



WireScope 350 User's Guide



Agilent Technologies

Innovating the HP Way

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Contents

CHAPTER 1	9
INTRODUCTION	9
Introduction	9
System Requirements	9
Items Supplied	9
Optional Accessories	9
Software Upgrades	10
Standard Warranty	10
Technical Support	10
<i>Before you call</i>	10
<i>Viewing software and hardware version information</i>	11
CHAPTER 2	13
CABLE TESTING OVERVIEW	13
Purpose	13
Two-ended certification testing	13
Test configurations	14
<i>Link configuration</i>	14
<i>Channel configuration</i>	14
Cabling certification standards	15
CHAPTER 3	17
WIRESCOPE OVERVIEW	17
WireScope 350 hardware	17
<i>Color touch screen user interface</i>	17
<i>CompactFlash™ memory card slot</i>	17
<i>Digital fault finding</i>	18
Ports	18
<i>SmartProbe test port</i>	18
<i>Serial port</i>	18
<i>USB ports</i>	18
<i>Talkset jack</i>	18
<i>Charger port</i>	18
WireScope 350 user interface overview	19
<i>Basic screen layout</i>	19
<i>Keys</i>	20
<i>On-screen buttons</i>	20
<i>Data entry options</i>	21
<i>On-line Help</i>	22
CHAPTER 4	23
PREPARING TO RUN AN AUTOTEST	23
Remote Calibration	23
Test Probes	24
<i>SmartProbe Port Interface</i>	24
<i>WireScope probe configuration warnings</i>	24
Quick Start Guide	25
Autotest Settings	26
<i>Editing Autotest Settings</i>	26
<i>Setting cabling limits</i>	27
<i>Network certification</i>	28
<i>Site settings</i>	29
<i>Specifying the cable</i>	31

Contents

<i>Specifying the connecting hardware</i>	32
<i>Setting the pairing convention</i>	34
<i>Setting measurement options</i>	34
<i>Setting the maximum frequency</i>	37
<i>Plot storage setting</i>	37
<i>Storage Setup setting</i>	38
<i>Operators setting</i>	38
Using test probes	39
<i>Understanding SmartProbe test port features</i>	39
<i>Caring for the SmartProbe test port</i>	39
<i>Viewing probe information</i>	40
<i>Autotest settings profiles</i>	40
<i>Autotest setup in one step</i>	43
CHAPTER 5	45
RUNNING AN AUTOTEST	45
Starting the autotest	45
The autotest result summary screen.....	46
Saving test results.....	48
<i>Using the typewriter-style keyboard</i>	48
<i>Using the keypad</i>	48
<i>Using the list</i>	49
<i>Using auto-increment</i>	49
Starting the next autotest	50
Viewing result details	51
<i>Summary data</i>	52
<i>Frequency plots</i>	53
<i>Locating faults</i>	55
Viewing result details on the DualRemote 350	56
<i>Pair status indicators</i>	56
<i>Warning indicators</i>	56
<i>Progress indicator</i>	57
<i>Pass / Fail</i>	57
<i>Diagnostics</i>	58
<i>Power LED</i>	58
CHAPTER 6	59
CERTIFY NETWORKS	59
<i>Purpose</i>	59
<i>Operation</i>	59
<i>Certify networks results</i>	61
CHAPTER 7	63
TOOLS	63
<i>Introduction</i>	63
<i>Tools</i>	63
Quick Check	64
<i>Purpose</i>	64
<i>Operation</i>	64
<i>Results</i>	64
Blink Hub Port.....	65
<i>Purpose</i>	65
<i>Operation</i>	65
<i>Results</i>	65
Learn NVP.....	66

Contents

<i>Purpose</i>	66
<i>Operation</i>	66
<i>Results</i>	66
Measure Length	67
<i>Purpose</i>	67
<i>Operation</i>	67
<i>Results</i>	67
CHAPTER 8	69
RUNNING COAX AND TWINAX AUTOTESTS	69
Coax Testing	69
<i>Coax Setup</i>	69
<i>Operation</i>	69
<i>Results</i>	70
Twinax Testing	71
<i>Twinax Setup</i>	71
<i>Operation</i>	71
<i>Results</i>	72
CHAPTER 9	73
FIBER CABLE TESTING OVERVIEW	73
Introduction	73
Getting Started	73
CHAPTER 10	75
PREPARING TO RUN A FIBER AUTOTEST	75
Attach FiberProbes	75
<i>Viewing probe information</i>	75
Fiber Calibration	76
Fiber Autotest Settings	79
<i>Editing fiber autotest settings</i>	79
<i>Fiber Test Configuration Setup</i>	80
<i>Loss Limit</i>	81
<i>Length Limit</i>	82
<i>Network Certification</i>	83
<i>Site Settings</i>	83
<i>Specifying the fiber cable</i>	86
<i>Modal Bandwidth setting</i>	87
<i>Specifying the connecting hardware</i>	88
<i>Save to: Storage Location setting</i>	89
<i>Operators setting</i>	90
CHAPTER 11	91
RUNNING A FIBER AUTOTEST	91
Starting the Fiber Autotest	91
<i>Running a single ended fiber autotest</i>	92
<i>Running a double ended fiber autotest</i>	93
<i>DualRemote LED indicators during Double Ended Autotest</i>	94
The Fiber Autotest Result Summary Screen	95
Saving test results	96
Using auto-increment	96
Starting the next Autotest	96
Viewing result details	97
CHAPTER 12	99

Contents

FIBER CERTIFY NETWORKS	99
<i>Purpose</i>	99
<i>Operation</i>	99
<i>Certify networks results</i>	101
CHAPTER 13	103
FIBER TOOLS	103
Introduction	103
Loss Meter	104
<i>Purpose</i>	104
<i>Operation</i>	104
Length and Delay	105
<i>Purpose</i>	105
<i>Operation</i>	105
<i>Quick Setup Overview</i>	105
Power Meter	106
<i>Purpose</i>	106
<i>Operation</i>	106
<i>Power Meter Calibration</i>	107
Fiber Trace Mode	108
<i>Purpose</i>	108
<i>Operation</i>	108
Learn Fiber NVP	108
<i>Purpose</i>	108
<i>Operation</i>	109
CHAPTER 14	111
DATABASE AND MEMORY	111
Overview	111
Size of test result records and memory capacity	111
Viewing memory status	112
Using CompactFlash™ cards	113
Installing WireScope 350 software from a CompactFlash™ card	114
<i>Downloading autotest profiles from a CompactFlash™ card</i>	115
Using the Database viewer	117
<i>Viewing saved tests</i>	117
<i>Options for viewing saved tests</i>	119
<i>Deleting saved tests</i>	121
<i>Viewing reports</i>	122
<i>The site database</i>	124
<i>Creating or editing sites</i>	124
<i>Deleting sites</i>	124
<i>The cable specifications database</i>	125
<i>The connecting hardware database</i>	126
CHAPTER 15	127
WIRESCOPE 350 SYSTEM SETTINGS	127
<i>System information</i>	127
<i>Save to: Storage Location</i>	128
<i>Power</i>	128
<i>Time and date</i>	129
<i>User interface</i>	129
<i>Operators</i>	130
<i>Calibrate touchscreen</i>	131
<i>Serial baud rate</i>	132

Contents

<i>Restore Default Settings</i>	132
<i>Demo mode</i>	133
<i>Length Units</i>	133
<i>Calibration Information</i>	134
<i>Autoprint</i>	134
CHAPTER 16	135
USING THE TALKSET OPTION	135
<i>Operation</i>	135
<i>Controls</i>	135
CHAPTER 17	137
PRINTING CABLE IDENTIFIERS	137
WireScope 350 Printer Setup	137
<i>Saving Cable IDs</i>	138
<i>Printing the Cable ID</i>	138
APPENDIX A	139
SPECIFICATIONS	139
General	139
<i>Size</i>	139
<i>Weight</i>	139
<i>Power</i>	139
<i>Display</i>	139
<i>SmartProbe test port</i>	139
<i>Serial port</i>	140
<i>USB-A port</i>	140
<i>USB-B port</i>	140
<i>Talkset connector (3.6 mm phone jack)</i>	140
<i>CompactFlash™ card slot</i>	140
Measurements	141
<i>Wiremap</i>	141
<i>Length</i>	141
<i>Propagation delay and skew</i>	141
<i>Near end crosstalk (NEXT)</i>	141
<i>Attenuation</i>	142
<i>Return loss</i>	142
<i>Equal level far end crosstalk (ELFEXT)</i>	142
<i>Attenuation to crosstalk ratio (ACR)</i>	142
<i>Power sum NEXT (PSNEXT)</i>	142
<i>Power sum ELFEXT (PSELEXT)</i>	142
<i>Power sum ACR (PSACR)</i>	143
<i>Resistance</i>	143
<i>Ambient noise</i>	143
Environmental	144
<i>Indoor/outdoor</i>	144
<i>Operating temperature range</i>	144
<i>Storage temperature</i>	144
<i>Maximum relative humidity</i>	144
<i>Altitude</i>	144
<i>Mains supply voltage</i>	144
<i>Installation overvoltage</i>	144
<i>Pollution degree</i>	144
Symbols	144
<i>On / Off</i>	144
<i>DC power input</i>	144

Contents

<i>AC adapter tip polarity</i>	144
APPENDIX B	145
MEASUREMENT CALIBRATION	145
Multiple Levels of Calibration	145
Baseline Calibration	145
Remote Calibration.....	145
Environmental Calibration (Internal)	146
Field Verification of Baseline Accuracy	146
<i>Self-Test on a WireScope 350</i>	146
<i>Self-Test on a DualRemote 350</i>	146
APPENDIX C	147
LEGACY NETWORKS	147
APPENDIX D	149
BATTERY INFORMATION	149
Maximizing battery run time	149
Replacing the battery	150
Battery safety.....	151
INDEX	153

Chapter 1

Introduction

Introduction

Thank you for purchasing your WireScope 350!

The WireScope 350 is the most advanced and productive cabling certification tester available. It is designed as a platform to support your cable certification needs for now and well into the future. This User Guide will help you to quickly get up and running with your new WireScope.

System Requirements

The kit you purchased contains everything you need to certify cabling. To certify Category 6 cabling, you may need to purchase a set of SmartProbes that is matched to the brand of connecting hardware you will be using. For a list of available Category 6 SmartProbes, please visit www.wirescope.com

Items Supplied

The WireScope 350 is available as a basic WireScope 350 Complete Analyzer Kit or as a WireScope 350 Professional Test Kit. The items contained in the basic kit are listed below. Professional kits contain additional items and the kit is contained in a hard carry case instead of the nylon carrying case.

Part No.	Qty.	Description
N2600A	1	WireScope 350
N2600A	1	DualRemote 350
N2595A-110 (110V) N2595A-210(220V)	2	12V Charger/AC Adapter
N2584A-003	1	8-pin DIN/DB9 RS-232 Serial Cable
N2604A-100	2	Cat 6 Universal Channel SmartProbes
N2604A-101	2	Cat 6 Universal Link SmartProbes
N2605A-070	1	WireScope 350 User's Guide
N2605A-071	1	ScopeData Pro User's Guide
N2605A-060	1	ScopeData Pro software CDROM
N2605A-070	1	WireScope 350 User's Manual
N2605A-071	1	ScopeData Pro User's Manual
N2605A-092	1	Large Nylon Carrying Case

CAUTION:

Use only the 12V charger/adaptor supplied with your WireScope and DualRemote. Using an incompatible charger/adaptor can damage your WireScope equipment and void your warranty.

Optional Accessories

Refer to the *Read Me First* information packet for accessories you may purchase for your WireScope 350. Also, explore the latest optional accessories described on Agilent Technologies' website, <http://www.wirescope.com>.

Software Upgrades

Software upgrades for the WireScope 350 are available for download from Agilent Technologies' website, <http://www.wirescope.com>. Refer to your *ScopeData Pro User's Guide* for instructions for downloading software to the WireScope 350. The DualRemote 350 uses the identical software contained in the WireScope 350. Any mismatch in software versions is detected during the Remote Calibration procedure (23). The WireScope 350 will guide you through the procedure for downloading software from the WireScope 350 to the DualRemote 350.

Standard Warranty

The standard one year limited warranty against defects in materials and workmanship is contained in the *Read Me First* information packet supplied with your kit. Optional extended warranties for analyzers and accessories are available, as described in the information packet and on Agilent Technologies' website, <http://www.wirescope.com>.

Technical Support

If you have questions or comments about your WireScope 350, contact our Technical Support department:

- Phone (800) 931-0055 or (508) 486-0450
- FAX (508) 486-0650
- Email support@wirescope.com

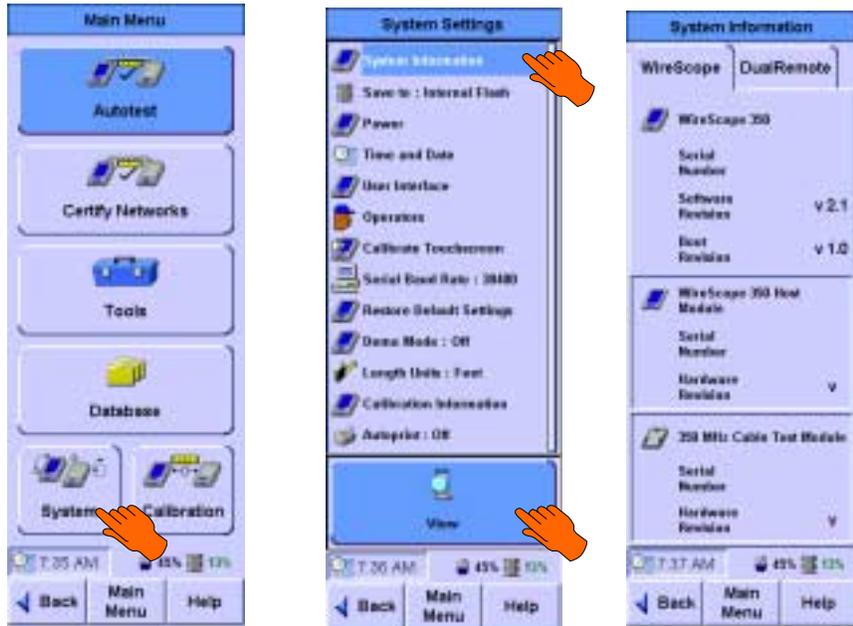
Before you call

When contacting the Technical Support department, please be ready to provide the following information:

- Serial numbers and software version of the WireScope and DualRemote units (see next section)
- Detailed description of the problem, including the exact wording of any error messages.

Viewing software and hardware version information

From the main menu screen, press the **System** button. At the System Settings screen, select the **System Information** entry in the list of settings and press the **View** button.



The System Information screen displays serial numbers and hardware and software version numbers for all of the key subsystems of your WireScope 350 test set.

Both the WireScope 350 and DualRemote 350 consist of a top part, known as a “host module” which contains the user interface and PC interface connections, and a bottom part, known as a “test module”. Each of these has a unique serial number.

To view information for the last used DualRemote 350, press the **DualRemote** tab.

Chapter 2

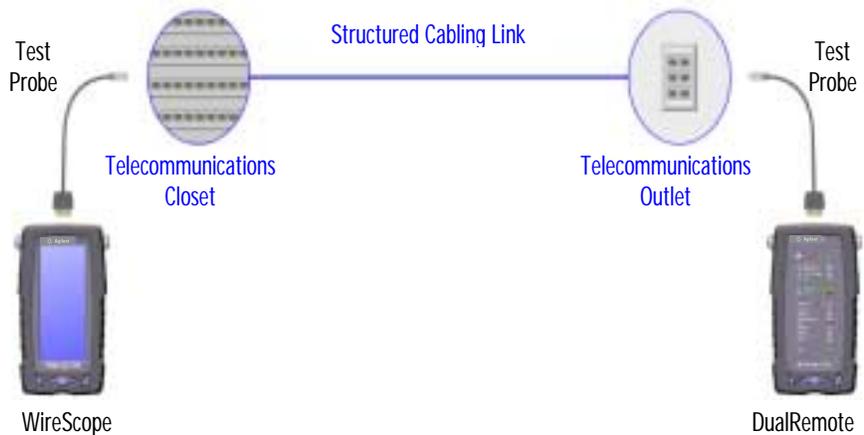
Cable Testing Overview

Purpose

Modern structured cabling systems and components are designed to support a variety of high-speed LAN technology interfaces. In order to ensure that structured cabling systems provide adequate performance to support these application interfaces, cabling standards committees have developed quality control specifications intended to be applied as new cabling is installed.

The purpose of instruments like the WireScope 350 is to provide a convenient and reliable means of certifying new installations for compliance with structured cabling standards.

Two-ended certification testing



Standards for structured twisted pair cabling require that both ends of each cabling run be tested in order to find the worst case performance condition. For this reason, all certification testing requires a two-part test set, consisting of a main unit and a remote unit, each of which contains similar test capabilities. One unit tests the cabling run from the telecommunications closet end and the other tests from the telecommunications outlet end at the user location.

Certification testing is highly automated. An *Autotest* function coordinates a series of measurements between the WireScope and DualRemote devices and then analyzes the resulting data to determine if the cabling run passes or fails the required standards.

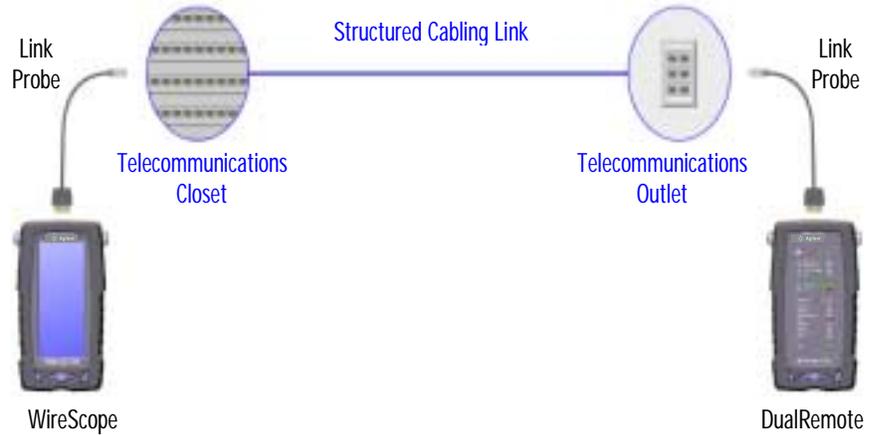
Several key criteria apply in determining pass or fail status for a tested cabling run:

- Whether the user patch cords are included in the cabling run during the test (i.e. “Link” or “Channel” test configuration)
- What standard document and which performance level you want to test the cabling to (i.e. what “Category” or “Class” are you seeking certification for)

Test configurations

There are two commonly used configurations for certifying installed cabling.

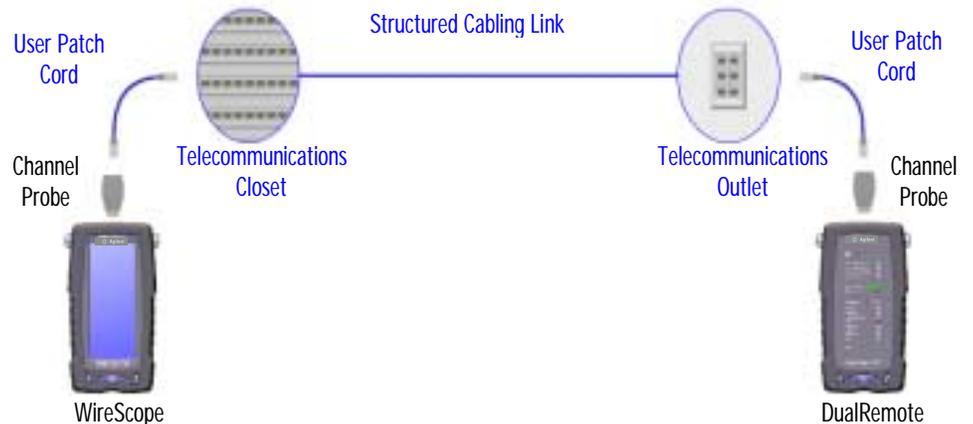
Link configuration



The *Link* configuration is intended for use in facilities still in the construction stage. The link configuration does not include the user patch cords at either end of the cabling run because these cords are often not installed until after the facility is occupied. Because the link configuration does not include the two additional connections which would be added when the patch cords are connected, performance standards are more stringent for cabling tested using the link configuration.

The WireScope and DualRemote attach to the link under test via special link test probes, which are terminated in male modular-8 plugs.

Channel configuration



The *channel* test configuration is intended to provide a comprehensive end-to-end cabling performance certification. The channel configuration does include the user patch cords at both ends of the cabling run. The pass/fail limits applied when testing with the channel configuration are less stringent than for the link configuration in order to account for the performance degradation inherent in the two additional modular connections.

The WireScope and the DualRemote attach to the channel under test via special channel probes, which provide a modular-8 jack interface for connection to the user patch cords.

Cabling certification standards

Although tremendous progress has been made to date in the area of structured cabling specifications, standards development is a continuous process driven by technology innovations and market forces. As a consequence, there has been and will continue to be an ongoing evolution in the certification requirements specified for commercial cabling projects.

At present, the structured cabling industry is in the process of making the transition from Category 5 to Category 6 products and standards. This transition will continue for some time as product innovation continues and as standards documents continue to evolve.

For the most up to date discussion of structured cabling standards, please visit www.wirescope.com/standards.

Chapter 3

WireScope Overview

WireScope 350 hardware

The WireScope 350 is packaged in a rugged enclosure designed to withstand the challenges present in a construction environment. A tough “skeleton” with an over-molded bumper protects against damage during drops or accidental knocks.



Color touch screen user interface

A bright color touch screen simplifies navigation through menus and improves comprehension of test data, resulting in faster operation and reduced training times.

CompactFlash™ memory card slot

The WireScope 350 stores test result data, including plot data, on removable CompactFlash™ memory cards. This approach allows for unlimited expansion of memory capacity and transferal of test data without taking the WireScope 350 out of service. Readily available CompactFlash™ card readers and adapters allow data to be uploaded directly to either laptop or desktop PCs.

Ports

Digital fault finding

Powerful digital fault finding algorithms automatically pinpoint cable fault locations and causes, speeding problem resolution and increasing operator productivity.



SmartProbe test port

The SmartProbe port provides a high performance interface to the full range of compatible SmartProbes. This port enables the WireScope 350 to automatically determine what type of probe is attached, select appropriate screens and modes, and warn you of any configuration conflicts.

Serial port

The RS-232 8-pin DIN serial port provides one alternative interface for communication with a PC for software upgrades or data transfer. An 8-pin DIN to DB-9 cable is included.

USB ports

The WireScope 350 incorporates a universal serial bus (USB) interface to provide PC and peripheral communication at up to 100 times the speed of a conventional serial port. The DualRemote 350 incorporates a USB slave port.

Talkset jack

Both the WireScope 350 and DualRemote 350 incorporate talkset jacks to improve coordination within testing teams. Plug and play operation allows operators to communicate over the tested cabling between Autotests.

Charger port

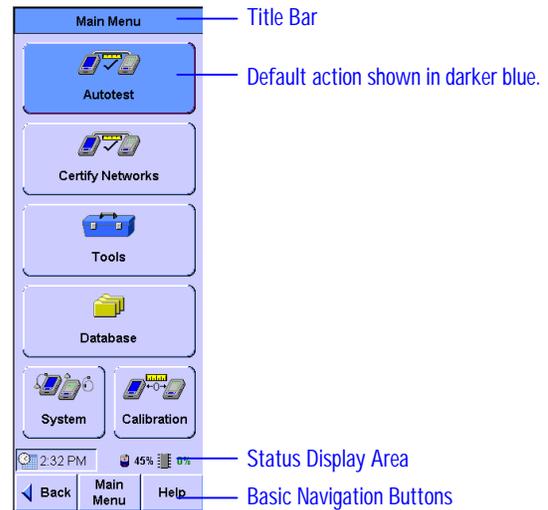
An external charger port allows charging of the long life NiMH battery pack.

WireScope 350 user interface overview

The WireScope 350 is designed for ease of use. The bright color touch screen allows for a clear and logical layout of functions at each stage in the cable certification cycle.

Basic screen layout

Several common screen elements are used throughout the WireScope 350 user interface.



The title bar identifies each screen.

The status display area shows the current time set on the WireScope 350, talkset status, battery status, and storage status.

-  The talkset icon appears when the talkset is plugged in.

The power status icon shows the current battery state. The percentage figure shows the amount of charge remaining in the battery.

-  = Plugged into AC adapter. Battery charging.
-  = Fully charged battery
-  = Battery is half empty
-  = Battery is empty

The storage icon indicates where test results will be saved and how full the memory is.

-  0% = Results saved to compact flash card.
-  0% = Results saved to internal memory.

Keys

You control the WireScope 350 using a combination of mechanical keys and on-screen buttons.



The **Power Key** turns the unit on. If the unit is already on, quickly pressing the power key brings up the sleep/shut-down dialog box. The unit will go to sleep in 5 seconds unless you cancel this option.

When the unit is asleep, touching the screen or keys wakes it up to the state it was in before it went to sleep.

Pressing and holding the power key for over one and a half seconds shuts down the unit.



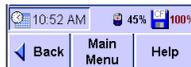
Pressing the **OK Key** is equivalent to pressing the on-screen button shown in dark blue . The dark blue color indicates the default action for any screen.



The **Up/Down Key** scrolls screens which contain long lists.

On-screen buttons

The following basic navigation buttons are present at the bottom of most screens:



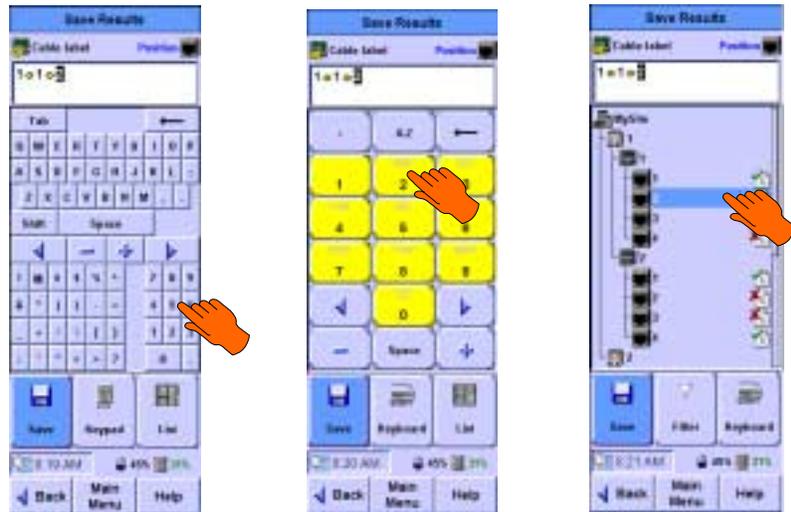
- **Back** goes back to the previous screen.
- **Main Menu** returns to the main menu from any screen.
- **Help** launches the help viewer.



Data entry options

In many places within the WireScope 350 user interface, you may need to enter numbers or text. The text entry icon denotes fields that you can enter text into. The WireScope 350 provides up to three alternative ways to enter text:

- Using a typewriter-style keyboard
- Using a telephone-style keypad
- Picking from a list of entries



When using the telephone-style keypad, you can enter text by first pressing the **A-Z** key.

If you have difficulty Pressing the correct key when using the typewriter-style keyboard, try using the provided stylus.

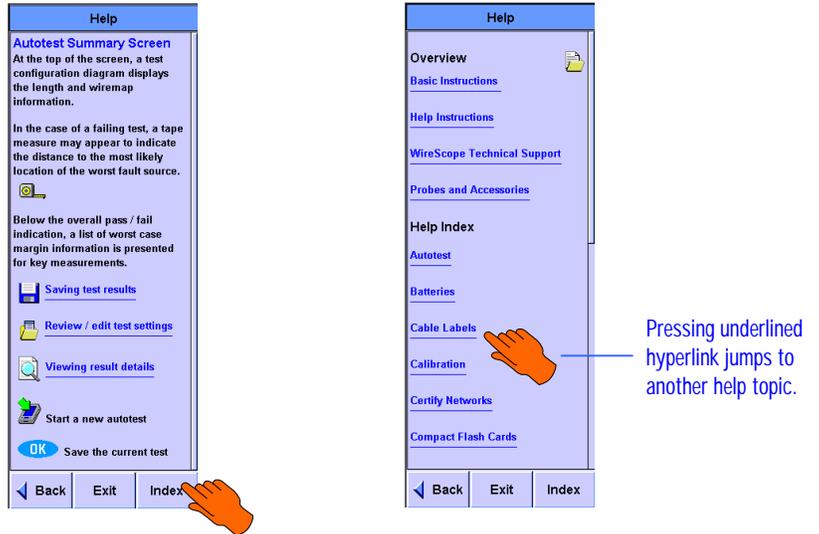


The increment and decrement keys provide a quick way to change the value of any cable label field with a single keystroke.

On-line Help



An extensive on-line help system is available on the WireScope 350. To access help for any screen, press the **Help** button.



When you press the help key, you launch the help window, which describes the current screen. Help screens may contain text, graphics and hyperlinks to further information. While in the help window, the following buttons are available at the bottom of the screen:

- **Back** returns to the previous screen
- **Exit** closes the help viewer.
- **Index** jumps to the help index window.

Chapter 4

Preparing to Run an Autotest

The Autotest is the function users run most frequently. The Autotest function is designed to provide certification testing of installed cabling.

Before you run the Autotest, however, it is important to verify that you have properly prepared the WireScope 350 for your certification project.

Remote Calibration

Before you begin testing, it is necessary to calibrate the WireScope and DualRemote pair that you will use. Remote calibration is a process that allows the WireScope to compensate for any slight anomalies in its measurement hardware or that of the companion DualRemote unit.

Connect the WireScope 350 and DualRemote 350 per either of the configurations below.



If you are testing link configurations to Category 6 / Class E or higher, Agilent Technologies recommends that you use the precision calibration cable, as this produces the most accurate calibration.

From the main menu screen, press **Calibration**. Follow the instructions to complete the calibration process.

Test Probes



SmartProbe Port Interface

The WireScope 350 uses test probes to connect to the cabling runs that it certifies. All WireScope 350 test probes attach through the SmartProbe port at the top of the WireScope and DualRemote enclosures. The SmartProbe port provides high performance for test signal transmission, power to support active probes, and a two-way control interface between the tester and the test probe. A variety of test probes are available, including SmartProbes that track usage and configuration data.

WireScope probe configuration warnings

Because it is important to use the correct test probes in order to achieve optimal measurement results, particularly for category 6 installations, the WireScope 350 warns you whenever it detects a potential conflict between the detected probe and any of the test settings. This you to avoid wasting time testing with the wrong probes or with the wrong tester settings.

If the WireScope detects an over-voltage condition at the SmartProbe port, it displays an error message. An example of this warning is provided below:



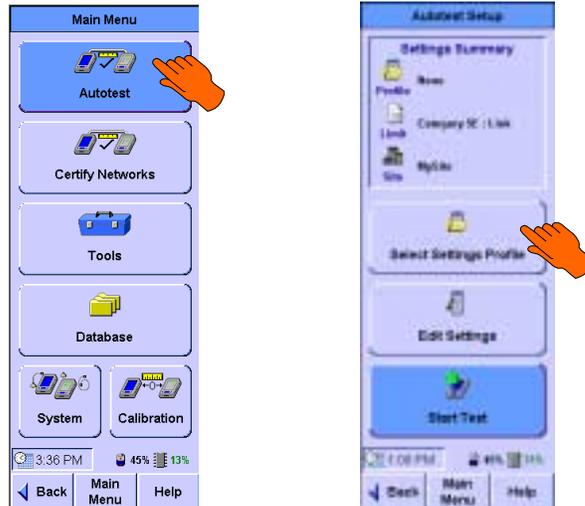
An example of the over-voltage warning given on the DualRemote 350 is shown on page 57.

