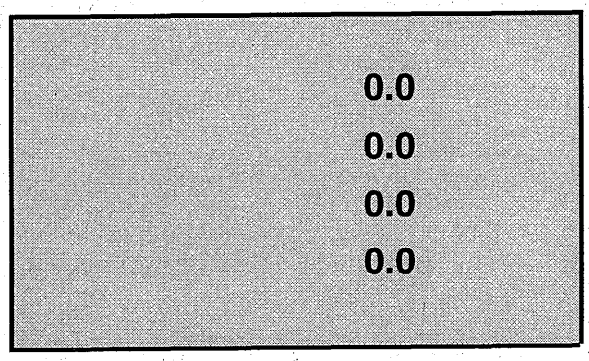
Parameter	Pin	Example	Limits	Basic requirement
Question: Man. gearbox? YES/NO (if NO, miss out four test stages)				
Brake+clutch switch	36	0.0 V	0.0 – 2.0 V	Depress the brake pedal
Brake+clutch switch	36	0.0 V	9.0 – 15.0 V	Release the brake pedal
Brake+clutch switch	36	0.0 V	0.0 – 2.0 V	Depress the clutch pedal
Brake+clutch switch	36	0.0 V	9.0 – 15.0 V	Release the clutch pedal
TCS lamp	23	11.4 V	9.0 – 15.0 V	
Cruise control	31	11.7 V	9.0 – 15.0 V	Set cruise control ON
Cruise control	18	10.8 V	9.0 – 15.0 V	Set cruise control RES
Cruise control	19	11.4 V	9.0 – 15.0 V	Set cruise control SET
Cruise control	31	0.0 V	0.0 – 2.0 V	Set cruise control OFF
Throttle position signal	26	199 Hz	199–201 Hz	
Question: Wheel sensor test? YES/NO (if NO, miss out one test stage)				
Wheel speed	10	4.42 Hz	1.0 – 300.0 Hz	Rotate right–hand front wheel
Engine coolant temp.	33	1.82 V	0.1 – 4.5 V	
Comm.ASR/TC–AVS	29	1660 Hz	1– 3000 Hz	
Comm.ASR/TC–ABS	32	1610 Hz	1 – 3000 Hz	
Engine rpm	12	844 RPM	500–2000 RPM	Start the engine
Engine load Signal	27	28.3 Hz	1.0 – 200.0 Hz	"
Main ground	1	0.0 V	0.0 – 0.2 V	"
Ground, throttle position	4	0.09 V	0.0 – 0.2 V	"
Ground, throttle position	5	0.12 V	0.0 – 0.2 V	"
Engine coolant temp.	33	1.79 V	0.1 – 4.5 V	"
Question: Equipment ACC or A/C? YES/NO (if NO, miss out four test stages)				
A/C In	37	11.4 V	8.0 – 15.0 V	Switch on fan and A/C
A/C Relay #85	38	1.11 V	0.0 – 0.2 V	"

Saab 9000 2.3 turbo, M93, ETS, aut. (contd.)

Parameter	Pin	Example	Limits	Basic requirement
A/C In	37	0.28 V	0.0 – 2.0 V	Switch off ACC
A/C Relay #85	38	12.5 V	8.0 – 15.0 V	"
+15	25	1.41 V	0.0 – 2.0 V	Ignition off

Readings

There is no system data test for the ETS system.



Saab 9000 2.3 turbo, M93, ASR

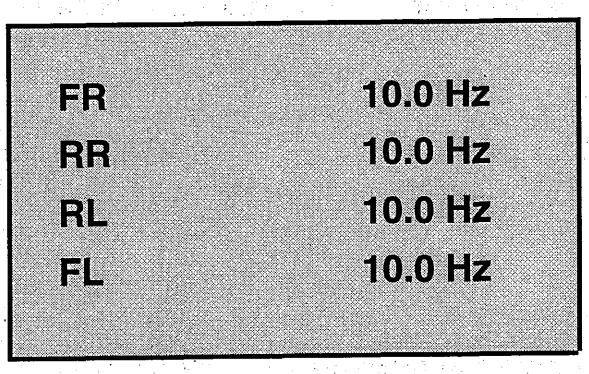
Parameter	Pin	Example	Limits	Basic requirement
Main ground	13	0.0 V	0.0 – 0.2 V	Active ground test
Ground, throttle position	15	0.0 V	0.0 – 0.2 V	ECM reconnected
+15	12	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #87	25	0.0 V	0.0 – 2.0 V	"
+15	12	12.2 V	9.0 – 15.0 V	Ignition on
Main relay #87	25	12.0 V	9.0 – 15.0 V	"
Throttle position +5V	7	4.79 V	4.7 – 5.3 V	"
Throttle position +5V	11	4.93 V	4.7 – 5.3 V	"
Throttle position +5V	20	4.79 V	4.7 – 5.3 V	"
Throttle position sensor	1	OK		Potentiometer test 1. Wide open throttle 2. Slowly release the throttle
Pedal position sensor	3	1.69 V	0.0 – 2.0 V	Ignition on
Pedal position sensor	3	3.71 V	3.5 – 5.0 V	"
Comm.ASR/TC–ABS	2	1540 Hz	1,– 3000 Hz	"
Comm.ASR/TC–ABS	14	1260 Hz	1 – 3000 Hz	"
TCS lamp	19	11.7 V	9.0 – 15.0 V	"
Wheel speed	9	11.6 Hz	10.0 – 100.0 Hz	Rotate the front right wheel 1/2 revolution per second
Wheel speed	21	13.8 Hz	10.0 – 100.0 Hz	Rotate the right–hand rear wheel 1/2 revolution per second
Wheel speed	8	10.1 Hz	10.0 – 100.0 Hz	Rotate the left–hand rear wheel 1/2 revolution per second
Wheel speed	10	10.1 Hz	10.0 – 100.0 Hz	Rotate the left–hand front wheel 1/2 revolution per second
Engine rpm	18	1040 RPM	500– 2000 RPM	Start the engine
Pedal position sensor	22	3.99 V	3.5 – 5.0 V	No throttle
Pedal position sensor	22	1.75 V	0.5 – 2.0 V	Quick throttle increase
Wheel speed	9	7.19 Hz	1.0 – 100.0 Hz	Engage DRIVE and release the brake pedal
Throttle actuator motor	23	955 Hz	1 – 1000 Hz	Quickly turn the motor back
Throttle actuator motor	24	648 Hz	1 – 1000 Hz	"

