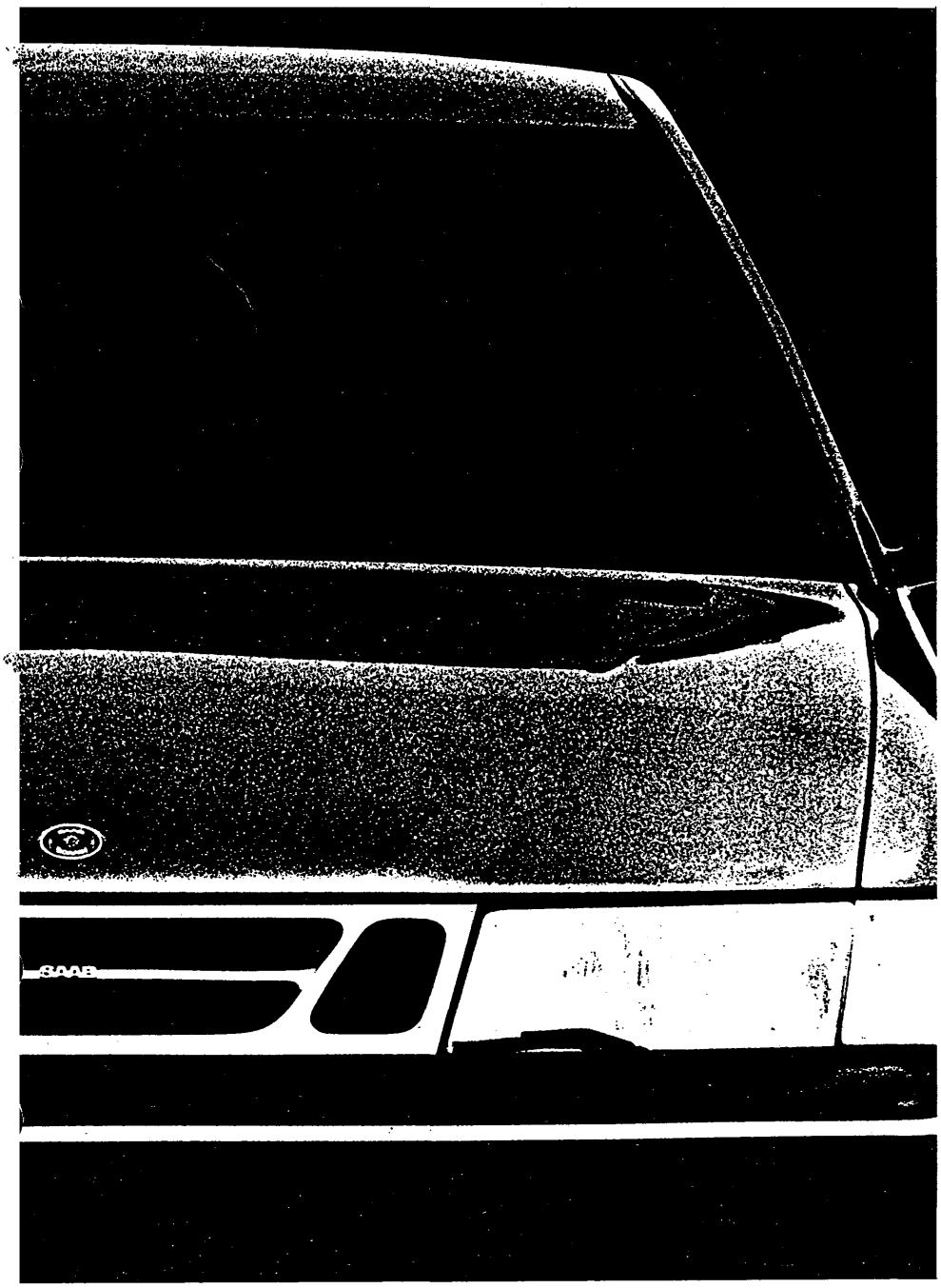
Saab

Service Manual



M 1997

ENG

1:4 Tech 2

Saab
SERVICE MANUAL

1:4 Tech 2
M 1997

Preface

Tech 2 is a test and diagnostics instrument designed for diagnosing faults on cars. Tech 2 can be upgraded continuously with new software for fault diagnosis on new car models and when modifications are made to the electronic circuitry in the cars.

All information and illustrations in this service manual are based on the particulars and data that were applicable at the time of going to press. Technical data and equipment may be subject to alteration without prior notice.

Saab Automobile AB

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 provided 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	PA	Asia/Pacific region
FE	Far East	SE	Sweden
FI	Finland	US	USA
FR	France	UC	US California

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

Introduction

General

The Tech 2 is a portable instrument designed to assist fault diagnosis and the repair of electronic systems with self–diagnosis. The Tech 2 is the ISAT scan tool's successor and will eventually replace the ISAT entirely.

Faults arising in systems with self–diagnosis are detected and saved in the system's control modules. The Tech 2 reads the system's saved fault information and the fault is presented in the form of a diagnostic trouble code as well as the source of the fault and its cause in plain text. The Tech 2 can check the selected system via read and activation commands. By means of the Tech 2 it is also possible to:

- program and adjust control modules
- obtain readings of measured values
- record sequences of measured values
- activate certain functions
- obtain readings of system information

A fault diagnosis procedure for the selected system will be found in the relevant service manual.

How to use the manual

In order to make full use of the equipment, the person who is going to use it should first carefully read through this manual.

Knowledge of the car's systems

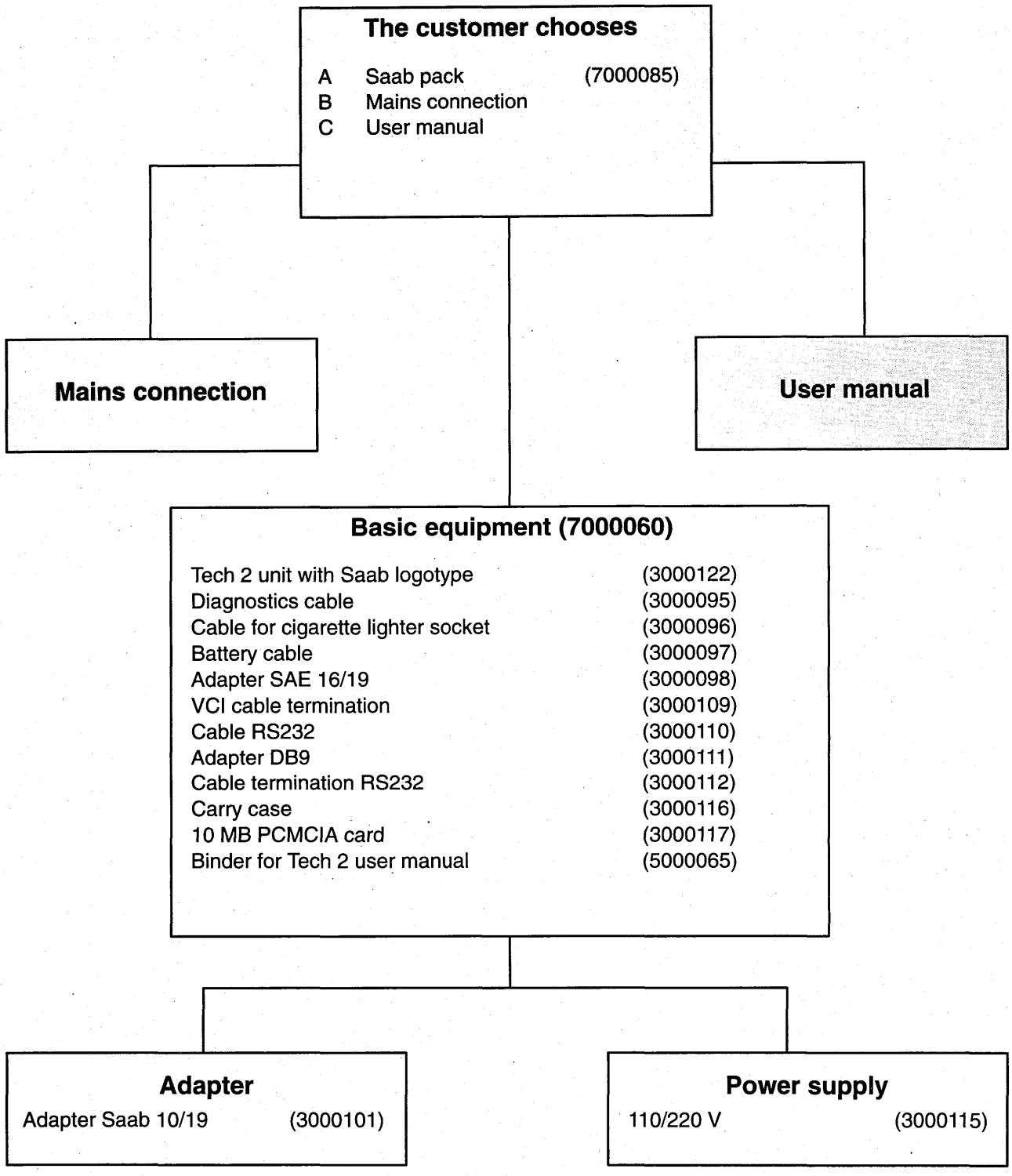
Although the Tech 2 is a powerful instrument, it cannot replace the knowledge and experience of workshop personnel.

To make the best use of the equipment it is necessary to have acquired thorough knowledge of Saab cars. We recommend using the Tech 2 in conjunction with the relevant service manual.

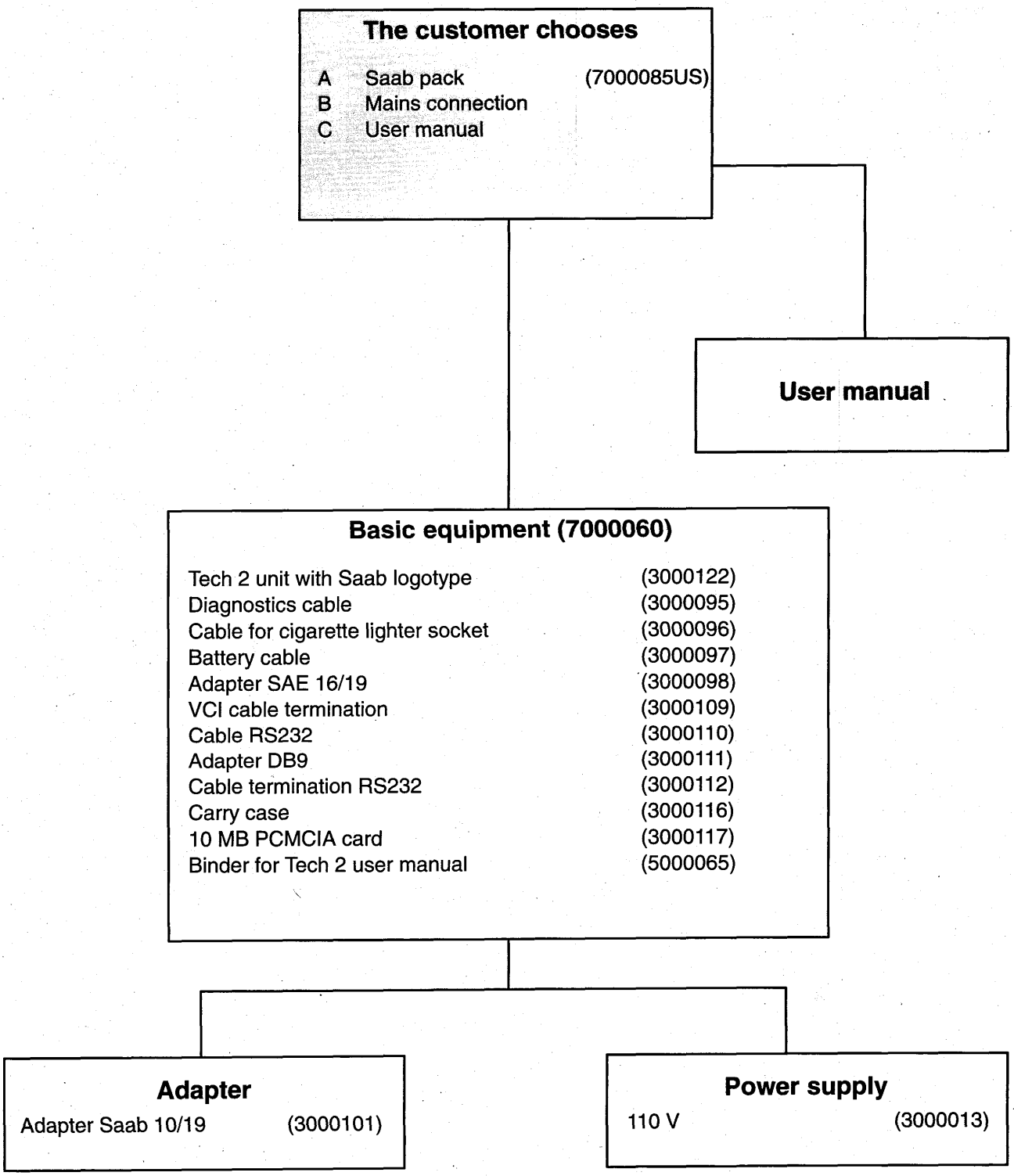
Before using the Tech 2 you should also study the latest service information bulletins.

Technical data

Tech 2 equipment for all markets except USA and Canada



Tech 2 equipment for Canada and USA

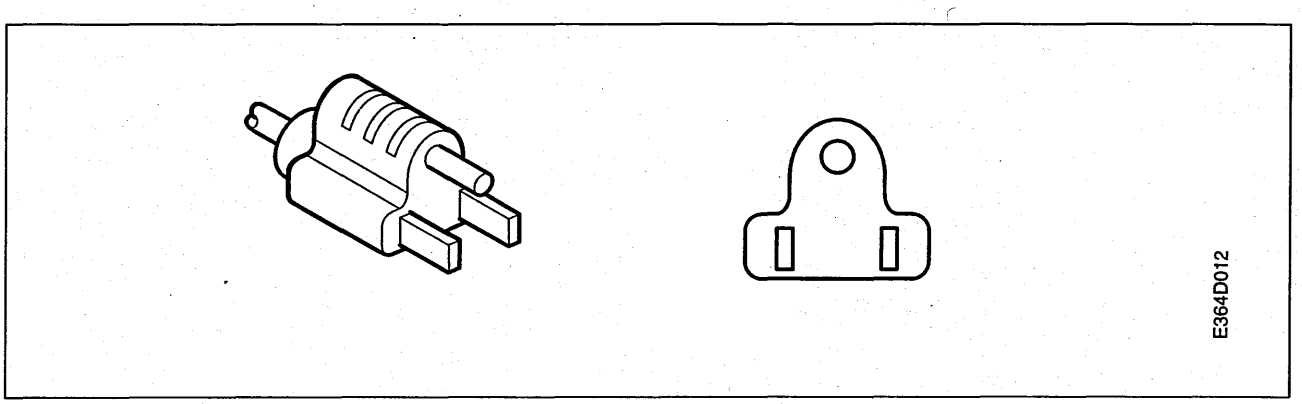


Saab pack (7000085)

Contents	Complete kit
Kent Moore part number	7000085
Markets	All except Canada and USA

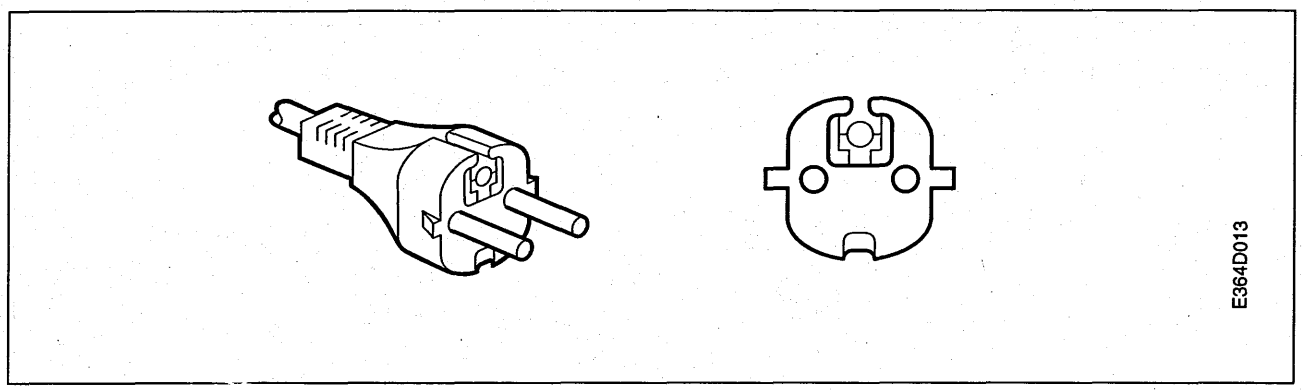
Saab pack (7000085US)

Contents	Complete kit
Kent Moore part number	7000085US
Markets	Canada and USA



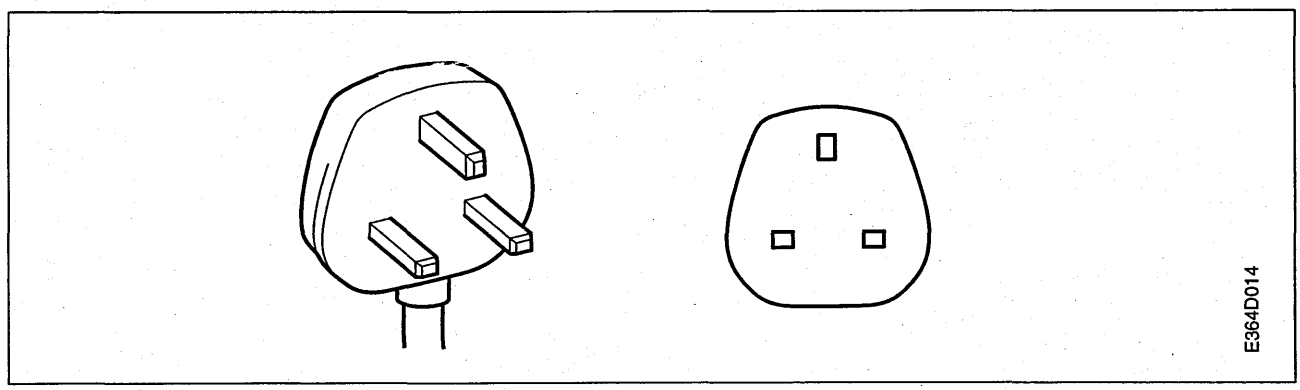
Mains connection (3000141)

Voltage	V	125–127
Alternating current	A	10
Kent Moore part number		3000141
Markets		Canada
		Mexico
		Philippines
		Taiwan
		USA



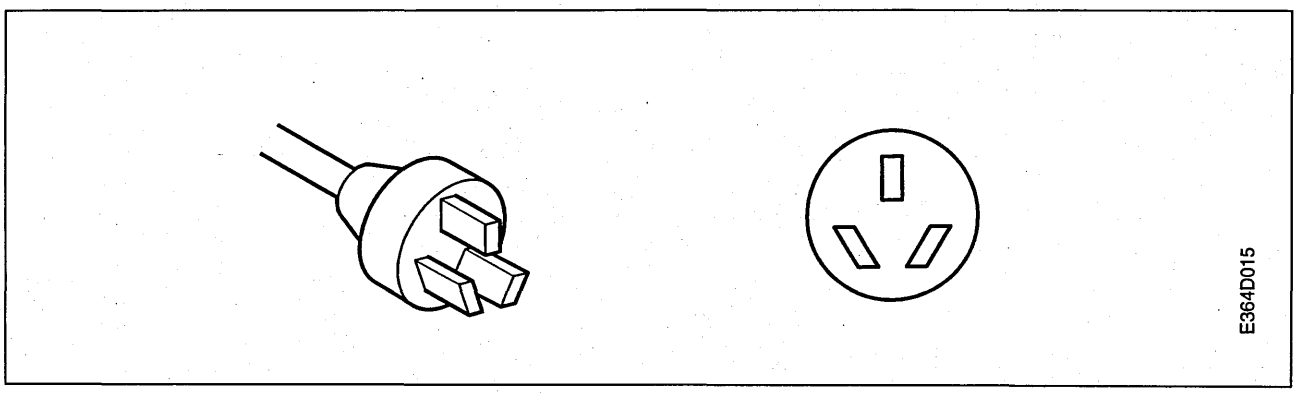
Mains connection (3000142)

Voltage	V	250
Alternating current	A	10
Kent Moore part number		3000142
Markets		Egypt
		Saudi Arabia
		East and West Europe



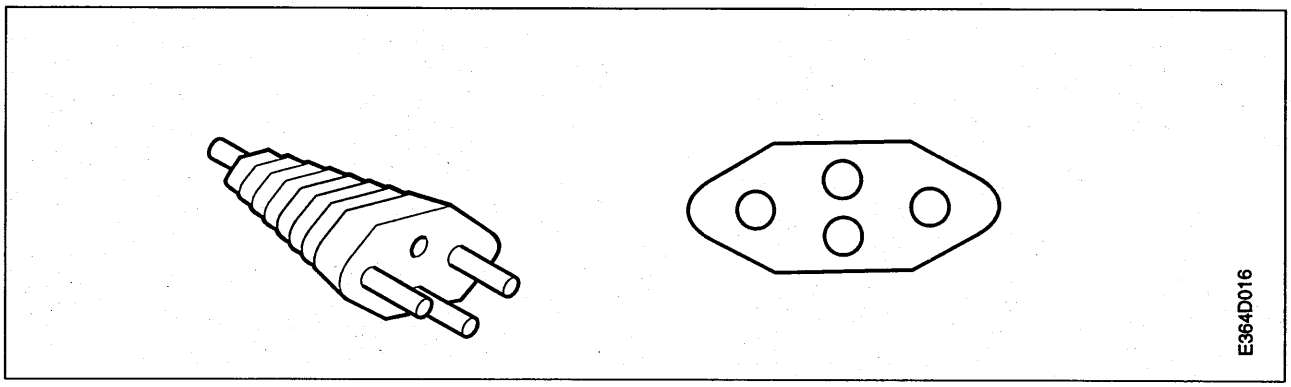
Mains connection (3000143)

Voltage	V	250
Alternating current	A	5
Kent Moore part number		3000143
Markets		Cyprus
		Nigeria
		Singapore
		Great Britain
		Zimbabwe



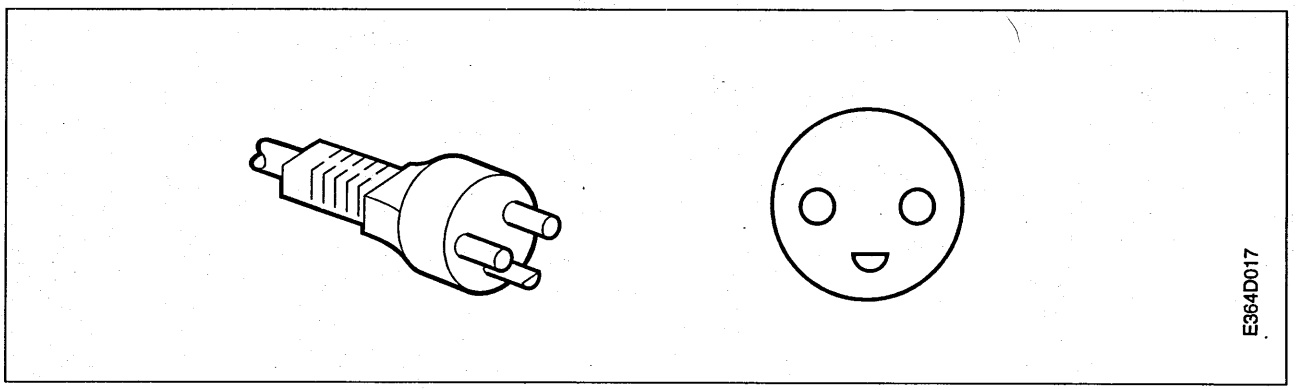
Mains connection (3000144)

Voltage	V	250
Alternating current	A	7,5
Kent Moore part number		3000144
Markets		Australia
		China
		New Zealand



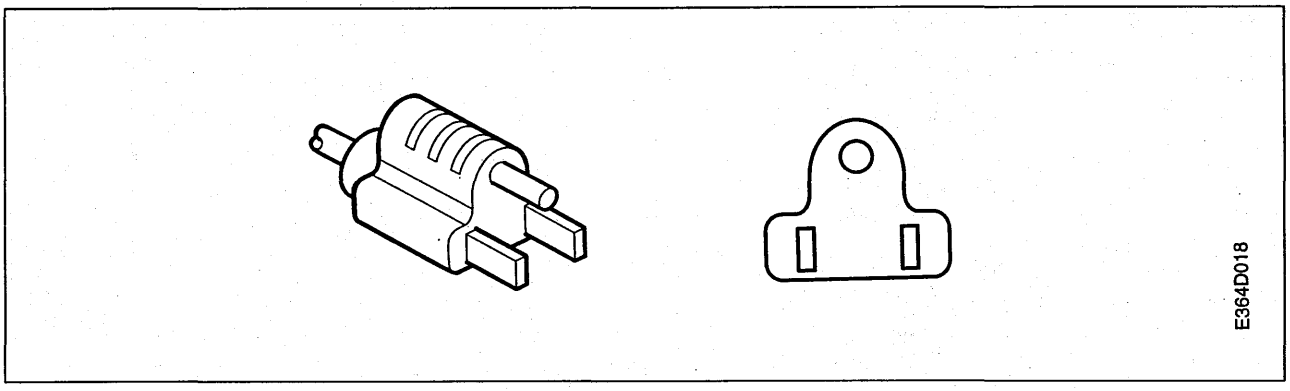
Mains connection (3000145)

Voltage	V	250
Alternating current	A	7,5
Kent Moore part number		3000145
Markets		Switzerland



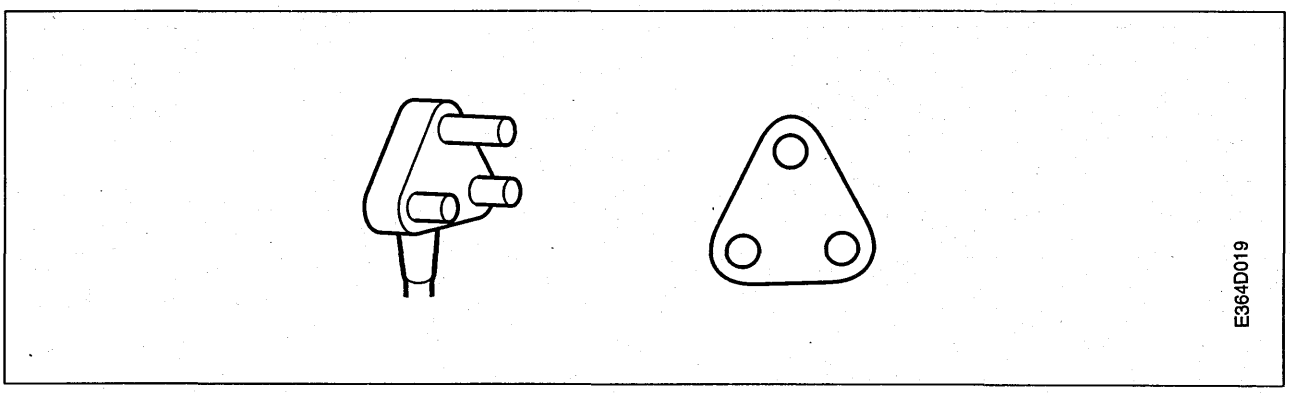
Mains connection (3000146)

Voltage	V	250
Alternating current	A	10
Kent Moore part number		3000146
Markets		Denmark



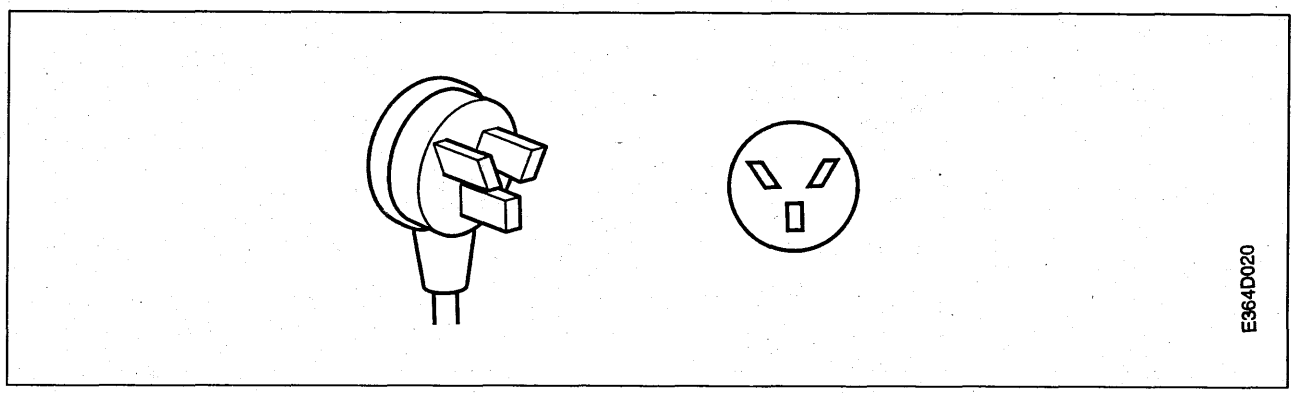
Mains connection (3000147)

Voltage	V	100
Alternating current	A	12
Kent Moore part number		3000147
Market		Japan



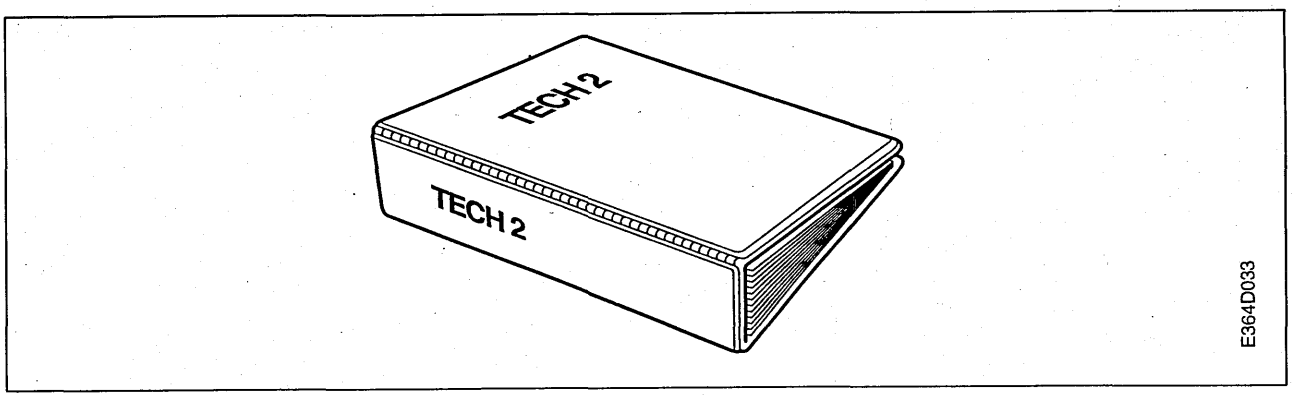
Mains connection (3000148)

Voltage	V	250
Alternating current	A	10
Kent Moore part number		3000148
Markets		India
		South Africa



Mains connection (3000149)

Voltage	V	250
Alternating current	A	10
Kent Moore part number		3000149
Market		Israel



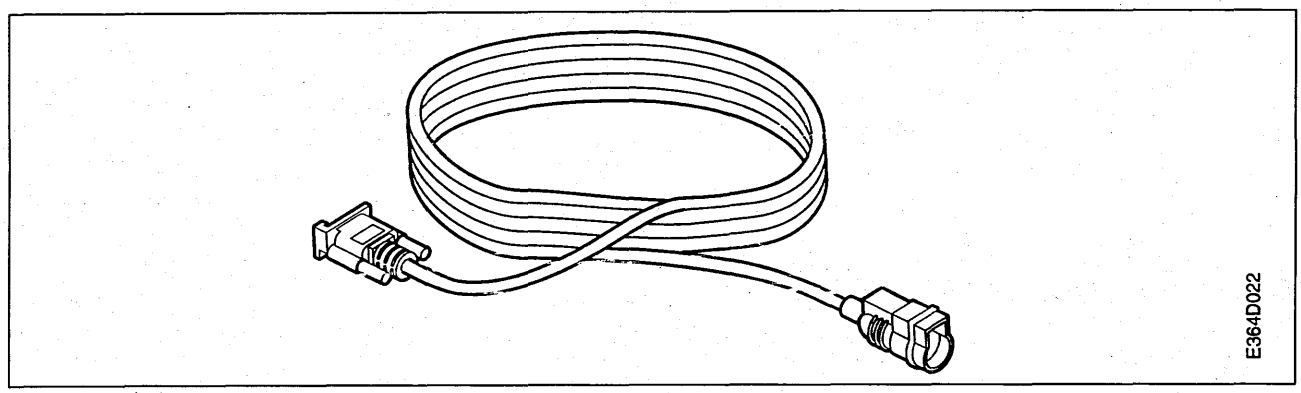
User manual

Language	Kent Moore part number
Bahasa	5000094
Danish	5000097
English	5000099
Finnish	50000100
French	50000101
Greek	50000103
Dutch	50000098
Italian	50000105
Japanese	50000106
Chinese	5000095
Norwegian	50000107
Polish	50000108
Portuguese	50000109
Serbo–Croat	50000110
Spanish	50000111
Swedish	50000112
Thai	50000113
Czech	5000096
Traditional Chinese	50000131
Turkish	50000114
German	50000102

Basic pack (7000060)

