

BT603

User's Manual



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LIMITED PRODUCT WARRANTY AND LIMITATION OF LIABILITY

BST warrants its products and accessories to be free from defects in materials and workmanship under normal consumer usage for periods(s) outlined below. This warranty is not transferable and valid only to the original buyer or end-user. BST shall not be liable for any direct, indirect or consequential loss arising or damages suffered resulting from the usage of any of its products herein or any other products used in conjunction with.

WHAT IS COVERED:

COVERAGE	LENGTH OF COVERAGE
BT603 MAIN UNIT	One (1) year from the date of purchase by original buyer or end-user
PARTS AND ACCESSORIES	Ninety (90) days from the date of purchase by original buyer or end-user
BATTERIES	Ninety (90) days from the date of purchase by original buyer or end-user. Only batteries that leak are covered
SOFTWARE	Ninety (90) days from the date of purchase by original buyer or end-user

WHAT IS NOT COVERED:

Normal wear and tear, batteries (only batteries that leak are covered), abuse & misuse, usage of non-BST or non-BST certified products/accessories, unauthorized service and modification, altered products and error free software or operation without interruption.

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1. Safety Information

Safety Caution

This product complies with the safety requirement of ICE 1010-1: 2001. It is designed to be used on de-energized circuits only; however, it is protected against telephone networking voltages (EN 60950: 1999 Sec. 2.3).





Connections to any main supply voltage will be resulted in damage to the tester and/or a hazardous to the user. Hence the user must assume the responsibility for ensuring his/her safety.



CAUTION

1. Ban on measuring a live or charged wire
2. Measure after discharging the wire pair under test through connecting the wire to earth or the wire pair each other
3. Use only certified charger, please follow the user's manual

Symbols used on the Tester

	Caution! See explanations in this manual
	Double insulation or Reinforced insulation.
	Battery.
	Tester complies with the current EU Directives

International Standards

Safety : IEC 1010-1: 2001

EMC : EN 61326: 1997+ A1: 1998

EMC Standard		Category Pass
ESD	IEC 1000-4-2	A
EM	IEC 1000-4-3	A
Burst	IEC 1000-4-4	A
Surge	IEC 1000-4-4	A
Conducted RF	IEC 1000-4-4	A

Class Machinery

This test is certified in Business (A Class) and use only for business purpose.

2. Overview of Features

BT603 is an MTDR (Metallic Time-Domain Reflectometer) device that can measure the cable length and diagnose the cable defects such as break (open), shorted-circuit and sudden change of impedance (such as, repeaters) in graphic and numeric formats. It also includes many useful functions such as the Crosstalk test, Wiremap test and Network (TCP/IP) analysis that can be used to test & compare the cable (and network) to satisfy required network standards.

In addition, BT603 provides a Tone-generating function used to identify and trace the cable in cavities (such as walls, floors, etc.). It also provides a Continuity-test function to check out the continuity of cable.

BT603 is a high-tech all-in-one instrument suitable for installing, repairing and maintaining business network services based on UTP/STP cables, Coaxial cables, Telephone cables, and other metallic cable pairs cost effectively.

The tester comes with the accessories listed below. If an item is damaged or missing, contact your supplier immediately.

Standard Accessories

Remote Identifier #1
BNC to F connector
PC program setup CD
Download cable (USB-232)
Test pin lead cable (30cm)
Alligator-clip(black)
Alligator-clip(red)

Portable bag
Tone detector
User's Manual

Optional Accessories

Remote Identifier #2
Remote Identifier #3
Remote Identifier #4
12V automobile-cigar-charger
Portable-printer (latest version)
Adapter (DC15V, 1A)

3. Physical Features

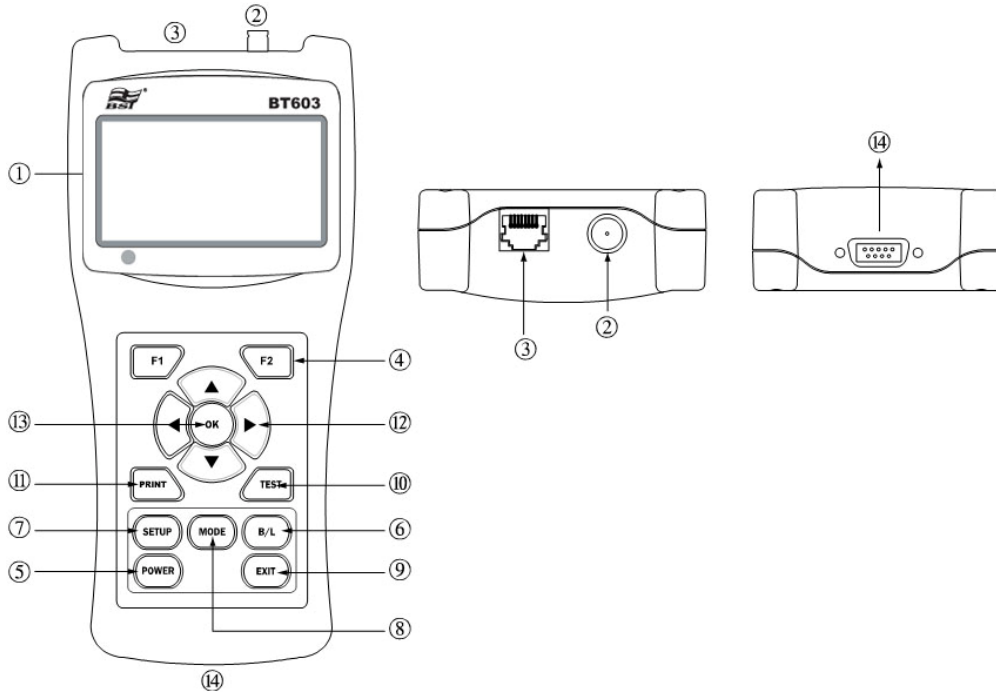


Figure 1 Exterior of BT603

LCD display with backlight.

BNC connector for connecting to coaxial cable or the alligator clip (a standard accessory),

8-pin modular (RJ45) connector for connecting to twisted pair network cables.

Function buttons. These buttons provide functions related to the current screen, the specific function is shown on the screen above the buttons.

Power on/off button.

Backlight on/off button. Additionally, pressing this button for more than three seconds will turn on/off the button sound.

Setup button for selecting test parameters.

Mode button for selecting action of the arrow buttons – zooming and scrolling waveform, moving cursors.

Exit button.

Test button for starting the selected test.

Print button.

Arrow buttons, used to navigate the cursor through screen options.

OK button for selecting the highlighted item in the menu.

RS-232C port for uploading saved test results to a PC and printing current test results.