Saab 9000 2.3 turbo, M93, ASR (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Wheel speed	9	0.0 Hz	0.0 – 0.0 Hz	Depress the brake pedal Then engage the parking gear (P)
+15	12	0.28 V	0.0 – 2.0 V	Ignition off

Readings

		Pin
FR	Wheel speed, right front, signal from ABS	9
RR	Wheel speed, right rear, signal from ABS	21
RL	Wheel speed, left rear, signal from ABS	8
FL	Wheel speed, left front, signal from ABS	9



Saab 900s 2.0, M90, Lucas CU14

Parameter	Pin	Example	Limits	Basic requirement
Main ground	4	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	14	0.0 V	0.0 – 0.2 V	
Main ground	27	0.0 V	0.0 – 0.2 V	
Main ground	40	0.0 V	0.0 – 0.2 V	
+30	15	12.5 V	9.0 – 15.0 V	
Ground, mass air flow	25	0.0 V	0.0 – 0.2 V	ECM reconnected
+15	19	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	12	12.5 V	9.0 – 15.0 V	"
Main relay #87	2	0.28 V	0.0 – 2.0 V	"
Pump relay #85	16	0.28 V	0.0 – 2.0 V	"
+15	19	12.0 V	9.0 – 15.0 V	Ignition on
Main relay #85	12	2.85 V	0.0 – 4.0 V	"
Main relay #87	2	12.3 V	9.0 – 15.0 V	"
Pump relay #85	16	12.3 V	9.0 – 15.0 V	"
Injector	11	12.3 V	9.0 – 15.0 V	"
Injector	13	12.3 V	9.0 – 15.0 V	"
Throttle position +5V	3	4.79 V	4.6 – 5.3 V	"
Throttle position sensor	20	OK		Potentiometer test 1. Wide open throttle 2. Slowly release the throttle
Engine coolant temp.	7	0,58	0.1 – 4.5 V	
ELCD valve	17	1.14 V	0.0 – 2.0 V	

Question: Cold starting valve fitted? YES/NO (if NO, miss out two test stages)

Cold valve code	34	0.0 V	0.0 – 2.0 V
Cold start valve	33	0.0 V	9.0 – 15.0 V

Saab 900s 2.0, M90, Lucas CU14 (contd.)

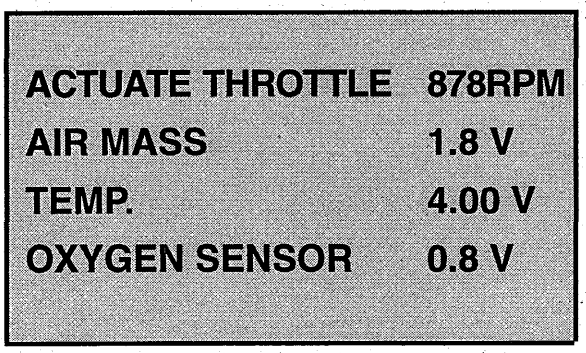
Parameter	Pin	Example	Limits	Basic requirement
Question: Wheel sensor test? YES/NO (if NO, miss out one test stage)				
Wheel speed	6	3.22 Hz	1.0 – 300.0 Hz	
CHECK ENGINE (MIL)	10	11.7 V	9.0 – 15.0 V	Ignition on
Ignition pulses	39	786 RPM	500 – 2000 RPM	Start the engine
Main ground	4	0.0 V	0.0 – 0.2 V	"
Main ground	14	0.0 V	0.0 – 0.2 V	"
Main ground	27	0.0 V	0.0 – 0.2 V	"
Main ground	40	0.0 V	0.0 – 0.2 V	"
Ground, mass air flow	25	0.0 V	0.0 – 0.2 V	"
Pump relay #85	16	2.99 V	0.0 – 4.0 V	"
Injector	11	14.0 Hz	10.0 – 25.0 Hz	No throttle
Injector	11	1.16 ms	1.0 – 10.0 ms	"
Injector	13	13.7 Hz	10.0 – 25.0 Hz	"
Injector	13	1.02 ms	0.1 – 10.0 ms	"
Intake mass air flow	35	1.16 V	1.0 – 2.0 V	"
IAC valve	1	12.0 V	9.0 – 15.0 V	Actuate throttle
IAC valve	26	0.84 V	0.0 – 2.0 V	"
IAC valve	28	11.7 V	9.0 – 15.0 V	"
IAC valve	29	0.86 V	0.0 – 2.0 V	"
IAC valve	1	0.86 V	0.0 – 2.0 V	"
IAC valve	26	11.8 V	9.0 – 15.0 V	"
IAC valve	28	0.86 V	0.0 – 2.0 V	"
IAC valve	29	12.0 V	9.0 – 15.0 V	"
Intake mass air flow	35	2.61 V	2.5 – 4.0 V	Actuate throttle more than 3000 RPM

Saab 900s 2.0, M90, Lucas CU14 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Question: Equipment ACC or A/C? YES/NO (if NO, miss out four test stages)				
A/C In	21	0.0 V	9.0 – 15.0 V	Switch **on** the fan and A/C
A/C Relay #85	36	0.0 V	0.0 – 4.0 V	"
A/C In	21	0.0 V	0.0 – 2.0 V	Switch **off** the fan and A/C
A/C Relay #85	36	0.0 V	9.0 – 15.0 V	"
Question: Aut. transmission? YES/NO (if NO, miss out two test stages)				
Drive	5	0.0 V	9.0 – 15.0 V	Engage reverse (R)
Drive	5	0.0 V	0.0 – 4.0 V	Engage parking gear (P)
CHECK ENGINE (MIL)	10	13.4 V	9.0 – 15.0 V	
Oxygen sensor	23	0.0 V	0.0 – 0.3 V	Vary engine speed
Oxygen sensor	23	0.87 V	0.6 – 1.0 V	"
ELCD valve	17	8.16 Hz	7.0 – 20.0 Hz	"
Engine coolant temp.	7	0.58 V	0.1 – 4.5 V	
+15	19	0.0 V	0.0 – 2.0 V	Ignition off