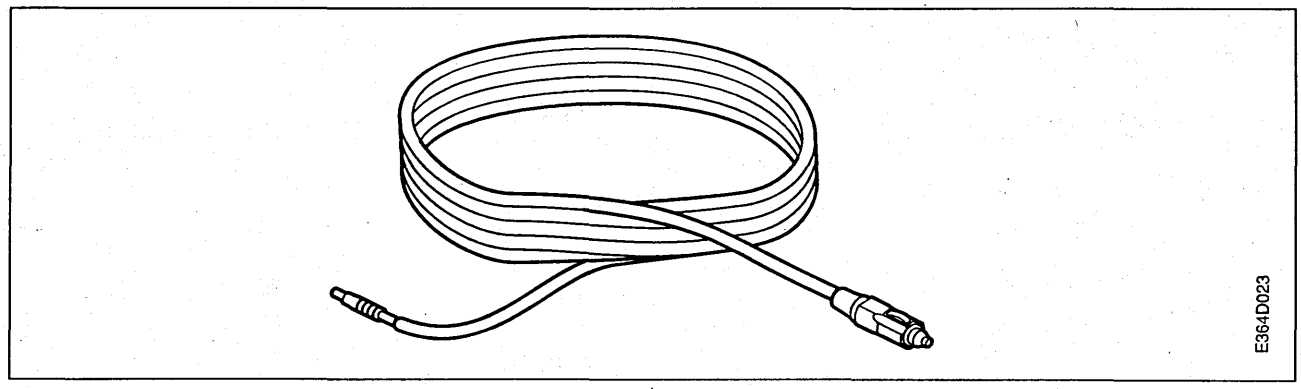
Kent Moore part number	7000060

Contents	**Kent Moore part number**
Tech 2 unit with Saab logotype	3000122
Diagnostics cable	3000095
Cable fcr cigarette lighter socket	3000096
Battery cable	3000097
Adapter SAE 16/19	3000098
VCI cable termination	3000109
Cable RS232	3000110
Adapter DB9	3000111
Cable termination RS232	3000112
Carry case	3000116
10 MB PCMCIA card	3000117
Binder for Tech 2 user manual	5000065



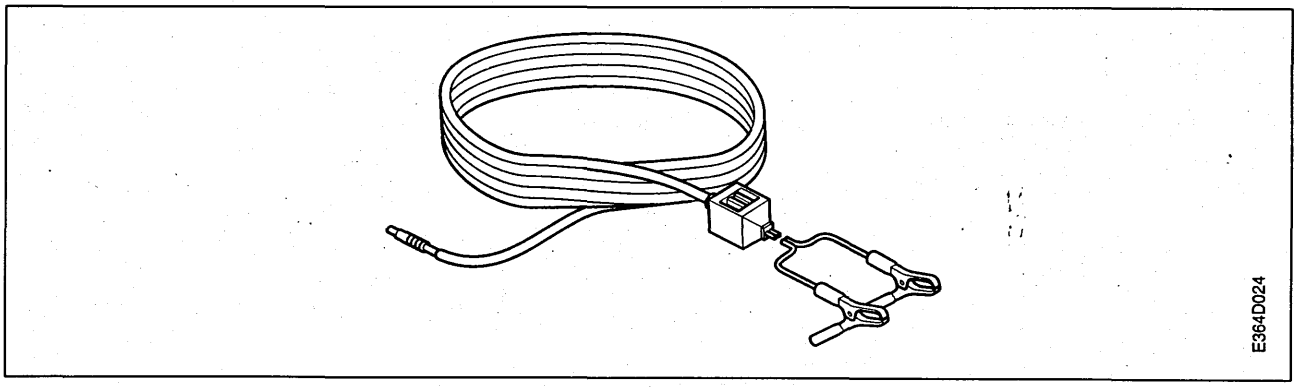
Diagnostics cable (3000095)

Kent Moore part number	3000095



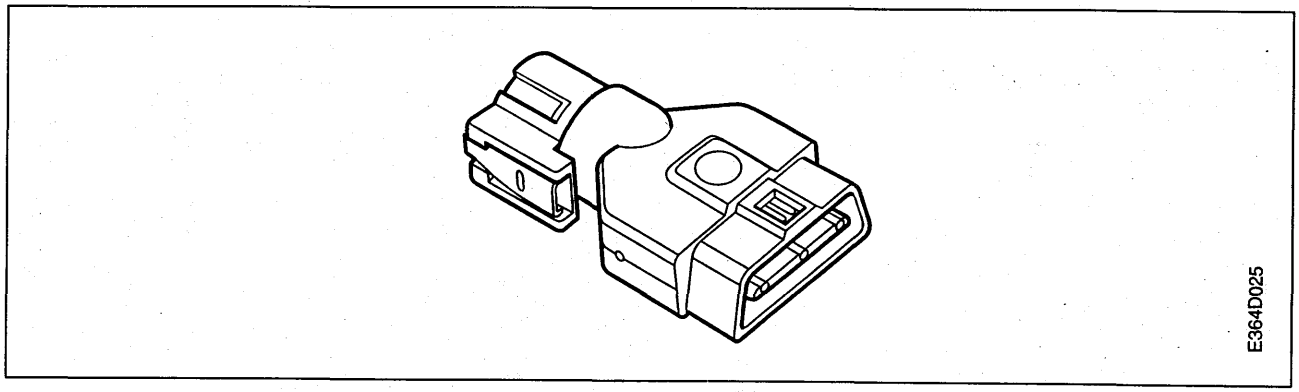
Cable for cigarette lighter socket (3000096)

Kent Moore part number	3000096



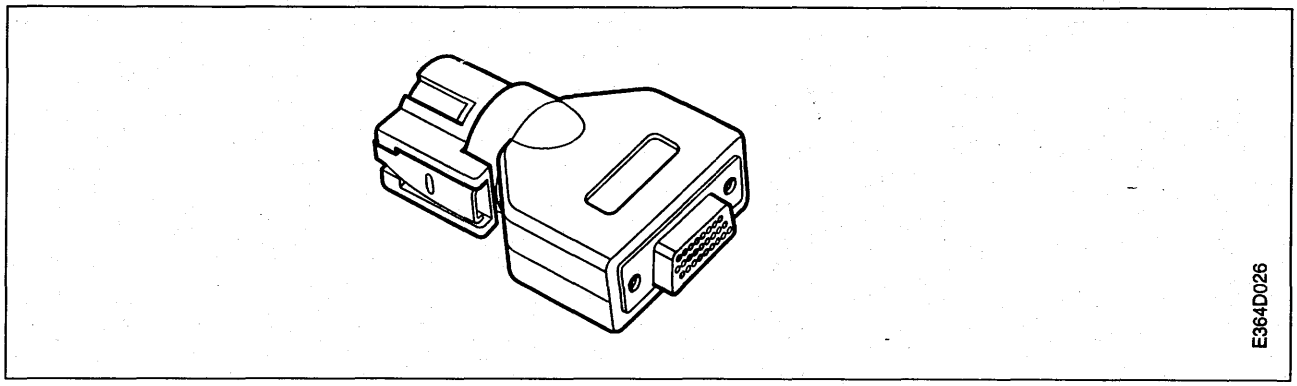
Battery cable (3000097)

Kent Moore part number	3000097



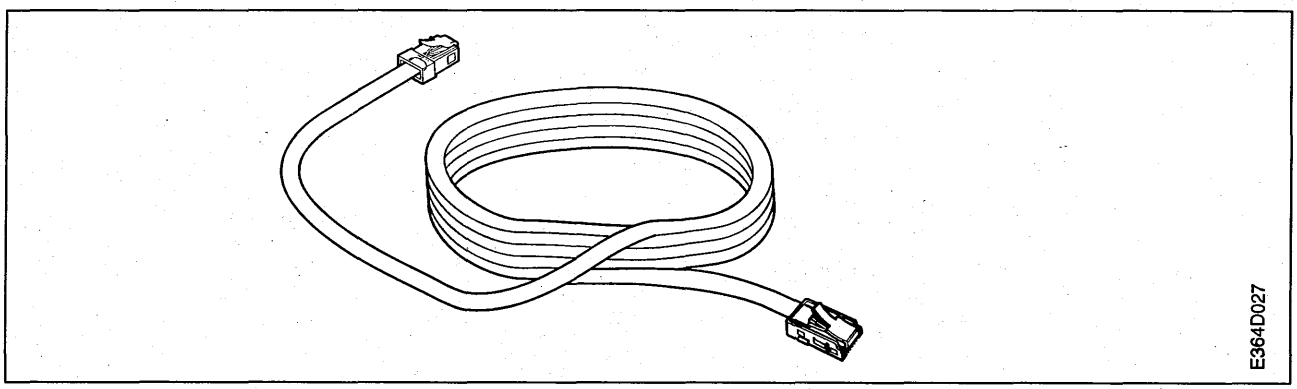
Adapter SAE 16/19 (3000098)

Kent Moore part number	3000098
Function	For connection to the data link connector on certain M94–M95 US vehicles and the majority of later model year vehicles.



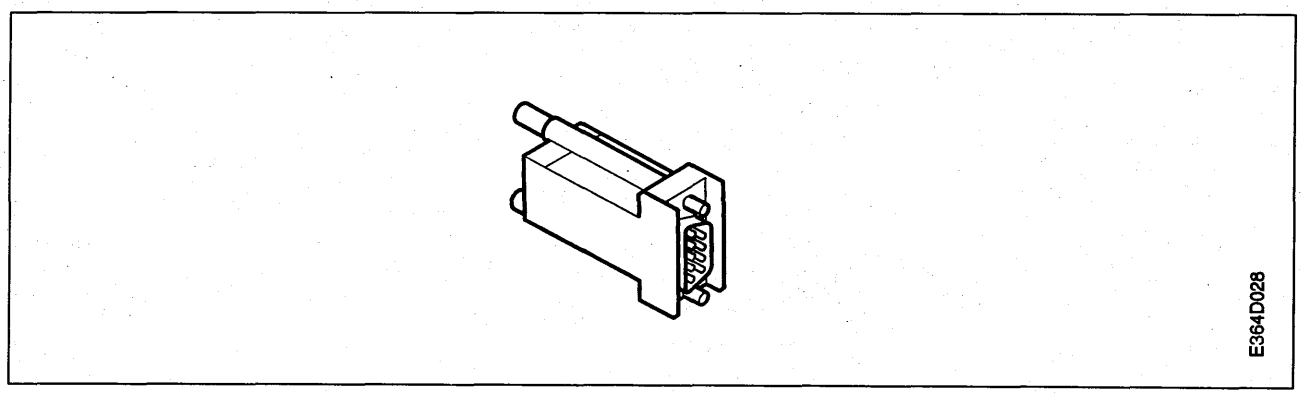
VCI cable termination (3000109)

Kent Moore part number	3000109



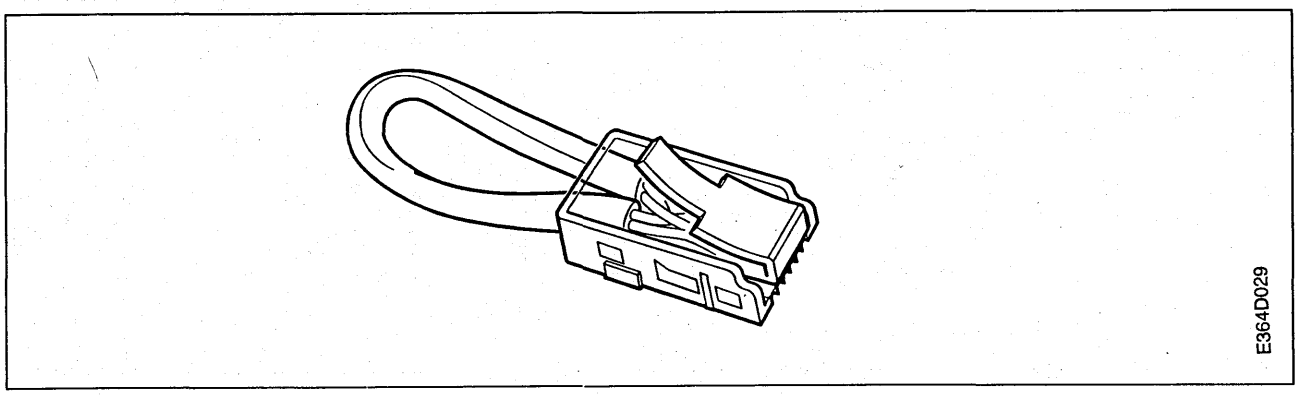
Cable RS232 (3000110)

Kent Moore part number	3000110



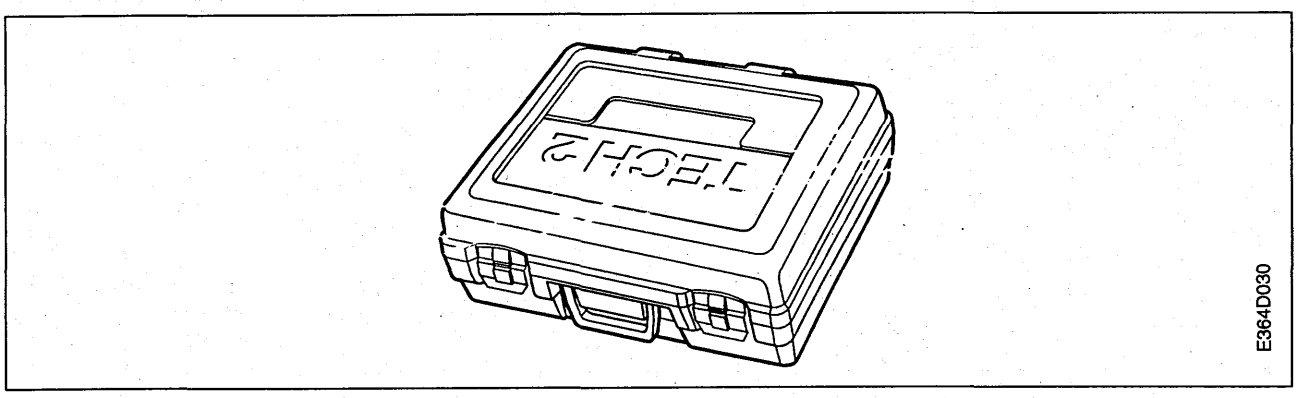
Adapter DB9 (3000111)

Kent Moore part number	3000111



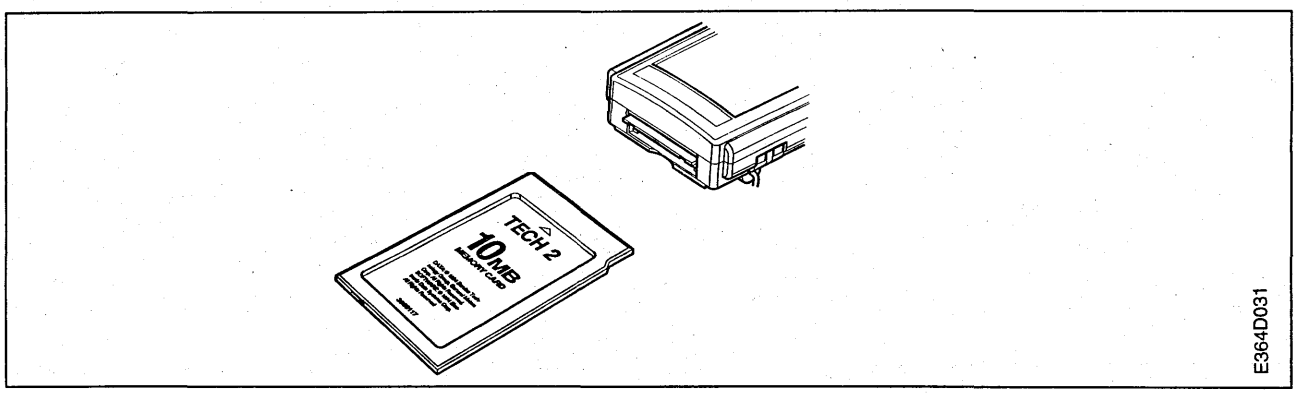
Cable termination RS232 (3000112)

Kent Moore part number	3000112



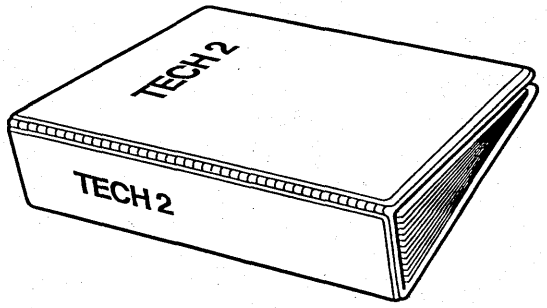
Carry case (3000116)

Kent Moore part number	3000116



10 MB PCMCIA card (3000117)

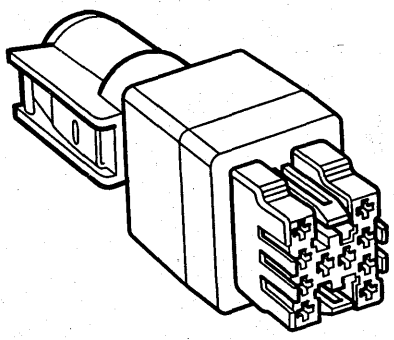
Kent Moore part number	3000117



E364D033

Binder for Tech 2 user manual (5000065)

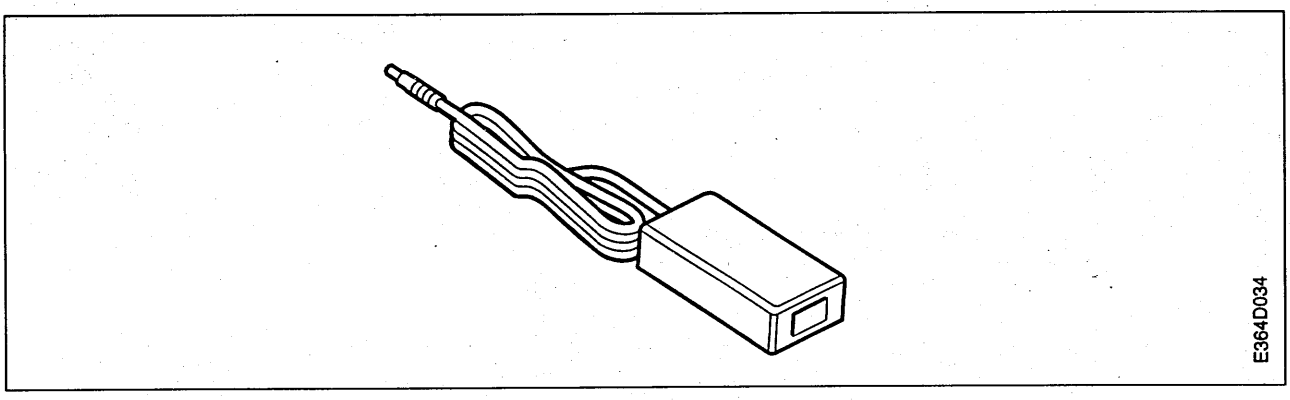
Kent Moore part number	5000065



E364D042

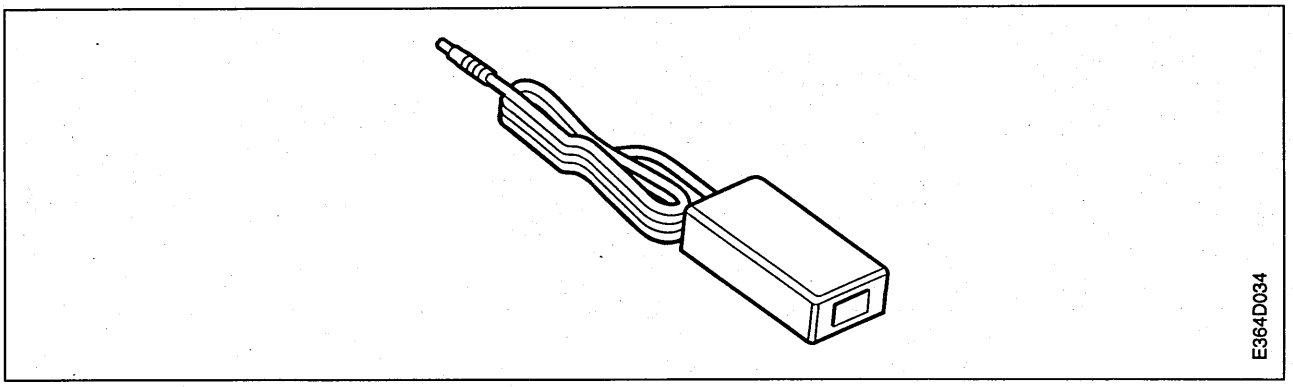
Adapter Saab 10/19 (3000101)

Kent Moore part number	3000101
Function	For connection to Saab vehicles with 10–pin connector.



Power supply (3000115)

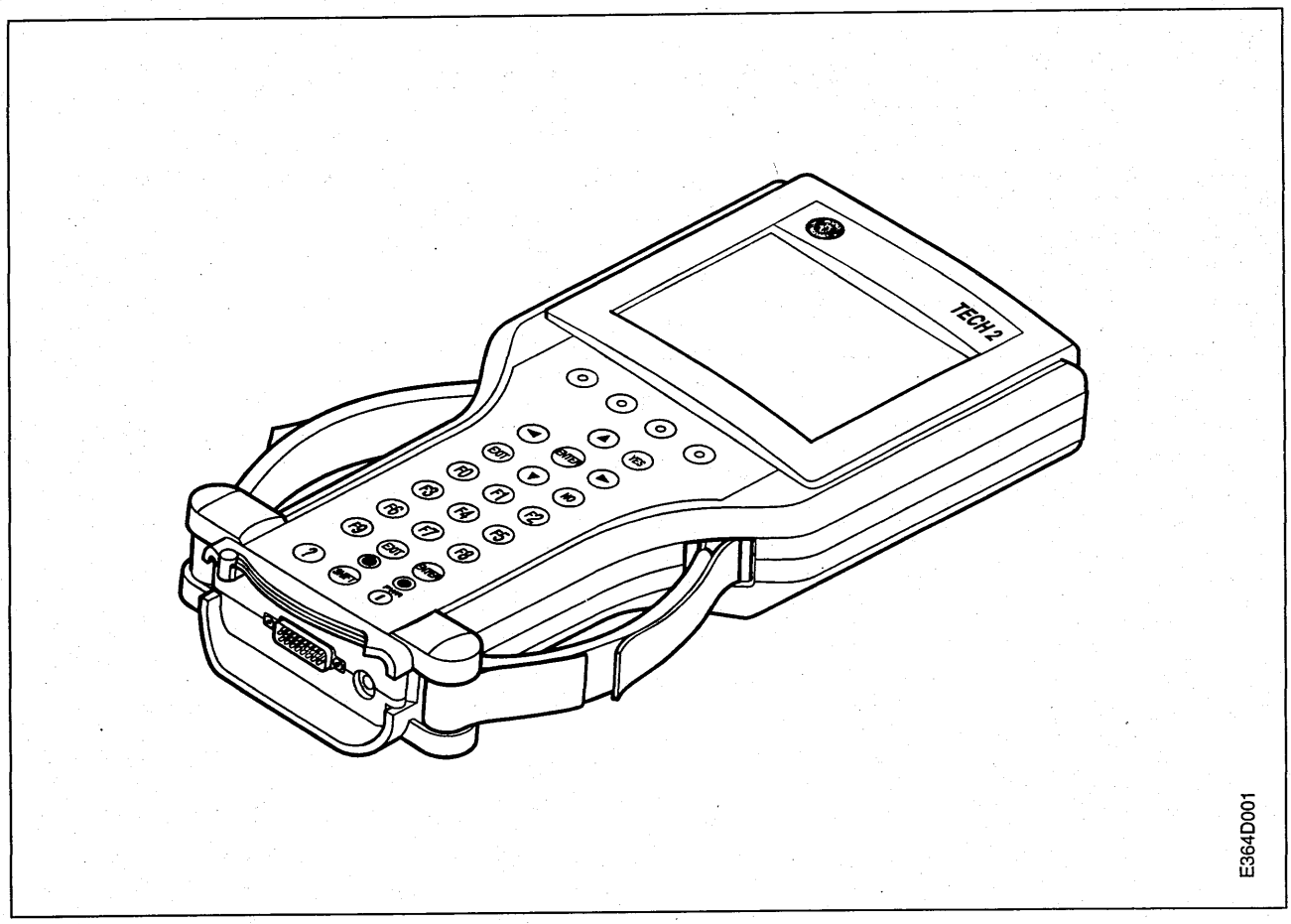
Kent Moore part number		3000115
Markets		All except Canada and USA
Voltage	V	110/220



Power supply (3000013)

Kent Moore part number		3000013
Markets		Canada and USA
Voltage	V	110

Cleaning and maintenance



Cleaning and maintenance of the Tech 2

The Tech 2 needs continual maintenance to keep it in proper working order. By following the simple instructions in this section, you can make sure that the instrument will provide trouble–free operation for a long time ahead.

Carry out the following steps after using the Tech 2:

1 Turn off the Tech 2 by pressing "PWR". Then unplug the cable from the mains outlet and the Tech 2 instrument.

2 Check that the cable and its connectors are undamaged and free from corrosion.

3 Check that the display, keypad, cable connections and connectors are free from dirt, spots and stains, etc.

Impurities in various forms which stem from aluminium, acids, chlorides, silicone, manganese, iron and carbon may occur in the air at a garage or workshop.

Such impurities attack the outer surface of the Tech 2 as well as its cables and adapters.

Maintenance of the Tech 2 includes regular cleaning of the casing, display, keypad, cable connections and connectors. Follow the cleaning instructions on the next page for best results:

WARNING

Turn off the Tech 2 and unplug the cable from the mains outlet before starting to clean the instrument.

Important

Do not use cleaning agents containing solvents or petroleum products.

Note

Although the Tech 2 is a moisture–resistant instrument, it is not entirely moistureproof. It is therefore advisable to wipe it thoroughly dry after it has been cleaned.

Cleaning the casing

Wipe the casing clean using a soft cloth moistened with a mild detergent or soap solution.

Avoid using petroleum–based products like acetone, benzene and trichlorethylene as they contain chemicals which can damage plastic surfaces.

Display maintenance

Dirt adheres to the display in the course of normal usage. Wipe it off with a clean, soft antistatic cloth.

Remove obstinate spots and stains by moistening a soft cloth with a glass–cleaning liquid which is free from abrasives and then wipe the display clean.

Remove really obstinate spots and stains by moistening a soft cloth with a glass–cleaning liquid and then wipe the display clean.

Cleaning the keypad

Clean the keypad with a mild detergent which contains no abrasives.

Important

Never pour or spray cleaning agents directly on any part of the Tech 2. Use a cloth moistened with the cleaning agent instead.

Maintenance of cable connections and connectors

Inspect all cable connections and look along the cables for nicks and worn or abraded parts. Inspect the connectors and their pins to see whether there is any grease, dirt or rust on them.

If dirt is present on the outside of cable connections and connectors, it can be wiped off with a mild soap solution.

Change the cable connections if their contact pins are worn or corroded.

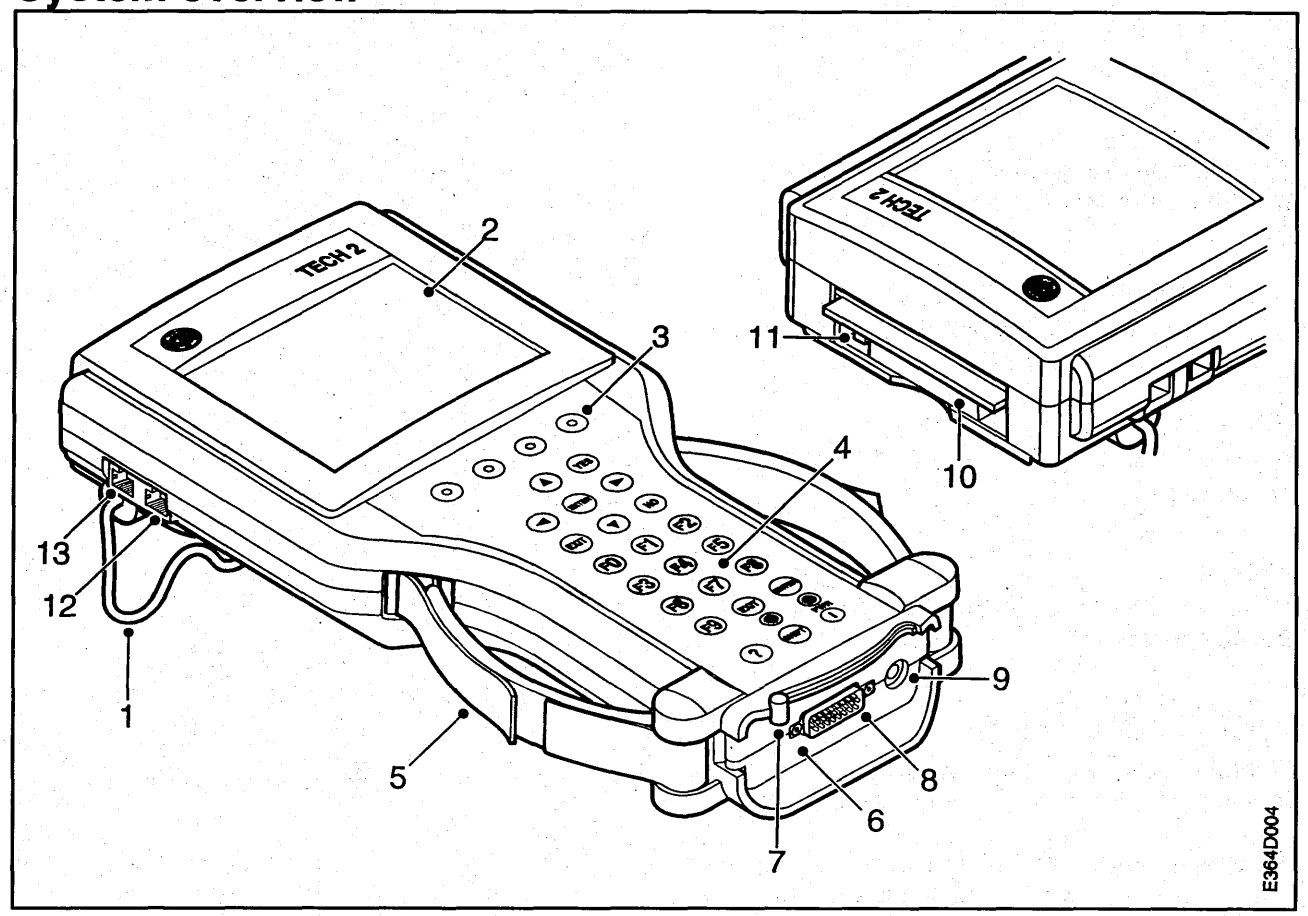
Storage of the Tech 2

Keep the following information in mind when the instrument is to be stored away:

- Since the Tech 2 is not an entirely moisture–proof instrument, store it away from solvents and other liquids.
- Ultraviolet radiation and infrared light will darken the display, so store the Tech 2 away from direct sunlight.
- Since the impact–resistant casing of the Tech 2 can get scratched, keep the instrument packed in its carry case.

Technical description

System overview



Main components

The main components are:

1 Support
2 Display
3 Display keys
4 Keypad
5 Adjustable hand clasps
6 Communications module (VCI)
7 Locking arm for communications module
8 Connector for diagnostics cable
9 Socket for power supply plug
10 Port for PCMCIA card
11 Release button for PCMCIA card
12 RS232 communications port
13 RS485 communications port

1 Support

The support can also be folded out 90° or 180° when the instrument is used on a flat surface or in a suspended position.

2 Display

Large LCD display showing 16 rows of 40 characters.

3 Display keys

Four display keys providing different functions, depending on which system is used.

4 Keypad

Keypad with diaphragm which keeps grease and liquids from entering the instrument.

5 Adjustable hand clasps

Adjustable hand clasps with Velcro fasteners for easy adjustment to give the best grip.

7 Locking arm for communications module

Locking arm for securing a communications module to the Tech 2.

Note

The communications module cannot be removed when the diagnostics cable is connected.

8 Connector for diagnostics cable

26–pin connector for diagnostics cable with threads for mounting screws.

9 Socket for power supply plug

Socket for power supply from any of the power supply sources.

Note

When the Tech 2 is connected to the car, it should not be connected to any external power source.

10 Port for PCMCIA card

Covered slot for PCMCIA memory card (Personal Computer Memory Card Industry Association).

11 Release button for PCMCIA card

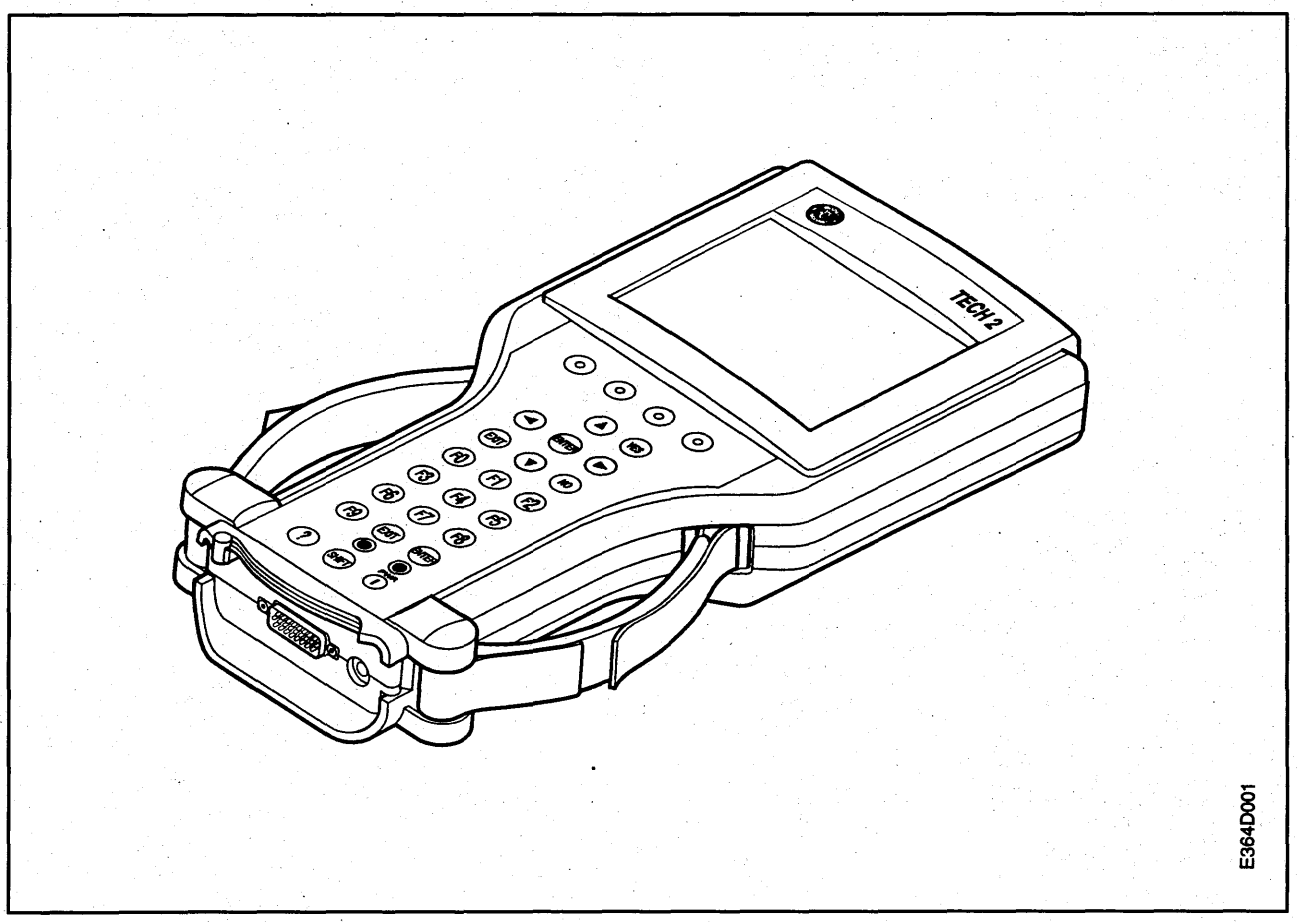
Release button for PCMCIA card. The arrow on the button indicates which slot is in use.

