SPX®
WHERE IDEAS MEET INDUSTRY

OPERATION MANUAL

T625 TDR

CABLE FAULT LOCATOR

90/00901198-10 ISSUE 10 01/2014

REFER TO PREFACE AND SAFETY INSTRUCTIONS BEFORE OPERATING

Radiodetection®

CONTENTS

1. PREFACE & SAFETY

1.1 BATTERIES

The T625 is provided with a set of 3 Ah rechargeable NiMh cells. These are supplied in the discharged state and must be charged for 24 hours before use. Charge the batteries as described in section 4.2. Note that full rated capacity may not be achieved for the first three cycles of use.

1.2 HEALTH AND SAFETY AT WORK ACT 1974 SECTION 6.1 (C)

This product is tested and supplied in accordance with Radiodetection's published specifications and, when used in normal or prescribed applications and within the parameters specified for mechanical and electrical performance, it will not cause danger or hazard to health or safety, provided that normal engineering and safety practices are observed.

All usage of the product must be in accordance with the Operating Manual for this equipment and any work on the electrical components housed within the machine must be undertaken by qualified personnel.

If there is any doubt about any aspect relating to the correct use of this equipment, contact Radiodetection Limited.

1.3 SAFETY PRECAUTIONS

For connection to live cables up to 600 V RMS use the Bicotest T600FS Blocking Filter.

Only fit 3 Ah NiMh cells to the T625.

Do not charge the batteries when the ambient temperature is below 0°C.

AC adaptor and its carry pouch are not waterproof.

AC adaptor is for indoor use only.

The T625 main unit is safe and conforms to IEC 1010. The AC adaptor conforms to the manufacturer's safety standards.

2. INTRODUCTION

2.1 T625 OVERVIEW

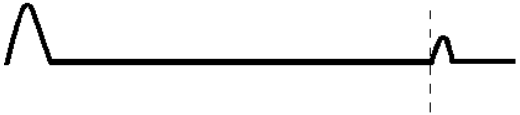
The T625 is a Time Domain Reflectometer, also known as a Pulse Echo Test set or Radar Cable Test Set, that provides visual indication of cable faults. Pulses transmitted into a cable are reflected by cable imperfections. The transmitted pulse and the reflected pulse(s) are shown on the display. The time taken by the pulse to travel to the fault and return is a measure of the distance to the fault. Distance to fault is displayed on the screen after the cursor is positioned to coincide with the start of the fault pulse. The type of fault can be determined by analysis of the displayed waveform.

Note: The cable must contain at least two conductors or one conductor and screen.

2.2 SAMPLE TRACES

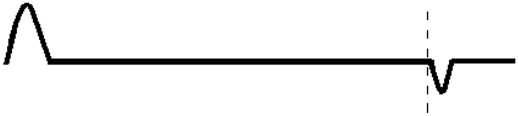
1. Open circuit/high impedance series faults

Note: Positive (upward) reflection.



2. Short circuits/low impedance shunt faults

Note: Negative (downward) reflection



The T625 provides for:

a) examination of a single pair

b) comparison between a good pair and a faulty pair

c) difference between a good pair and a faulty pair, so that reflections from common features such as joints and change of wire gauge or insulation, cancel out; this permits obscure faults to be more readily identified

d) location of crosstalk points, i.e. splits and resplits, by transmitting on one pair and receiving on the other

e) 'before and after' comparison using the memory facility.

2.3 POWER SOURCE

The T625 is powered by 8 rechargeable cells in a compartment accessible from the rear of the T625 or from an external DC power source via the DC jack.

When operated from batteries, the T625 will automatically switch off when they are almost discharged.

2.4 MAIN FEATURES

Figure 1 shows the front panel of T625.

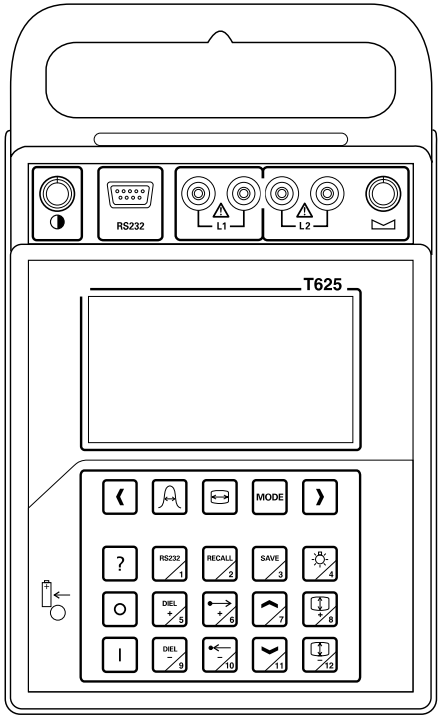


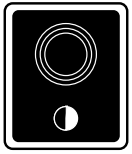
Figure 1

3. FRONT PANEL

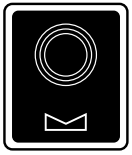
3.1 CONTROLS

Switches T625 ON. The T625 has an automatic switch off feature 5 mins after the last key operation to conserve battery life.

Switches T625 OFF.



Rotary control to adjust the contrast of the screen display.



Rotary control used to:

- Balance out the transmitted pulse at the start of the trace for near end measurements in the absence of a reference cable.
- Assisting in identifying fault reflections at long distance.

Not operational in some modes.