Readings

		Pin
ACTUATE THROTTLE	Ignition pulse	
AIR MASS	Mass air flow sensor	
TEMP.	Engine coolant temperature sensor	
OXYGEN SENSOR	Oxygen sensor	



Saab 9000 turbo 2.0, M88, LH 2.2

Parameter	Pin	Example	Limits	Basic requirement
Main ground	5	0.0 V	0.0 – 0.2 V	Active ground test
Main ground	11	0.0 V	0.0 – 0.2 V	
Main ground	25	0.0 V	0.0 – 0.2 V	
Sensor ground	6	0.0 V	0.0 – 0.2 V	ECM reconnected
+15	18	0.0 V	0.0 – 2.0 V	Ignition off
Main relay #85	21	13.1 V	9.0 – 15.0 V	
Main relay #87	9	0.0 V	0.0 – 2.0 V	
Pump relay #85	17	0.0 V	0.0 – 2.0 V	
Intake mass air flow	7	0.0 V	0.0 – 1.0 V	
+15	18	12.0 V	9.0 – 15.0 V	Ignition on
Injector	13	0.0 Hz	0.0 – 0.0 Hz	"
Main relay #85	21	1.12 V	0.0 – 4.0 V	"
Main relay #87	9	12.5 V	9.0 – 15.0 V	"
Pump relay #85	17	12.8 V	9.0 – 15.0 V	"
Idling switch	3	4.56 V	4.0 – 15.0 V	Wide open throttle
Full load switch	12	0.0 V	0.0 – 2.0 V	"
Idling switch	3	0.0 V	0.0 – 2.0 V	No throttle
Full load switch	12	5.42 V	4.0 – 15.0 V	"
IAC valve	10	94.5 Hz	50.0 – 150.0 Hz	
IAC valve	10	4.94 ms	0.1 – 10.0 ms	
IAC valve	23	94.5 Hz	50.0 – 150.0 Hz	
IAC valve	23	5.52 ms	0.1 – 10.0 ms	
Engine coolant temp.	2	1.31 V	0.1 – 4.5 V	
Ignition pulses	1	505 RPM	500 – 2000RPM	Start the engine
Main ground	5	0.0 V	0.0 – 0.2 V	
Main ground	11	0.0 V	0.0 – 0.2 V	Start the engine
Main ground	25	0.0 V	0.0 – 0.2 V	"
Sensor ground	6	0.0 V	0.0 – 0.2 V	"
Pump relay	17	0.0 V	0.0 – 2.0 V	"

Saab 9000 turbo 2.0, M88, LH 2.2 (contd.)

Parameter	Pin	Example	Limits	Basic requirement
Intake mass air flow	7	3.05 V	0.5 – 3.5 V	Start the engine
CO adjustment	14	1.89 V	0.5 – 4.0 V	"
Injector	13	22.1 Hz	10.0 – 30.0 Hz	"
Injector	13	2.42 ms	0.1 – 10.0 ms	"
IAC valve	10	100 Hz	99 – 101 Hz	"
IAC valve	10	6.15 ms	0.1 – 10.0 ms	"
IAC valve	23	101 Hz	99 – 101 Hz	"
IAC valve	23	3.53 ms	0.1 – 10.0 ms	"
Injector	13	30.9 Hz	30.0 – 70.0 Hz	Actuate throttle up to 3000 RPM
Intake mass air flow	7	3.99 V	3.5 – 5.0 V	Actuate throttle up to 3000 RPM

Question: Oxygen sensor fitted? YES/NO (if NO, miss out two test stages)

Oxygen sensor	20	0.0 V	0.0 – 0.3 V	Vary engine speed
Intake mass air flow	20	0.86 V	0.6 – 1.0 V	Vary engine speed

Question: Aut. transmission? YES/NO (if NO, miss out two test stages)

Drive	4	0.0 V	9.0 – 15.0 V	
Drive	4	0.0 V	0.0 – 4.0 V	

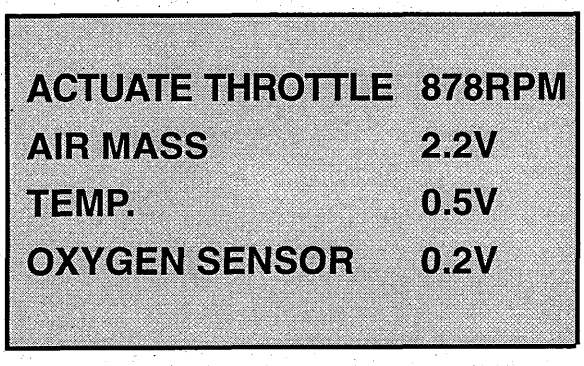
Question: Burn off air mass test? YES/NO (if NO, miss out three test stages)

Ignition pulses	1	3010RPM	3000–5000RPM	Actuate throttle up to 3000 RPM
Engine coolant temp.	13	0.70 V	0.1 – 1.0 V	
Burn off air mass	8	3.89 V	3.3 – 5.0 V	Ignition off
+15	18	0.0 V	0.0 – 2.0 V	Ignition off

Saab 9000 turbo 2.0, M88, LH 2.2 (contd.)

