BLACK BOX NETWORK SERVICES

SOHOTEST Series
SOHOTEST Kit

SOHO Plus Tester

Provides voice, data, and video testing with length measurement.

Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500) • FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746 • Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018 • Web site: www.blackbox.com • E-mail: info@blackbox.com

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This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

Normas Oficiales Mexicanas (NOM)
Electrical Safety Statement
INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

Safety Information

To ensure safe operation of the SOHO Plus Tester, follow the instructions carefully and observe the warning messages listed below. Failure to observe warnings can result in severe injury or death and can cause damage to the tester.

WARNINGS:

The SOHO Plus Tester is designed for use on unenergized cabling systems. Connecting the SOHO Plus Tester to live AC power may damage the unit and pose a safety hazard for the user.

Poorly terminated RJ plugs might damage the jacks on the SOHO Plus Tester. Visually inspect an RJ plug before inserting it into the main or remote tester to ensure you are placing the plug into the appropriate jack.

The cable's contacts should always be recessed into the plastic housing of the receiving jack. Plugging a 6-position phone plug into the 8-position data jack on the tester has the potential to damage the outer-most contacts of the jack. Insert the cable into the appropriate connector on remote or main tester.

Do not place equipment and its accessories in the trash. Items must be properly disposed of in accordance with local regulations.

Table of Contents

1. Specifications 10
2. Overview 12
   2.1 Introduction 12
      2.1.1 Features 12
      2.1.2 Terms and Descriptions 13
   2.2 What's Included 16
   2.3 Hardware Description 16
3. LCD Display Screen and Keypad Functions 19
   3.1 LCD Display Screen 19
      3.1.1 Test Mode 19
      3.1.2 Tone Mode 19
      3.1.3 Length Mode 20
      3.1.4 Pass/Special Cables 20
      3.1.5 Cable Faults 21
      3.1.6 Shield Indicator 23
      3.1.7 Wire Map: Tester Pin # 23
      3.1.8 Wire Map: Remote Pin # 23
      3.1.9 Battery Low 23
      3.1.10 Location ID 23
      3.1.11 Voltage Detected Warning 24
   3.2 Keypad 24
4. Operation 28
   4.1 Turning the Unit On/Off 28
      4.1.1 Turn Unit On 28
      4.1.2 Turn Unit Off 28
   4.2 Automatic Power Down 28
   4.3 Cable Testing General Guidelines 29
   4.4 Testing Voice Cables 30
   4.5 Testing Video Cables 32
   4.6 Testing Data Cables 33
   4.7 Using ID Mode 35
   4.8 Using Tone Mode 36
   4.9 Using Length Mode 39

4.9.1 Measure Cable Length 39
4.9.2 View the Length Constant 42
4.9.3 Adjust the Length Constant Value 43
4.9.4 Length Constant Accuracy 45
5. Maintenance 47
5.1 Battery Replacement 47
5.2 Cleaning 47
5.3 Storage 47
6. Troubleshooting 48
6.1 Contacting Black Box 48
6.2 Shipping and Packaging 48
Appendix. Cable Wiring and Display Screen 49
A.1 Properly Wired T568A Data Cable 49
A.2 T5668A Data Cable with Split Pairs 49
A.3 T568A Cable with a Short and an Open 50
A.4 T568A Cable with a Miswire and Unrecognized Continuity 51

1. Specifications

Cable Types — CAT7, CAT6x, CAT5e, CAT5, CAT4, CAT3 shielded or unshielded, coax

CE Approval — Yes

Default Length Constants — Restored with power on reset:
Voice: 17.4 pF/ft.;
Video: 16.5 pF/ft.;
Data: 15 pF/ft.

Length Accuracy without Length Constant Accuracy — ±3% plus ±1 foot (30.4 cm)

Maximum Coax Cable Length — 100 ohms maximum DC resistance, center conductor plus shield

Maximum RJ Cable Length — 1000 ft. (305 m)

Maximum Voltage* — RJ jack: 66 VDC or 55 VAC; F-connector: 50 VDC or VAC

*Parameters refer to the maximum voltage that can be applied to any two connector pins without causing damage to the tester.

Minimum Cable Length for Split Pair Detection — 1.5 ft. (0.5 m)

Measurement Technology — Capacitance testing

User Controls — Keypad: (5) Buttons

Connectors — SOHOTEST: (1) RJ-11 jack, (1) F-connector, (1) RJ-45 jack;
Remote Tester: (1) RJ-11 jack, (1) RJ-45 jack

Indicators — LCD display screen; low battery icon flashes when battery voltage falls below 6V

Temperature Tolerance — Operating: 32 to 122° F (0 to 50° C);
Storage: -4 to +140° F (-20 to +60° C)

Humidity Tolerance — 10 to 90%, noncondensing

Power — (1) 9-V alkaline battery: Active: 425 hours; Standby: 4 years

Size — 6.4"H x 2.8"W x 1.4"D (16.3 x 7.1 x 3.6 cm)

Weight — 9 oz. (256 g) with battery and remote-end of tester

2. Overview

2.1 Introduction

The SOHOTEST is a handheld device used to test, identify, and detect potential faults in voice, video, and data cables. The SOHO Plus Tester has the added feature of length measurement, allowing you to measure the length of a cable as a whole or by individual wire pairs located within a cable. The test unit offers the following features:

2.1.1 Features

- Continuity testing discerns if the voice, data, and/or video cables being tested have been wired correctly with no faults.
- ID Mapping identifies cables and determines their exact location. Map up to 19 locations at one time.
- Tone Mode verifies cable wiring paths by sound.
- Length Measurement determines the length (in feet or meters) of an entire cable and/or individual wire pairs within the cable.
- Tests voice (6-wire), data (8-wire), and video (coax).
- Easy to read, extra-large 7-segment LCD screen with large icons clearly displays test results.
- Tone generation over voice, data, and video cables, with four different tones.
- RJ (Voice and Data) test remote stores in bottom of case. A video ID remote is also included.
- Tests and indicates pins with shorts, opens, reversals, miswires, and split pairs.
- Displays "Pass" icon for correctly wired T568A/B.
- Displays "X-over" for correctly wired cross-over (uplink) data cables and displays "Rev" for correctly wired reverse-pinned voice cable.
- Low power consumption for long battery life.
- Auto power-off.

- Easy to operate.
- Displays length reading in feet or meters.
- Cable test results displayed in wire map format with connector pin numbers.
- Conserves power and supports long battery life with Auto-off feature and battery low icon.
- Video and data cables can be connected to the tester at the same time to improve testing efficiency.
- Patch cables may be tested without detaching the remote from the main tester.

2.1.2 Terms and Descriptions

Table 2-1 defines the terms used throughout this document and provides information to assist you with proper operation and understanding of the test unit.

Table 2-1. Terms and descriptions.

Term	Description and Uses
Video cable	Coax cable with a single-pair (2-pin) wiring system. • The pins are paired in order of continuity. • Test this cable using the F-connector on the main test unit.
Data cable	Data cables with a 4-pair (8-pin) wiring system. • Pin pairs are not wired by continuity, but follow a cabling standard. • Test this cable using the RJ-45 adapter on the main test unit.
Cabling standards	Standard wiring design of a cable. The pairing of wires differs according to cable type. • Many standards adopt a wire-color system to help ensure proper pin pairing. • Common data cable wiring standards are known as T568A/B.
Voice cable	Phone cable with a 3-pair (6-pin) wiring system. • The pins are paired by continuity, except in the case of a reverse-pinned voice cable. • Use the RJ-11 adapter on the main test unit to test a voice cable.