4. Connecting Cables

Before connecting cables, be sure to check the following:

1. Power sources (over 6.5 volts) should not be connected to the far end of the cable.
2. Cable must be connected to only one of the two connectors: BNC connector (Ⓣ in Figure 2) or RJ45 connector (Ⓝ in Figure 2).


Depending on the cable you want to connect, you can use:

Coaxial Cable	Connect it directly to the BNC connector.
Shielded Twisted Pair (STP) Cable	Connect it directly to the RJ45 connector.
Unshielded Twisted Pair (UTP) Cable	Connect it directly to the RJ45 connector.
Unshielded Multi-Core Cable	After connecting the alligator clip lead to the BNC connector; choose one pair of the cable using the alligator clips.

The tester is not intended to be connected to active systems, or equipment. Prolonged exposure to the voltages applied by these interfaces may damage the tester.

If the tester detects voltage over 6.5V, a “WARNING” screen is displayed. Disconnect the tester if the voltage warning symbol appears.

5. Getting Started

Press  more than three seconds; the display turns on and shows the Main Menu.

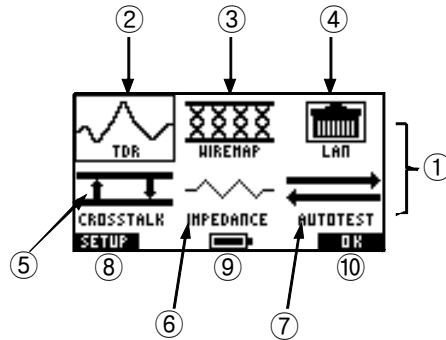













Figure 2 Main Menu

- ① Menu selection area. To select a function, use     to highlight the item; press  or .
- ② TDR test. (See page 14)
- ③ Wiremap test. (See page 29)
- ④ Network analysis. (See page 31)
- ⑤ Crosstalk test. (See page 25)
- ⑥ Additional test functions. (See page 39)
- ⑦ Auto test. (See page 43)
- ⑧ To change the system parameters, press  or .
- ⑨ Battery gauge.
- ⑩ To select the item, press  or  when highlighted.

6. Setting System Parameters

To change the system parameters, press  in the main menu (See Figure 2).

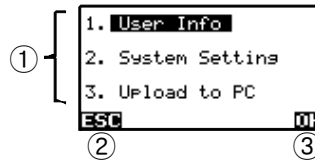










Figure 3 Screen for Setup

- ① There are three categories – setting user information, system setup, and uploading stored data to a PC. To select a category, use   to highlight the field; press  or .
- For more information about setting user information, see Section 6.1.
For more information about setting system setup, see Section 6.2.
For more information about uploading stored data to a PC, see Section 7.1.
- ② To exit this menu, press  or .
- ③ Press  or  to go to the selected category.

6.1. Setting User Information

To change user information, select the Setup menu (Figure 3) and edit in 1 as below.

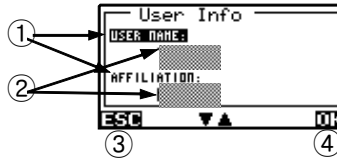









Figure 4 Setting User Information

- ① To edit settings, press   to highlight the field; then, press .

You can use "User Name" as the operator's name and "Affiliation" as an abbreviated company name.

- ② Use the   buttons to select the character and then use   to change the highlighted character.
- ③ To exit this menu without saving changes, press  or .
- ④ To store the changes, press .

6.2. Setting System Setup

To change system settings, access the Setup menu (Figure 3) and edit in 2 as below.

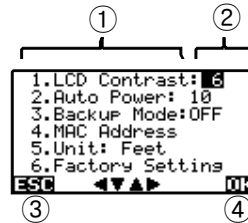


Figure 5 System Setting

- To edit settings, press to highlight the field, then press to change the number; press or .
 - Pressing changes parameter values.
 - When in edit mode the cursor will blink. Press to retain to the previous value.
To exit this menu, press after or before changing values – at this point, the cursor is not blinking.
 - Pressing or selects or confirms, or starts the selected function.
- v To alter the screen contrast, change the number in 'LCD Contrast' (min=1 max=11).
 - v To alter the auto-off feature, change the 'Auto Power' setting to the number of minutes required before auto-off.
 - v To makes the new settings your default, toggle the 'Backup mode' to ON. Leaving 'Backup Mode' set to OFF means that the changes are effective for the current session only.

- v To change the MAC address of the tester, chose menu item 4 (Figure 5) and enter the new MAC address in ① below.

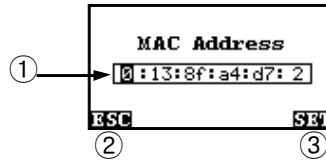


Figure 6 Setting MAC Address

- ① The MAC address field consists of 6 numbers between 0 and 255 (hexadecimal, 00h ~ ffh).
 ◀ ▶ moves the cursor and ◀ ▶ changes the highlighted character.
 Available characters are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f.
- ② To exit this menu and save changes press **F2**.
- ③ To exit this menu without saving changes press **F1**.
- v To alter the length units, change the 'Unit' setting. (Feet/Meter)
- v You can reset the tester to default settings (Menu option 5);the tester asks for confirmation. Highlight your choice using ◀ ▶ then press **OK** to accept (Note the exit key is available to cancel).

7. Communication with External Devices

7.1. Uploading Stored Data to a PC

To upload stored data to a PC, select "Upload to PC" in Setup menu (Figure 3).

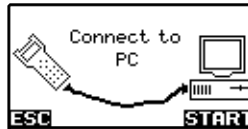





Figure 7 Uploading Screen

After connecting the tester to the PC, press  or  to start the download (Ensure the software is running on the PC).

7.2. Printing Test Results

The test results, including the measured waveforms, can be printed using the optional printer and printer cable. After connecting the printer to the tester, press  to start printing the results for the current test.

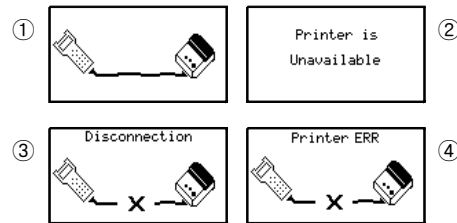


Figure 8 Printing Screens

- ① Printer is connected and tester is ready for printing.
 - ② The tester cannot detect an attached printer.
 - ③ Printer is not connected.
 - ④ An error has occurred during printing. Check the printer or refill printer paper; then try again.
- v The optional printer listed is the only one recommended for printing.

8. TDR Testing

8.1. Operation Principles

When an electric pulse is transmitted from one end of a cable, this electrical signal travels through the cable, and its reflected signal is generated where propagation characteristics (characteristic impedance) of the cable are changed; these points are defined as the “events.” By measuring the shape of the reflected signals and the times they take to reach the tester, the types and the distance of the events can be determined.