Readings

		Pin
ACTUATE THROTTLE	Ignition pulse	1
AIR MASS	Mass air flow sensor	7
TEMP.	Engine coolant temp. sensor	2
OXYGEN SENSOR	Oxygen sensor	20

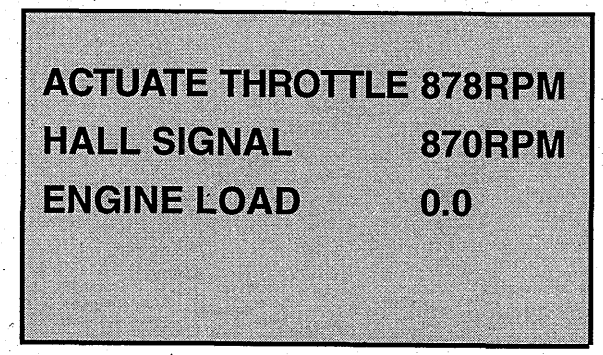


Saab 900i 2.1, M91, EZK–91

Parameter	Pin	Example	Limits	Basic requirement
Main ground	20	0.0 V	0.0 – 0.2 V	Active ground test
Sensor ground	10	0.0 V	0 – 0.2 V	ECM reconnected
+15	6	0.0 V	0 – 2.0 V	Ignition off
+15	6	11.4 V	9.0 – 15.0 V	Ignition on
Throttle position switch	7	8.41 V	4.0 – 12.0 V	Wide open throttle
Throttle position switch	7	0.07 V	0.0 – 1.0 V	No throttle
Hall effect sensor	4	10.2 V	9.0 – 15.0 V	
Hall effect sensor	24	528 RPM	500–2000 RPM	Start the engine
Main ground	20	0.0 V	0.0 – 0.2 V	"
Sensor ground	10	0.0 V	0.0 – 0.2 V	"
Ignition pulses	16	1230 RPM	500 – 7000 RPM	"
Engine RPM	17	1100 RPM	500 – 7000 RPM	"
Torque limitation	8	18.1 Hz	5.0 – 200.0 Hz	"
CHECK ENGINE (MIL)	3	10.8 V	9.0 – 15.0 V	"
+15	6	0.28 V	0.0 – 2.0 V	Ignition off

Readings

ACTUATE THROTTLE	Ignition pulse
HALL SIGNAL	Signal from Hall effect sensor
ENGINE LOAD SIGNAL	Signal from LH Jetronic



Service

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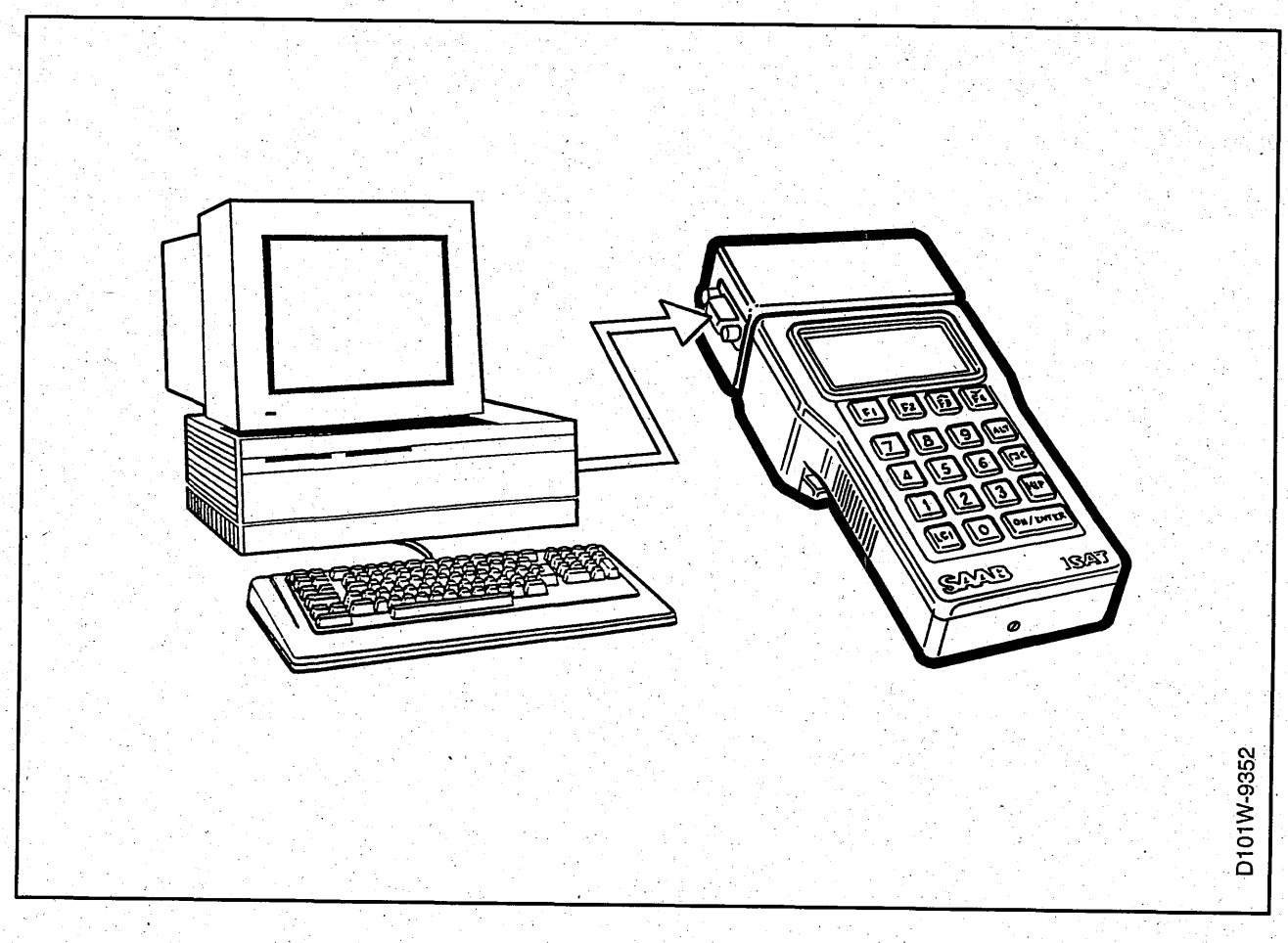
Upgrading, PC to ISAT scan tool



In order to upgrade the ISAT scan tool, the instrument must be equipped with the M96 memory module. Check by switching on the ISAT scan tool. The display should show **ver sion 6.0 or higher**. If it is a lower version, a new memory module should be ordered.