Table 2-1 (Continued). Terms and descriptions.

Term	Description and Uses
Pins	Individual wires within a cable. • Two pins paired together are known as pin pairs.
F-Connector	Coax cable connector.
RJ Jack	Connector for a voice or data cable. • The connector can be located on the tester itself. When mounted on a wall, the RJ Jack is known as a wall port. • RJ-11 is used for voice. • RJ-45 is used for data.
RJ Plug	Cable end that is inserted into a wall port or the test unit.
Length Constant Value	The amount of capacitance in picofarads (pF) per unit distance.

2.2 What's Included

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

- (1) SOHO Plus test unit
- (1) master remote
- (1) set of RJ-45 remotes (1–5)
- (1) set of coax remotes (1–5)
- (1) F-connector coupler
- (1) RJ-45 to alligator clip cable assembly
- This user's manual

2.3 Hardware Description

SOHO Plus Tester

The SOHO Plus Tester, illustrated in Figure 2-1, has four main parts: the connectors, the LCD display screen, the keypad, and the remote tester.

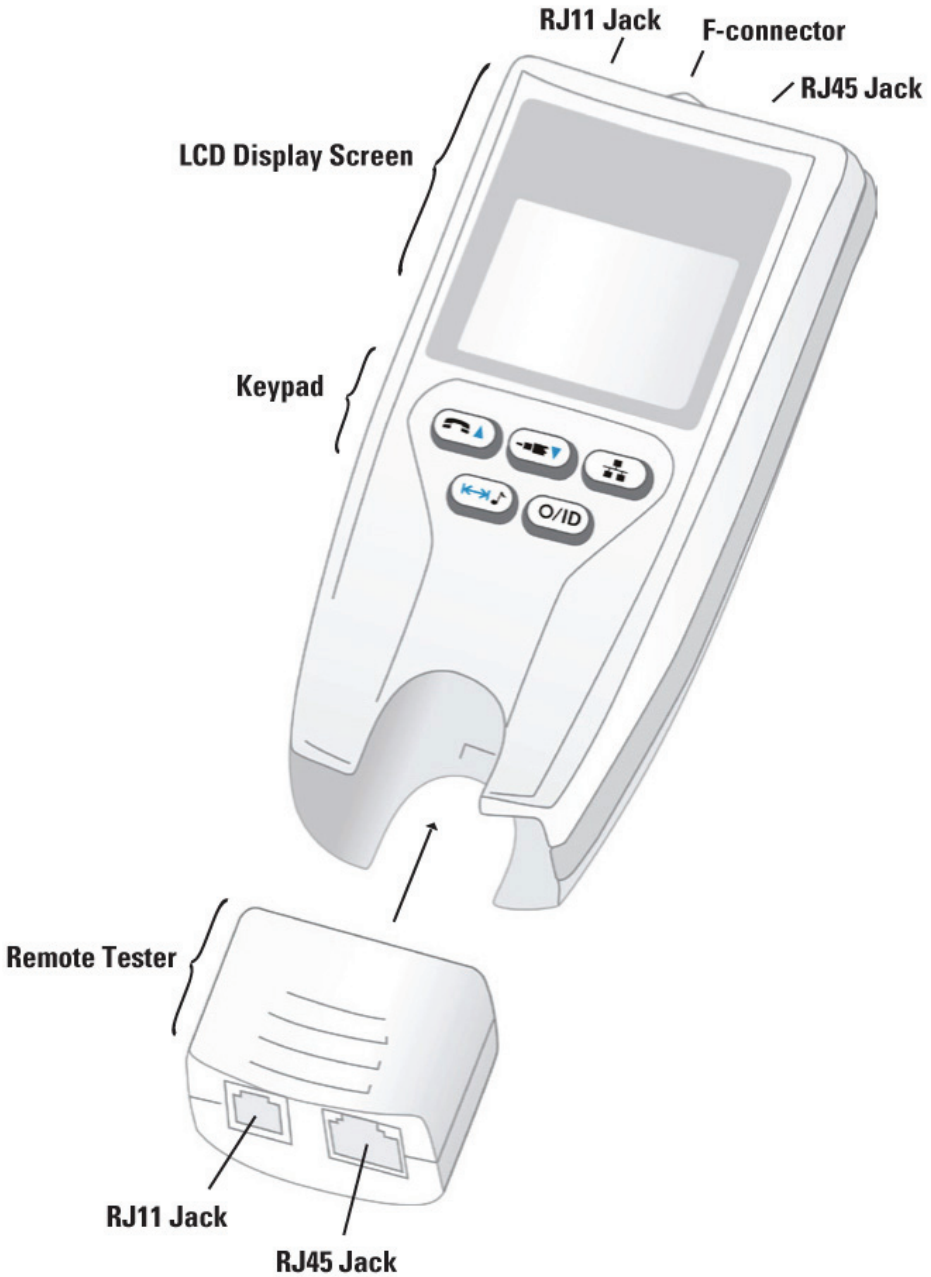


Figure 2-1. SOHO Plus Tester components.

Jacks and Connectors

The main unit connectors located at the top of the SOHO Plus Tester include two RJ jacks for data and voice cables and one F-connector for video cables.

Remote Tester

The remote tester can be detached from the main unit to test cables over a distance. The remote test unit has two RJ jacks for data and voice cables and is integral to the testing process. See Chapter 4 for detailed instructions on cable testing.

LCD Display Screen

The main tester has a high-contrast LCD display screen, shown in Figure 3-1. The LCD screen displays the following: test mode, pass/special cables, cable faults, shield indicator, battery capacity, locator ID#, voltage detection, and wire mapping.

NOTE: Go to Chapter 3 for details about the LCD display screen.

3. LCD Display Screen and Keypad Functions

3.1 LCD Display Screen

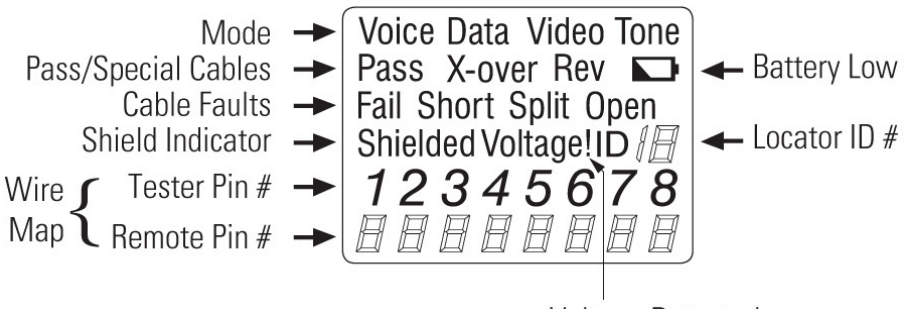


Figure 3-1. LCD display screen.

3.1.1 Test Mode

The top line of the display shows the cable type test mode (voice, data, and video).

