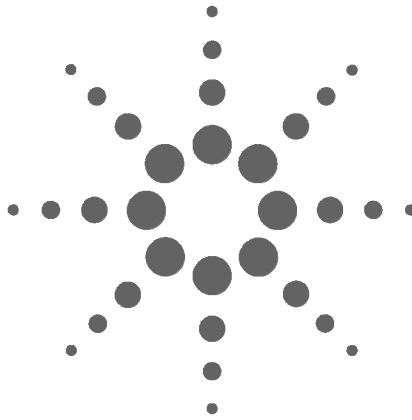




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Agilent Technologies N2600A

WireScope 350

User's Manual

Version 3.0



Agilent Technologies

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About This Book

This manual covers the use of WireScope 350 testers using software version 3.0.

Note that some systems running earlier software may not provide all of the features described in this manual; systems running later versions of software may operate differently than described in this manual. Be sure to refer to any user's manual supplements or release notes that came with the unit, or call 800-452-4844.

Getting Started

Chapter 1, *Getting Started*, introduces the WireScope 350 tester, (called the Tester in this manual) and illustrates its features and controls.

Chapter 2, *Using WireScope*, describes how to perform basic functions with the Tester, such as connecting power, installing probes and CompactFlash™ cards, downloading software, and working with the WireScope 350 software.

Cabling Certification

Chapter 3, *Certifying Copper Cabling*, describes how to set up and run Autotests on copper cabling.

Chapter 4, *Certifying Fiber Cabling*, describes how to set up and run Autotests on optical fiber cabling.

Chapter 5, *Saving Test Results*, describes how to save test results.

Chapter 6, *Expert Mode for Copper Testing*, explains advanced configuration options for testing copper cabling.

Chapter 7, *Expert Mode for Fiber Testing*, explains advanced configuration options for testing optical fiber cabling.

Reference

Chapter 8, *Reference*, describes the measurement details, calibration, and memory usage.

Chapter 9, *Specifications*, describes the WireScope 350's and Fiber SmartProbe's specifications.

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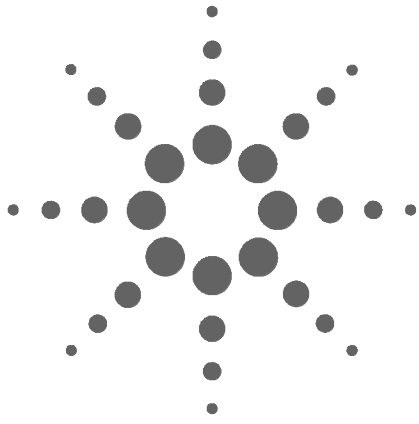
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WireScope at a Glance



Control Buttons

You control the WireScope 350 using a combination of mechanical and on-screen buttons. The three mechanical buttons are at the bottom of the WireScope's face.

Power: The **Power** button turns the unit on. If the unit is already on, pressing the power button opens the sleep/shut-down dialog box. The unit goes to sleep in 5 seconds unless you cancel this option.

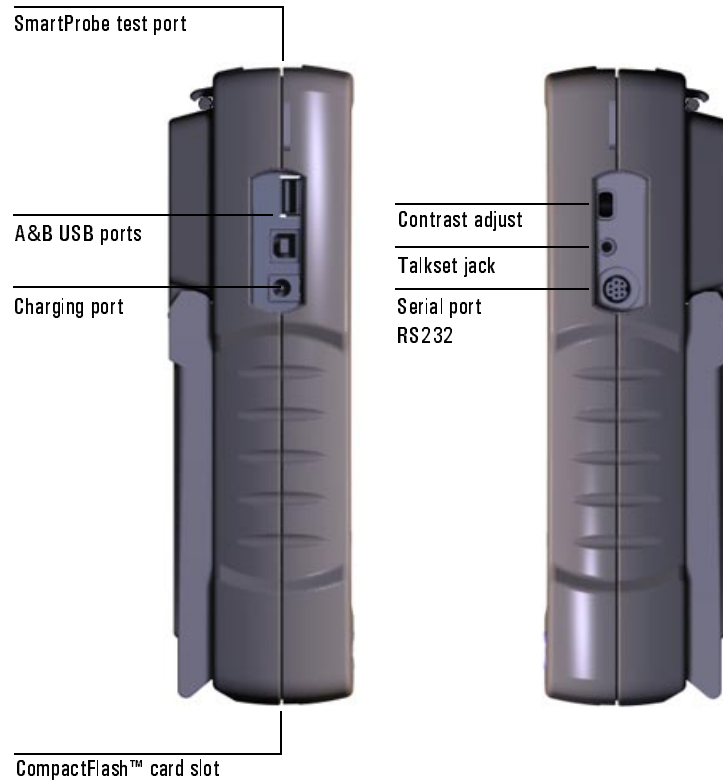
When the unit is asleep, touching the screen or buttons wakes it to the state it was in before it went to sleep.

Pressing and holding the power button for two seconds turns the unit off.

OK: Pressing the **OK** button executes a selected onscreen action. A dark blue color indicates the selected action on all screens.

Scroll: The **Scroll** button scrolls screens that contain long lists.

Ports



SmartProbe test port: The SmartProbe test port accepts all compatible probes. The WireScope 350 automatically determines what type of probe is attached, selects appropriate screens and modes, and warns of any configuration conflicts.

USB ports: The WireScope 350 has a universal serial bus (USB) interface for high speed communication with PCs and peripherals. The DualRemote 350 has a USB slave port.

Serial port: The RS-232 8-pin DIN serial port allows serial communication with a PC for software upgrades or data transfer. An 8-pin DIN to DB-9 cable is included in the kit.

Talkset jack: Both the WireScope 350 and DualRemote 350 have talkset jacks to improve coordination within testing teams. Operators can communicate over the tested cabling when autotests are not running.

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

CompactFlash™ Slot: This slot accepts CompactFlash™ cards, for storing and transferring data, upgrading the WireScope software, and loading user-defined profiles.

System Requirements

The WireScope 350 kit contains everything needed to certify copper cabling to Category 6.

To certify optical fiber cabling, purchase a set of Fiber SmartProbes+ (included in the Professional Test Kit).

For a list of available SmartProbes, please visit <http://wirescope.comms.agilent.com>

To print reports, archive test results, and download WireScope software upgrades and profiles, a Windows PC is required. The PC must run Windows 95[®] or later, or Windows NT[®], and the ScopeData Pro[®] software.

To transfer files, profiles, and software updates using the CompactFlash[™] card, the PC must be equipped with a CompactFlash[™] drive.

To print labels, the PC described above must be connected to a printer, or labels can be printed directly from the WireScope, using a Brady TLS2200[®] printer and interface cable.

WireScope 350 Hardware

The WireScope 350 is enclosed in a rugged case designed to withstand the challenges of a construction environment. A tough “skeleton” with a molded bumper protects against damage.

Touch Screen User Interface

A color touch screen simplifies navigation through menus and presents test data, resulting in faster operation and reduced training time.

CompactFlash™ Card Slot

The WireScope 350 stores test results, including plot data, in internal memory or on removable CompactFlash™ memory cards. Using CompactFlash™ cards allows unlimited storage capacity and transfer 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 PCs.

Items Supplied

The WireScope 350 is available as a basic WireScope 350 Complete Analyzer Kit (N2600A-100 or -200), or as a WireScope 350 Professional Test Kit. The items contained in the basic kit are listed in the following table. Professional kits contain additional items including Fiber Smart Probes, and come in a hard carrying case instead of the nylon carrying case.

Part No.	Qty.	Description
5065-4944	1	WireScope 350
5065-4945	1	DualRemote 350
N2595A-110 (-100)	2	110 Vac to 12 Vdc Charger/Adapter
N2595A-210 (-200)	2	220 Vac to 12 Vdc Charger/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-092	1	Large Nylon Carrying Case

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

Optional Accessories

Refer to the *Read Me First* information packet for accessories available for the WireScope 350. For the latest optional accessories, go to Agilent Technologies' website at <http://wirescope.comms.agilent.com>

WireScope SmartProbes

The WireScope 350 uses test probes called SmartProbes to connect to the cabling runs that it certifies. All WireScope 350 test probes connect to the SmartProbe port at the top of the WireScope and DualRemote. The WireScope 350 automatically detects any SmartProbes connected to it, and configures its interface to the matching parameters.

WireScope probe configuration warnings

The WireScope 350 displays a warning when it detects a potential conflict between the detected probe and any of the test settings. Using an inappropriate probe can affect measurement accuracy. This is especially important for category 6 installations.

If the WireScope detects an over-voltage condition at the SmartProbe port, it displays the following warning message:



Caution: Never connect WireScope test probes or test cables to a voltage source, such a telephone jack. Excessive voltages can damage WireScope probes and the WireScope 350 analyzer, and void your warranty.

Link and Channel SmartProbes

Each WireScope test kit includes SmartProbes for testing copper cabling in both Link and Channel configurations.



**Universal Cat 6 Link
SmartProbe**

N2604A-101

**Universal Cat 6 Channel
SmartProbe**

N2604A-100

Link SmartProbes connect to the customer's wall plate and telecommunications panel jacks. The WireScope software compensates for the probe's transmission characteristics so they do not affect test results. A counter built in to the probe lets the WireScope issue a warning when the probe nears the end of its normal useful life.

Channel SmartProbes connect to the customer's patch cords at the wall plate and telecommunications panel. The WireScope software compensates for the probe's transmission characteristics so they do not affect test results. A counter built in to the probe lets the WireScope issue a warning when the probe nears the end of its useful life.

Note: Category 6 SmartProbes can be used to test cabling to Category 5 and earlier standards. Older category 5 probes cannot be used to test to Category 6.

Fiber SmartProbe⁺

Installing a set of Fiber SmartProbes transforms the WireScope 350 into an optical fiber power meter and loss meter and cable length meter, for certifying optical fiber cabling. Fiber SmartProbes support 25 network-specific certification tests, including 1000BaseSX and 1000BaseLX. Each Fiber SmartProbe⁺ can both transmit and receive, for single-end or double-ended testing.

Fiber probes are sold in pairs, in these configurations:

- Singlemode 1310 nm
- Singlemode 1550 nm
- Multimode 850 nm
- Multimode 1300 nm

Multimode Fiber SmartProbes have LED signal sources, and a range of 4 km in length for 850nm and 10 km for 1300nm.

Singlemode Fiber SmartProbes have Class 1 laser signal sources, and a range of 50 km in length.



Singlemode Fiber SmartProbe⁺

Available in 1310 nm and 1550 nm versions



Multimode Fiber SmartProbe⁺

Available in 850 nm and 1300 nm versions

For detailed information and specifications of the available Fiber SmartProbes, visit:

<http://wirescope.comms.agilent.com/products/fiber/FIBER.HTM>

Cabling Certification and Tests

Cabling Certification Standards

Certification testing with the WireScope 350 is highly automated. An *Autotest* function coordinates a series of measurements between the WireScope and DualRemote devices and analyzes the results to determine if the cabling run passes or fails the selected standards.

Copper Cable Testing

Standards for structured twisted pair cabling require that both ends of each cable run be tested, to find the worst case performance condition. All certification testing requires a two-part test set, consisting of a main unit and a remote unit, each of which has similar test capabilities. One unit tests the cabling run from the telecommunications closet end and the other tests from the outlet end.

There are two primary considerations when testing:

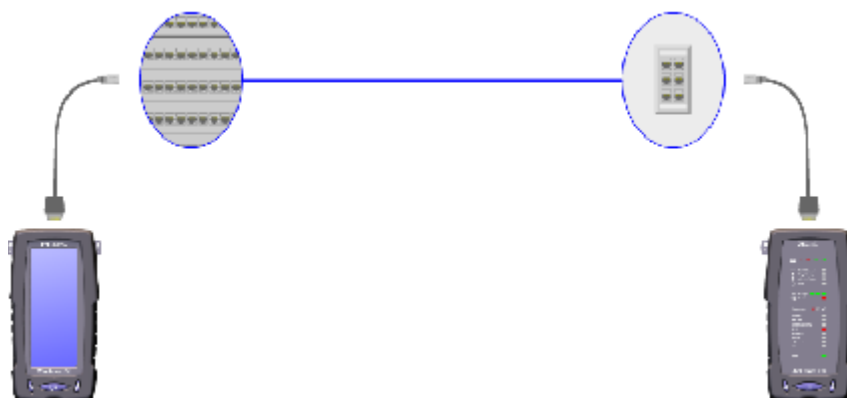
- Whether the user patch cords are included in the cabling run during the test, if not -Link test configuration; if yes - channel test configuration.
- Which standard should be used (Category or Class.)