Upgrading with PC (personal computer)

The computer must be IBM compatible and equipped with DOS and preferably also with Windows™.

1 Connect the null modem cable with the 9–pin connector to the computer's communications port (see the computer manual). Connect the other end to the SDA module COMM 9 socket.

2 Start Windows™ and activate the window with the FLASH PROGRAMMING icon.

3 Double click on the icon and click once on FILE and then on CONFIGURE. Select the communications port that the ISAT scan tool is connected to.

4 Click on OK and then RESTART. The text CONNECT AND ACTIVATE ISAT is displayed.

5 Switch on the ISAT scan tool and select UPDATE ISAT and press **F2** for RECEIVER ← ISAT.

6 If the coupling is faulty, you will see a message advising you to check the connection and restart.

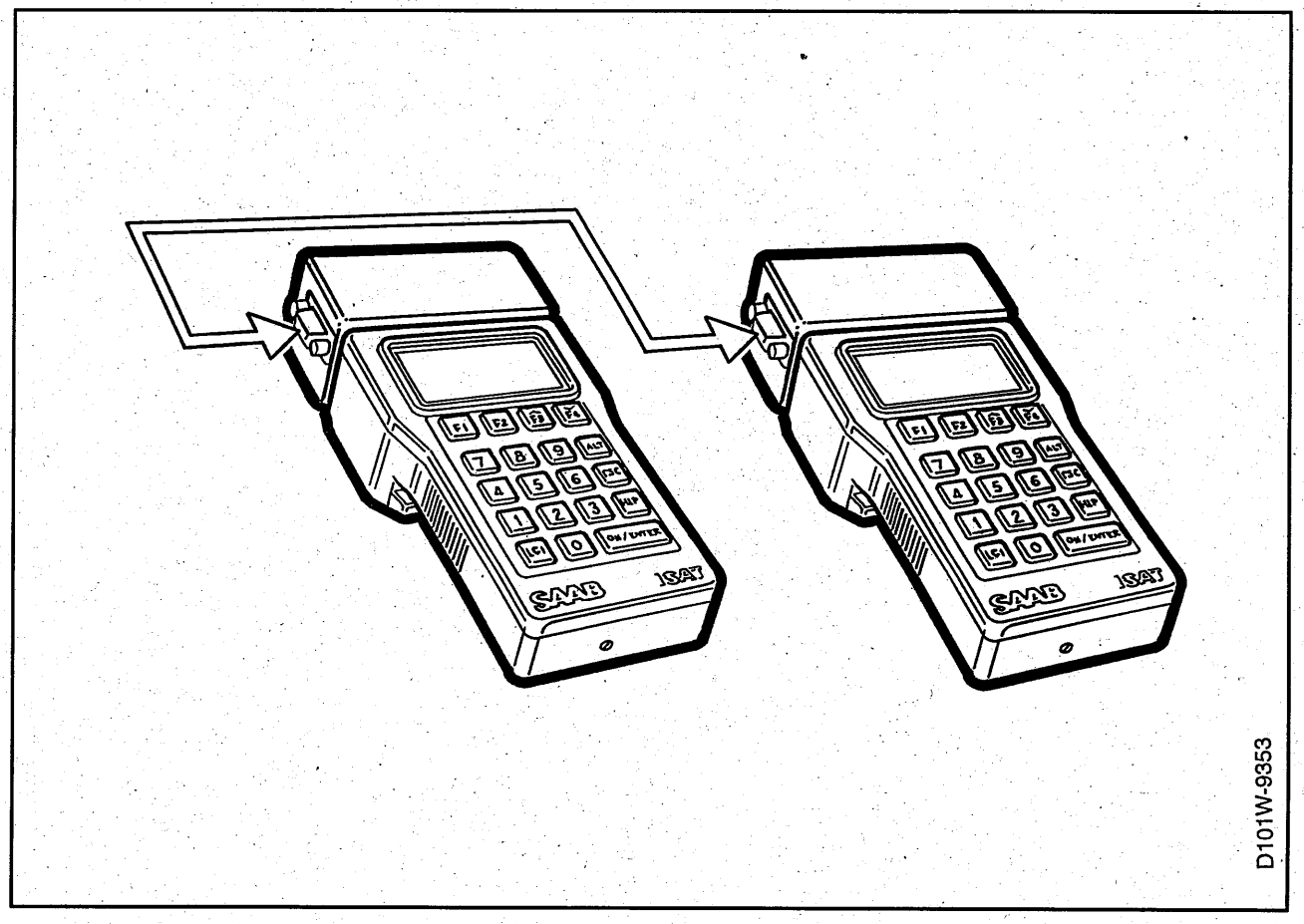
7 When the upgrade starts, this can be seen on both displays.

8 During the upgrade, the display shows which version is currently being fed in, the number of banks 1–32 and the number of blocks 198–0. A timer counts down from 100 to 0.

9 If the upgrade is approved, this is shown on the display.

10 If the upgrade is not approved you will have the option of restarting.

Upgrading, ISAT scan tool to ISAT scan tool



It is also possible to upgrade the ISAT scan tool using a second ISAT scan tool (primary ISAT scan tool) which has been upgraded using a PC. The upgrade takes about 60 minutes so the ISAT scan tool should be connected to a car to receive operating current.