Some of the following keys are not operational in some modes (see section 7). Pressing a non-operational key will cause the T625 to emit a beep. When a variable function, e.g. Range, reaches its limit the T625 will emit a beep.

BACKLIGHT
Switches the display backlight ON. The backlight may be turned off by pressing the key a second time or by waiting for the automatic backlight switch off to occur (5 mins after switch on). Also acts as number ‘4’ when required.

CURSOR
Adjusts the position of the vertical line cursor.

Moves the cursor to the left or right. If held down, the cursor will move slowly at first and then more quickly until it reaches the edge of the screen.

TRACE EXPANSION (ZOOM)
Causes the trace around the cursor to be displayed with greater resolution. The amount of expansion is dependent on range. Pressing the key a second time causes the display to return to the full range display. Not operational on the 25 m range. Maximum expansion is x4 on ranges of 300 m and above.

DIELECTRIC
Used to set the appropriate velocity factor for the pair under test.

Causes the dielectric value to be incremented or decremented. If held down, the displayed value will change slowly at first, then more quickly until the limit is reached. Also used to enter the numbers ‘5’ and ‘9’ when required.

RANGE
Selects the displayed range.

Causes the display range to increase or decrease. If the key is held down, the T625 will step through the available ranges.

Also used to enter the numbers ‘6’ and ‘10’ when required.

SHIFT
Adjusts the vertical position of the trace.

Causes the trace to be shifted up or down. If the key is held down, the trace will shift slowly at first and then more quickly until the internal shift control reaches its limit.

When L1 & L2 are displayed, both waveforms will move.
When L1 & M are displayed, only L1 waveform will move.

Also used to enter the numbers ‘7’ or ‘11’ when required.

AMPLITUDE
Adjusts the vertical amplitude of the display.

Causes the next higher or lower gain range to be selected. If the key is held down, the T625 will step through the available gain ranges.

Also used to enter the numbers ‘8’ or ‘12’ when required.

PULSE WIDTH
Toggles the pulse width between wide and narrow. Not operational on the 25m range.

MEMORY
If the display is showing a live trace, pressing this key enables the display and the T625 settings to be saved to any of the twelve memories.
Also acts as number ‘3’ when required.

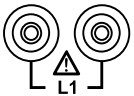
Enables any of the twelve memories to be recalled.
Also acts as number ‘2’ when required.

INTERFACE
Calls up a menu which allows the dump of the displayed waveform to a printer, or memorised waveforms to a PC.
Also acts as number ‘1’ when required.

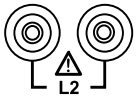
HELP
Accesses the help facility (see section 8).

MODE
Selects the operating mode (see section 6).

3.2 CONNECTORS



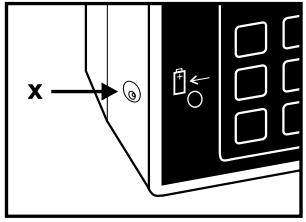
2 off, 4 mm sockets used to connect to the pair under test.



2 off, 4 mm sockets used to connect to a second pair.

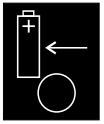
RS232

9 way D connector used to interface to printer or PC.



DC jack (X) used to supply 12 - 20 V external DC power to the T625 (centre positive).

3.3 CHARGE INDICATOR



Charge indicator illuminates when the battery is being charged.

4. POWER SOURCES

4.1 EXTERNAL DC

The T625 will run from an external DC power source via the DC jack. This may be either the AC adaptor or any other DC supply that meets the specification (see section 14).

Note that the batteries are always charged when external DC power is applied to the T625 and it is switched off – **DO NOT FIT NON -RECHARGEABLE BATTERIES.**

4.2 BATTERIES – DO NOT FIT NON -RECHARGEABLE BATTERIES

4.2.1 RECHARGING

The cells may be recharged by connecting the AC adaptor (or other suitable power supply) to the DC power jack and leaving the equipment switched off. The CHARGE indicator will illuminate while the batteries are being charged. Full charge is achieved in 14 hours. A fully charged battery will give approximately 8 hours operation if the backlight is not used.

Note: When fitting new cells the initial charge period should be 24 hours and 14 hours thereafter.

4.2.2 MAXIMISING BATTERY LIFE

Do not recharge until the LOWBAT warning is displayed.

Do not charge for more than 24 hours.

Stay within the RECOMMENDED temperature limits shown in the specification (section 14).

4.2.3 REPLACEMENT

Figure 2 shows the rear view of T625.

Cells are accessed by removing the back cover which is secured by 2 fasteners.

See specification (section 14) for cell type.

It is recommended that cells are replaced as a set of 8.

4.3 MEMORY BACK UP BATTERY

The memory back up battery is a lithium manganese cell which is part of the main PCB assembly. The life expectancy is typically four years and replacement is recommended every two years during a routine service to avoid possible loss of stored traces.

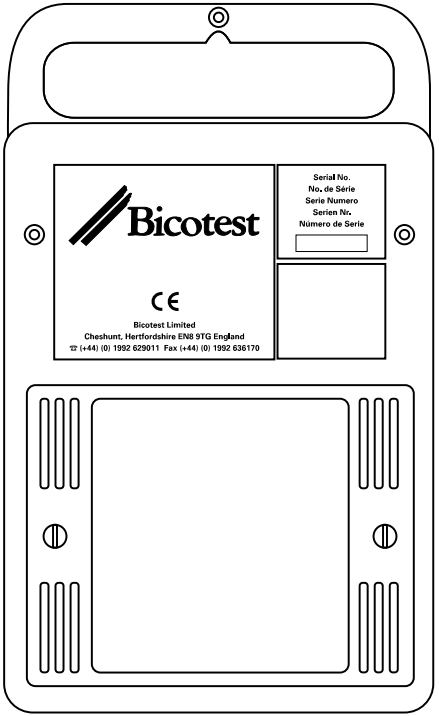


Figure 2

5. DISPLAY

Figure 3 shows the T625 display.