12 RS232 communications port

The RS232 communications port is used when the Tech 2 is upgraded via a PC.

13 RS485 communications port

The RS485 communications port is not used at present.



Brief description

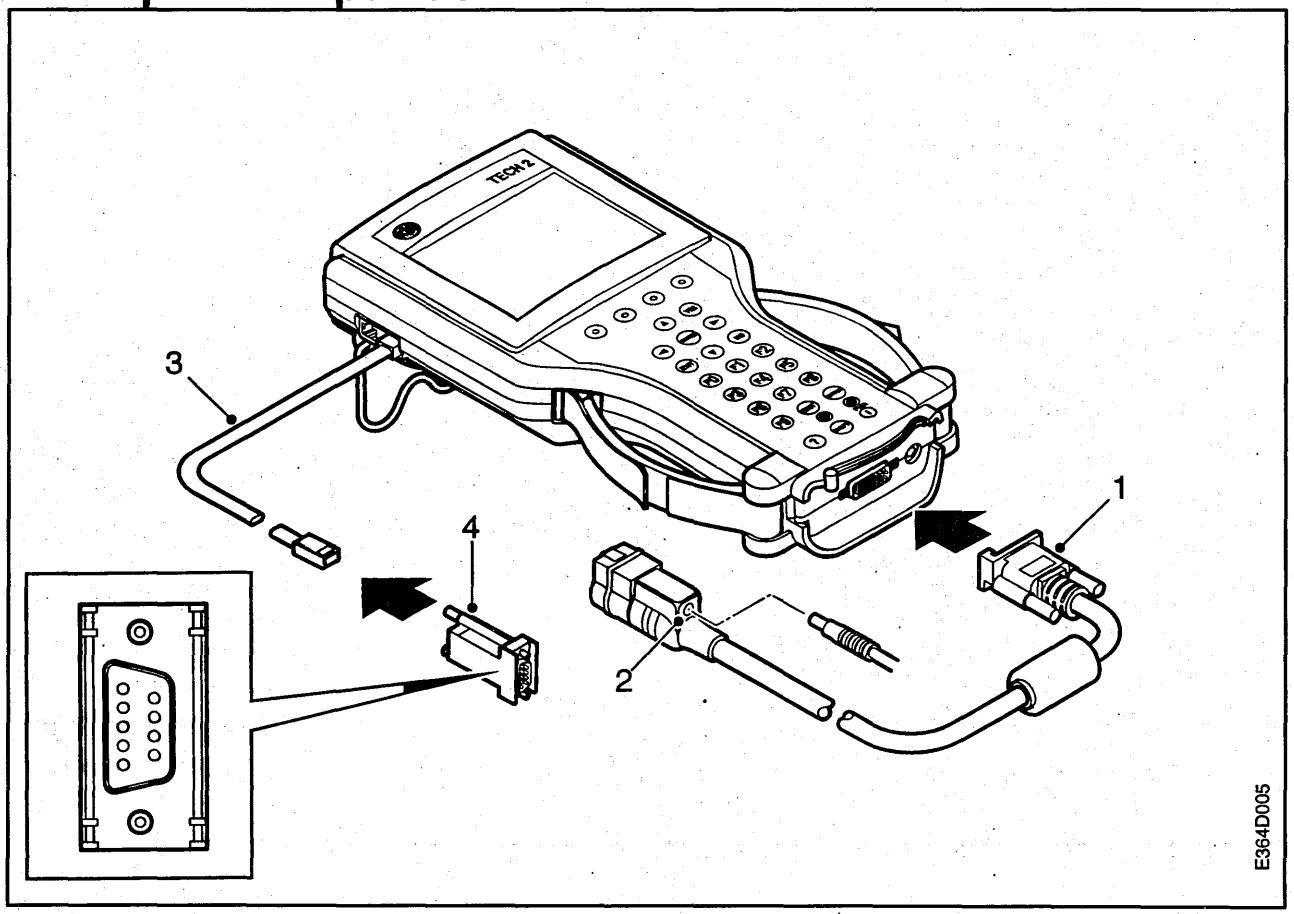
The Tech 2 is a portable diagnostics instrument designed for fault diagnosis and adjustment of the car's electronic systems.

Power for the Tech 2 can be supplied:

- via a cable from the vehicle's data link connector
- by connection with a battery cable
- via a cable from the vehicle's cigarette lighter socket
- from a wall outlet via a transformer.

The guarantee for the Tech 2 is in the form of a replacement programme, which in the shortest possible time ensures that this important item of equipment will be available at your workshop with the least possible delay.

Description of operation



Cables, connectors and adapters

1 Diagnostics cable
2 Connector for external power sources
3 Cable RS232
4 Adapter DB9

Diagnostics cable

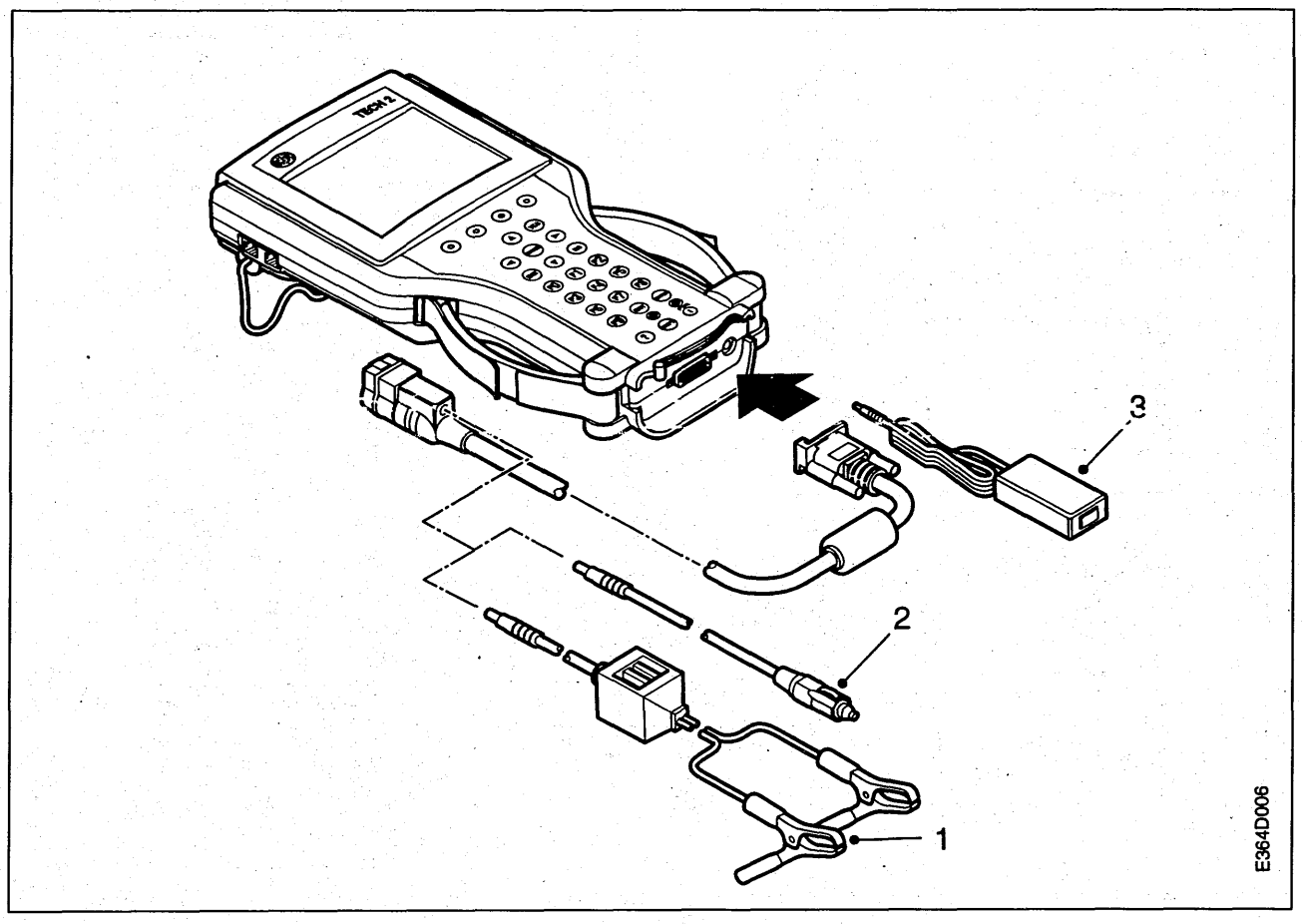
Diagnostics cable with a 26–pin connector for plugging into the Tech 2 communications module and a connector at the other end for the various vehicle adapters (see table on page 8).

Note

The Tech 2 has all the necessary connectors for Saab. Extra or replacement adapters can be purchased from the supplier.

RS232 cable and DB9 adapter

An RS232 cable and DB9 adapter are required for communication between the Tech 2 and a computer for the purpose of downloading data. The cable plugs into the RS232 port on the Tech 2.



Power supply

When used in a car the Tech 2 receives power via the connector for the diagnostics cable. However, power can also be supplied via:

1 Battery cable
2 Cable for cigarette lighter socket
3 Wall outlet

These should be connected only to the connector at the vehicle end of the diagnostics cable (see illustration above).

Connection to an extra vehicle or a vehicle that can supply current via the diagnostics cable causes no damage since its connection mechanically disconnects the internal power supply source. When not used in a vehicle (such as when the Tech 2 is being reprogrammed), the power supply can be connected either to the diagnostics cable or the connector on the VCI module beside the diagnostic cable's connector (see illustration above).

Battery cable

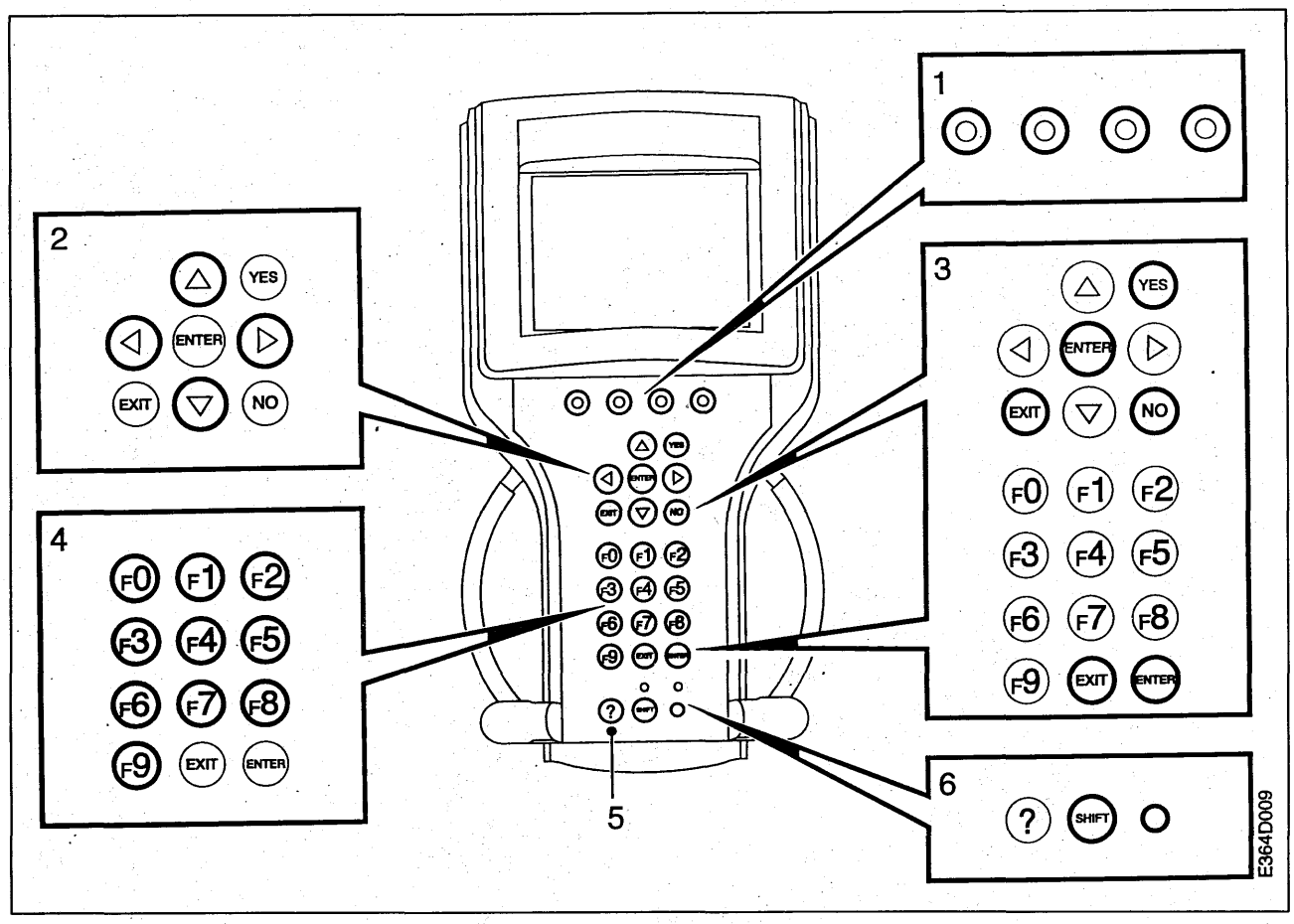
The battery cable should be used when a separate power supply is needed and the cigarette lighter is not supplied with current when the ignition is switched off. When the battery cable is used, the ignition can be switched off without affecting the supply of current to the Tech 2. One end of the cable is fitted with a plug that plugs into the connector on the diagnostics cable and the other end is fitted with two battery clamps, one red (+) and one black (–). The correct polarity is important. The cable incorporates a fuse holder with two fuses. If either of these fuses needs replacing, an identical fuse must be used.

Cable for cigarette lighter socket

The cable for the cigarette lighter socket can also be used for supplying current from the vehicle. This cable has a plug at one end which is connected in the same way as the battery cable and a plug at the other end which goes into the cigarette lighter socket. The cable incorporates a fuse which is accessible on unscrewing the end of the plug for the cigarette lighter socket. If the fuse needs changing, an identical fuse must be used.

Wall outlet

Current from the mains can be used via the transformer which is included in the Tech 2 kit. There are two mains units, one for Canada and the United States and one for the rest of the world.



Using the Tech 2

1 Display keys
2 Selection keys (with arrows)
3 Action keys
4 Function keys
5 Help key
6 Control keys

Display keys

The four keys are connected to the boxes which can be shown at the bottom of the display. When a display key function is available, a box is shown which describes its function. If no boxes are shown, no functions are available.

Selection keys (with arrows)

Keys with up arrows and down arrows control the scrolling of marked text. The keys with arrows pointing left and right scroll an entire display at a time and correspond to "Page up/down" on a PC. Small arrows at top and bottom on the right–hand side of the display indicate whether more information can be presented.

Action keys

The action keys "YES", "NO", "ENTER", and "EXIT" are used to execute a certain action or answer a certain question. They are also used to move forward and backward through the different menus.

Function keys

The function keys "F0"–"F9" are used for special menu functions. Certain menu choices have an F number and a description. They can be used as an alternative to positioning the cursor on a line and pressing "ENTER".

Help key

Pressing the help key "(?)" activates the help function for the current part of the Tech 2 system.

Control keys

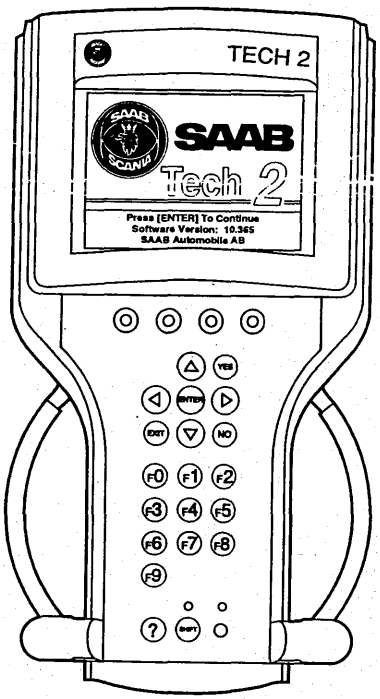
The Tech 2 is turned on and off with the "PWR" key. The "SHIFT" key is used in conjunction with the up and down arrow keys to vary the contrast of the display. When the "SHIFT" function is active the LED lights up.

Note

When the SHIFT function is turned on the rest of the keypad is blocked.

Diagnostics

General



When the Tech 2 is turned on a brief self–test starts and then the heading "TECH 2" and the Saab logotype are displayed. To go to "Main Menu", press "ENTER".

Select the desired function from the "Main Menu".

- "F0: Diagnostics"
- "F1: View Captured Data"
- "F2: Set Options"

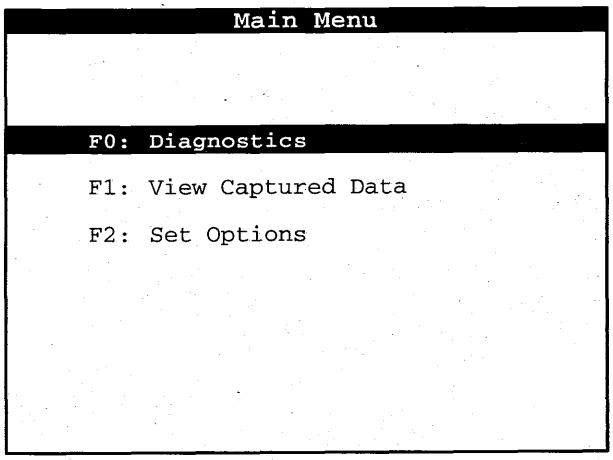
Instructions

Important instructions may be displayed from time to time, such as "Turn Engine Off".

Navigating to the desired system

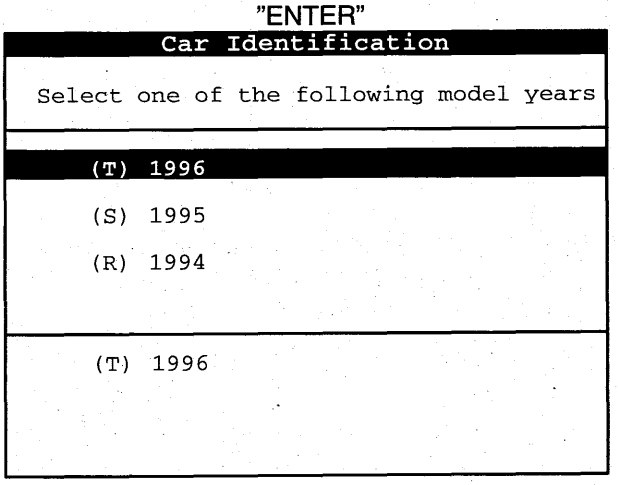
Here follows an example showing how fault diagnosis can be carried out using the Tech 2 on the desired system, which in this case is the "Saab Information Display" (SID).

Select application.



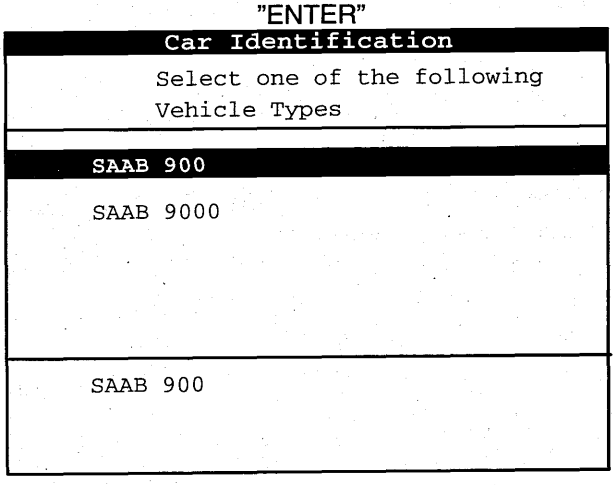
"ENTER"

State desired model year.



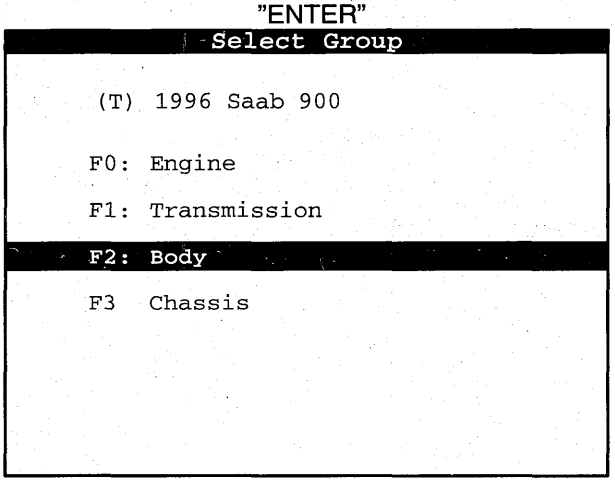
"ENTER"

State the desired car type.



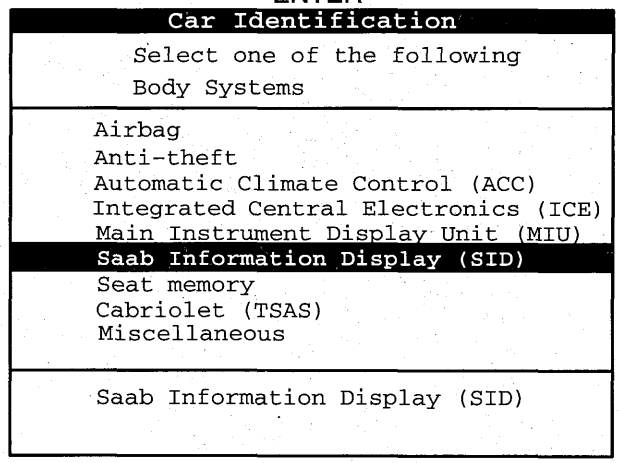
Select desired group.

"ENTER"



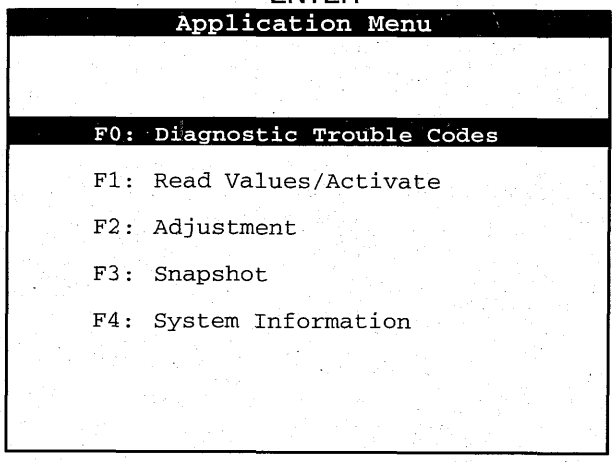
To go to system level, select the desired system.

"ENTER"



You are now at system level. Select the desired heading to leave "Application Menu".

"ENTER"



System level, diagnostics

The Tech 2 communicates at system level with the selected control module in order to obtain the desired information. The system menu may contain the following headings. The majority of systems will contain only some of the following headings:

1 "F0: Diagnostic Trouble Codes"
2 "F1: Read Values/ Activate"
3 "F2: Adjustment"
4 "F3: Snapshot"
5 "F4: System Information"

Here follows a short description of the menu headings, accompanied by a more detailed description which also contains some examples.

Diagnostic Trouble Codes

A list of diagnostic trouble codes that have been generated in one of the car's control modules, with descriptions and code status, can be obtained through the Tech 2. The diagnostic trouble codes are listed by priority, depending on their status.

Read Values/Activate

Different functions in the system can be activated by selecting them and readings of their values can be obtained.

Parameters can be shown as a graph ("Line Graph") which can be selected by means of a display key.

The Tech 2 supports the display of control module data which is updated in step with changes in the vehicle's electronic systems. Important parameters can be selected at any time and grouped at the top of the list for easier observation.

Certain control module functions can also be tested here. One of the most common tests is the idling speed test in which engine rpm can be increased or decreased. Some control modules can also check the injectors. They do this by disconnecting individual injectors so that weak cylinders can be detected.

There are also tests with which the function of actuators in electronic systems can be checked.

Adjustment

This function is used to program the control module's memory with fresh data.

Example: Country code for anti–theft alarm.

Snapshots

The "Snapshot" function enables values from control modules to be recorded for subsequent playback and analysis.

"Snapshot" is particularly useful when carrying out fault diagnosis where intermittent faults are concerned.

Recorded values can be shown either in a regular read value list or as a line graph.

There are three different ways of recording "Snapshots", depending on how it is desired to use the available recording time.

Recording continues until the memory is full or until recording is interrupted by pressing "EXIT". Two snapshots at a time can be recorded in the Tech 2's memory. If additional "Snapshots" are recorded, the earliest recording will be deleted from the Tech 2's memory.

Available recording time varies between different systems and diminishes at the same rate as the number of recorded read values increases.

All parameters are saved and five parameters at a time can be selected at any moment for observation as a group.

Three parameters at a time can be selected additionally for display in the form of a graph using the "Plot" function.

System Information

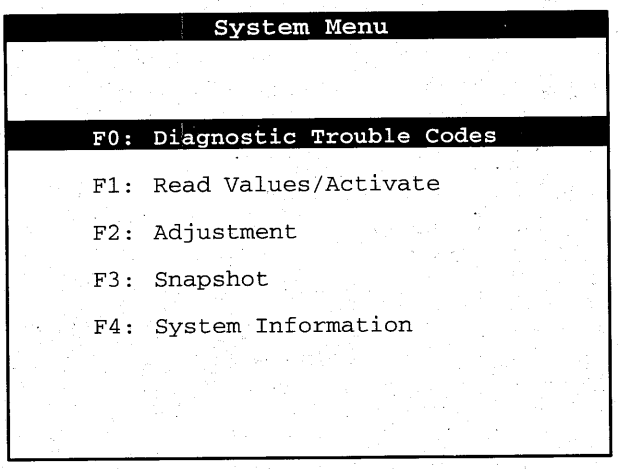
This function shows system data, such as the part number and version of the software and hardware. This information is system dependent.

Diagnostic Trouble Codes

Here follow two examples of how to obtain readings of diagnostic trouble codes and clear diagnostic trouble codes.

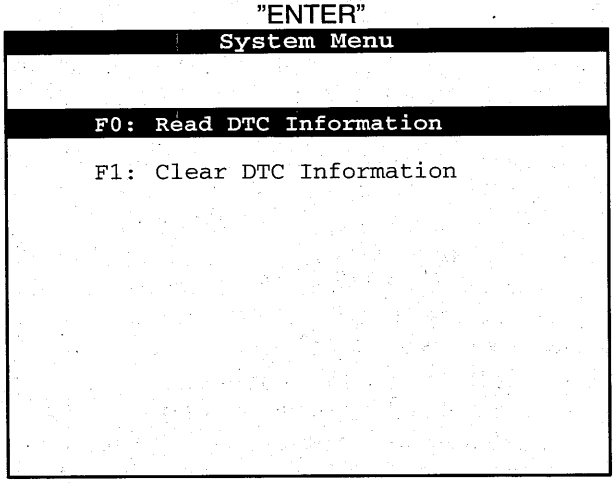
- Example 1: Read DTC Information

Select diagnostic trouble codes in the system menu.



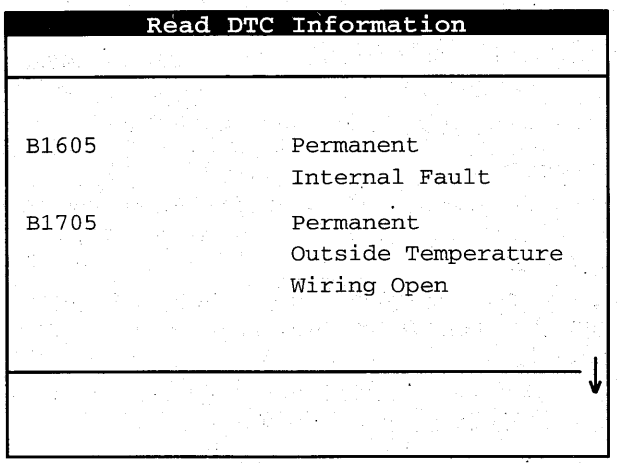
"ENTER"

Select "F0".



Presented here are the diagnostic trouble codes that are saved in the control module's memory.

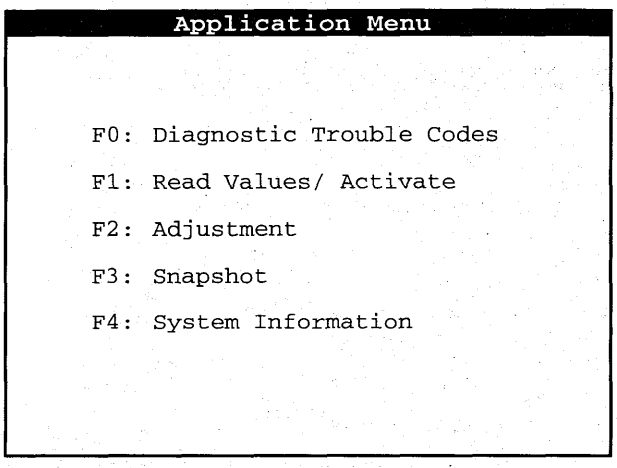
There is room for a maximum of 3 diagnostic trouble codes in the display. If there are more than three diagnostic trouble codes, up or down arrows will be shown in the upper and lower part of the display. In such case, press the corresponding selection key to see the other trouble codes.



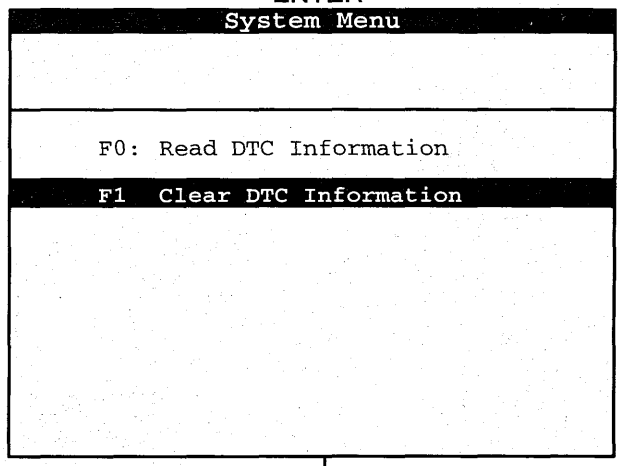
Diagnostic Trouble Codes, continued

- Example 2: Clear DTC Information

Select "Clear DTC Information" in the system menu.