CAUTION:

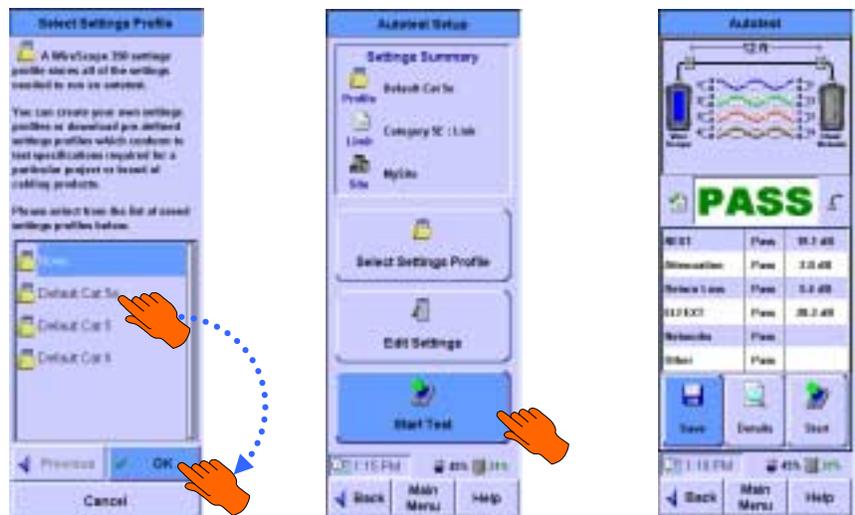
Do not connect WireScope test probes or test cables to a voltage source, such as a telephone jack. Excessive voltages can damage WireScope probes and/or the WireScope 350 analyzer and void your warranty.

Quick Start Guide

You can use the WireScope 350 with minimal settings. To do this for link or channel tests, insert the required Basic Link or Channel Adapters as required in both the WireScope 350 and DualRemote 350. Then, turn both units on and calibrate as previously directed. Starting at the Main Menu, press **Autotest**. This brings up the Autotest Setup screen.



Press **Select Settings Profile**. The Select Settings Profile screen is displayed, enabling you select a stored profile. For our example, select Default Cat 5e. Click **OK** to return to the Autotest Setup screen. Connect the WireScope 350 and the DualRemote 350 to the cable to be tested. Then click **Start** to begin the test. The Autotest result summary screen is displayed. At this point you can **Save** the test data, review **Details** of the test, or **Start** a new test by pressing the named button on the screen as described starting on page 46.

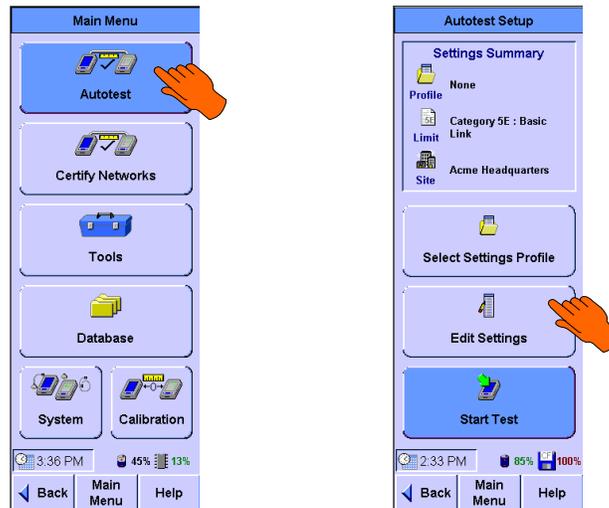


Autotest Settings

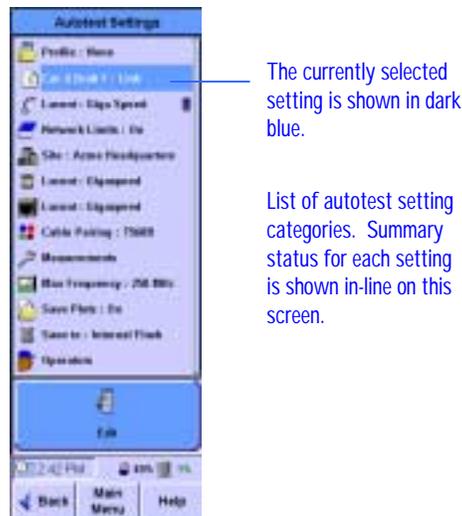
The WireScope 350 Autotest is designed to be very flexible to support the wide range of cabling certification requirements that you may encounter in the field. Before you start testing, it is important to verify that Autotest settings match your certification requirements.

Editing Autotest Settings

To edit autotest settings, start at the main menu screen. Press **Autotest**. This brings up the Autotest Setup screen. The Autotest Setup screen summarizes a few key settings. You can either start an autotest from this screen or edit settings.



To view and edit any autotest settings, from the Autotest Setup screen, press **Edit Settings**. The Autotest Settings screen will open up.



The Autotest Settings screen lists all of the current autotest setting categories and summary status for each. To view or edit any setting, first select it either by touching it or by moving the dark blue highlighting using the **⬅** key. Selection is indicated by a darker blue color highlight.

Press **OK** or the **Edit** button to open the configuration screen(s) for the selected setting. Once you have opened the configuration screen(s) for any setting, there will be instructions to guide you through any changes to that setting. When you exit the configuration screen(s) for any setting, you will return to the Autotest Settings screen.

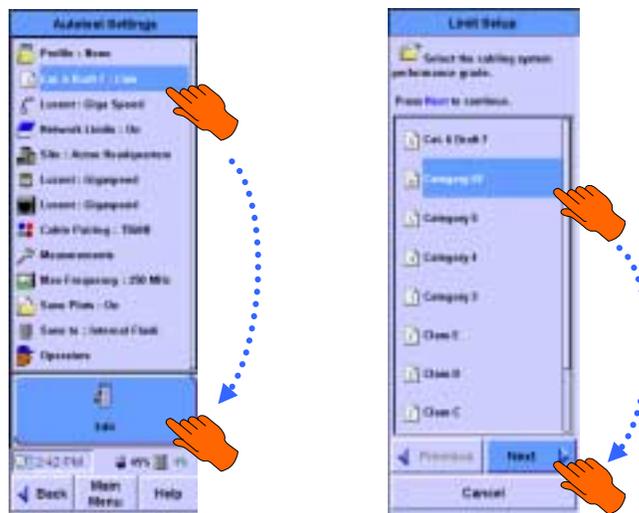
NOTE:

Select (or create new) an autotest profile as directed on page 40. Standard profiles for Cat 5, Cat 5e, and Cat 6 are pre-defined in WireScope software.



Setting cabling limits

Perhaps the most important setting is the cabling performance limit to apply during pass/fail certification of autotest results. To edit the cabling limit setting, select it from the list of autotest settings and press **OK** or the **Edit** button to open the cabling limit configuration screens.



The Limit Setup configuration screens step you through the process. The first step is selecting the category, class or custom limit. Press **OK** or **Next** to continue.



The second step is selecting the test configuration (such as Link or Channel), since each test configuration requires a slightly different set of limits to account for the number of connections included. Press **OK** or **OK** to finish making the limit setting and return to the Autotest Settings screen.

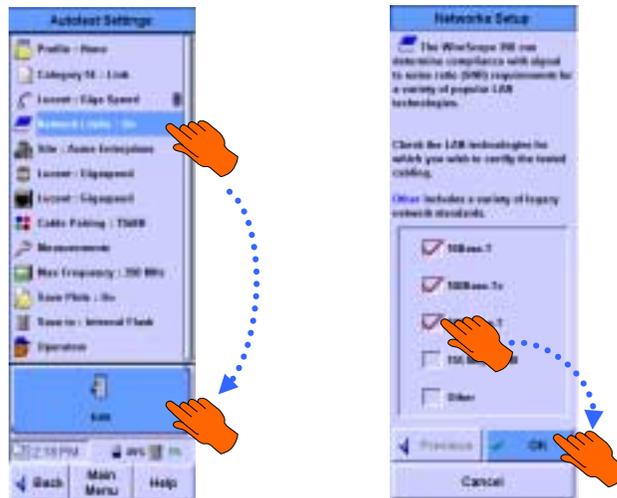


Network certification

The WireScope 350 can certify cabling for compliance with the physical medium dependent (PMD) requirements of popular network interface technologies such as Ethernet or ATM. Network certification can be in addition to certification to cabling limits.

A pass result for a particular network technology (i.e. 100 Mbps Ethernet) indicates that the tested cable run meets the signal to noise ratio (SNR) requirements necessary to successfully support communications between devices of that type.

To add network certification into the autotest, select it from the list of autotest settings and press **OK** or the **Edit** button to open the Networks Setup configuration screens.



Check the boxes corresponding to the network types you wish to certify the cabling for. The “other” Category encompasses a number of less popular legacy applications. When you are finished, press **OK** or **OK** to return to the Autotest Settings screen.

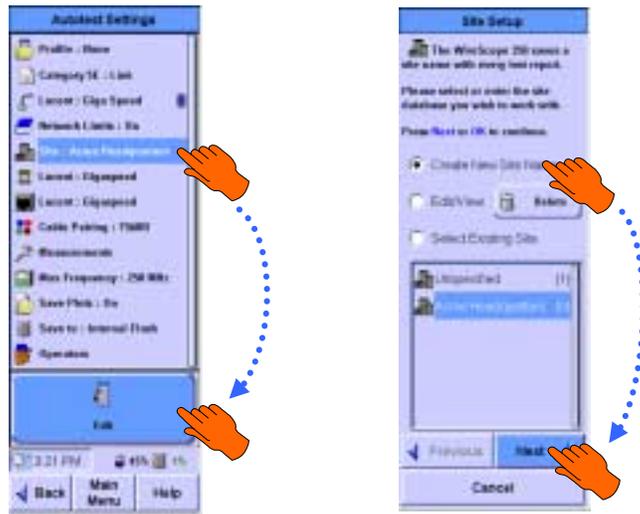


Site settings

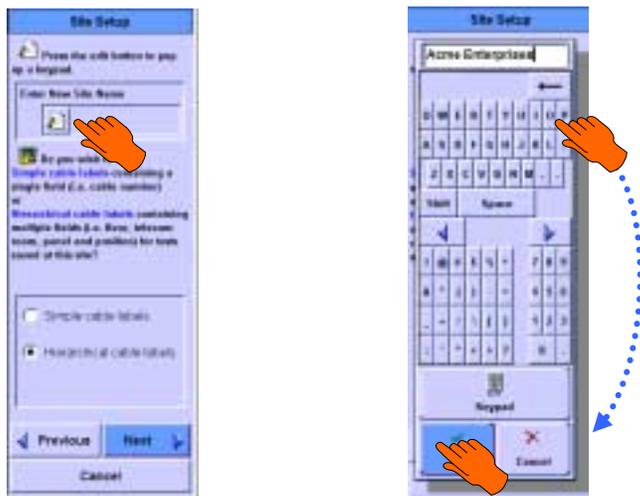
The WireScope 350 can store the site name in each test result record. This capability helps organize test records and simplifies reporting. A characteristic of the site setting is the format used to label test records from that site. You can save either:

- A simple cable label with only one field (i.e. “cable number”)
- A hierarchical cable label that contains multiple fields (i.e. “building / floor / telecom room / panel / port number)

Select the site icon and press **OK** or the **Edit** button to enter or change the site settings. You can either select an existing site name if you have one already loaded, or enter a new site name.

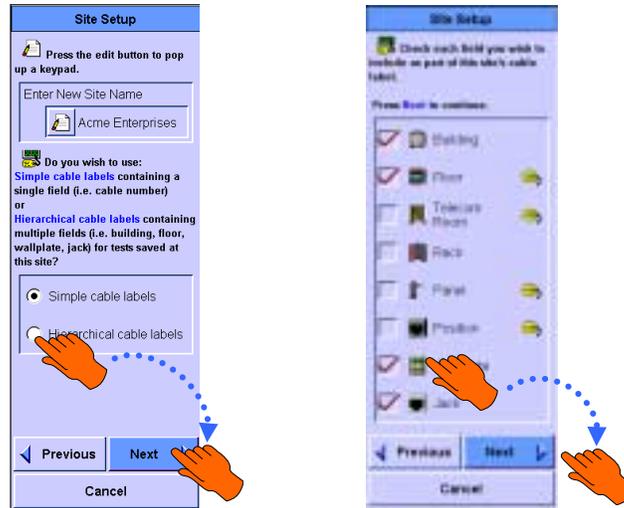


First, enter a site name. Press the edit icon to pop up a data entry keypad. Enter the site name either using the telephone-style keypad or the typewriter-style keyboard. Then press OK.



Setting up hierarchical cable labels

By default, the WireScope 350 is set to use simple cable labels composed of just a single field. This is the format that most previous generation cable testers used. Many customers, however, prefer to save cable labels in a hierarchical format.

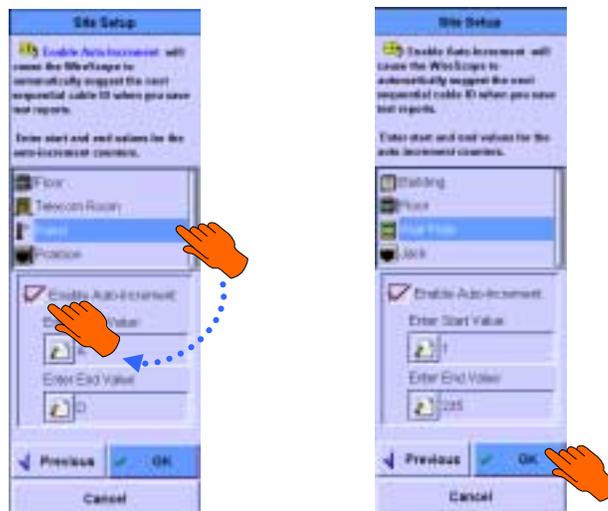


To configure the WireScope 350 to use hierarchical cable labels, set the corresponding radio button on the Site setup screen. Press **OK** or **Next** to continue site setup.

Select which fields to include in the hierarchical cable label. Press **OK** or **Next** to continue on to auto-increment settings within site setup.

Setting up cable label auto-increment behavior

For either simple or hierarchical cable labels, it is useful to set up an auto-increment scheme so that you do not have to manually enter repetitive cable label information when testing a sequence of cabling runs.



Select a cable label field for which you wish to enable auto-increment and check the “enable auto-increment” box. Enter a start and end value. Repeat for each field you wish to auto-increment. Press **OK** or **OK** to return to the Autotest Settings screen.

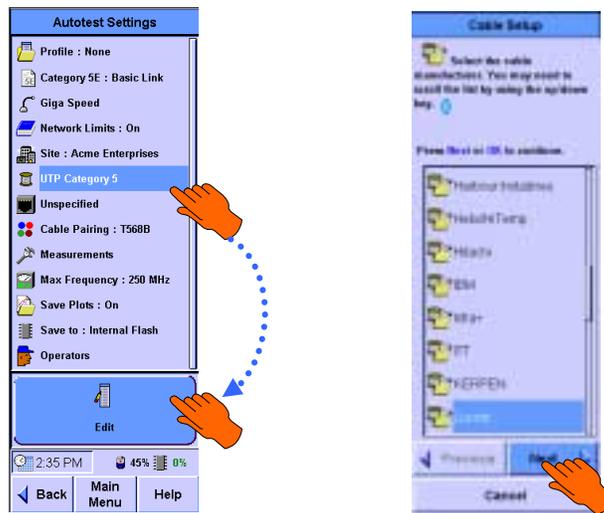


Specifying the cable

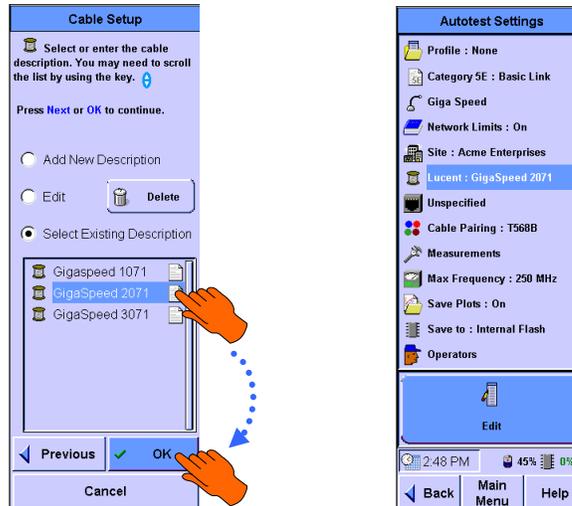
You must specify either the part number or the performance characteristics of the cable under test in order for the WireScope 350 to make accurate length measurements. You can either select the cable part number from a pre-loaded list of the most popular cable types or you can enter the cable part number and specifications.

If you manually enter cable specifications, it is important to input accurate values for the nominal velocity of propagation (NVP) for each cable pair. Failure to do so will produce inaccurate cable length and distance-to-fault measurements.

To enter cable information starting at the Autotest Settings screen, select the cable icon and press **OK** or **Edit**.



The Cable Setup configuration screen prompts you to specify the manufacturer of the cable that you will be testing. If you do not know the manufacturer, select “unspecified”. Use the **OK** key if you need to scroll the list of manufacturers. In the example above, “Lucent” is selected. Then, press **OK** or **Next**.



The Cable Database configuration screen prompts you to either enter/edit a cable description or select one from the list already stored on the WireScope 350. If you see the part number of the cable you are using, select it and press **OK** or **OK** to complete cable selection and return to the Autotest Settings screen.

If you do not see the cable you are using already listed in the WireScope 350, select **Add New Description** and follow the instructions to add the specification data for the new cable.



Specifying the connecting hardware

You can use this setting to store information in each test record about the type of connecting hardware used to terminate the tested cable runs. You can either select the connecting hardware part number from a pre-loaded list or you can enter a description or part number.

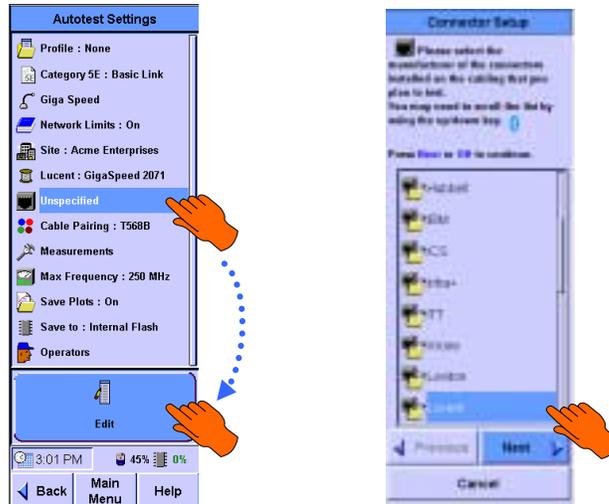
The nominal performance grade (i.e. Category 6) of the connecting hardware can be specified in order to assist the WireScope 350 in identifying misconfiguration errors.

To enter connecting hardware information starting at the Autotest Settings screen, select the connector icon and press **OK** or **Edit**.

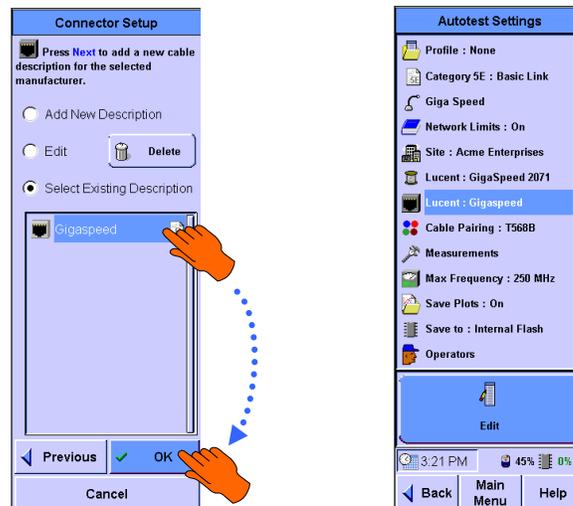
NOTE:

When testing Category 6 or Class E Channels using the Universal Channel adapters, this selection is very important for obtaining maximum accuracy during measurements.

The first Connector Setup configuration screen prompts you to specify the manufacturer of the connecting hardware that you will be testing. If you do not know the manufacturer, select “unspecified”. Use the  key if you need to scroll the list of manufacturers. In the example below, “Lucent” is selected. Then, press  or **Next**.



The Connector Setup configuration screen prompts you to either enter/edit a connector description or select one from the list already stored on the WireScope 350. If you see the part number of the connecting hardware you are using, select it and press  or **OK** to complete connector selection and return to the Autotest Settings screen.



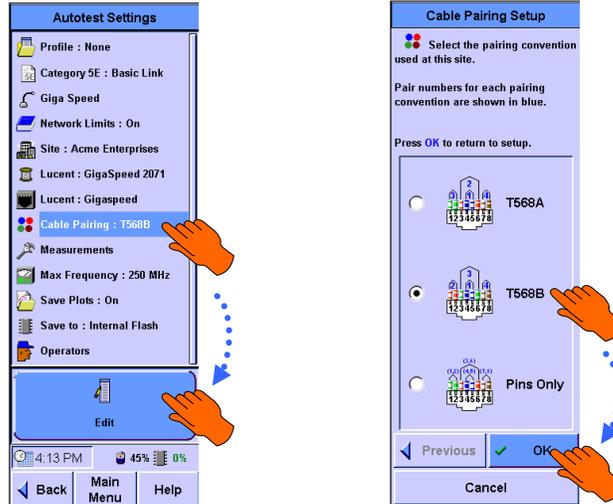
If you do not see the connecting hardware you are using already listed in the WireScope 350, select **Add New Description** and follow the instructions to add the specification data for the new connector.



Setting the pairing convention

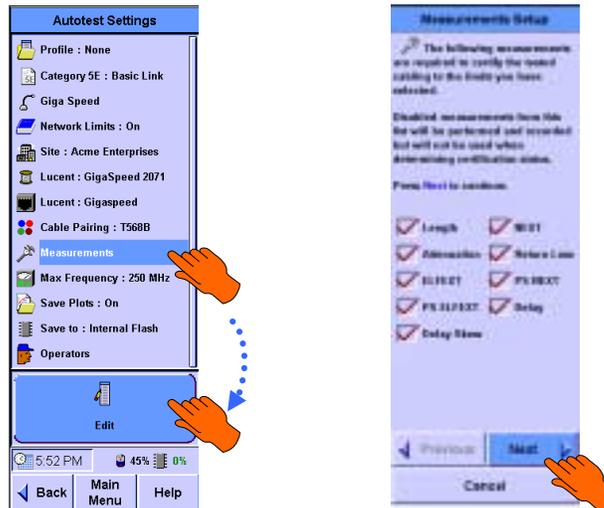
Cable pairing determines which cable pairs are attached to which contacts in the modular-8 connector. The WireScope 350 relies on this setting to correctly associate cable pair numbers with modular-8 contact numbers.

To set the cable pairing, from the Autotest Setup screen, select cable pairing and press **OK** or **Edit**.



Setting measurement options

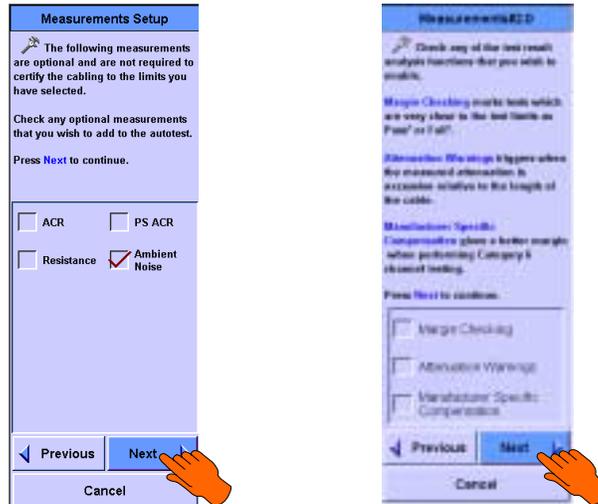
The selected cabling performance limit determines the minimum set of measurements required. The measurement options setting allows you to add optional measurements, specify frequency spacing, set fault locator behavior and enable warnings during the autotest.



Select the measurement options icon and press **OK** or **Edit** to change measurement options. The first Measurements Setup screen lists the measurements required by the cabling limit you have selected.

If you uncheck any of the required measurements, these tests will still be performed during the autotest, but will not be used for determining pass/fail status.

You can specify optional measurements and analyses to be included in the autotest by checking the applicable boxes.

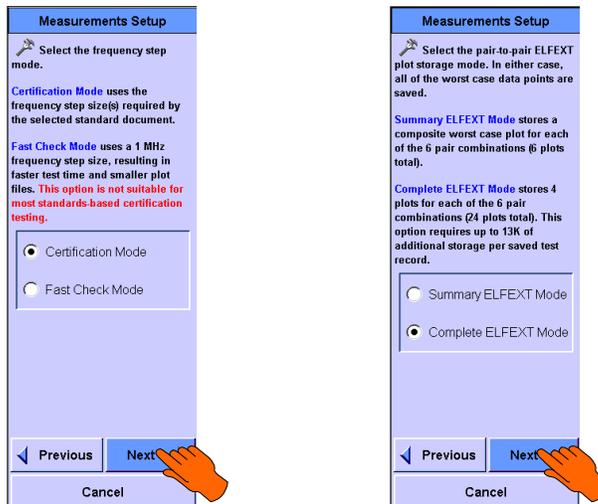


You can also set the frequency step size and the format used to store pair to pair ELFEXT data.

NOTE:

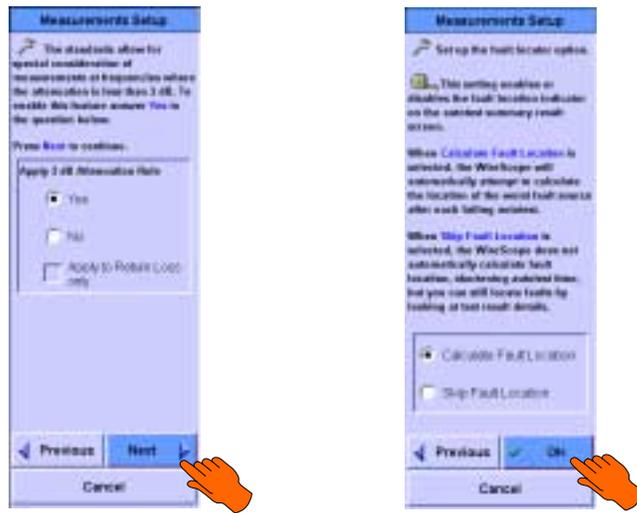
If you set the WireScope 350 to Fast Check Mode, you will not collect enough data to certify the tested cabling runs.

Either ELFEXT mode captures all of the worst case ELFEXT data points.



You can also specify whether the WireScope 350 applies the 3 dB attenuation rule to tests. Select **Yes** or **No**, then press **OK** or **Next**.

You can also specify whether the WireScope 350 automatically calculates the fault location at the end of a failing autotest. Agilent Technologies recommends that you leave this setting selected unless you have a specific need to further optimize test speed.

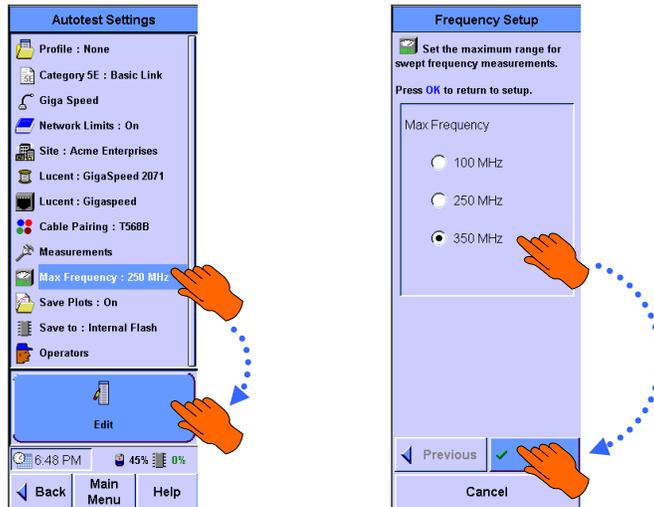


When you have finished setting measurement options, press **OK** or **OK** to return to the **Autotest Settings** screen.



Setting the maximum frequency

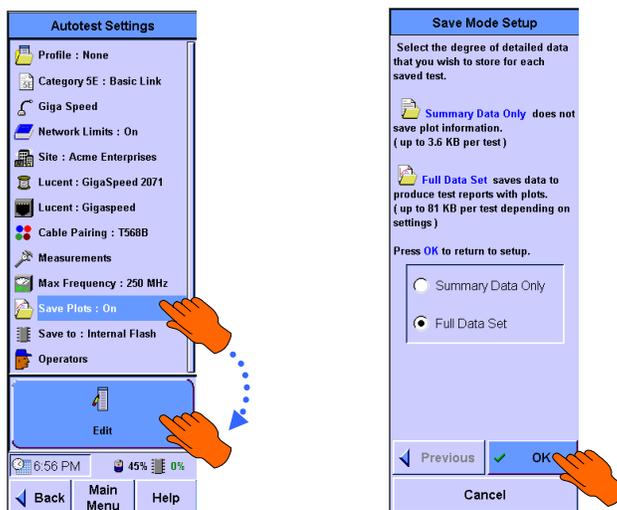
The selected cabling performance limit determines the minimum required test frequency range. This setting allows you to specify a larger frequency range than is required for the current cabling performance limit. Select the test frequency icon and press **OK** or the **Edit** button to change the maximum test frequency.



Plot storage setting

The WireScope 350 can store either a summary data set or a full data set, including plots, for each test performed. The advantage of storing plots is the ability to re-evaluate saved test results for standards compliance and troubleshooting purposes.

To set the WireScope 350 to save plots for each autotest, select the save plots icon and press **OK** or **Edit**.



Storage Setup setting

This setting allows you to choose where to save test results.



If a CompactFlash™ memory card is inserted, the default choice is to save test results to the CompactFlash™ card.



Otherwise, the default choice is to save results to the internal flash memory.

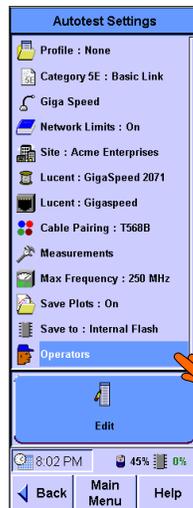
Select the test results storage icon and press  or the **Edit** button to change the test result storage setting.



Operators setting

Usually, a two-person team operates the WireScope 350. You can store the names of both the main unit operator and the remote unit operator in each test record.

You can also store information about which end of the cable run each unit tested (for example: main unit in telecom closet and remote unit at user location). Select the Operators icon and press  or the **Edit** button to enter or change operator information.