The changes in the characteristic impedance are often caused by open or shorted cables. Figure 9 shows the waveforms of the signals measured by the tester when a pulse is initiated into two cable conditions. Position □ represents where the pulse signal applied to the cable, and the Position □ represents where the reflected signal from open or shorted cables. In an open cable, both the initial pulse and its reflected signal have the same polarity while the inverse polarity occurs in a shorted cable.

The interval between Position □ and □ corresponds to the time difference which is method to calculate the distance to the point of impedance change. In this calculation, the velocity of propagation (VOP) is used; VOP is the speed of the electrical waves propagating through a cable, which depends on the unique characteristics of each cable.

$$(\text{Distance}) = (\text{Transmission time}) \times (9.84 \times 108) \times \text{VOP (unit feet)}$$

$$(\text{Distance}) = (\text{Transmission time}) \times (3 \times 108) \times \text{VOP (unit meter)}$$

VOP is expressed as a percentage of the speed of light in vacuum. For example, when we say the VOP of a cable is equal to 66%, it means that the signal propagates at 66% of the speed of light. The VOP value is affected by the type of a cable’s metal conductors, by its insulation material, and by its structure. For communication cables, their VOP values are normally listed in one of their specifications prepared by the cable manufacturers. Typical VOP values are between 30% and 90%.

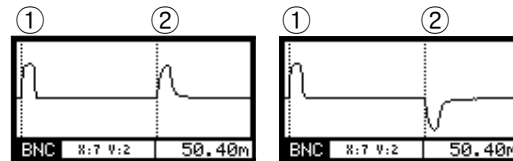


Figure 9 Waveforms for Open and Shorted Cables

8.2. TDR Function

The tester provides four TDR test functions.

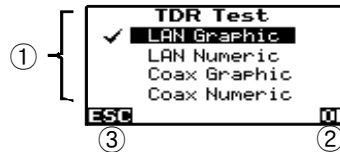


Figure 10 Menu for Selecting a TDR Function



- ① Use the arrow keys   to highlight the required test.

The words “Graphic” and “Numeric” mean that the tester shows the results in the form of waveform or numeric displays, respectively.

For “LAN Graphic” and “Coaxial Graphic”, see Section 8.3

For “LAN Numeric”, see Section 8.4.

For “Coax Numeric”, see Section 8.5.

- ② To start the highlighted function, press  or .

- ③ To go back to the previous menu, press **F1** or **EXIT**.

8.3. LAN Graphic and Coax Graphic

The tester plots the reflections on a distance scale to show you where impedance changes occur.

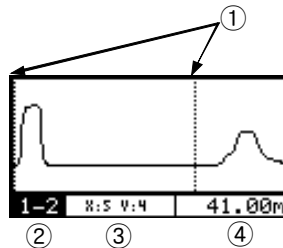


Figure 11 TDR Plots

- ① To position “CURSOR1” and “CURSOR2”, use **←** **→** with the mode set to “CURSOR1” and “CURSOR2” respectively. (See Section 8.6) The cursors must be located at the beginning of reflections.
- ② The numbers shown indicate the pair being used on the RJ45 connector. “BNC” indicates the BNC connector is being monitored.
- ③ The “Mode indicator” shows the current display operating mode and setting. To change its mode, press **MODE**. (See Section 8.6)
- ④ Distance (between Cursor1 and Cursor2) or VOP. To swap them, press **F2**.

If you want to change the parameters for the TDR test, save the current result or load the stored results, then press **SETUP**.

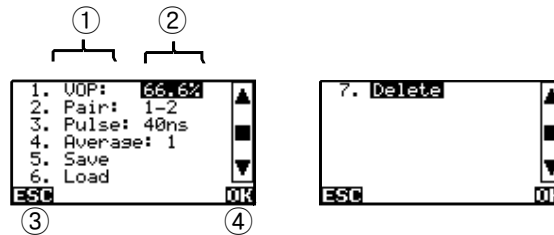


Figure 12 Setup Menu

- ① To change the relevant value, use the arrow keys to highlight the field then press or to store the changes.
 - ② For VOP, moves the cursor and changes the highlighted number.
For other parameters (Pair, Pulse and Average), changes the number.
 - ③ To exit this menu and save press or . To exit and cancel, press . Please note that in edit mode the cursor will blink.
 - ④ Press or to select the highlighted items or to save the changed parameters.
- v VOP is expressed as a percentage of the speed of light in vacuum.
 - v Pulse is the horizontal (time) width of the pulse for the TDR testing; as the width increases, the maximum measurable distance increase since the total energy of the pulse is increased. However, the time span corresponding to the pulse width becomes dead zone within which two adjacent events can be hardly distinguished by the tester.
 - v Average is the degree of average number before which a TDR test result is obtained. The degree is presented in three steps; as the degree increases, e.g. the average number increases, the noise effect appearing in the plot will be reduced; however, the time for a test to be completed (or for the waveform display to be refreshed) will be increased.

- v To save the test results, select “SAVE.”

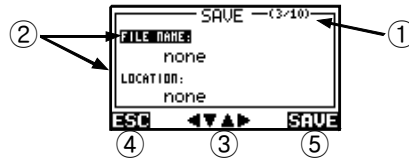


Figure 13 Saving Plots

- ① Memory sector where the test is to be saved. If the sector is not empty, it will be highlighted. To change the memory sector, press .
- ② Fields of test information. To enter string, press to change the highlighted field; then, press . You can use “FILE NAME” as the filename and “LOCATION” as the location where the current test is performed.
- ③ Fields for location and name entry. moves the cursor and changes the highlighted character.
- ④ To exit this menu without saving, press or .
- ⑤ To store the result, press . If the memory sector chosen is not empty, the tester asks you if you wish to overwrite. Select the relevant response using ; press .

Caution: If you overwrite the data on the sector, the previous data stored in that sector will be permanently erased.

- v To load the stored test results, select “LOAD.”