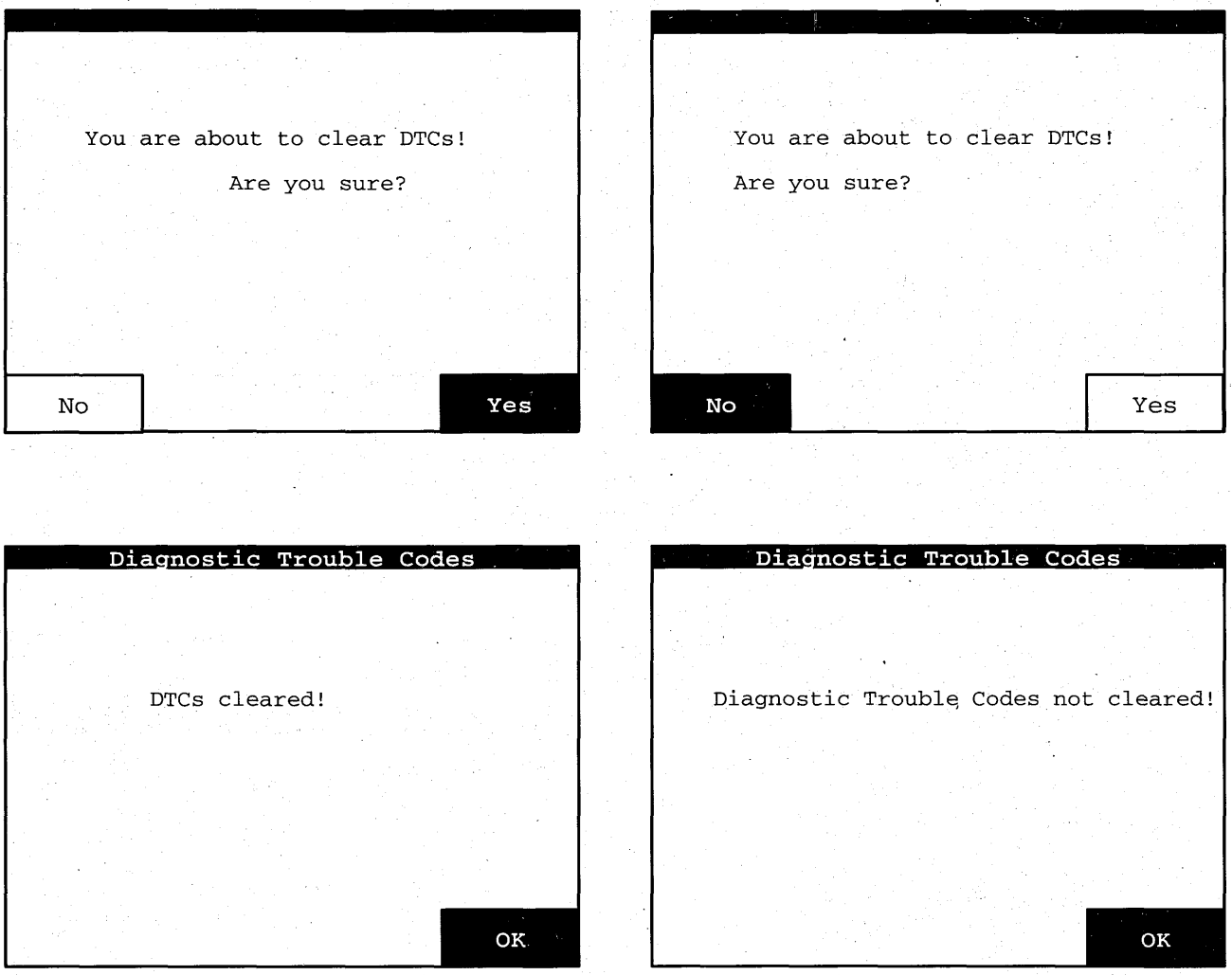
"ENTER"



Select "F1 Clear DTC Information".

Continued on next page at A.

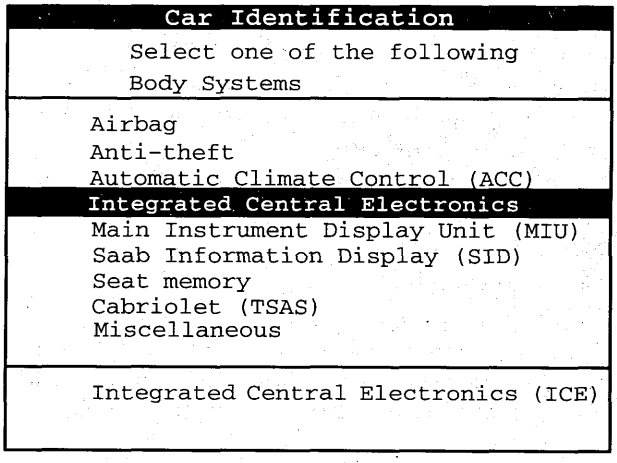
A, continued


You are about to clear DTCs!
Are you sure?
No
Yes
You are about to clear DTCs!
Are you sure?
No
Yes
Diagnostic Trouble Codes
DTCs cleared!
OK
Diagnostic Trouble Codes
Diagnostic Trouble Codes not cleared!
OK

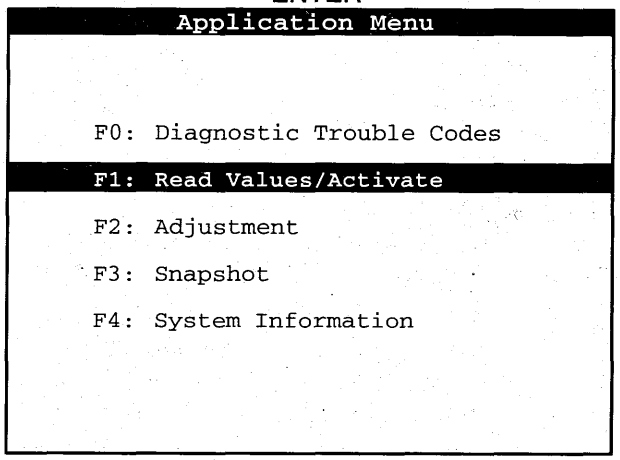
Read Values/Activate

Here follows an example of how the "Read Values/ Activate" function works. The example is based on selection of body system and to arrive here from the main menu you should repeat what has been described in earlier examples.

To go to system level, select the desired system.



"ENTER"



You are now at system level. Select "Read Values/ Activate".

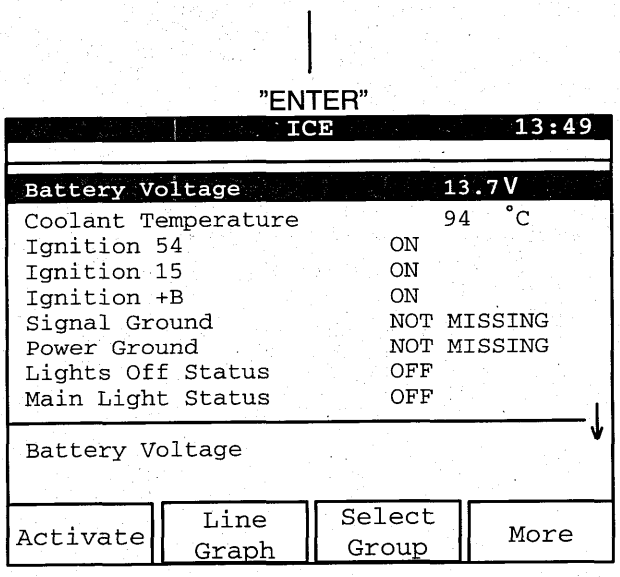
Read Values/ Activate, continued

Here is the list of all read values that are available in the system concerned. The down arrow on the right at the bottom of the display indicates that the list consists of more values downward than can be shown in the display all at once.

This example will begin with a look at all the available read values.

Step the cursor downwards with the down arrow key to see one new value at a time or press the selection key with the right arrow to scroll one full display at a time (corresponding to page up/down on a PC).

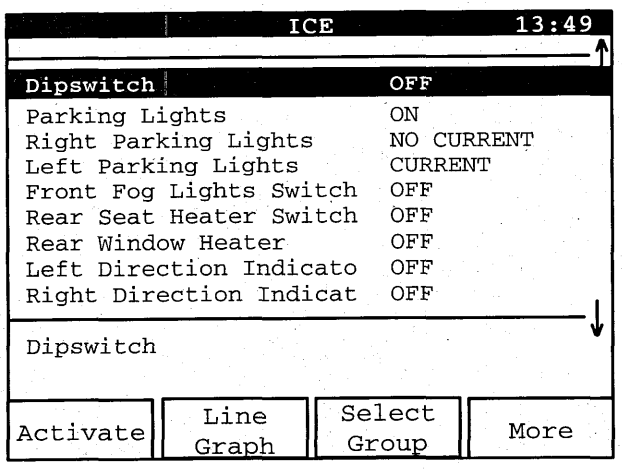
Press the right arrow key to scroll to the next display of read values.



The up arrow on the right at the top of the display indicates that the list consists of more values upward than can be shown in the display all at once.

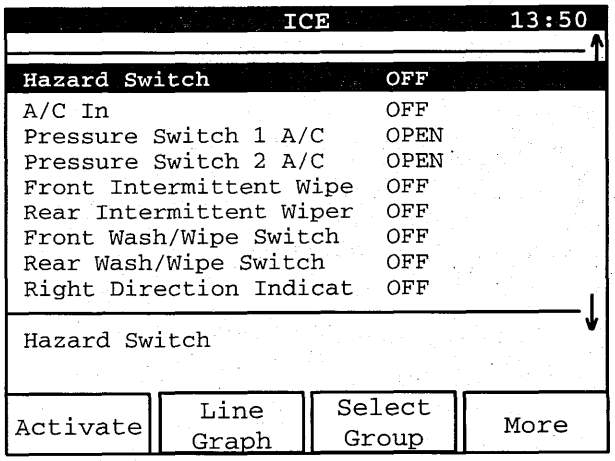
Step the cursor upwards to see one new value at a time or press the selection key with the left arrow to scroll one full display at a time.

Press the right arrow key to scroll to the next display of read values.

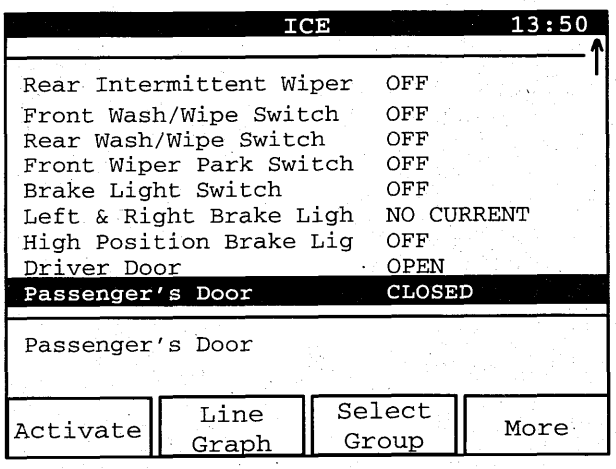


Read Values/ Activate, continued

Press the right arrow key to scroll to the next display of read values.



All the read values in the list have now been displayed. Every available display key is described below and explained with an example

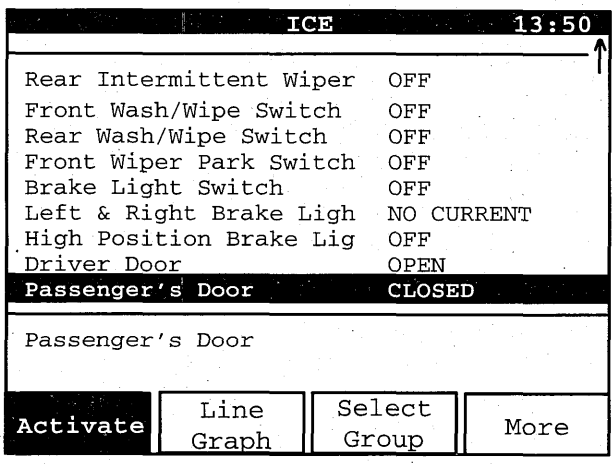


Read Values/ Activate, continued

Activate

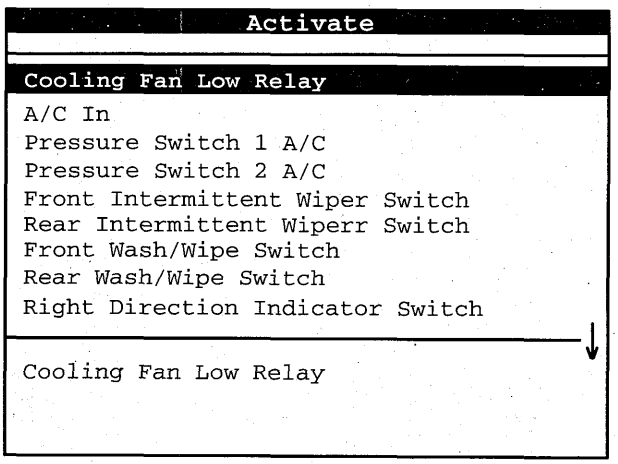
This example shows how the display key "Activate" works by activating "Beam on Relay".

Select the display key "Activate" to access the list of available activation commands.

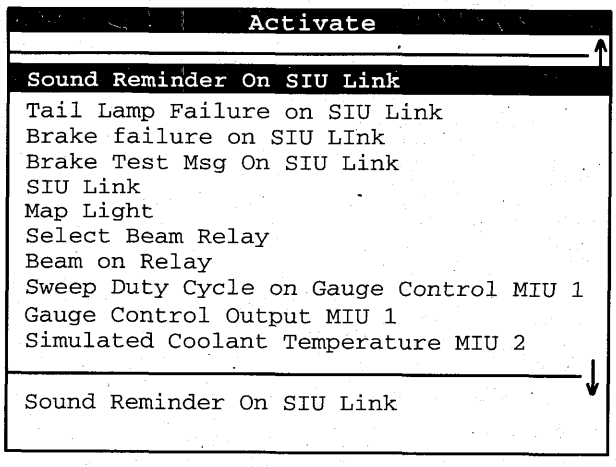


Here is a list of all available actuators.

Press the right arrow selection key to scroll to the next display of activation commands.

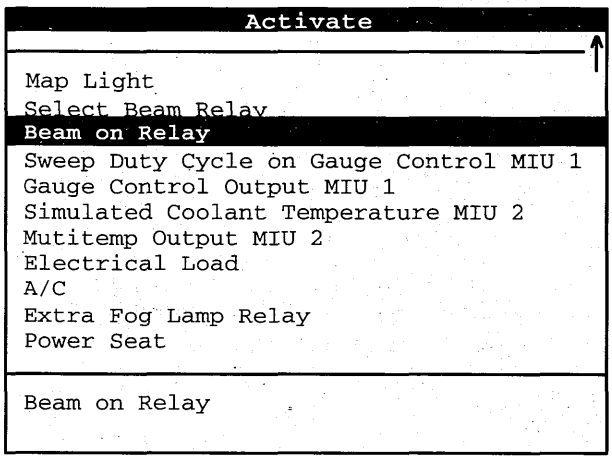


Press the right arrow selection key to scroll to the next display of activation commands.



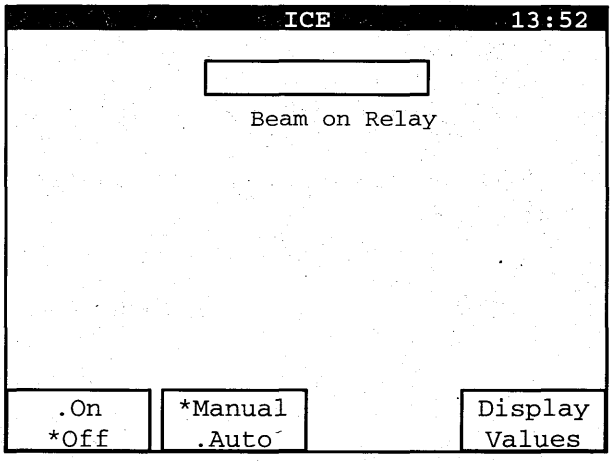
Read Values/ Activate, continued

Select "Beam on Relay".



"ENTER"

"Beam on Relay" can be activated manually or automatically. Manual activation is set here, which is shown by an asterisk "*" next to the word "Manual" on the "Manual/ Auto" display key.

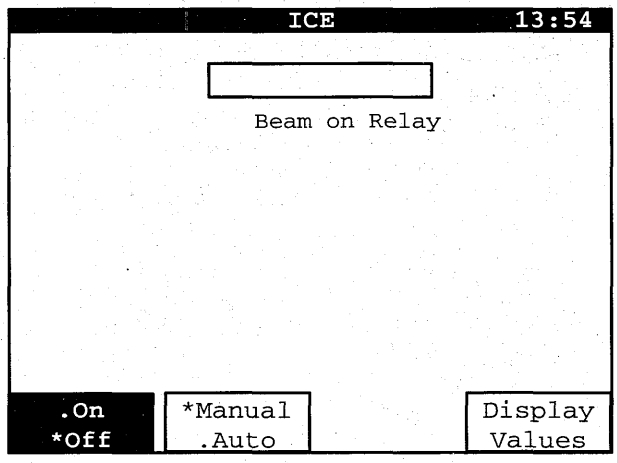


Read Values/ Activate, continued

On/Off

When "Beam on Relay" is set for manual activation, it is activated by pressing the "On/Off" display key. Check that the headlamps are on dipped beam.

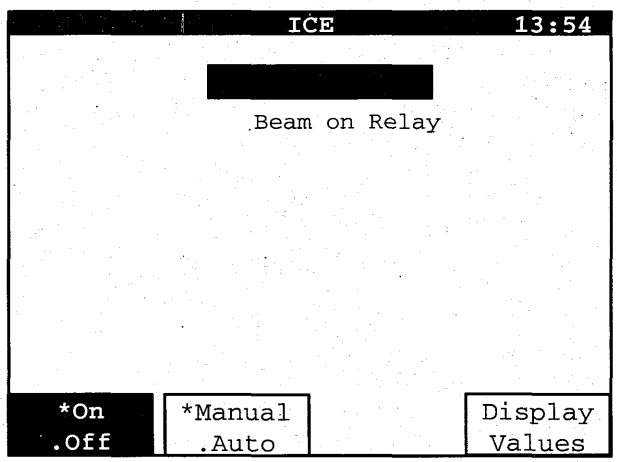
"Beam on Relay" can be turned on or off by pressing the "On/Off" display key. The asterisk will then move to indicate the appropriate setting.



Press the "On/Off" display key once again to switch off the headlamps.

Press "EXIT" to return to the list of activation functions.

Press "EXIT" once again to return to the read values list.

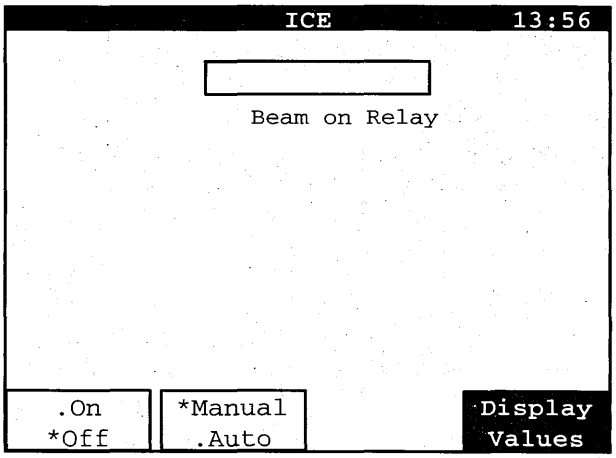


Read Values/ Activate, continued

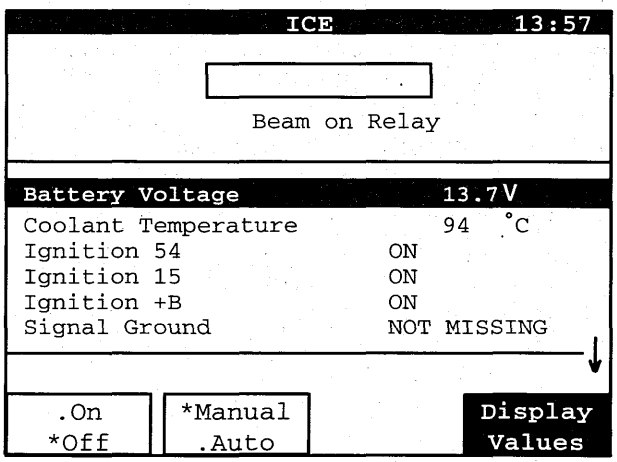
Display Values

If you want to see the read values at the same time as you carry out an activation, use the "Display Values" display key.

Press the "Display Values" display key to see the read values list and the activation function simultaneously.



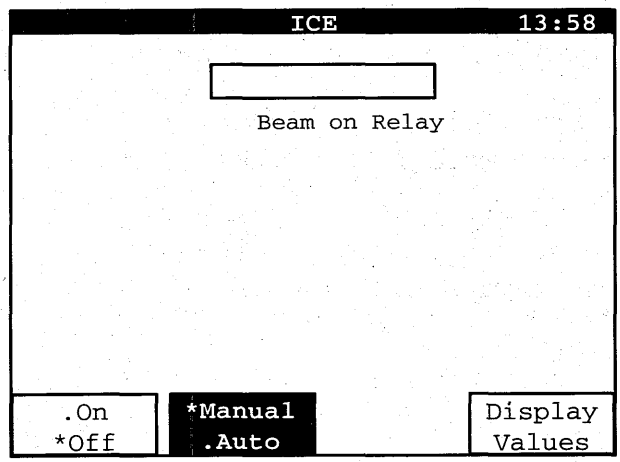
Press the "Display Values" display key again to hide the read values list.



Read Values/ Activate, continued

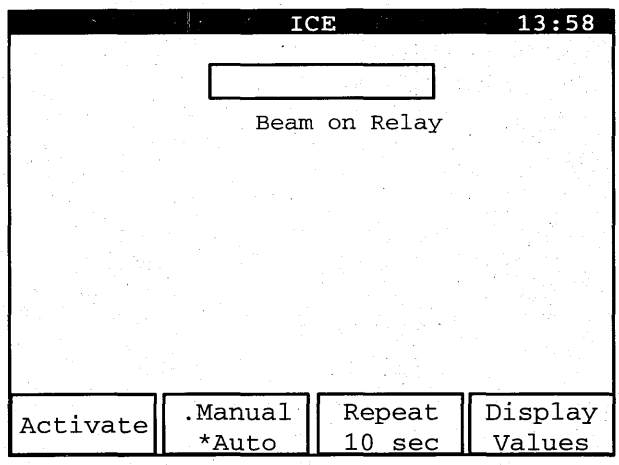
Manual/ Auto

Press the "Manual/ Auto" display key to set the activation function in the automatic mode.



Automatic activation is set here, which is indicated by an asterisk next to the word "Auto" on the "Manual/ Auto" display key.

When the "Manual/ Auto" display key is pressed again, the Tech 2 reverts to manual setting of the activation function.

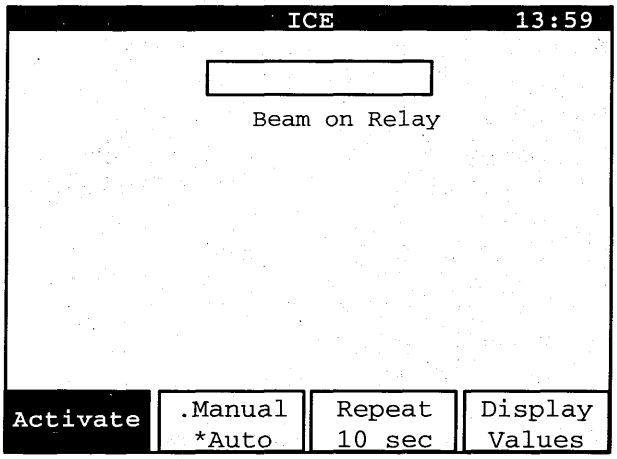


Read Values/ Activate, continued

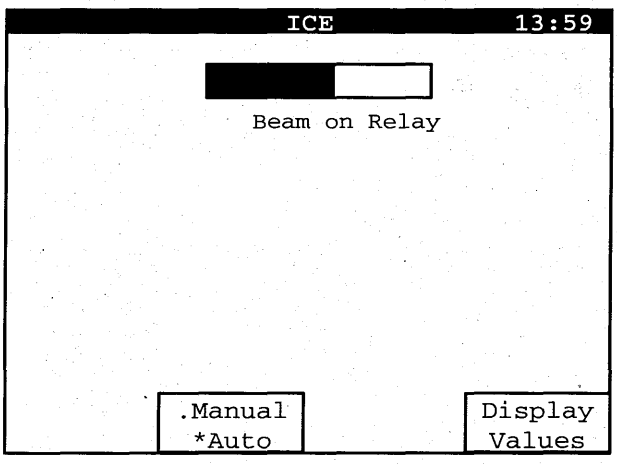
Activate

Press the "Activate" display key to start automatic activation of "Beam on Relay". Check that the headlamps are turned on/off throughout the entire activation period.

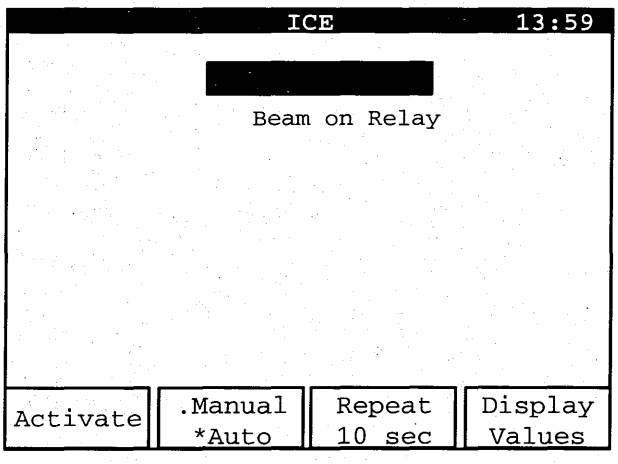
Automatic activation is used when you want to carry out longer activation during which the actuator is turned on and off at a given frequency, such as when diagnosing a fault in the wiring harness, for instance.



Activation continues until the rectangular box in the display is filled. The headlamps are turned on and off about once a second.



At the end of the activation session, the "Activate" and "Repeat 10 sec" display keys, which were hidden during the actual activation process, will reappear.

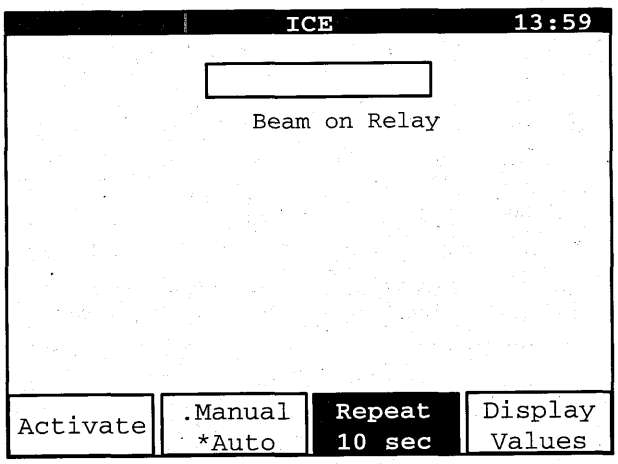


Read Values/ Activate, continued

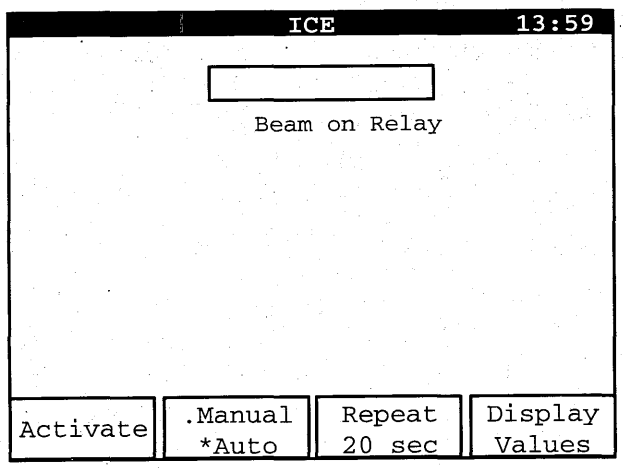
Repeat 10 sec

The "Repeat 10 sec" display key is used to change the duration of the activation period by 10 seconds at a time.

Press the "Repeat 10 sec" display key.



The activation time can be set at a maximum of 100 seconds.



Read Values/ Activate, continued

Line Graph

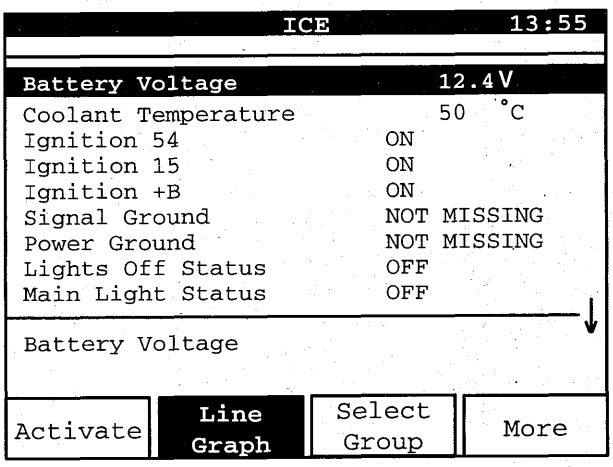
Using the "Line Graph" function, the read values can be shown in graphic form, which is often practical when carrying out fault diagnosis. The read values are also updated faster in "Line Graph" than in list form.

On the basis of the list containing all available read values, an example is given below of how the "Line Graph" function can be used.

"Line Graph" is activated for one value at a time by marking the desired value in the read values list and pressing "ENTER".

"Line Graph" can also be activated by pressing the "Line Graph" display key.

Select the "Line Graph" display key to reach the list of values which can be displayed as "Line Graph".



Read Values/ Activate, continued

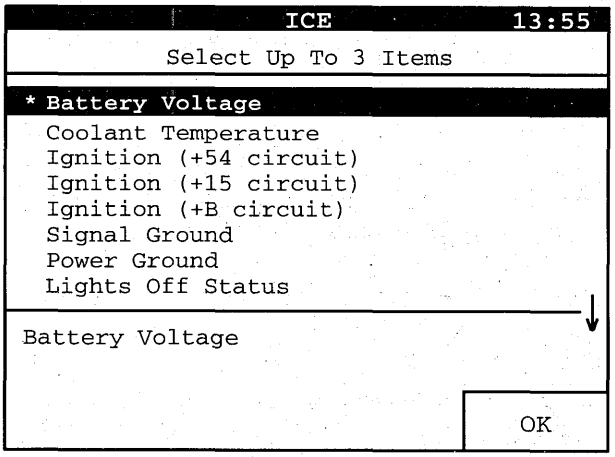
Select up to 3 items for display simultaneously with "Line Graph". Position the cursor on the desired value and press "ENTER" to select the value. The selected value will be marked with an asterisk "*" at the beginning of the line.

The selected value can be removed by positioning the cursor on it and pressing "ENTER". When 3 values have been selected, one of the values must be removed before a new value can be selected.

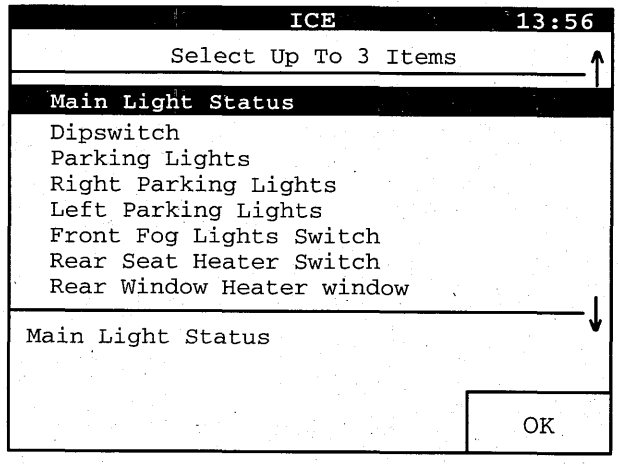
End selection by pressing the "OK" display key.

Select "Battery Voltage".

Scroll to the next part of the list by pressing the selection key with a right arrow.

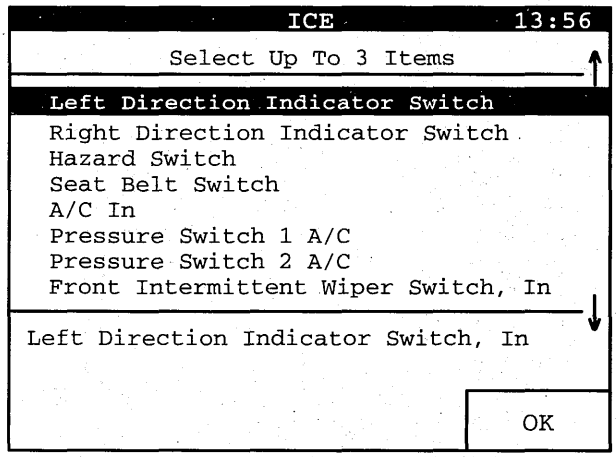


Scroll to the next part of the list by pressing the selection key with a right arrow.

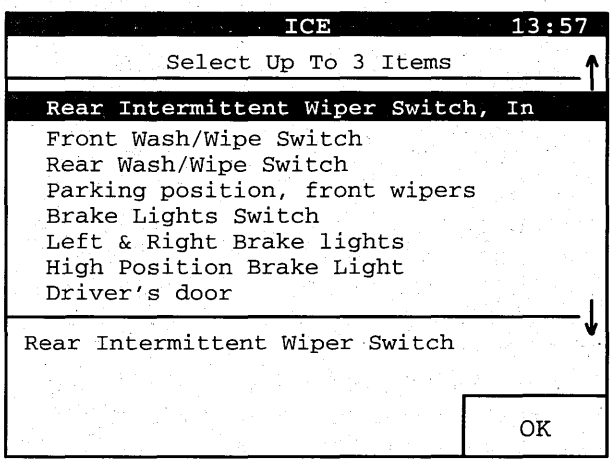


Read Values/ Activate, continued

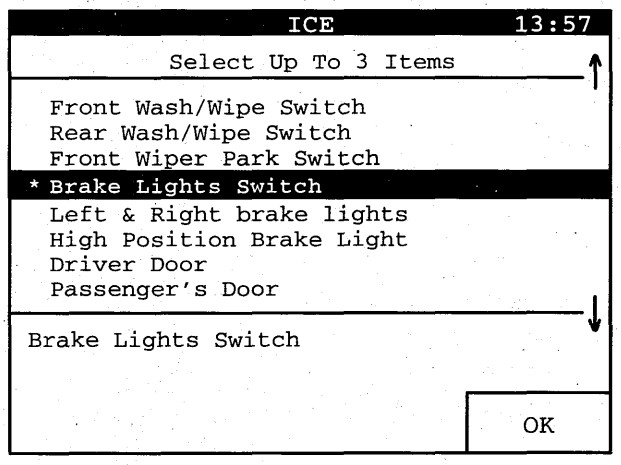
Scroll to the next part of the list by pressing the selection key with a right arrow.