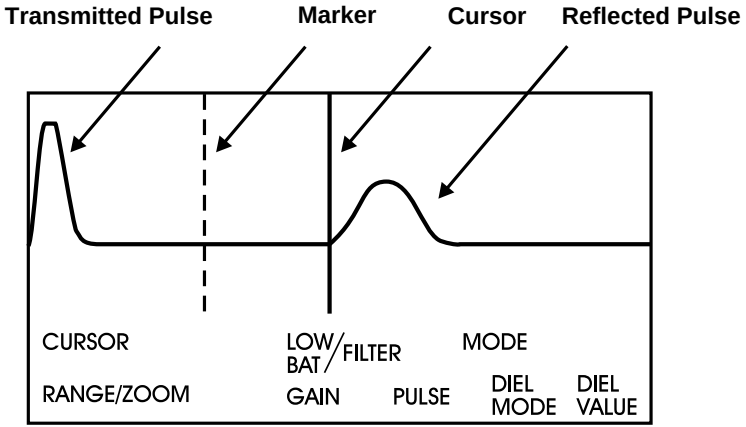


Figure 3

CURSOR: Shows the cursor position in terms of metres, feet or time (as selected through the HELP system). When the marker is on, the distance between the cursor and the marker is displayed.

RANGE/ZOOM: When the display is not in ZOOM, the selected range in metres, feet or time (as selected through the HELP system) is displayed. In Zoom mode, this is replaced by the word ‘ZOOM’ with the display being expanded about the cursor position.

LOW BAT: When the battery charge is low, a flashing battery symbol will be displayed. 

FILTER: When the filter is switched in  is displayed.

GAIN: Shows the selected gain from A1 (minimum gain) to A9 and then Aa through to Af (maximum gain).

PULSE INDICATOR: Shows if the transmit pulse is wide  or  narrow.

DIEL MODE: The units for the dielectric mode (‘P’ - PVF, ‘V’ - velocity, ‘V/2’ - velocity/2).

DIEL VALUE: Shows the velocity in terms of PVF, velocity or velocity/2 (as selected through the HELP system.

MODE: Shows the operational mode of the T625 (see section 6).

6. MODES

The T625 has eight operating modes. The mode is selected by pressing the MODE key and then pressing the appropriate key as shown on the menu.

6.1 LIVE MODES (L1, L2, L1 & L2, L1 – L2, XTALK)

6.1.1 LINE 1 (L1)

The pulse is transmitted on the L1 sockets and the resulting waveform displayed. This is the normal mode of operation for fault finding on a single cable.

6.1.2 LINE 2 (L2)

This mode is identical to the L1 mode except that the L2 sockets are used.

6.1.3 DUAL (L1 & L2)

This mode combines the L1 and L2 modes, showing two traces on the screen - one from L1 and the other from L2. It is normally used for comparison of two cables.

6.1.4 DIFF (L1 – L2)

Displays the difference between the two waveforms (L1 and L2). It is normally used to identify the differences between a known good cable and a faulty one. It is also a convenient way to find close in faults, as two similar cables may balance each other more accurately than one cable and the internal balance control.

6.1.5 XTALK (CROSSTALK)

Outputs the transmit pulse on L1, but displays the signal received on L2. Normally used for the location of crosstalk (splits and resplits). A typical trace is shown in figure 4.

Figure 4

6.2 MEMORY MODES (M, L1 & M, L1 – M)

The memory facility is provided to facilitate 'before' and 'after' comparison of the same pair/conductor. If the fault is not readily obvious the waveform is stored in a memory, the T625 is disconnected from the cable, and some external stimulus is applied to the cable (e.g. HV Surge Generator of Fault Burner). Once the external stimulus has been disconnected the L1 terminals are connected to the faulty pair/conductor, and the waveform compared to the memorised waveform using the L1 & M mode or the L1 – M mode.

6.2.1 M (MEMORY)

This mode allows the display of any memory.

6.2.2 DUAL (L1 & M) (LINE 1 AND MEMORY)

The signal received from L1 and the selected memory are displayed.

6.2.3 DUAL (L1 – M) (LINE 1 - MEMORY)

The difference between the signal received from L1 and the selected memory are displayed.

7. OPERATING INSTRUCTIONS

7.1 GENERAL

For correct operation of the T625 the cable to be tested must be de-energised. If the cable is energised or is likely to become energised, then the Blocking Filter must be used.

Note: The fault distance displayed includes the 2m connecting lead. This should be subtracted from the reading obtained.

Provide the T625 with power either by fitting batteries or connecting a suitable external DC supply to the DC jack.

Switch the T625 ON by pressing the ON button and select the required mode. Adjust the contrast control to give a clear display.

The operating mode may be changed at anytime by pressing the MODE key and selecting the required mode.

7.2 LIVE MODES (L1, L2, L1 & L2, L1 – L2, XTALK)

Connect the cable under test to the L1 and/or L2 sockets as appropriate using the test leads.