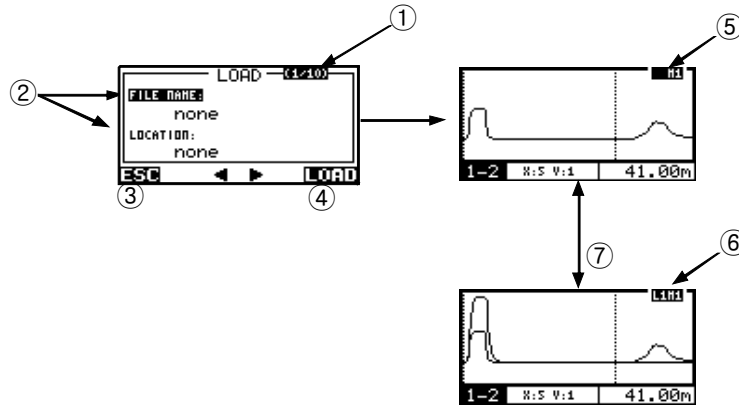


Figure 14 Loading and Comparing Plots

- ① Memory sector to be loaded. To change the memory sector, press .
- ② Information fields.
- ③ To exit this menu without loading any data, press or .
- ④ To load the result, press ; then the tester asks you to load or not. Select the highlighted answer using ; press .
- ⑤ The loaded plot is being displayed.
- ⑥ The loaded plot and current plot are being displayed at the same time.
- ⑦ To change the display, press .

- v To delete the stored test results, select "DELETE."

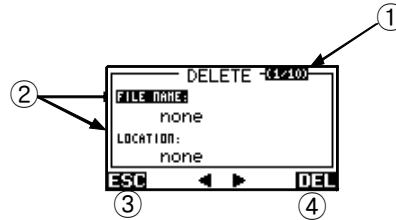


Figure 15 Deleting a Stored Plot

- ① Memory sector to be deleted. To change the memory sector, press .
- ② Information fields.
- ③ To exit this menu without deleting any data, press or .
- ④ To delete the result, press ; then the tester asks you to delete or not. Select the highlighted answer using ; press .

Caution: If you choose to delete the data on the sector, it will be permanently erased and cannot be retrieved.

8.4. LAN Numeric

The tester shows the TDR test results numerically for UTP or STP cable connected to the RJ45 connector.

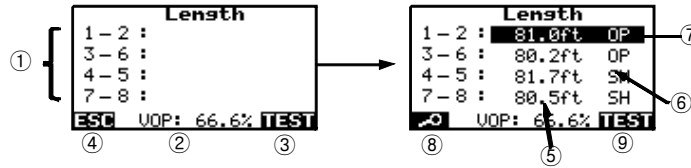















Figure 16 LAN Numeric Test

- ① Cable pairs.
- ② The VOP value used to calculate distance is the percentage of the speed of light in a vacuum.
  moves the cursor and   changes the highlighted character.
- ③ To start testing, press  or .
- ④ To go back to the previous menu, press  or  before test. After test, press  to go back to the previous menu.
- ⑤ Calculated distances to the detected faults for the respective pairs.
- ⑥ Type of termination; “OP” stands for open pair and “SH” does for shorted pair.
- ⑦   moves the highlighted pair.
- ⑧ To see more details for the pair, press ; then, you can see the TDR plots for the highlighted pair. (See Section 8.3)
- ⑨ To perform the test again, press .

8.5. Coax Numeric

The tester shows the TDR test results numerically for the BNC connector. It also can detect a device connected to the cable. Note that the detection capability for devices may not be precise in the long distance.

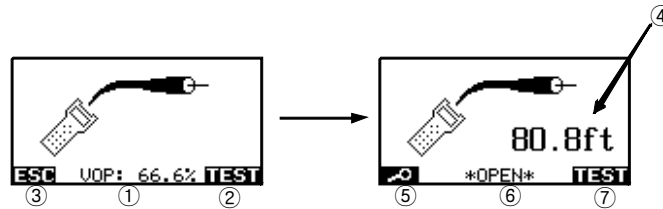



Figure 17 Coaxial Numeric Test

- ① The VOP value used to calculation of distance. It is the percentage of the speed of light.
 ◀ ▶ moves the cursor and ▲ ▼ changes the highlighted character.
- ② To start testing, press **F2** or **OK**.
- ③ To go back to the previous menu, press **F1** or **EXIT** before test. After test, press **EXIT** to go back to the previous menu.
- ④ Calculated distance to the opposite end of the cable.
- ⑤ To see more details for the pair, press **F1**; then, you can see the TDR plots. (See Section 8.3)
- ⑥ Type of termination: OPEN, SHORT, and NO EVENT
- ⑦ To perform the test again, press **F2**.

8.6. Assigning Mode to Arrow Buttons and Selecting Pulse

By using the cursor buttons, the user can control the waveform display screen such as zooming –in or –out, scrolling and moving cursor1 or cursor2. Pressing the  button allows the user to assign each operation to the cursor buttons.

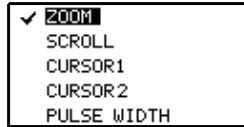







Figure 18 Selecting Mode for Arrow Buttons

Select an item using the  or  buttons, then press the  button to select. The cursor buttons will now operate in future tests as assigned in the waveform display. For example, if the user selects “PULSE WIDTH,” then the width of the measuring pulse can be increased or decreased using the  .

8.7. Measurement Accuracy and VOP

If the VOP is set accurately, the tester performs at an accuracy of $\pm 4\%$ for coaxial, UTP and STP cables. For example, $\pm 10\%$ for cables under 5 meters in length. However, general metallic cables with uneven capacity and inductance can show less accuracy than other well-made communication cables, since the VOP may not be constant along the cable.

Even if the theoretical VOP of cables is calculated through permittivity at the time of production, the actual VOP of cables can be a little different from theoretical one. The actual value is a little higher than the expected value since the space between the metallic wires cannot be cleaned completely.

In twisted pair cables, the VOP gets affected so much that it can twist the wires inside the cables. The insulation between two of the wires increases with the increased twisting, which reduces the amount of air thus increasing the VOP.

For example, CAT5 cables are produced with twisting which adjusted by pairs in order to make it less vulnerable to crosstalk. It makes VOP to deviate approximately by 2 %.

You can determine a cable's actual VOP by adjusting the measured length to match a known length of cable.

1. Connect a known length of the cable to be tested to the tester's twisted pair or coaxial connector. For maximum accuracy and adjustment resolution, use a cable between 45 ft and 70 ft (14 m and 21 m) long.
2. Start the TDR test.
3. Adjust the Cursor2 to the point of reflection.
4. Change the VOP to get the length.

9. Crosstalk Testing

The tester measures crosstalk based on the TDX (Time-Domain Crosstalk) test similar to the TDR test, where a pulse is injected through a pair and the induced signal is measured in other pairs.

The crosstalk test is performed only on the LAN cables (UTP or STP) using the RJ45 connector.