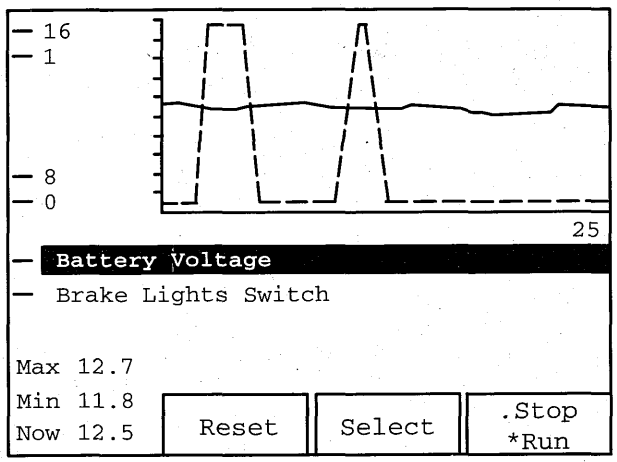
Scroll to the next part of the list by pressing the selection key with a right arrow.



Select "Brake Lights Switch". Then press the "OK" display key to have the selected values presented as a "Line Graph".



Read Values/ Activate, continued



Under the Line Graph on the left are the values which are shown while the continuous and broken lines on the left of the parameter name indicate which curve shows which parameter (value).

In this example the continuous line indicates battery voltage and the broken line shows the value of the brake lights switch. The minimum and maximum values on the vertical scale are differentiated in the same way.

The horizontal scale shows how many readings of the values in question have been made since the "Line Graph" function was activated.

The minimum and maximum values shown on the left of the vertical scale are set on the basis of experience and may be regarded as limits within which the value readings obtained should occur. However, a value need not necessarily be OK just because it is within the minimum and maximum limits.

In regard to the marked value, the maximum and minimum values obtained while running the current "Line Graph" function are shown at bottom left of the display. The present value is shown right at the bottom.

It is also possible to reset the minimum and maximum values to zero for the time elapsing since "Line Graph" was started, or since the last time they were reset to zero, by pressing the "Reset" display key.

To mark another value, press the "Select" display key or use the up and down arrow selection keys to move the cursor.

Updating of "Line Graph" is stopped and started by means of the "Stop/Run" display key, which means that the curves stop and start again as appropriate.

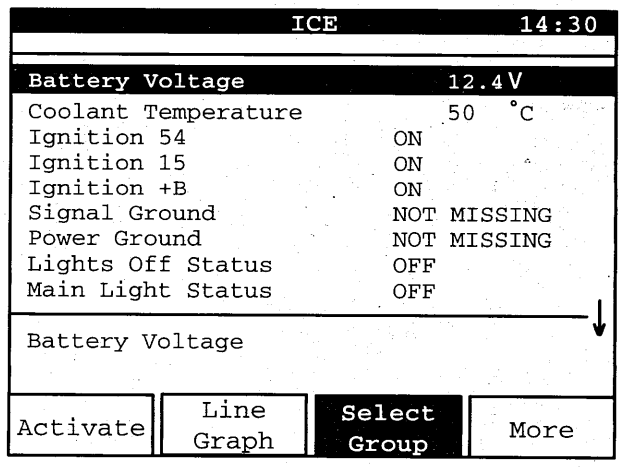
Press "EXIT" to return to the "Line Graph" list. Press "EXIT" again to return to the read values list.

Read Values/ Activate, continued

Select Group

An example of how the "Select Group" function can be used is given below. It is sometimes practical to group values of the same type in a list of their own. Updating speed also increases since the instrument has fewer values to check.

Press the "Select Group" display key to select the category of values that is to be shown in the read values list.



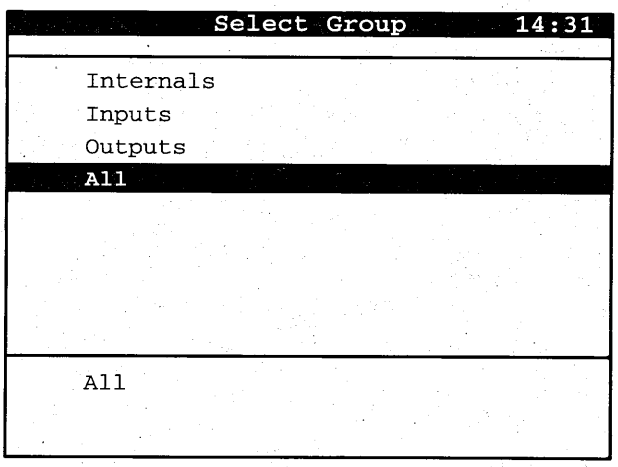
Select internal values to show the values that are used internally in the control module.

Select inputs to show which values the control module reads from its own sensors and which come from other control modules.

Select outputs to show only the values which are output from the control module concerned.

Select all to show all available values in the current system.

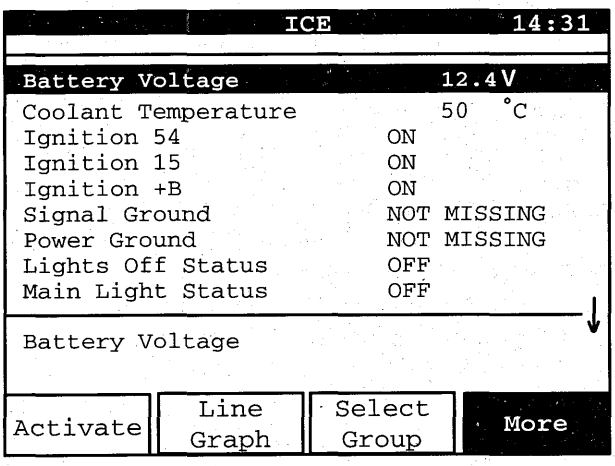
Press "EXIT" to return to the read values list.



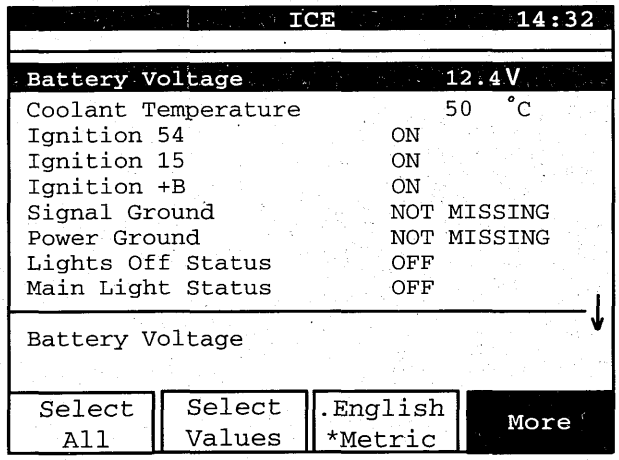
Read Values/ Activate, continued

More

Press the "More" display key to show other available display keys. The number of available display keys varies from one system to another.



Other available display keys are shown here. Press the "More" display key once again to see other available display keys. Since only 2 sets of display keys are available, the first set will be shown again when the "More" display is pressed.

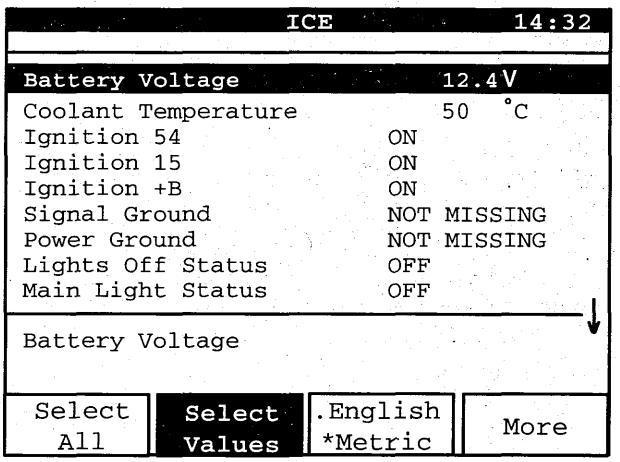


Read Values/ Activate, continued

Select Values

In certain cases you might want to look at several selected values simultaneously.

Press the "Select Values" display key to create your own list of read values in which only selected read values are included.

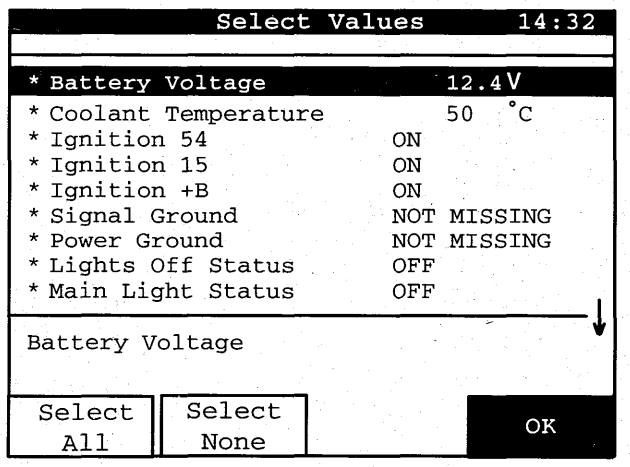


At the start all read values are selected. To remove an individual value, mark it and press "ENTER".

To remove all values, press the "Select None" display key. To select an individual value after this, mark the value and press "ENTER".

Press the "Select all" display key to select all read values again.

Press the "OK" display key to show the list of selected read values.

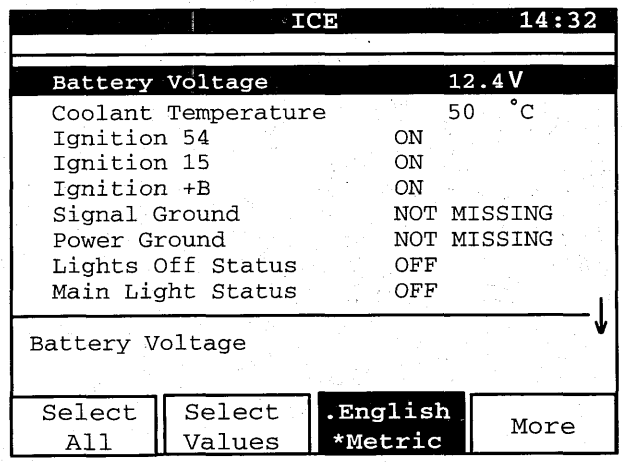


Read Values/ Activate, continued

English/ Metric

Press the "English/Metric" display key to switch between English and metric units of measurement.

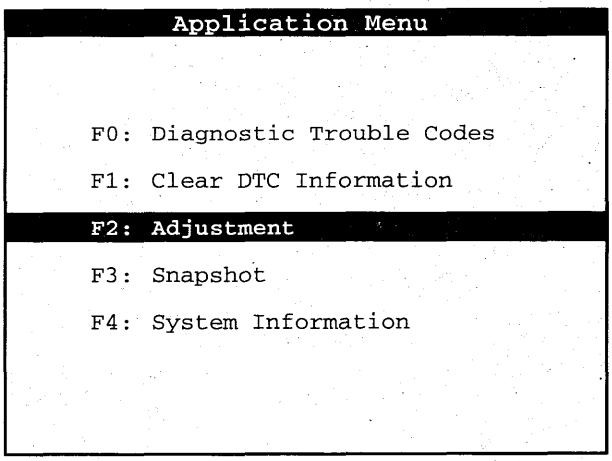
Next time the Tech 2 is used, a setting which has been changed here will not remain changed. To change settings permanently, see the "Set Options" section.



Adjustment

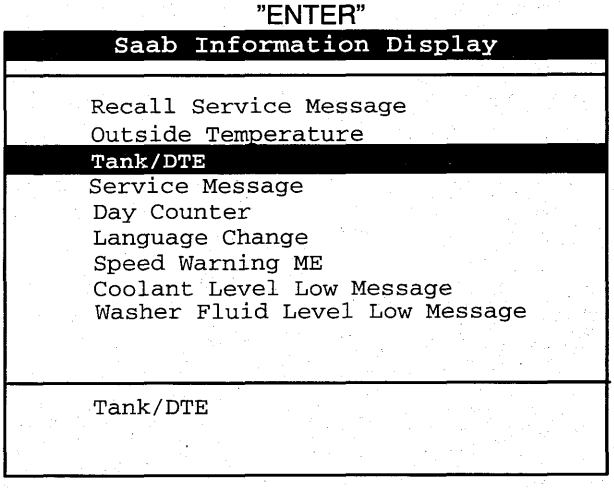
Adjustment, example

Adjustment is selected from the system menu.



"ENTER"

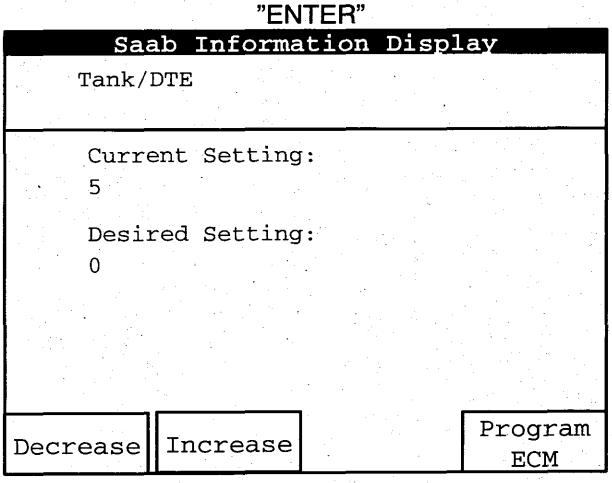
Tank/DTE is selected in this example.



"ENTER"

Set the desired value with the "Increase" or "Decrease" display keys and then save the desired value in the control module by pressing the "Program ECM" display key.

When the value has been changed the desired setting will be marked.

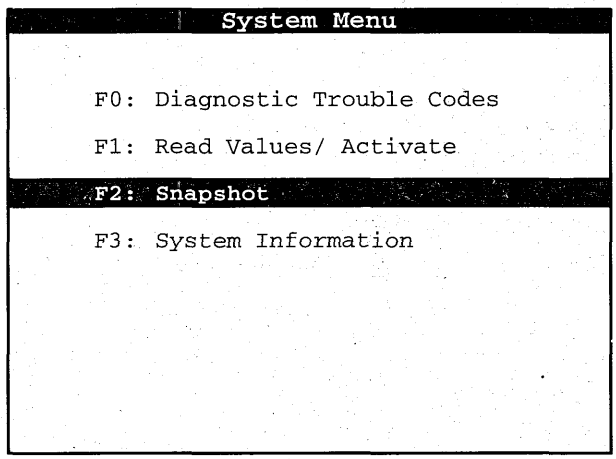


Snapshot

Here follows an example showing how the "Snapshot" function can be used to record data from the "Automatic transmission (TCM)" system.

By selecting "Diagnosis"/ "(S) 1995"/ "SAAB 900" / "F1: Transmission"/ "Automatic transmission (TCM)" in the main menu, you will end up in the system menu shown on the right.

Select "F2 Snapshot".



Snapshot, continued

Trigger

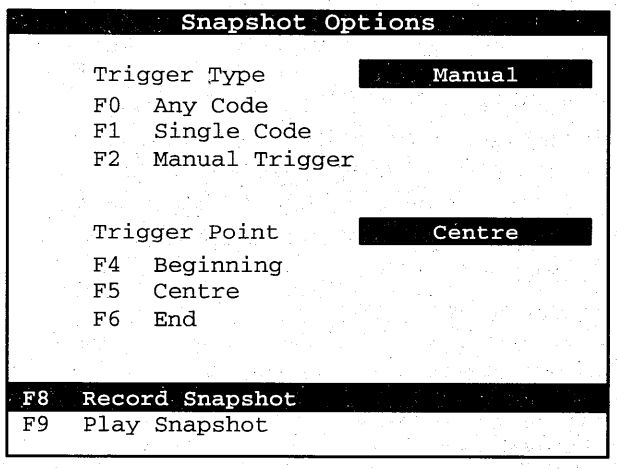
Before starting to record a "Snapshot", you must select the desired type of recording. This is done by selecting the desired "Trigger type". Trigger means "go" and by selecting the type of trigger you determine what it is that will cause recording to start.

There are three types of "Trigger Type" in "Snapshot":

1 "Any Code" means that recording starts as soon as a diagnostic trouble code is generated in the relevant system's control module. This function has not yet been implemented.

2 "Single Code" means that recording starts only if the diagnostic trouble code which the operator has set is generated in the control module. This function has not yet been implemented.

3 "Manual Trigger" means that recording is started manually by the operator.

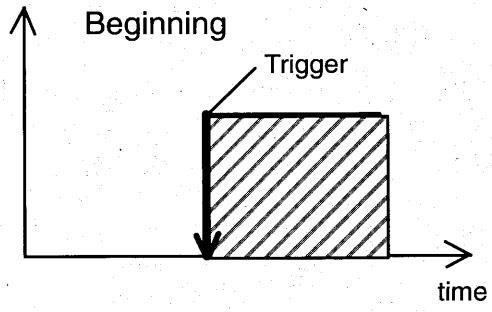


Snapshot, continued

The next step is to decide the "Trigger Point" which determines how the recording time will be used in relation to when the "Trigger Point" is activated.

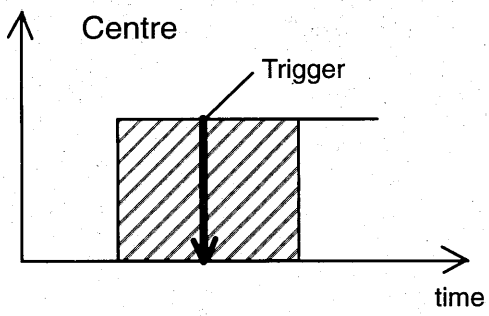
In "Snapshot", three different positions can be selected for the trigger:

1 "Beginning", which means that activation of the trigger causes recording to start and that the entire recording after the trigger is saved.

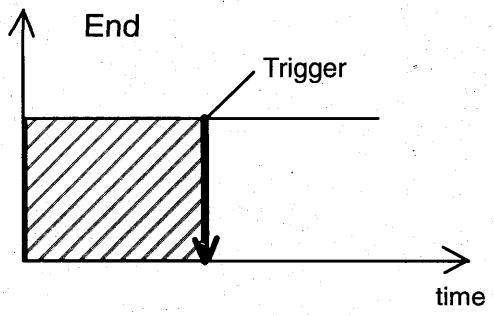


The trigger is activated by pressing the "Trigger" display key.

2 "Centre" means that recording starts when all settings have been made. When the trigger is activated, recording continues for a while so that half the recording occurs before and half occurs after the trigger on the time axis.



3 "End" also means that recording starts when all settings have been made. When the trigger is activated, recording ends and the entire recording occurs before the trigger on the time axis.



Select "F8: Record Snapshot".

For an example of "F9: Play Snapshot", see the section entitled "View Captured Data".

Snapshot, continued

Yet another way of adapting recording to the requirements of the moment is to select the group of signals to be recorded.

The categories differ between different systems.

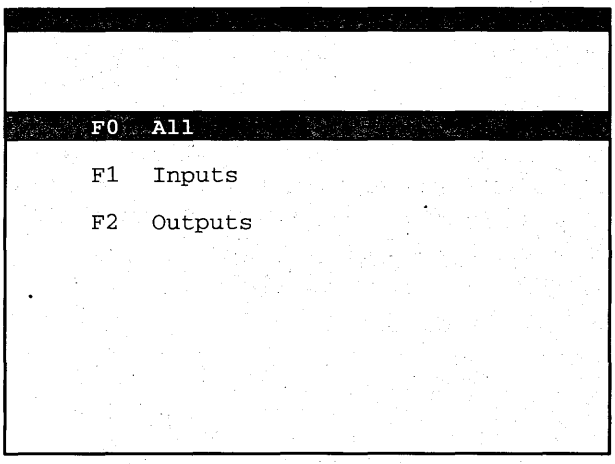
1 "F0: All" means that all available values will be recorded.

2 "F2: Inputs" means that only those values obtained from the system's own sensors or other control modules will be recorded

3 "F3: Outputs" means that only those values sent out by the control module will be recorded.

In general, the maximum recording time increases when the number of recorded values decreases. For instance, if the recording of output values only is of interest, recording time can be extended by selecting outputs instead of all values.

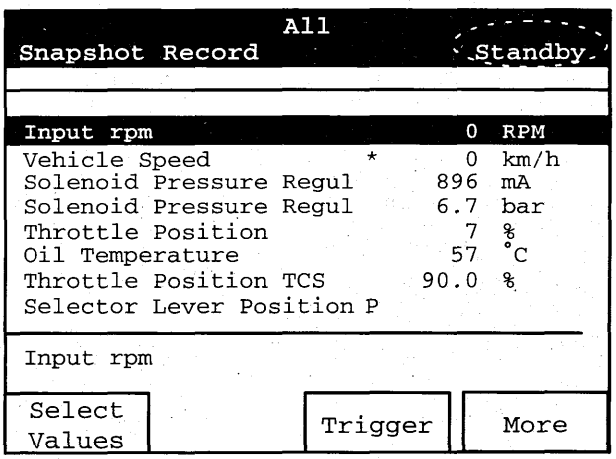
Select "F0: All" to record all the values.



If the "Any Code" or "Single Code" trigger type is selected, "Snapshot" recording will start when the menu on the right appears.

Recording of a "Snapshot" will now take place at the same time as all read values in the relevant control module are shown on the display.

The message "Standby" at top right in the display flashes to indicate that the Tech 2 is waiting for a trigger signal.

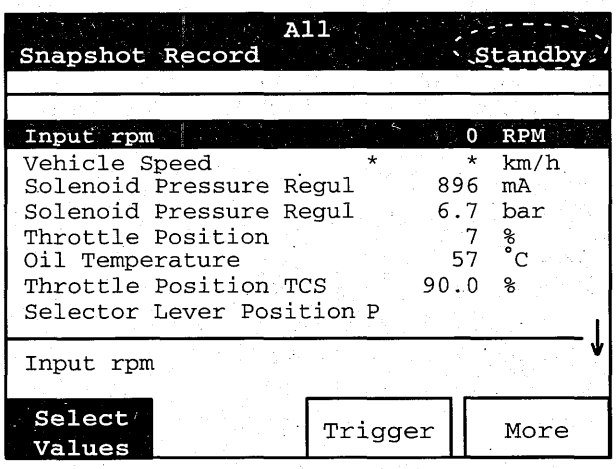


Snapshot, continued

Select Values

In "Snapshot" mode also you can take a look at a number of values. This does not affect the recording which records the entire selected category.

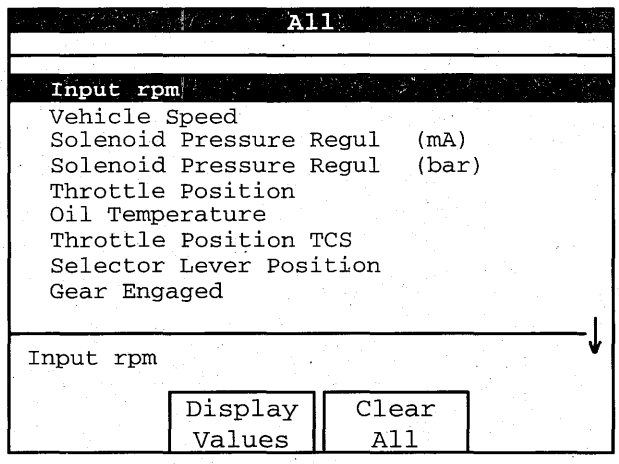
Press the "Select Values" display key to select up to 5 read values for display at the top of the list.



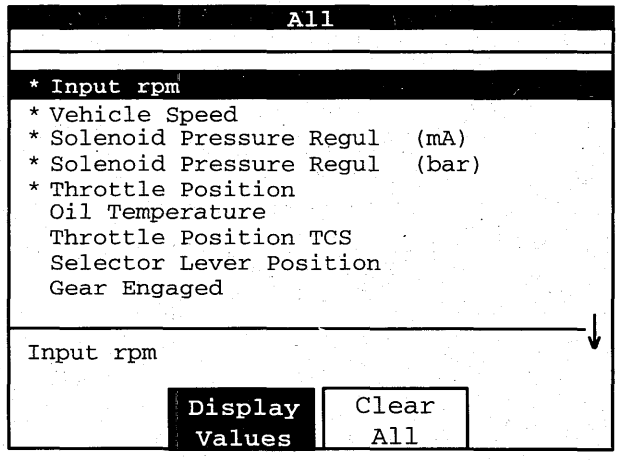
Select the desired value by marking it and then press "ENTER".

Selected values are marked with an asterisk "*" at the beginning of the line.

When 5 values have been selected, one of the values must be removed before a new value can be selected.



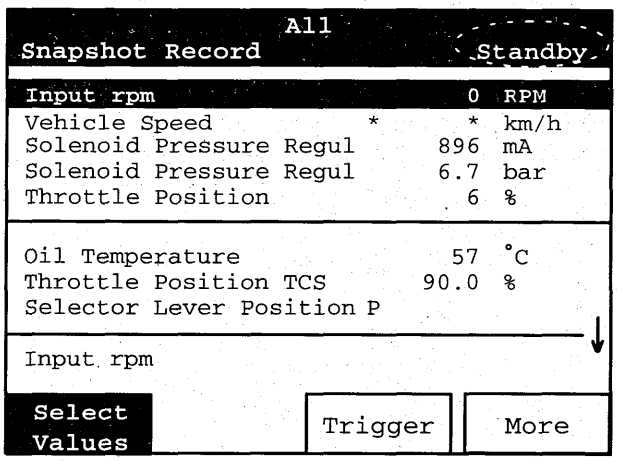
Press the "Display Values" display key to show the selected values at the top of the list of read values.



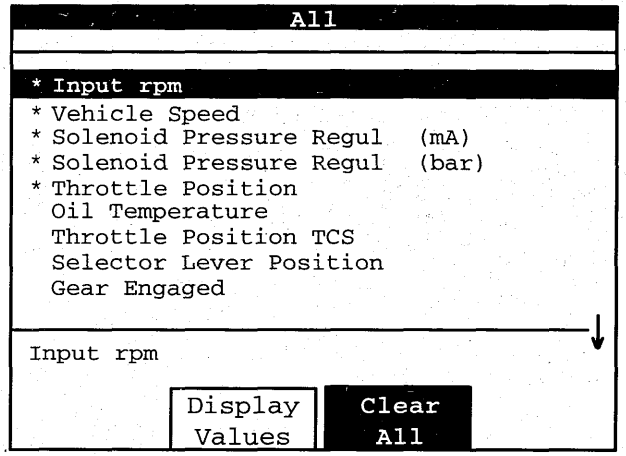
Snapshot, continued

If you want to remove selected values and return to the list with no selected values, proceed as follows:

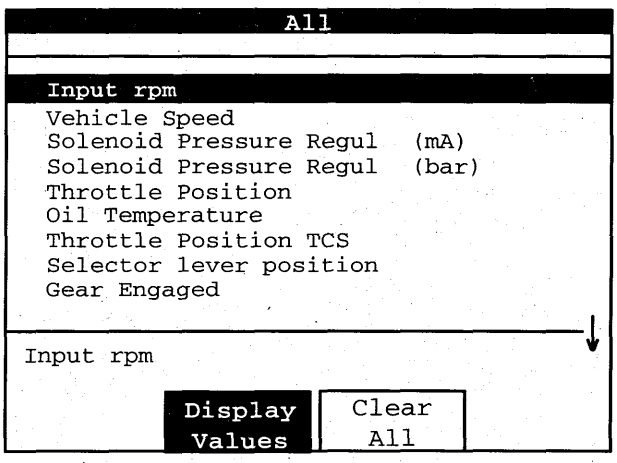
Press the "Select Values" display key.



Press the "Clear All" display key to remove all values.

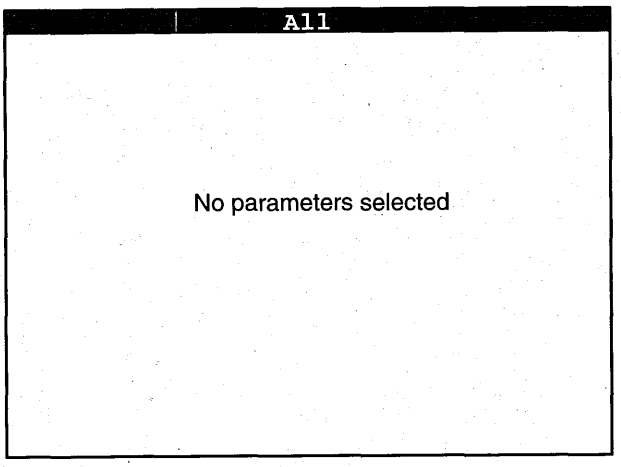


Press the "Display Values" display key to return to the list of all available read values.



Snapshot, continued

The message "No parameters selected" will be displayed for about 3 seconds and after that the list of read values will again be displayed.

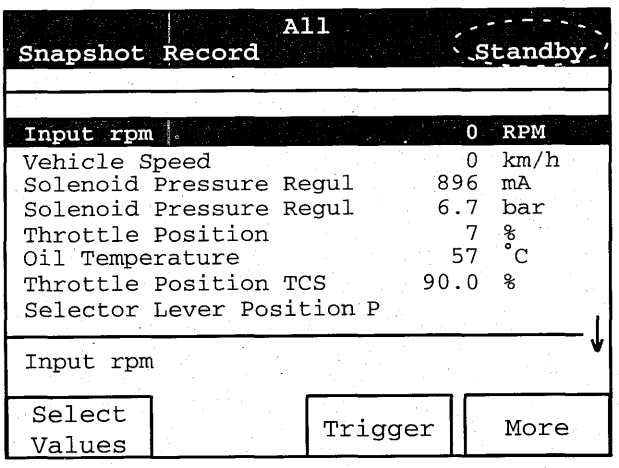


Here is the menu with all the system's available read values again.

Press "EXIT" to return to the menu in which different categories of signals can be selected.

Press "EXIT" again to return to the menu with "Trigger position" and "Trigger Point" options.

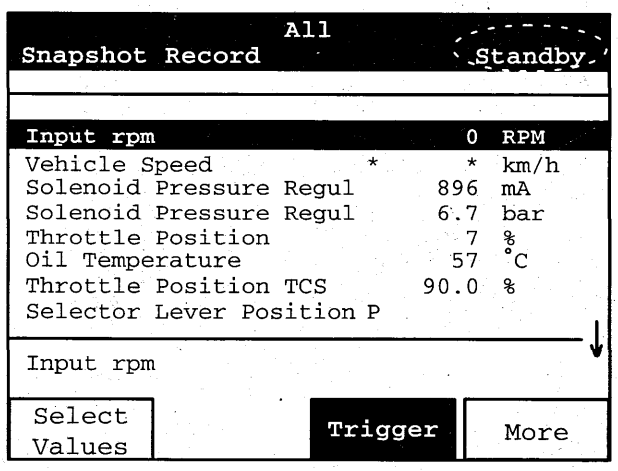
Press "EXIT" once again to return to the system menu.



Snapshot, continued

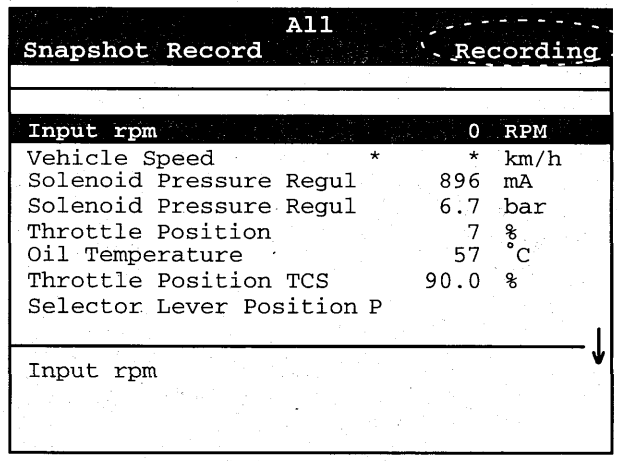
Trigger

Press the "Trigger" display key at the desired time to set the "Trigger Point".

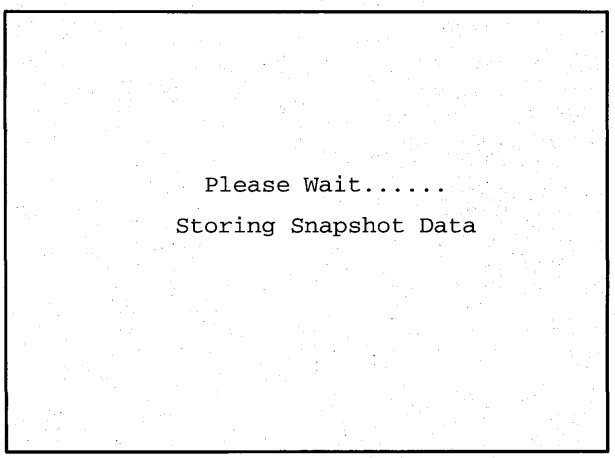


Since the middle "Trigger Point" has been selected here, recording continues for a length of time corresponding to the time it takes to fill half the memory available for the "Snapshot" concerned.

If a shorter recording time is desired, recording can be interrupted by pressing "EXIT" at the desired time.



When the memory is full or recording is stopped, the message "Please wait.....Storing Snapshot Data" will be displayed during the time it takes to save data to the memory card.



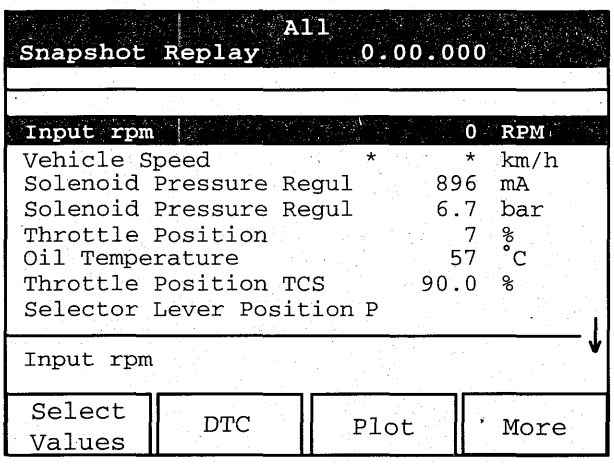
Snapshot, continued

When the recording has been saved, it will be played back immediately.

Here is the menu with available read values from the recording.

Press "EXIT" to return to the menu containing the "Trigger position" and "Trigger Point" options.