1 Connect the null modem cable with the 9–pin connector to the SDA module's COMM 9 socket.

2 Primary ISAT scan tool:
Switch on the ISAT scan tool and select UPDATE ISAT and press **F3** for SEND → ISAT

3 Slave ISAT:
Switch on the ISAT scan tool and select UPDATE ISAT and press **F2** for RECEIVER ← ISAT.

4 If the coupling is faulty, you will see a message advising you to check the connection and restart.

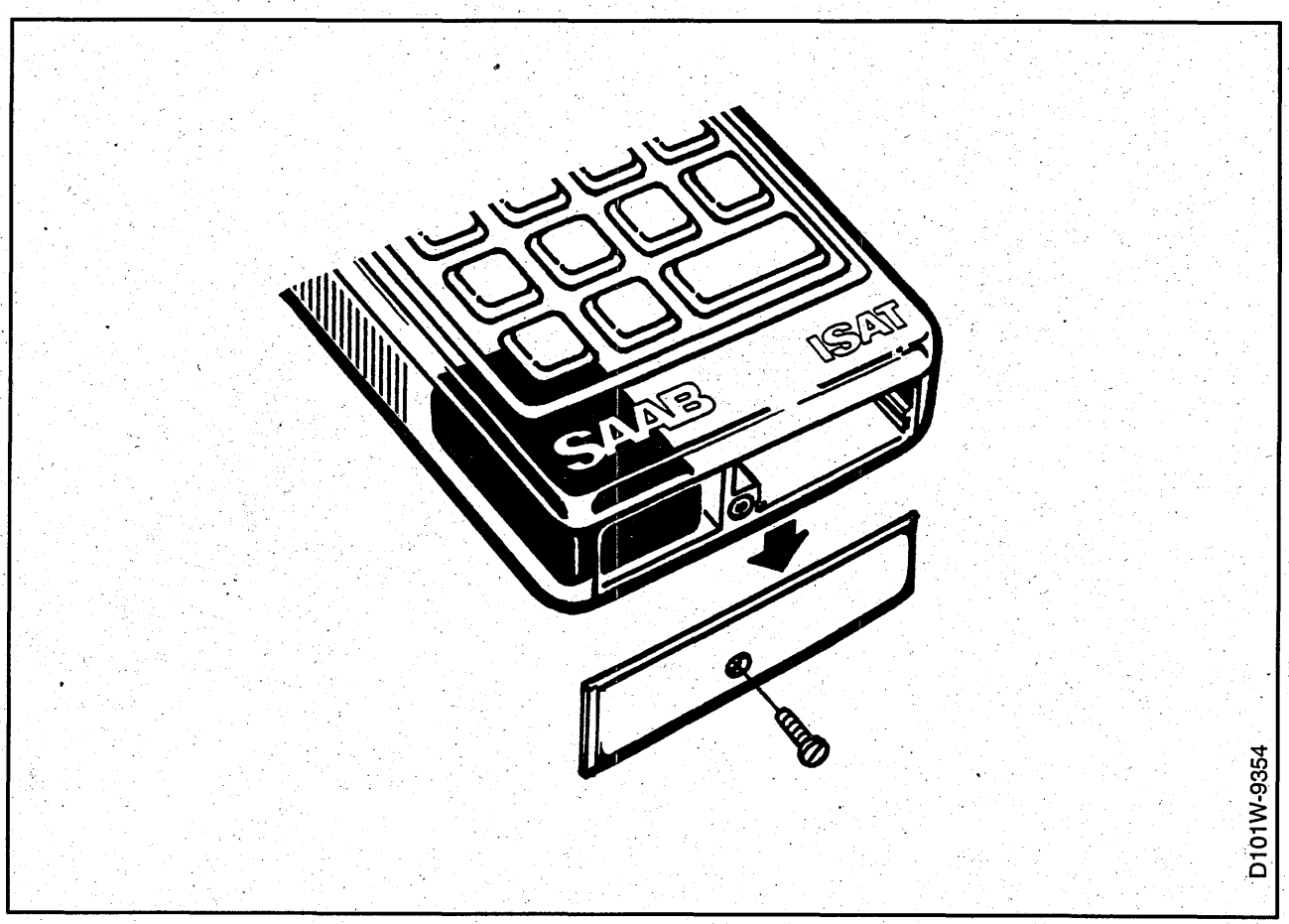
5 When the upgrade starts, this can be seen on both displays.

6 During the upgrade, the display shows which version is currently being fed in, the number of banks 1–32 and the number of blocks 198–0. A timer counts down from 100 to 0.