For up-to-date information on structured cabling standards, please visit <http://wirescope.comms.agilent.com/standards>

Link and Channel Tests

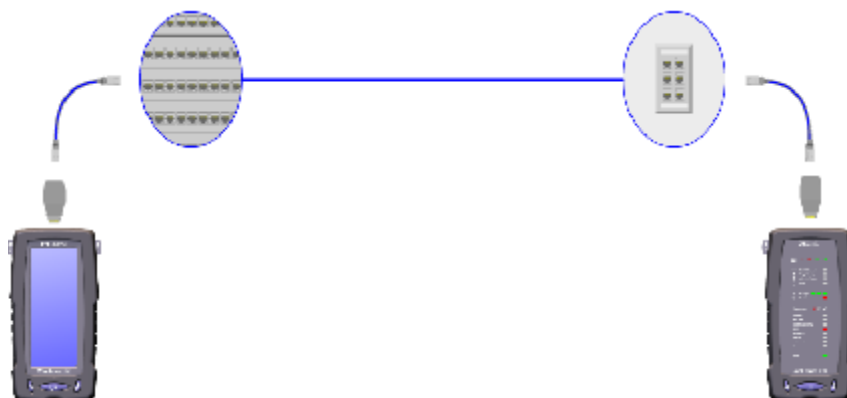
There are two commonly used configurations, *link* and *channel*, for certifying copper cabling.

Link configuration



The link configuration is used in facilities still under construction, and does not include user patch cords. Because the link configuration does not include the two additional connections which the patch cords would produce, performance standards for link configuration tests are more stringent. The WireScope and DualRemote attach to the link under test with special link test probes, which terminate into modular-8 plugs.

Channel configuration



The channel configuration includes the user patch cords at both ends of the cable run. The pass/fail limits applied when testing with the channel configuration are less stringent than for the link configuration, to allow for the performance degradation inherent in the two additional modular-8 connections.

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

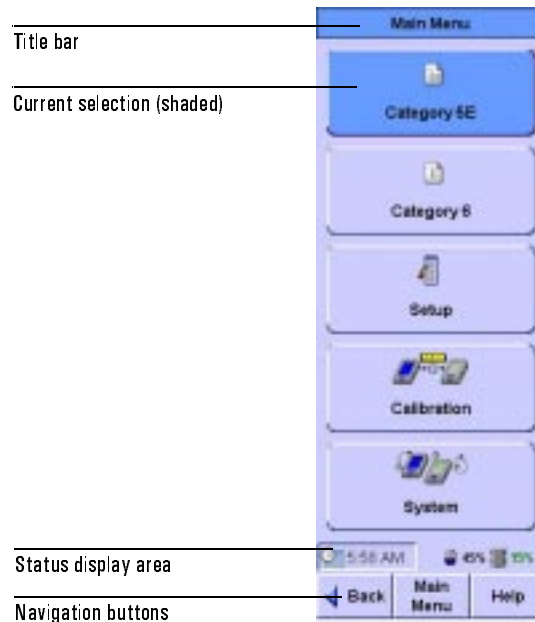
Optical Fiber Cable Testing

Fiber SmartProbes support 25 network-specific certification tests including 10BaseFL, 10BaseFB, 100BaseF, 1000BaseSX, 1000BaseLX, ATM155, ATMSWL, ATM622, and a variety of legacy network standards.

WireScope User Interface

The WireScope 350's touch screen displays a layout of functions at each stage in the cable certification process.

Touch Screen Layout



Title Bar

The title bar identifies each screen.

Selection Indicator


Selected onscreen item is shown in a darker blue background. When a screen first displays, the default selection is shown. Pressing a selection either highlights that item or activates it, if it is a control button.


Status display area

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





Talkset icon: The talkset icon appears when a talkset is plugged in.

 **72%** **AC Power icon:** This icon appears when the external power adapter is connected to the WireScope and an ac power source. The number next to the icon is the percent of full battery charge.

 **45%** **Battery Charge icon:** When the WireScope operates using battery power, this icon shows the current battery state. The percentage figure is the amount of charge remaining in the battery.

Storage icon: The storage icon indicates where test results are saved and how full the CompactFlash™ card or internal memory is.

 **50%** = Results are saved to a CompactFlash™ card. In the example, the card is half full.

 **65%** = Results are saved to internal memory. In the example, the internal memory is 65% full.

Onscreen Buttons

Three navigation buttons display at the bottom of most screens.



Back: Displays the previous screen

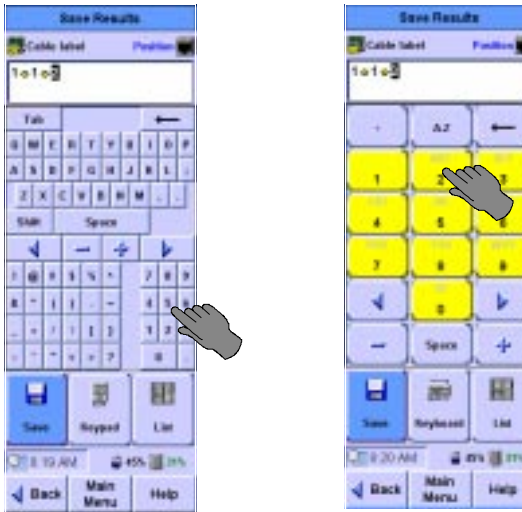
Main Menu: Opens the Main Menu from any screen

Help: Launches the Help viewer (see *Online Help*, on page 1-15)

Data Entry Options

When WireScope testing requires entry of numbers or text, a text entry icon denotes fields that accept text. The WireScope 350 provides two ways to enter text:

- Typewriter-style keyboard (below, left)
- Telephone-style keypad (below, right)



When using the telephone-style keypad, which is the default, you can enter text by first pressing the **A-Z** key. After that, pressing one of the numbered keys enters the first letter on the key. Pressing the key twice enters the second letter, and pressing the key three times enters the third letter.

Some of the keyboard buttons are small; using the provided stylus allows more precise control of which buttons are pressed.

The increase (+) and decrease (-) keys change the value of the currently selected field.

Online Help

An extensive online Help system is available on the WireScope 350, by pressing the **Help** button at the bottom of the screen.

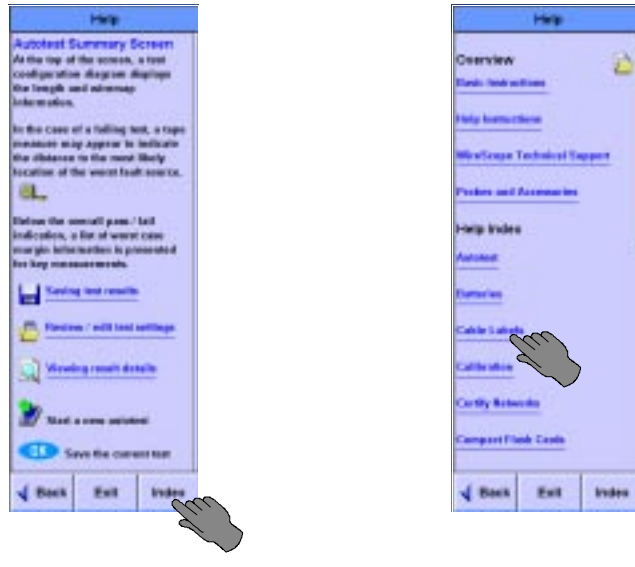


When you press the **Help** button, the Help window opens, describing the current screen. Help screens may contain text, graphics and hyperlinks to further information. While in the Help window, the following buttons are available at the bottom of the screen:

- **Back** returns to the previous screen
- **Exit** closes the Help viewer.

Getting Started
WireScope User Interface

- **Index** opens the Help index window.



The DualRemote 350

The DualRemote 350 performs the same tests as the WireScope 350, and is controlled by the WireScope. The DualRemote displays information using LED indicators.



Control Buttons

The DualRemote 350 has the same control buttons on its face as the WireScope 350.

Power: The **Power** button turns the unit on and off.

OK: Pressing the **OK** button does nothing.

Scroll: The Scroll button scrolls through the diagnostic indications.
(See *Diagnostics*, on page 1-19.)

Indicators

Pair Status Indicators

The pair status indicators turn green or red at the end of a test to show the status of each pair. A red indicator means the associated pair failed the current test.

Warning Indicators

The warning indicators denote conditions that might prevent or impair testing.

Hub/NIC Detected: The Hub/NIC Detected indicator means the DualRemote 350 is connected to a hub/Switch port or NIC port, instead of to a port connected to the WireScope 350. [This function is not yet supported.]

Voltage Warning: The voltage warning indicator means the DualRemote 350 is connected to a line which has a potentially damaging voltage present. This condition usually occurs when attempting to test a line that is connected to a telephone switch.

Caution: If you see this indicator, *immediately disconnect the DualRemote from the line*. Failure to disconnect the line can permanently damage the DualRemote 350.

Calibration Required: The Calibration Required indicator means the DualRemote 350 is not calibrated to the WireScope 350. The autotest will not execute until the calibration is performed.

Battery: The battery indicator shows the current state of the DualRemote 350 battery charge.

When an external charger is supplying power to the DualRemote:

- The Battery indicator is steady green when the battery is charging.
- The Battery indicator flashes rapidly green when the battery is fully charged. It may flash slowly if it is cooling between charging cycles.

When no external charger is connected to the DualRemote:

- The Battery indicator is dark when the battery is operating normally.
- The Battery indicator is red when the battery charge is low.

Caution: Use only the 12V charger/adaptor supplied with your WireScope and DualRemote. Using any other charger/adaptor can damage your WireScope equipment and void your warranty.

Test Progress and Result Indicators

Progress: The Progress LEDs show approximately how much of the current test is complete, 1/3, 2/3, and complete.

Pass/Fail: The Pass/Fail indicator turns green when the test passes, or red when the test fails.

Diagnostics

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

WS and DR: Indicate at which end of the tested cable the measurement failed.

- WS lights when a failure occurs at the WireScope end of the circuit.
- DR lights when a failure occurs at the DualRemote end of the circuit.
- WS and DR both light when failures occur at both ends of the circuit. To determine which failures occurred at which end of the circuit, use the Scroll button.

A column of diagnostic indicators shows details about the cause(s) of a test failure. The failures indicated on the DualRemote 350 are:

Wiremap: Turns red when a fault with the cable connections is detected.

Split Pairs: Turns red when a split pair is detected.

Length/Delay/Skew: Turns red when cable length, signal delay, or skew are outside the passing limits.

NEXT : Turns red when near-end pair-to-pair or power sum faults are detected.

Attenuation: Turns red when attenuation is outside passing limits.

ELFEXT : Turns red when far-end pair-to-pair or power sum faults are detected.

Return Loss: Turns red when the return signal loss exceeds passing limits.

Other: Turns red when any other failing test results occur. If the cable run has multiple test failure causes, the **Scroll** button scrolls between diagnostic indications. The current selection blinks. The pair indicators and WS or DR indicators associated with the selected failure also blink.

Power

The Power LED turns green when the DualRemote 350 is powered on.

WireScope Software

Probe Detection

The WireScope software automatically detects which probes are connected to the WireScope 350 and DualRemote 350, and configures the testing program to match those probes. Conflicts between the installed probes and testing selections generate an error message.

Digital Fault Finding

The WireScope's software automatically pinpoints cable fault locations and causes, speeding problem resolution and increasing operator productivity.

Software Upgrades

Software upgrades for the WireScope 350 are available for download from the Agilent Technologies website, <http://wirescope.comms.agilent.com/>

See *Upgrading the WireScope Software*, on page 2-7, and refer to the *ScopeData Pro User's Guide* for instructions for downloading software to the WireScope 350.