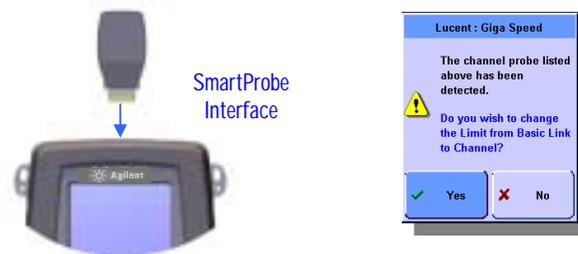
Enter the name of each operator and the location where he or she is testing. This information is captured automatically and stored in each saved autotest file. Press  or **OK** to return to the Autotest Settings screen.

Using test probes

It is important that any instrument be configured properly if the test data is to be useful. At a construction job site, it is especially critical that the cable certification equipment be configured properly before testing begins to avoid wasting time and money by testing to the wrong requirements. The WireScope 350 is designed to minimize the opportunities to make such mistakes through the use of an intelligent test probe (SmartProbe) port and a robust autotest settings profile capability.

Understanding SmartProbe test port features

With the advent of Category 6 technology, you must not only match test probes type to the test configuration (i.e. Link or Channel), but also match to the manufacturer of the connectors used on the cabling to be certified. Failure to do this can yield useless certification results.



The WireScope 350 has the ability to detect the characteristics of the attached test probes and based on this information and the selected connector and cabling limit settings, warn you if there is a potential misconfiguration before testing starts.

In addition to providing a high performance connection for the test signals from the test hardware, the SmartProbe interface provides power and a two-way control interface to support active test probes. All of the Category 6 SmartProbes for the WireScope 350, for example, are active. This allows critical data such as probe serial numbers, compatibility information, and how many times the probe has been used to be stored in memory internal to each probe.

Caring for the SmartProbe test port

The SmartProbe port is not designed to be connected to cables that have high voltages present (for example, voltages present on telephone lines). Therefore, be certain that no excessive voltages are present before connecting the cable under test to the SmartProbe or Channel Adapter.

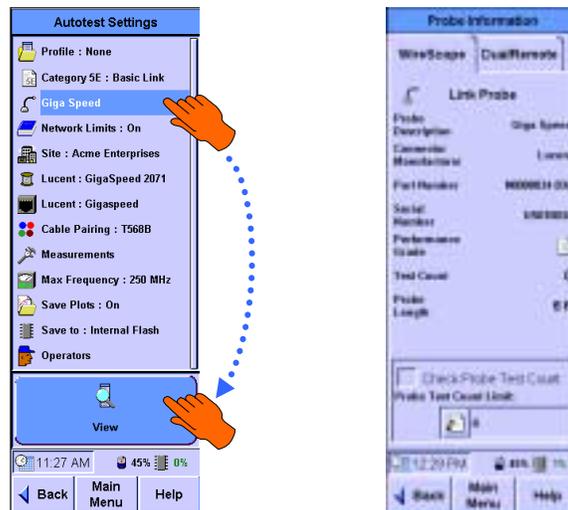
CAUTION:

Do not connect WireScope test probes or test cables to a voltage source, such a telephone jack. Excessive voltages can damage WireScope probes and/or the WireScope 350 analyzer and void your warranty.



Viewing probe information

To access probe information, from the Autotest Settings screen, select the probe icon and press **OK** or **Edit**.



WireScope and DualRemote tabs summarize information about attached probes.

You can view the WireScope (default) or DualRemote probes by pressing the appropriate tab on the top of the display.

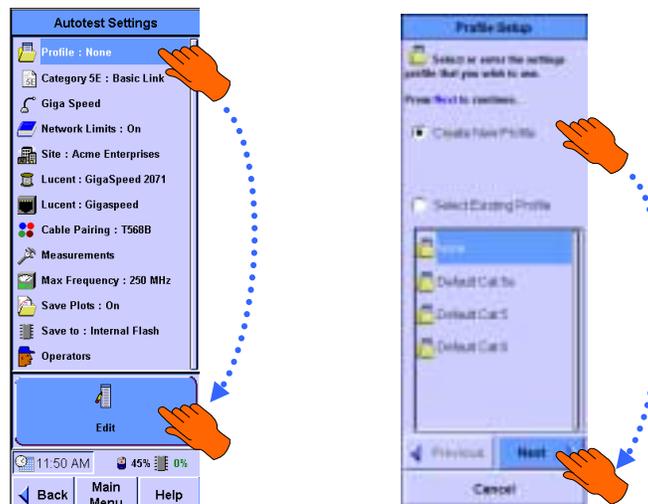


Autotest settings profiles

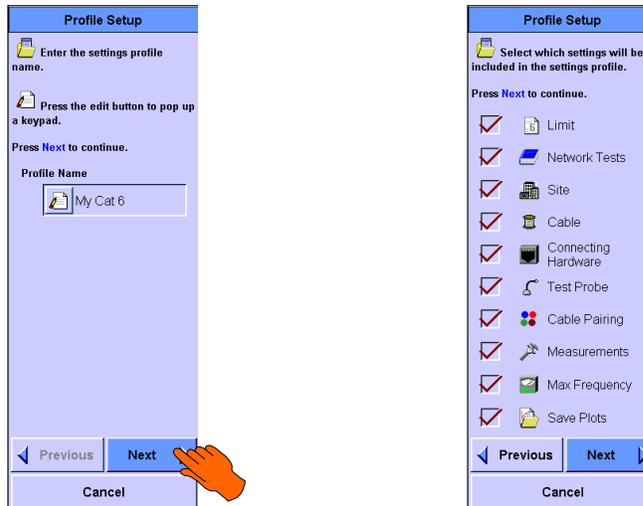
You can quickly and consistently configure WireScope 350 units prior to testing by using a *settings profile*. Loading a settings profile is a fast way to configure multiple settings all at once.

A WireScope 350 settings profile stores any or all of the settings needed to run an autotest. You can save the current state of the WireScope 350 to a settings profile so that you quickly restore settings later or you can load predefined settings profiles which conform to test specifications required for a particular project or brand of cabling products.

You can create a settings profile either directly on the WireScope 350 or from within the ScopeData Pro software application on a PC. To create a settings profile directly on the WireScope 350, start from the Autotest Settings screen. Select the autotest settings profile icon and press **OK** or **Edit**.



To create a new profile, press **Create New Profile** and press **OK** or **Next**. Enter a name for the new settings profile and press **OK** or **Next** to continue. Select which settings to include in the setting profile by checking the boxes next to the corresponding settings.



NOTE:

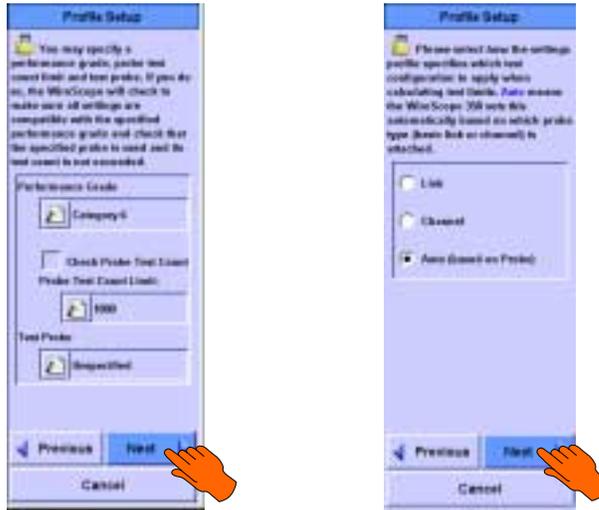
*If one or more profiles were present, the **Update Selected** and **Delete** choices would be added to the first **Profile Setup** screen (in addition to **Create New Profile** and **Select Existing Profile**).*

*To select an existing profile press **Select Existing Profile**; then press the profile name displayed (**My Cat 6** in the example screen) and press **OK** or **Next**. The display returns to the Autotest Settings screens and lists the profile you selected.*

*To update an existing profile press the profile name desired (**My Cat 6** in the example), then press **Update Selected**, and press **OK** or **Next**. The screens continue as for a new profile, but include the existing parameters which you can change, as needed.*

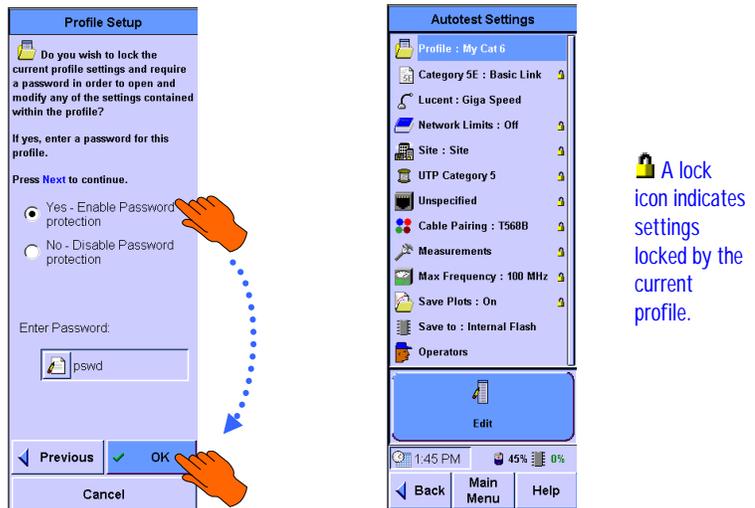
*To delete an existing profile first select the profile; then press **Delete**. You will be prompted to confirm your choice to continue with **Delete**.*

To upload a profile from CompactFlash™ card, see page 115.



You can enter a performance grade (i.e. Category 6) and a test probe count limit (optional). (If you enable Check Probe Test Count, you must enter a Probe Test Count Limit value ranging from 100 to 20,000.) If you enter either of these items, the WireScope 350 will check for compatibility with these settings whenever this settings profile is loaded. If you leave either of these settings as “Unspecified”, the WireScope 350 will not check for such compatibility while the settings profile is loaded. Press **OK** or **Next** to continue.

You must also specify which test limit for any performance grade the WireScope 350 uses. You can pick a single configuration (i.e. Category 6 channel) or you can select “Auto based on probe” (recommended). If you select “Auto (based on probe)”, the WireScope 350 will adjust the test limit for any performance grade based on the type of the limit (link or channel) based on the test configuration. So in this example, if you attach a basic link probe, the WireScope 350 would apply the Category 6 basic link test limit. Press **OK** or **Next** to continue.

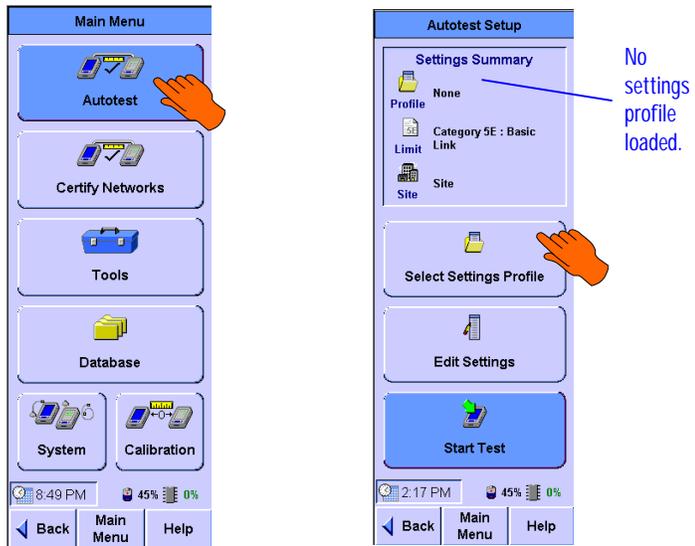


You can password-protect settings profiles. If you want to alter any settings in a password-protected profile, you must enter the correct password. This feature prevents unauthorized users from altering the cable certification settings. To enable password protection, select **Yes – enable password protection**, enter a password and press **OK** or **OK** to finish configuring the autotest settings profile.

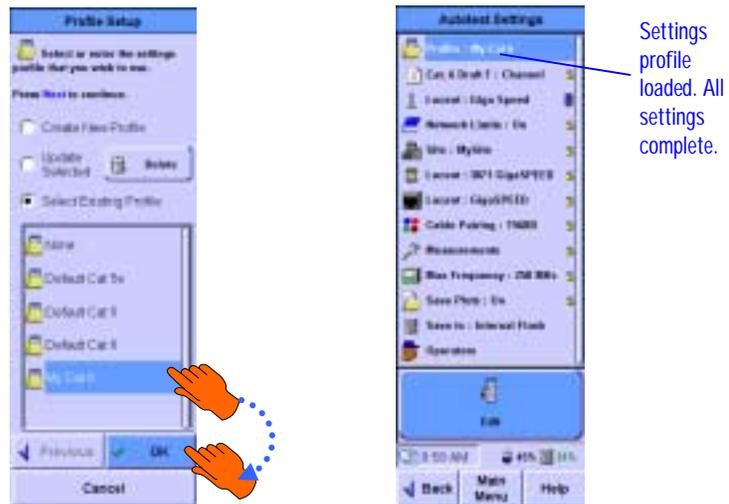
Autotest setup in one step

Once there are settings profiles stored on the WireScope 350, you can quickly load a settings profile without going through the detailed autotest settings process.

Starting from the Main Menu screen, press **OK** or **Autotest**.



At the Autotest Setup screen, press **Select Settings Profile**.



Select the settings profile that you wish to use and press **OK** or **OK** to complete the autotest setup process. When you return to the Autotest Setup screen, you can see that the settings profile is loaded. You are now ready to test.

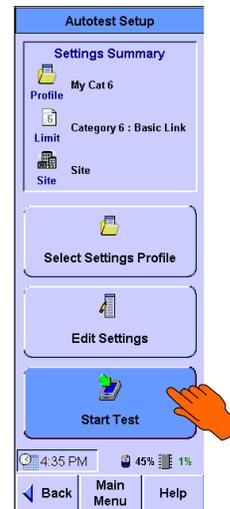
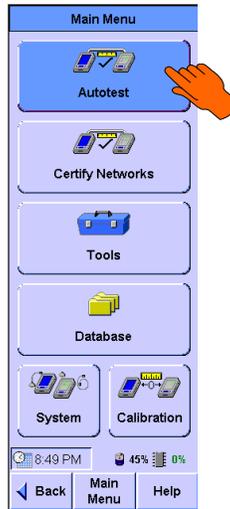
Chapter 5

Running an Autotest

Starting the autotest



Make sure that you have attached the correct test probes and configured the proper settings or loaded a settings profile as described in the previous chapter. Connect the WireScope 350 at one end of the cabling run that you wish to test and the DualRemote 350 at the other.



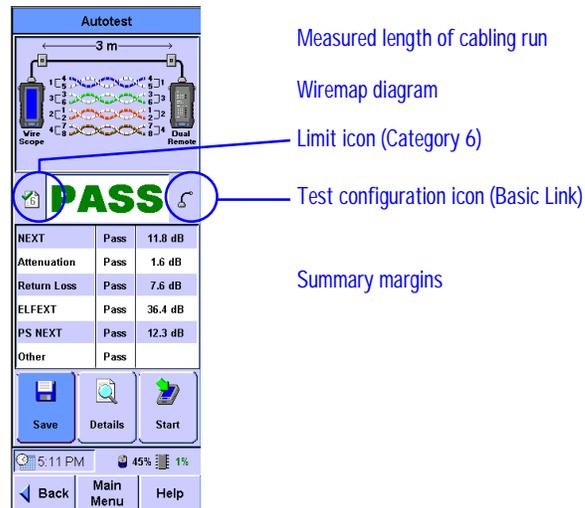
To start an autotest from the Main Menu screen press **OK** or **Autotest**. This brings up the Autotest Setup screen. If you need to, you can review settings from this screen before you start the autotest. Press **OK** again or **Start Test**.



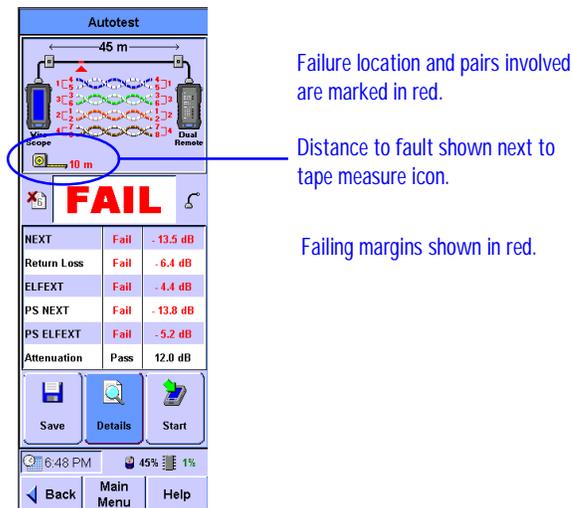
If you have not connected to the DualRemote 350, a “Searching For Remote” dialog box will come up until you connect the DualRemote 350. If the DualRemote 350 is connected to the other end of the cabling run, the progress indication dialog will come up. A bar graph will update as the test progresses. To stop the test before it is complete, press **OK**.

The autotest result summary screen

After the autotest completes, the Autotest Summary screen appears. Examples of passing and failing tests are presented below.



In the case of a failing test, if the calculate fault location option is turned on, the WireScope 350 will automatically calculate the distance to the most likely failure source in the tested cable run.



From the Autotest Result Summary screen, you can either:

- Save the current test result by pressing the **Save** button (described in next section)
- Start a new autotest by pressing the **Start** button; this results in the following message being displayed:



Continue by pressing **OK** or the **Yes** to discard the measurement, or press **No** to return to the three choices

- View detailed result data by pressing the **Details** button. A screen similar to the one shown on page 51 will appear

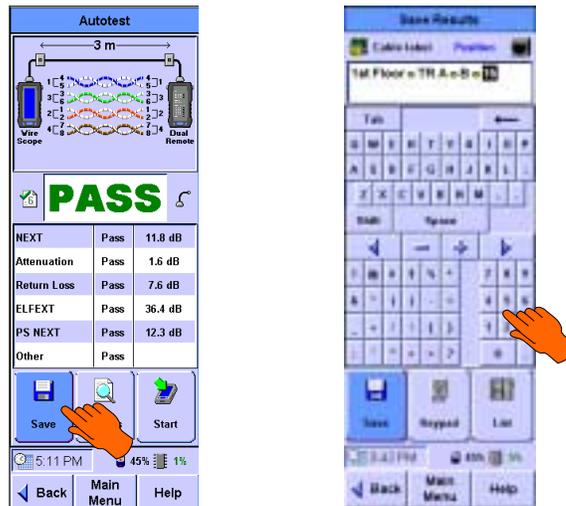
Saving test results



When you press the **Save** button, the Save Results screen appears. Each saved test result record must have a unique cable label. There are several options for entering the cable label for the saved test result:

- You can use a typewriter-style keyboard
- You can use a telephone-style keypad
- You can pick an previously-saved label from a list
- Or, if a label list has been loaded, you can select a label from the list of cable IDs.

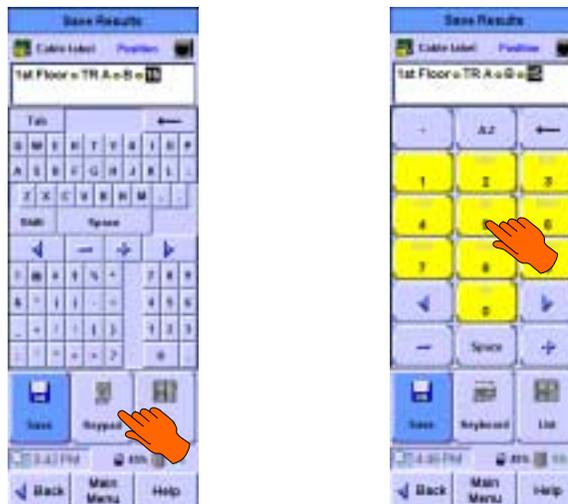
Using the typewriter-style keyboard



When you press the **Save** button, by default, the Save Results screen appears open to the typewriter-style keyboard option. You can enter text and numbers using either your fingertip or the provided stylus.

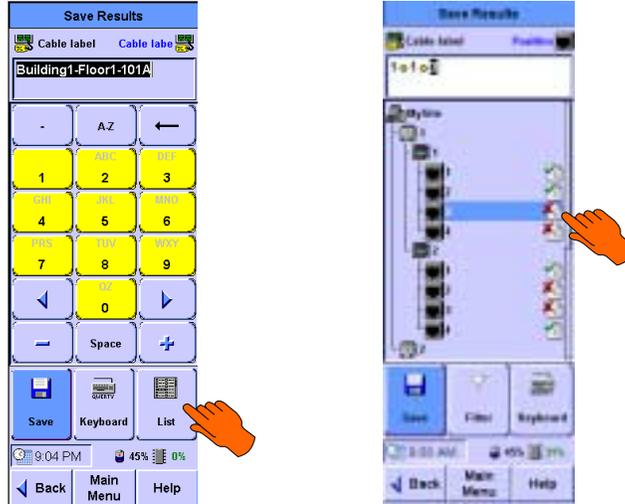
Using the keypad

If you are entering mostly numbers, you may prefer to use a telephone-style keypad with bigger keys. Press the **Keypad** button to switch to the keypad mode.



Using the list

If you have already saved test records on the WireScope 350 and would like to save the current test under one of the already-entered cable labels, you may prefer to pick the cable label from a list. Press the List button to switch to list mode.



Using auto-increment

Often, if you are testing cabling runs in a predictable sequence, it can save time to configure the WireScope 350 to auto-increment cable labels. With auto-increment, you dramatically reduce the amount of data entry that you must do.

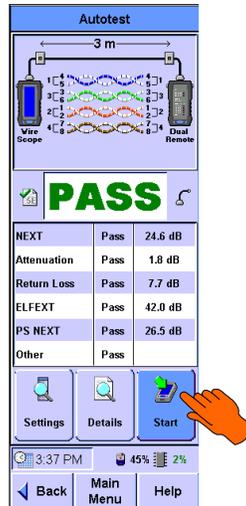
To setup cable label auto-increment, please see *Site Settings* in Chapter 4. In the example sequence below, auto-increment is set for the wallplate and jack fields of an hierarchical cable label format.



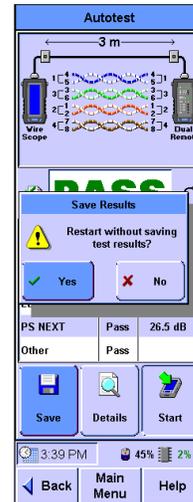
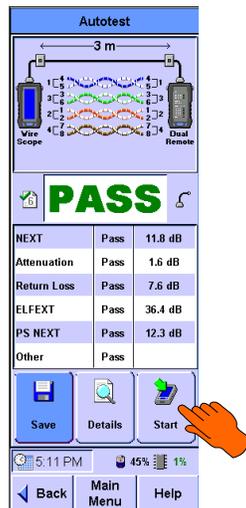
Starting the next autotest



From the Autotest Summary screen, you can start another autotest by pressing the **Start** button. If you have already saved the previous test, the autotest will start without any further delay.



If you have not yet saved the previous test, a dialog box will pop up to confirm that you wish to start another test without saving the previous result.

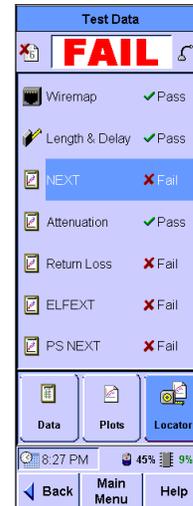


Press the **OK** key or **Yes** to start the next test.

Viewing result details



To see a complete listing of all measurements for any completed autotest, press the **Details** button while at the Autotest summary results screen.



You may need to scroll the list to see all of the measurements in the Test Data window. Use the **↓** key to scroll the list.

Each measurement is listed together with a summary result.

- Passing results are marked with a green check.
- Failing results are marked with a red cross.
- Measurement results not used in determining overall pass/fail status are marked to signify that these results are for information only.

Particularly in the case of failing measurements, you may want to see more detailed information. The WireScope 350 can present test result data in a variety of formats, depending on the type of data:

- Summary worst case data only
- Frequency plots
- Locator plots



Summary data

The WireScope 350 summary data screens present result data in tabular format. To launch the summary data screen for any measurement, select the measurement from the Test Data screen. Then, press the **Data** button.

The example above shows the summary data screen for the NEXT measurement.

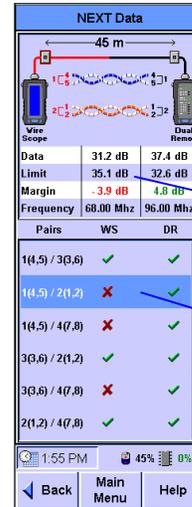
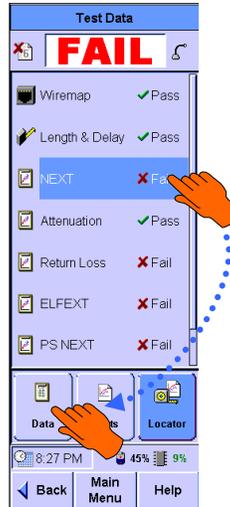


Diagram shows selected pair combination and which end failed.

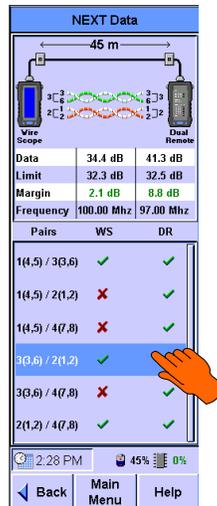
Data table

Currently selected pair combination highlighted in dark blue.

In this case, the measured NEXT data did not meet the selected cabling performance limit (Category 6 basic link) for three of the six possible pair combinations.

The data table shows the values and margins for the worst-case frequency point for the selected pair or pair combination. Negative margins are shown in red.

By default, the summary data screen opens with the pair or pair combination selected which has the worst margin. You can select other pairs or pair combinations by touching in the list box or by using the **+/-** key.



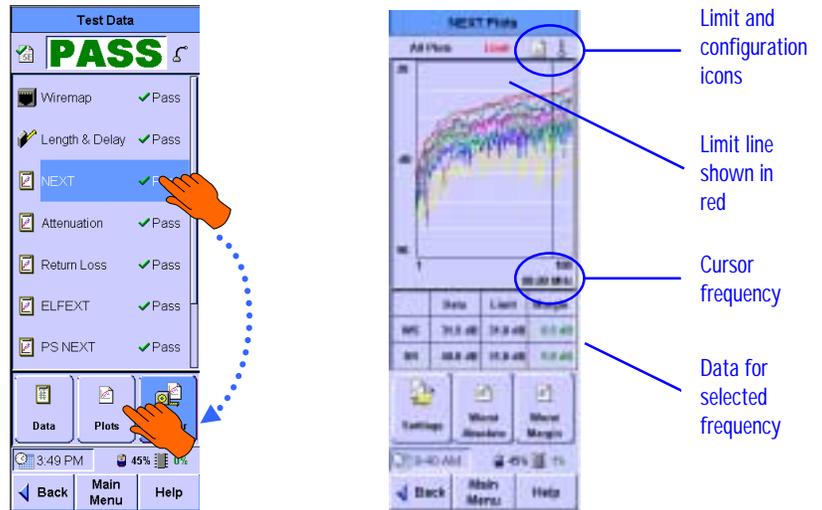
Selecting pairs changes the diagram and table to match.



Frequency plots

WireScope 350 can display frequency plots for swept frequency measurements. This view of the data provides a very complete picture of the performance of the cabling run under test compared to the required test limit.

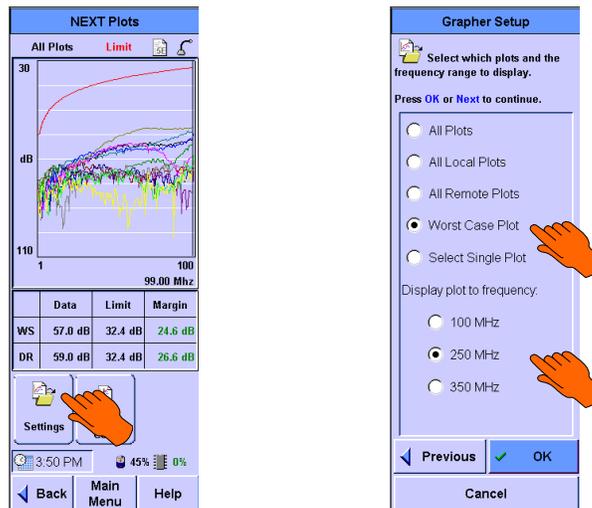
To launch the frequency plot screen for any swept frequency measurement, select the measurement from the Test Data screen. If a frequency plot is available for the selected measurement, the **Plots** button will appear at the bottom of the screen. Press the **Plots** button.



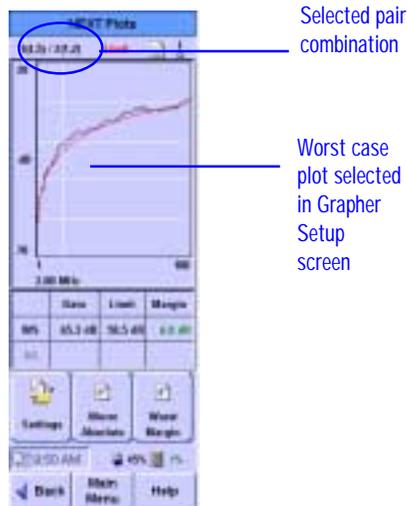
The Plots screen shows frequency plots for all of the measured pairs or pair combinations. For some measurements, plots from both the WireScope 350 and DualRemote 350 are superimposed on the same set of axes.

The frequency cursor is set to the point with the worst margin by default when the Plots screen appears. You can move the frequency cursor to any point by either touching in the plot area or by using the **F** key. You can move the cursor to the worst case point at any time by pressing the **Worst Absolute** button, or back to the point with the worst margin by pressing the **Worst Margin** button.

Press the **Settings** button to customize the displayed plot.



The Grapher Setup screen allows you to select which pairs or pair combinations to view and the displayed frequency range. The available frequency range choices depend on the maximum frequency setting.

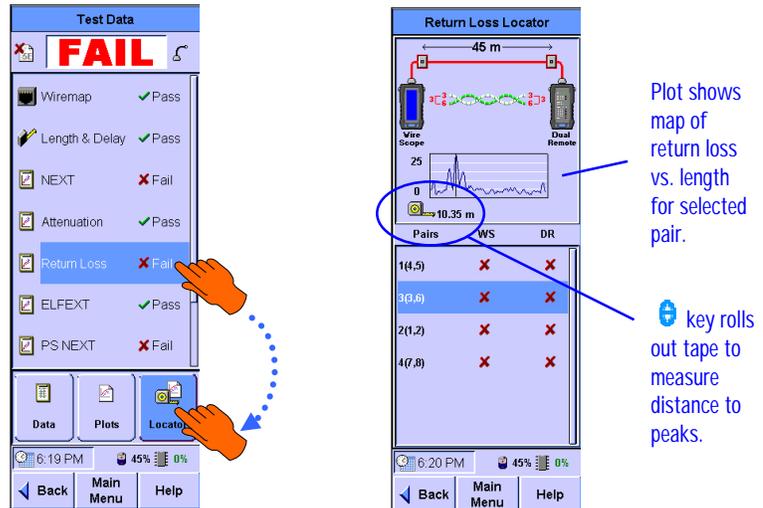




Locating faults

The WireScope 350 measurement plots contain high resolution signal phase information that can be used to map the location of Near End Crosstalk (NEXT) and Return Loss noise coupling along the tested cabling run. This capability is especially important when you need to troubleshoot a failing cabling run.

To view the fault locator screen, select either NEXT or Return Loss from the list of measurements on the Test Data screen. Press the **Locator** button.



By default, the Locator screens open with the pair or pair combination selected which has the worst margin. You can select other pairs or pair combinations by touching in the list box.