3.1.2 Tone Mode

Tone Mode must be used with a tone tracer probe. The probe allows you to trace cable wiring paths and identify potential faults by sound. The following icons appear in the display screen when Tone Mode is in use:

- Cadence: There are four cadence options: HI, LO, Hi-Lo1, and Hi-Lo2. The selected cadence appears in the lower right corner of the display screen.
- Tone Path Selection: When tracing a video cable, the selected cadence is transmitted on the coax pin ("P"), the coax shield ("S"), or both the pin and shield ("PS"). The icons related to the current tone path selection appear in the lower left corner of LCD display screen.

NOTE: The tone tracer probe is sold separately. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com for details.

3.1.3 Length Mode

When the LENGTH/TONE button is pressed, the measured cable length (in units of feet or meters) appears in the lower right corner of the LCD display screen and the "L" icon appears above pins 7 and 8 in the Wire Map. The following values and icons display in the screen when measuring cable length:

- Edit Capacitance: When adjusting the length constant value for a cable, the "Edit Cap" icon appears in the bottom of the screen. An "E" icon displays above pins 7 and 8 in the Wire Map to indicate you are in Edit Mode.
- Length Constant Value: A value, measured in picofarads (pF) per foot or meter appears in the bottom of the LCD display screen. This value corresponds to the selected cable type and can be adjusted at any time. When viewing the length constant value for a cable type, the "C" icon displays above pins 7 and 8.

3.1.4 Pass/Special Cables

The second row of the display screen corresponds to the wiring structure of the cable being tested. The SOHO Plus Tester displays the following three icons:

- Pass: The "Pass" icon appears if the cable has a properly wired 4-pair T568A/B data cable, a 3-pair one-to-one wired voice cable, or a video cable with no faults.
- X-over: This icon displays if a properly wired cross-over (uplink) data cable is recognized. A crossover cable is a data cable with the 1-2 pair wired to the 3-6 pair. This allows an Ethernet NIC card without MDI-X capability to communicate by wiring the transmit end of the cable to the receiver on the opposite end of the cable.

- Rev: The "Rev" icon is displayed when the cable is a properly wired reverse-pinned voice cable. A reverse-pinned voice cable has all wires on one cable connector ordered by continuity and the connector on the opposite end of the cable has the pins located in reverse order. Pin 1 connects to Pin 6 on the opposite connector; Pin 2 connects to Pin 5 and so on.

3.1.5 Cable Faults

There are four possible error conditions on the cable: Fail, Short, Split, and Open. Cable faults appear in the third row of the LCD screen. The faults are described in Table 3-1 below. Refer to the Appendix for a visual representation of cable faults and how they appear in the Wire Map.

Table 3-1. Cable faults.

Cable Fault	Description
Fail	A "Fail" error occurs when a cable's wire connections do not follow cabling standards. • This icon will illuminate when any cable fault is detected. • Any miswired pin pairs will flash in the Wire Map.
Open	An "Open" error means a wire connection within the cable is not continuous through the length of the cable. • The pin pairs with errors will flash in the Tester Pin # field of the Wire Map and will be blank in the Remote Pin # field.

Table 3-1 (Continued). Cable faults.

Short	The "Short" icon appears when two or more wires within a cable are electrically connected. This is also known as a short circuit. • A dash (-) will appear in the Remote Pin # field to indicate the shorted pin pairs. • This dash will appear directly below the flashing pairs in the Tester Pin # field.
Split	A split, also known as an AC signal fault, occurs when wires are not twisted together according to their cabling standard. • This miswire commonly occurs with pins 3, 4, 5, and 6 in a data cable. • The pin pairs experiencing the split will flash in the Remote Pin # fields of the wiring map.

NOTES:

Open and Short errors take precedence over miswires and the appropriate icon(s) will appear in the display screen.

NOTES (continued):

If the pairs displayed in the Wire Map are flashing, the cable has a problem (split, open, short, or fail). If the pairs are not flashing, the cable is wired properly and a "Pass" icon will appear.

The accuracy of the SOHO Plus Tester is limited to identifying the pin pairs with errors. It cannot identify the individual pin experiencing the error.

3.1.6 Shield Indicator

The "Shielded" icon, appearing in the fourth line of the LCD screen, illuminates when a shielded data cable is properly wired at both ends. The icon flashes if the shield is shorted to a pin in the cable. The shorted pins display in the Wire Map and the "Short" indicator appears.

3.1.7 Wire Map: Tester Pin

The top line in the Wire Map shows the pin numbers of the cables connected to the main tester. If a cable fault is detected, the pin pairs experiencing the error will flash.

3.1.8 Wire Map: Remote Pin

The bottom line of the Wire Map corresponds to cables connected to the remote tester. The Remote Pin # field will show if the connected cables have errors (short, open, fail, and split). The appearance of dash lines indicates shorted pins. No number displayed in the Remote Pin Number line indicates Open pins. Pin pairs will flash if they are split.

3.1.9 Battery Low

The battery low symbol illuminates when the battery is nearing depletion. The symbol flashes when the battery needs to be replaced.

NOTE: Results may be unreliable at this point so the battery should be replaced.

3.1.10 Location ID

The "ID" symbol, located in the third line of the LCD screen, appears when the SOHO Plus Tester is in Video, Data, or ID Mode. When using the wire mapping remotes, the "ID" icon will turn on and the remote ID number will display to its right. The ID number is not displayed if an error occurs, such as "Open" or "Short."

3.1.11 Voltage Detected Warning

If voltage is detected on any of the cable connectors, the "Voltage!" icon flashes. A check for voltage is performed before each test and if found, no test is run. If the icon appears, the tester should be disconnected immediately from the source of the voltage. The tester automatically powers down in 90 seconds if the detected voltage is not removed.

3.2 Keypad

The SOHO Plus Tester is equipped with five buttons, illustrated in Figure 3-2. Some buttons have more than one function. The functions are explained in Table 3-1. For each cable test, results are displayed in the Wire Map of the LCD display screen.