Adjust the dielectric value either using the DIEL+ and DIEL– keys or via the HELP system (see section 8) to the required value. If dielectric value is not known refer to section 2 of the TDR Application Guide.

Select the range to cover the full cable length.

Adjust the BALANCE control to minimise the transmitted pulse at the start of trace if in L1, L2 or L1 & L2 mode.

Adjust the gain using the AMPLITUDE keys until the reflection can be clearly seen.

Move the cursor with the CURSOR keys until it is over the point at which the start of the reflected pulse just leaves the horizontal (see figure 5).

If any range except the shortest is used, the ZOOM key may be used to show the trace in more detail.

The distance to the fault may be read off from the screen. Remember to deduct the length of the test lead unless the marker is used.

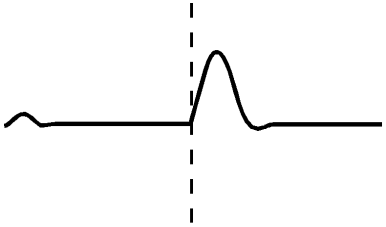


Figure 5

The marker may be used to:

a) Eliminate the length of the test lead.

b) To measure between any two features on the trace.

The marker appears as a dotted line, and the cursor can move either side of it, so the distance that appears on the screen in the cursor position can be positive or negative depending on whether the cursor is to the right or the left of the marker. The distance is the true distance from marker to cursor irrespective.

Once placed, the marker will stay in the same position even if the range is changed.

7.2.1 To eliminate the length of the test lead

Connect only the test lead to the instrument, and select the 25 m range. Adjust the controls so that the reflection from the end of the test lead is obtained. Position the cursor at the start of this reflection (see figure 5).

Press HELP  and select option 3 “SET MARKER”, the solid cursor will change to a dotted line.

Connect the lead to the cable under test and proceed as in section 7.2. The distance measured will be the distance to the fault from the end of the lead.

7.2.2 To measure between two features on the waveform

Obtain a waveform as detailed in 7.2. Move the cursor to the feature from which the measurement is to be made, (e.g. reflection from a known point or change of cable type). Press HELP and select option 3 “SET MARKER”, the solid cursor will change to a dotted line. (If the marker has previously been set, option 3 in the HELP menu will prompt “CLEAR MARKER”, this will cause the instrument to return to its normal operating mode, and access to HELP option 3 will have to be repeated to reset marker to new position).

Move the cursor to the feature to which the measurement is to be made (see figure 6). The readout will give the distance between the marker and the cursor.

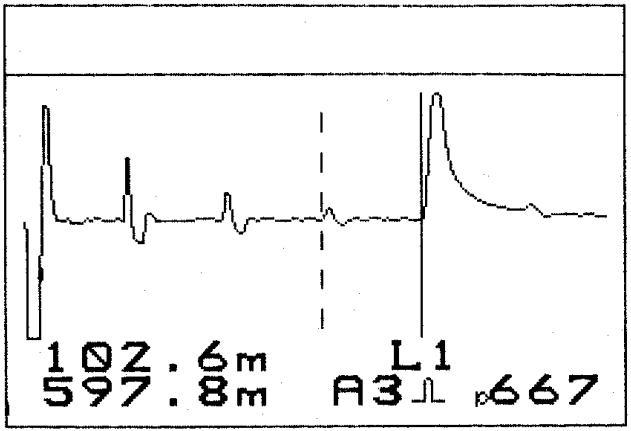


Figure 6

The FILTER is used to filter out low frequency components with the effect of sharpening up the reflection from long cables. For short cables the filter should be switched out.

Note: The balance control is inoperative in modes ‘L1 – L2’ and XTALK.

The T625 will make a quiet ticking noise in the ‘L1 & L2’ mode.

7.3 MEMORY MODES

7.3.1 GENERAL

The SAVE key is used when any live mode is selected to save the displayed trace (L1 only in the L1 & L2 mode) to a specified memory.

The RECALL key allows the recall of a specified memory. If the T625 is in a memory mode, then the mode is not changed. If the T625 is in a live mode, the mode will be changed to the MEMORY (M) mode (see below).

Selection of any of the memory modes from the MODE menu always uses the last memory that was accessed using the SAVE or RECALL keys. If a memory mode is accessed immediately after switch on M1 will always be displayed, unless the unit switched off automatically, in this case the last memory accessed will be displayed.

Once in a memory mode, the RECALL key may be used to change the displayed memory WITHOUT changing the mode.

NOTE: ENTERING A MEMORY MODE WILL RESET ALL T625 SETTINGS EXCEPT FOR THE DISTANCE UNITS AND DIELECTRIC TYPE TO THOSE THAT WERE SAVED WITH THE TRACE.

7.3.2 MEMORY (M) MODE

Selection of this mode causes the T625 to display the last saved or recalled memory. The mode indicator will show 'Mx' where 'x' is the selected memory number between 1 and 12.

The following keys are inoperative: PULSE  SAVE 

AMP+ 

AMP– 

SHIFT KEYS 

RANGE+ 

RANGE– 

DIEL+ 

DIEL– 

7.3.3 DUAL (L1 & M) MODE

Displays both the signal received on L1 and the selected memory. The mode indicator will show ‘L1 & Mx’ where ‘x’ is the selected memory between 1 and 12.