You can move the tape to measure the distance to any peak on the plot by either touching in the plot area or by using the **key**.

NEXT and Return Loss peaks often occur at connection points in the cabling run. For this reason, the locator screen can be useful for finding the distance to any intermediate connections in the cabling run.

Viewing result details on the DualRemote 350

The DualRemote 350 performs at the far end of the cabling run all of the same test functions as the WireScope 350. The WireScope 350 controls the DualRemote 350 during all test functions by communicating with it over the cabling run under test.



Considerable information is available to the DualRemote 350 operator via the DualRemote 350 front panel indicators.



Pair status indicators

4,5 3,6 1,2 7,8

The pair status indicators are bi-color LEDs that light green or red at the end of any test to signal the status of each pair. Any pair involved in a failure condition will light in red.

Warning indicators

The warning indicators alert the DualRemote 350 operator to conditions that might prevent or impair testing.



Hub / NIC detected

The hub / NIC detected LED indicates that the DualRemote 350 is plugged into a hub / Switch port or a NIC port instead of into a port which is connected to the WireScope 350. [This function is not yet supported in software. A future software upgrade will add this capability.]



Voltage Warning

The voltage warning LED indicates that the DualRemote 350 is plugged into a line, which has a potentially damaging high voltage present. Usually, this condition occurs when attempting to test a line plugged in to a telephone switch.

IMMEDIATELY DISCONNECT THE DUALREMOTE350 FROM THE LINE WHEN THIS WARNING APPEARS.

Failure to do so may cause permanent damage to the DualRemote 350 hardware.



Calibration Required

The Calibration Required LED indicates that the DualRemote 350 needs to be recalibrated with the WireScope 350.

You will not be able to proceed with the autotest until the calibration process is complete.



Battery

The battery LED indicates the current state of the DualRemote 350 battery.

When the DualRemote 350 is plugged into the AC charger:

- A solid green color means the battery is charging.
- A flashing green color means that the battery is fully charged.

CAUTION:

Use only the 12V charger/adaptor supplied with your WireScope and DualRemote. Using an incompatible charger/adaptor can damage your WireScope equipment and void your warranty.

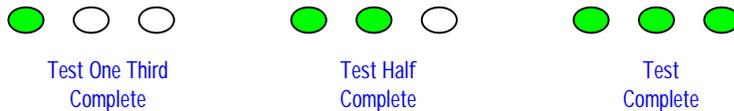
When the DualRemote 350 is not plugged into the AC charger:

- When the battery LED is off, the battery operating normally.
- A solid red color means that the battery charge is low.



Progress indicator

The progress LEDs indicates approximately how much of the current test is complete.



Pass / Fail

The Pass / Fail LED indicates the pass / fail status of the last completed test.

- Green indicates pass
- Red indicates fail

Diagnostics

The Diagnostics section of the DualRemote 350 front panel provides more detailed information about failing test results.

WS and DR LEDs indicate at which end of the tested cable the measurement failed.

WS DR

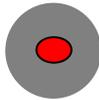
Test failed at
WireScope end of
cabling run

WS **DR**

Test failed at
DualRemote end of
cabling run

WS **DR**

Test failed at both
ends of cabling run



A column of diagnostic LEDs provide further detail about the cause(s) of a test failure. The failure causes that can be indicated are:

- Wiremap
- Split pairs
- Length / Delay / Skew (any of these conditions)
- NEXT (pair-to-pair or power sum)
- Attenuation
- ELFEXT (pair-to-pair or power sum)
- Return Loss
- Other (any other failing measurement)

In the event that the cabling run has multiple test failure causes (i.e. NEXT and Return Loss), you can use the  key to scroll between failure cause indications. The current selection is indicated by a blinking LED. The pair indicators and WS/DR indicators will blink to show which pairs and which cable end correspond to the selected failure cause.

Power LED

The power LED indicates on / off status for the DualRemote 350. When this LED is lit, the DualRemote 350 is powered on.

Chapter 6

Certify Networks



Purpose

Some users are not concerned about whether the tested cabling complies with cabling standard performance requirements, but rather are interested in directly surveying their cabling for compatibility with popular network applications, such as Ethernet (at various speeds) and ATM.

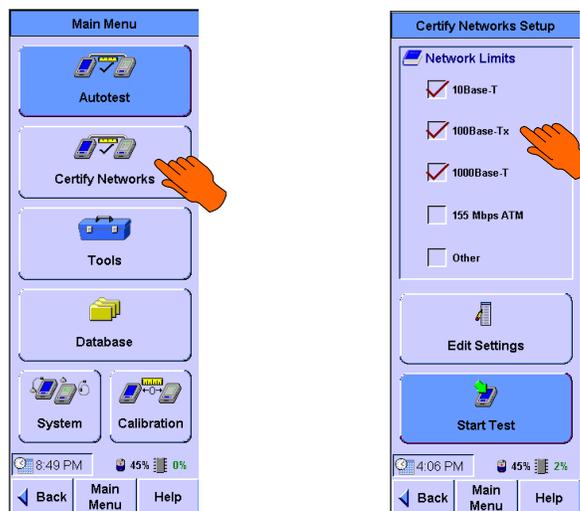
Whereas cabling performance standards attempt to be application-neutral, and consequently to take into account the requirements of many applications, the Certify Network test profiles implemented in the WireScope 350 are specific to the requirements of each network application interface.

By running a certify network test, you can determine whether the tested cabling can successfully support the selected network application(s).

Operation

You can either run the Certify Network test profiles as part of the autotest function (setting this up is described in chapter 4) or separately using the Certify Networks test function.

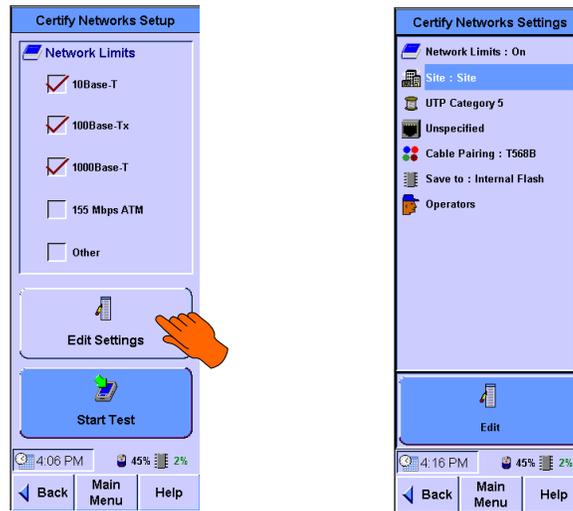
To run the Certify Networks function independently, press the **Certify Networks** button on the main menu screen.



The certify networks setup screen appears. You can directly select which network applications to certify the cabling for by checking the appropriate boxes in this screen.

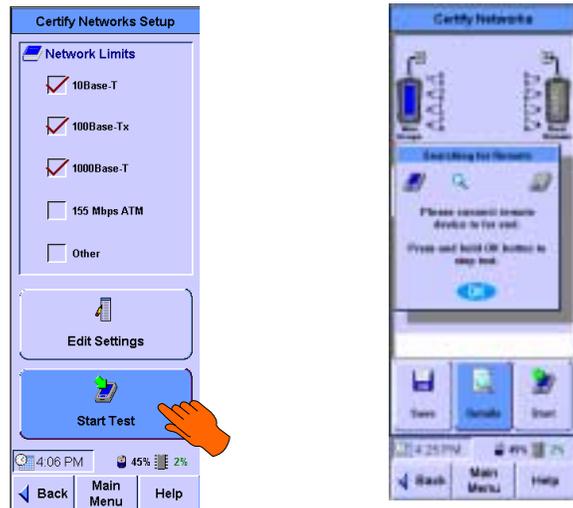
The “Other” Category encompasses a variety of legacy applications. If you select this option, the WireScope 350 will analyze the cabling for compatibility with all of these legacy applications.

You can review and edit other relevant settings before testing by pressing the **Edit Settings** button.



The Certify Networks settings are a subset of the Autotest settings and can be edited using the same procedures outlined in chapter 4.

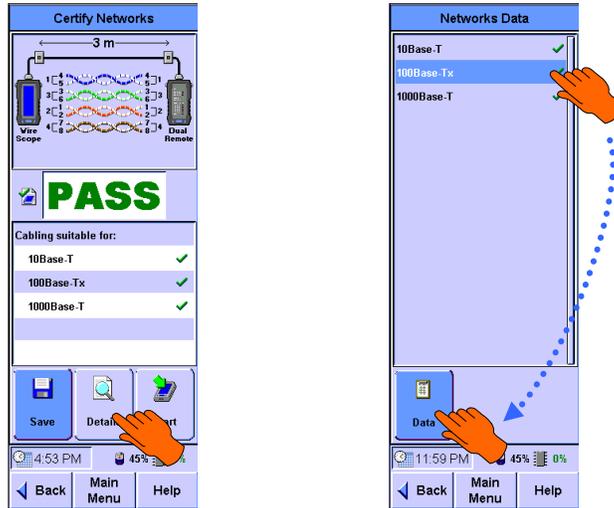
To start the Certify Networks test, return to the Certify Networks setup screen and press **OK** or press the **Start Test** button.



The Certify Networks test will start. You can stop the test before it finishes by pressing the **OK** key.

Certify networks results

The Certify Networks summary results screen lists the network types tested and a summary result. You can view more detail about the tested networks by



pressing the **Details** button. The Networks Data screen will appear. Select the network result you wish to view details for. Press  or the **Data** button.

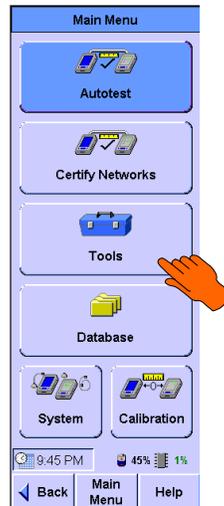
	Data	Margin
SNR	57.0 dB	42.0 dB
NEXT	57.2 dB	28.2 dB
Attenuation	0.2 dB	19.8 dB

The detail screen for the selected network type will appear, listing margin information.



Introduction

The Tools menu organizes individual test functions that you can run from the WireScope 350. To access the test functions under the tools menu, press the **Tools** button on the main menu.



Tools

The Tools menu contains three tools:

- Quick Check
- Blink Hub Port
- Learn NVP
- Measure Length

To launch any of these tools, press the corresponding button.

Quick Check



Purpose

The Quick Check tool provides a quick way of testing for proper continuity and pairing without doing a full autotest.

Operation

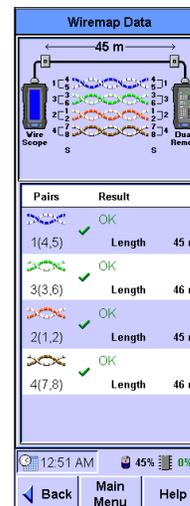
From the Tools menu screen, press the **Quick Check** button.

The quick check starts immediately.



Results

The quick check summary result screen indicates a pass or fail for the tested cabling run. You can see more detail by pressing the **Details** button.



Blink Hub Port

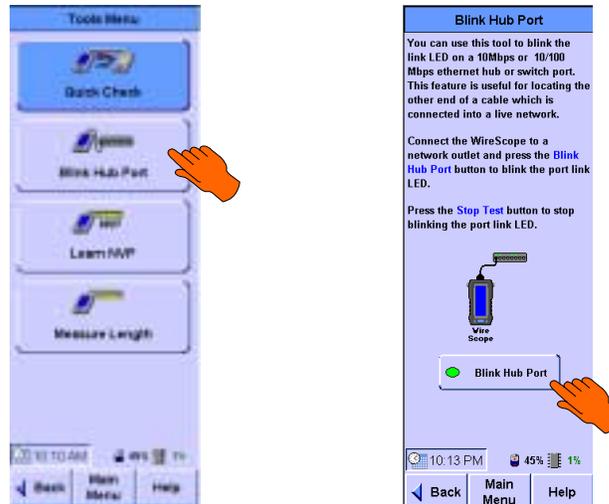


Purpose

The Blink Hub Port Tool allows you to blink the link LED on a 10 Mbps or 10/100 Mbps Ethernet hub or switch port. This feature is useful for locating the other end of a cable connected into a live network.

Operation

From the Tools menu, press the **Blink Hub Port** button.



When the Blink Hub Port screen appears, plug the WireScope 350 into a cable run that terminates in a hub or switch port and press the **Blink Hub Port** button.

Results

The WireScope 350 applies a periodic 10BaseT link pulse sequence to the attached hub or switch port. This sequence will cause the hub or switch port link LED to blink, making it easy to identify the opposite cable end in the wiring closet.

- The blink rate is approximately 1 second
- During the test, the **Blink Hub Port** button becomes the Stop Test button, which stops the test and returns to the **Blink Hub Port** button

Learn NVP



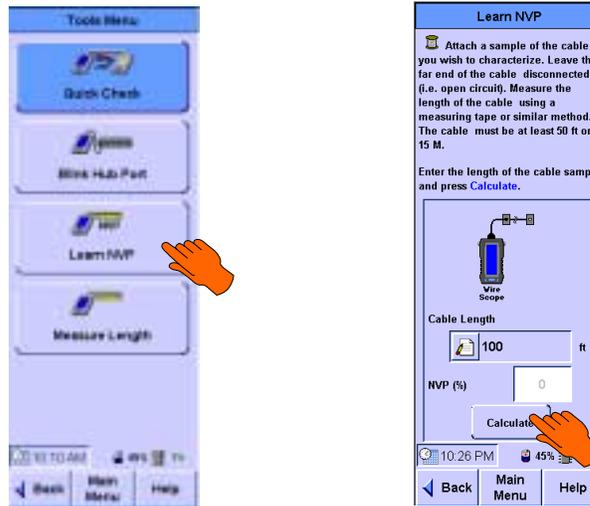
Purpose

The Learn NVP tool allows you to measure the NVP (Nominal Velocity of Propagation) of an unknown cable type provided that you have a known length. Cable samples must be at least 50 feet (or 15 meters) long. Longer samples produce more accurate NVP measurements.

NVP measurements must be made with an open circuit at the far end of the cable under test.

Operation

From the Tools menu, press the **Learn NVP** button.



Attach a known length of cable to the WireScope 350 only. Do not connect the far end of the cable to the DualRemote 350. Enter the known length of the sample of cable.

Press the **Calculate** button to measure the NVP of the cable sample.

Results

The resulting NVP value represents the speed at which electrical signals propagate along the sample cable, expressed as a percentage of the speed of light in a vacuum.

Measure Length

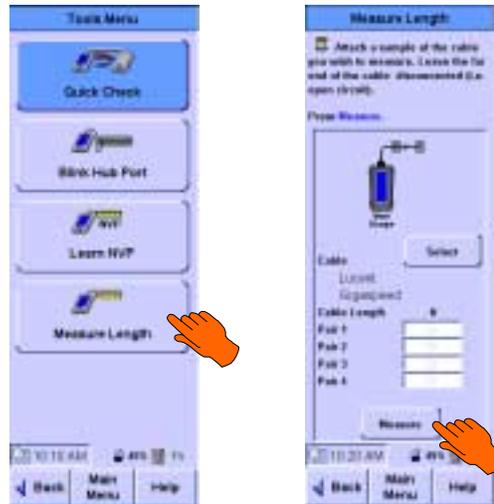


Purpose

The Measure Length tool allows you to measure the length of a cable connected to the WireScope 350. The far end of the cable must not be connected to the DualRemote 350 and must not be terminated (i.e., open-ended).

Operation

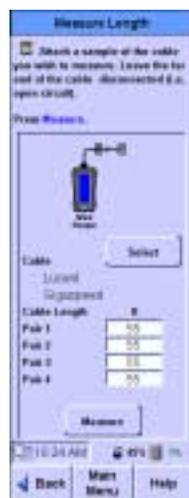
From the Tools menu, press the **Measure Length** button.



Press the **Measure** button to measure the length of the cable.

Results

The length of the cable is displayed.



Running COAX and TWINAX Autotests

The WireScope 350 and the DualRemote 350 support both Coaxial and Twinaxial standards. This chapter will instruct you how to test to these standards.

Coax Testing



Coaxial cable (also called Coax) consists of an insulated central conducting wire wrapped in another cylindrical conducting wire. Both of these wires are encased in an insulating layer and an outer protective layer. Coax is typically used in carrying high-speed data and in CATV.

Coax Setup

Testing of coaxial cable checks only for length and cable integrity. Because of this, there is no need to calibrate before the Autotest. Only a subset of the tester settings applies to Coax testing. These settings are shown on the screens below.



Operation

Insert the Coax probe in the WireScope 350's SmartProbe port and connect it to the coaxial cable to be tested. There is no need to use the DualRemote 350 in certifying Coax cables. Press the **Autotest** button on the Main Menu to bring up the Autotest Setup screen shown above. Press the **Edit Settings** button to change any settings. A detailed description of the Autotest Setup and Autotest Settings screens can be found in Chapter 4. It may be necessary for you to add a new description to the cable database (add name, specify 1 pair for cable pair count, then select Coax; then, either specify the cable's NVP or select Calculate NVP from length; finally, add or select the target performance grade for the cable, if applicable (otherwise, Unspecified)).

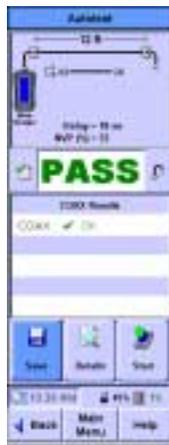
When the Coax probe is inserted a default Coax cable is automatically selected. You can change to a different Coax cable in the Autotest Settings screen.

The WireScope 350 is capable of certifying 10Base-2 and 10Base-5 network operation over Coax. By selecting **Other** in the Network Limits of the Autotest Settings screen, or in the Summary screen of the Certify Networks screen, you can enable the certification of these networks.

Press the **Start Test** button from the Autotest Setup screen to perform the Coax Autotest (or Certify Network test).

Results

After the test has completed, the Autotest result screen below on the left will appear.



[Details screen](#)

The Coax Autotest evaluates length and cable integrity. These results are shown in both the diagram at the top of the screen and the table at the bottom. Delay and NVP information are also shown. The results of coax network certification are also shown in the bottom section of the result screen. Press the **Details** button to display the Wiremap Data screen containing additional information about the test.

Twinax Testing



Twinaxial (also called Twinax) cables are able to carry high frequencies and are most often used for data transmissions and video applications. Twinax consists of one twisted pair and a metallic shield.

Twinax Setup

Testing of Twinaxial cable checks only for length and cable integrity. Because of this, there is no need to calibrate before the Autotest. Only a subset of the tester settings applies to Twinax testing. These settings are shown on the screens below.

Operation

Insert the Twinax probe in the WireScope 350's SmartProbe port and connect it to the Twinax cable to be tested. There is no need to use the DualRemote 350 in certifying Coax cables. Press the **Autotest** button on the Main Menu to bring up the Autotest Setup screen shown above. Press the **Edit Settings** button to change any settings. A detailed description of the Autotest Setup and Autotest Settings screens can be found in Chapter 4. It may be necessary for you to add a new description to the cable database (add name, specify 1 pair for cable pair count, then select TWINAX; then, either specify the cable's NVP or select Calculate NVP from length; finally, add or select the target performance grade for the cable, if applicable (otherwise, Unspecified)).

When the Twinax probe is inserted a default Twinax cable is automatically selected. You can change to a different Twinax cable in the Autotest Settings screen.

NOTE:

The WireScope 350 does not specify any networking standards that run on Twinax cable. Any attempt to run a Certify Networks test on a Twinax cable will trigger an error message stating that none of the networks selected are configured to run on this type of cable

Press the **Start Test** button from the Autotest Setup screen to perform the Twinax Autotest

Results

After the test has completed, the result screen below on the left will appear.



One twisted pair
with Shield

Data Table



Details
Screen

The Twinax Autotest evaluates length and cable integrity. Twinax cable integrity includes the detection of a properly connected shield. These results are shown in both the diagram at the top of the screen and the table at the bottom. Delay and NVP information are also shown. Pressing the **Details** button shows more information about the test.

Chapter 9

Fiber Cable Testing Overview

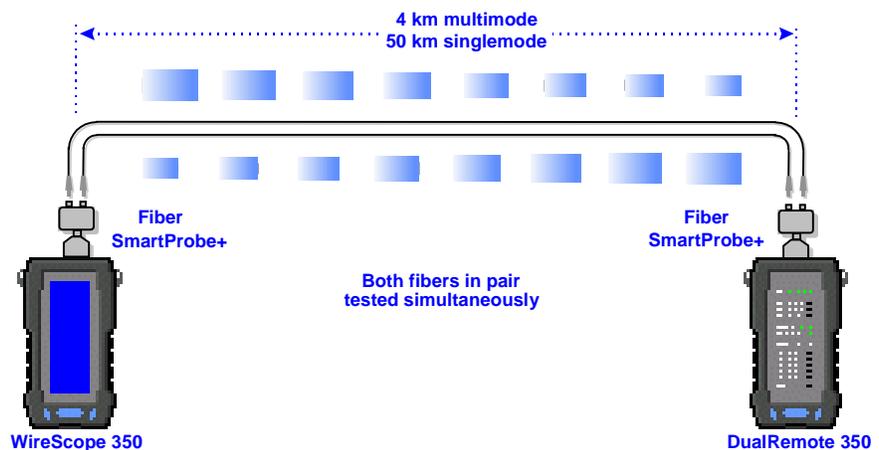
Introduction

The Fiber SmartProbe⁺ for the WireScope 350 simplify installation testing in mixed twisted pair and fiber optic installations. Testing of both multimode and singlemode optical fiber is supported by the Fiber SmartProbe⁺ family of products. Simply attach the Fiber SmartProbe⁺ to the SmartProbe port of the WireScope 350 and the unit becomes a high performance optical fiber power meter and loss meter. When the Fiber SmartProbe⁺ is used the physical length and propagation delay of a fiber optic pair is measured. Fiber optic test results are stored in the WireScope 350's tests database and can be uploaded to a Windows-based PC via the same ScopeData Pro software used to manage twisted pair test results.

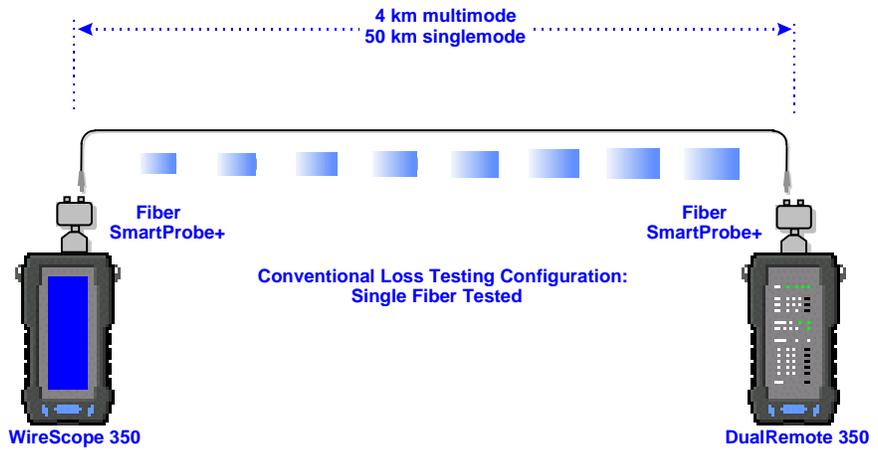
Getting Started

The Fiber SmartProbe⁺ product line consists of a family of fiber optic test probes, each of which can function as both a transmitter and a detector. LED based Fiber SmartProbes⁺ support both 850nm and 1300nm wavelengths for qualifying multimode fiber. Singlemode fiber is qualified by using the laser based 1310nm and 1550nm Fiber SmartProbes⁺. This architecture supports both Single Ended and Double Ended measurements and allows multiple combinations of Fiber SmartProbes⁺ to be used together for Double Ended measurements.

Double Ended testing requires two Fiber SmartProbes⁺. Fibers can be tested either in pairs or individually and can be up to 4 km long for multimode and 50 km for singlemode. When the two Fiber SmartProbes⁺ are used in a pair for Double Ended testing, a single Autotest can characterize a pair of fibers at two different wavelengths.

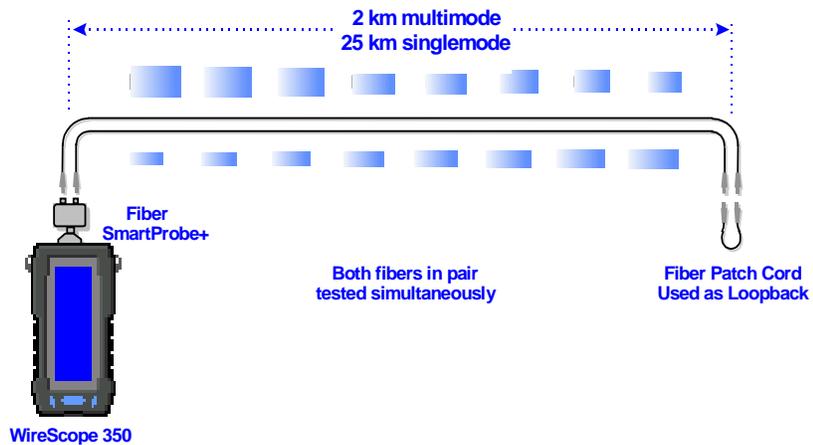


Double-Ended Test Configuration - Testing Fiber Pairs



Double-Ended Test Configuration - Testing Single Fibers

Single Ended measurements require that fibers be tested in pairs in a loopback configuration. The advantage of Single Ended testing is that only one Fiber SmartProbe⁺ is required.



Single Ended Test Configuration

Connect the Fiber SmartProbe⁺ to the WireScope 350 and it automatically configures itself for fiber optic specific testing.

Preparing to Run a Fiber Autotest

The Fiber Autotest is a comprehensive test that reports PASS/FAIL results based on user configurable limits. The Fiber Autotest will optionally generate PASS/FAIL results for the fiber optic network specifications stored in the Network Database.

Before you run the Autotest, however, it is important to verify that you have properly prepared the WireScope 350 for your certification project.

Attach FiberProbes

The WireScope 350 has the ability to detect the characteristics of the attached Fiber SmartProbes. Based on this information this interface automatically brings up the Fiber Main Menu screen once the Fiber SmartProbe is attached. You are now ready to configure the Fiber Autotest settings.

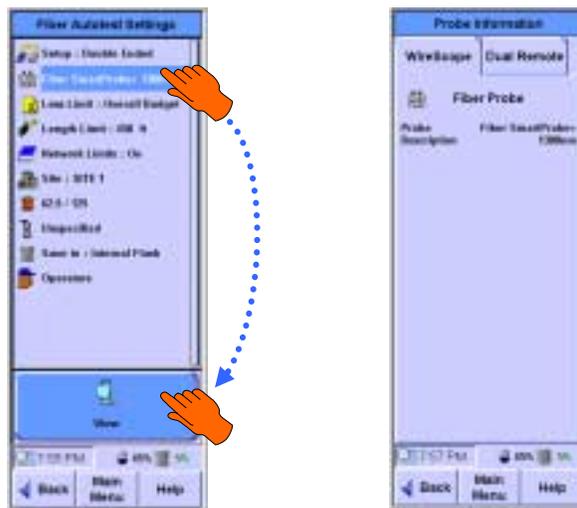


The key to providing this capability is that the SmartProbe interface port warns the operator if there is a potential invalid configuration before testing starts.



Viewing probe information

To access probe information, from the Fiber Autotest Settings screen, select the probe icon and press **OK** or **View**.

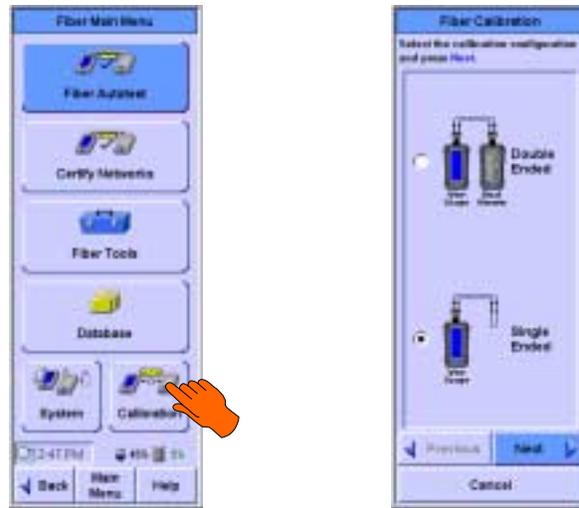


WireScope and DualRemote tabs summarize information about attached probes.

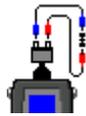
Fiber Calibration

Before you begin testing, it is necessary to calibrate the WireScope and DualRemote pair that you will use. Remote calibration is a process that allows the WireScope to obtain the reference level for measurement. In particular, you must insert the required Fiber SmartProbes.

Before running any fiber optic tests, Fiber SmartProbes need to be calibrated. To calibrate, select **Calibration** from the Fiber Main Menu. This brings up the Fiber Calibration screen with two options, Single Ended and Double Ended.

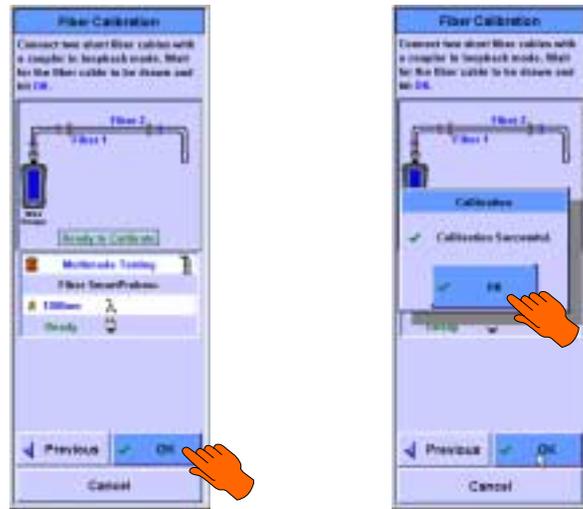


These options are explained in the following two sections.

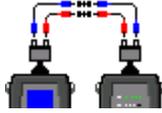


Single Ended Calibration

Attach the Fiber SmartProbe⁺ to the test port of the WireScope 350. Connect the transmitter of the Fiber SmartProbe⁺ to the detector of the same probe using two short test cables and a coupler between them. Press **Calibration** from the Fiber Main Menu. Select the Single Ended option in the Fiber Calibration screen. Press **Next** or the **OK** button to continue.



When the WireScope 350 detects a valid connection, the **OK** button will be enabled. Press **OK** or the **OK** button to perform the calibration. When the calibration is complete, a status dialog will appear. Press **OK** or the **OK** button to return to the Fiber Main Menu.



Double Ended Calibration

Connect one Fiber SmartProbe⁺ to the WireScope 350 test port and one Fiber SmartProbe⁺ to the DualRemote 350 test port. Connect the two probes together with the two duplex patch cables and couplers supplied with the probes. Connect a cable from the transmitter of each Fiber SmartProbe⁺ to the detector of the other. Make sure that a coupler is connected correctly with each duplex cable.

Press **Calibration** on the Fiber Main Menu, and select Double Ended. Press **Next** or **OK** to continue.



The next screen, displayed above, will show both the WireScope and the DualRemote 350. As the probes detect the signal being passed between them, cables will be drawn to represent the connections. When there is a valid connection, the **OK** button will be enabled. Press **OK** or **OK** to perform calibration. When the calibration is complete, a status dialog will appear. Press **OK** or **OK** to return to the Fiber Main Menu.