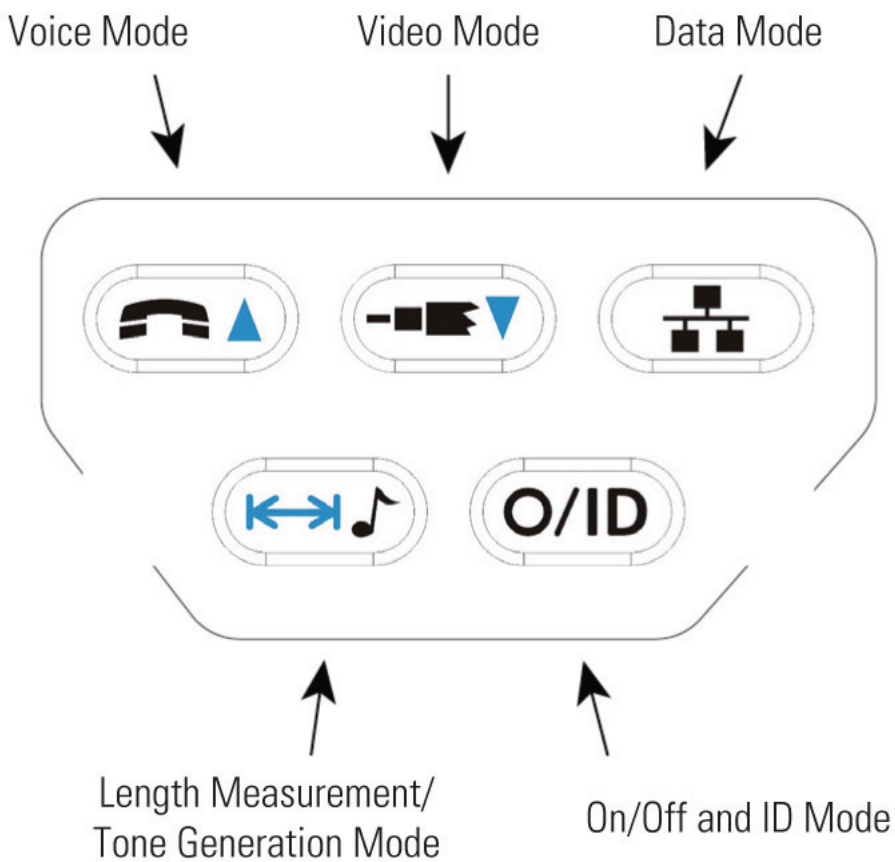


Figure 3-2. Keypad.

Table 3-2. Keypad.

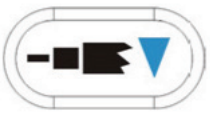
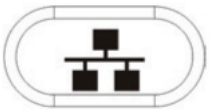
Button Name and Icon	Description
Voice	The Voice button tests voice cables. • Each press of the button causes one test to run on the 6-position RJ jack. • Hold the button down to start/stop continuous testing. • In Length Mode, the blue arrow allows you to adjust the length constant value. • A short press of the Voice and Video buttons simultaneously changes the length measurement unit from feet to meters.
Video 	The Video button tests coax cables terminating at an F-Connector. • In Length Mode, the blue arrow allows you to adjust the length constant value. • A short press of the Voice and Video buttons simultaneously changes the length measurement unit from feet to meters.
Data 	The Data button tests data cables. • Each press of the data button runs one test on the 8-position RJ jack. • Hold the button down to start/stop continuous testing.

Table 3-2 (Continued). Keypad.

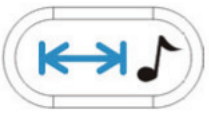
Button Name and Icon	Description
Length/Tone 	Length/Tone This button has two functions: Tone generation and length measurement. TONE MODE: Tone Mode, indicated by a musical note, is used with a tone probe to identify faults in cables via sound. • When the unit is turned off, press and hold down the Tone button for two seconds to enter Tone Mode. • An audio tone is transmitted from the unit through the selected wire pairs of the cable being tested. LENGTH MODE: Length Mode, indicated by a double arrow, is used to measure the entire length of a cable and its pin pairs. • One press of the button enters length constant. • A long press (two seconds) of the button allows you to edit the length measurement unit from feet to meters.

Table 3-2 (Continued). Keypad.

Button Name and Icon	Description
Power/ID Mode	This button has two functions: Turning the unit On/Off and ID Mode. POWER • In any test mode, one press of the O/ID button turns the SOHO Plus Tester Off. • Subsequent presses of the button turn the unit On/Off. ID MODE: ID Mode is used with wire mapping remotes to identify cable runs. • When the SOHO Plus Tester is Off, one press of this button turns the unit on and begins ID mode. • ID Mode scans all cable types (voice, video, and data) and displays any detected wire mapping remotes.

NOTE: To run a continuous test on data or voice cables, press and hold down the corresponding mode button until "LOOP ON" appears. Tests will execute until another cable test mode or O/ID buttons are pressed or after 5 minutes of no change in the test result.

4. Operation

To ensure safe operation of the SOHO Plus Tester, follow the instructions carefully and pay attention to the warnings and cautions. Failure to observe warnings can result in severe injury or death and can cause damage to the tester.

4.1 Turning the Unit On/Off

4.1.1 Turn Unit On

Press the desired cable type button (voice, video, data, tone or ID) to start testing in that mode immediately.

4.1.2 Turn Unit Off

Press the O/ID button to power down the tester. The display screen will go blank.

4.2 Automatic Power Down

The SOHO Plus Tester automatically turns off to conserve battery power. The automatic power down feature varies according to which cable test mode is in use (see Table 4-1). The power down timer is restarted whenever a button is pressed.

Table 4-1. Automatic power down.

Test Mode	TIme
Voice	18 sec. (5 minutes when looping)
Data	18 sec. (5 minutes when looping)
Video	5 minutes
Length/Tone	60 minutes
ID	5 minutes

4.3 Cable Testing General Guidelines

The SOHO Plus Tester tests video, data, and voice cables to detect potential faults, measures cable length, shows a cable's wire pairing, and examines the physical properties of a cable.

NOTES:

The RJ jacks for data and phone cables share internal connections within the tester. Only one RJ cable can be connected at a time for accurate cable test results.

An RJ cable and a coax cable may be connected at the same time. In ID mode, all connectors on the Tester may be connected at the same time.

To easily toggle between cable test modes, press the desired cable type button.

NOTES:

The SOHO Plus Tester is designed for use on unenergized cabling systems. Connecting the SOHO Plus Tester to live AC power may damage the unit and pose a safety hazard for the user.

Poorly terminated RJ plugs, the head of a cable, have the potential to damage the jacks on the SOHO Plus Tester. Visually inspect an RJ plug before inserting it into the tester to ensure you are inserting the plug into the appropriate jack of the remote-end or tester-end of the unit (for example, the data cable plug fits into the data jack on the unit).

The cable's contacts should always be recessed into the plastic housing of the receiving jack. Plugging a 6-position phone plug into the 8-position data jack on the tester has the potential to damage the outermost contacts of the jack. Insert the cable into the appropriate connector on the remote end or tester end of the unit.

4.4 Testing Voice Cables

Testing a voice cable is a two-end test where one end is connected to the main tester and the other end is connected to the remote tester.

NOTE: Plug the cable into the appropriate jacks on the main tester and remote tester. Failure to do so can damage the connectors.

1. Insert one end of the cable into the RJ-11 jack on the main tester.
2. Place the other end of the cable into the RJ-11 jack on the remote tester.
3. Single Test: To run a single test on the 6-position connected voice cable, press the VOICE MODE button. The following appears in the LCD display screen (see Figure 4-1):

- The "Voice" icon appears in the upper left corner.
- The cable wiring structure displays (Pass, X-over, or Rev).
- The "ID" icon appears with remote #1 displayed as the cable is connected to the remote tester.
- The Wire Map fields update to indicate any cable faults. A perfectly wired voice cable will display all pins (1–6) in both fields of the Wire Map display.