The following keys are inoperative: PULSE, SAVE, AMP+, AMP–, RANGE+, RANGE–, DIEL+, DIEL–

The SHIFT keys may be used to separate the two traces.

7.3.4 DIFF (L1 – M) MODE

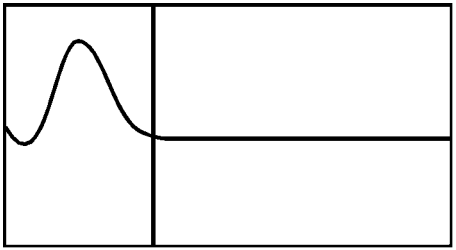
Displays ‘L1 – M’ i.e. the difference between the signal received on L1 and the selected memory. The mode indicator will show ‘L1 – Mx’ where ‘x’ is the selected memory between 1 and 12.

The following keys are inoperative: PULSE, SAVE, AMP+, AMP–, RANGE+, RANGE–, DIEL+, DIEL–, SHIFT KEYS

7.4 NEAR END MEASUREMENTS

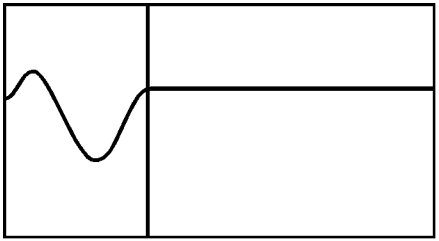
Faults which occur within the portion of trace in which the transmit pulse occurs can be seen by balancing out the transmit pulse using the BALANCE control.

OPEN CIRCUIT



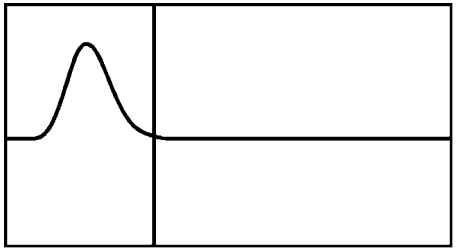
UNBALANCED - Figure 7

SHORT CIRCUIT



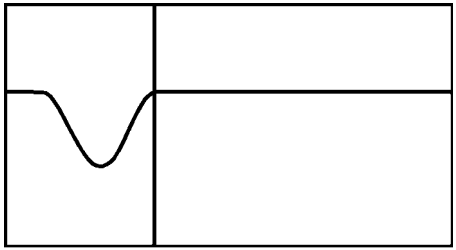
UNBALANCED - Figure 8

OPEN CIRCUIT



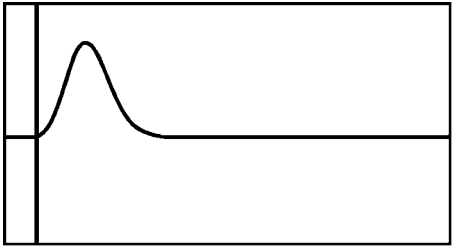
BALANCED - Figure 9

SHORT CIRCUIT



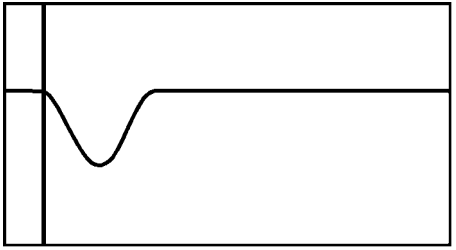
BALANCED - Figure 10

OPEN CIRCUIT



FAULT LOCATION - Figure 11

SHORT CIRCUIT



FAULT LOCATION - Figure 12

7.5 Balance control adjustments to obtain reflections at longer lengths

1. Connect the line under test to the L1 sockets with the sensitivity at A1.

2. Select a range which covers the full cable length.

3. Adjust the balance control to minimise the transmitted pulse at the start of the trace.

4. Increase the AMP control in steps adjusting the balance control to achieve a clear indication of the fault (figure 13).

5. The filter is often used on long lengths of telephone cable to improve the waveform. It is accessible from the help menu.

6. If the fault can be displayed on a shorter range, reduce the range, reducing the AMP if required. Simultaneously adjust the balance control to maintain a horizontal trace.

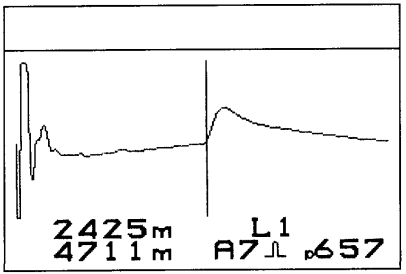


Figure 13

8. HELP

Help can be accessed when a waveform is displayed on the screen by pressing HELP. 

Exit from HELP pages can be achieved in the following ways:

- Directly back to the operating mode (by pressing key 8). This returns the T625 to the state it was in prior to HELP being pressed.
- Back to the top level HELP menu (by pressing key 7).
- In the case of HELP functions that program the T625, conclusion of the programming action returns the T625 back to the operating mode.

8.1 GENERAL HELP

8.1.1 KEY 7 - HELP TEXT

Leads to a sub menu with help text.

8.1.2 HELP MENU KEY 1 - EXPLANATION

Provides a multi-page description as the HELP functions available.

8.1.3 HELP MENU KEY 2 - CONTROLS
Provides a description of each key function.

8.1.4 HELP MENU KEY 3 - SAMPLE TRACES
Provides typical waveforms for several types of fault.

8.1.5 HELP MENU KEY 4 - BATTERIES
Provides text describing care of the rechargeable batteries.

8.2 PROGRAMMING THE T625

8.2.1 KEY 5 - UNITS
Configures the range and cursor position readout in metres, feet, or time (microseconds or nanoseconds as appropriate).