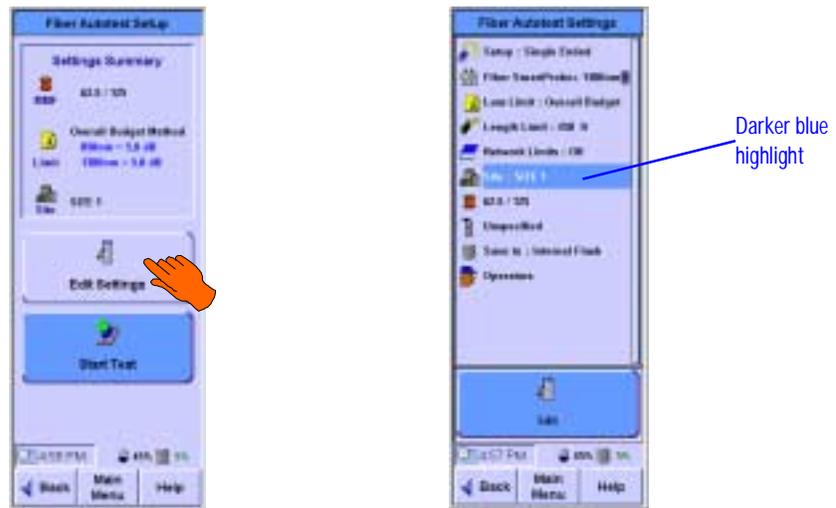
Fiber Autotest Settings

The WireScope 350 is designed to be flexible to support a wide range of networking, cable, and connector certifications you may encounter in the field. Before you start testing, it is important that your fiber autotest settings match your certification requirements.



Editing fiber autotest settings

To edit autotest settings, start at the Fiber Main Menu and press **Fiber Autotest**. This brings up the Fiber Autotest Setup screen. The Fiber Autotest Setup screen summarizes a few key settings. You can either start an autotest from this screen or edit settings.



To view and edit any fiber autotest settings from the Fiber Autotest Setup screen, press **Edit Settings**. The Fiber Autotest Settings screen shown above on the right will open up.

The Fiber Autotest Settings screen lists all of the current fiber autotest settings categories and summary status for each. To view or edit any setting, first select it either by touching it or using the **OK** key. Selection is indicated by a darker blue color highlight.

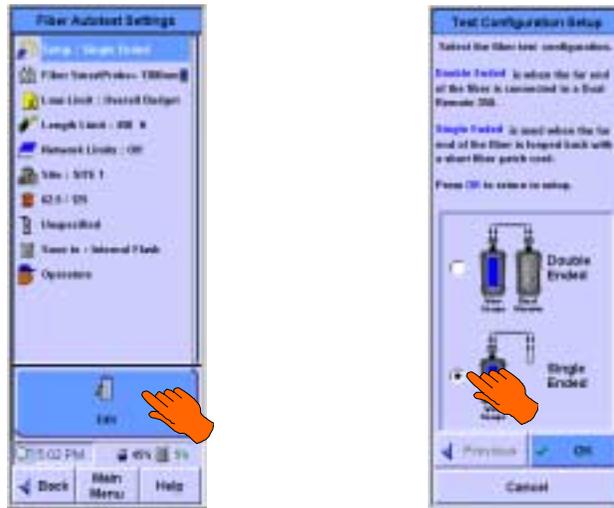
Press **OK** or the **Edit** button to open the configuration screen(s) for the selected setting. Once you have opened the configuration screen(s) for any setting, there will be instructions to guide you through any changes to that setting. When you exit the configuration screen(s) for any setting, you will return to the Fiber Autotest Settings screen.



Fiber Test Configuration Setup

First, you must specify whether the Fiber Autotest will be Single Ended or Double Ended.

Single Ended measurements require that fibers be tested in pairs in a loopback configuration. **Double Ended** testing requires two Fiber SmartProbes allowing fibers to be tested either in pairs or individually.



To select Single Ended or Double Ended Mode, select the **Setup** icon and press the **OK** or the **Edit** button. Select the desired configuration and press **OK** or **OK** to return to the Fiber Autotest Settings screen.

NOTE:

The WireScope 350 detects the type of probe inserted into the SmartProbe connector. See page 39 for an introduction to this feature and how to view probe information.



Loss Limit

You are given two options for this parameter, Overall Budget Method and Length/Loss Method.

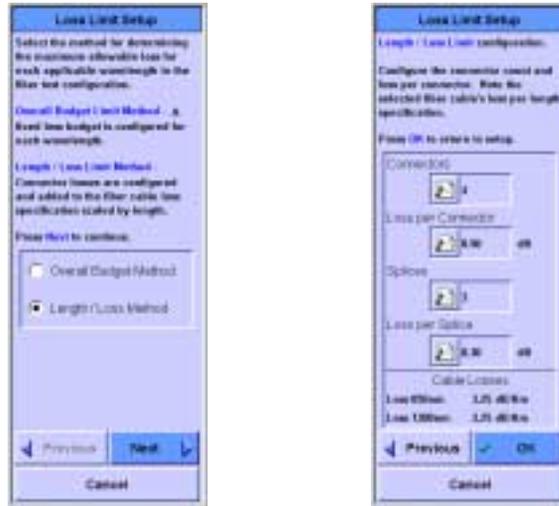
Overall Budget Method configures a fixed loss limit value for each applicable wavelength. If a multimode cable is selected, you will be asked to specify overall loss budgets for 850 nm and 1300 nm wavelengths. If a singlemode cable is selected, you will be asked to specify overall loss budgets for 1310 nm and 1550 nm wavelengths.



Multimode
Example

Press **OK** or  to complete the setup. This returns you to the Fiber Autotest Settings screen.

Length/Loss Method lets the WireScope 350 calculate the limit for you based on the length of the cable tested. You will be able to set values for **Connectors**, **Loss per Connector**, **Splices**, and **Loss per Splice**. The connector and splice losses are added to the loss calculated by multiplying the length of the fiber by the loss/Km specification of the selected cable. These specifications are shown at the bottom of the Setup screen.

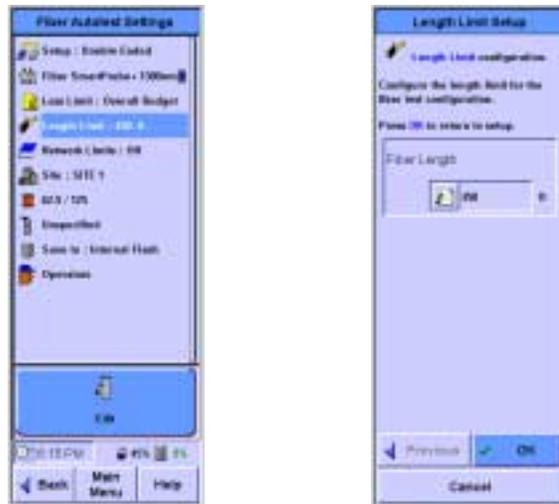


Press **OK** or  to complete the setup. You will be returned to the Fiber Autotest Settings screen.



Length Limit

The Length Limit parameter allows you to set the maximum cable length allowed. To change the length select **Length Limit** and press  or **Edit**. Press the edit icon to pop up a numeric data entry keypad. Enter the length and press **OK** or  to close the keypad.



Press **OK** or  to complete the setup and return you to the Fiber Autotest Settings screen.



Network Certification

The WireScope 350 can certify cabling for compliance with the physical medium dependent (PMD) requirements of popular network interface technologies such as Ethernet or ATM. Network certification can be in addition to certification to cabling limits.

A pass result for a particular networking technology indicates that the tested cable run meets the loss and length requirements necessary to successfully support communications between devices of that type.

To add network certification into the autotest, select **Network Limits** from the list of autotest settings and press **OK** or the **Edit** button to open the Fiber Networks Setup configuration screens.



Check the boxes corresponding to the network types you wish to certify the cabling for. The “Other” Category encompasses a number of less popular legacy applications. When you are finished, press **OK** or **OK** to return to the Fiber Autotest Settings screen.



Site Settings

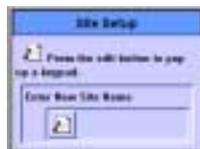
The WireScope 350 can store the site name in each test result record. This capability helps organize test records and simplifies reporting. A site setting specifies the format used to label test records for that site. You can save either:

- A simple cable label with only one field (i.e. “cable number”)
- A hierarchical cable label that contains multiple fields (i.e. “Building / Floor / Wall Plate / Jack Number”)

Select the site icon and press **OK** or the **Edit** button to enter or change the site settings. You can either select an existing site name if you already have one loaded, or enter a new site name. Press **Create New Site Name** and press **OK** or **Next** to continue.

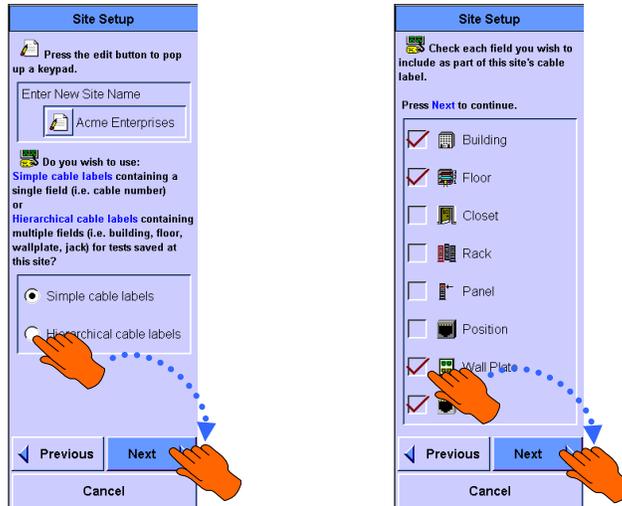


To enter a new site name, press the edit icon. You can enter the site name either using the telephone-style keypad or the typewriter-style keyboard.



Setting up hierarchical cable labels

By default, the WireScope 350 is set to use simple cable labels composed of just a single field. This is the format most used by previous generations of cable testers. Many customers, however, prefer to save cable labels in a hierarchical format.

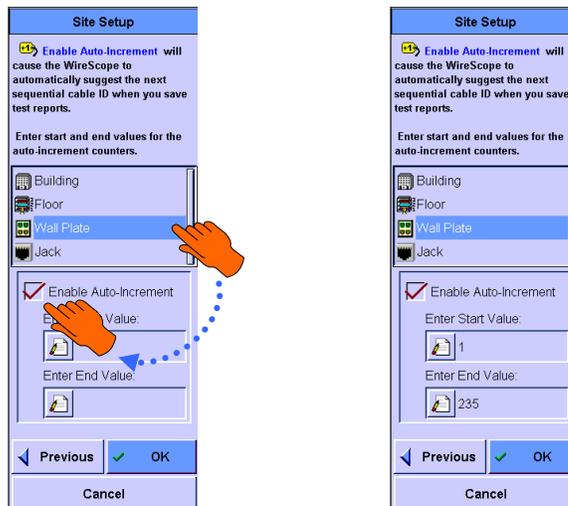


To configure the WireScope 350 to use hierarchical cable labels, set the corresponding radio button on the Site setup screen. Press **OK** or **Next** to continue site setup.

Select the fields to include in the hierarchical cable label. Press **OK** or **Next** to continue on to auto-increment settings within site setup.

Setting up cable label auto-increment behavior

For either simple or hierarchical cable labels, it is useful to set up an auto-increment scheme so that you do not have to manually enter repetitive cable label information when testing a sequence of cabling runs.



Select a cable label field for which you wish to enable auto-increment and check the “enable auto-increment” box. Enter a start and end value. Repeat for each

field you wish to auto-increment. Press **OK** or **OK** to return to the Fiber Autotest Settings screen.



Specifying the fiber cable

You must specify either the part number or the performance characteristics of the cable under test in order for the WireScope 350 to make accurate length and power measurements. You can either select the cable part number from a pre-loaded list of the most popular cable types or you can enter the cable part number and specifications.

If you manually enter cable specifications, it is important to input accurate values for the refractive index or, optionally, the nominal velocity of propagation (NVP) for each fiber type. Failure to do so will produce inaccurate cable length measurements.

To enter cable information, starting at the Fiber Autotest Settings screen, select the cable icon and press **OK** or **Edit**.



The first Cable Setup configuration screen prompts you to specify the manufacturer of the cable that you will be testing. If you do not know the manufacturer, select “Unspecified”. Use the **+** key if you need to scroll the list of manufacturers. In the example above, Corning is selected.

The next Cable Setup configuration screen prompts you to either enter/edit a cable description or select one from the list already stored on the WireScope 350. If you see the part number of the cable you are using, select it and press **OK** or **OK** to complete cable selection and return to the Fiber Autotest Settings screen.

If you do not see the cable you are using already listed in the WireScope 350, select **Add New Description** and follow the instructions to add the specifications data for the new cable.

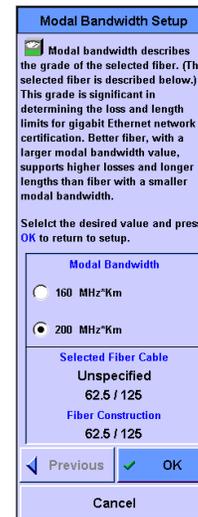


Modal Bandwidth setting

Modal bandwidth describes the grade of the selected fiber. This grade is significant in determining the loss and length limits for gigabit Ethernet network certification. Better fiber, with a larger modal bandwidth value, supports higher losses and longer lengths than fiber with a smaller modal bandwidth. The modal bandwidth settings will only appear if a 62.5/125u or a 50/125u fiber cable is selected.

The actual loss and length limits for 1000Base-SX, at 850nm, are dependent on the fiber type and the modal bandwidth of the selected fiber.

To modify the modal bandwidth information, starting at the Fiber Autotest Settings screen, select the modal bandwidth icon and press **OK** or **Edit**.



Select the fiber's modal bandwidth specification and press **OK** or **OK** to return to the Fiber Autotest Settings screen.



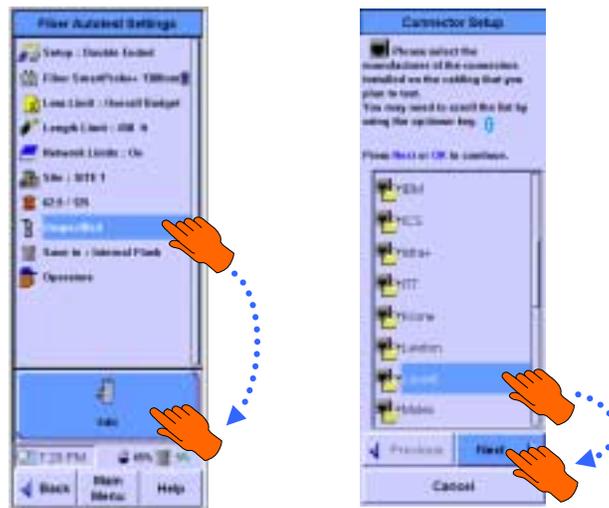
Specifying the connecting hardware

You can use this setting to store information in each test record about the type of connecting hardware used to terminate the tested cable runs. You can either select the connecting hardware part number from a pre-loaded list or you can enter a description or part number.

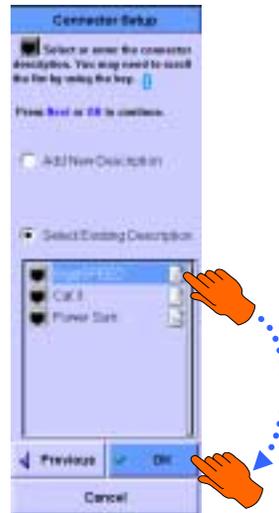
The connector type specified assists the WireScope 350 in determining the test configuration. Some connectors, such as MT-RJ, do not allow for fiber swapping. Selecting this type of connector will disable the swap feature used in Double Ended testing.

To enter connecting hardware information, start at the Fiber Autotest Settings screen and select the connector icon and press **OK** or **Edit**.

The first Connector Setup configuration screen prompts you to specify the manufacturer of the connecting hardware that you will be testing. If you do not know the manufacturer, select “Unspecified”. Use the **↑** key if you need to scroll the list of manufacturers.



The next Connector Setup configuration screen prompts you to either select a connector from the list stored on the WireScope 350 or add a new description. If you see the part number of the connecting hardware you are using, select it and press **OK** or **OK** to complete connector selection and return to the Autotest Settings screen.



If you do not see the connecting hardware you are using already listed in the WireScope 350, select **Add New Description** and follow the instructions to add the specification data for the new connector.

Save to: Storage Location setting

This setting allows you to choose where to save test results.



If a CompactFlash™ memory card is inserted, the default choice is to save test results to the CompactFlash™ card.



Otherwise, the default choice is to save results to the internal flash memory.

Select the test results storage icon and press **OK** or the **Edit** button to change the test result storage setting.

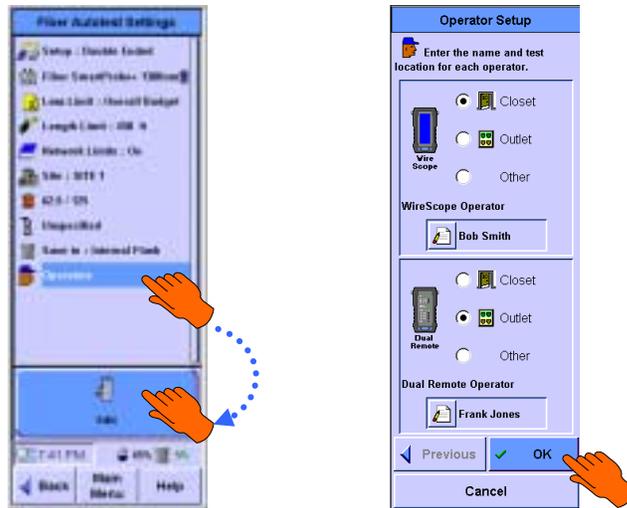


Operators setting

Usually, a two-person team operates the WireScope 350 set. You can store the names of both the main unit operator and the remote unit operator in each test record.

You can also store information about which end of the cable run each unit tested (for example: main unit in telecom closet and remote unit at user location).

Select the Operators icon and press **OK** or the **Edit** button to enter or change operator information.



Enter the name of each operator and the location where he or she is testing. This information is captured automatically and stored in each saved Autotest file. Press **OK** or **OK** to return to the Fiber Autotest Settings screen.

Chapter 11

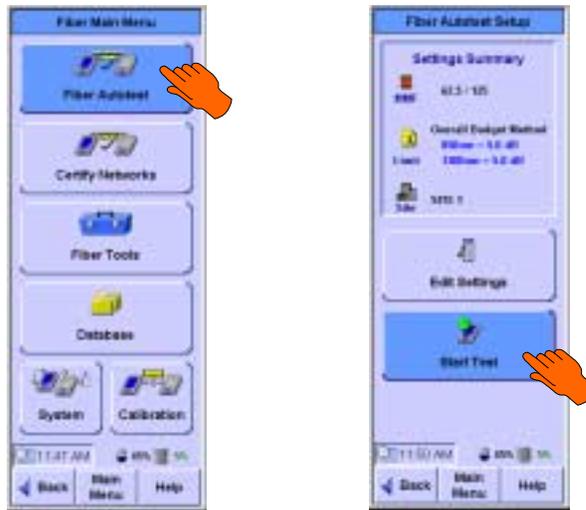
Running a Fiber Autotest

Starting the Fiber Autotest



Make sure that you have attached the correct fiber test probes and configured the proper settings.

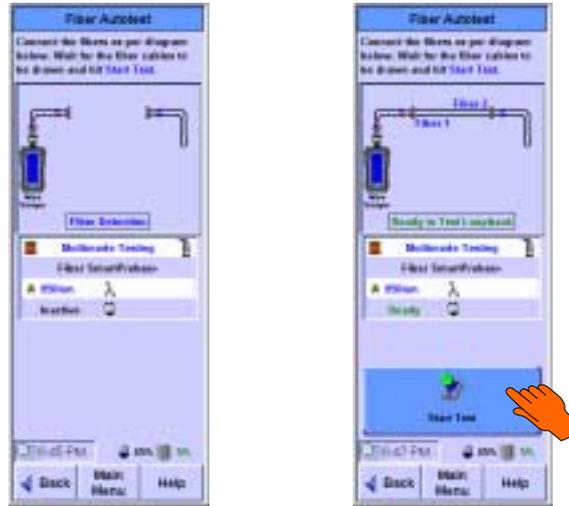
To start an Autotest from the Fiber Main Menu screen, press **OK** or **Autotest**. This brings up the Fiber Autotest Setup screen. If you need to, you can review settings from this screen before you start the Autotest. Press **OK** again or **Start Test**.



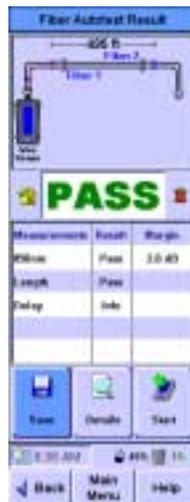
The procedures for running a single ended and double ended fiber autotests differ slightly as the following sections describe.

Running a single ended fiber autotest

Connect the WireScope 350 and attached Fiber SmartProbe⁺ to one end of the fiber pair to be tested. Using a fiber patch cable, connect the two fibers at the far end of the fiber pair in a loopback configuration. After pressing **Start Test** on the Fiber Autotest Setup screen, the screen shown below will appear.

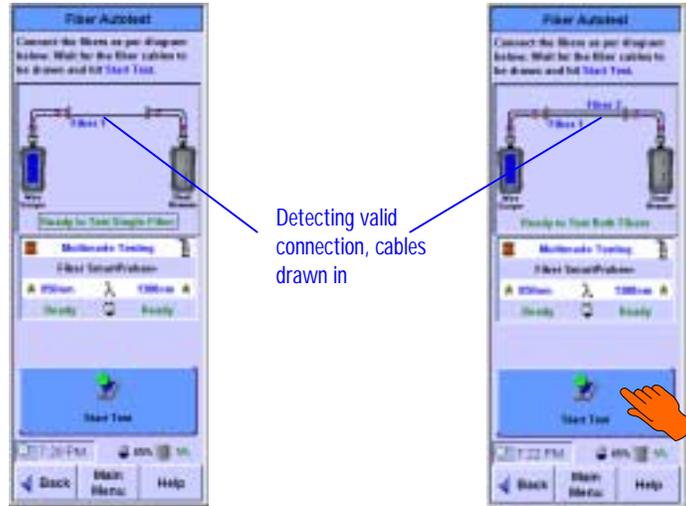


The Fiber Autotest screen shows the current state of the fibers connected to the Fiber SmartProbe⁺. The WireScope 350 constantly monitors these connections waiting for a valid Single Ended configuration. Once this valid configuration is detected, the cable connections are drawn and the **Start Test** button is enabled. Press **Start Test** or **OK** to begin the Fiber Autotest. The test will run to completion and the Fiber Autotest Result screen will be displayed.

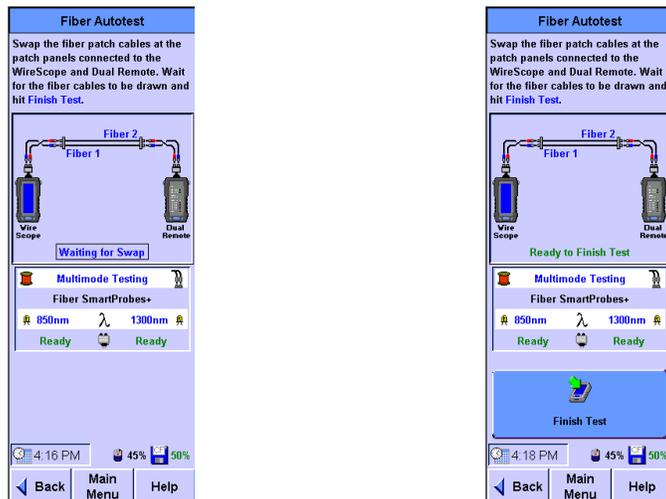


Running a double ended fiber autotest

Connect the WireScope 350 and attached Fiber SmartProbe⁺ to one end of the fiber pair to be tested. Connect the DualRemote 350 and attached Fiber SmartProbe⁺ to the other end. After pressing **Start Test** on the Fiber Autotest Setup screen, the screen shown below will appear.



The Fiber Autotest screen shows the current state of the fibers connections. The WireScope 350 constantly monitors these connections waiting for a valid double ended configuration. Once a valid configuration is detected, the cable connection(s) are drawn and the **Start Test** button is enabled. Press **Start Test** or **OK** to begin the Fiber Autotest. If the test configuration is a 2 fiber connection between Fiber SmartProbes with different wavelengths, the test will continue with a screen similar to the one below. Otherwise the test will run to completion and the Fiber Autotest Result screen will be displayed.



It is at this point in a double ended test where the user(s) must swap the fibers at each end of the fiber cable run before the test can complete. Both the WireScope and the DualRemote will play a swap chirrup to indicate this required fiber swap.

NOTE:

It is important that this swap occur at the wall outlet or patch panel and NOT at the Fiber SmartProbes to insure accurate results.

The WireScope 350 continues to monitor the connections waiting for a successful swap of the fibers. When a valid swapped configuration is detected the cable connections are drawn and the **Finish Test** button is enabled. Press **Finish Test** or **OK** to finish the Fiber Autotest. The test will run to completion and the Fiber Autotest Result screen will be displayed.



DualRemote LED indicators during Double Ended Autotest

The LEDs on the DualRemote 350 are used to aid you in monitoring, performing, and evaluating the result of a Double Ended autotest. The following groups of LEDs are used during fiber testing:



Progress Indicator

The three Progress Indicator LEDs are used to aid you in monitoring and performing a Double Ended autotest. The following states are possible:

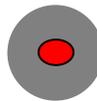
- Test Starting: Waiting for initial double ended 2-fiber connection
- Test Active: Initial double ended 2-fiber connection detected
- Test Active: Middle LED blinks (swap chirrup sounds)
Waiting for users to swap the two fiber connections
- Test Active: Middle LED solid ON
Swap complete, ready to continue test
- Test Complete: Result shown on Pass / Fail Led



Pass / Fail

The pass / fail LED indicates the pass / fail status of the last completed test.

- Green indicates pass
- Red indicates fail



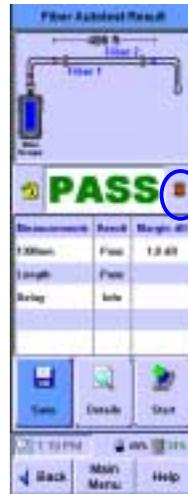
Diagnostics

A column of diagnostic LEDs provide further detail about the cause(s) of a test failure. The failure causes that can be indicated for a fiber test are:

- Length / Delay / Skew >> Fiber length failure
- Attenuation >> Fiber loss failure
- Other >> Fiber Certify Network failure

The Fiber Autotest Result Summary Screen

After the Autotest completes, the Autotest Summary screen appears. Examples of single and double ended tests are displayed below.



Measured length of cabling run

Single Ended Test Setup

Multimode Cable Test

Summary margins



Double Ended Test Setup

Loss Marked as FAIL

Failing margins shown in red

From the Fiber Autotest Result screen, you can either:

- Save the current test result by pressing the **Save** button
- Start a new autotest by pressing the **Start** button
- View detailed result data by pressing the **Details** button.

Saving test results



When you press the **Save** button, the Save Results screen appears. Each saved test result record must have a unique cable label. There are several options for entering the cable label for the saved test result:

- You can use a typewriter-style keyboard
- You can use a telephone-style keypad
- You can pick an already-saved label from a list
- Or, if a label list has been loaded, you can select a label from the list of cable IDs.

Details for entering data using the keyboard, keypad, or using a list are given on page 21.

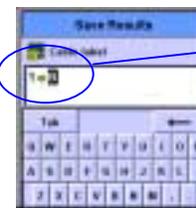
Using auto-increment



Often, if you are testing cabling runs in a predictable sequence, it can save time to configure the WireScope 350 to auto-increment cable labels. With auto-increment, you dramatically reduce the amount of data entry that you must do. To setup cable label auto-increment, please see *Site Settings* in Chapter 4. In the example sequence below, auto-increment is set for the panel and position fields of a hierarchical cable label format.



First test is labeled Panel 1, Position A

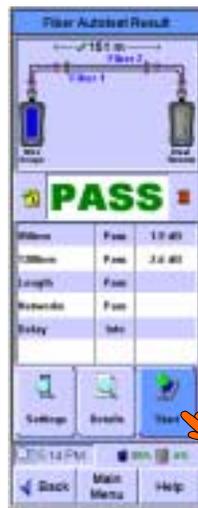


Second test is labeled Panel 1, Position B

Starting the next Autotest



From the Fiber Autotest Result screen, you can start another Autotest by pressing the **Start** button. If you have already saved the previous test, the Autotest will start without any further delay. If you have not yet saved the previous test, a dialog box will pop up to confirm that you wish to start another test without saving the previous result.



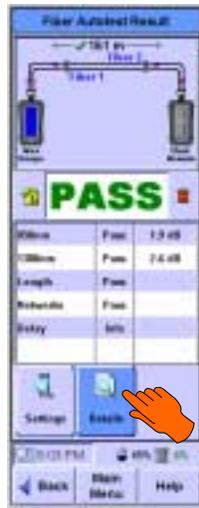
Press **Start** to start the next test.



Viewing result details



To see a complete listing of all measurements for any completed Fiber Autotest, press the **Details** button while at the Fiber Autotest Result screen.



Data Table

Currently selected parameter highlighted in dark blue

You may need to scroll the list to see all of the parameters in the Test Data window. Use the  key to scroll the list.

Each measurement is listed together with a summary result.

-  Passing results are marked with a green check.
-  Failing results are marked with a red "X".
-  Measurement results not used in determining overall pass/fail status are marked to signify that these results are for information only.

The parameters listed on this screen may include:

- Loss measurements at available wavelengths
- Length measurements
- Delay measurements
- Individual network certification results

The detailed information about the selected parameter will appear in the Data Table at the top of the Fiber Test Data screen.

Chapter 12

Fiber Certify Networks



Purpose

Some users are not concerned about whether the tested cabling complies with cabling standard performance requirements, but rather are interested in directly surveying their cabling for compatibility with popular network applications, such as Ethernet (at various speeds) and ATM.

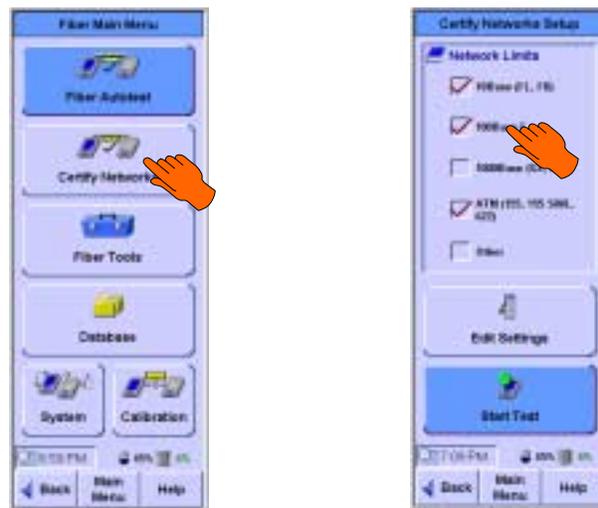
Whereas cabling performance standards attempt to be application-neutral and consequently take into account the requirements of many applications, the Certify Network test profiles implemented in the WireScope 350 are specific to the requirements of each network application interface.

By running a fiber certify network test, you can determine whether the tested cabling run can successfully support the selected network application(s).