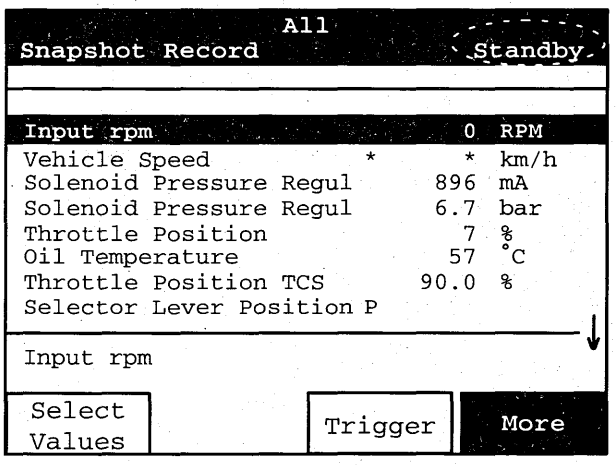
Press "EXIT" again to return to the system menu.



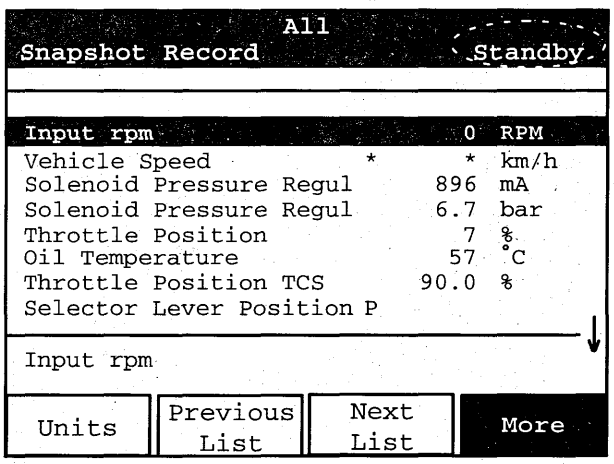
Snapshot, continued

More

Press the "More" display key to see other available display keys.



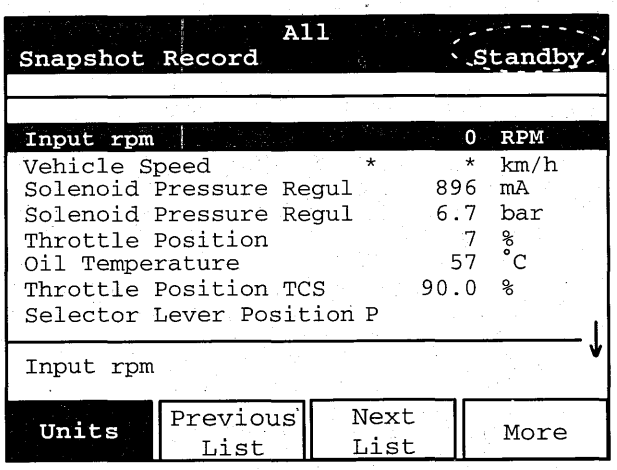
Here are other available display keys in the system concerned.



Snapshot, continued

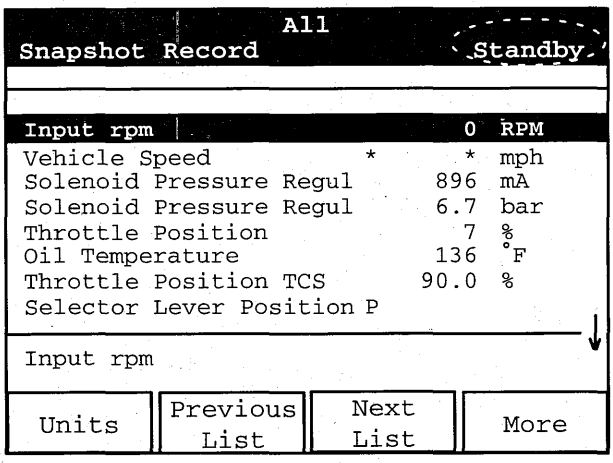
Units

Press the "Units" display key to alternate between metric and English units.



The display now shows English units.

Press the "Units" display key again to return to metric units.

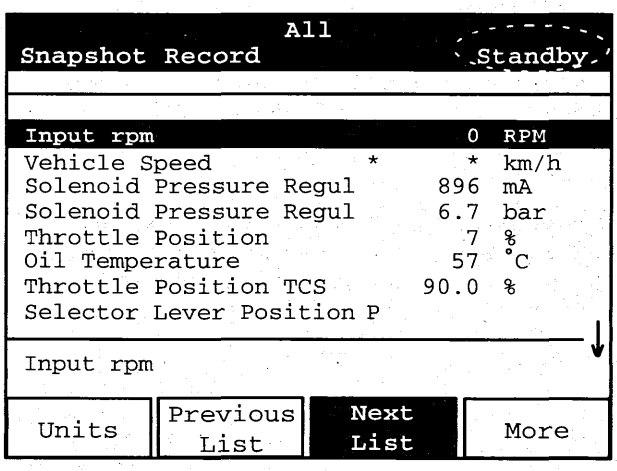


Snapshot, continued

Previous List, Next List

Press the "Previous List" or "Next List" display key to alternate between categories of read values.

Press the "Next List" display key.



The display now shows available read values from the "Inputs" category.

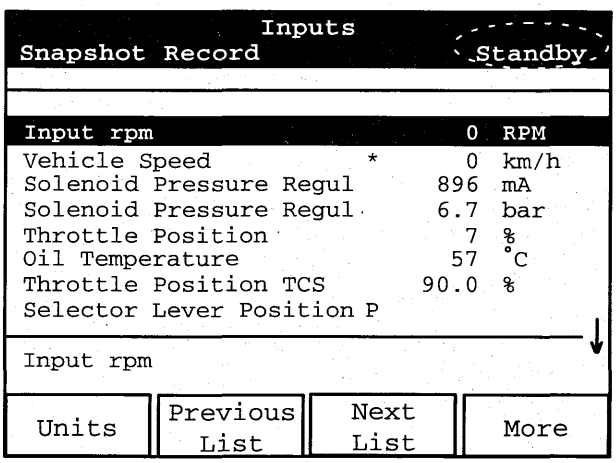
Press the "Next List" display key to see available read values from the "Outputs" category.

Press the "Next List" display key once more to see available read values from the "All" category again.

By using the "Previous List" display key instead, the categories of read values will be changed correspondingly in reverse order.

Press "EXIT" to return to the menu with "Trigger position" and "Trigger Point" options.

Press "EXIT" again to return to the system menu.

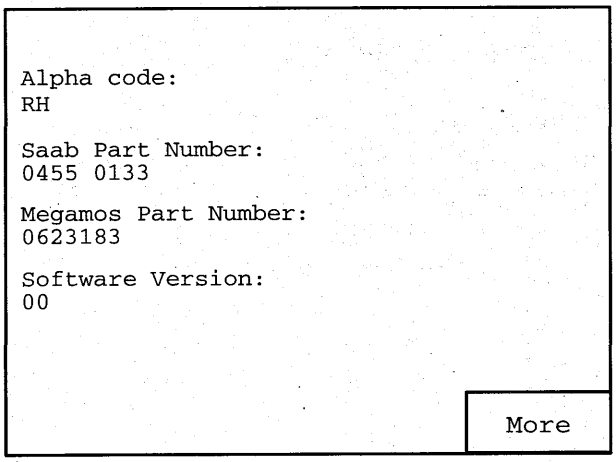


System Information

This function shows system data, such as the part number and version of the software and hardware. This information is system dependent.

In this example, system information will be obtained from the anti–theft alarm.

If there is more information available than can be shown all at once in the display, the "More" display key at bottom right in the display can be used.

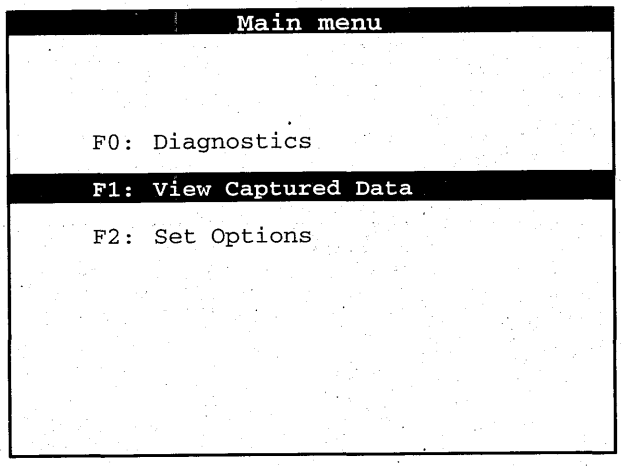


View Captured Data

View Captured Data

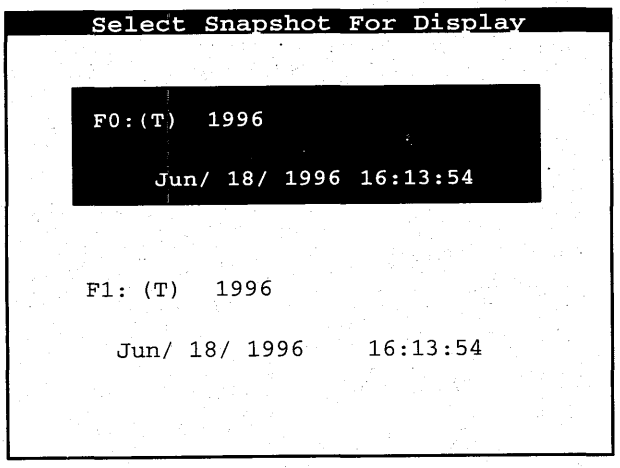
Select "F2: View Captured Data" to view recorded snapshots.

"View Captured Data" can also be obtained by selecting "F9 Play Snapshot" as described on page 59.



The Tech 2 can save 2 snapshots. Move the cursor to the desired "Snapshot" and press "ENTER" to view the recording.

For each recording the Tech 2 shows the date and time of the recording as well as the model year of the car on which the recording was made.



View Captured Data, continued

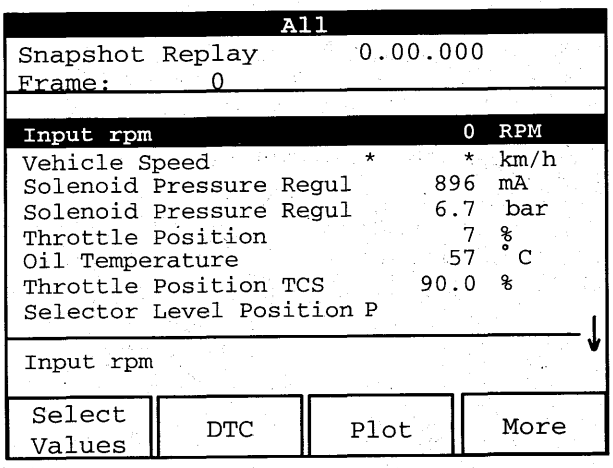
Here is the menu with available read values from the recording:

The top line of the display shows the recording time and number of updates.

Every function will now be explained with the aid of an example.

Select Values

See Diagnostics/Snapshot/Select Values for examples of how the "Select Values" display key works.

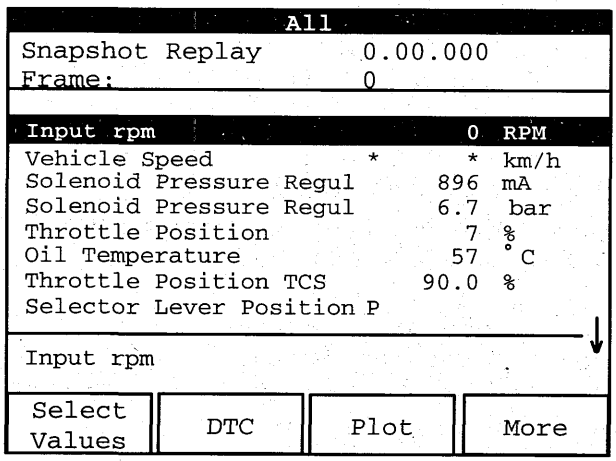


View Captured Data, continued

Diagnostic trouble code

See Diagnostics/diagnostic trouble codes for examples of how the "DTC" display key works.

However, this function was not implemented at the time of going to press.

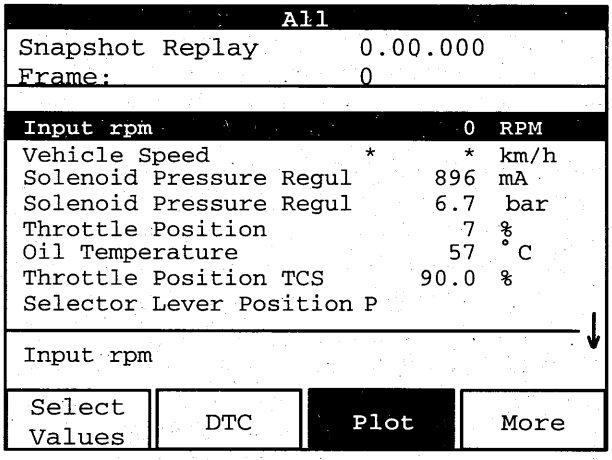


View Captured Data, continued

Plot

On the basis of the list of all available read values, an example of how the "Plot" function can be used is given below.

Press the "Plot" display key to access the list of values which can be displayed in "Plot" form.

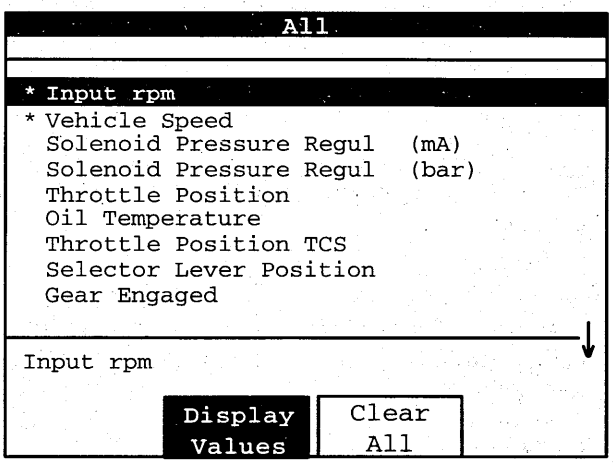


Select up to 3 items for displaying simultaneously in "Plot" form. Position the cursor on the desired value and press "ENTER" to select it. The selected value will be marked with an asterisk "*" at the beginning of the line.

The selected value can be removed by positioning the cursor on it and pressing "ENTER". When 3 values have been selected, one of the values must be removed before a new value can be selected.

Select "Input rpm" and "Vehicle Speed".

Then press the "Display Values" display key to activate "Line Graph".



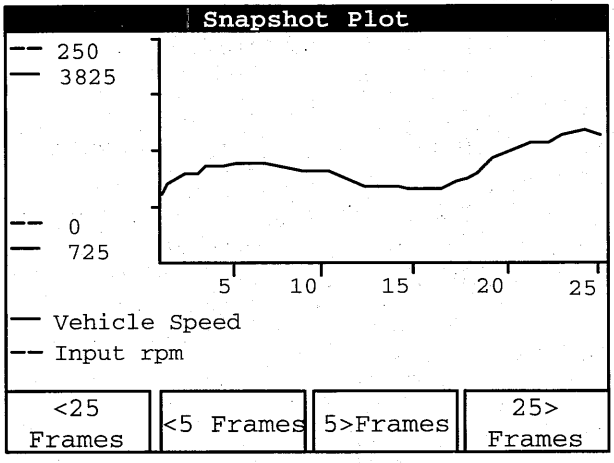
View Captured Data, continued

The values that are displayed are given on the left under Plot. The continuous line and broken line respectively on the left of the parameter name indicate which curve shows which parameter (value).

In this example the continuous line indicates "Input rpm" and the broken line shows "Vehicle Speed". The minimum and maximum values on the vertical scale are differentiated in the same way.

The horizontal scale shows how many "Frames" of the values concerned have been retrieved since the "Snapshot" function was activated.

The maximum and minimum values that have been obtained in respect of the marked value during the current recording are shown at bottom left in the display.



<25 Frames

Press the "<25 Frames" display key to show the values concerned in "Plot" form 25 steps earlier in the recording.

<5 Frames

Press the "<5 Frames" display key to show the values concerned in "Plot" form 5 steps earlier in the recording.

5 >Frames

Press the "5> Frames" display key to show the values concerned in "Plot" form 5 steps further on in the recording.

25 >Frames

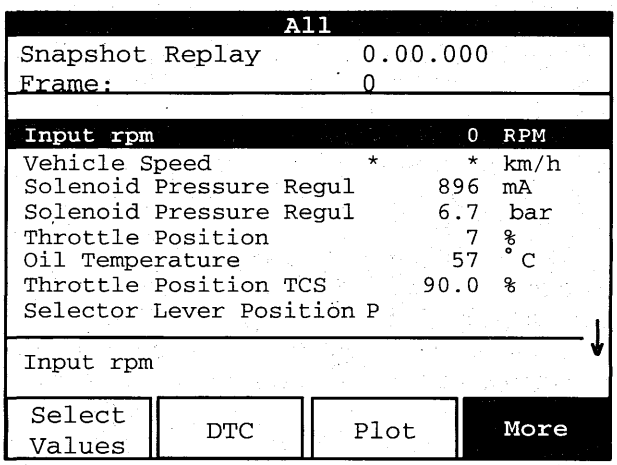
Press the "25 >Frames" display key to show the values concerned in "Plot" form 25 steps further on in the recording.

Press "EXIT" to return to the "Plot" list. Press "EXIT" again to return to the read values list.

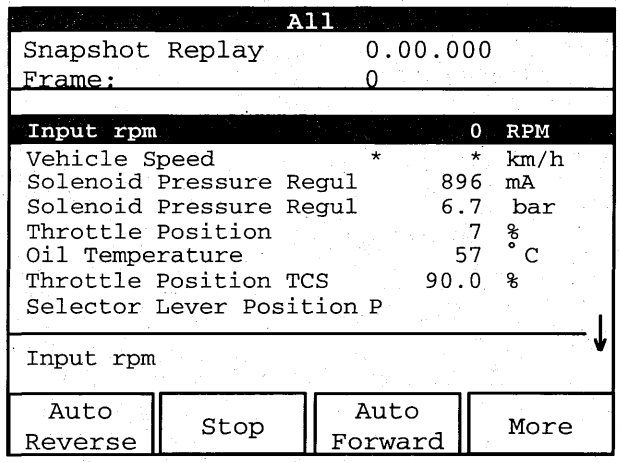
View Captured Data, continued

More

Press the "More" display key to show other available display keys.



Here is the next set of display keys.

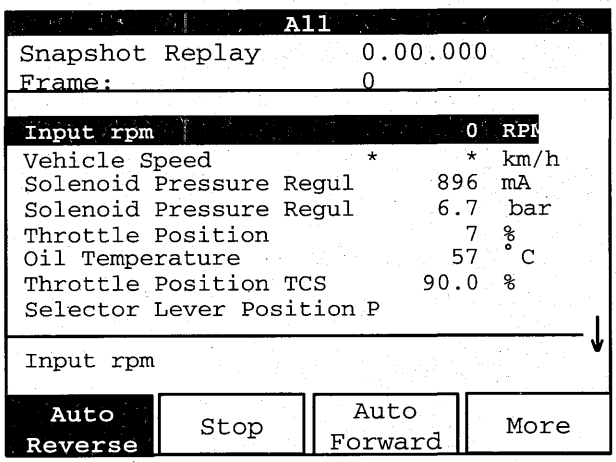


View Captured Data, continued

Auto Reverse

The "Auto Forward" and "Auto Reverse" display keys act like the fast forward and rewind buttons on a tape recorder.

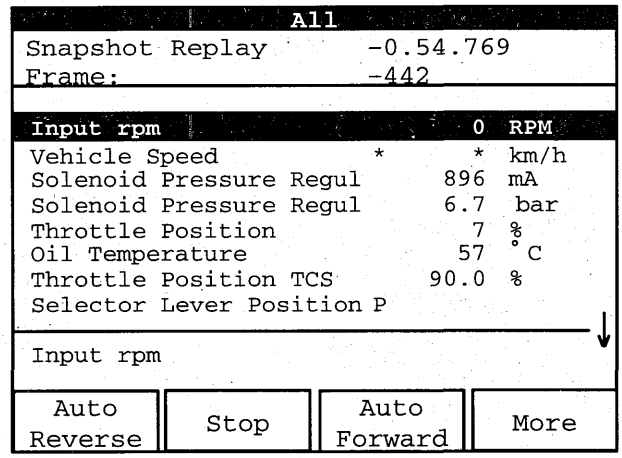
Press the "Auto Reverse" display key to play the recording backwards. To enable a more careful study to be made of what has been recorded, the recording is played back at a slower speed than that at which it was actually recorded.



The "Auto Reverse" display key plays the recording backwards from the position at which the "Auto Reverse" display key is pressed.

Stop

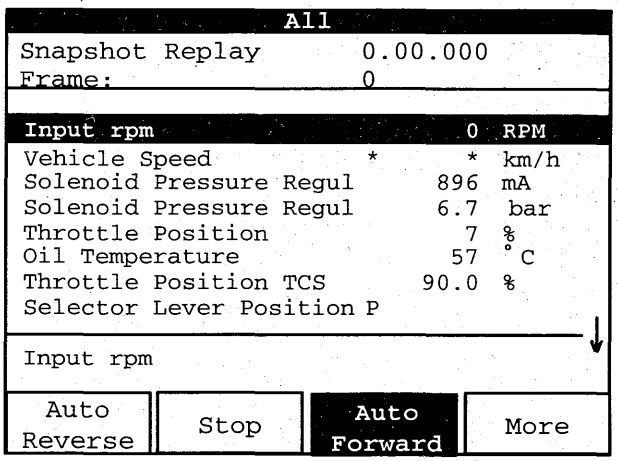
Press the "Stop" display key to stop playing of the "Snapshot" being shown.



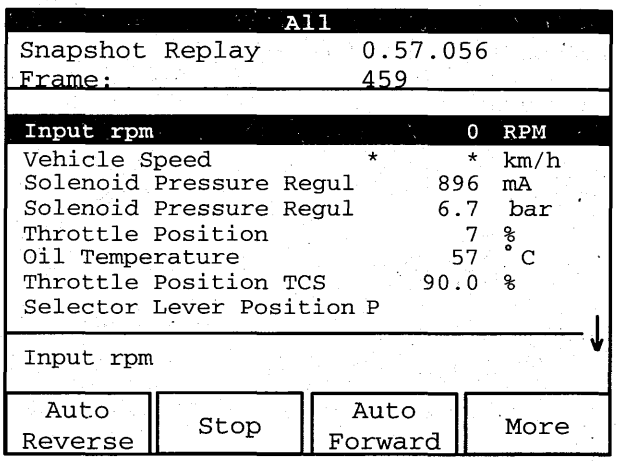
View Captured Data, continued

Auto Forward

Press the "Auto Forward" display key to play the recording forwards.



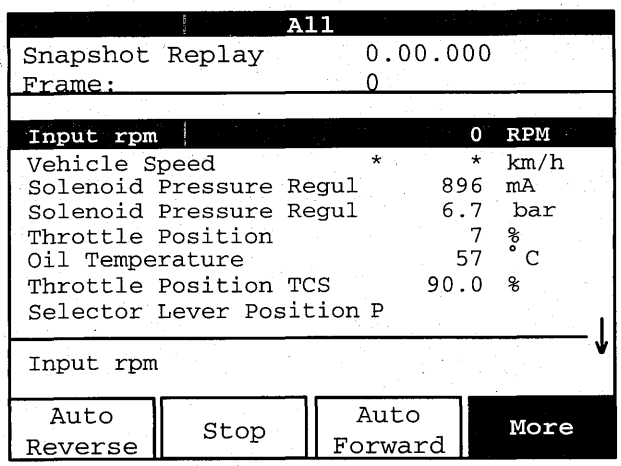
The "Auto Forward" display key plays the recording forwards from the position at which the "Auto Forward" display key is pressed.



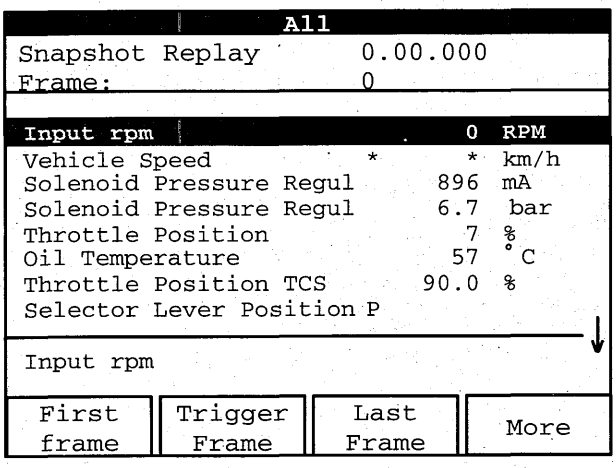
View Captured Data, continued

More

Press the "More" display key to show other available display keys.



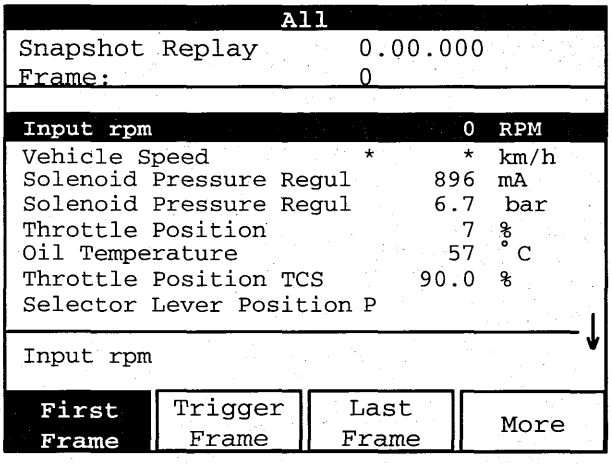
Here is the next set of display keys.



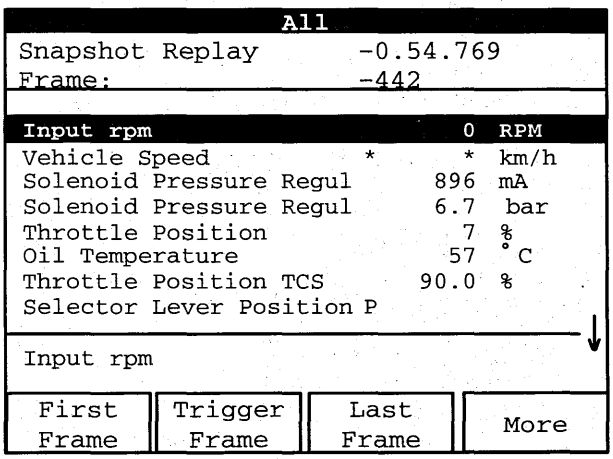
View Captured Data, continued

First Frame

Press the "First Frame" display key to show the recording's first set of values.



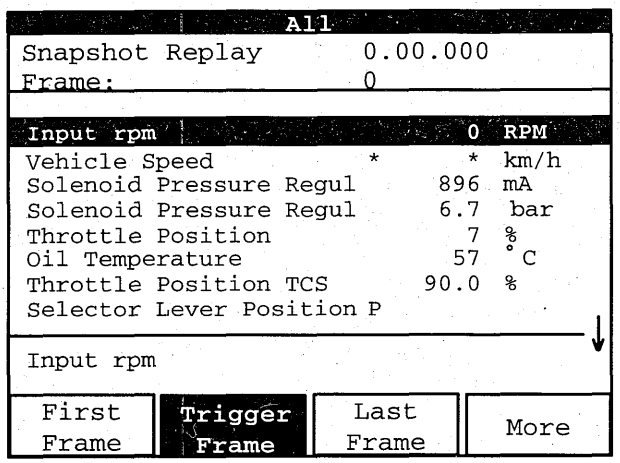
Here is the recording's first set of values. They were recorded 54 seconds (or 442 updates) before the "Trigger" display key was pressed.



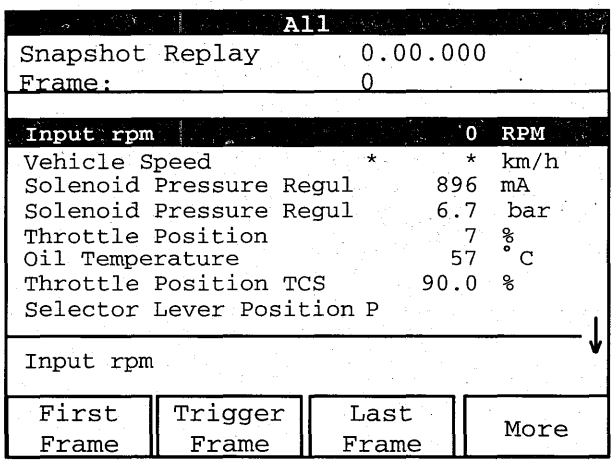
View Captured Data, continued

Trigger Frame

Press the "Trigger Frame" display key to show the recording's values at the "Trigger Point".



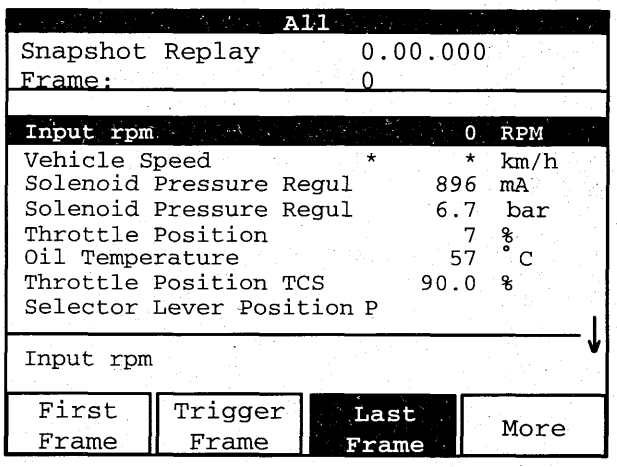
In this case, "Trigger Point" is set at "Centre", which is suitable when analysis of both sequences before and after the "Trigger Point" is important.



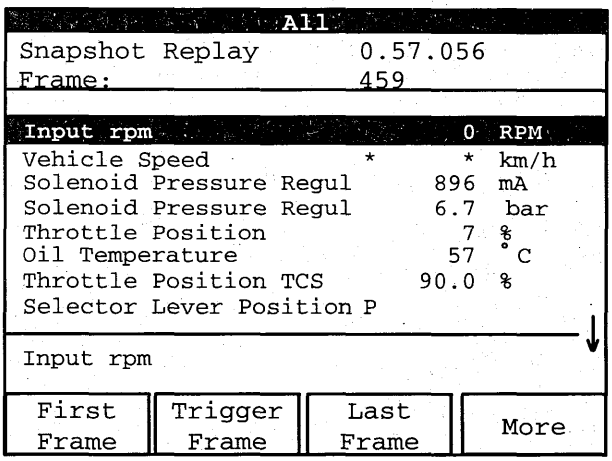
View Captured Data, continued

Last Frame

Press the "Last Frame" display key to show the recording's final set of values.



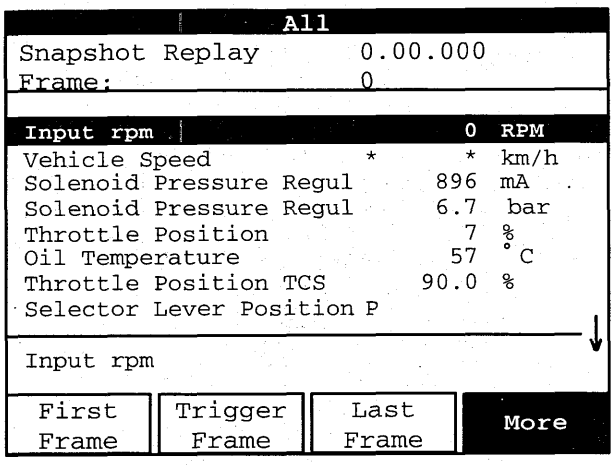
Here is the recording's final set of values.



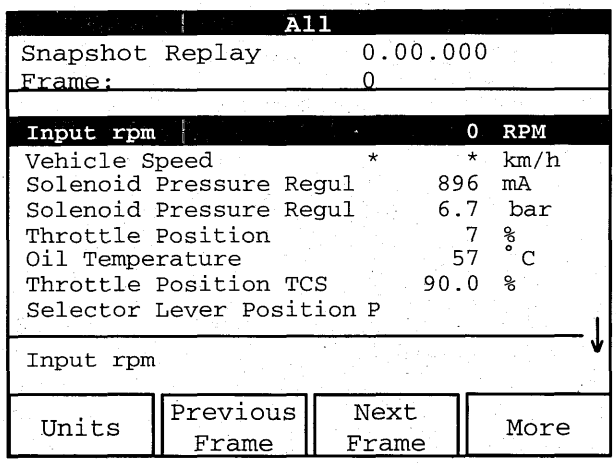
View Captured Data, continued

More

Press the "More" display key to show other available display keys.



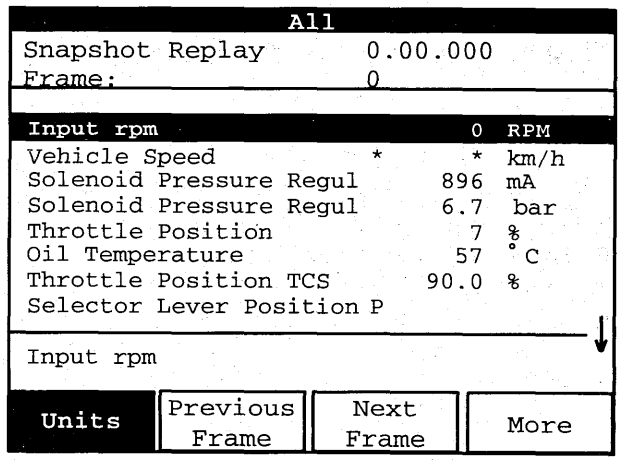
Here is the next set of display keys.