8.2.2 KEY 6 - DIELECTRIC
Configures the dielectric in PVF, velocity or velocity/2.

8.2.3 KEY 2 - CABLE TYPE

Programmes directly for various cable types, as shown below:

OPTION	MAIN TYPE	SUB TYPE	DIELECTRIC SETTING (PVF)
1	TELEPHONE	POLY PE	0.667
		JELLY FILLED	0.640
		PAPER (0.83uF)	0.720
		PAPER (0.72uF)	0.880
		PVC	0.530
2	POWER	PILC	0.540
		XLPE	0.540
		MIC	0.410
3	CATV	SOLID PE	0.667
		FOAM PE	0.820
		SASPE	0.880
		AIR	0.980
4	IBM	IBM 1	0.780
		IBM 2	0.780
		IBM 3	0.620
		IBM 6	0.780
		IBM 9	0.690

OPTION	MAIN TYPE	SUB TYPE	DIELECTRIC SETTING (PVF)
5	DATA	SOLID PE/PP	0.667
		FOAM CPE/CPP	0.780
		PVC	0.530

Note: The dielectric settings quoted are typical average values, and variations may be encountered. The manual adjustment can be used to select specific values, if known, otherwise refer to section 2 of the TDR Application Guide.

Example: Testing CATV FOAM PE.
Enter HELP menu and press number 2. This will present the five options. Select option 3 (CATV), select 2 (FOAM PE), the instrument will then display its last operating mode with the dielectric setting selected to the appropriate value for FOAM PE. The display will be in PVF, V, or V/2 depending on dielectric mode previously selected**.**

8.2.4 HELP KEY 1 - FILTER
Toggles the 150 KHz filter on or off.

8.2.5 HELP KEY 3 - MARKER
Sets or clears the on screen marker.

8.2.6 KEY 8 - OPERATION
Returns the unit to the normal operating mode.

9. DEFAULTS AND POWER UP CONDITIONS

The following settings are saved when the T625 is switched off and restored when it is switched on:

DISTANCE UNITS (i.e. metres, feet or time)

DIELECTRIC UNITS (i.e. PVF, V or V/2)

DIELECTRIC VALUE

The other aspects of the T625 default to:

RANGE	75m (NOMINAL)
GAIN	A1
DISPLAY	MODE MENU
PULSE	WIDE
DISPLAY	FULL
CURSOR	1/3 OF WAY ACROSS SCREEN
DEFAULT MEMORY	M1
BACKLIGHT	OFF
SHIFT	CENTRE

If the unit powers off automatically, then all machine settings are restored when the unit is switched on.

10. RS232 - PRINTING AND PC INTERFACE

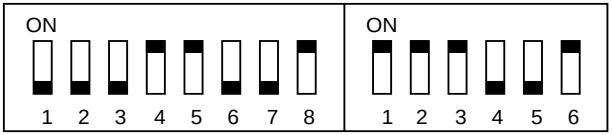
When the T625 is in the operating mode (ie when a trace is displayed on the screen) a print of the screen may be made.

10.1 PRINTERS

A suitable printer is the Seiko DPU 411- 21B available in 220v 50Hz or 120v 60Hz versions. Other printers may require a different interface cable and printer set-up and details of the RS232 interface are given in the specification Section 14.

10.2 PRINTER SETUP Seiko DPU 411-21B

The DIP switch on the printer must be set as shown below.



10.3 PRINTING PROCEDURE

Connect the interface cable supplied with the printer between the printer and the RS232 port.

Obtain the required display on the screen; either a live trace, a recalled memory trace, or an L + M or L - M trace.

Depress the RS232 key and select menu option 1, “Printer”. The display will then show “Printing” as data is transferred to the printer.

10.4 PC TRANSFER

A PC Software kit, X600 TRACEability™, is available. This enables a cable database to be established. Data from all memories can be transmitted to, and received from, a PC. See the manual supplied with the software for full instructions.

11. PRACTICE USE OF THE T625

Obtain a reel of wire with both ends accessible. Connect one end to the L1 sockets using one of the test leads.

Set up the T625 as described in section 7.

Observe the display and note the upward reflection indicating an open circuit.

Short the far end of the cable and note the fault reflection is inverted.

Connect a second reel of wire of the same length to the L2 sockets. Open circuit the ends of both cables. Select the L1 – L2 mode. Observe that the displayed trace is more or less flat because the reflected signals from each cable cancel each other out.

Short out the ends of one cable. Note that the reflected pulse is now visible. If the shorted cable is connected to L1 the reflected pulse will be negative, but if it is connected to L2 the reflected pulse will be positive.

12. FUSES

For information only. The fuses are not replaceable by the user.

FH1 1A Quick Blow (F) (External DC fuse)

FH2 1A Quick Blow (F) (Battery Fuse)

13. CLEANING

The unit may be cleaned with a mild detergent.

14. SPECIFICATION

All specifications in this section assume a PVF of 0.667.
1 metre is equivalent to 3.28 feet or 10 nanoseconds.