Operation

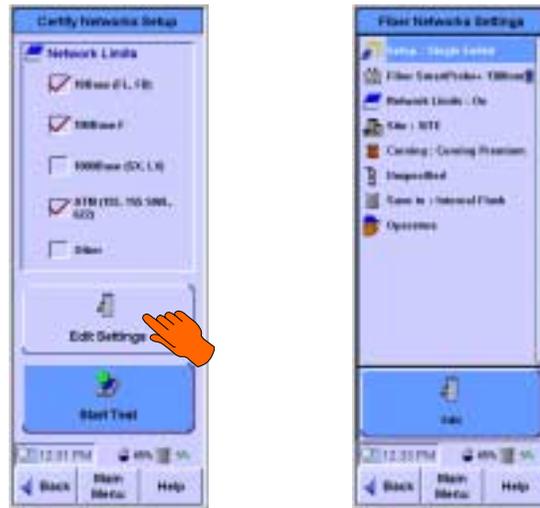
You can either run the Certify Network test profiles as part of the fiber autotest function (setting this up is described in chapter 7) or separately using the Certify Networks test function.

To run the Certify Networks function independently, press the **Certify Networks** button on the Fiber Main Menu screen. The Certify Networks setup screen appears. You can directly select which network applications to certify the cabling for by checking the appropriate boxes in this screen.

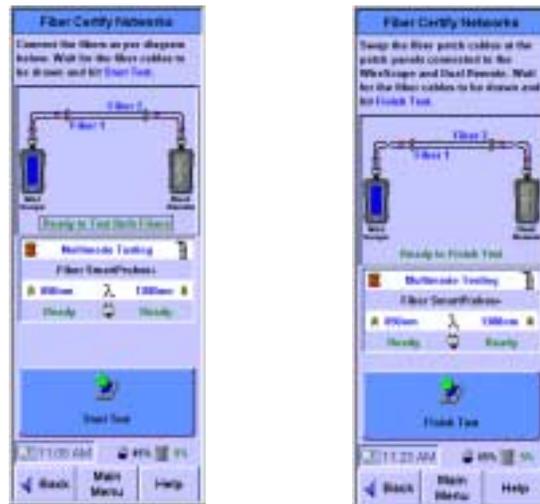


The “Other” category encompasses a variety of legacy applications. If you select this option, the WireScope 350 will analyze the cabling for compatibility with all of these legacy applications.

You can review and edit other relevant settings before testing by pressing the **Edit Settings** button.



The Certify Networks settings are a subset of the Autotest settings and can be edited using the same procedures outlined in Chapter 7.



To start the Certify Networks test, return to the Certify Networks setup screen and press **OK** or press the **Start Test** button. Screens similar to the ones above will step you through the test. The process of running a Fiber Certify Networks test is the same as that of the Fiber Autotest. Refer to the procedures outlined in Chapter 10 for details. When the test has run to completion a Fiber Certify Networks Result Summary screen will appear.

Certify networks results

The Certify Networks summary results screen lists the network groups tested and a summary result. The Save and Start options on this screen behave the same as those found on the Fiber Autotest screen. See Chapter 10.



You can view more detail about the tested networks by pressing the **Details** button. The Networks Data screen will appear. The details and margin information for the network selected in the list will appear in the Data Table at the top of the screen.



Data Table
Margin Information

Networks

Chapter 13

Fiber Tools

Introduction



The Fiber Tools menu organizes individual fiber test functions that you can run from the WireScope 350. To access the test functions under the Fiber Tools menu, press the **Tools** button in the Fiber Main Menu.



The Fiber Tools menu contains five tools:

- Loss Meter
- Length and Delay
- Power Meter
- Trace Mode
- Learn Fiber NVP

To launch any of these tools, press the corresponding button.

Loss Meter

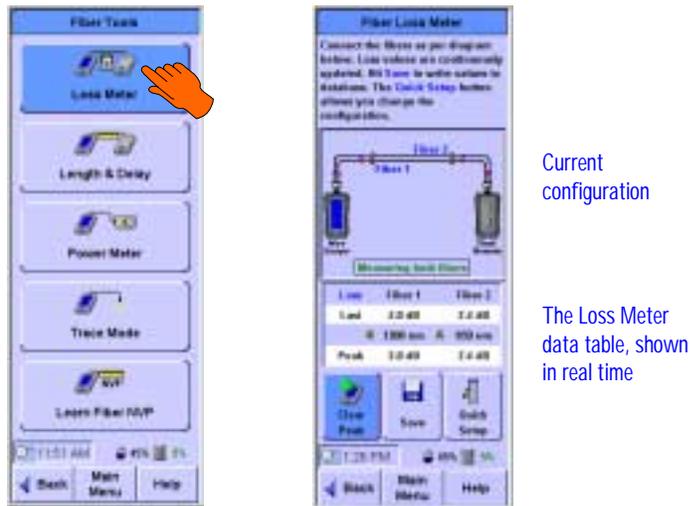


Purpose

The Loss Meter is a troubleshooting tool, aimed at helping the installer quickly verify and correct cabling problems. The Loss Meter continuously reports the loss on each fiber optic cable connected. The Loss Meter performs the test in real time and displays results based on the current configuration and the number of fiber optic cables connected to the SmartProbe(s).

Operation

From the Fiber Tools menu, press the **Loss Meter** button, or the **OK** button, since **Loss Meter** is highlighted in darker blue.

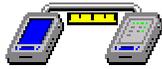


The Loss Meter shows the current test configuration and constantly updates the measured loss values for all applicable wavelengths in real time. The Fiber Loss Meter screen shows the results of the measurement in the Data Table. From here, the measurements can be saved, for use later as viewing.

The tool offers the following options:

- Press **Clear Peak** to reset the peak values in the data table.
- Press **Save** to write the current table to the results database.
- Press the **Quick Setup** button to bring you up a configuration screen where you will be able to select single or double ended testing, and/or specify the fiber type. See the Quick Setup Overview topic in the Length and Delay section that follows.

Length and Delay

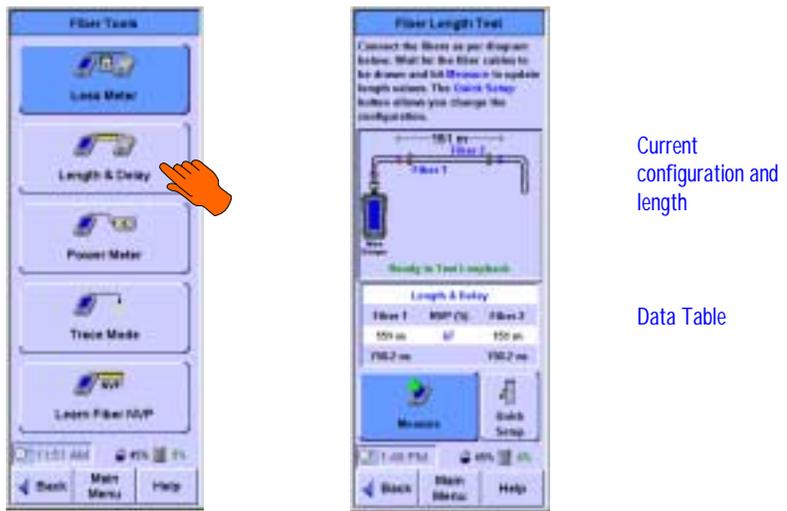


Purpose

Length and Delay is a test used to quickly measure the length and propagation delay of the fiber under test. It uses the currently selected cable's specifications to get the NVP.

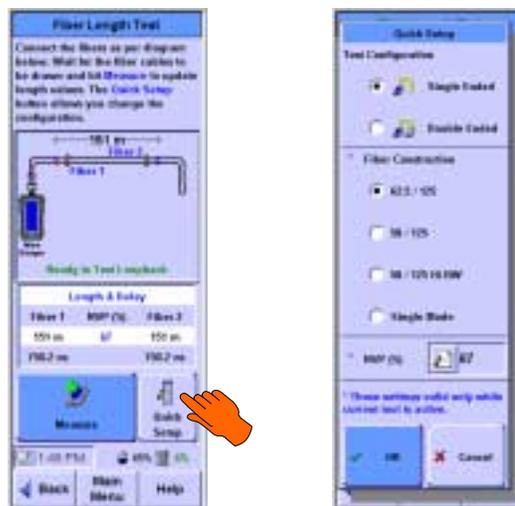
Operation

From the Fiber Tools menu, press the **Length & Delay** button. This brings you to the Fiber Length test screen. From here you can either go to the **Quick Setup**, or you can start the measurement. The **Measure** button will only appear when the WireScope 350 detects a valid fiber connection. Press the **Measure** or **OK** button to update the length and delay values for each fiber in the Data Table.



Quick Setup Overview

Pressing the **Quick Setup** button brings you to a screen where you will be able to set the configuration as single or double ended, fiber type, and the NVP value. Here, the fiber type and NVP are test specific. In other words, any changes to the fiber type and NVP will NOT be reflected in the system settings nor will they be preserved if you were to exit and re-enter the Length and Delay tool.



After changing any settings in the Quick Setup dialog press **OK** or  to return to the Fiber Length and Delay screen.

Power Meter

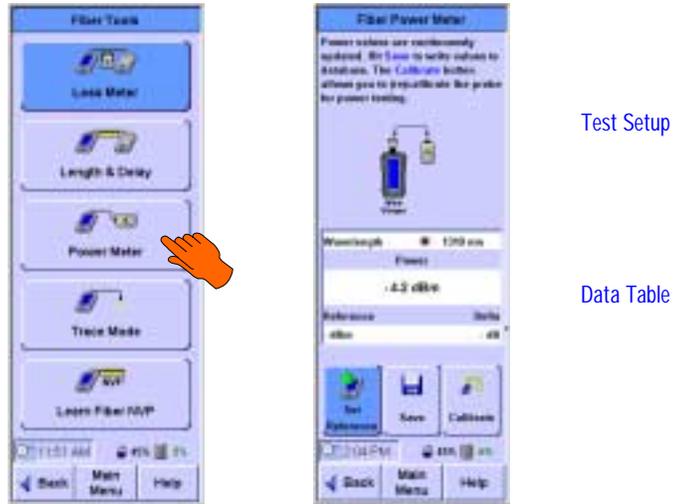


Purpose

The Power Meter is a troubleshooting tool, aimed at helping the installer quickly verify and correct cabling and/or equipment problems. The Power Meter allows you to connect a cable between equipment (or some other light source) and the detector of the Fiber SmartProbe⁺, then measure the power level. The results can be saved to the tests database for later viewing.

Operation

From the Fiber Tools menu, press the **Power Meter** button. If the probe inserted in the WireScope 350 has been calibrated (see Power Meter Calibration below), the screen below on the right will appear. This is the Fiber Power Meter tool. The Data Table shows a constantly updating power level while indicating the wavelength of the inserted Fiber SmartProbe⁺.

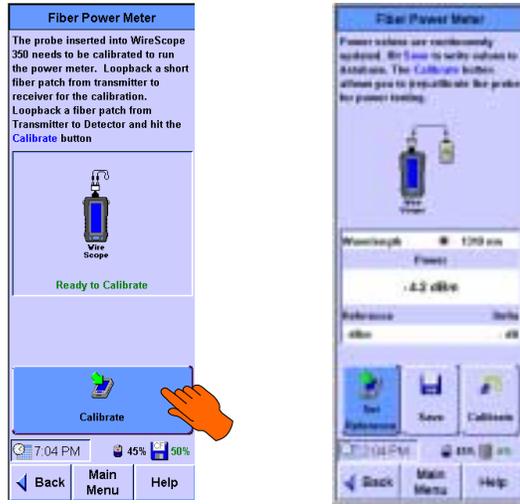


The tool allows you to store the current power level as a reference by pressing the **Set Reference** button. Once the reference is stored, the Delta field is constantly updated to reflect the difference between the Reference value and the current power level. This will provide a valid Delta field that shows a constantly updating difference. The **Save** button allows you to save the current values in the Data Table for later viewing. The **Calibrate** button brings up the Power Meter Calibration screen described below.

Power Meter Calibration

The power meter requires a calibration in order to produce accurate power measurements. This calibration is a loopback configuration where the transmitter of the Fiber SmartProbe⁺ inserted in the WireScope 350 is connected to the detector of the same probe with a SINGLE (i.e. no couplers) fiber patch cord.

The Power Meter Calibration screen shown below appears whenever a new Fiber SmartProbe⁺ is detected upon entering the Power Meter tool. Pressing the **Calibrate** button on the Power Meter screen will also bring up this screen.



The WireScope 350 constantly monitors the Fiber SmartProbe⁺ waiting for a valid loopback configuration. Once this valid configuration is detected, the animation of the loopback cable stops and the **Calibrate** button is enabled. Press **Calibrate** or **OK** to begin the calibration. The calibration will run to completion and the Fiber Power Meter screen will be displayed. Any stored reference and delta power values will be reset after a calibration.

Fiber Trace Mode

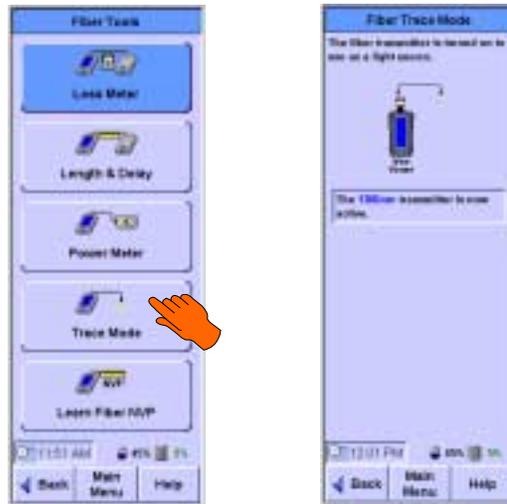


Purpose

Fiber Trace Mode is a troubleshooting tool aimed at helping the installer quickly verify and correct cabling problems. Upon entering Trace Mode the transmitter on the Fiber SmartProbe⁺ connected to the WireScope 350 is activated. This allows you to verify that the light is present at the end of the cable.

Operation

Press the **Trace Mode** button from the Fiber Tools menu. This will bring you to the Fiber Trace Mode screen.



Press **Back** to exit the tool.

Learn Fiber NVP



Purpose

The Fiber Learn NVP tool allows you to measure the NVP (Nominal Velocity of Propagation) of an unknown cable type provided you have a known length. Cable samples must be at least 50 feet (or 15 meters) long. Longer samples produce more accurate NVP measurements.

The tool expects the length specification to differ when in single ended mode and double ended mode.

Single Ended Mode Length Specification

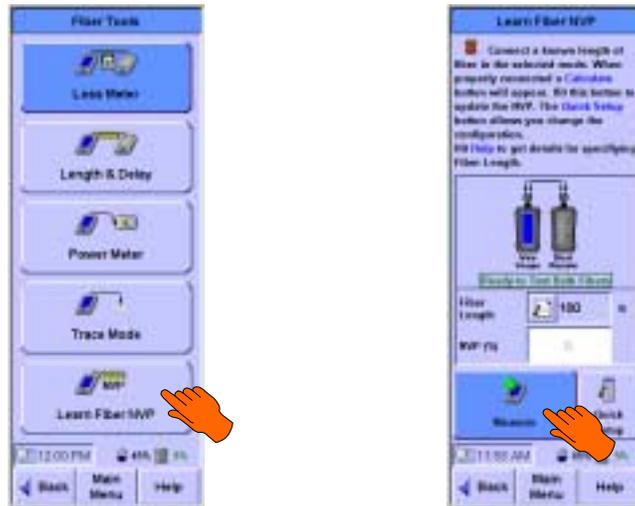
In a single ended configuration, the tool expects a single fiber to be connected from the transmitter of the Fiber SmartProbe⁺ to its detector. When entering length in the tool, enter the ENTIRE length of the fiber cable.

Double Ended Mode Length Specification

In double ended configuration, the tool expects 2 fibers to be connected from the WireScope 350 to the DualRemote. When entering length in the tool, enter the AVERAGE length of the 2 fiber cables.

Operation

From the Fiber Tools menu, press the **Learn Fiber NVP** button.



Attach a known length of fiber cable to WireScope 350 and specify the length as described above. The WireScope 350 constantly monitors the Fiber SmartProbe⁺ waiting for a valid test configuration. Once this valid configuration is detected, the animation of the fiber connection stops and the **Measure** button is enabled. Press **Measure** or **OK** to update the NVP value.

The resulting NVP value represents the speed at which light will propagate along the sample cable, expressed as a percentage of the speed of light in a vacuum.

Press **Back** to return to the Fiber Tools screen.

Chapter 14

Database and Memory

Overview

When you save test results, the WireScope 350 stores the saved data into either its internal flash memory or optionally, into a removable CompactFlash™ memory card.

You can review test results on the WireScope 350 by using the Database tool.

You can upload saved test results directly from the WireScope 350 or from a CompactFlash™ memory card to a PC running ScopeData Pro software.

Size of test result records and memory capacity

The amount of memory space that each test result takes up depends on the options that you set before you start testing. Generally, if you save plots with each test, the size of each test result file is considerably larger than if you omit plots. When you save plots, the size of the result file depends on the maximum frequency selected and on how many additional measurements you add into each autotest.

The WireScope 350 allocates approximately 4MB of internal Flash memory for test result storage. The exact amount of memory available depends on the size of the WireScope 350 software that is loaded.

The following table outlines approximate record storage capabilities for the internal Flash memory when configured for 4MB and for a 32 MB removable CompactFlash™ card.

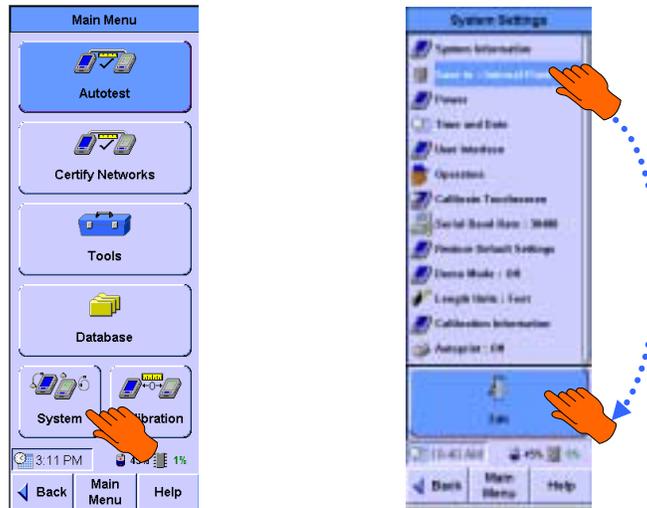
Autotest Type	Comment	Record Size (KB)	Capacity (# of Records)	
			Internal 4 MB Flash	32 MB CFlash Card
Category 5, 5E or 6 without plots	None	3.1	~ 1,200	~ 9,900
Category 5, 5E, 6 without plots	Ambient noise sweep on	3.6	~ 1,150	~ 9,250
Category 5 or 5E with plots saved	Plots to 100 MHz	33.8	~ 90	~ 750
Category 6 with plots saved	Plots to 250 MHz Summary ELFEXT	52.8	~ 60	~ 480
Category 6 with plots saved	Plots to 350 MHz; Ambient noise spectrum saved Complete ELFEXT mode	81.0	~ 45	~ 350

Viewing memory status

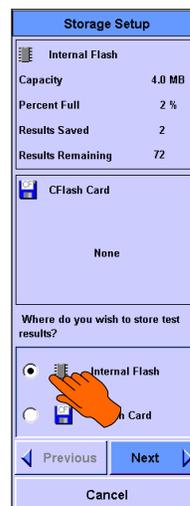
At the bottom of all test screens, the WireScope 350 provides a quick indication of how much of the available memory is already full.

-  0% shows how full the internal Flash memory is
-  0% shows how full the CompactFlash™ memory card is

To see more detailed information about the status of the current memory location, press **System** on the main menu. The System Settings screen will appear. Select the memory setting and press  or the **Edit** button.



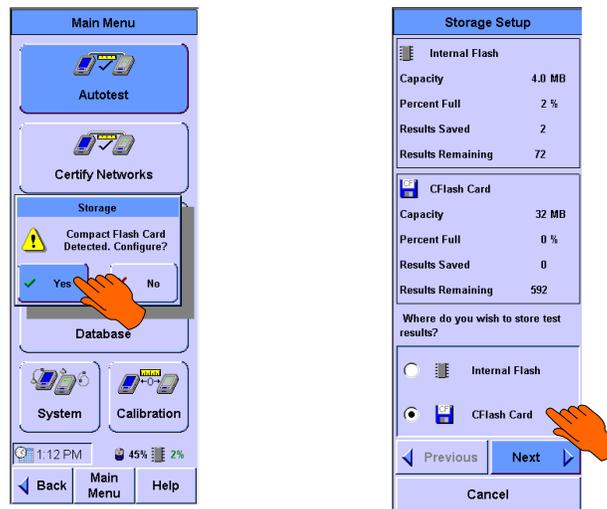
The Storage Setup screen will appear. The capacity and percent full status of the current memory device are displayed. The number of records that can be saved into the remaining free memory with the current autotest settings is also displayed.



Using CompactFlash™ cards

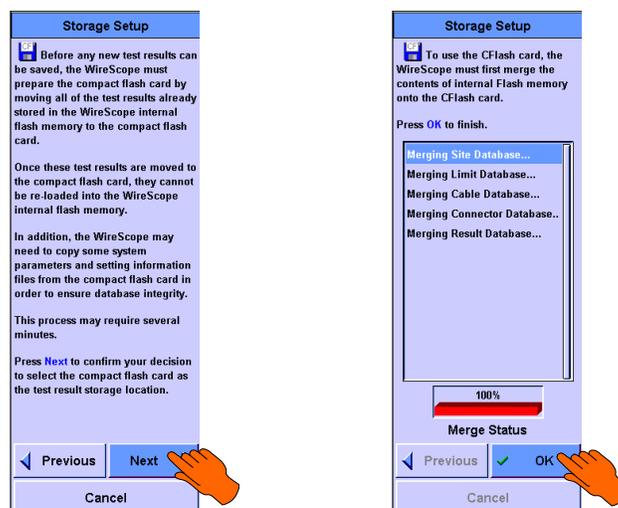
The WireScope 350 can save test results either in an internal (fixed) flash memory area or in an optional removable CompactFlash™ memory card. If the CompactFlash™ slot is empty, the WireScope 350 by default saves test results to the internal flash memory area.

When you insert a CompactFlash™ card into the WireScope 350 CompactFlash™ slot, the following dialog box appears:



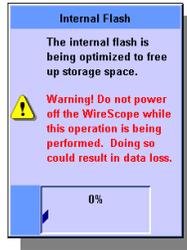
Press the **Yes** button to begin configuring the CompactFlash™ card. The Storage Setup screen will appear. Select **CFlash Card** and press **OK** or Next to continue.

Before the WireScope 350 can begin saving tests records to the CompactFlash™ card, it automatically moves all result and setting information presently stored in internal flash memory to the CompactFlash™ card. Once the information is moved, the internal flash memory is cleared.



Once this process of merging databases onto the CompactFlash™ card and cleaning up the internal flash memory is complete, you can start saving test results to the CompactFlash™ card.

The WireScope 350 internal flash storage stores data in the same way that PCs store data on hard disks. Saved files are broken into segments and stored in any free portions available. Periodically, the WireScope 350 may need to defragment the internal flash storage in order to reclaim unused space. The following dialog box will appear when the WireScope 350 automatically defragments the internal flash storage.



Depending on the amount of information stored, this process may require several minutes.

CAUTION: *Do not turn off the WireScope or remove the battery during defragmenting. To do so will likely result in the permanent loss of stored information.*

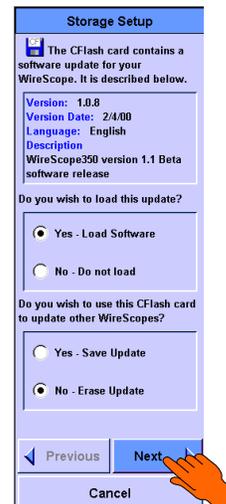
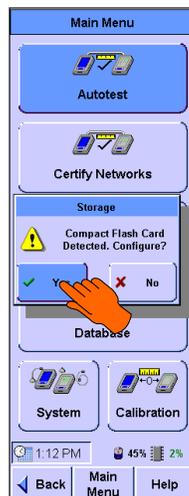
Installing WireScope 350 software from a CompactFlash™ card

You can install new software on your WireScope 350 from a CompactFlash™ card. This method is the fastest, most convenient way to upgrade software.

Please use the included ScopeData Pro application to copy WireScope 350 software components onto a CompactFlash™ card in order to prepare it for use in upgrading one or more WireScope 350s.

Once you have copied the WireScope 350 software components onto the CompactFlash™ card, insert the card into the first WireScope 350 that you wish to upgrade.

The following screens will appear.



The Storage Setup screen describes the software version contained on the inserted CompactFlash™ card and gives you the option of accepting or rejecting the software upload. This screen also allows you to specify whether you wish to upgrade other WireScope 350 units with this card.

If you specify that you would like to upgrade other WireScope 350s with the CompactFlash™ card, then the WireScope 350 will not erase the software upgrade files from the CompactFlash™ card after the upgrade is complete.

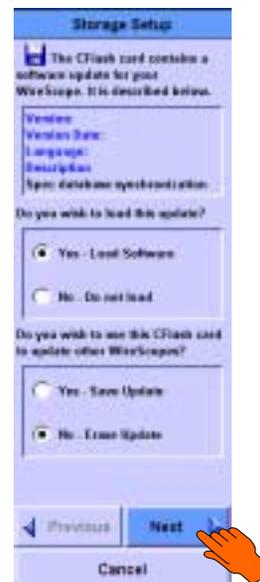
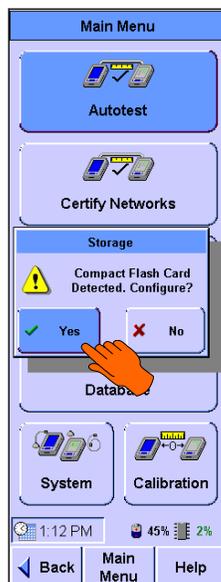
If you indicate that you do not wish to use the CompactFlash™ card to upgrade other WireScope 350 units, the WireScope 350 will erase the CompactFlash™ card after loading the software upgrade in order to provide the maximum possible space on the CompactFlash™ card for test results storage.

Press the **Next** button to continue with loading WireScope 350 software from the CompactFlash™ card. After the software upload is complete, the WireScope 350 will merge any test results stored in its internal flash memory onto the CompactFlash™ card in order to prepare for storing subsequent test results on the CompactFlash™ card.

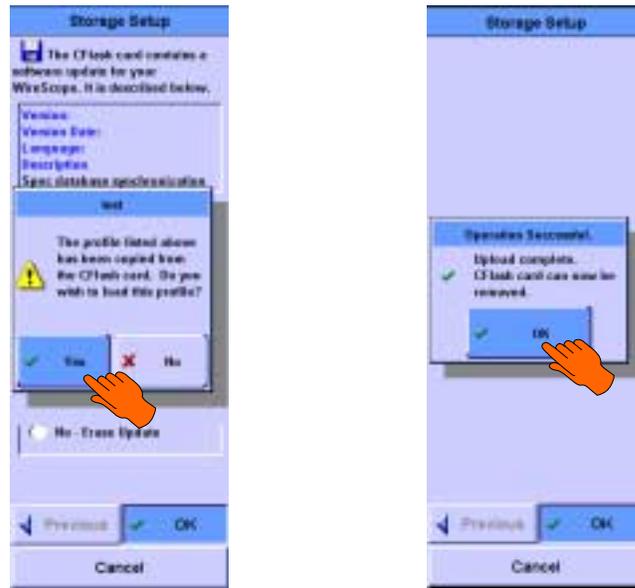
Downloading autotest profiles from a CompactFlash™ card

The CompactFlash™ card is a convenient means for quickly downloading autotest profiles. After downloading the profile using ScopeData Pro, insert the CompactFlash™ card into the WireScope 350. The unit will detect the card and prompt you to configure. Press **Yes** to continue. The Storage Setup screen appears listing Spec database synchronization as the software update for your WireScope.

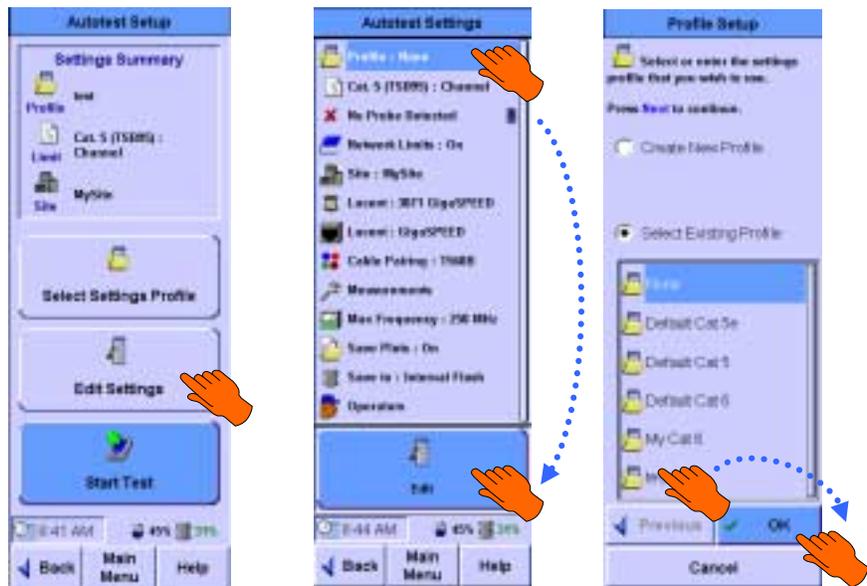
The screen displays the question: "Do you wish to use this CFlash card to update other WireScopes?" Be sure to select **Yes** if that is your intent; otherwise, the profile will be erased once the downloading is completed. Then, press **Next**.



The WireScope 350 then copies the profile from the card and asks you if you want to load the profile. To do so, press **Yes**; to abort, press **No**. Once the upload is completed, the display tells you that you can remove the CFlash card.



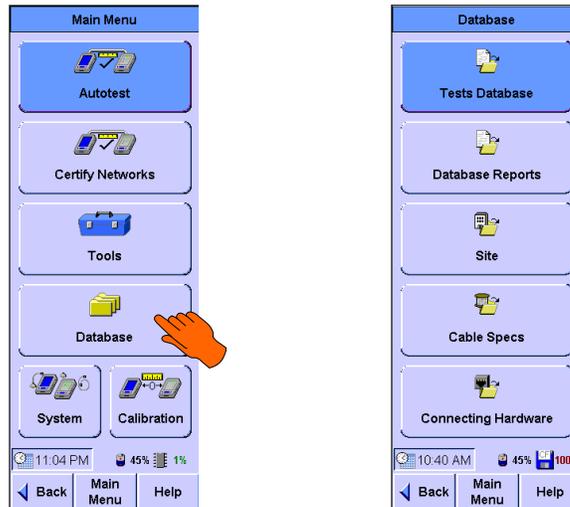
The autotest profile is now ready for your selection and use. For our example, the profile is named “test.” To view and select the profile from the Autotest Setup screen, press **Edit Settings**. On the next screen, with the Profile parameter selected, press **Edit**. The Profile Setup screen is displayed with all available profiles listed. The downloaded profile “test” is added to the list. To use this profile, press to select that profile, then press **OK**. The sequence of screens is shown below.