The DualRemote 350 uses the same software as the WireScope 350. The Remote Calibration procedure detects any mismatch in software versions. To upgrade the DualRemote 350 after upgrading the WireScope 350, perform a calibration. 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 the Agilent Technologies website, <http://wirescope.comms.agilent.com/>

Technical Support

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

Location	Telephone Number
USA	800 452-4844
Canada	877 894-4414
Brazil	55 11 7297-3600
Central & South America	52 5258-4392 (Mexico)
Asia Pacific	(65) 375-8100 (Singapore)
Japan	(81) 426 56 7832
Europe, Africa, & West Asia	(31 30) 547-2323 (Netherlands)

Additional numbers and locations are available in the WireScope Help menu under Technical Support. You can also get help at the Agilent Technical Assistance Website: <http://www.agilent.com/find/assist>

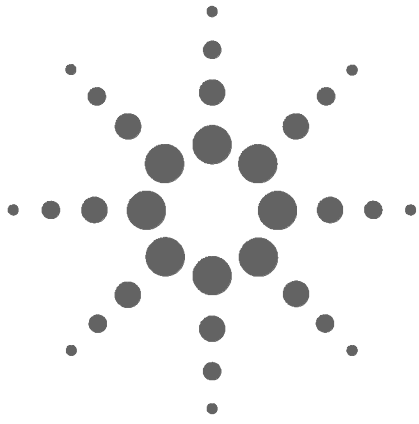
Before you call

Try to solve any problems using the WireScope 350's built-in Help system. (See *Online Help*, on page 1-15.)

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 *Viewing Software and Hardware Version Information*, on page 2-8.)
- Detailed description of the problem, including the exact wording of any error messages and what was being done when the error occurred.
- Company name and street address.
- Contact name and telephone number.

Getting Started
Technical Support



2

Using WireScope

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External and Battery Power

The WireScope 350 and DualRemote 350 are powered by NiMH rechargeable batteries. These batteries contain circuitry that reports their state of charge to the WireScope. The units can also be powered by external ac/dc power adapters. Connecting the adapters also charges the batteries.

A fully charged battery can run the WireScope for 5-6 hours before requiring recharging. The DualRemote's lack of an LCD screen allows it to run longer on a charge. Reducing screen brightness and enabling the Sleep function allows the WireScope to run longer on a charge.

Using External Power

To power the WireScope or DualRemote with AC power, or charge their batteries:

- 1 Choose either the 110 Vac to 12 Vdc adapter (N2595A-110), or the 220 Vac to 12 Vdc adapter (N2595A-210), depending on the supply in the building.

Caution: Use only the external adapter supplied in the WireScope Kit. Using other power adapters may damage the tester, and will void its warranty.

- 2 Connect the end of the adapter's cable to the charging jack on the side of the unit. See *Charging port*, on page 1-3.
- 3 Plug the body of the adapter into an appropriate ac source.

Removing the Battery

The batteries are located on the back of the WireScope and DualRemote.

To remove a battery:

- 1 Turn the unit off and disconnect the external adapter.
- 2 Fully open the stand on the back of the unit.
- 3 Pull the battery release tab toward the bottom of the unit and out.

Battery Safety

To avoid the risk of fire, burns, or damage to your battery pack, do not allow metal objects 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 NiMH 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.

Connecting to Cabling for Certification

The WireScope Tester uses SmartProbes to connect to cabling runs. The Tester automatically detects which probes are installed in the WireScope and DualRemote, and selects matching test parameters.

To connect the Tester to a cable run:

- 1 Select the correct probe for the type of cabling to be certified. See Chapter 3, *Certifying Copper Cabling*, or Chapter 4, *Certifying Fiber Cabling*.
- 2 Insert matching probes in the SmartProbe test ports at the top of the WireScope and DualRemote.
- 3 Connect the SmartProbes to the ends of the cable run being tested.

SmartProbes

Every WireScope SmartProbe contains a memory chip that keeps track of how many tests have been performed with the probe. This data is helpful for determining when the probe is reaching the end of its useful life.

Caution: Never connect any WireScope probe to a voltage source such as a telephone jack. Excessive voltage will damage the WireScope and probe, and void the warranty.

Viewing Probe Information

You can view detailed information about the probes attached to the WireScope and DualRemote. See *Viewing Probe Information*, on page 6-9 for copper test probes, or on page 7-3 for fiber test probes.

Using Talksets

The 2-Way Talkset Kit (N2605A-137) allows operators at opposite ends of a copper cable run to coordinate their efforts. The Talkset Kit is included in the WireScope 350 Professional Test Kit, or can be ordered separately.

Note: The talksets do not work with optical fiber cabling.

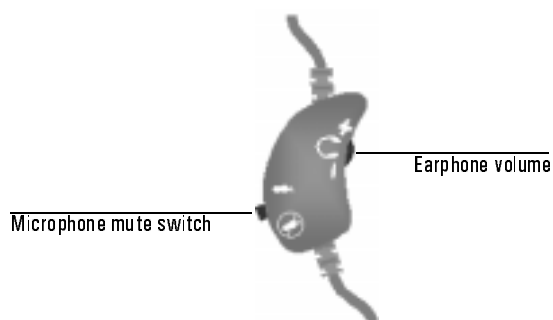
To use talksets for communicating between the ends of a cable run:

- 1 Insert a talkset's plug into the talkset jack on the WireScope, and the plug of another talkset into the jack of the DualRemote. See *Talkset jack*, on page 1-3, for the jack's location.
- 2 Connect the WireScope's and DualRemote's SmartProbes to the ends of a cable run.
- 3 Speak and listen as with any telephone headset.

Note: When a test is running, talkset communication is disabled. Wait until the test finishes before speaking.

Talkset Controls

The WireScope talksets have two controls:



- The thumbwheel in the inside curve of the control housing controls the earpiece volume.
- The switch on the outside curve of the control housing switches the microphone off.

Using CompactFlash™ Cards

The WireScope 350 can use CompactFlash™ cards for storing large amounts of test data, for transferring data to a PC, and for installing new software.

Installing CompactFlash™ Cards

To install a CompactFlash™ card:

- 1 Find the CompactFlash™ card slot in the bottom of the WireScope 350. See *CompactFlash™ Slot*, on page 1-3, for the location of the slot.
- 2 Insert the CompactFlash™ card into the slot.(If the card does not go in easily, make sure it is oriented correctly with the lip on the bottom.)
- 3 The WireScope detects the card, and asks if you want to configure the card.

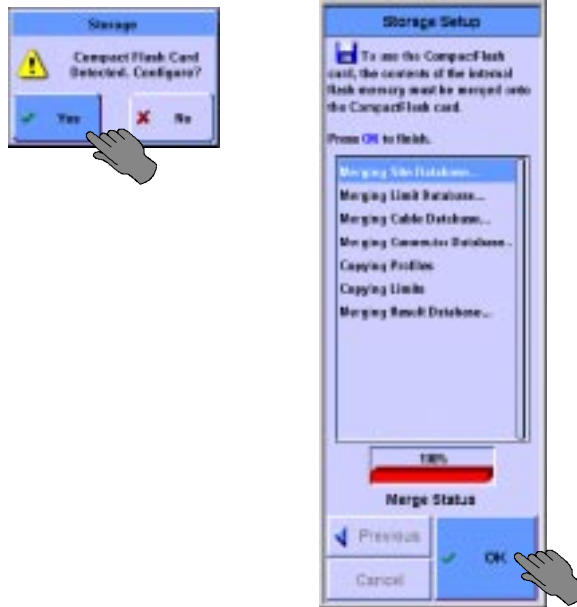
Configuring CompactFlash™ Cards

When a CompactFlash™ card is inserted in the WireScope 350, the tester detects it and displays a window asking if you want to configure the card.

To configure an installed CompactFlash™ card:

- 1 Insert the card in the slot at the bottom of the WireScope. The Storage window opens.

- 2 On the Storage window, press **Yes**. The Storage Setup screen displays.



- 3 A screen describing the configuration procedure displays. The configuration executes in steps.
- 4 When the progress bar shows 100%, press **OK**. The WireScope 350 will automatically change the Save to: setting on the System Settings to CFlash Card.

Upgrading the WireScope Software

The latest WireScope software is available on the Agilent WireScope Website.

To download the software:

- 1 Using the Web browser on a PC, go to <http://wirescope.comms.agilent.com/>
- 2 Click on the link for “The Latest Software Package for your WireScope/FrameScope Product.”
- 3 Complete the registration page, and follow the instructions.

See the *ScopeData Pro User's Guide* for instructions on installing the new software in the WireScope and DualRemote.

Viewing Software and Hardware Version Information

To see the software and hardware revision levels, complete the following steps:

- 1 On the main menu, press the **System** button. The System Settings screen appears.
- 2 On the System Settings screen, press **System Information**, then press the **View** button. The System Information screen appears.



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.

The WireScope 350 and DualRemote 350 windows each consist of three parts:

- The upper section shows the serial number, software revision level, and boot revision level of the device.
- The middle section shows the hardware revision level of the host module, which contains the user interface and PC interface connections
- The lower section shows the hardware revision level of the test module.

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

The System Settings Menu

The System Settings screen is a menu of controls for configuring and viewing information about the WireScope 350.



To open one of the System Settings tools:

- 1 Press **System** on the Main Menu or Expert Mode Main Menu. The System Settings screen displays.
- 2 Press the desired tool, then press **Edit** or **View**. (The label on the large button near the bottom of the screen changes with different selections.) The selected tool's screen displays.

System Information: The System Information screen displays information about the WireScope and DualRemote hardware and software.

Save To: Opens a screen for choosing the destination for saved test results; internal flash memory or CompactFlash™ card.

Power: Opens the Battery Status screen which shows the charge state of the batteries in the WireScope and DualRemote.

Time and Date: This screen has controls for setting the date and time on the WireScope.

User Interface: The User Interface Setup screen has controls for:

- Selecting length units
- Enabling and disabling Expert Mode
- Turning the speaker on and off
- Turning the touch-click sounds on and off
- Enabling and configuring the Sleep Timeout function
- Setting the screen brightness

Operators: The Operator Setup screen has controls for entering the names and locations of the technicians using the WireScope and DualRemote.

Calibrate Touchscreen: This screen guides you through a calibration of the touchscreen. Make sure you have a stylus available before entering this function.

Serial Baud Rate: The Serial Baud Rate Setup screen selects one of three data transfer rates for communication with a PC.

Restore Default Settings: This screen lets you clear the operator list and custom limits. It also changes all settings back to a known state, which is its main function.

Calibration Information: This screen displays the serial numbers of the WireScope 350 and DualRemote 350, the date they were calibrated at the factory, and the date they were last calibrated in the field.

Autoprint: This screen turns autoprinting on and off. This should be turned on if you wish to print labels on an attached Brady TLS2200 printer after each test record is saved.

Demo Mode: This screen turns Demo mode on and off. Demo mode is useful when learning to use the WireScope and does not reflect the actual cable/run attached to the WireScope.

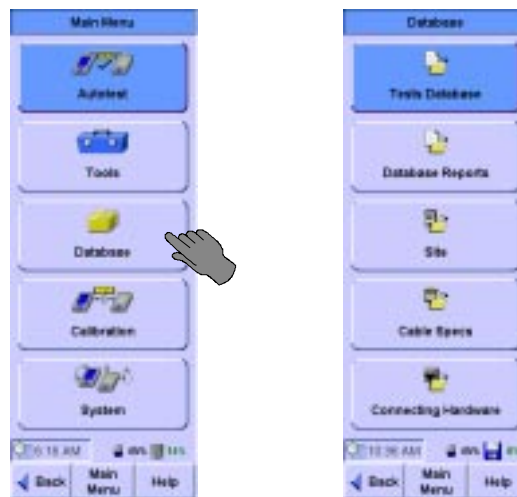
The Database Menu

The Database screen is a menu button that leads to five databases:

- The Tests database contains saved test results.
- Database Reports are summaries of key statistics for saved test results, by site.
- The Site database contains tools for viewing, editing, and creating site configurations.
- The Cable Specs database contains tools for viewing, selecting, and creating cable types by manufacturer.
- The Connecting Hardware database contains tools for viewing, selecting, and creating connector types by manufacturer.

To display the Database screen:

- 1 On the Main Menu, press **Database**. The Database screen displays.



- 2 To view or edit one of the databases, press its button on the menu.