RESOLUTION AND RANGES:

RANGE (Nominal)	RESOLUTION	
	FULL	ZOOM
25 m	0.10 m	0.10 m
50 m	0.20 m	0.10 m
75 m	0.30 m	0.10 m
150 m	0.60 m	0.20 m
300 m	1.25 m	0.30 m
600 m	2.50 m	0.60 m
1,200 m	5.00 m	1.25 m
2,400 m	10.00 m	2.50 m
4,800 m	20.00 m	5.00 m
9,600 m	40.00 m	10.00 m
19,200 m	80.00 m	20.00 m

Sampling Accuracy	±0.3 m (all ranges)
Fault Location Accuracy	50 m ±0.64% of range 75 m ±0.43% of range 150 m ±0.35% of range All other ranges: ±0.24% of range
Dielectric Setting	0.300 to 0.999 (PVF)
Cursor	Single vertical line + Marker
Pulse Amplitude	Nominally 20 V into 100 Ω
Output Impedance	100 Ω

TRANSMIT PULSE WIDTH:

RANGE	PULSE WIDTH	
	WIDE	NARROW
25 m	24 ns	24 ns
50 m	68 ns	24 ns
75 m	68 ns	24 ns
150 m	136 ns	68 ns
300 m	280 ns	68 ns
600 m	630 ns	136 ns
1,200 m	1320 ns	280 ns
2,400 m	1320 ns	280 ns
4,800 m	2250 ns	630 ns
9,600 m	2250 ns	630 ns
19,200 m	2250 ns	630 ns

SENSITIVITY:

GAIN RANGE	APPROX. SIGNAL FOR FULL SCALE DEFLECTION
A1	72 V
A2	36 V
A3	18 V
A4	8.6 V
A5	4.3 V
A6	2.1 V
A7	1.1 V
A8	540 mV
A9	270 mV
Aa	135 mV
Ab	68 mV
Ac	34 mV
Ad	17 mV
Ae	8 mV
Af	4 mV

Balance	220 Ω
Line Connections	4 mm banana sockets, 19 mm spacing
Input Protection	300 V RMS, 0 to 60 Hz or 300 V DC

DISPLAY MODES	**Direct:** L1 L2 L1 & L2 (Display of both lines) L1 – L2 (Difference between two lines) XTALK (Transmit on L1, receive on L2) **Memory:** M L1 & M L1 – M
Memories	12
Memory Storage	Storage of the displayed trace in modes L1, L2, L1 – L2, XTALK Storage of L1 trace in mode L1 & L2 PVF VALUE, RANGE, GAIN, PULSE WIDTH, SHIFT POSITION, saved with trace and restored on recall.
Display	240 X 128 pixel LCD (Waveform Area = 240 x 100 pixel)

<table>
<tr><td>RS232</td><td>Configuration:
4800 baud, no parity, 8 bits
Connector 9 pin D male

<table><tr><th>PIN</th><th>FUNCTION</th><th>DIRECTION (with respect to T625)</th></tr><tr><td>2</td><td>Received Data (RXD)</td><td>Input</td></tr><tr><td>3</td><td>Transmit Data (TXD)</td><td>Output</td></tr><tr><td>5</td><td>Ground</td><td></td></tr><tr><td>6</td><td>Data Set Ready (DSR)</td><td>Input</td></tr><tr><td>7</td><td>Request To Send (RTS)</td><td>Output</td></tr></table></td></tr>
<tr><td>External DC</td><td>Operating 12 V to 20 V, 0.25 A
Battery Charging 15 V to 20 V, 0.25 A
Connector: 2.1 x 5.5 x 9.5 mm DC plug, center positive.
If external power is applied to the T625 and the unit is switched off THEN THE BATTERIES WILL BEGIN CHARGING.
Reverse polarity protection: Yes</td></tr>
</table>

Battery	Quantity: 8
	Size: R14
	Capacity: 3 Ah
	Type: NiMh
Battery Life	12 hours from full charge, without backlight
Backlight	LED backlight with auto switch off (5 mins)
Keyboard	Sealed membrane
Carry Bag	Soft weather-proof bag with shoulder strap and pouch to house accessories
Accessories	2 off 2 m test leads
	Operating manual
Dimensions (Main Unit)	300 x 183 x 75 mm
Weight	2.9 kg (including batteries)

Environmental & Safety (Main Unit)	
Safety	BS EN 61010-1:1993 and IEC 1010- :1990 and Amendment 1:1992 Over voltage Category II Pollution Degree 2 Double insulated
Environmental Temperature	Operating temperature: Including batteries: 0°C to +50°C Excluding batteries: -5°C to +50°C Storage temperature: Including batteries: -20°C to +50°C Excluding batteries: -20°C to +65°C
Recommended temperature limits to maximise battery life	Charging: +10°C to +35°C Discharging: -5°C to +45°C Storage: 0°C to +45°C
Damp Heat, Steady State	BS 2011, part 2.1 Ca : 1977 (IEC 68-2-3 : 1969) 40°C, 93% RH, 4 days C, 93% RH, 4 days
Damp Heat, Cyclic	BS 2011, part 2.1 Db : 1981 (IEC 68-2-30 : 1980) 25°C, 95% RH, 12 hr 55°C, 93% RH, 12 hr 6 cycles