Using the Database viewer

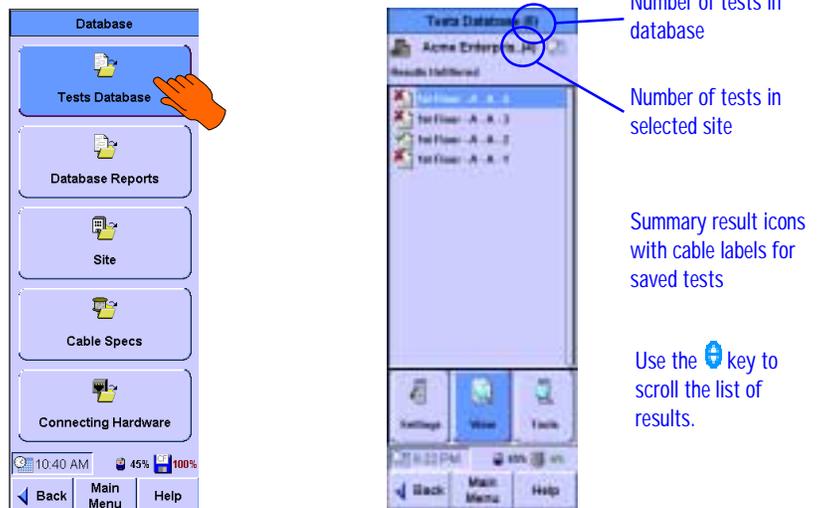
You can view any of the data saved in the WireScope 350's local flash memory or an installed CompactFlash™ card by using the database viewer.

To run the database viewer, from the main menu, press **Database**. The Database menu screen will appear.



Viewing saved tests

To view saved tests, from the Database menu screen, press **OK** or the **Tests Database** button.



The tests database screen will appear showing a summary listing of saved test results. Each saved result has an associated summary result icon, which allows you to see at a glance to see pass/fail status and test type. For example:

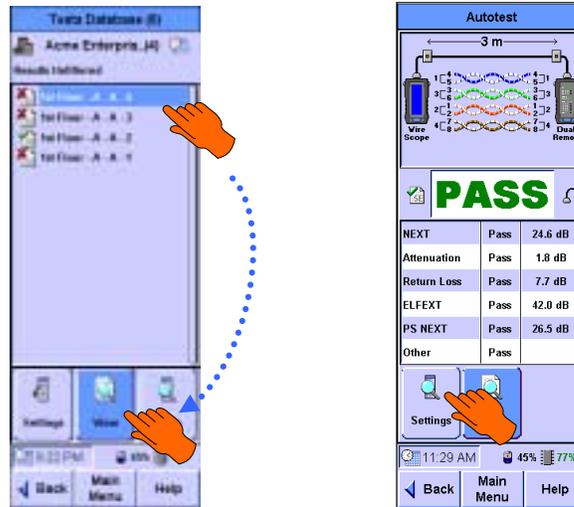


Denotes a Category 6 autotest which passed

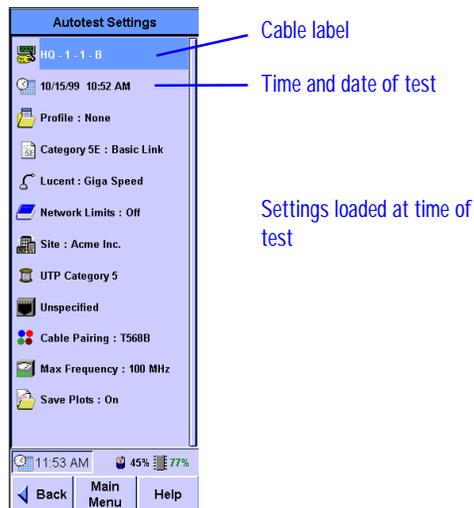


Denotes a Category 5E autotest which failed

To view more detail for any saved test record, select it from the summary list and press **OK** or the **View** button. The Autotest summary screen for the saved record will appear. You can view details of the saved test by pressing the **Details** button. For more information about interpreting test result details, see Chapter 6.



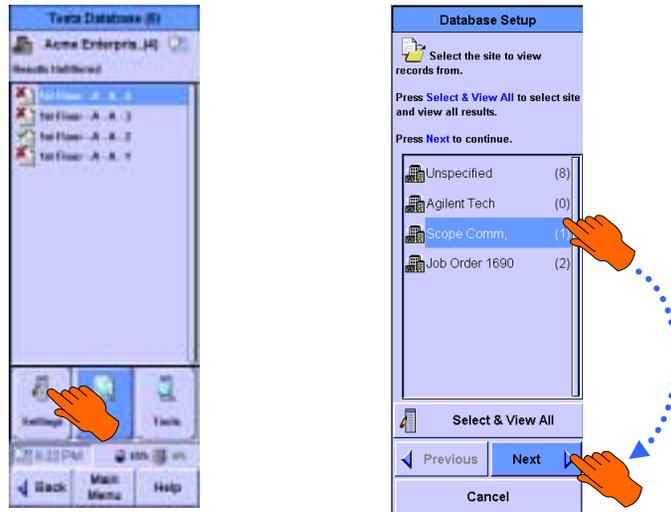
To review the settings that were loaded at the time the selected test result was saved, press the **Settings** button. The Autotest Settings screen will appear.



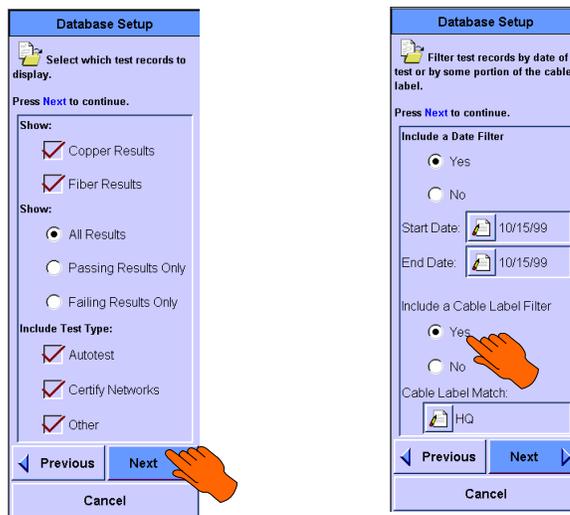
Options for viewing saved tests

When you have a large number of test results saved on your cable tester, it can be difficult to quickly find the information that you need when you are reviewing results. To solve this problem, the WireScope 350 tests database tool offers multiple options for filtering and sorting test records.

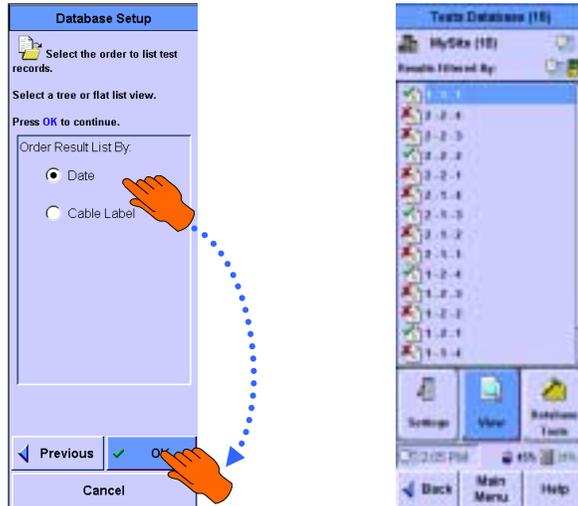
To filter or sort the Tests Database summary view, press the **Settings** button. The first Database Setup screen will appear. Select the site that you wish to view records from. The number of records currently saved in each site is shown after the site name. To view all records for the selected site press **Select & View All**, otherwise press **OK** or **Next** to continue with custom filtering options.



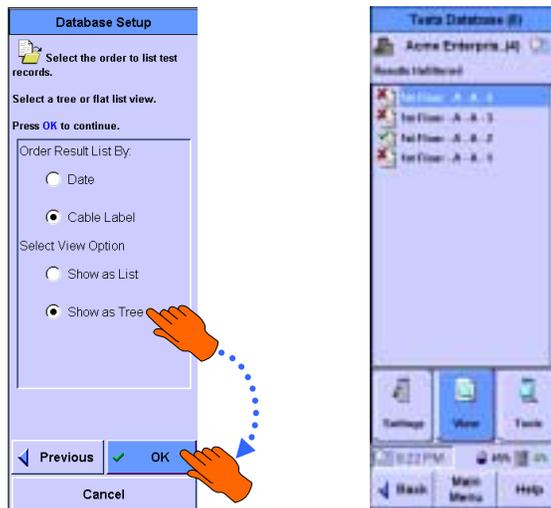
You can choose to show all results, passing results only or failing results only. You can also filter results by test type. You can further filter the results list by test date and by some portion of the cable label. Make your selections and continue by pressing **OK** or the Next button.



Next, select the order that you wish to see the summary results listed in. If you select **Order Result List by Date**, the results will be listed in the order that they were collected.



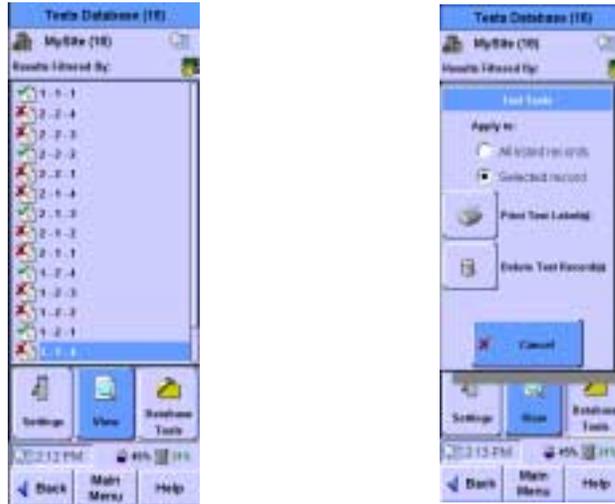
If you select **Order Result List by Cable Label** and if the site you are viewing uses a hierarchical cable label format, you have the further option of showing the filtered result list as a tree or as a list. If you select **Show as Tree**, the resulting list of records shows the cabling plant hierarchy.



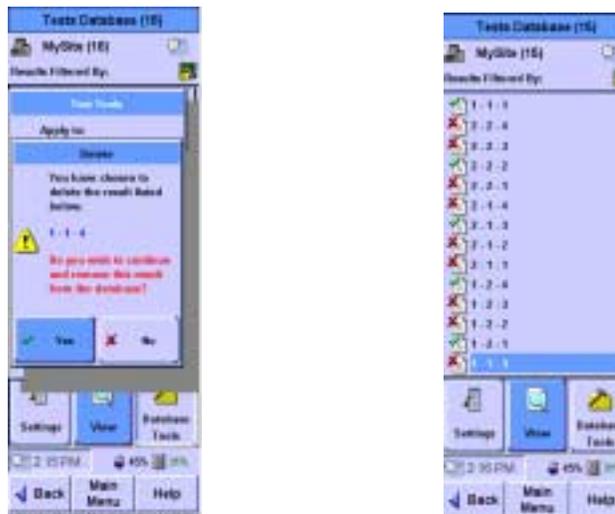
Deleting saved tests

To delete saved test records, select the record to be deleted and press the **Database Tools** button. The Test Tools screen prompts you to select all listed records in the database or the selected record (default). To continue deleting the test(s), press **Delete the test record(s)**.

CAUTION: *Deleted test records cannot be restored.*



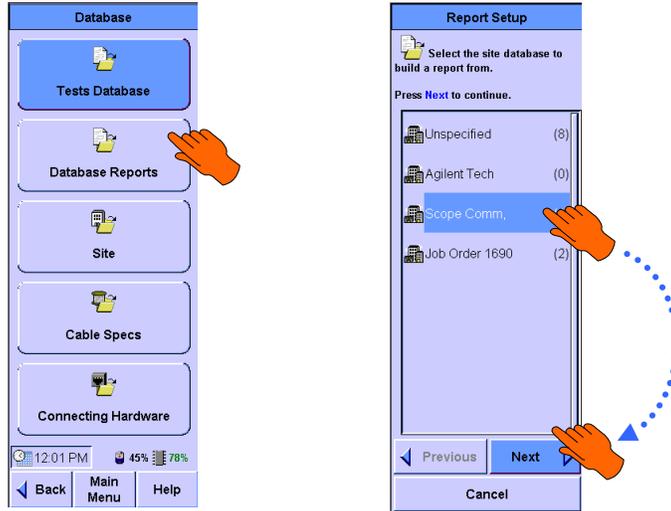
The WireScope cautions you about your intent to delete the test(s). To continue, click **Yes**. To abort, click **No**. The next screen displays the database with the deleted file missing from the list.



Viewing reports

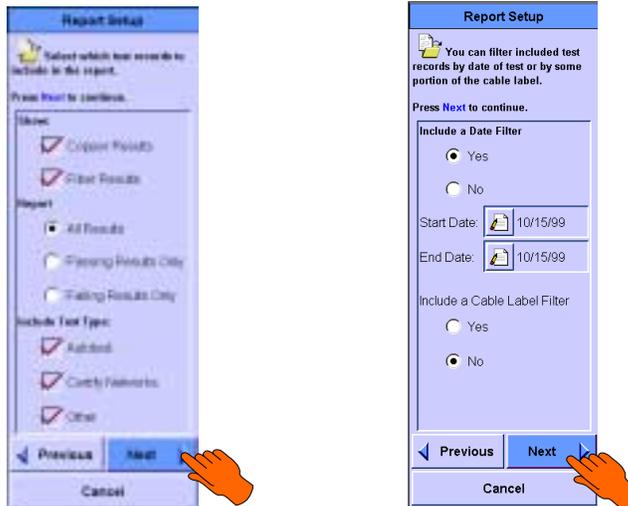
On the WireScope 350, you can view reports that summarize key statistics for test records saved in the internal database.

From the database menu screen, press the **Database Reports** button. The first database setup screen will appear. Select the site you wish to generate a report for and press **OK** or the **Next** button. The number of results store in each site appears after each site name in the list.

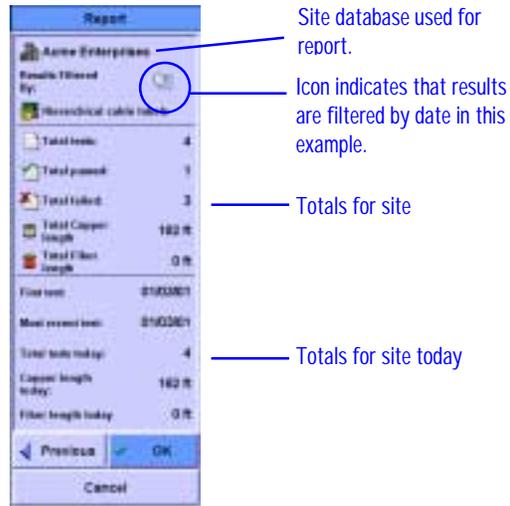


Z

Successive database report setup screens prompt you to select which records to include in the report based on the test type, pass/fail status, date of test, and cable label values. Make the appropriate record criteria selections and press **OK** or the **Next** button to continue through each of these screens.



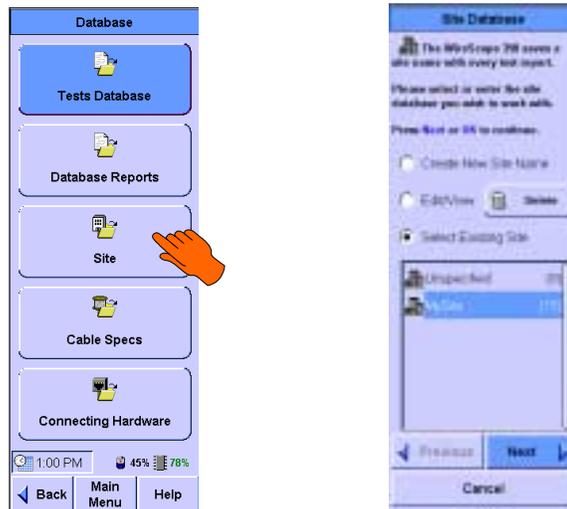
After you set the criteria, which defines which test records are included in the report, the WireScope 350 analyzes the saved test results and generates a summary report.



The site database

The site database tool allows you to maintain site-related information in the WireScope 350 database. Using this tool, you can add and configure a new site, edit the characteristics of an existing site, or delete sites and all of the records saved for that site.

From the database menu screen, press the **Site** button. The first site database setup screen will appear.



Creating or editing sites

You can create or edit site information by selecting the corresponding choice and pressing **OK** or the **Next** button. The number after the site name is the number of results saved for that site. When creating a new site, you must enter a name for the site and select and specify the cable label format and characteristics as detailed in Chapter 4 (*Site Settings*).

NOTE:

You cannot change the name of an existing site file. This restriction is necessary to maintain the integrity of site databases.

Deleting sites

You can delete a site file from this screen by selecting the site and pressing the **Delete** button.

CAUTION:

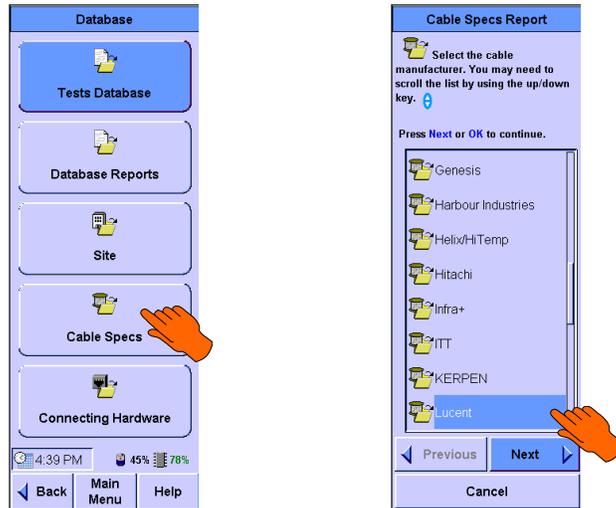
Deleting a site file deletes all of the test results saved for that site. Once you delete a site file, there is no way to recover any test results that had been saved to that site file.

The cable specifications database

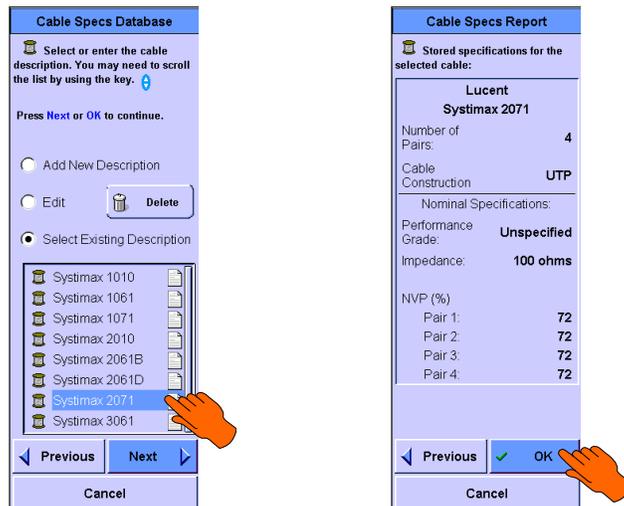
The cable database tool allows you to review, edit or add to the cable specifications information that is stored on the WireScope 350.

Accurate cable NVP (Nominal Velocity of Propagation) specifications must be selected in order for the WireScope 350 to produce accurate length measurements.

To view the specifications for any cable in the WireScope 350 database, from the database menu screen, press the **Cable Specs** button. Select the cable manufacturer from the list and press **OK** or the **Next** button. You may need to scroll the list using the **Up/Down** key to find your choice. If you wish to review the specifications for a generic cable, select “Unspecified” from the list.



Select the cable description from the list available for the selected manufacturer. Press **OK** or the **Next** button to view a summary specification report for the selected cable.

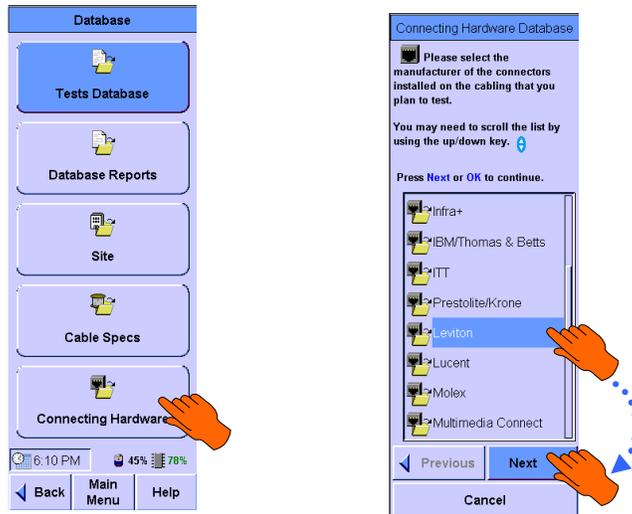


The connecting hardware database

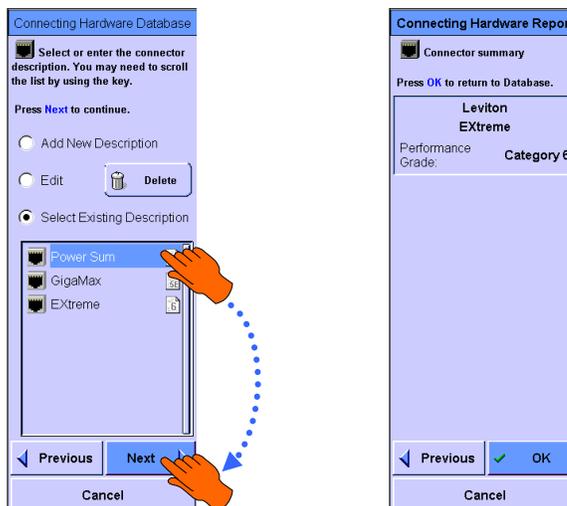
The connecting hardware database tool allows you to review, edit or add to the connecting hardware information that is stored in the WireScope 350.

The WireScope 350 uses the connecting hardware setting to check for compatibility between the attached test probe and the connecting hardware on the cabling under test. This compatibility is especially important when testing Category 6 cabling runs.

To view the specifications for any connector in the WireScope 350 database, from the database menu screen, press the **Connecting Hardware** button. Select the connector manufacturer from the list and press **OK** or the **Next** button. You may need to scroll the list using the **↑** key to find your choice. If you wish to review the specifications for a generic connector, select “Unspecified” from the list.



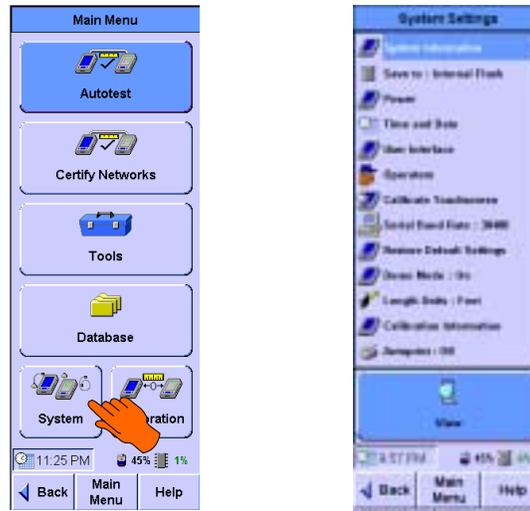
Select the connector description from the list available for the selected manufacturer. Press **OK** or the **Next** button to view a summary specification report for the selected connector.



WireScope 350 System Settings

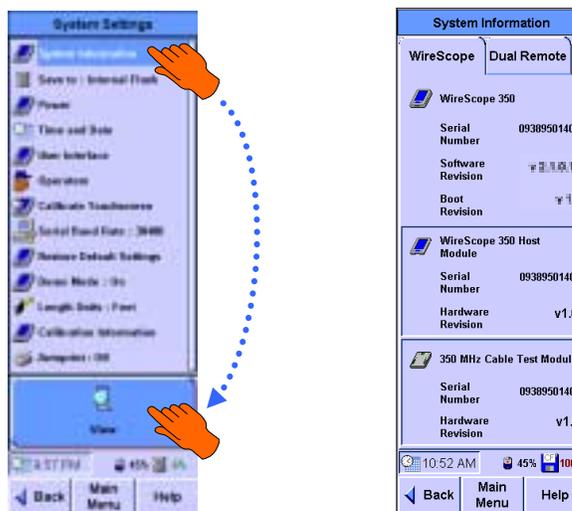


System settings allow you to view or change characteristics of the WireScope 350 that are not specific to any single test function. To view system settings, from the main menu screen, press the **System** button.



System information

The system information screen shows the serial numbers and hardware and software version information for both the WireScope 350 and for the last calibrated DualRemote 350 unit. To view the system information screen, from the system settings screen, select **System Information** and press **OK** or the **View** button.

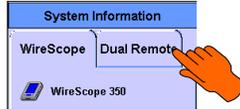


Both the WireScope 350 and DualRemote 350 consist of two portions:

- A host portion containing the screen or LEDs
- A cable test module attached to the bottom of the host

Each of these modules has a separate serial number. You should verify that both of the cable test modules have the same hardware revision number.

Use the tabs along the top of the screen to switch between viewing WireScope 350 and DualRemote 350 information.



Save to: Storage Location

This setting allows you to choose where to save test results.



If a CompactFlash™ memory card is inserted, the default choice is to save test results to the CompactFlash™ card.



Otherwise, the default choice is to save results to the internal flash memory.

Select the current test results storage icon and press **OK** or the **Edit** button to change the test result storage setting.

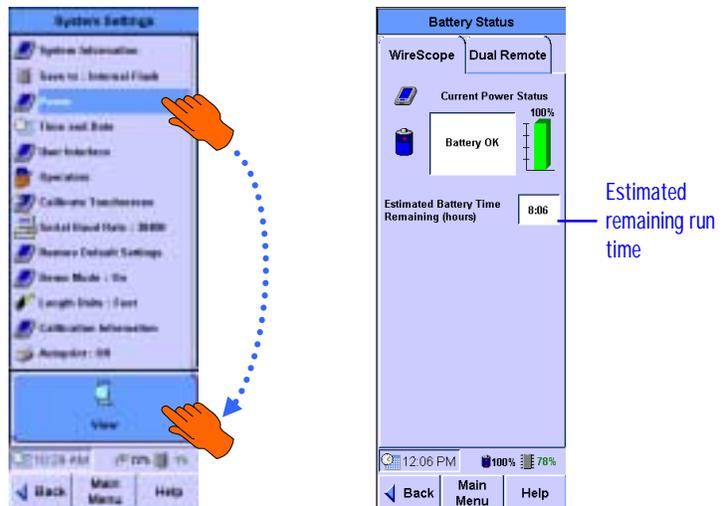
For more information about memory management and settings, please refer to Chapter 7.



Power

The power status screen shows the state and charge status for the WireScope 350 battery and the last known charge status of the DualRemote 350.

From the System Settings screen, select **Power** and press **OK** or the **View** button.



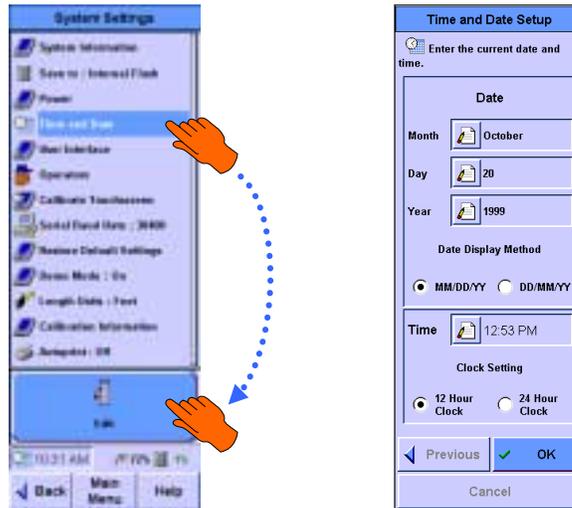
Pressing the DualRemote tab shows the last known charge status of the DualRemote 350.



Time and date

The WireScope 350 stores the time and date in each test record. This setting allows you to enter the correct time and date and to specify display format options.

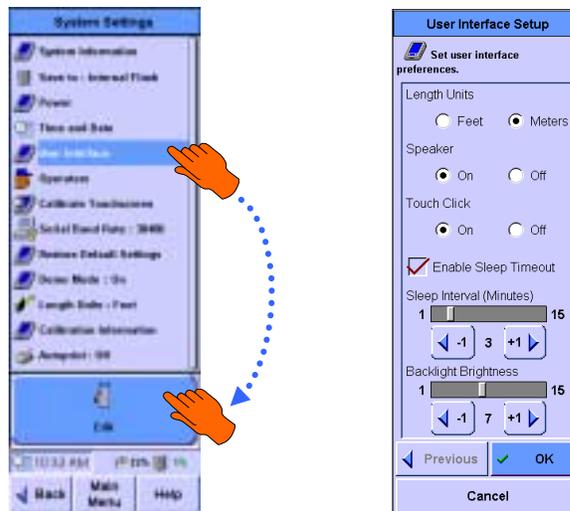
From the System Settings screen, select the **Time and Date** icon and press **OK** or the **Edit** button to change time and date settings.



User interface

You can set preferences for feet or meters, screen brightness, sounds, and the time delay before the WireScope 350 goes to sleep automatically.

To edit user interface settings, from the System Settings screen, select **User Interface** and press **OK** or the **Edit** button.



Length Units

This setting determines how the WireScope 350 displays length.

Speaker and Touch Click

These settings enable sound to give you audible feedback as you perform operations with the touch screen..

Enable Sleep Timeout

When this setting is enabled, the WireScope 350 will go to sleep if there has been no activity for the specified interval. When the WireScope 350 is asleep, power consumption is greatly reduced, prolonging battery life. A touch anywhere on the screen or pressing any of the keys will wake the WireScope 350 and return to the screen it was in when it went to sleep.

Backlight Brightness

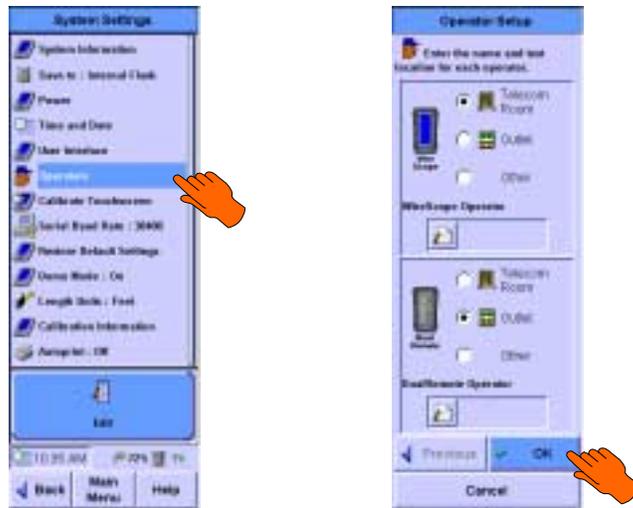
You can adjust the screen backlight brightness for improved visibility. A brighter screen setting consumes more battery power. For this reason, Agilent Technologies recommends that you set the backlight brightness to the lowest setting that provides adequate screen readability in the environment where you will be working.



Operators

Usually, a two-person team operates the WireScope 350. You can store the names of both the main unit operator and the remote unit operator in each test record.

You can also store information about which end of the cable run each unit tested (for example: main unit in telecom room and remote unit at user location). Select the **Operators** icon and press  or the **Edit** button to enter or change operator information.



Enter the name of each operator and the location where he or she is testing. This information is captured automatically and stored in each saved autotest file. Press  or **OK** to return to the System Settings screen.