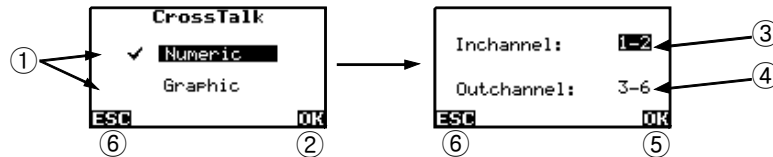


Figure 19 Selecting Crosstalk Test

- ① The tester provides two types of crosstalk test. (See 9.1 and 9.2)
 - ◀ ▶ changes the highlighted item. Press **OK** or **F2**; then the selected item is marked by '✓'.
- ② After selecting, press **F2** or **OK** to move the next step.
- ③ Channel to send a pulse. To change it, press ◀ ▶ after selecting the item using ▶ ◀.
- ④ Channel to measure a signal. To change it, press ▶ ◀ after selecting the item using ▶ ◀.
- ⑤ To move to the next step, press **F2** or **OK**.
- ⑥ To go back to the previous menu, press **F1** or **EXIT**.

9.1. Numeric Test

This test examines whether the cable qualifies to the standards such as those for 10 base-T, 100 base-TX, and 1000 base-T in terms of the crosstalk.

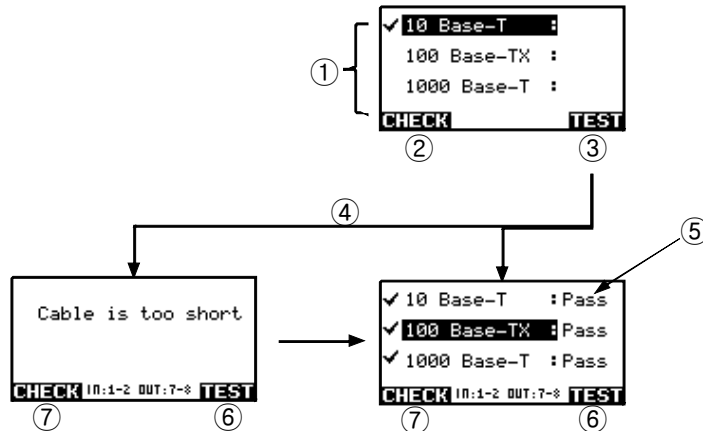





Figure 20 Numeric Test for Crosstalk

- ① Type of applications. changes the highlight.
- ② To select application, press or when highlighted. The selected applications are marked by ']'.
- ③ To start test with the selected applications, press .

- ④ If the cable tested is too short the test displays an error message.
Confirm that cable connection is correct or use a longer cable.
 - ⑤ If the cable tested meets the standards it shows 'Pass'
If not, it shows 'Fail.'
 - ⑥ To perform the test again, press .
 - ⑦ To select applications again, press .
- v To go back to the previous menu, press .

9.2. Graphic Test

This test shows the induced signal in real-time plots. The plot and its operation is similar to Figure 11

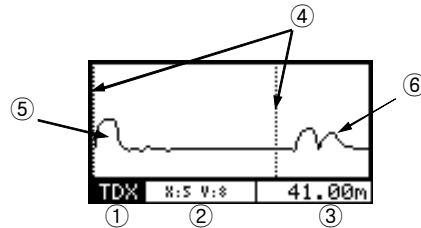


Figure 21 Graphic Test for Crosstalk

- ① To change the input channel and measuring channel, press **F1**. (See Figure 19)
- ② Mode indicator for . It also shows the current setting. To change its mode, press **MODE**. (See Section 8.6)
- ③ Distance (between Cursor1 and Cursor2) or VOP. To swap them, press **F2**.
- ④ Cursor1 and Cursor2. To move them, use with its mode set to "CURSOR1" and "CURSOR2" respectively. (See Section 8.6)
The cursors must be located at the beginning of reflections.
- ⑤ Magnitude of crosstalk near the tester end; this corresponds to Near End Crosstalk.
- ⑥ Magnitude of crosstalk nearer the far end of the cable; this corresponds to Far End Crosstalk.

10. Wiremap Testing

This test provides wiremap information for UTP and STP cables. It shows faults such as open, shorted, reversed, crossed and split pairs which can arise in cabling.

This test requires the remote identifier which should be attached to the far end of the cable.

Note that the remote identifiers are functionally identical, except for their ID numbers.

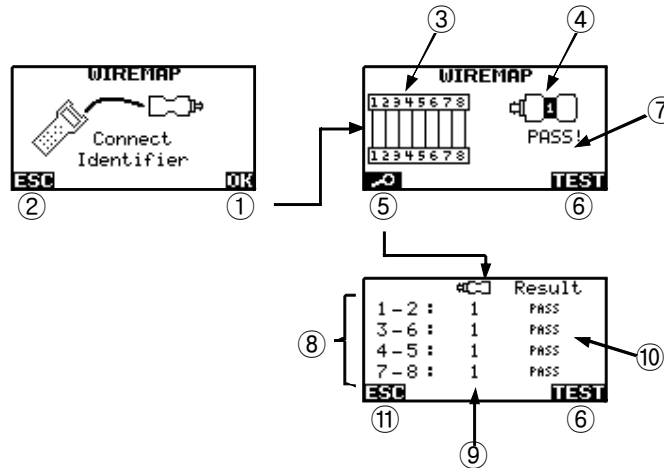


Figure 22 Wiremap Test

- ① To start testing, press **F2** or **OK**.
- ② To go back to the previous menu, press **F1** or **EXIT**.
- ③ Wiremap diagram. It shows the status of wiring in graphical form.
- ④ ID number of the remote identifier connected to the tester.
- ⑤ To see more details for the pair, press **F1**; then, you can see the result of each pair.
- ⑥ To perform the test again, press **F2**.
- ⑦ Test result message.
- ⑧ Pairs in the cable.
- ⑨ ID number of the remote identifier connected to the tester.
- ⑩ The test result of each pair is displayed.
- ⑪ To go back to the previous screen, press **EXIT**.

If the cable fails the test, the tester shows the detected problem. To see detailed information for the test, press **F1**.

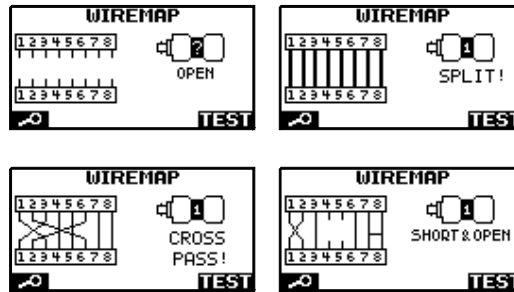


Figure 23 Example of faults in Wiremap Test

11. Network Analysis

This test provides the network information based on the TCP/IP on the logical level. It consists of three steps:

- (1) inspecting whether the port is active,
- (2) assigning an IP address to the tester and
- (3) collecting the network information of the devices connected to the network.

11.1. Inspecting Activity of the Port

Figure 24 is displayed if the port is active.