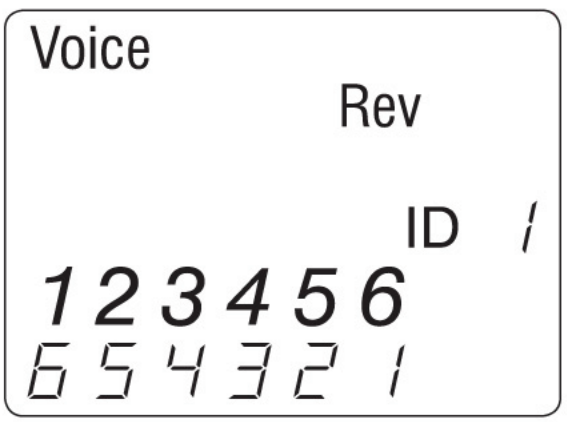


Figure 4-1. Voice mode test with Rev. cable.

4. Continuous Test: To run a continuous test, press and hold down the VOICE MODE button until "LOOP ON" appears in the display (see Figure 4-2). When looping is active, three small moving "bars" appear on the right side of the display screen. The display screen will update with the icons and values that appear during a single test (see Figure 4-1).

   To turn test looping OFF, press and hold down the VOICE MODE button until "LOOP OFF" appears.

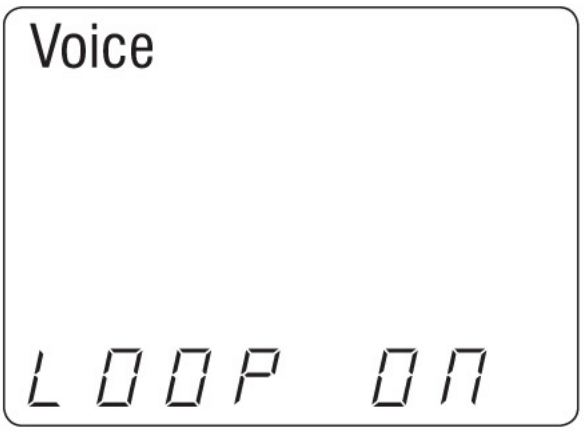


Figure 4-2. Loop testing in voice mode.

NOTE: The test loops until the VOICE MODE button is held down, or the O/ID button is pressed, or after 5 minutes of no change in the test results.

5. Troubleshoot if cable faults (open, short, fail, or split) are detected.

- The pins experiencing error(s) appear in the Wire Map of the display screen.
- Refer to the LCD Display Screen section for details of the cable faults.

NOTE: If the cable is a properly wired, reverse-pinned voice cable, the "Rev" symbol will illuminate and blink in the LCD screen. The Wire Map will display the reverse wired pin connections.

4.5 Testing Video Cables

1. Connect the provided F-Connector coupler to the F-connector at the top of the main tester (see Figure 4-3).

Figure 4-3. Connector on main tester.

2. Screw one end of the video cable into the F-connector coupler.
3. Secure a coax remote to the opposite end of the video cable.
4. Press the VIDEO MODE button to start continuous testing. The following updates appear in the LCD display screen (see Figure 4-4).

- The "Video" icon illuminates in the upper right corner.
- A progression of "o's" appears on the bottom of the display to indicate active testing.
- The cable wiring structure displays (Pass, X-over, or Rev).
- The "ID" icon appears with the Coax wire mapping remote number to its right.

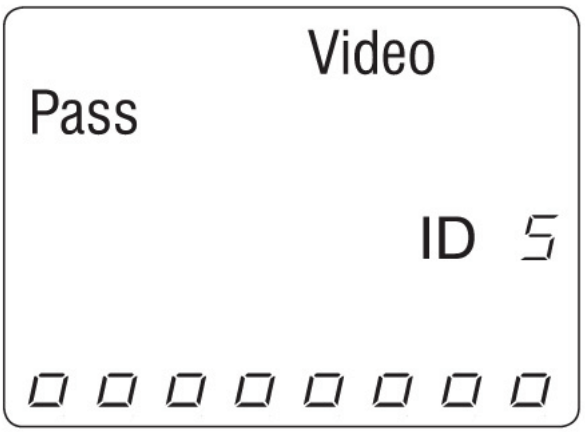


Figure 4-4. Loop testing in video mode.

NOTE: The tests run until the O/ID button is pressed or when 5 minutes elapses with no change in the test results.

5. Troubleshoot if cable faults (open or short) are detected.

4.6 Testing Data Cables

Testing a data cable is a two-end test where one end is connected to the main tester and the other end is connected to the remote tester.

1. Plug one end of the data cable into the RJ-45 jack on the main tester.

NOTE: Make sure you are inserting the cable into the appropriate jack.

2. Insert the opposite end of the cable into the RJ-45 jack on the remote tester.
3. Single Test. To run a single test, press the DATA MODE button. The following appears in the display screen (see Figure 4-5).

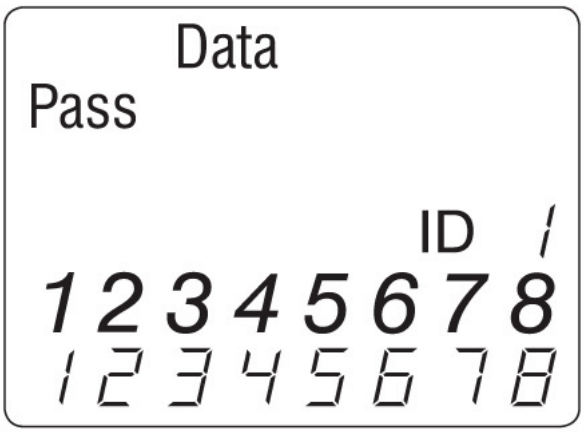


Figure 4-5. Data mode test.

- The "Data" icon appears at the top of the screen.
- The cable wiring structure displays (Pass, X-over, or Rev).
- The "ID" icon appears with remote #1 displayed as the cable is connected to the remote tester.
- The Wire Map fields update to indicate any cable faults. A perfectly wired data cable will display all pins (1–8) in both fields of the Wire Map display.

4. Continuous Test. To run a continuous test on the data cable, press and hold down the DATA MODE button until "LOOP ON" appears in the screen. When looping is active, three small moving "bars" appear on the right side of the display screen. The display screen will update with the icons and values that appear during a single test.

   To turn OFF loop testing, press and hold down the DATA MODE button until "LOOP OFF" appears (see Figure 4-6).

Figure 4-6. Loop off in data mode.

NOTE: The test loops until the DATA MODE button is held down, or O/ID button is pressed, or after 5 minutes of no change in the test result.

5. Interpret display results and troubleshoot potential cable faults.

- The pins experiencing error(s) appear in the Wire Map of the display screen.
- Refer to the LCD Display Screen section for details of the cable faults.

NOTE: The "X-over" symbol will appear if a properly wired (uplink) data cable is detected. The Wire Map will show the pin connections with the crossover. Refer to Chapter 3, LCD Display Screen, for details.

4.7 Using ID Mode

This ID functionality of the SOHO Plus Tester identifies cables using remotes. Each remote is numbered sequentially to help you easily identify cables.

1. Make sure the SOHO Plus Tester is turned OFF.
2. Insert the cable plug into the corresponding receiver on the main tester (RJ-11 jack for voice cables, RJ-45 jack for data cables, F-connector for video cables).