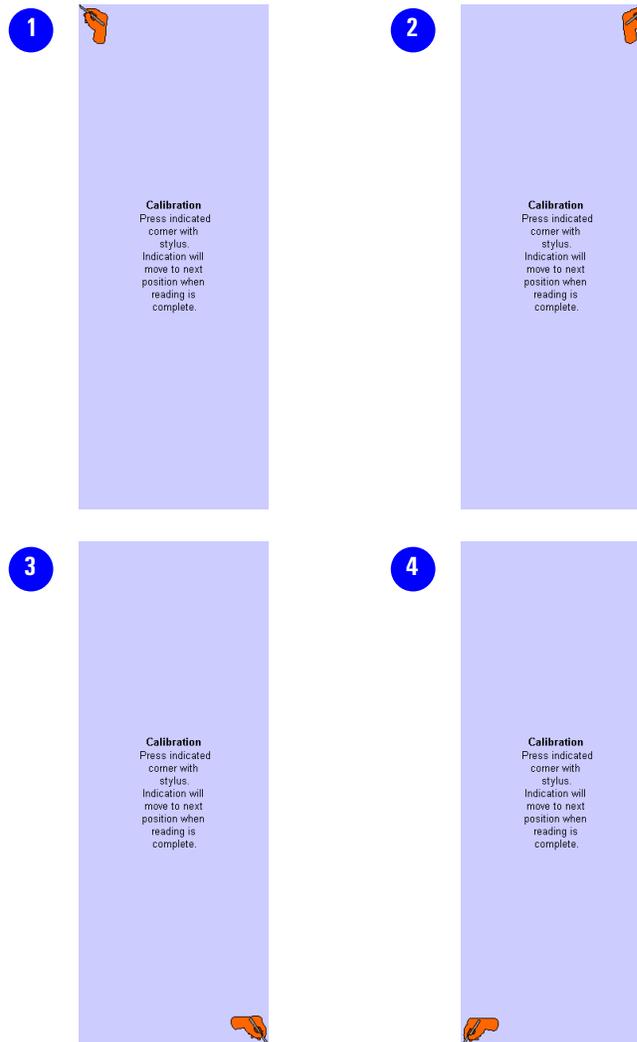


Calibrate touchscreen

If you notice that the WireScope 350 is misinterpreting your screen touches (i.e. entering the value of the key adjacent to the one you are trying to press), then you may need to calibrate the touchscreen to bring it into alignment with the underlying display.

Please be sure that you have the stylus that was supplied with the WireScope 350 before you attempt to calibrate the touchscreen. Calibrating the touchscreen with a larger pointing device (such as your fingertip) may degrade the alignment of the touchscreen calibration.

Select **Calibrate Touchscreen** from the system Settings Screen and press  or the **Edit** button. The following screens will appear:



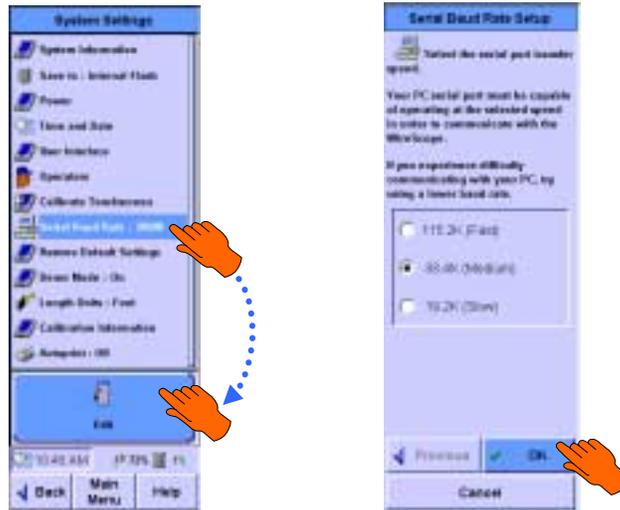
Touch the indicated corner of each screen with the tip of the stylus, being careful to touch as close to the corner as possible. After each successful touch is registered, the hand icon will move to the next corner and continue this process until the touchscreen calibration process is complete.



Serial baud rate

The serial port baud rate setting allows you to manually set the data rate for the RS-232 serial port. In most cases, you will not have to change this setting because ScopeData Pro automatically controls the data rate when communicating with the WireScope 350 over the serial port.

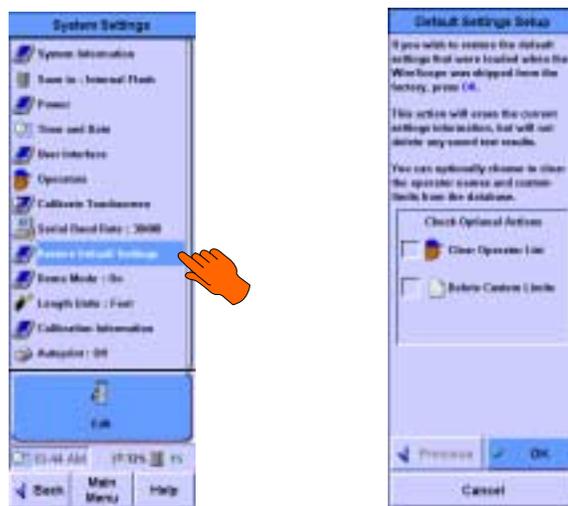
To manually change the serial port data rate, from the System Settings screen, select Serial Baud Rate and press **OK** or the **Edit** button.



Restore Default Settings

You can quickly restore all of the WireScope 350 settings to the factory default values.

To restore the default settings, from the System Settings screen, select **Restore Default Settings** and press **OK** or the **Edit** button.

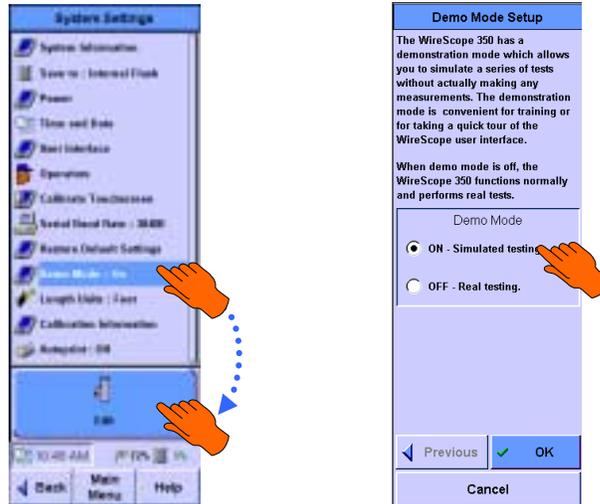




Demo mode

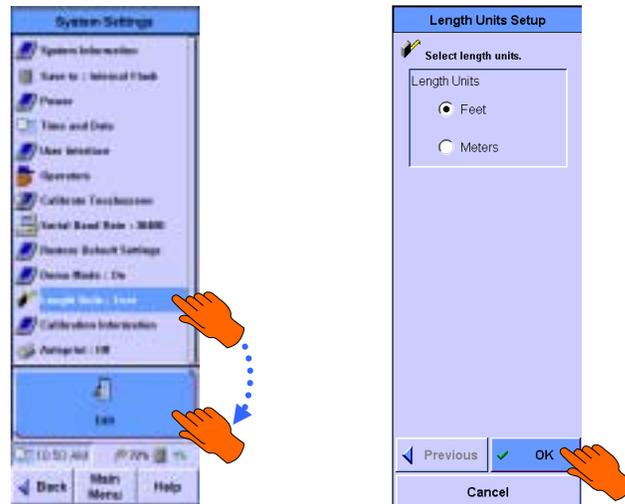
The WireScope 350 has a demonstration mode, which allows you to simulate a series of tests without actually making any measurements. The demonstration mode is convenient for training or for taking a quick tour of the WireScope 350 user interface. When demo mode is off, the WireScope 350 functions normally and performs real tests.

To turn demo mode on, from the system settings screen, select **Demo Mode** and press **OK** or the **Edit** button.



Length Units

You can switch the length units from feet to meters from the System Settings menu.





Calibration Information

Selecting **Calibration Information**, then **View** in the System Settings screen tells you the date when the base line or factory calibration was performed on the WireScope 350 and DualRemote 350. It lists the serial numbers for both units followed by the date they were calibrated. The region at the bottom lists the software revision of the two units, followed by the date the last calibration (copper or fiber) was performed in the field.



Autoprint

The Autoprint feature, when enabled, permits on-site automatic label printing on a Brady TLS2200 printer after each test record is saved. (See <http://www.bradydatacomm.com/> for information on the TLS2200 printer.) Press **Autoprint** to enable this feature (enabled when check mark is present). Connect the serial printer to the RS-232 serial port (see page 140).



Chapter 16

Using the Talkset Option

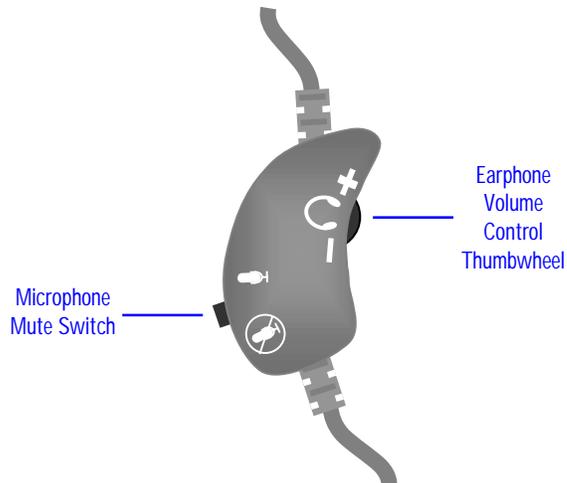
The WireScope 350 talkset option (part number N2605A-137) allows WireScope 350 and DualRemote 350 operators to talk between autotests over the cabling run under test. Each talkset option is voice-actuated; that is, a voice message is sent whenever the operator speaks without the need for pressing a talk button. This feature permits tests to be performed in an orderly manner and improves testing productivity.

Operation

Insert the talkset plug into the Headset connector on both the WireScope 350 and the DualRemote 350 (see page 140) to enable simultaneous two-way voice communications. Speaking into the microphone activates the voice communications. Voice communications are inhibited whenever the WireScope 350 and DualRemote 350 are in the process of testing.

Controls

Two controls are contained on the talkset. The Volume control enables setting earphone volume to a comfortable. The Mute switch allows disabling extraneous voice transmissions when testing in noisy environments.



Chapter 17

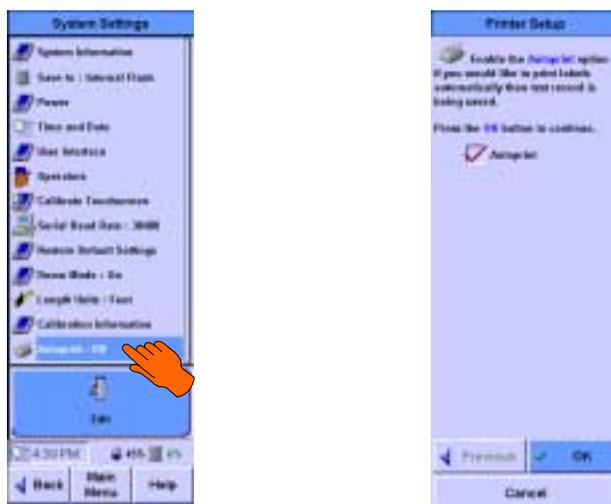
Printing Cable Identifiers

The WireScope 350 can print the saved cable identifiers directly to the Brady TLS2200 label printer. The WireScope 350 setup is described below and once the printing option is turned on, each time the operator saves a test result, a label is printed. This feature automates the labeling process and eliminates repetitive data entry for the operator, which saves times and minimizes mistakes.

WireScope 350 Printer Setup

Configuring the WireScope 350 to print to the Brady printer is a simple process.

- From the Main Menu select **System**
- From the System Settings menu select the **Autoprint** option and then press **Edit**
- This will bring you to **Printer Setup**.



The Autoprint feature, when enabled, permits on-site automatic label printing after each test record is saved.

Press **Autoprint** to enable this feature, this is enabled when a red check mark is present.

Connect the Brady interface cable, (part number N2605A-050), from the serial port on the WireScope 350 to the serial port on the Brady TLS2200 printer.

Turn on the Brady TLS2200 printer. Press <Func>+<Exit> Keys simultaneously to set the printer to **Peripheral Mode**.

Saving Cable IDs

Once you have completed the test, save your test result using one of the following methods

- Enter the cable ID
- Use a hierarchical site ID
Select from an imported cable ID list



Printing the Cable ID

Once you have completed the test and saved the test result, the WireScope will automatically detect the Brady TLS2200 printer and the size of the installed label. The Label Print Wizard screen allows you to:

- Set the number of labels to print
- Select the font size
- Preview the label
- Print the label



Appendix A

Specifications

NOTE:

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired and successful operation can not be guaranteed.

General

Size

Each unit: 9.125" x 4.625" x 2.625" HWD (23.17 x 11.75 x 6.66 cm)

Weight

Each unit: 2.86 lbs. (1.3 kg)

Power

A removable rechargeable Nickel Metal Hydride (NiMH) battery pack typically provides 9 hours of operation between charges, depending on use and power management settings. An internal fast charger recharges the NiMH battery pack in less than 5 hours. Extra battery packs are available.

Battery pack specification: (Part Number N2605A-135) 7.2 VDC 3800 mAh

Power converter: External AC to DC power converter (Part Number N2595A-110 for 110 VAC models, Part Number N2595A-210 for 220 VAC models) supplies 12 VDC, 1.2 A to the WireScope 350 or DualRemote 350 power connector. Power connector polarity: Positive (+) on the outer sleeve; Negative (-) on the tip.

CAUTION:

Use only the 12V charger/adaptor supplied with your WireScope and DualRemote. Using an incompatible charger/adaptor can damage your WireScope equipment and void your warranty.

Display

6.625" (16.83 cm) diagonal backlit color LCD. Resolution: 240 (H) x 640 (V). The display is capable of displaying text and graphics in up to 256 colors.

SmartProbe test port

Attachment point for test probes. Interface contains high performance signal channels for measurement functions and two-way control interface for reading and controlling active test probes.

Serial port

Allows the WireScope 350 or DualRemote 350 to connect to PCs or printers. Connector is an 8-pin micro-DIN. Pin out:

Din 8 pin #	Signal	DB9 pin #	DB25 pin #
1	DTR	4	20
2	RXD	2	3
3	GND	5	7
4	NOT USED		
5	TXD	3	2
6-8	NOT USED		

USB-A port

WireScope 350 only. The USB-A port allows the WireScope 350 to connect to USB peripherals. Provides up to 100 mA @ 5VDC for attached USB peripherals.

USB-B port

WireScope 350 and DualRemote 350. The USB-B port allows the WireScope 350 or DualRemote 350 to connect to a PC equipped with a USB port.

Talkset connector (3.6 mm phone jack)

WireScope 350 and DualRemote 350. Supports two way voice communication between WireScope DualRemote operators over cable run under test. Requires Agilent Technologies talkset (Part Number N2605A-137) to operate.

CompactFlash™ card slot

Provides removable non-volatile storage for test result files. Supports any standard CompactFlash™ Flash storage card. Densities as high as 192MB are presently available. Data stored in standard format compatible with PCMCIA-ATA specification.

Measurements

Wiremap

The wiremap measurement checks for proper end to end continuity and pairing. Problems that can be detected are:

- Short circuit
- Open circuit
- Reversed pairs
- Transposed pairs
- Split pairs
- Shield continuity faults

Length

The length measurement determines the electrical length of the cabling run under test. Length measurement requires accurate cable nominal velocity of propagation (NVP) setting to yield specified accuracy. NVP values are automatically loaded when you select a cable from the built-in database.

<i>Accuracy</i>	$\pm 4\%$ or ± 2 feet (0.6 M), whichever is greater
<i>Resolution</i>	± 1 feet (0.3 M) < 100M
<i>Minimum Distance</i>	0 feet (0 M)
<i>Maximum Distance</i>	1,100 feet (330 M)

Propagation delay and skew

The Propagation delay function measures the one way propagation delay over each pair of the cabling run under test.

<i>Accuracy</i>	$\pm 4\%$ or ± 1 nanoseconds, whichever is greater
<i>Resolution</i>	± 1 nanoseconds
<i>Minimum Delay</i>	0 nanoseconds
<i>Maximum Delay</i>	2,000 nanoseconds
<i>Delay Skew</i>	Calculated as the difference in nanoseconds between the longest and shortest measured propagation delay among the four pairs of a single cabling run

Near end crosstalk (NEXT)

Measures near end coupling between pairs in the cabling run under test. Measured at both ends of cabling over 6 pair combinations.

<i>Frequency Range</i>	1 – 350 MHz
<i>Frequency Step Sizes</i>	125 kHz, 250 kHz, 500 kHz, 1 MHz , set automatically based on selected standards ¹
<i>Resolution</i>	0.1 dB
<i>Dynamic Range</i>	90 dB or 25 dB beyond Category6 basic link limit, whichever is higher
<i>Baseline Accuracy</i>	40% better than TIA Level III requirement ²

Attenuation

Measures attenuation of all four pairs.

<i>Frequency Range</i>	1 – 350 MHz
<i>Frequency Step Size</i>	125 kHz, 250 kHz, 500 kHz, 1 MHz , set automatically based on selected standards ¹
<i>Resolution</i>	0.1 dB
<i>Dynamic Range</i>	90 dB
<i>Baseline Accuracy</i>	40% better than TIA Level III requirement ²

Return loss

Measures return loss of all four pairs from each end of the cabling run under test.

<i>Frequency Range</i>	1 – 350 MHz
<i>Frequency Step Size</i>	125 kHz, 250 kHz, 500 kHz, 1 MHz , set automatically based on selected standards ¹
<i>Resolution</i>	0.1 dB
<i>Dynamic Range</i>	35 dB
<i>Baseline Accuracy</i>	40% better than TIA Level III requirement ²

Equal level far end crosstalk (ELFEXT)

Measures far end coupling between pairs in the cabling run under test. Measured for all pair combinations.

<i>Frequency Range</i>	1 – 350 MHz
<i>Frequency Step Size</i>	125 kHz, 250 kHz, 500 kHz, 1 MHz , set automatically based on selected standards ¹
<i>Resolution</i>	0.1 dB
<i>Dynamic Range</i>	90 dB or 40 dB beyond Category 6 link limit whichever is higher
<i>Baseline Accuracy</i>	40% better than TIA Level III requirement ²

Attenuation to crosstalk ratio (ACR)

Computed by subtracting the measured attenuation from the measured near end crosstalk (NEXT) at each frequency point.

Power sum NEXT (PSNEXT)

Computed for each pair by calculating a power sum total of the pair-to-pair NEXT from the three other pairs.

Power sum ELFEXT (PSELEXT)

Computed for each pair by calculating a power sum total of the pair-to-pair ELFEXT from the three other pairs.

Power sum ACR (PSACR)

Computed by subtracting the measured attenuation from the computed power sum near end crosstalk (PSNEXT) at each frequency point.

Resistance

Measures the DC loop resistance for each pair in the tested cabling run.

Range 5 – 1,000 Ω

Accuracy $\pm 5\%$

Ambient noise

Measures the ambient noise spectrum of each pair immediately after the autotest.

Frequency Range 1 – 350 MHz

Sensitivity 0.1 mV RMS

Accuracy $\pm 5\%$

NOTES:

1. *Fast check mode setting forces frequency step to 1MHz.*
2. *TIA level III measurement parameter and tester accuracy requirements per TIA Category 6 Draft – Addendum to TIA-568-B and ISO/IEC 61935-1 draft amendment 1, 10/99.*

Environmental

Indoor/outdoor

Intended for indoor use.

Operating temperature range

0 – 40 °C (32 °F – 104 °F)

Storage temperature

-10°C – 55°C (14 °F – 131 °F)

Maximum relative humidity

80% for temperatures up to 31°C (56 °F)

Altitude

Up to 3,000 meters

Mains supply voltage

Not to exceed $\pm 10\%$ of the nominal voltage.

Installation overvoltage

Category II

Pollution degree

2

Symbols

 On / Off

 DC power input

 AC adapter tip polarity

This symbol indicates a positive DC voltage on the outer barrel of the connector and ground on the inner contact. This arrangement is described as *Negative Tip Polarity*.

CAUTION:

Use only the 12V charger/adaptor supplied with your WireScope and DualRemote. Using an incompatible charger/adaptor can damage your WireScope equipment and void your warranty.

Appendix B

Measurement Calibration

This section describes the calibration techniques employed in the manufacturing and maintenance of the WireScope 350 and DualRemote 350 to assure accurate and consistent measurement performance.

Multiple Levels of Calibration

Multiple levels of calibration are employed in the design and production of the WireScope 350 and DualRemote 350 to assure reliable measurement accuracy.

Baseline calibration assures NIST traceability and precise agreement with a laboratory Spectrum Analyzer. This is performed at the factory.

Remote calibration establishes a zero reference for accurate attenuation measurements. This should be performed in the field on a daily basis.

Environmental calibration ensures maximum accuracy in the presence of temperature and humidity variations. This is executed automatically by the WireScope 350 and the DualRemote 350 before every test.

Baseline Calibration

The baseline calibration process consists of comparing the measurement output of the WireScope 350 or DualRemote 350 with a traceable reference instrument and then “zeroing out” any differences between the field test equipment and the reference instrument. The resulting calibration data is automatically downloaded to the WireScope 350 or DualRemote 350 and stored in non-volatile memory.

Under normal use conditions, the WireScope 350 will require baseline re-calibration no more frequently than once per year, and in most cases, far less frequently.

Remote Calibration

The purpose of remote calibration is to establish a common zero reference basis between the WireScope 350 and its associated DualRemote 350 before any end-to-end measurements are taken.

You must perform a remote re-calibration if you use your WireScope 350 with a different DualRemote 350 or if you upgrade the software in either the WireScope 350 or the DualRemote 350. The WireScope 350 stores the serial number information of the DualRemote 350 that it has been calibrated to. Before each measurement, the WireScope 350 checks the serial numbers of the DualRemote 350 to which it is connected. If the WireScope 350 does not have remote calibration data stored for the detected DualRemote 350, a warning appears, asking you to calibrate the DualRemote 350.

Agilent Technologies recommend that the remote calibration be run once a day, preferably at the beginning of a testing session.

Environmental Calibration (Internal)

The purpose of the environmental calibration is to compensate for the effects of ambient temperature and voltage variations. The WireScope 350 and DualRemote 350 use internal calibration paths to connect the signal source and measurement circuits together to establish a local calibration reference before each measurement.

The WireScope 350 and DualRemote 350 automatically perform an internal environmental calibration before each measurement, so no operator involvement is required.

Field Verification of Baseline Accuracy

The Self-Test Probe (part # N2594A-015) can be used in the field to verify the baseline accuracy of a WireScope 350 or DualRemote 350. The Self-Test Probe makes use of the SmartProbe port interface in the WireScope 350 and DualRemote 350 to automate the setups required to perform this function.

Self-Test on a WireScope 350

Make sure that the WireScope 350 display is showing the main menu screen. Attach the self-test probe to the SmartProbe port of the WireScope 350. Press the  key.



A passing self test indicates that the baseline calibration data for the WireScope 350 is still valid. If the self test fails, the WireScope 350 requires a new baseline calibration or repair. Please contact WireScope technical support if the self test fails.

Self-Test on a DualRemote 350

To run a self test on the DualRemote 350, attach the self test probe to the SmartProbe port of the DualRemote 350. Press the  key. The result LED on the front panel of the DualRemote 350 indicates the outcome of the self test. If the self test fails, the DualRemote 350 requires a new baseline calibration or repair.

Appendix C

Legacy Networks

This is a list of the Legacy networking protocols supported by the WireScope 350 and the DualRemote 350. These networks are listed under the “Other” option, in both the Certify Networks settings screen; and in the Network Limits setting, located in the Autotest Setting screen. The copper networks are listed with pins used, and the fiber networks are each listed with its corresponding wavelength.

<i>Copper Network</i>	<i>Pairs Used</i>
Token Ring	
4 Mbps (Active)	(3, 6, 4, 5)
4 Mbps (Passive)	(3, 6, 4, 5)
16 Mbps (Active)	(3, 6, 4, 5)
16 Mbps (Passive)	(3, 6, 4, 5)
100Base-T4	All
802.12	All
TP-PMD	(1, 2, 7, 8)
25 Mbps ATM	(1, 2, 7, 8)
51 Mbps ATM	(1, 2, 7, 8)
ISDN	(3, 6, 4, 5)
Arcnet	(4, 5)
3X-AS/400	(4, 5)
3270	(4, 5)
<i>Coaxial Cable</i>	
10Base-2	
10Base-5	
<i>Fiber Network</i>	<i>Wavelength</i>
FDDI	1300 nm, 1310 nm
Fibre Channel Sx	850 nm
Fibre Channel Lx	1300 nm
OC-3 Sx (155 Mbps)	1300 nm
OC-3 Lx (155 Mbps)	1300 nm, 1310 nm
OC-12 (622 Mbps)	1300 nm, 1310 nm
OC-48 (2.5 Gbps)	1310 nm
Token Ring	850 nm

Appendix D

Battery Information

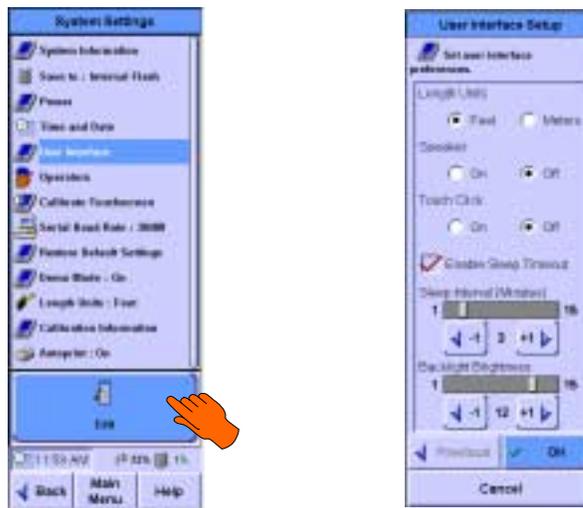
Maximizing battery run time

The rechargeable NiMH battery packs that power the WireScope 350 and DualRemote 350 should be adequate to support a full day's worth of testing under normal conditions. Starting with a fully charged battery, the WireScope 350 is typically able to run for 9 hours before requiring a recharge. The DualRemote 350 can run even longer between recharges because it does not have a color screen and therefore consumes less power while operating.

To maximize battery run time, you should:

- Set the screen backlight brightness to the lowest setting that provides adequate screen readability in the environment where you will be working.
- Enable the sleep function so that the WireScope 350 can power down its screen and save more power when you leave it unattended for a few minutes.

To adjust these settings, starting from the main menu screen, press the **System** button. Select **User Interface** and press **OK** or the **Edit** button.



Replacing the battery

To change the battery on either a WireScope 350 or DualRemote 350, first power the unit off.

Make sure that the AC/DC power converter is not plugged in to the charger port.



Flip out the stand at the back of the unit and press the battery release tab to release the top edge of the battery pack. Rotate the battery pack towards the bottom of the unit and then pull the battery up and back to remove it from the back of the unit.

Battery safety



To avoid the risk of fire, burns, or damage to your battery pack, do not allow a metal object to touch the battery contacts.

- The battery pack is suitable for use only with compatible WireScope family devices.
- Do not disassemble the battery pack. There are no user serviceable parts inside. Do not dispose of the battery pack in fire or water.
- Handle a damaged or leaking battery with extreme care. If you come in contact with the electrolyte, wash the exposed area with soap and water. If the electrolyte contacts the eye, flush the eye with water for 15 minutes and seek medical attention.
- Do not expose the battery pack to high storage temperatures (above 55°C).
- When discarding a battery pack, contact your local waste disposal provider regarding local restrictions on the disposal or recycling of batteries.
- To obtain a replacement battery (part number N2605A-135), contact your local dealer.
- Do not charge the battery pack if the ambient temperature is above 40°C.

- Attach FiberProbes, 75
- auto-increment, 30, 85
- Autotest
 - Fiber, 79
- Autotest profile
 - Create new, 40
 - Delete profile, 41
 - Downloading using CompactFlash, 114
 - password protection, 42
 - Select existing, 41
 - Update selected, 41
- autotest results, 46
- Autotest Settings, 26
 - Fiber, 79
- Autotest settings profiles, 40
- Backlight brightness, 130
- Baseline Calibration, 145
- battery charge status, 128
- cable specifications database, 125
- cabling limits, 27
- Calibrate touchscreen, 131
- calibration, 145
- Certify Networks, 28
 - Copper, 28
 - Fiber, 99
- CFlash. *See* CompactFlash
- Channel configuration, 14
- Charger port, 18
- Coax Testing, 69
- CompactFlash
 - Card slot, 17
 - defragmenting, 114
 - Downloading autotest profiles using, 115
 - Installing software using, 114
- connecting hardware database, 126
- Data entry options, 21
 - keyboard, 21
 - keypad, 21
- Database viewer, 117
- demonstration mode, 133
- Downloading
 - Autotest profiles from CompactFlash, 115
 - Software from CompactFlash, 114
- DualRemote 350, 56
- Environmental Calibration, 146
- Fast Check Mode*, 35
- Fiber Trace Mode, 108
- Field Verification, 146
- finding cable faults, 55
- Frequency plots, 53
- Hardware
 - Version information, 11
- Hierarchical cable labels, 30, 85
- Keys, 20
- Learn Fiber NVP, 108
- Legacy Networks, 147
- Length and Delay, 105
- Length Limit, 82
- Length units, 129
- Link configuration, 14
- Locating faults, 55
- Loss Limit, 81
- Loss Meter, 104
- maximum frequency, 37
- measurement options, 34
- memory capacity, 111
- multimode, 73
- Network certification, 28
- Network Limit, 83
- On-line Help, 22
- Operators, 38, 87, 90
- pairing convention, 34
- Password
 - profile protection, 42
- Plot storage, 37
- Power Meter, 106
- probe information, 75
- Profile. *See* Autotest profile
- Quick Check, 64
- Recommended service interval
 - DualRemote 350, 145
 - WireScope 350, 145
- Remote Calibration, 23, 76, 145
- reports, 122
- Save to
 - CompactFlash™ or internal, 89, 128
- Save to (storage location), 128
- Saving results, 48, 96
- Self Test, 146
- Self Test Probe, 146
- Serial port, 18
 - Setting baud rate, 132
- Singlemode, 73
- site database, 124
- Site settings, 29
- sleep timeout, 130
- SmartProbe, 39
 - Care and protection, 39
 - features, 39
 - viewing probe information, 40
- SmartProbe test port, 18
- SmartProbe+, 73
- Software
 - Upgrading, 10
 - Version information, 11
- Speaker and touch click, 130
- Specifying the cable, 31
- Specifying the connecting hardware, 32, 88
- Starting the autotest, 45, 91
- Storage location, 89
 - Save to setting, 89
- Support, Technical, 10
- System Requirements, 9
- talkset, 135
- Talkset jack, 18
- Technical Support, 10

- contacting, 10
- telephone-style keypad, 21
- Test probes. *See* SmartProbe
- Time and date, 129
- Twinax Testing, 71
- typewriter-style keyboard, 21
- USB ports, 18
- Using CompactFlash™ cards, 113

- Version information, 11
- Viewing memory status, 112
- Warranty
 - Extended, 10
 - Standard, 10
- WireScope, 10
- WireScope 350 Printer Setup, 137