View Captured Data, continued

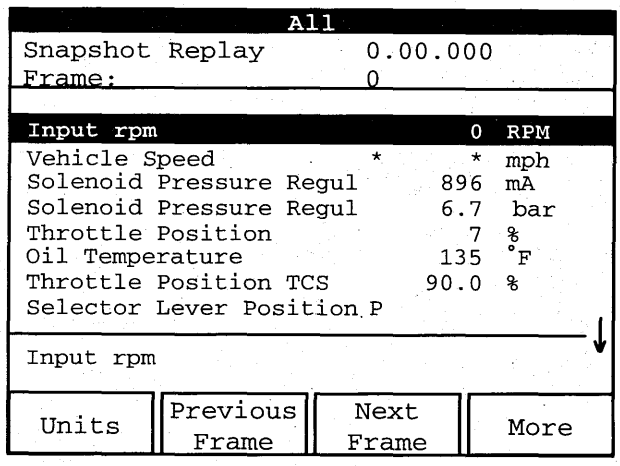
Units

Press the "Units" display key to alternate between metric and English units.



English units are shown here.

Press the "Units" display key again to return to metric units.

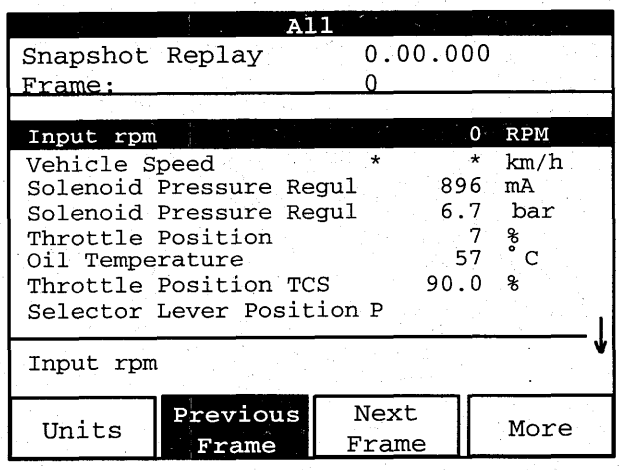


View Captured Data, continued

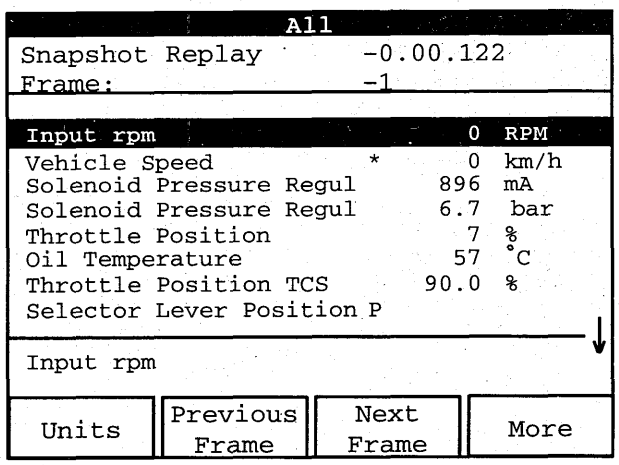
Previous Frame

The "Next Frame" and "Previous Frame" display keys are used to step forward manually one update at a time.

Press the "Previous Frame" display key to show the immediately preceding set of values.



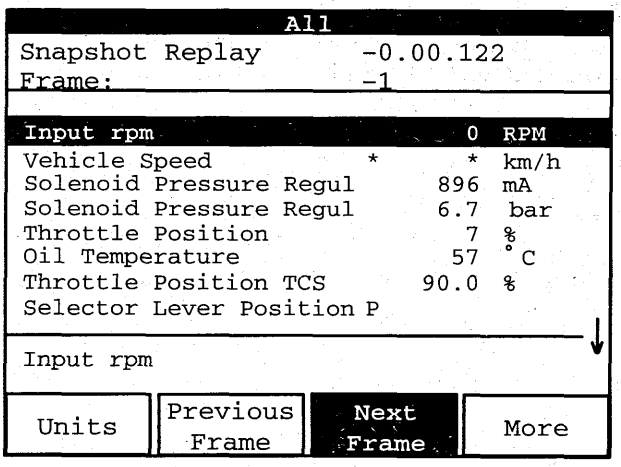
Here is the recording's immediately preceding set of values.



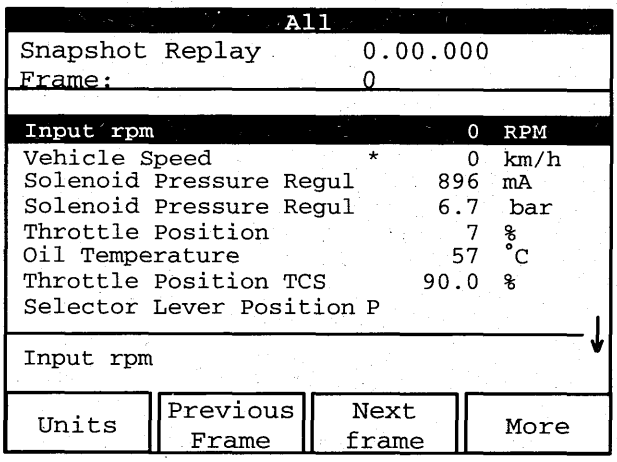
View Captured Data, continued

Next Frame

Press the "Next Frame" display key to show the immediately following set of values.



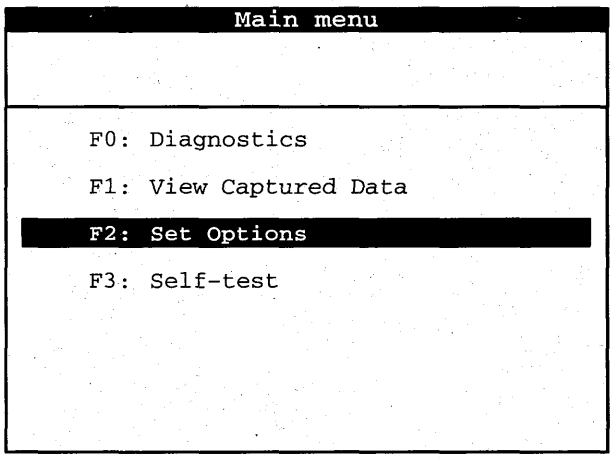
Here is the recording's immediately following set of values.



Set Options

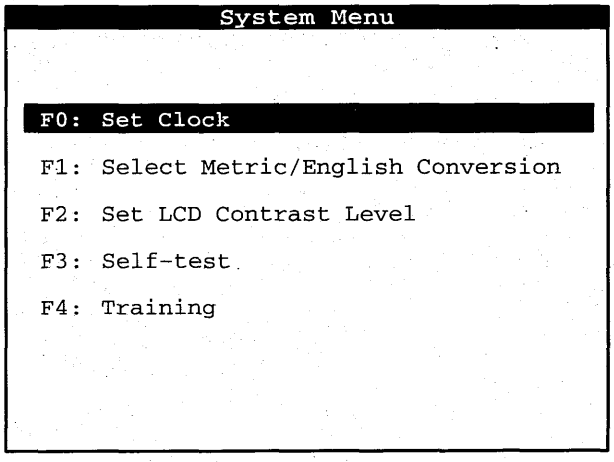
The main menu includes "F2: Set Options", which contains:

- "F0: Set Clock"
- "F1: Select Metric/English Conversion"
- "F2: Set LCD Contrast Level"
- "F3: Self–test"



If the cursor is positioned on "Set Options" and "ENTER" or "F2" is pressed, the "Set Options" menu will be displayed as shown on the right.

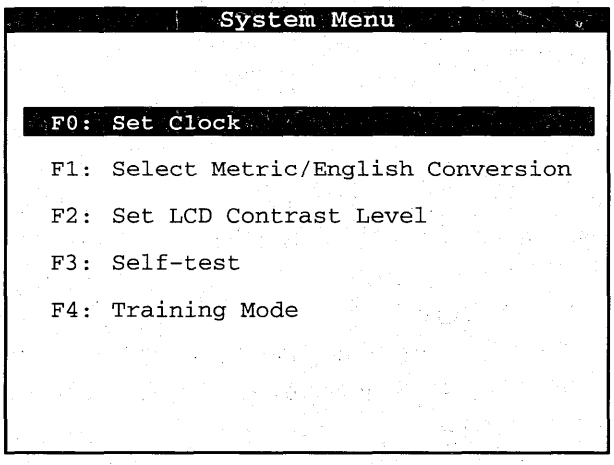
In the following, the various functions in "Set Options" will be described and examples will explain how they work.



Set Clock

If the cursor is positioned on "Set Options" and "ENTER" or "F2" is pressed, the "Set Options" menu will be displayed as shown on the right.

Select "F0: Set Clock"

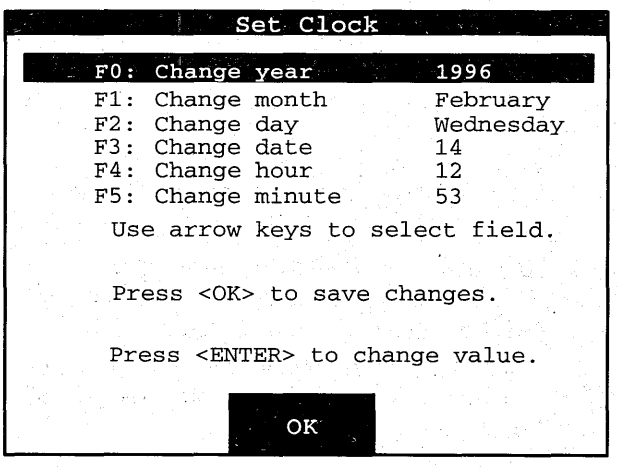


The date and time can be changed in two ways:

1 By marking the desired choice and pressing "ENTER" to change the value. The value changes one step at a time each time "ENTER" is pressed.

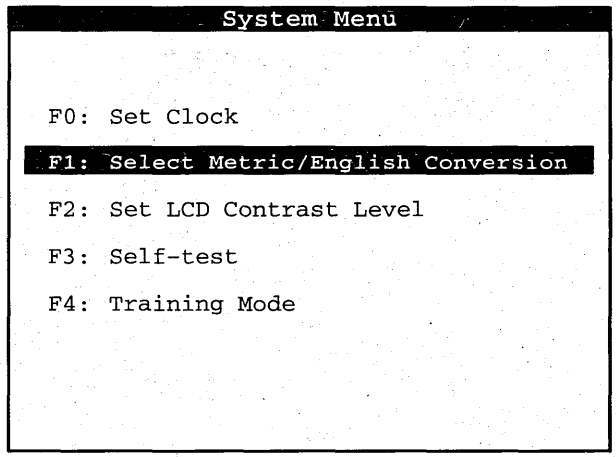
2 By pressing the corresponding function key. The value changes one step at a time each time "F" is pressed.

When settings have been changed, the new values will be saved by pressing the "OK" display key.

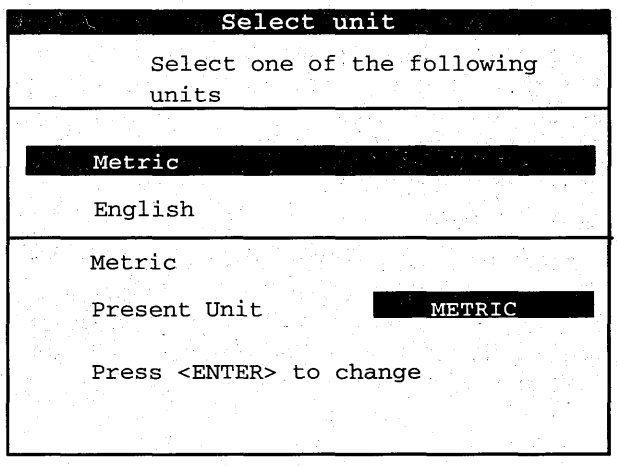


Select Metric/English Conversion

Select "F1: Select Metric/English Conversion".

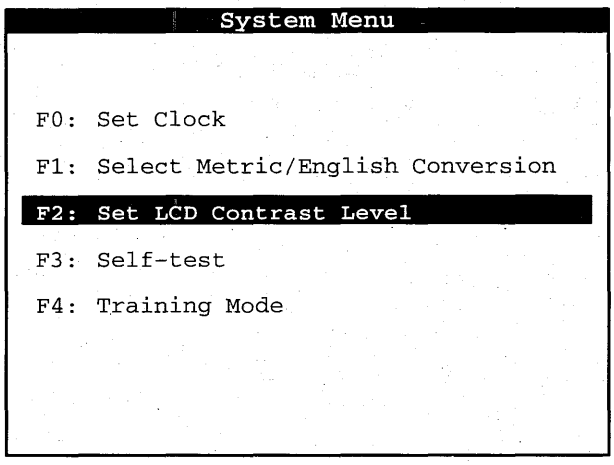


English or metric units can be selected by marking the desired setting and then pressing "ENTER" to change the setting. The selected setting will be saved and displayed next time the Tech 2 is used.



Set LCD Contrast Level

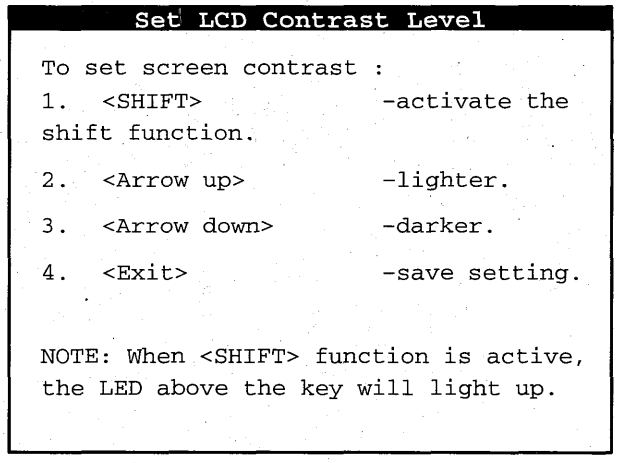
Select "F2: Set Contrast Level".

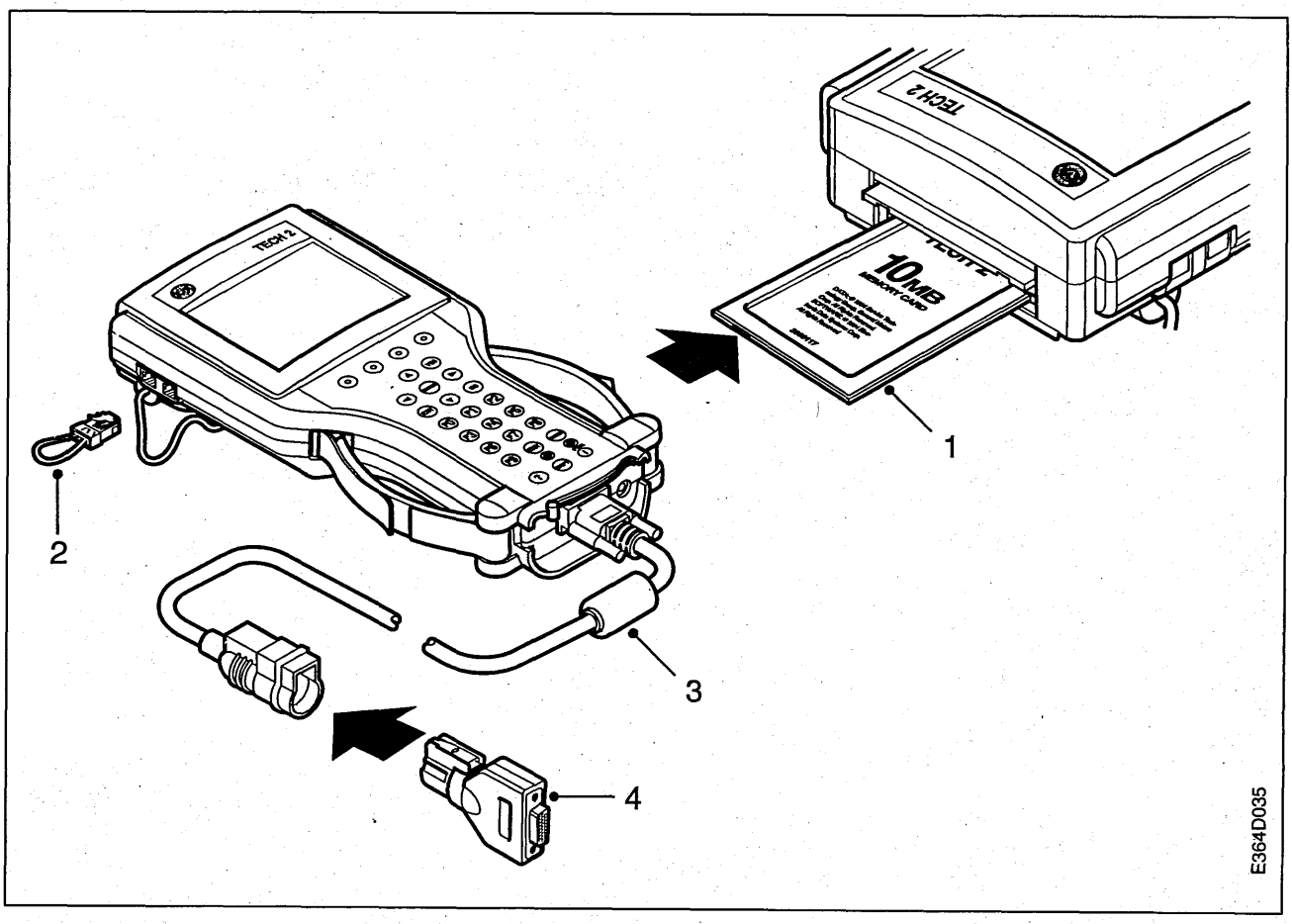


The display can be made lighter or darker to suit the background lighting. The desired contrast can be achieved by pressing the "SHIFT" key, causing the green lamp to light up. The display can then be set to the desired lighter or darker level by pressing "Arrow up" or "Arrow down".

Note

When the desired contrast level has been set, the "Shift" function must be deactivated by pressing the "Shift" key again so that the lamp above it goes out. If this is not done the "SHIFT" function will continue to lock the keypad.





Self–test

If necessary, the Tech 2 can also perform more in–depth self–tests. Although this function is mainly intended for repairs, it may be useful in helping the operator to pinpoint a problem.

Before Tech 2 self–tests are carried out, the following steps must be taken (see illustration above):

1 Check that the PCMCIA card is correctly inserted in the "0" port, the upper slot on the left. Also check that the read/write protection is located on the left (see arrow in the illustration above).

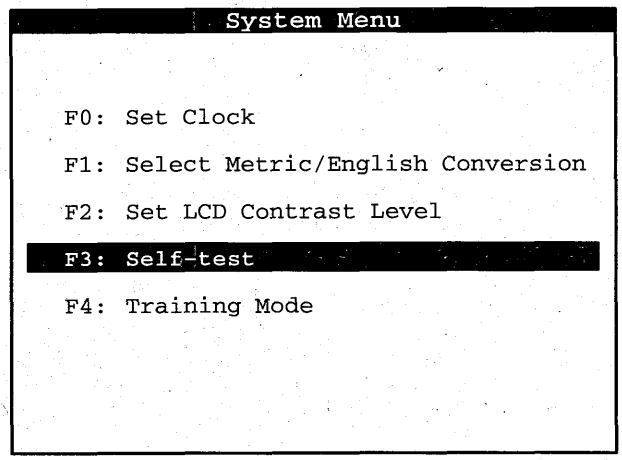
2 Plug the RS232 cable termination into the RS232 communications port.

3 Connect the diagnostics cable to the Tech 2.

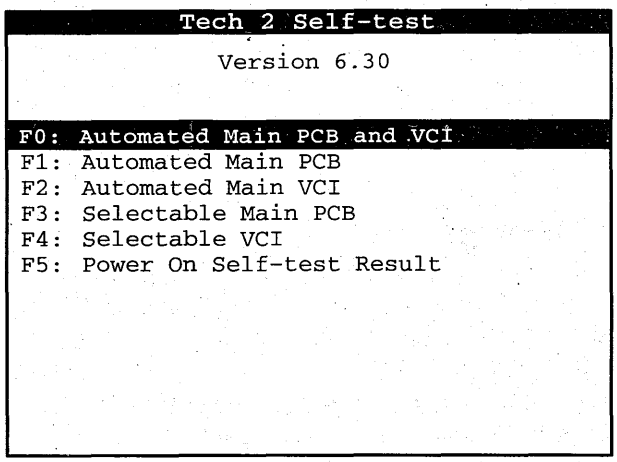
4 Connect the VCI cable termination to the vehicle end of the diagnostic cable.

Self–test, continued

Select "F3: Self–test" to see the list of available self–tests.



Mark "F0: Automated PCB and VCI" and press "ENTER" to test the components on the main printed board assembly and in the communications interface.

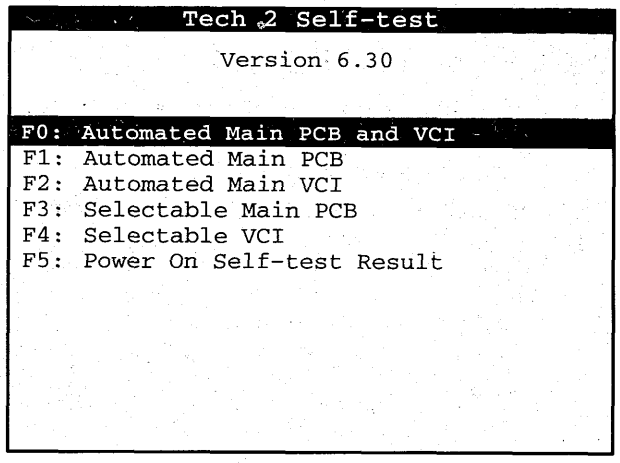


Self–test, continued

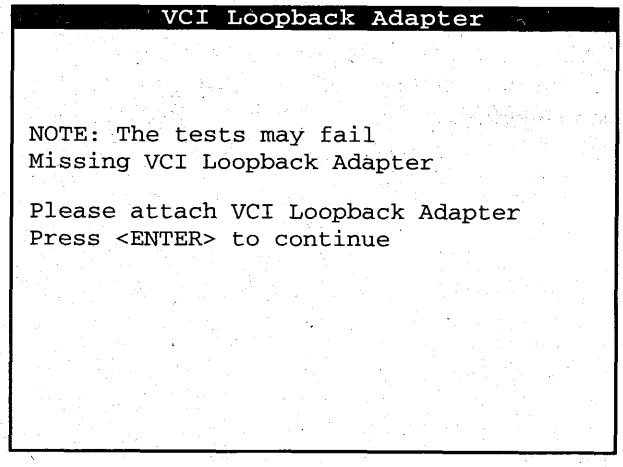
Automated Main PCB and VCI

The components on the main printed board assembly and in the communications interface are tested automatically. This test is the most practicable since it limits the trouble to a single unit. The fault is diagnosed as being in either the Tech 2, the VCI module or the cables.

Select "F0: Automated Main PCB and VCI" and press "ENTER" to perform the test.

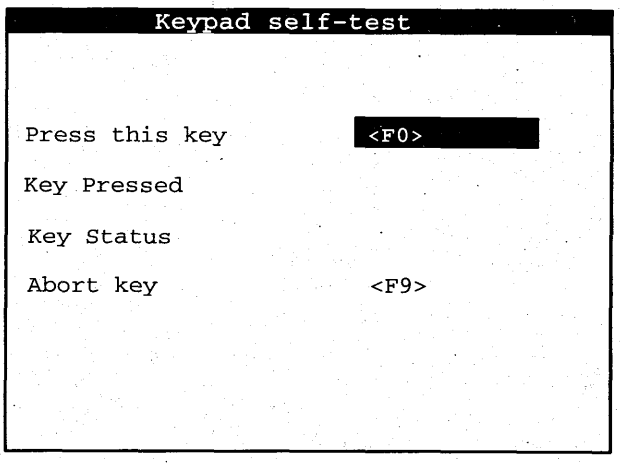


If the VCI cable termination is not connected to the Tech 2, the menu on the right will be displayed. In such case, connect the VCI cable termination (see illustration on page 93) and press "ENTER" to continue.



During the test the operator is requested to press each key in turn.

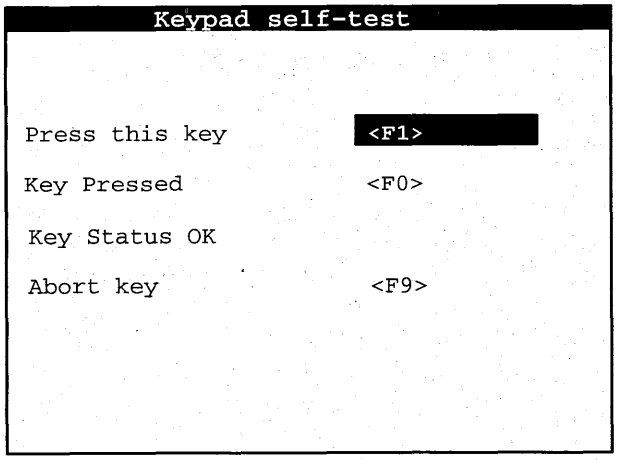
Press "F0".



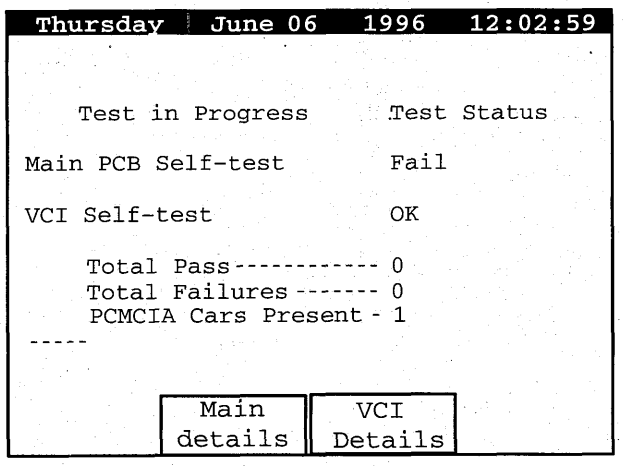
Self–test, continued

For each key that is pressed, the Tech 2 will indicate whether it is OK or not. The operator will then be requested to press the next key.

Follow the instructions for completing the keypad test.

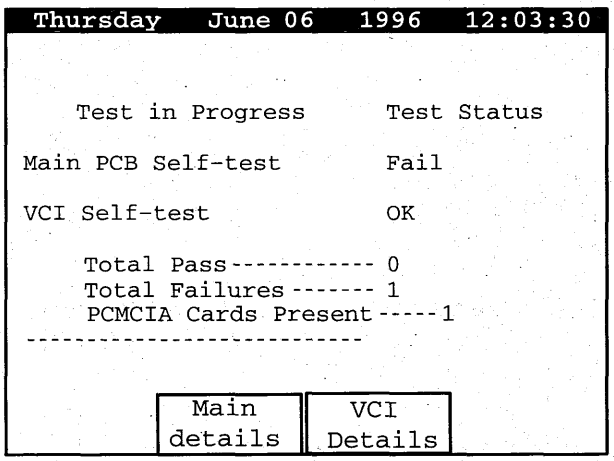


When the keypad test has been completed, first the menu on the right will be displayed with the message "Test in Progress" to indicate that a self–test of the VCI interface is in progress.



Self–test, continued

When the keypad and the VCI interface have been tested, the display will show the test status in the menu as shown on the right.



- The "Pass" message and a zero opposite "Total failures" indicate that the equipment is in proper working order. In such case, press "EXIT" to return to the main menu.

Note

If the equipment passes the test but there is a communications problem with a vehicle, the adapter may be at fault. This can be checked to some extent with the ID test, see "F4: Selectable VCI".

- A "Fail" message and the figure 1 or higher indicate a problem in one or more areas. Make a note of all fail messages and report them to the service department.

If the fail messages include any of the following

1 "DLC 1..Fail (VCI Data Communication Link 1.)"

2 "DLC 2..Fail (VCI Data Communication Link 2.)"

3 "CCD..Fail (VCI Collision Detection.)"

4 "Loopback Fail (VCI Loopback Circuits.)"

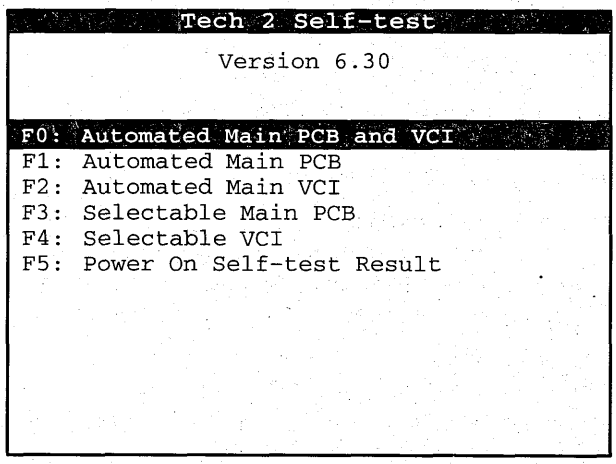
Remove the diagnostics cable and the VCI termination. Then plug the VCI termination straight into the VCI module and carry out a new test.

- "Pass" and a 0 opposite "Total failures" indicate that the fault is in the cable.
- "Fail" and a 1 or higher figure indicate a problem in the VCI module.

Note

This could be caused by a low power supply. Check this by means of the special test for the cable termination (see "F4 Selectable VCI").

Self–test, continued



F1: Automated Main PCB

As F0 but only tests the main printed board assembly.

F2: Automated VCI

Tests only the communications interface in the same manner.

Note

The Tech 2 must never be plugged into a vehicle's data link connector when performing a self–test.

F3: Selectable Main PCB

Retrieve a submenu for selecting special parts. This menu is generally intended for tests in connection with the repair of units.

F4: Selectable VCI

Also retrieve a submenu which shows special tests to facilitate repairs. Two of these tests are of interest to the technician, however:

1 Test of VCI cable termination to measure the power supply.

- Use the display key for selecting "More tests" and move to the other display.
- Mark "F5: VCI Loopback" and press "ENTER". Clear instructions are given in the following display for testing modules, connectors and power supplies. If the power supply is lower than 9 volts, connect an alternative power supply and carry out a new test.

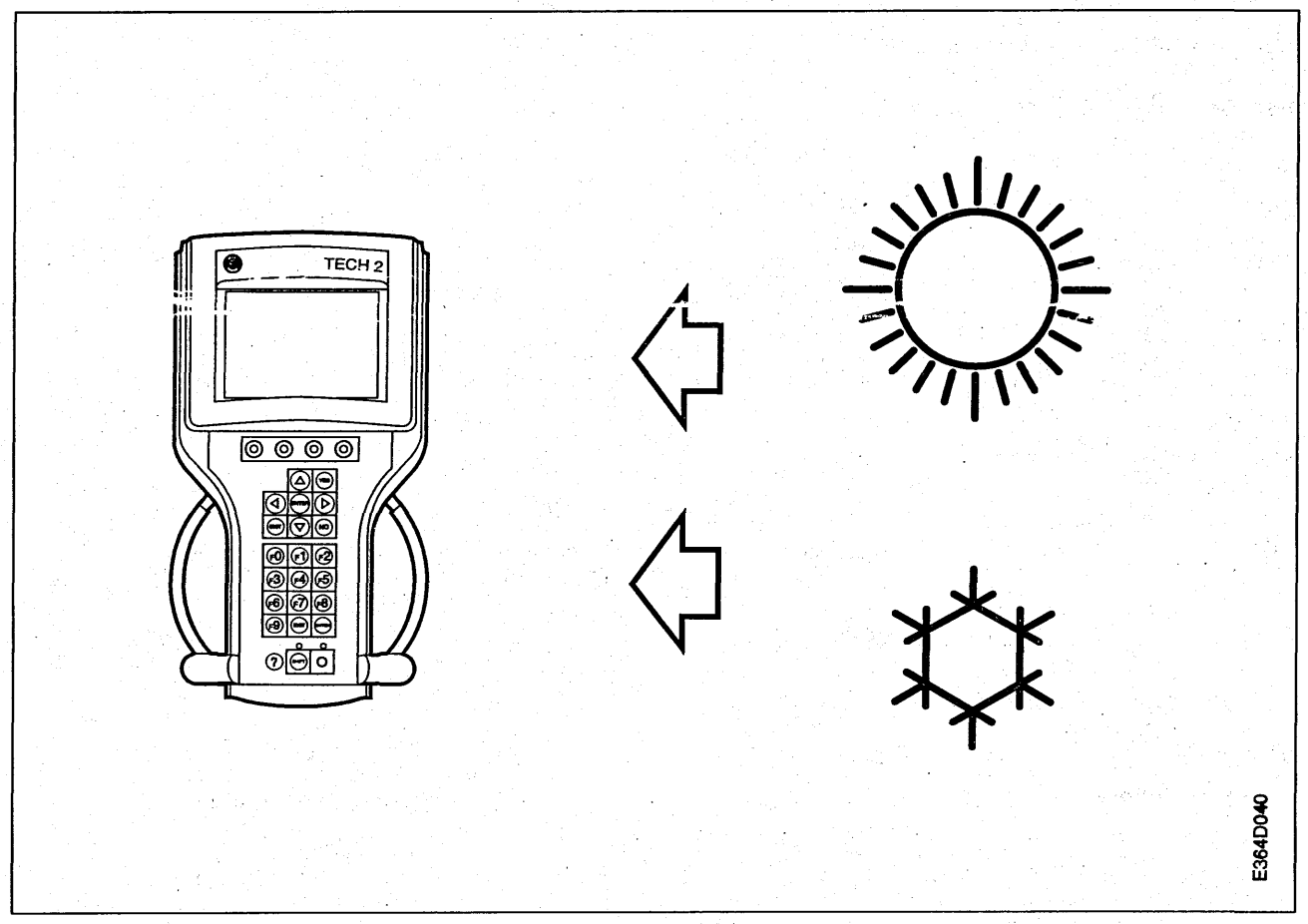
2 ID test of adapter to check which adapter is connected.

- In the first display select "F1: VCI ID" and press "ENTER".
- Follow the instructions on the display to confirm that the adapter is recognized.
- If the adapter is not recognized, change it and perform a new test.