Low Air Pressure	BS 2011 part 2.1 M : 1984 (IEC 68-2-13 : 1983) Non operational: 150 mb 16 hours Operational: 533 mb 30 minutes
Random Vibration	BS 2011 part 2.1 Fdb : 1973 5 to 150 Hz, 0.005g^2/Hz 2 hours in each of 3 planes (in soft carry case)
Shock	BS EN 60068-2-27 : 1993 part 2, test Ea (IEC 68-2-27 : 1987) 50g, 11ms (in soft carry case)
Bump	BS EN 60068-2-29 : 1993 part 2, test Eb (IEC 68-2-29 : 1987) 40g, 6ms, 1000 bumps in each of 3 axes (in soft carry case)
Free Fall	BS EN 60068-2-32 : 1993 part 2.1, test Ed (IEC 68-2-32 : 1975) 1 m (in soft carry case)
Water and Dust Protection	BS EN 60529 (IEC 529 : 1989) To IP54
Test Leads **Safety** **Installation Category** **(Overvoltage Category)**	 BS EN 61010-2-031:1995 and IEC 1010-2-031:1993 30 V RMS or 60 V DC Double insulated Pollution Degree 1

Optional AC Adaptors (supplied with soft carry case which can be fitted to the main carry case strap)	USA: Input: 120V±10% 60Hz, 180mA Output: 15V DC, 400mA, Conforms to UL1950 UK: Input: 230V±10% 50Hz, 90mA Output: 15V DC, 400mA, EUROPEAN Input: 230V±10% 50Hz, 90mA Output: 15V DC, 400mA,

Accessories	Item	Part No.
	Single Blocking Filter	T600FS
	Dual Blocking Filter	T600FD
	PC software for data transfer (9 pin/25 pin lead)	X600

15. PRODUCT SAFETY DATA

The T625 is a Pulse Echo Test Set that provides visual indication of cable faults. The T625 is tested and supplied in accordance with our published specifications, and when used in normal or prescribed applications within the parameters specified for electrical and mechanical performance, will not present any danger or hazard to health or safety, provided normal engineering and safety practices are observed.

Doubt relating to any aspect of usage of this instrument must be referred to Radiodetection Limited.

15.1 POWER SUPPLY

a) The instrument is fitted with eight rechargeable NiMh batteries with capacity of 3 Ah. The batteries should only be replaced with equivalent cells with the same capacity. A quick blow fuse that is not accessible to the operator is fitted to protect the battery circuit

b) The instrument can also be powered with an external 12 to 20 V DC source 0.25 A as outlined in specification (section 14). A quick blow fuse that is not accessible to the operator is fitted to offer protection.

c) The instrument can also be powered with an optional AC Adaptor (for further details see specification, section 14).

15.2 ROUTINE SERVICING

It is recommended that the instrument is returned to Radiodetection Limited annually for service and calibration checks. The instrument is fitted with eight rechargeable NiMh batteries with capacity of 3 Ah. Replacement batteries must be of a similar type.

15.3 COMPOSITION/TOXIC HAZARDS

Under normal conditions of use, storage and handling, the T625 presents no toxic hazards, however, in certain circumstances the following could apply:

a) Incineration

The instrument houses NiMh batteries and these **must not be incinerated**. Additionally some of the electronic components included in the assembly are constructed with resins and other chemicals which produce toxic fumes during incineration. It is required that the instrument is submitted to the correct authority for disposal in accordance with local by-laws.

b) Acidic or Caustic Compounds

Some of the electronic components included in the assembly, particularly the electrolytic capacitors contain acidic compounds. In the event of any damaged items coming into contact with the skin, the affected area should be washed with clean, cold water. In the event of eye contamination, thoroughly irrigate with recognised eye-wash and seek urgent medical assistance.

c) Physical Damage

Some of the components used in the assembly may contain very small quantities of toxic materials. There exists a remote possibility that the physically damaged components may present a toxic hazard. As a general precaution avoid unnecessary contact with the damaged electronic components and arrange for disposal in accordance with local legislation that may currently be in force.

15.4 TRANSPORT AND HANDLING

The instrument is supplied in a soft carry bag which offers adequate protection under normal working conditions. For transportation over long distances the instrument should be suitably packed in a box filled with shock absorbing material such as bubblepack or corrugated cardboard.

15.5 STORAGE

The instrument should be stored in a dry, clean environment. The NiMh battery will self discharge over a period of up to 1 year so it may be necessary to fully charge and discharge the battery several times, using the recommended adaptor, before full capacity is restored.

No hazard is anticipated during storage.

15.6 DISPOSAL

When disposing of electrical and electronic equipment or packaging materials, exercise precautions that are required by local legislation. If in doubt, contact the local authority.

15.7 SAFE USE

The T625 is designed to be used by suitably trained personnel following the procedures and instructions described in this operating manual. Additionally, the following points should be noted:

a) Personal Protection/Protective Clothing

Not necessary for operating the T625, providing that normal safe working practice is observed.

b) Working Environment

No special precautions are needed for operating the T625. Appropriate precautions must be observed for potentially hazardous, working environments such as construction site installations, electricity substations, explosive atmospheres, etc.

Other products available from Bicotest:

LEXXI™ T810
A universal hand-held TDR for use on all types of metallic cable, including live AC when used with the blocking filter lead

T600 Series TDRs
World class, user-friendly cable fault locators which feature interface with PCs via X600 TRACEability™ software

T631F, T600FS, T600FD Blocking Filters
Single and dual input LV mains blocking filters for use with T600 series TDRs

T272 High Resistance Cable Fault Locator
For location of high resistance insulation faults of up to 200 megohms

Please contact our Sales Office for further information on the above systems.

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