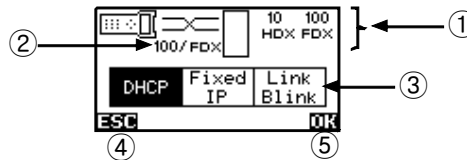




Figure 24 When the Port is Active

- ① Advertised speed and duplex that are supported by a network device when connected to the tester.
10: 10 Mbps, 100: 100 Mbps
HDX: half-duplex, FDX: full-duplex
- ② Actual speed and duplex.
- ③ Three options are available for the next step. To select the item, use   to highlight the item.
DHCP: The addresses are assigned by DHCP servers. (See Section 11.2.1)

Fixed IP: The addresses are assigned manually. (See Section 11.2.2)

Link Blink: The tester makes the LED of a HUB blink. (See Section 11.3)





- ④ Press  or  to go back to the previous menu.
- ⑤ Press  or  to start the selected function

Figure 25 is displayed if the RJ45 connector is not correctly connected to the port, or there is no network device attached to the far end of the cable being tested.

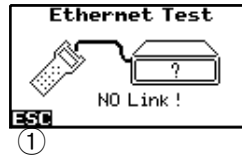




Figure 25 When the Port is not Active

- ① Press  or  to go back to the previous menu.

11.2. Assignment of IP Address

11.2.1. Using DHCP Server

The tester starts to search a DHCP server. If the server is found, the tester receives its IP address, gateway address, subnet mask and DNS server address. The result is displayed as in Figure 26.

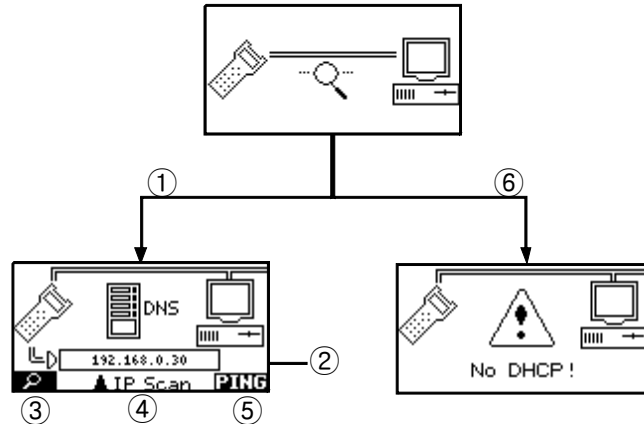







Figure 26 Searching for a DHCP Server

- ① The tester finds a DHCP server. Press  to go back to the previous menu.
- ② Assigned IP address of the tester.
- ③ Press  to see the more detailed information including the gateway address, subnet mask and DNS server address.
- ④ Press  to start the next step, Collecting Network Information. (See Section 11.5)

- ⑤ Press  to start PING test. (See Section 0)
- ⑥ The tester could not find a DHCP server. Press  to go back to the previous menu.

11.2.2. Assigning Static IP Address

When no DHCP server is available, you can assign the network setting manually.

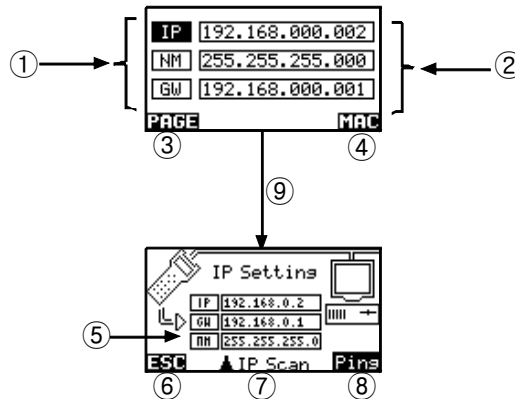












Figure 27 Assigning Fixed IP Address

- ① IP: IP address, NM: subnet mask, GW: gateway address
- ② The IP, Net Mask and Gateway fields used for the tester address entry.
-   moves the cursor and   changes the highlighted number.
- ③ Press  to scroll through and highlight the fields IP, NM, and GW, press..

- ④ Press  to assign a MAC address to the tester. For more information, see Section 6.2.
- ⑤ Assigned addresses.
- ⑥ Press  to return the previous screen.
- ⑦ Press  to start the next step, Collecting Network Information. (See Section 11.5)
- ⑧ Press  to start PING test. (See Section 11.4)
- ⑨ After setting the information, then press  to move to the next screen.

11.3. Link Blink

This function helps you determine which cable is connected to which port on a network hub or switch. This function generates a link pulse of frequency of 1 second to blink the port's activity LED.

The function does not work with non-negotiating hubs or with ports that use signal timing outside of typical timing parameters.

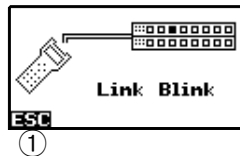




Figure 28 Link Blink Function

- ① Press  or  to go back to the previous menu.

11.4. PING Test

This test shows the time taken in sending a predetermined packet to the gateway and receiving the response. The time is displayed in the order of milliseconds.

Note that if the network uses firewall the tester may not receive any response.

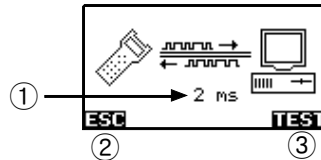


Figure 29 PING Test

- ① The round trip time in milliseconds.
- ② Press **F1** or **ESC** to go back to the previous menu.
- ③ Press **F2** to perform the ping test again.

11.5. Collecting Network Information

This function collects the information about the devices belonging to the same network based on the subnet mask of '255.255.255.0' (in hexadecimal, FF.FF.FF.00); therefore, the maximum number of the detectable devices is equal to 256.

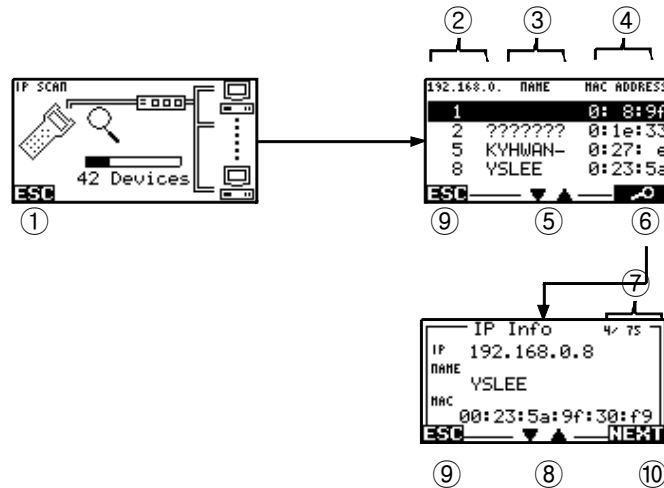










Figure 30 Collecting Network Information

- Press **F1** or **ESC** for a while to stop collecting.
- IP addresses of the devices.
In this figure, the highlighted device has the address of 192.168.0.1.
- Device names on the network.
- MAC addresses of the devices.
In this screen, only first three numbers in the addresses are shown.
-   changes the highlighted device.