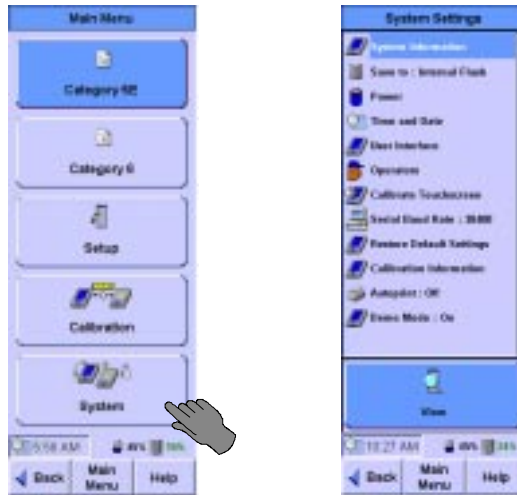
Printing Labels

Printing Labels On Site

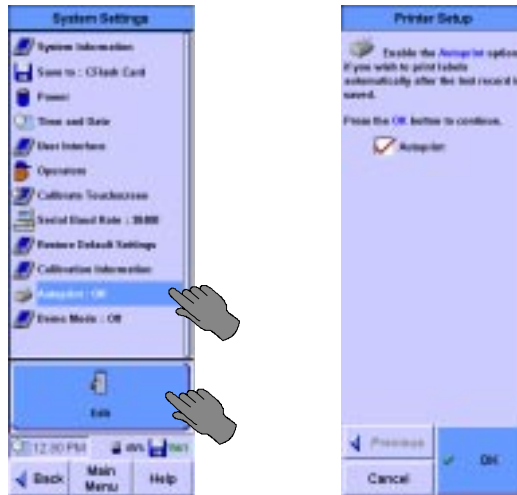
The WireScope 350 can print labels directly to a Brady TLS2200 label printer. The labeling parameters are set using the procedure *Choosing the Labeling Format*, on page 3-6. When the WireScope is configured as described in the following procedure, a label for the tested cable will be printed after saving a test result.

To configure the WireScope 350 to print to the Brady label printer:

- 1 On the Main Menu, press **System**. The System Settings screen displays.



- 2 On the System Settings screen, press **Autoprint**, then **Edit**. The Printer Setup screen displays.



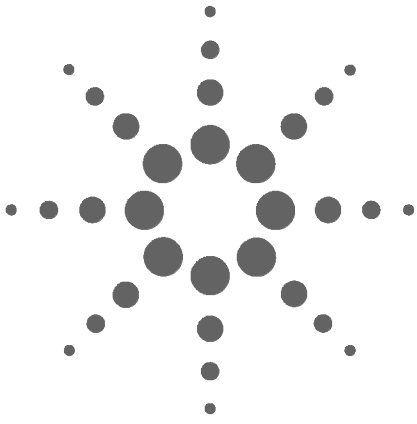
- 3 Press **Autoprint** to enable the Autoprint function. A checkmark shows that the function is enabled.

- 4 Connect the N2605A-050 interface cable to the serial ports of the WireScope 350 and Brady TLS2200.
- 5 Turn the Brady printer on.
- 6 Press the **Func** and **Exit** keys on the printer simultaneously. This sets the printer to Peripheral mode.

Printing Labels from a PC

Refer to the *ScopeData Pro User's Guide* for instructions on printing labels using a PC.

**Using WireScope
Printing Labels**



3

Certifying Copper Cabling

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Copper Testing Overview

This chapter describes how to certify twisted-pair copper cabling. The procedures in this chapter are sufficient for most copper certification jobs. If the requirements of the job are not addressed here, refer to Chapter 6, *Expert Mode for Copper Testing*.

Calibrating the Tester

Before you begin a test, the WireScope and DualRemote pair must be calibrated. Calibration allows the WireScope to compensate for slight anomalies in its measurement hardware or that of the companion DualRemote unit.

- 1 Connect the WireScope 350 and DualRemote 350 in either of the configurations shown below.



2 On the main menu, press **Calibration**.



3 Follow the onscreen instructions to complete the calibration.

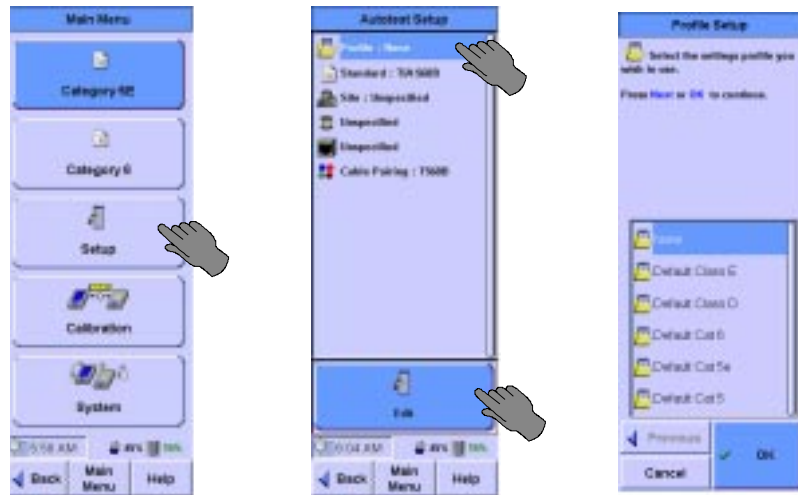
Note: To test link configurations to Category 6, Class E, or higher, Agilent recommends calibrating with the precision calibration cable.

Setting Up an Autotest

The tester must be configured for testing at each site by completing the following procedures.

Opening the Setup Menu

- 1 On the Main Menu, press **Setup**. The Autotest Setup screen displays.



Choosing the Profile

The WireScope 350 normally displays one or two limit options on the Main Menu, based upon the profile selected. If None is selected, then the two limit options are dependent upon the Standard selected. If the Standard is TIA-568B, then the two limit options are Category 5E and Category 6. Otherwise Class D and Class E are displayed. If the profile for a specific test is selected, then only that test choice is displayed. To change the profile:

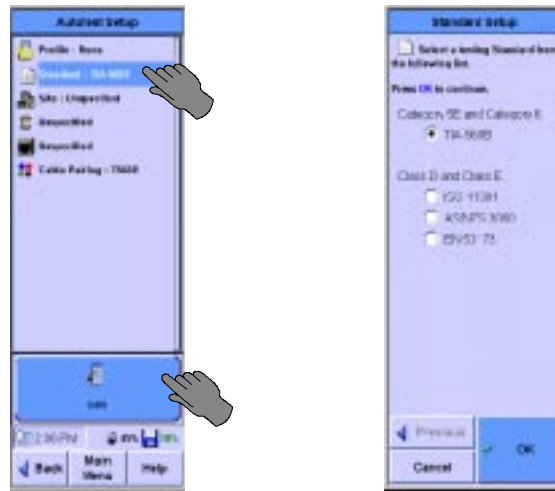
- 1 On the Autotest Setup screen, press **Profile**, then **Edit**. The Profile Setup screen displays.
- 2 Press **None**, or the profile of choice, then press **OK**. The Autotest Setup screen will then show your selected profile.

Choosing the Standard

The WireScope 350 normally tests to the TIA-568B standard. (For detailed information about test standards, please visit the website at: <http://wirescope.comms.agilent.com/>) To test to a different standard, follow these steps:

Note: The Profile must be set to None in order to change the Standard.

- 1 On the Autotest Setup screen, press **Standard**, then **Edit**. The Standard Setup screen displays.



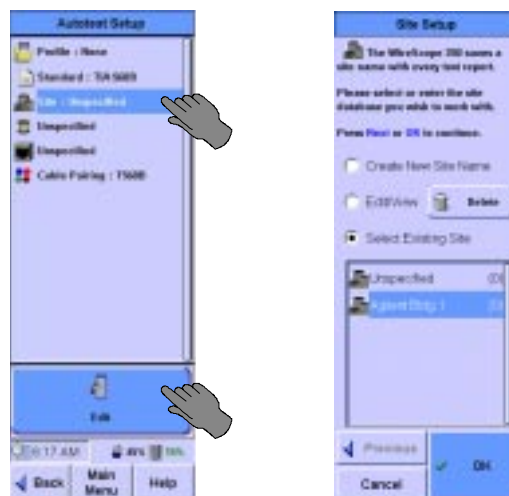
- 2 Select the desired standard, then press **OK**. The Autotest Setup screen will then show the selected standard. The selected standard is applied to all subsequent tests.

Entering the Site Name

The site name identifies the group of settings used on a job, and can be applied to test records for that site.

To enter the site name:

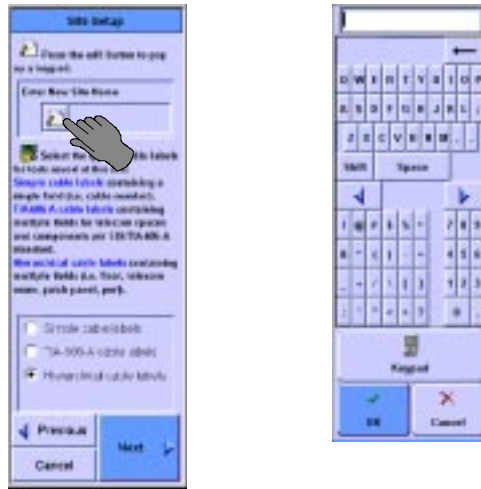
- 1 On the Autotest Setup screen, press **Site**, then press **Edit**. The Site Setup screen displays.



- 2 Select **Create a New Site Name**, then press **Next**. (The **OK** button changes to a **Next** button when you select **Create a New Site Name**.) The screen changes, to allow naming the site.

Note: To change the name or labeling format for an existing site, press the site name on the list, then select **Edit/View** and press **Next**.

- 3 Press the icon under Enter New Site Name. The onscreen keyboard opens.



- 4 Press the keyboard keys to enter the site name, then press **OK**. The keyboard closes.

Choosing the Labeling Format

The labeling format specifies the scheme used to label test records for that site. This format is applied to the test report and to labels printed for the job. There are three label format options:

- **Simple** has only one field, such as 'cable number'. See page 3–7 for the Simple format configuration procedure.
- **TIA-606-A** complies with the TIA-606-A standard. See page 3–9 for the TIA-606-A format configuration procedure.
- **Hierarchical** has multiple fields, for designations such as Building, Floor, Wall Plate, and Jack Number. See page 3–11 for the Hierarchical format configuration procedure.

- 1 On the Site Setup screen, press the preferred labeling format, then press **Next**.



Simple Label Format

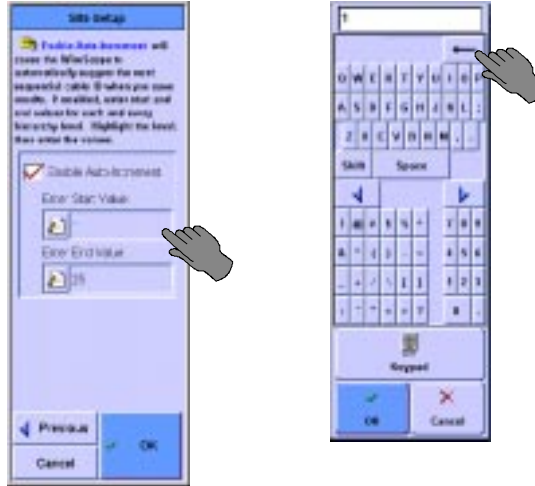
When you choose the Simple labeling format, the following screen displays:



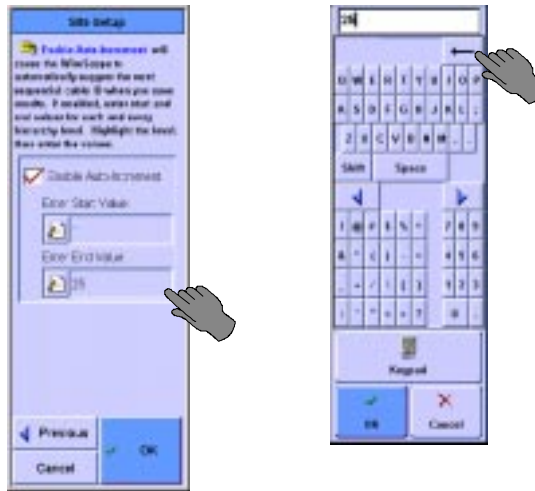
To configure the simple labeling format:

- 1 If you want the numbers on the labels to increase automatically with each new label and test, press **Enable Auto-Increment** so that a checkmark appears, as in the figure above.