3. For data or voice cables, insert a Network or Voice wire mapping remote into an RJ Jack wall port. For video cables, attach Coax wire mapping remote(s) to the F-Connector coax wall receiver.
4. Press the O/ID button to turn the tester ON and enter ID Mode. Wire mapping results display as follows:

- A progression of "o's" appears on the bottom of the display to indicate ID Mode is active.
- If wire mapping remotes are found, the connector type illuminates and a numeric value (1 to 19) appears in the ID field of the display screen showing the wire mapping remotes that match the connected cable (see Figure 4-7).
- If wire mapping remotes are not found, "Open" displays in the LCD screen.
- If multiple wire mapping remotes are found, the ID or fault is displayed automatically in sequence. If wire mapping remotes are not found, "Open" displays in the LCD screen.

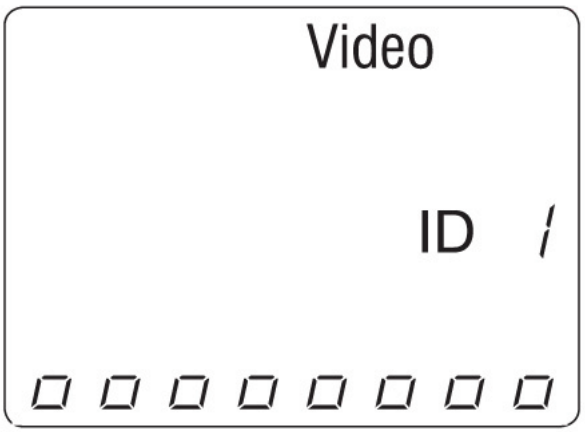


Figure 4-7. Detected coax remote.

4.8 Using Tone Mode

Tone Mode is used to trace cable runs and locate faults by sound.

Selection of this mode emits a cadence from the main tester through the connected cable. The tone is detected by a tone tracer probe (sold separately—contact Black Box Technical Support at 724-746-5500 or info@blackbox.com for details).

NOTE: It may be impossible to differentiate between the tone generated from the test pair and the sound emitted by neighboring wiring pairs within the cable.

1. Connect one end of the cable to the main tester. The remote tester is not used.
2. With the unit turned OFF, press and hold down the LENGTH/TONE button for two seconds to enter Tone Mode.
3. To select a tone cadence, press the LENGTH/TONE button repeatedly to step through the four cadence options: HI, LO, Hi-Lo1, and Hi-Lo2. Stop when you reach the option you want. The option you select determines the cadence sent from the main tester, through the cable, and picked up by the tone tracer probe.

NOTE: If you do not adjust the cadence, the main tester will default to the last selected cadence.

4. Press the appropriate cable type button (voice, video, or data) to select a cable for the tone signal.
5. Press the cable type button again to select different combinations of pins to carry the tone signal. Each press of the cable type button steps you through the cable's wire pairs. The selected pin pair appears in the Wire Map. Figure 4-8 shows pin pairs 1 and 2 selected for testing a data cable.

The following appears in the LCD display screen:

- The cable type icon appears at the top of the screen.
- The "Tone" icon displays in the upper right corner of the screen.
- Three progression bars appear above pins 7 and 8 demonstrating you are in active Tone Mode.

- The selected pin pairs appear in the wire map of the display screen.

Figure 4-8. Tone mode with data cable selected and Hi-Lo1 cadence.

NOTE: For tracing video cables, you must choose a tone path to transmit the cadence (pin (P), shield (S), or both (PS)). Continuous presses of the VIDEO MODE buttons steps through the tone path options. Figure 4-9 shows "P" selection in Video Mode.

Figure 4-9. Video cable test with Pin selected.

6. Use the tone probe (not included) to locate faults and track wire runs behind walls, floors, and ceilings.

4.9 Using Length Mode

Length Mode is used to measure the length of entire cables and their pin pairs and allows you to view and adjust the length constant value for video, data, and voice cables.

4.9.1 Measure Cable Length

The SOHO Plus Tester measures the entire length of a cable as well as the length of individual wire pairs.

NOTE: Using coax or data remotes while measuring length will add one to two feet to the length reading due to internal stray capacitance. If a cable's capacitance is too large, dashes will display for the length.

1. Make sure the SOHO Plus Tester is turned OFF.
2. Insert the cable plug into the corresponding receiver on the main tester (RJ-11 jack for voice cables, RJ-45 jack for data cables, F-Connector for video cables).
3. Press the LENGTH/TONE button to enter Length Mode. The following icons appear in the display screen (see Figure 4-10).

- An "L" icon appears in the right side of the screen.
- Cable length in units of feet or meters displays in the bottom of the screen.
- The connector type last selected (voice, data, or video) displays in the top of the screen.
- An "o" symbol bounces in the lower left corner of the screen to indicate activity.

NOTE: Measuring cable length is the primary function of the LENGTH/TONE button. If you hold down the button too long, you will enter Tone Mode. If you mistakenly enter Tone Mode, simply press the O/ID button and select the LENGTH/TONE button again to enter Length Mode.

Figure 4-10. Length mode.

4. Change measurement units. The units can be changed from feet to meters and back again by quickly pressing the VOICE and VIDEO buttons at the same time. When the unit of measurement is set to feet, the "Ft" icon is displayed in the lower right corner of the screen. When meters are selected, the unit of measurement is not displayed.
5. Verify that the connector type appearing in the display screen matches the connected cable. If it does not match, press the cable type button corresponding to the cable you plan to measure (voice, video, or data).

NOTE: If you do not select the cable type button mode matching the connected cable, the tester will try to measure the previously tested cable and may skew the measured length results.

6. Measure Entire Cable: After selecting the cable type button for the connected cable, the measured length reading shown in the display screen is representative of the entire cable.

NOTE: Voice and Video length modes automatically select and display the length of the first pin pair without a fault. For cables with no faults, the length of pair 1-2 for Data Mode and pair 3-4 for Voice Mode will automatically appear in the display screen.

The Tester Pin # field is blank when the length reading for the entire cable is displayed. Refer to Step 7 below for instructions on stepping through the wire pairs. Refer to Section 3.1, LCD Display Screen for a description of the Tester Pin # field.

7. Measure Pin Pairs: Press the cable type button again to measure the length of the first pin pair. The number(s) for the pair being measured will display in the screen (see Figure 4-11). Subsequent presses of the cable type button will cycle through all the pairs and return to the length reading for the entire cable when you have advanced past the last pin pair. The following icons appear in the display screen:

- The cable type icon appears at the top of the screen.
- Length of pin pairs in units of feet or meters displays in lower right corner of the screen.
- The "L" icon displays indicating you are in Length Mode.
- A bouncing ball activity indicator appears in the lower left corner.

NOTE: If the selected cable pair is shorted, "SHORT" will display for the shorted pair and the length readout is dashes.

The number of wire pairs depends on the type of cable you are testing. Data cables have 4 wire pairs and voice cables have 3 pairs. If you are testing a video cable, you will receive only one length measurement reading, because a video cable has a single wire pair.

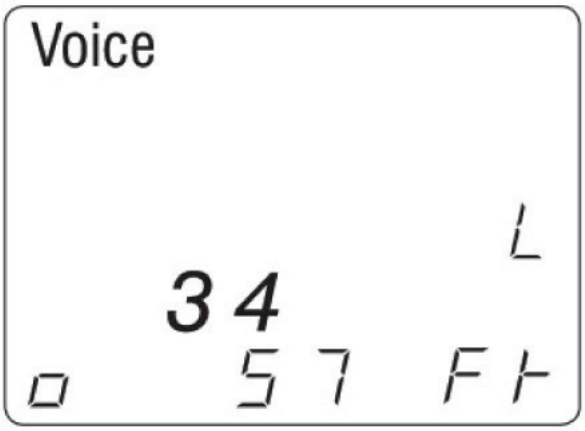


Figure 4-11. Length of pin pairs 3 and 4.