- ⑥ Press  to see more detailed information of the highlighted device.
- ⑦ Number of the device and the total number of detected devices.
- ⑧   changes the selected devices.
- ⑨ Press  or  to go back to the previous step.
- ⑩ Press  to see the next device.

12. Additional Functions

The tester provides three additional functions: Characteristic impedance test, Continuity test and Tone generation.

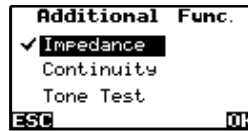



Figure 31 Menu Screen of Additional Functions

- To select the item, use  or  to highlight the item; then press  or .
- To go back to the previous menu, press  or .

12.1. Characteristic Impedance Test

The tester calculates the characteristic impedance of the cable based on the TDR method. However, contrary to the TDR test in Section 6, this test uses a step signal.

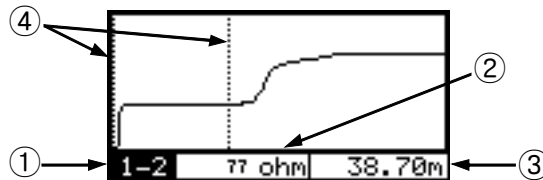


Figure 32 Characteristic Impedance Test

- ① Connector used for testing. To change the connector, press **F1**; then the test is conducted on 'BNC' → '1-2 (RJ45)' → '3-6 (RJ45)' → '4-5 (RJ45)' → '7-8 (RJ45)' → 'BNC'.
- ② Characteristic impedance. It is calculated on the position of Cursor2; therefore, it should be located within the cable length.
- ③ Distance (between Cursor1 and Cursor2) or VOP. To swap them, press **F2**.
- ④ Cursor1 and Cursor2. To move them, use **←** **→** with its mode set to "CURSOR1" and "CURSOR2" respectively. (See Section 8.6)
- Use the cursor keys **←** **→** To change the mode or set the VOP, then press **MODE**. It is similar to changing pulse width in Section 8.6 and is similar to setting the items as shown in Section 8.6.
- To go back to the previous menu, press **EXIT**.

12.2. Continuity Test

The tester calculates the wire resistance like normal multimeters; therefore, the cable has to form a loop, e.g. the far end of the cable has to be shorted. The maximum measurable resistance is 50 K Ω .

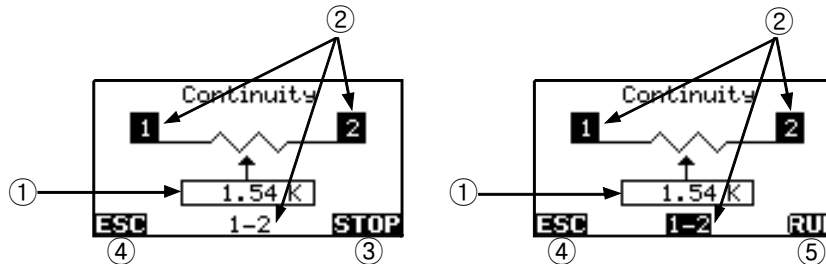


Figure 33 Continuity Test

- ① Measured resistance. If this does not exceed 150 Ω , then a buzzer sound is generated so that the continuity of the cable is confirmed.
- ② Connector used for testing. To change the connector, press or ; then the test is conducted on 'BNC' → '1-2 (RJ45)' → '3-6 (RJ45)' → '4-5 (RJ45)' → '7-8 (RJ45)' → 'BNC'.
- ③ To stop the test, press . (The measured value just before is displayed in ①.)
- ④ To go back to the previous menu, press or .
- ⑤ To run the test again, press . (Continuity mode runs continuously to help you measure resistance.)

12.3. Tone Generating Function

This function emits a tone of the frequency of 810 ~ 1100 Hz through the connector; therefore, it is possible to trace the cable with a standard tone probe (not supplied) available from most electrical outlets.

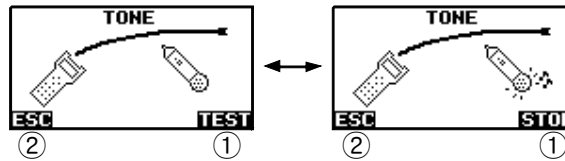





Figure 34 Tone Generation

- ① To start or stop the tone generation, press .
- ② To go back to the previous menu, press  or .

□

13. Auto Testing

Auto test performs all of the tests chosen from the list (figure 35) including the TDR test (see Section 8.4), qualification tests (10 BASE-T, 100 BASE-TX and 1000 BASE-T) (see Section 9.1), crosstalk test and continuity test (see Section 12.2). In particular, the TDR test provides the information of cable length and delay skew by pairs.

13.1. Selecting Test Functions

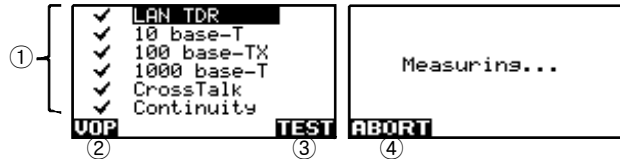


Figure 35 Selecting Auto Test Functions

- ① Test items. To select them, move the highlight using ; press when highlighted. The selected items are marked by '✓'.
- ② When "LAN TDR" is highlighted, you can change VOP by pressing . In other cases, you can go back to the previous menu by pressing .
- ③ To start the selected tests, press .
- ④ When measuring, you can abort the test by pressing for a while.

13.2. Test Results

The tester provides the results in window-by-window manner



The screenshot shows a monospaced text window with the following content:

Length		
1-2 :	301.88m	OP
3-6 :	307.20m	OP
4-5 :	309.21m	OP
7-8 :	300.48m	OP
PAGE VOP: 66.8% TEST		

Numbered callouts are placed around the window:

- ① above the first column (Cable pairs)
- ② above the second column (Distance to termination)
- ③ above the third column (Type of termination)
- ④ below the first column
- ⑤ below the second column
- ⑥ below the third column

Figure 36 Auto Test Result: LAN TDR

- ① Cable pairs.
- ② Distance to termination.
- ③ Type of termination. “OP” stands for open end; “SH” does for shorted end.
- ④ To move to the next page (test result), press .
- ⑤ VOP used in calculation of distance.
- ⑥ To perform test again, press .