F5: Power On Self Test Results

Repeats the fail display that is shown immediately after the self–test with equipment turned on.

Self–test, continued



Tips

If:

- The Tech 2 fails to start, try another power supply.
- There is no display, try adjusting the contrast.
- The display appears to have dead areas/pixels, use "Selectable main PCB" to perform a "Display Controller" test and check the display in black–and–white.
- The Tech 2 has communications problems, check all cable connections again.
- The Tech 2 is very cold or hot, it may prove impossible to set the desired contrast level. In such case, this is because the display is sensitive to temperature and the trouble will go away when the Tech 2 attains normal operating temperature again.

Self–test, continued

Display message explanations

Self–test with equipment turned on

001	IRAM	Pass/Fail	Internal RAM
002	ERAM	Pass/Fail	External RAM
003	UART	Pass/Fail	Universal asynchronous receiver transmitter
004	MCU	Pass/Fail	Micro control unit
005	QSPI	Pass/Fail	QSP–interface
006	SCI	Pass/Fail	Serial communications interface
007	TPU	Pass/Fail	Time processor unit
008	RTC	Pass/Fail	Real time clock
009	CLKMEM	Pass/Fail	Clock memory
010	Keypad	Pass/Fail	Keypad

Automated Main PCB and VCI

Main printed board assembly

RAM/ROM	Pass/Fail	RAM/ROM
RS485	Pass/Fail	RS485 port or cable termination not connected
RS232	Pass/Fail	RS232 port or cable termination not connected
Keypad	Pass/Fail	Keys on keypad, in working order
PCMCIA Slot 1	Pass/Fail	Card in slot number 1
PCMCIA Slot 2	Pass/Fail	Card in slot number 2
Display	Pass/Fail	Status of LCD, its memory, display RAM and control unit
Sound Transducer	Pass/Fail	Check of sound transducer
Real–Time Clock	Pass/Fail	Status or resetting the real time clock

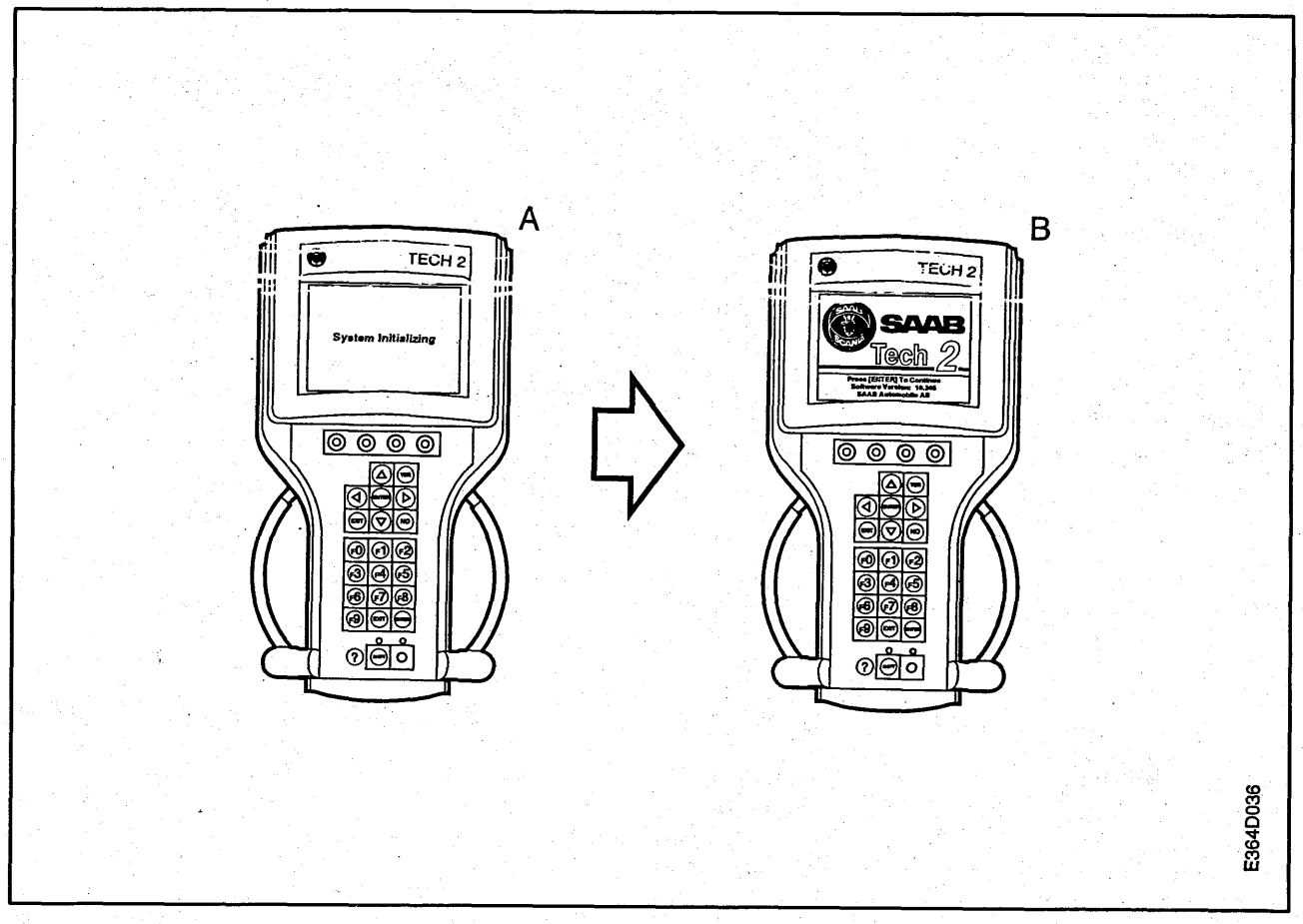
Self–test, continued

Communications interface for vehicles

MUX	Pass/Fail	Multiplexers 1 and 2 in proper working order
ADC	Pass/Fail	Status of A/D converter
SIPO 8	Pass/Fail	Check of serial in parallel out
SIPO 20	Pass/Fail	Check of serial in parallel out
DLC 1	Pass/Fail	Check of communications link 1 (data link connector 1)
DLC 2	Pass/Fail	Check of communications link 2 (data link connector 2)
TPU	Pass/Fail	Status of time processor unit
HBCC	Pass/Fail	Check of Hosted Bus Control Chip
CCD	Pass/Fail	Status of SI bus
Dual UART	Pass/Fail	Function of dual asynchronous universal receiver transmitter
J1708	Pass/Fail	Check of J1708 user interface
Gnd–FET	Pass/Fail	Check of ground field effect transistor
Level Shifters	Pass/Fail	Test of circuits
Cross Point	Pass/Fail	Check of cross point circuit
Short L and M	Pass/Fail	Check of connections
Test I/01–I/016	Pass/Fail	Check input/output cables
Loopback	Pass/Fail	Test ports or cable terminations not connected

Service

Self–tests on starting



Each time the Tech 2 is started it automatically performs a self–test of its own functionality. When the Tech 2 is started the words "SYSTEM INITIALIZING" appear on the display for about four seconds. The self–test is performed during this period. At the end of the self–test the Tech 2 emits audible signals, as follows:

- No audible signal at all indicates a fault in the sound transducer. The Tech 2 can still be used.
- An audible signal indicates that the self–test was successful. The Saab logotype and Tech 2 then appear automatically on the display (see illustration above).

Self–tests on starting, continued

- A series of three audible signals indicates that a part of the Tech 2 is not in satisfactory working order. In such cases the display will show the tests performed and their status, "PASS" or "FAIL".

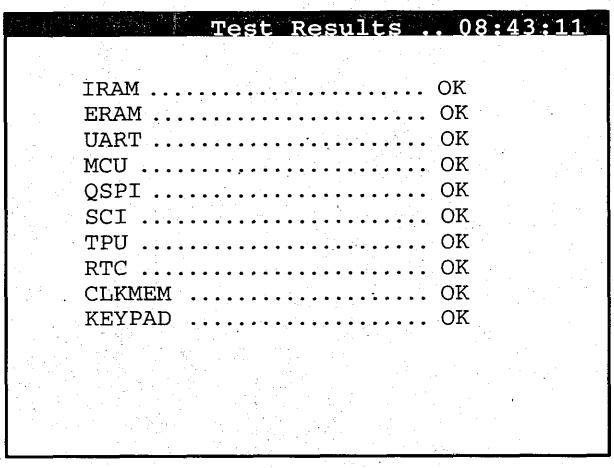
If a "Fail" message is displayed, you can proceed as follows:

1 Turn off the Tech 2.

2 Check all connections.

3 Check that nothing is resting on the keypad.

4 Start the Tech 2 again.



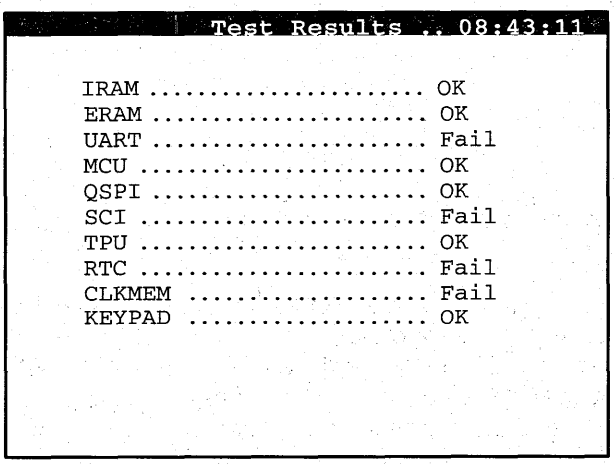
If the trouble persists, the Tech 2 needs overhauling. In some cases, however, which are shown in the menu on the right, fault diagnosis will be allowed to continue until a replacement unit arrives through the Tech 2's exchange programme (see under "Support" in this section):

- "UART...Fail" supports all functions except communication via the RS232 port.
- "SCI...Fail" supports all functions except communication via the RS485 port.
- "RTC...Fail" or "CLKMEM...Fail" refers to the clock and may indicate a circuit of battery fault.

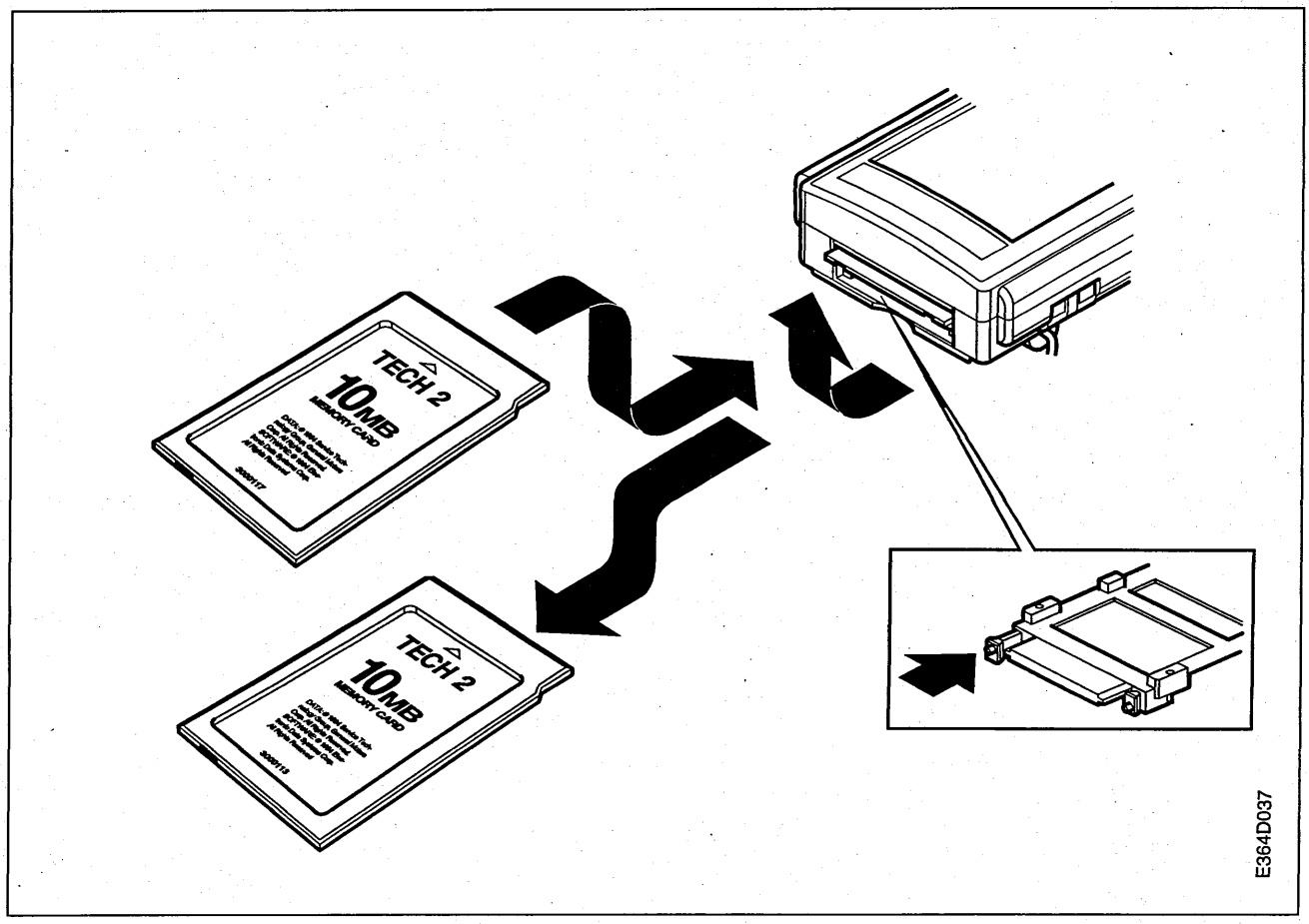
In the above cases, fault diagnosis will continue if any key is pressed.

In the event of a keypad fault, the Tech 2 will not complete the starting procedure. The "SHIFT" lamp will light up instead.

All other types of fault message indicate that the functionality of the Tech 2 may be affected and fault diagnosis carried out with it should therefore not be continued.



Tech 2 updating



The Tech 2 can be updated as changes are introduced in workshop information. The software in question is on PCMCIA cards.
In the course of updating, old information on the PCMCIA card is written over. It is therefore unnecessary to check that the right PCMCIA card is connected to the Tech 2 before updating is performed.

Important

The PCMCIA card ports are designed for PCMCIA cards using a 5 V power supply. For this reason, use only PCMCIA cards that are obtained from the Tech 2 supplier.

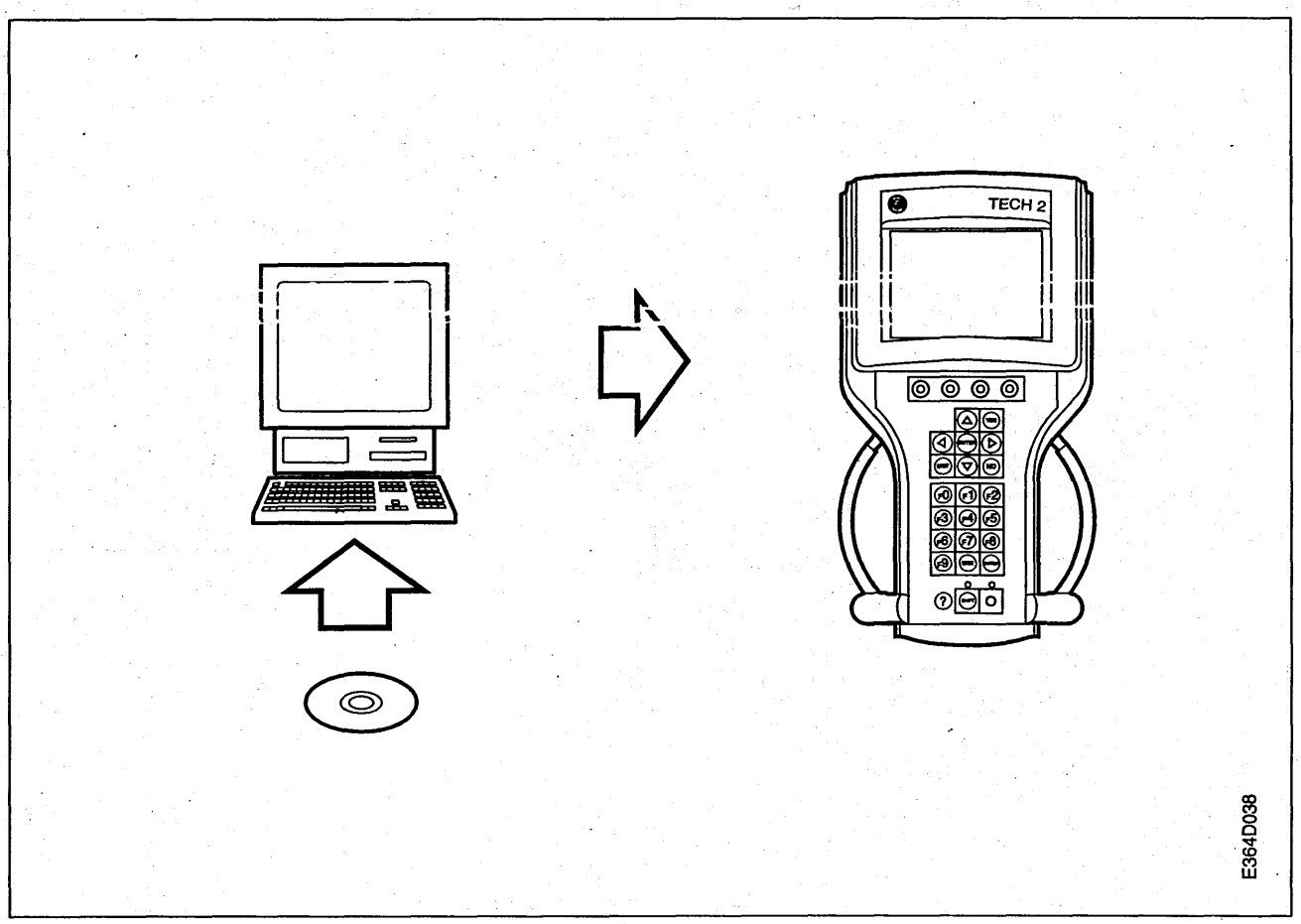
The PCMCIA card is not designed to be changed regularly and if this is done it will wear out after a period of use. The guarantee does not cover such wear.

The upper card slot accepts PCMCIA cards of the type currently supplied together with the Tech 2. The lower card slot is reserved for possible future needs.

The Tech 2 has 2 slots for PCMCIA cards. Proceed as follows if any PCMCIA card has to be changed:

1 Open the protective cover over the PCMCIA card slots by pressing on the edge nearest the thumb groove located at the top of the Tech 2.
2 Press the release button on the left–hand side of the card slot.
3 Remove the PCMCIA card.
4 Insert the replacement card into the card port's grooves.
5 Press the edge of the PCMCIA card downwards until it locks in place.
6 Close the protective cover over the PCMCIA card ports. Take care to prevent the cover from springing back on repeated occasions as this could result in damage to the cover and its adjacent parts.

Tech 2 updating, continued



When the correct PCMCIA card has been connected to the Tech 2, the instrument can be updated with the latest workshop information.

Important

If new software is downloaded to the Tech 2 it will overwrite earlier information on the PCMCIA card. For this reason, make absolutely sure that the right PCMCIA card is connected to the Tech 2.

1 Connect the Tech 2 to a 12 V power supply.

2 Connect the RS232 cable and DB9 adapter to the RS232 port on the Tech 2 and to the communications port on the PC

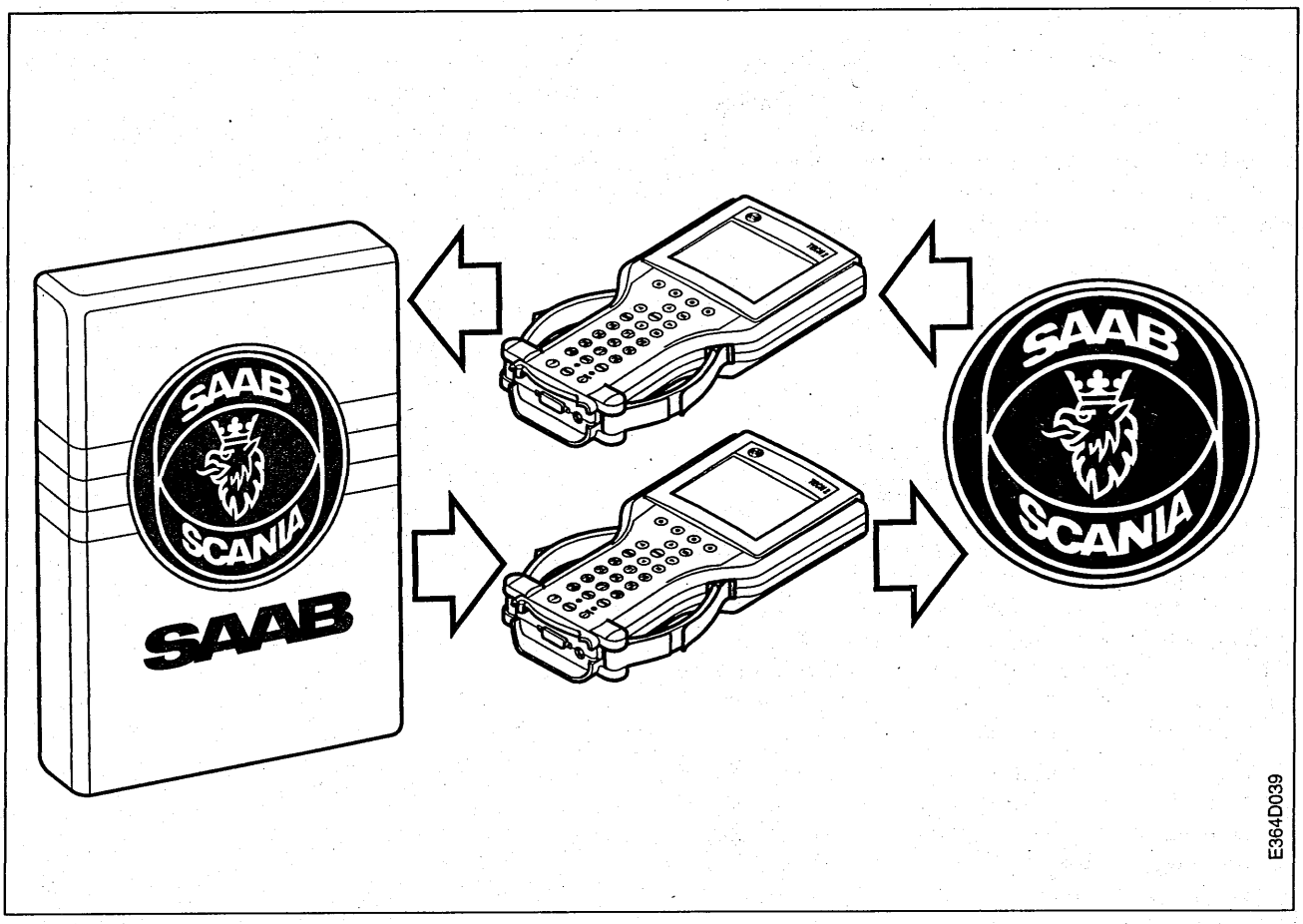
3 Start the Tech 2 by pressing "PWR". The text "Initializing" will appear briefly on the Tech 2's display followed by a display with the text "Tech 2" and Saab's logotype.

4 Start the PC. Start the procedure for downloading information to the Tech 2 and follow the instructions on the display.

Should a problem arise during data transmission, such as because the RS232 cable has worked loose, the Tech 2 will emit a low tone for about 2 seconds.

5 Check that the right version number is shown on the Tech 2's display.

Technical support



General

Apart from the usual guarantee period of 12 months, the Tech 2 is also covered by an exchange programme that is valid for 2 years from the date of purchase. In the majority of countries in Europe, the United States and Canada, this means that a faulty unit will be changed by courier service within 24 hours of the fault being reported to the HPCSC (Hewlett Packard Customer Support Centre) in Great Britain or the United States.

Note

The exchange unit will be supplied only on condition that the faulty unit is handed over in its place.

Ordering a new Tech 2

During the second year the exchange service may be subject to a fee in countries outside the European Union and in such cases the fee must be paid on delivery of the exchange unit.

If you want to purchase additional Tech 2 instruments, you can either get in touch with the person responsible for the Tech 2 at the importer's office or through direct contact with the local representative of distributor Kent Moore. The importer in each country determines the procedure to be followed. The instrument will then be supplied through Kent Moore's worldwide distribution network.

Note

New Tech 2 instruments can only be ordered in the aforementioned manner. It is not possible to obtain new instruments through Saab Automobile AB.

Technical support, continued

Responsibility of workshop personnel

Workshop personnel are under obligation to look after their Tech 2 instruments in accordance with the instructions in the section entitled "Care and maintenance of the Tech 2". If there are any signs indicating that an instrument is faulty, workshop personnel should:

1 Perform the Tech 2 "Self–test" as described in the "Set Options" section. A note should be made of the fault messages, if any.
2 Fill in a "Tech 2 fault report" as described in the "Tech 2 user manual" and then call the person responsible for Tech 2 at the importer's office.

Note

It is important to inform the person responsible for the Tech 2 at the importer's office as soon as possible so that an exchange unit will be forwarded with the least possible delay. The person responsible for the Tech 2 at the importer's office will immediately advise the Hewlett Packard Service Centre if the instrument has to be changed.

Within the EU, exchange instruments will be dispatched on the next working day if the Hewlett Packard Service Centre receives a fault report from the person responsible for the Tech 2 at the importer's office before 4 p.m. on the previous working day.

Responsibility of the importer

The importer is under obligation to appoint a person who will be responsible for the Tech 2 and who will serve as the contactperson between workshop personnel and the HPCSC. Should the importer so decide, the same person will also accept orders for new instruments and pass on such orders to distributor Kent Moore.

The importer in each country should also keep statistics of the different fault reports received so that an information database is built up which can be used for quickly identifying and rectifying recurrent faults. The database should contain:

- Fault symptoms.
- The number of fault reports concerning different symptoms and the date of each report.
- Cause of the fault.
- Action taken.

In order to fulfil the role as this important link, the person responsible for the Tech 2 at the importer's office must be conversant with the car's various systems and also have a detailed knowledge of fault diagnosis and diagnostic tools.

When contacting the HPCSC, the following information should be available:

- Name of the person responsible for the Tech 2 at the importer's office.
- Name of the workshop and contactperson, as well as the workshop's Saab number and VAT registration number, if any.
- Address and telephone number of the workshop.
- Any fault messages from the Tech 2.
- Problem and course of events.
- Information on the car model used when the problem arose.

Technical support, continued

The person responsible for the Tech 2 at the importer's office decides whether the reported problem was caused by a fault due to:

1 Operation of the Tech 2.

2 Tech 2 diagnostics software.

3 The car systems' diagnostics software.

4 Hardware in the Tech 2.

1 Operation of the Tech 2

In the case of faults caused by the way the Tech 2 is used, the person responsible for the Tech 2 should explain why the problem has arisen and suggest a correct method of usage.

2 Tech 2 diagnostics software

In the case of faults which can be related to Tech 2 diagnostics software, the person responsible for the Tech 2 at the importer's office should get in touch with Saab Automobile's representative.

3 The car systems' diagnostics software

If several fault reports reveal a pattern which indicates that there may be something wrong with the car's diagnostics software in a particular system (e.g. if the control module of a certain system cannot establish contact with one of its sensors), the person responsible for the Tech 2 at the importer's office contact Saab Automobile's representative.

4 Hardware in the Tech 2

If the existence of a fault in the Tech 2's hardware can be established, the person responsible for the Tech 2 should report the fault immediately to the HPCSC.

Responsibility of Hewlett Packard

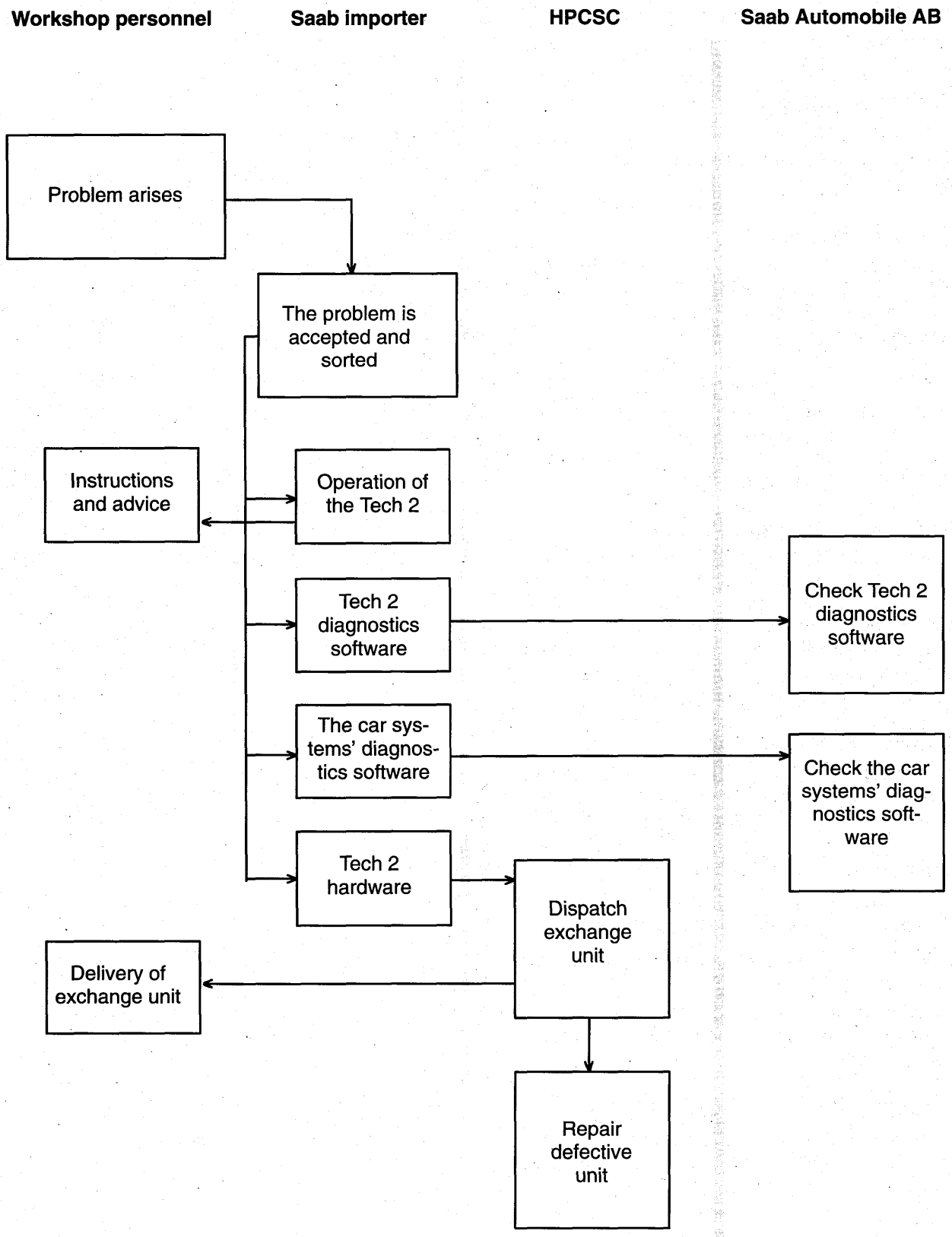
HPCSC (Hewlett Packard Customer Support Centre) personnel are responsible for:

- Forwarding a Tech 2 exchange unit to the workshop in question without delay.
- Repairing a defective Tech 2 and keeping the instrument in storage for subsequent use as an exchange unit.

Responsibility of Saab Automobile

Saab Automobile's representative is responsible for accepting and passing on fault reports which can be related to the diagnostics software in the Tech 2 or the car's hardware.

Technical support, continued



Workshop Information

User feedback

To

Saab Automobile AB
Workshop Information, MMSI
S–461 80 TROLLHÄTTAN
SWEDEN

Telefax: +46 520 843 70

Comments/Suggestions

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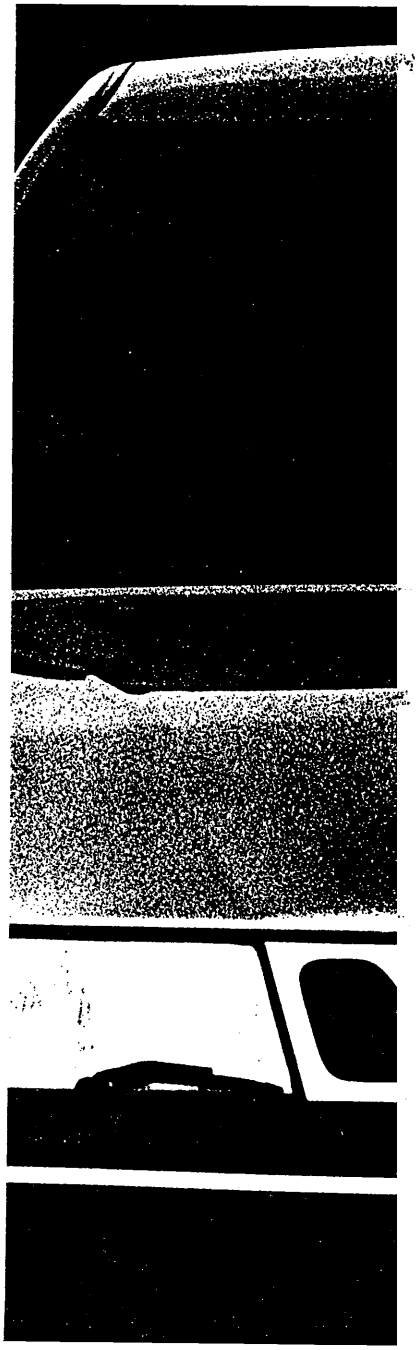
Manual Concerned: .....

It is important that SAAB technicians in the field regard the Workshop Service Manual as their bible and we therefore endeavour to make it easy to use and to ensure that it contains accurate information.

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

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



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