- 2 To set the beginning number to other than 1, press the **Enter Start Value** field. The onscreen keyboard opens.



- 3 Press the backspace arrow to erase the number in the display, then press the number keys to enter the new starting number. Press **OK**. The keyboard closes, and the new starting number appears in the **Enter Start Value** field.
- 4 To set the number of cable runs to label and test, press the **Enter End Value** field. The onscreen keyboard opens.



- 5 Press the backspace arrow to erase the number in the display, if any, then press the number keys to enter the new number. Press **OK**. The keyboard closes, and the new ending number appears in the **Enter End Value** field.
- 6 Press **OK**. The Autotest Setup screen displays.

TIA-606-A Label Format

When you choose the TIA-606-A labeling format and press **Next**, the following screen displays:



There are three formatting options within the TIA-606-A standard:

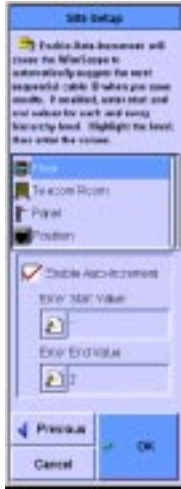
- Class 1 and Class 2 have fields for Floor, Telecom Room, Panel, and Position.
- Class 3 has fields for Building, Floor, Telecom Room, Panel, and Position.

The default Auto-Increment and number settings can be used, or the settings can be changed using the following procedures.

To configure the TIA-606-A labeling format:

- 1 Press **Class 1** or **Class 2** if there is only one building on the site. Press **Class 3** if the site includes more than one building. Press **Next**. The Site Setup screen changes to show the fields in the label, the

Auto-Increment settings for the field highlighted, and the start and end values for the field highlighted.

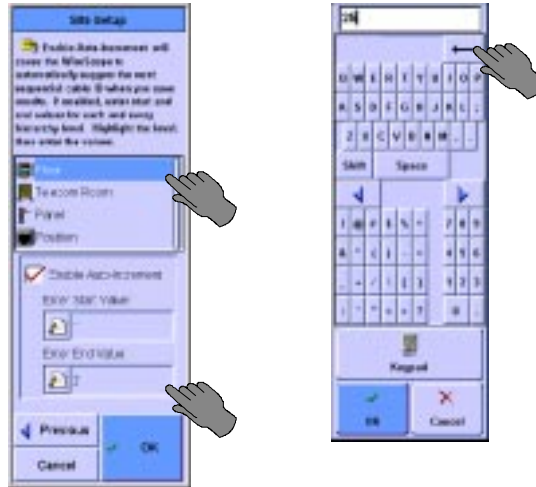


- 2 If you want the numbers for any field to increase automatically with each new label and test, highlight that field, then press **Enable Auto-Increment** so that a checkmark appears, as in the figure above.
- 3 To set the beginning number for a field to other than 1, highlight the category name, then press the **Enter Start Value** field. The onscreen keyboard opens.



- 4 Press the backspace arrow to erase the number in the display, then press the number or letter keys to enter the new starting value. Press **OK**. The keyboard closes, and the new starting value appears in the **Enter Start Value** field.

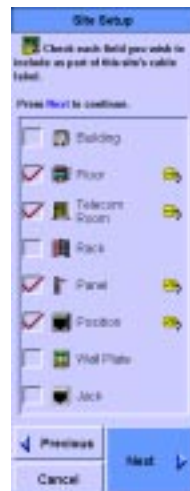
- To set the number of instances of a category (for example, the number of floors), press the **Enter End Value** field. The onscreen keyboard opens.



- Press the backspace arrow to erase the value in the display, then press the number or letter keys to enter the new value. Press **OK**. The keyboard closes, and the new ending value appears in the **Enter End Value** field.
- Repeat steps 2 through 6 for all the selected categories.
- Press **OK**. The Autotest Setup screen displays.

Hierarchical Label Format

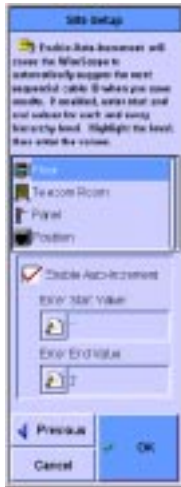
When you choose the Hierarchical labeling format, the following screen displays:



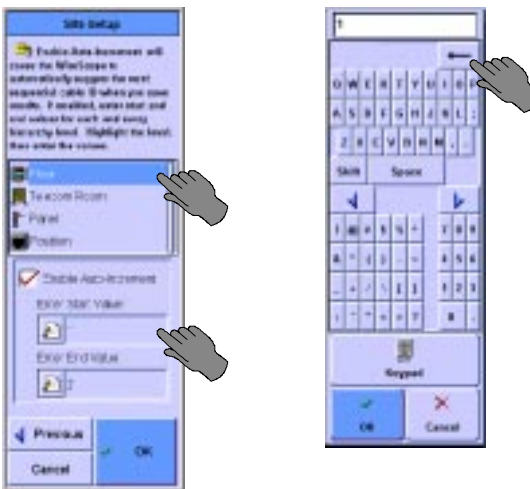
Checkmarks indicate fields that appear in the labels. Yellow tags next to the categories indicate that automatic number incrementing is enabled for that field.

To configure the hierarchical labeling format:

- 1 Press a category to check it for inclusion in the label, or to uncheck it so it does not appear. When all the desired categories are checked, press **Next**. The Site Setup screen changes to show the selected categories.

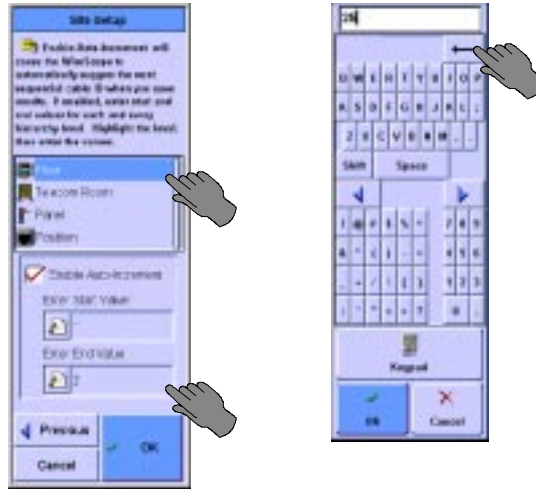


- 2 If you want the numbers for any field to increase automatically with each new label and test, press the category, then press **Enable Auto-Increment** so that a checkmark appears, as in the figure above.
- 3 To set the beginning number for a field to other than 1, press the category name, then press the **Enter Start Value** field. The onscreen keyboard opens.



- 4 Press the backspace arrow to erase the number in the display, then press the number or letter keys to enter the new starting value. Press **OK**. The keyboard closes, and the new starting value appears in the **Enter Start Value** field.

- 5 To set the number of instances of a category (for example, the number of floors), press the **Enter End Value** field. The onscreen keyboard opens.

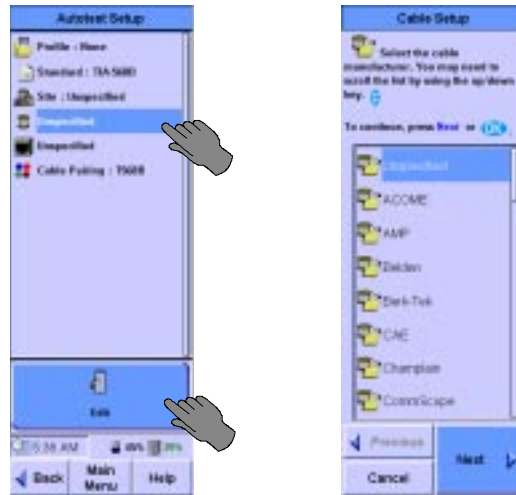


- 6 Press the backspace arrow to erase the value in the display, then press the number or letter keys to enter the new value. Press **OK**. The keyboard closes, and the new ending value appears in the **Enter End Value** field.
- 7 Repeat steps 2 through 6 for all the selected categories.
- 8 Press **OK**. The Autotest Setup screen displays.

Choosing the Cable Type

Cable from different manufacturers has different transmission characteristics. The WireScope 350 compensates for those differences if you tell it what cable is used on the job. A solid black cable spool icon indicates a shielded cable, a grey cable spool icon indicates an unshielded cable.

- 1 On the Autotest Setup screen, press the cable spool icon, then press **Edit**. The Cable Setup screen displays.



Note: The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll use the scroll button at the lower right of the WireScope.

- 2 Select the cable manufacturer, and press **Next**. The Cable Database screen displays.
- 3 Select a cable on the list, and press **OK**. The Autotest Setup screen displays, with the selected cable type next to the cable spool icon. If you do not see the cable on the list, see the next section.

Adding a new cable type

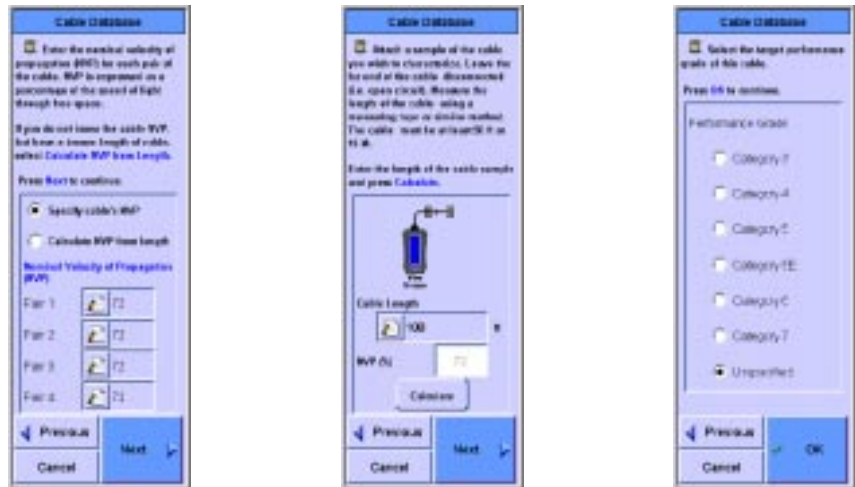
If you have a cable which is not in the cable database, you can add a new cable description to the database.

- 1 If the manufacturer is not present, leave the manufacturer as **Unspecified**. If the manufacturer is present on the list, select it, then press **Next**. The Cable Database screen is displayed. In either case, you will be offered stored descriptions of cable types. If one of the stored descriptions matches the cable being tested, select it, then press **OK**.
- 2 If not, highlight **Add New Description**, and press **Next**.
- 3 Enter the name to be added to the database and press **Next**.

- 4 Enter the pair count, cable construction, and impedance (default selections are available) and press **Next**.



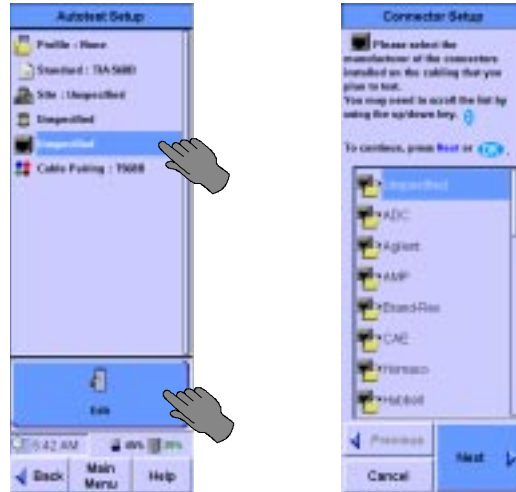
- 5 Enter the nominal velocity of propagation (NVP) for each pair, if known, or select **Calculate NVP from length**. If you need to calculate NVP from length, attach at least 50 feet (15 meters) of cable to the WireScope with the far end disconnected, enter the measured length, and press **Calculate**. The NVP as a percentage of the speed of light will be supplied in the NVP window. Press **Next**.
- 6 Select the target performance grade of the cable, if known, and press **OK**. The Autotest Setup screen displays, with the new cable type next to the cable spool icon.



Choosing the Connector Type

Connectors from different manufacturers have different transmission characteristics. The WireScope 350 compensates for those differences, if you tell it what connectors are used on the job.