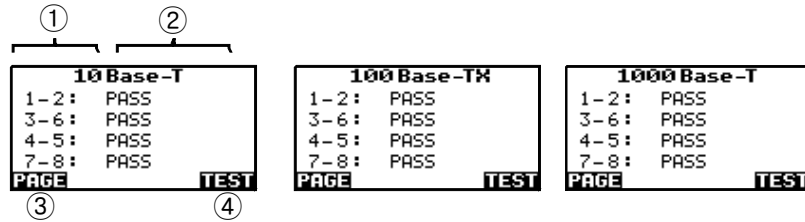




Figure 37 Auto Test Result: 10 BASE-T, 100 BASE-TX and 1000 BASE-T

- ① Cable pairs.
- ② When the pair passes the test, "PASS" is displayed. If not, "FAIL" is displayed.
- ③ To move to the next page (test result), press .
- ④ To perform the test again, press .

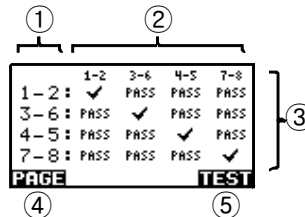




Figure 38 Auto Test Result: Crosstalk

- ① The cable pair used by the tester to send a pulse.
- ② The cable pair used by the tester to measure signal.
- ③ 4x4 table shows the results.
- ④ To move to the next page (test result), press .
- ⑤ To perform test again, press .

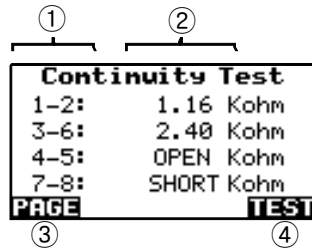





Figure 39 Auto Test Result: Continuity

- ① Cable pairs.
- ② Resistance between the pair.
- ③ To move to the next page (test result), press .
- ④ To perform test again, press .

13.3. Saving, Loading and Deleting Auto Test Results

You can save the current test result, or load/delete the previous test results by pressing the  button during the auto test.

The tester provides 50 sectors to save the auto test results. You can easily manage the sectors as shown in Figure 13, Figure 14 and Figure 15.

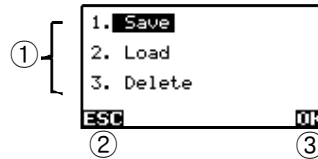








Figure 40 Handling Saved Data

- ①   changes the highlight.
- ② To go back to the previous menu, press  or .
- ③ To perform the selected action, press  or .

14. Maintenance

This product contains parts sensitive to electricity and it is not possible for a user to repair it directly. In case of damage or breakdown please contact BST or the reseller you purchased the tester from.

Warning

To avoid possible fire, electric shock, personal injury, or damage to the tester:

- Do not open the case. No user-serviceable parts are inside.
- Replacing electrical parts yourself will void the tester's warranty and might compromise its safety features.
- Use only approved replacement parts to repair this instrument.
- Contact BST or authorized reseller in case of damage or breakage.

Battery

The tester uses 10.8V Li-polymer battery.

Testing results can be effected if the battery charge is low, so it is advised to recharge the battery before using the CE1000. Always use the power adapter provided to recharge the tester. Using a non-approved power adaptor can result in damage to the tester.

Battery which was supported and adopted this instrument, warranty period up to 90days from the original purchase date

1. Complimentary Support :

- Technical & Material issue within first 90days (warranty period),

2. Support Incident (Non-complimentary)

- Notice that the issue is caused by non-certified repair or replacement service
- During warranty period, if you replace the battery, warranty period might expired from replacement day to 90days, or first purchase date to 90days.

⑥ **All batteries and adapters are certified by their manufactures and passed the safety inspections tests.**

15. Specifications

Title		Specification
Coaxial Test		<ul style="list-style-type: none"> - Graphic TDR / Numeric TDR selecting function - Resolution: 10 cm @ VOP 66.7 % - Display: 12.8 m ~ 1 km - Range: Graphic up to 1 km (Coax.) Numeric 5 m to 0.5 km - Accuracy : ± 0.9 % of reading or 0.5 m - Connector : BNC type
Network Analysis		<ul style="list-style-type: none"> - Analyze network structure and situation by ping test - DHCP, Fixing IP test - Link partner ability measurement (10M half, 10M full, 100M half, 100 full) - 10M half, 10M full, 100M half, 100 full duplex support function - MAC address editing - IP scan (IP / MAC address / NetBIOS name) - Link blink
LAN	Range Test	<ul style="list-style-type: none"> - Graphic, Numeric TDR / Graphic TDX - Resolution: 10 cm @ VOP 66.7 % - Display: 12.8 m ~ 500 m - TDR: Graphic up to 300 m Numeric 5 m to 300 m - TDX: Up to 300 m - Accuracy: ± 4 % of reading or 0.5m
	Wiremap Test	<ul style="list-style-type: none"> - Split measurement
	Crosstalk Test	<ul style="list-style-type: none"> - Pass, Fail - Standard test: 10 Base-T, 100 Base-TX, 1000 Base-T
	Impedance Test	<ul style="list-style-type: none"> - Graphic display - Accuracy: ± 10 %

	Continuity test	<ul style="list-style-type: none"> - Resistance measurement - Range: 0 ~ 50 kΩ - Buzz and output of pertinent resistance below 150Ω - Output of approximate resistance on 150~50 kΩ
	Automatic Test	<ul style="list-style-type: none"> - Auto measurement - 10Base-T, 100Base-TX, 1000Base-T, basic provisions about Wiremap - Wirelength, (crosstalk) test
	Saving Function	<ul style="list-style-type: none"> - TDR graph: 20 ea (LAN 10 ea, Coax 10 ea) - Automatic testing result: 50 ea
	Tone Function	<ul style="list-style-type: none"> - 1 kHz analog tone signal transmission
	Display	<ul style="list-style-type: none"> - 2.5" (128 x 64) mono graphic LCD
	Power	<ul style="list-style-type: none"> - 11.8 V (Li-Polymer, 1,800 mAh) - 15 V / 1 A AC-DC adapter - Operating time 6 hours, charging time 4 hours
	Peripherals	<ul style="list-style-type: none"> - USB (cable provided) - Serial Printer (function needed in printer)
	Environment Condition	<ul style="list-style-type: none"> - Operation temperature: -15 °C ~ +55 °C - Preserving temperature: -20 °C ~ +70 °C - Humidity: 95%
	Safety Standards	<ul style="list-style-type: none"> - EM61010-1 overvoltage CAT II, CAT III
	Accessories	<ul style="list-style-type: none"> - Modern bag (Soft carrying case) - Tone detector - Remote Identifier #1 - Download cable (USB-to-RS-232C) - TEST PIN lead cable (30 cm) - Alligator Clip (Black) - Alligator Clip (Red) - BNC to F connector - User manual - PC Program Setup CD