8. Interpret display results and trouble-shoot potential cable faults.

4.9.2 View the Length Constant

1. While in Length Mode, press the LENGTH/TONE button again to view the length constant. The following occurs in the display screen (see Figure 4-12):

- The "L" icon changes to "C" indicating the length constant is being displayed.
- The connector type (voice, data, or video) appears in the top of the screen.
- The length constant, measured in picofarads, displays in the bottom of the screen.

NOTE: Each press of the LENGTH/TONE button toggles between displaying the measured cable length and the length constant. After a few seconds the display screen defaults back to the measured length.

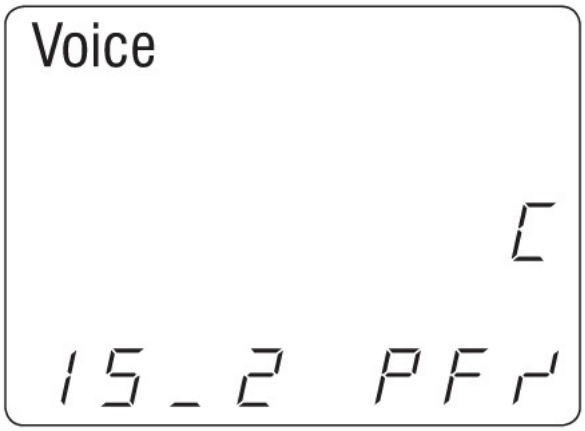


Figure 4-12. Viewing length constant.

4.9.3 Adjust the Length Constant Value

The SOHO Plus Tester has default length constant values for voice, video, and data cables. These values, shown in Table 4-2, are common length constants that apply to these cable types. You can adjust the length constant value according to the specifications of the cable you are testing.

NOTE: Bypass this section if the default values stored in the tester's memory satisfy the length constant values for the cables you are measuring.

Table 4-2. Default Length Constant Values.

Cable Type	Length Constant (picofarads per foot)
Voice	17 pF/ft.
Data	15 pF/ft.
Video	15 pF/ft.

NOTE: The length constant value last set for each connector type (voice, video, or data) is stored in the unit's memory. If you have not adjusted the length constant value for any or all cable types, the default values will be stored. The length constant can be adjusted at any time.

1. When in Length Mode, press and hold the LENGTH/TONE button until "EDIT CAP" appears in the bottom of the display screen. The following updates occur in the display screen (see Figure 4-13):

- The selected connector type (voice, data, or video) appears in the top of the screen.
- An "E" will display in the right side of the screen to indicate you are in Edit Mode.
- The display screen toggles between the current length reading and the length constant value.

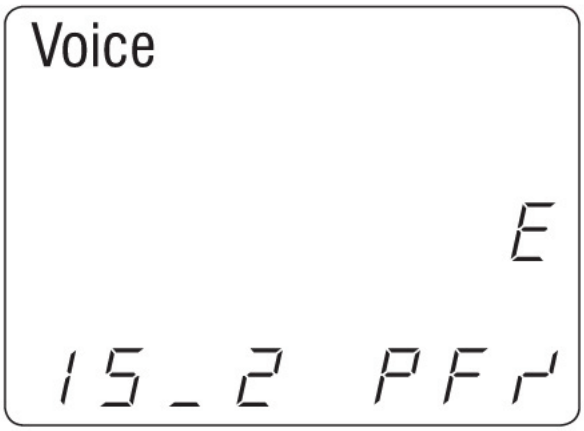


Figure 4-13. Edit mode.

2. Adjust the Length Constant value for the cable you are testing. In Edit Mode, the VOICE and VIDEO Mode buttons function as Up and Down (blue arrows are denoted on the buttons). You can use these buttons to adjust the length constant over a range of 10 to 40 picofarads per foot in 0.1pF/ft increments.

NOTES:

While editing, the display screen toggles back and forth between the length constant value and the measured cable length. You can edit the length constant value when the length constant is displayed. Continuously pressing the UP or DOWN buttons keeps the length constant on the display screen. Toggling begins when a few seconds have lapsed after the last button press.

You can also edit the length constant value while the measured length is displayed in the screen. This is helpful when you know the length of the cable. Press the UP/DOWN buttons while length is displayed in the screen. Continue to adjust the length constant until the reading matches the known cable length. The length constant is being updated as the length display is changing.

3. Select the LENGTH/TONE button again to measure the connected cable under the parameters of the new length constant.

NOTES: If the cable's capacitance is too large, dashes will display for the length.

Changing the connector type or exiting Length Mode will store the adjusted length constant in the unit's memory for the next test. Up to three length constants can be stored, one of each connector type.

4.9.4 Length Constant Accuracy

The length constant refers to the electrical parameter used to measure length, in this case, the capacitance of the cable per foot or meter. Accuracy depends on how close the instrument can be set to the cable constant for the cable being measured.

The length constant can vary from cable to cable of the same type produced by the same manufacturer. It can also vary over the length of one cable, because the length constant depends on the physical properties of the cable, which may not be consistent throughout the entire cable. The change in wire pair spacing through the cable can vary the length constant along the length of the cable.

5. Maintenance

5.1 Battery Replacement

1. Remove the single screw, located in the middle of the back of the SOHO Plus Tester, with a #1 Philips head screwdriver.
2. Take out the old battery and disconnect the battery cable.
3. Replace the old battery with an ANSI 1604A, 9-volt alkaline battery (Energizer 522, Duracell MN1604). Reattach the cable to the new battery and place the new battery into the battery compartment.
4. Replace the battery door and turn the screw into place to secure the battery door.

CAUTION: Do not over tighten the battery door. Doing so can damage the test unit.

5.2 Cleaning

Use a damp, clean cloth to clean the tester.

NOTES:

1. Disconnect all cables from the SOHO Plus Tester before cleaning. Failing to do so can damage the unit and result in personal injury.

2. Do not use abrasive, harsh cleaners or solvents to clean the SOHO Plus Tester.

5.3 Storage

When the SOHO Plus Tester is not in use, store it in a dry, protective case. The battery should be removed if the tester is stored for a long period of time.

Do not expose the SOHO Plus Tester to high temperatures or humidity. When stored in temperatures exceeding the limits listed in Chapter 1, Specifications, allow the SOHO Plus Tester to return to the normal, recommended operating conditions before using it.

6. Troubleshooting

6.1 Contacting Black Box

If you determine that your SOHO Plus Tester is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

6.2 Shipping and Packaging

If you need to transport or ship your SOHO Plus Tester:

- Package it carefully. We recommend that you use the original container.
- If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.

Appendix: Cable Wiring and Display Screen

A.1 Properly Wired T568A Data Cable

T568B is electrically identical to T568A, but swaps the green and orange pairs. Either standard will work as long as the same standard is used at both ends of a run or patch cable. Missing standards A and B creates a crossover cable. If there is a cross-over, the "X-over" icon will display and mismatched pins will flash in the wire map.