7 If the upgrade is approved, this is shown on the display.

8 If the upgrade is not approved you will have the option of restarting.

Changing the battery

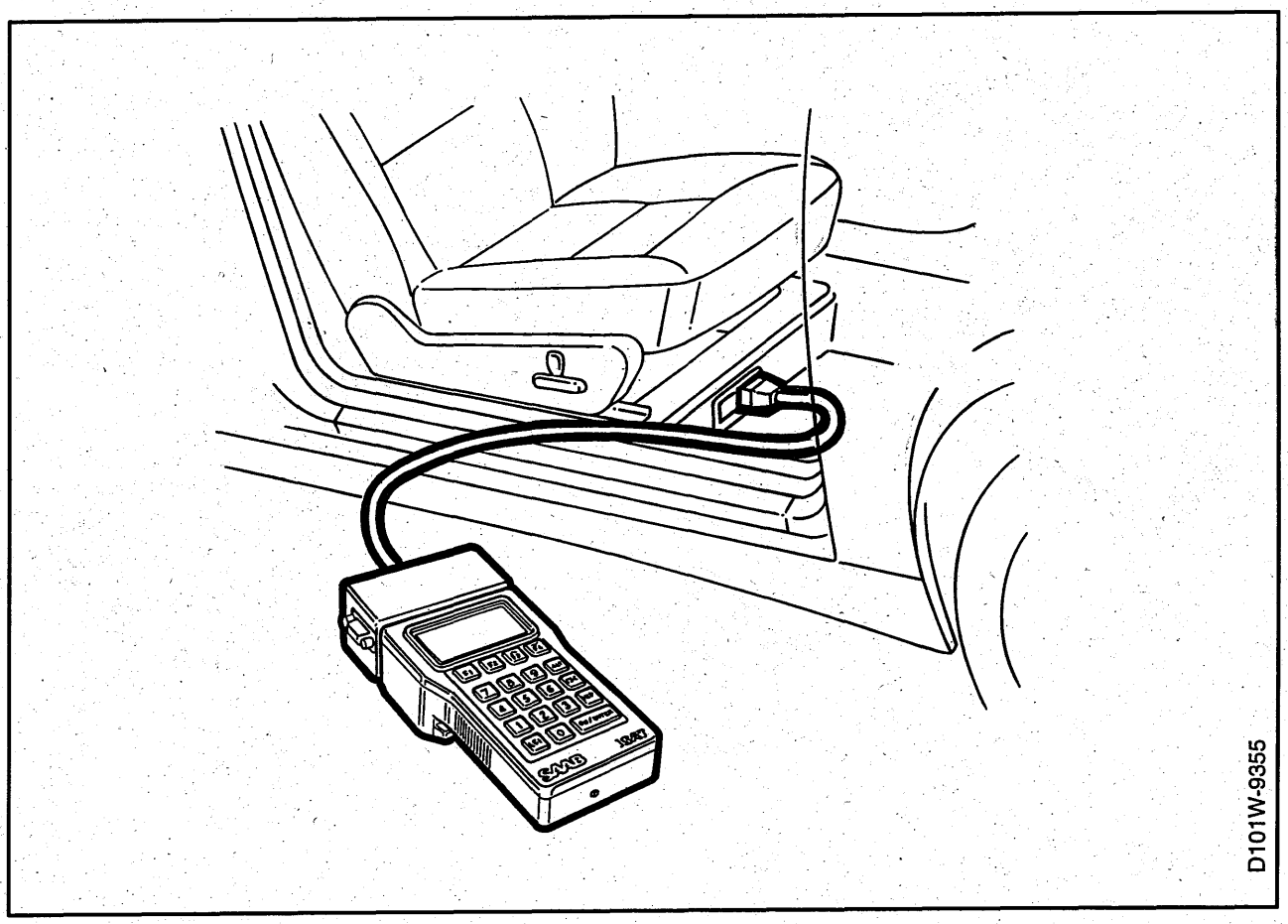


There is a battery in the bottom of the ISAT scan tool. This battery is changed as follows:

1 Remove the cover.
2 Remove the battery and unplug the connector.
3 Connect the new battery and push it into position, refitting the cover.

> ⚠ **WARNING**
>
> Only use a recommended **9 V rechargeable** battery. If other batteries are used, there is a danger of the ISAT scan tool exploding when it is connected to a car.

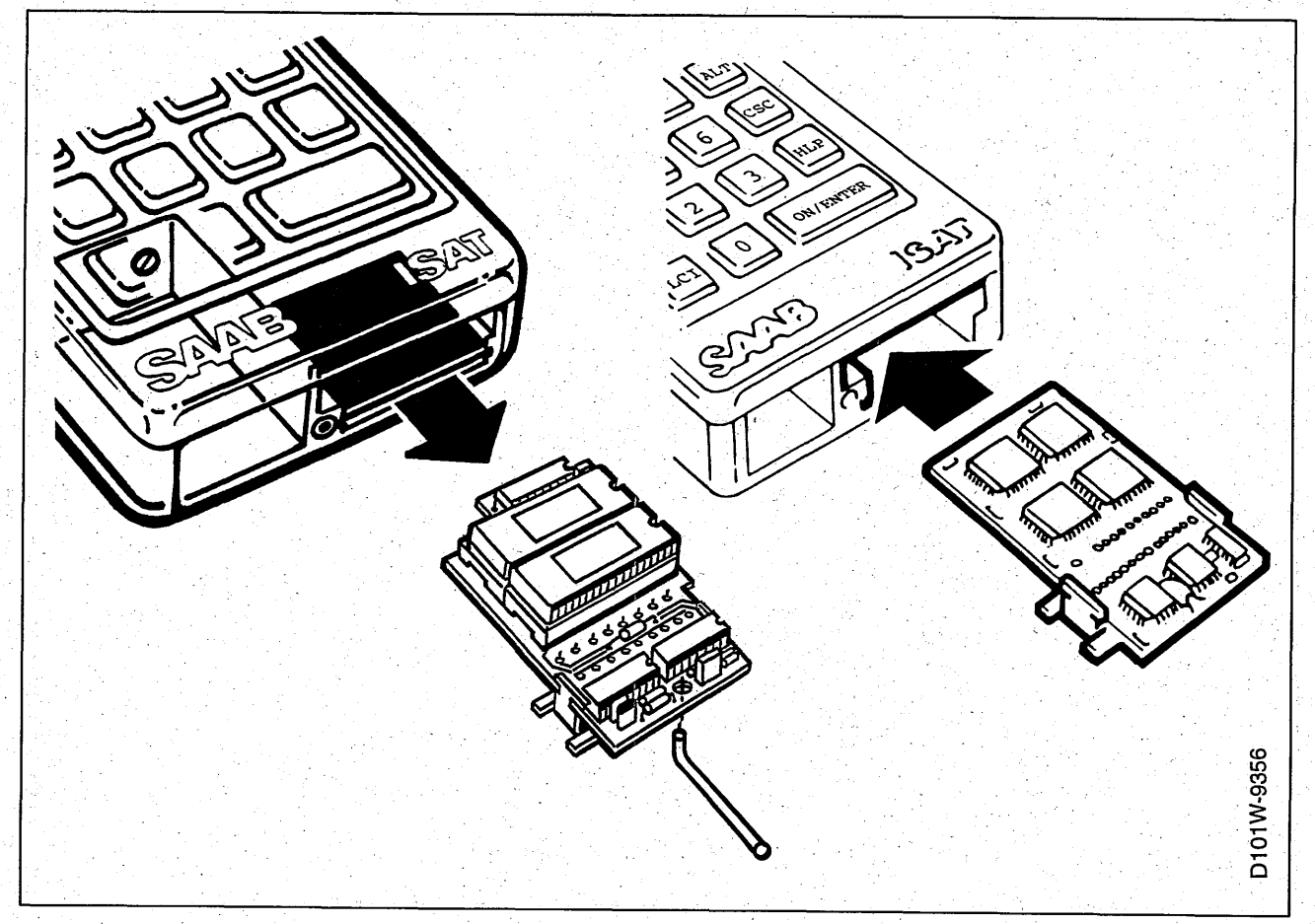
Charging the battery



In order for the battery in the ISAT scan tool to continue working for a long time, it must be recharged. Charging takes place when the ISAT scan tool is connected to a car via the data link connector. In order for the battery to become fully charged, the ISAT scan tool must be:

Connected for about 14 hours.