- 1 On the Autotest Setup screen, press the connector icon, then press **Edit**. The Connector Setup screen displays.



Note: The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll use the scroll button at the lower right of the WireScope.

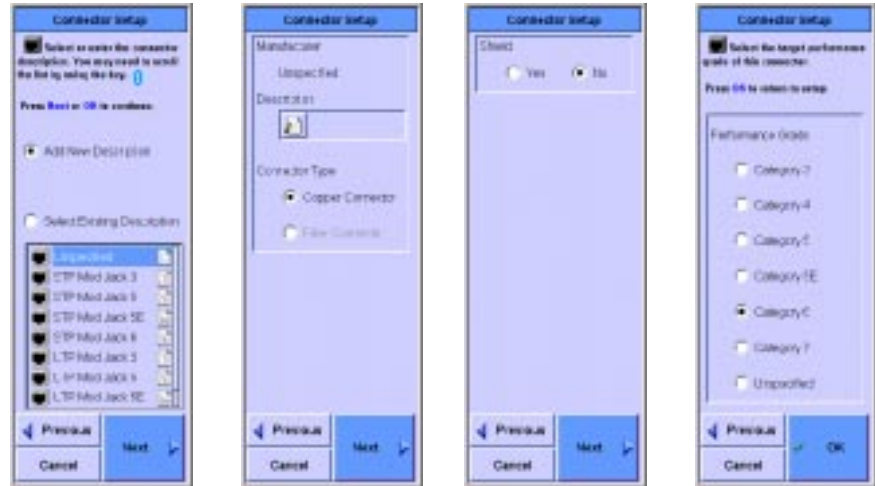
- 2 Press the manufacturer of the connector, then **Next**. A list of that manufacturer's connectors displays.
- 3 Press the name of the connector, then press **OK**. The Autotest Setup screen displays, with the selected connector type next to the connector icon. If you do not see the connector on the list, see the next section

Adding a new connector type

If you have a connector which is not in the connector database, you can add a new connector description to the database.

- 1 If the manufacturer is not present, leave the manufacturer as **Unspecified**. If the manufacturer is present on the list, select it, then press **Next**. The Connector Setup screen is displayed. In either case, you will be offered stored descriptions of connector types. If one of the stored descriptions matches the connector being tested, select it, then press **OK**.
- 2 If not, highlight **Add New Description**, and press **Next**.
- 3 Enter the name to be added to the database and press **Next**.
- 4 Select whether the connector is shielded or not and press **Next**.

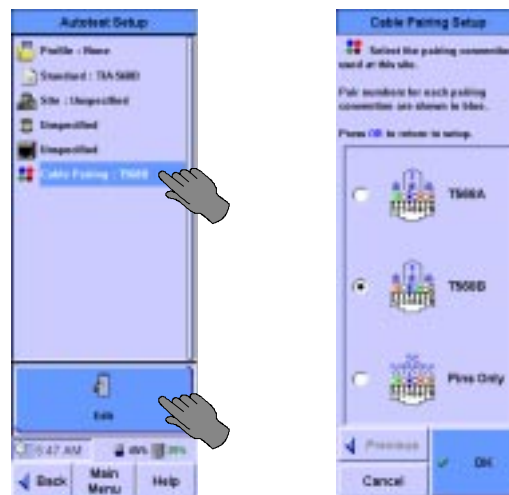
- 5 Select the performance grade of the connector, if known, and press OK. The Autotest Setup screen displays, with the new connector type next to the connector icon.



Choosing the Cable Pairing Convention

To identify the correct pair in the test results, the WireScope must be told what cable pairing convention is used. For example, if the 3,6 pair fails a test, it would be “Pair 2” if using T568A pairing, but it would be “Pair 3” if using T568B pairing.

- 1 On the Autotest Setup screen, press **Cable Pairing**, then press **Edit**. The Cable Pairing Setup screen displays.



- 2 Press the cable pairing convention used on the job, then press **OK**. The Autotest Setup screen displays, with the cable pairing convention named.

Entering the Operator Names

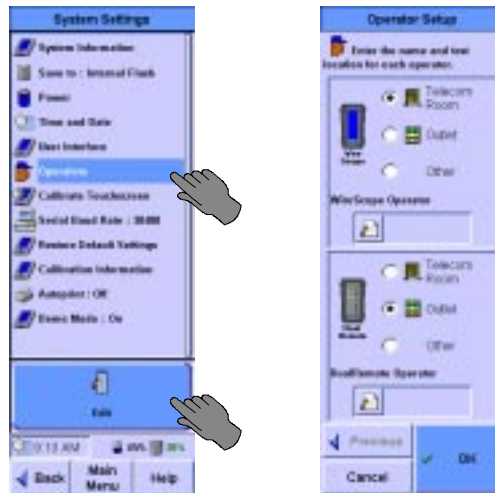
The names of the technicians performing the tests can be entered, and will appear on the test report.

To enter the test technicians' names:

- 1 On the Main Menu, press **System**. The System Settings screen displays.



- 2 Press **Operators**, then press **Edit**. The Operator Setup screen displays.



- 3 Choose the WireScope unit's testing location, either **Telecom Room**, **Outlet**, or **Other**.
- 4 Press the **WireScope Operator** field. The onscreen keyboard opens, with "WireScope Operator" at the top or a list of previously entered names will appear with the keyboard and keypad buttons available.

- 5 Pick a name from the list or press the keyboard keys to enter the name of the technician using the WireScope, then press **OK**. The keyboard closes, and the technician's name appears in the **WireScope Operator** field of the Operator Setup screen.
- 6 Choose the DualRemote unit's testing location, either **Telecom Room, Outlet**, or **Other**.
- 7 Press the **DualRemote Operator** field. The onscreen keyboard opens, with "DualRemote Operator" at the top or a list of previously entered names will appear with the keyboard and keypad buttons available.
- 8 Pick a name from the list or press the keyboard keys to enter the name of the technician using the DualRemote, then press **OK**. The keyboard closes, and the technician's name appears in the **DualRemote Operator** field of the Operator Setup screen.
- 9 Press **OK**. The System Settings screen displays.

Running an Autotest

To run an autotest:

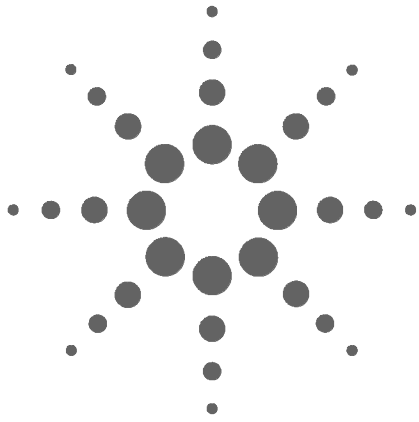
- 1 If this is the first test of the day or after a long break, calibrate the tester. See *Calibrating the Tester*, on page 3-2.
- 2 Connect the WireScope 350 and Dual Remote 350 to the ends of the circuit needing certification.
- 3 On the WireScope Main Menu, press the button identifying the selected test. The test executes.

Note: If no changes were made to the default testing standards or profiles, the Main Menu shows buttons for Category 5E and Category 6 tests. If the Profile has been changed, the Main Menu shows only one test button, indicating the new test profile.

- 4 If the autotest passes, the screen will look like this:



- 5 To save the test results, see Chapter 5 *Saving Test Results*.



4

Certifying Fiber Cabling

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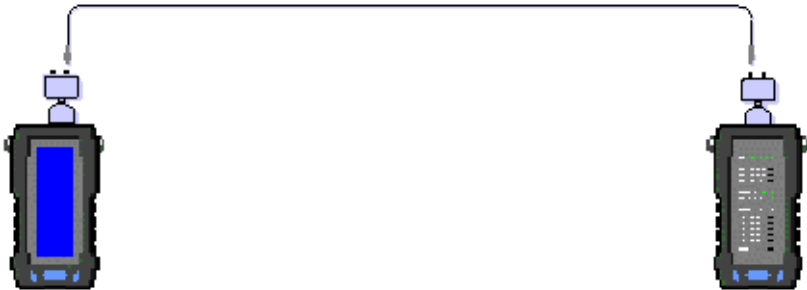


Fiber Testing Overview

This chapter describes how to certify optical fiber cabling. The procedures in the chapter are sufficient for most fiber certification jobs. If the requirements of the job are not addressed here, refer to Chapter 7, *Expert Mode for Fiber Testing*.

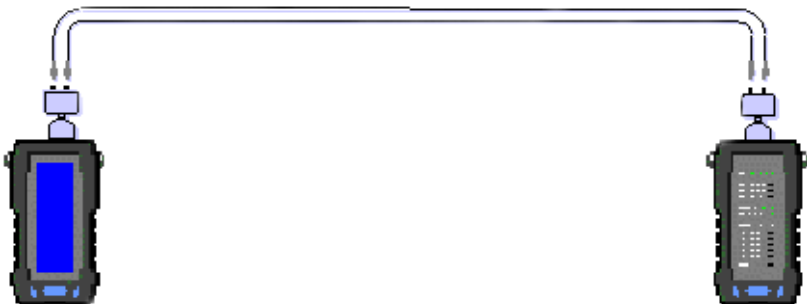
Three connection configurations are available for optical fiber certification testing.

Double-Ended, Single Fiber



Double-ended single fiber configuration tests one fiber, using two Fiber SmartProbes. For single fiber testing the fiber must go from the transmitter/laser source on the DualRemote to the detector on the WireScope. When the 850nm multimode probe is in the DualRemote, the units can be as much as 4 km apart. When the 1300nm multimode probe is in the DualRemote, the units can be as much as 10 km apart. When singlemode probes are used, the WireScope and DualRemote can be as much as 50 km apart. All maximum lengths are barring excessive loss.

Double-Ended, Fiber Pair



Double-ended fiber pair configuration tests two fibers, using two Fiber SmartProbes. When multimode probes are used, the WireScope and DualRemote can be as much as 4 km apart. When singlemode probes are used, the WireScope and DualRemote can be as much as 50 km apart. All maximum lengths are barring excessive loss.

Single-Ended, Fiber Pair (Loopback)



Single-ended loopback configuration tests two fibers, using one Fiber SmartProbe and a fiber test jumper. When an 850nm multimode probe is used, the WireScope and the fiber test jumper can be as much as 2 km apart, or 4 km overall fiber length. When an 1300nm multimode probe is used, the WireScope and the fiber test jumper can be as much as 5 km apart, or 10 km overall fiber length. When singlemode probes are used, the WireScope and fiber test jumper can be as much as 25 km apart, or 50 km overall. All maximum lengths are barring excessive loss.

Note: Singlemode Fiber SmartProbes use a laser light source that requires warming up before use. Before calibrating or testing with singlemode fiber probes, always connect the probes, turn on the WireScope (and DualRemote, if used), and wait five minutes for most accurate readings.

Calibrating the Tester

Before you begin a test, the WireScope and DualRemote pair must be calibrated. Calibration allows the WireScope to compensate for slight anomalies in its measurement hardware or that of the companion DualRemote unit.

Calibrating for Double-Ended Testing

Method A

This method is commonly called Method A or the 2-jumper method and is usually recommended for singlemode fiber.

Note: Use the same calibration method whether you are testing two fibers or just one fiber.

- 1 Insert a Fiber SmartProbe⁺ in the WireScope, and a Fiber SmartProbe⁺ in the DualRemote. They should both be either multimode or singlemode.

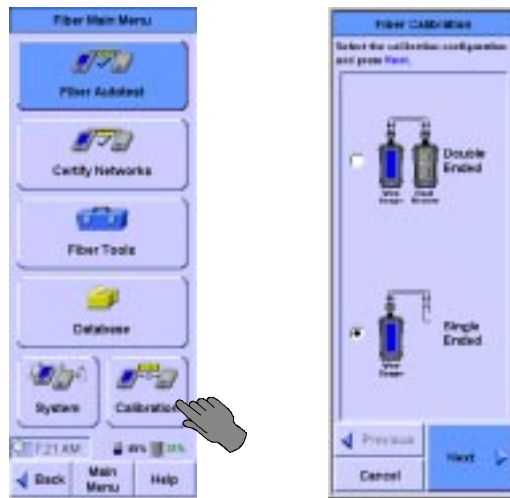
Note: Singlemode Fiber SmartProbes use a laser light source that requires warming up before use. Before calibrating or testing with singlemode fiber probes, always connect the probes, turn on the WireScope (and DualRemote, if used), and wait five minutes for most accurate readings.