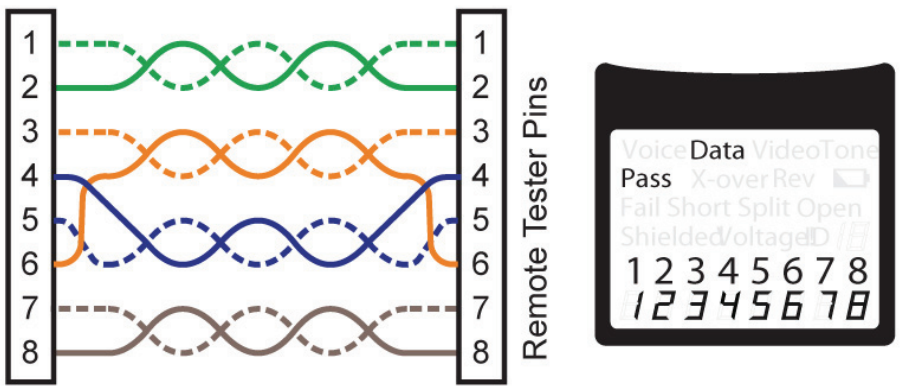


Figure A-1. Properly wired T568A cable wiring and display screen.

A.2 T568A Data Cable with Split Pairs

A common error in building a cable is to put all the wires in pin sequence: 1-2, 3-4, 5-6, 7-8. This will produce correct continuity, but the pairs are designated to be on pins 3-6 and 4-5 in the middle of the connector for compatibility purposes. As the designated wire pairs are not matched according to wiring standards, the "Split" error will appear. The mismatched pins will flash in the wire map of the LCD screen.

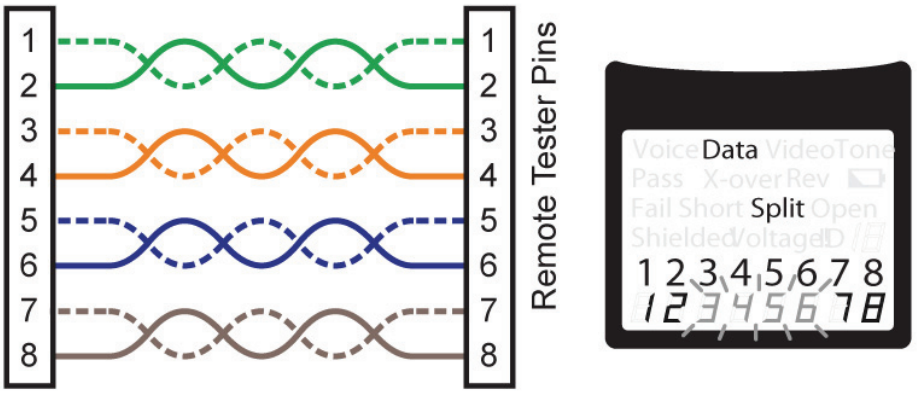


Figure A-2. T568A data cable with split pairs.

A.3 T568A Cable with a Short and an Open

The 1-2 pair pins are shorted together and the 7-8 pair is open. The pins with the errors are flashing. Dash lines (-) on the bottom (remote) display line indicate the short, while no numbers on the bottom line indicates the open pair.

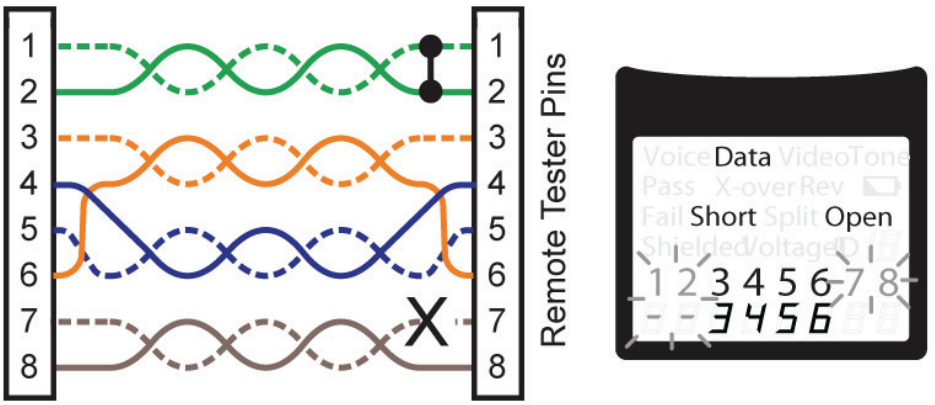


Figure A-3. T568A cable with a short and an open.

A.4 T568A Cable with a Miswire and Unrecognized Continuity

Pins 1 and 2 pins on the main tester are connected to Pins 2 and 1 at the remote-end. The pins with this error are flashing. The "U" for the remote pin numbers indicates an unrecognizable continuity was detected that is neither a short or open. An ID remote connected to the Tester when in cable test mode would also have shown this error.

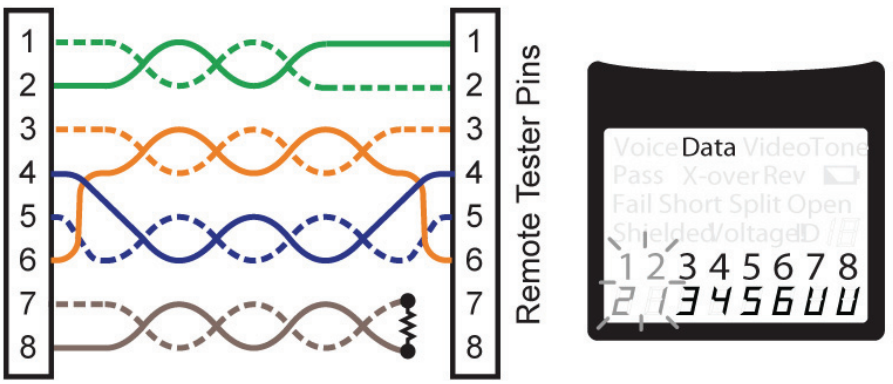


Figure A-4. T568A cable with a miswire and unrecognized continuity.

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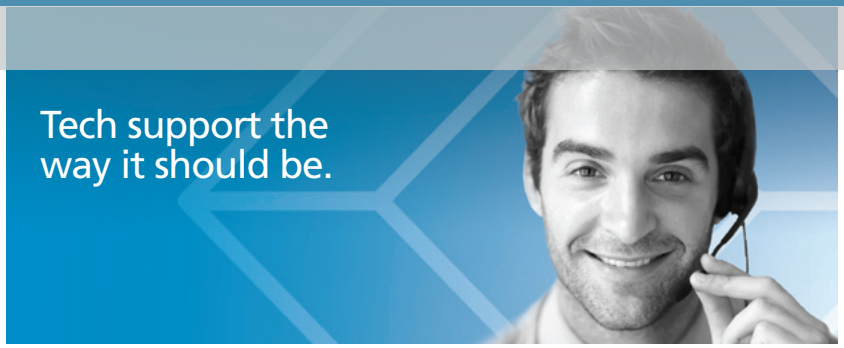

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SOHOTEST, version 1