Memory module, changing



In order for the ISAT scan tool to be upgraded in the future, it must be equipped with the M96 memory module.

This module is located behind the cover in the bottom of the ISAT scan tool.

The module is changed as follows:

1 Remove the cover on the bottom of the ISAT scan tool.

2 Extract the memory module using the hole in the outer edge.

3 Carefully insert the new module and refit the cover.

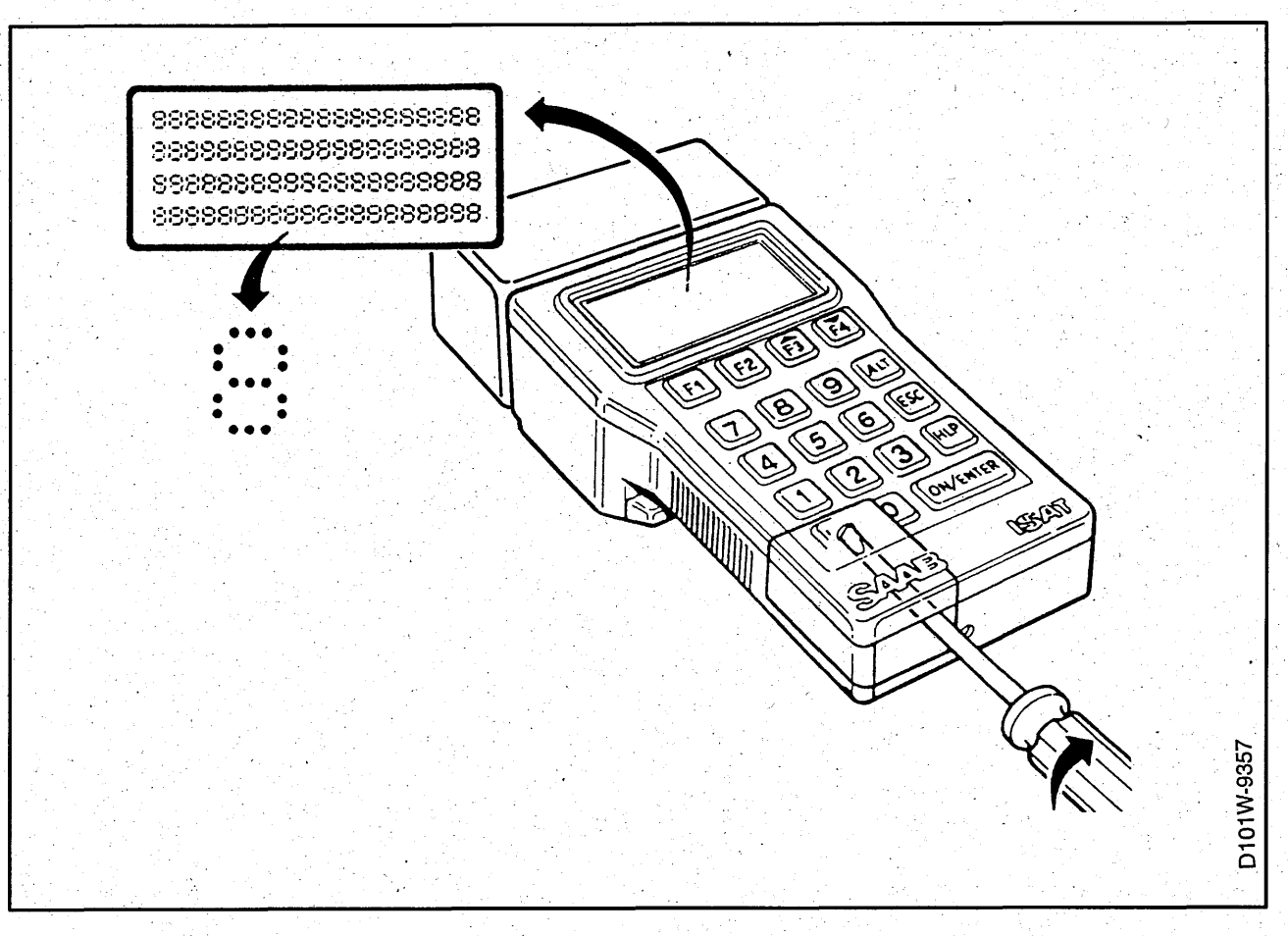
Important

Take care when handling the memory module. The memory module circuits are extremely sensitive to electrostatic discharge and can, if handled incorrectly, be damaged so severely as to be rendered unserviceable.

Never touch the memory module circuits and never place the module where it can come into contact with foreign objects.

Always store loose memory modules in an ESD cover.

Adjusting display



The display view angle can only be adjusted on the ISAT I scan tool.

The display is a dot matrix LCD display. This display is not as easy to read from all angles due to the properties of the LCD. It is therefore possible to adjust the angle using a set screw inside the battery cover. In the ISAT II scan tool, the display is manufactured in such a manner that it is easy to read from all angles.

1 Unscrew the battery cover on the bottom of the ISAT scan tool.

2 Remove the battery without disconnecting the leads.

3 Look at the display while carefully turning the set screw as illustrated. When the display is easy to read from the angle you require, release the set screw and close the cover.

Workshop Information

User feedback

To

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From

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Comments/suggestions

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Manual concerned: .....

It is important that Saab technicians in the field regard the Workshop Service Manual as their bible, and we therefore strive to make the manual easy to use and to provide accurate information.

By letting us have your views on this manual you will be helping us to maintain a high standard in our literature.

Note down any comments or suggestions you may have on a sheet of paper or take a copy of this page and send us your views at the above address. For greater convenience, you are also welcome to send your comments by fax, using the telephone number shown.

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