- 2 Connect duplex test jumpers to the two Fiber SmartProbes.
- 3 Connect the test jumpers to each other, using two couplers. Connect the WireScope transmitter to the DualRemote detector, and vice versa.
- 4 Turn on the WireScope and DualRemote.

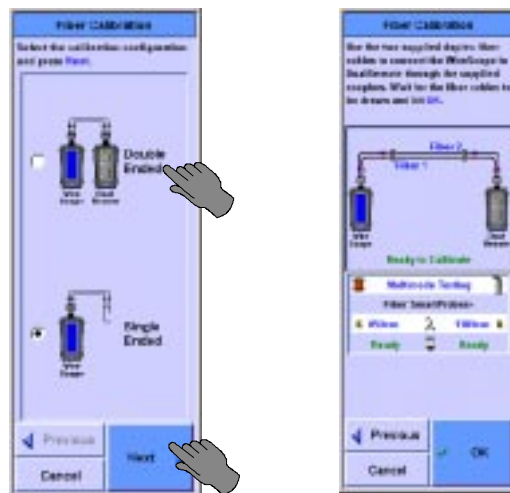
The WireScope detects a Fiber SmartProbe⁺, and displays the following window:



- 5 On the Fiber Main Menu, press **Calibration**. The Fiber Calibration screen displays.



- 6 Choose **Double Ended**, and press **Next**. The Fiber Detection screen displays.



- 7 When the message below the diagram reads, “Ready to Calibrate,” press **OK**. The Calibration window opens.
- 8 When the window reads, “Calibration Successful,” press **OK** in the window. The Fiber Main Menu displays. Remove the couplers and use the coupler ends of the test jumpers when changing connections. Leave the test jumper connections to the Fiber SmartProbes intact.

Method B

Method B or the 1-jumper method is usually recommended for multimode fiber.

- 1 Insert a Fiber SmartProbe⁺ in the WireScope and a Fiber SmartProbe⁺ in the DualRemote. They should both be multimode.
- 2 Connect a single fiber of each of two duplex test jumpers to the two Fiber SmartProbes⁺ with the transmitter of each connected to the detector of the other with no coupler.
- 3 Turn on the WireScope and DualRemote.
- 4 On the Fiber Main Menu, press **Calibration**. The Fiber Calibration screen displays as above.
- 5 Choose **Double Ended**, and press **Next**. the Fiber Detection screen displays as above.
- 6 When the message below the diagram reads, “Ready to Calibrate,” press **OK**. The Calibration window opens.
- 7 When the window reads, “Calibration Successful,” press **OK** in the window. The Fiber Main Menu displays. Leave the transmitter connection to the Fiber SmartProbes intact. Remove both detector connections and replace with the previously unused fiber of the duplex test jumper on each probe.

Method C

Method C is recommended for multi-fiber and small form factor (SFF) connectors.

Note: Because the multi-fiber/SFF connectors are polarized connectors, ensure that you have selected the proper connector type in the Autotest Setup screen, see *Choosing the Connector Type*, on page 4-18.

- 1 Insert a Fiber SmartProbe⁺ in the WireScope and a Fiber SmartProbe⁺ in the DualRemote. They should both be either singlemode or multimode.

Note: Singlemode Fiber SmartProbes use a laser light source that requires warming up before use. Before calibrating or testing with singlemode fiber probes, always connect the probes, turn on the WireScope (and DualRemote, if used), and wait five minutes for most accurate readings.

- 2 Connect special ST or SC to multi-fiber/SFF test jumpers to the two Fiber SmartProbes. These special transition jumpers are available from the connector manufacturers.
- 3 Connect the test jumpers to each other, using a special reference jumper which mates with the multi-fiber/SFF connector. Special reference jumpers are manufacturer specific. Contact the connector manufacturer for details. Connect the WireScope transmitter to the DualRemote detector, and vice versa.
- 4 Turn on the WireScope and DualRemote, if necessary.
- 5 On the Fiber Main Menu, press **Calibration**. The Fiber Calibration screen displays as above.
- 6 Choose **Double Ended**, and press **Next**. the Fiber Detection screen displays as above.
- 7 When the message below the diagram reads, “Ready to Calibrate,” press **OK**. The Calibration window opens.

- 8 When the window reads, “Calibration Successful,” press **OK** in the window. The Fiber Main Menu displays. Remove the reference jumper to start testing.

Calibrating for Single-Ended Testing

- 1 Insert a Fiber SmartProbe⁺ in the WireScope,.

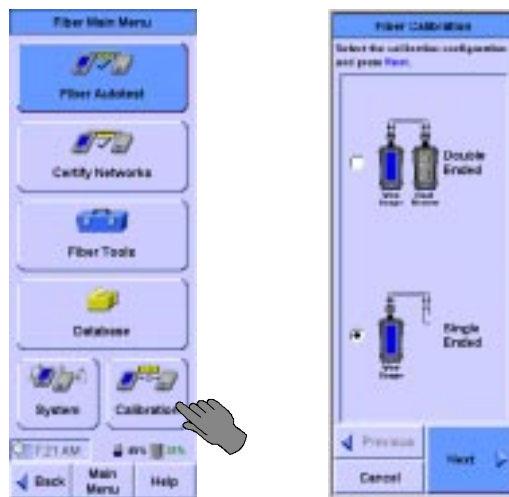
Note: Singlemode Fiber SmartProbes use a laser light source that requires warming up before use. Before calibrating or testing with singlemode fiber probes, always connect the probes, turn on the WireScope, and wait five minutes.

- 2 Connect a duplex test jumper to the Fiber SmartProbe⁺ transmitter and detector.
- 3 Connect the two test jumpers to each other, using a coupler.
- 4 Turn on the WireScope.

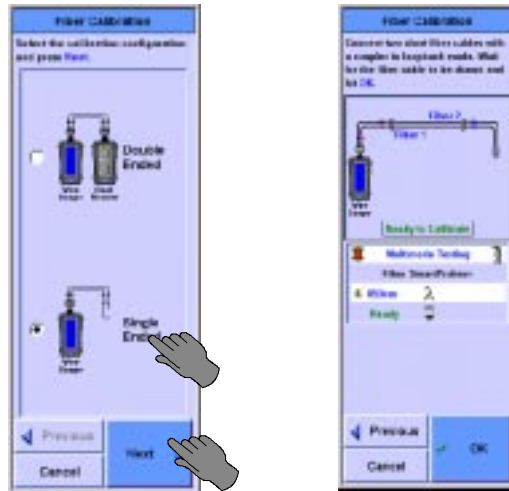
The WireScope detects a Fiber SmartProbe⁺, and displays the following window:



- 5 On the Fiber Main Menu, press **Calibration**. The Fiber Calibration screen displays.



- 6 Choose **Single Ended**, and press **Next**. The Fiber Detection screen displays.



- 7 When the message below the diagram reads, “Ready to Calibrate,” press **OK**. The Calibration window opens.
- 8 When the window reads, “Calibration Successful,” press OK in the window. The Fiber Main Menu displays.

Setting Up an Autotest

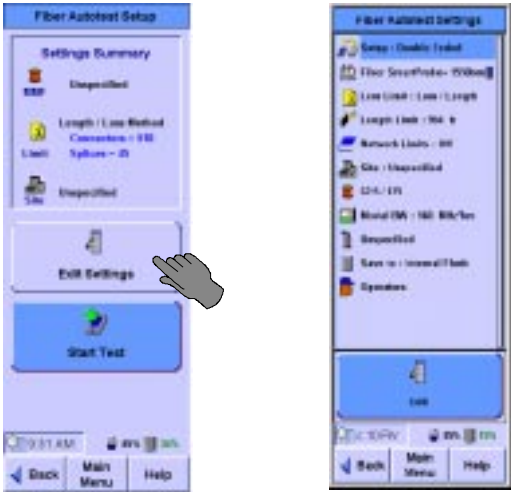
The tester must be configured for testing at each site by completing the following procedures.

Opening the Settings Menu

- 1 On the Main Menu, press **Fiber Autotest**. The Fiber Autotest Setup screen displays.



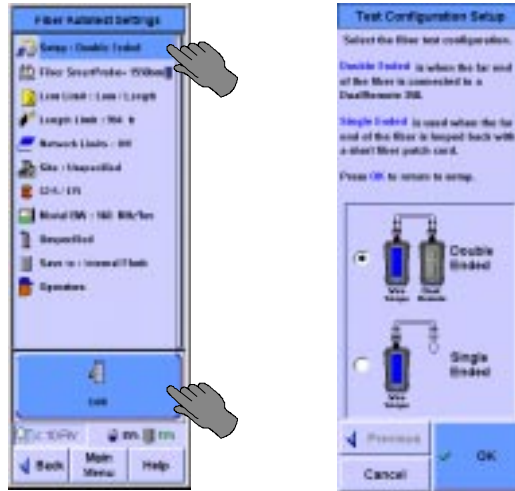
- 2 Press **Edit Settings**. The Fiber Autotest Settings screen displays.



Choosing the Test Configuration

To choose either single-ended or double-ended testing:

- 1 On the Fiber Autotest Settings screen, press **Setup**, then press **Edit**. The test Configuration Setup screen displays.

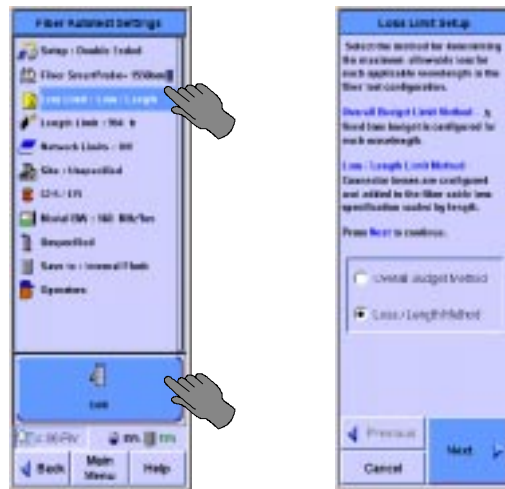


- 2 Press either **Double Ended** or **Single Ended**, then press **OK**. The Fiber Autotest Settings screen displays, with the selected configuration next to Setup.

Setting the Loss Limit

To set the loss limit for fiber testing:

- 1 On the Fiber Autotest Settings screen, press **Loss Limit**, then **Edit**. The Loss Limit Setup screen displays.



- 2 Select either **Overall Budget Method** or **Loss/Length Method**, then press **Next**. Continue by completing the steps in the matching section that follows.

Overall Budget Method

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

When you select **Overall Budget Method** and press **Next** on the Loss Limit Setup screen, the screen changes to the following:



- 1 To set the loss limit for a listed wavelength, press the wavelength field. The numeric keypad opens.



- 2 Press the backspace arrow to erase the displayed value, then enter the new limit value. Press **OK**. The keypad closes.
- 3 Press **OK**. The Fiber Autotest Settings screen displays.

Loss/Length Method

When **Loss/Length Method** is selected, the WireScope 350 calculates the limit based on the length of the cable tested. You can set values for connectors, loss per connector, splices, and loss per splice. The connector and splice losses are added to the loss that is calculated by multiplying the length of the fiber by the loss/Km specification of the selected cable, which is shown at the bottom of the Setup screen.

When you select **Loss/Length Method** and press **Next** on the Loss Limit Setup screen, the screen changes to the following:



- 1 To set any of the variable values, press the variable. The numeric keypad opens.

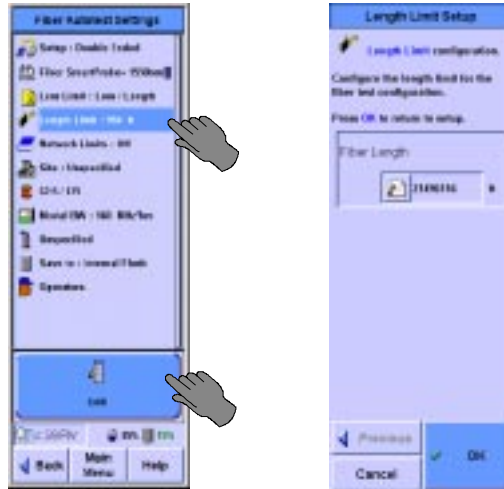


- 2 Press the backspace arrow to erase the displayed value, then enter the new variable value. Press **OK**. The keypad closes.
- 3 Press **OK**. The Fiber Autotest Settings screen displays.

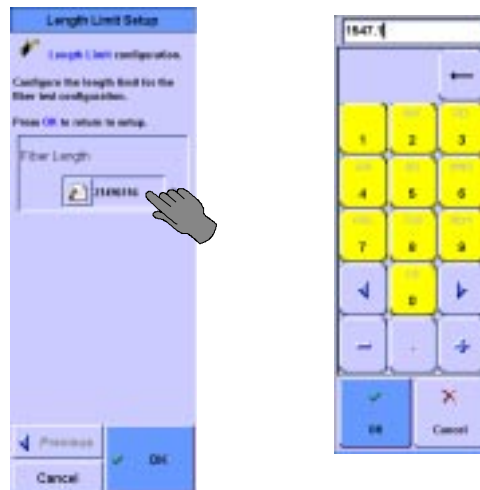
Setting the Length Limit

To set the length limit for fiber testing:

- 1 On the Fiber Autotest Settings screen, press **Length Limit**, then press **Edit**. The Length Limit Setup screen displays.



- 2 Press the Fiber Length field. The numeric keypad opens.



- 3 Press the backspace arrow to erase the displayed value, then enter the new limit value. Press **OK**. The keypad closes.
- 4 Press **OK**. The Fiber Autotest Settings screen displays.

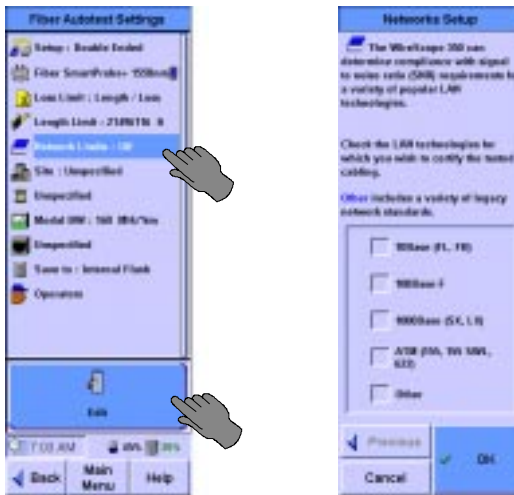
Choosing the Network Limit

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 performed in addition to certifying 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 choose the network limit:

- 1 On the Fiber Autotest Settings screen, press **Network Limits**, then press **Edit**. The Networks Setup screen displays.

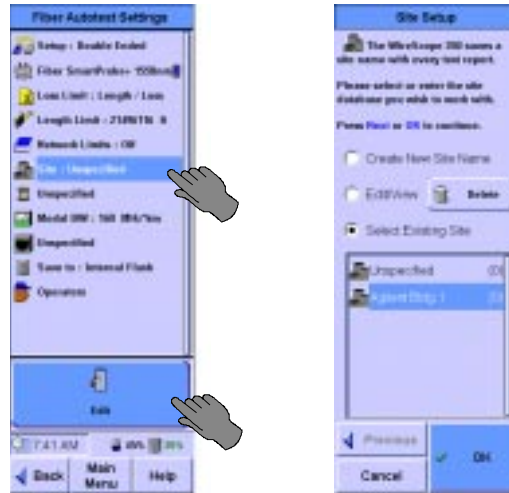


- 2 Press a limit to choose it. When you have placed check marks next to all types of networks you wish to certify, press **OK**. The Fiber Autotest Settings screen displays.

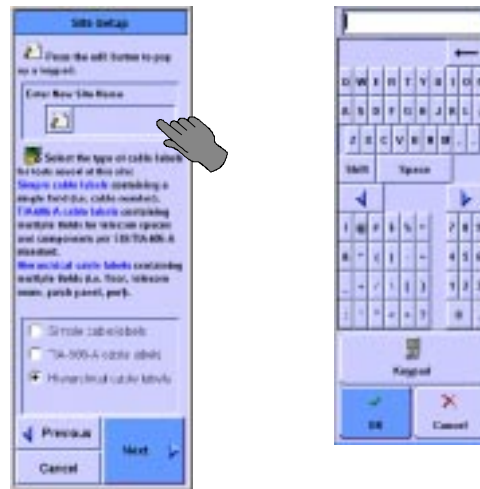
Entering the Site Name

The site name identifies the group of settings used on a job.

- 1 On the Fiber Autotest Settings screen, press **Site**, then press **Edit**. The Site Setup screen displays.



- 2 Select **Create a New Site Name**, then press **Next**. (The **OK** button changes to a **Next** button when you select **Create a New Site Name**.) The screen changes, to allow naming the site.
- 3 Press the Enter New Site Name field. The onscreen keyboard opens.



- 4 Press the keyboard keys to enter the site name, then press **OK**. The keyboard closes.

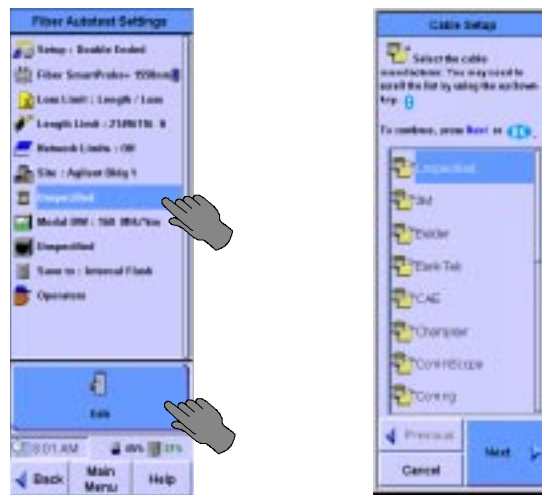
Choosing the Labeling Format

The labeling format for fiber testing is the same as that previously described in Chapter 3, *Certifying Copper Cabling*. See *Choosing the Labeling Format*, on page 3-6 for more information.

Choosing the Cable Type

Cable from different manufacturers has different transmission characteristics. The WireScope 350 compensates for those differences if you tell it what cable is used on the job. The color of the cable spool icon indicates multimode (orange) or singlemode (yellow) fiber.

- 1 On the Fiber Autotest Settings screen, press the spool icon, then press **Edit**. The Cable Setup screen displays.



- 2 Select the cable manufacturer, and press **Next**. The Cable Database screen displays.
- 3 Select a cable on the list, and press **OK**. The Fiber Autotest Setup screen displays, with the selected cable type next to the cable spool icon. If you do not see the cable on the list, see the next section.

Adding a new cable type

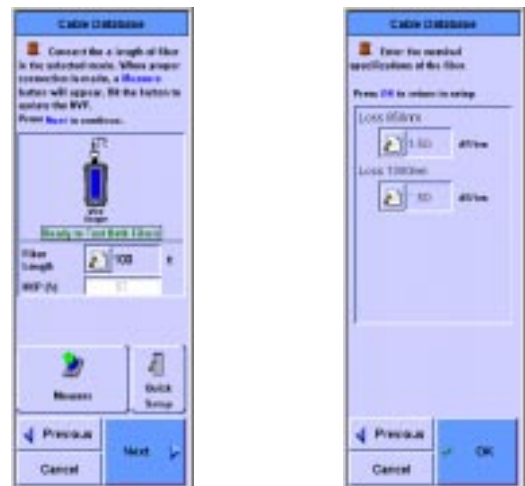
If you have a cable which is not in the cable database, you can add a new cable description to the database.

- 1 If the manufacturer is not present, leave the manufacturer as **Unspecified**. If the manufacturer is present on the list, select it, then press **Next**. The Cable Database screen is displayed. In either case, you will be offered stored descriptions of cable types. If one of the stored descriptions matches the cable being tested, select it, then press **OK**.
- 2 If not, highlight **Add New Description**, and press **Next**.
- 3 Enter the name to be added to the database and press **Next**.

- 4 Select the fiber construction that is appropriate and press **Next**.



- 5 Enter either the nominal velocity of propagation (NVP) of the fiber cable, **OR** the fiber cable's refractive index (default values are presented) and press **Next**. If you do not know either value, but have a known length of cable, select **Calculate NVP from length** and select the Test Configuration and press **Next**.
- 6 If you are calculating NVP from length, enter the fiber length. You may have to calibrate the tester in the test configuration you have specified, using appropriate test jumpers. There is a **Quick Setup** button for specifying the test configuration and fiber construction for the NVP measurement. When the proper connection has been made, a **Measure** button will appear. Press **Measure** and the NVP as a percentage of the speed of light will be entered in the NVP window. When completed, press **Next**.



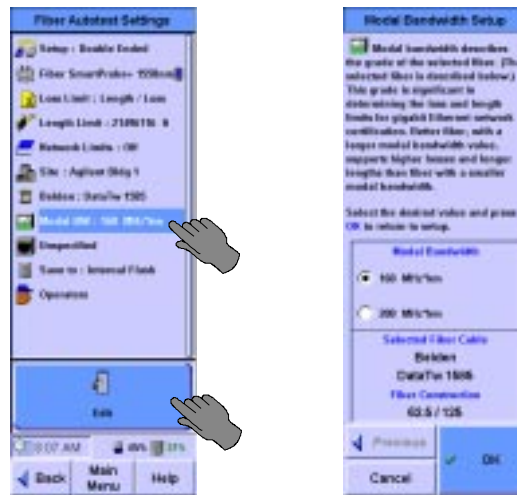
- 7 Enter the nominal specifications of the fiber. Default values are presented. Press **OK** and the Fiber Autotest Settings screen will display with the new cable description entered beside the cable spool icon.

Setting the Modal Bandwidth

Note: Modal bandwidth is a selection only available with multimode fiber. If a single mode fiber cable is selected above, this selection field is not present.

With multimode fiber, the signal can be transmitted in different “modes.” The modal bandwidth is a measurement of the ability of the fiber cable to pass the signal without adding additional attenuation. Modal bandwidth is a rating given to the fiber. The fiber manufacturer should be able to tell what the modal bandwidth of their fiber is. You should then select the proper Modal Bandwidth in the WireScope 350 before running the test. To set the modal bandwidth for optical fiber certification:

- 1 On the Fiber Autotest Settings screen, press **Modal BW**, then **Edit**. The Modal BW Setup screen displays.

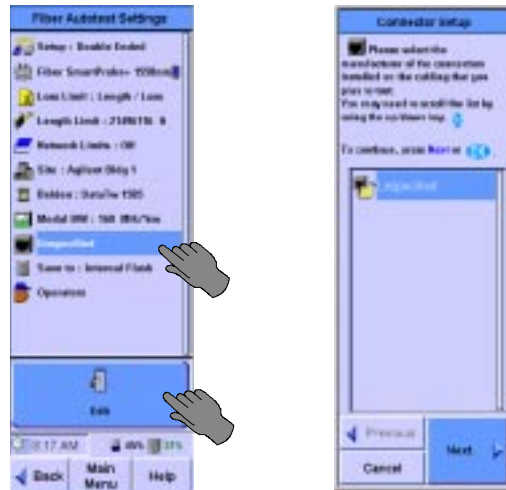


- 2 Choose the modal bandwidth and press **OK**. The Fiber Autotest Setup screen displays, with the chosen bandwidth next to **Modal BW**.

Choosing the Connector Type

Connectors of different types have different transmission characteristics. The WireScope 350 compensates for those differences, if you tell it what connectors are used on the job.

- 1 On the Fiber Autotest Settings screen, press the connector icon, then **Edit**. The Connector Setup screen displays.



- 2 Press **Next**. A list of that connector types displays.



- 3 Press the type of the connector, then press **OK**. The Fiber Autotest Setup screen displays, with the selected connector type next to the connector icon. If you do not see the connector on the list, see the next section

Adding a new connector type

If you have a connector which is not in the connector database, you can add a new connector description to the database.

- 1 If the manufacturer is not present, leave the manufacturer as **Unspecified**. If the manufacturer is present on the list, select it, then press **Next**. The Connector Setup screen is displayed. In either case, you will be offered stored descriptions of connector types. If one of

the stored descriptions matches the connector being tested, select it, then press **OK**.

- 2 If not, highlight **Add New Description**, and press **Next**.



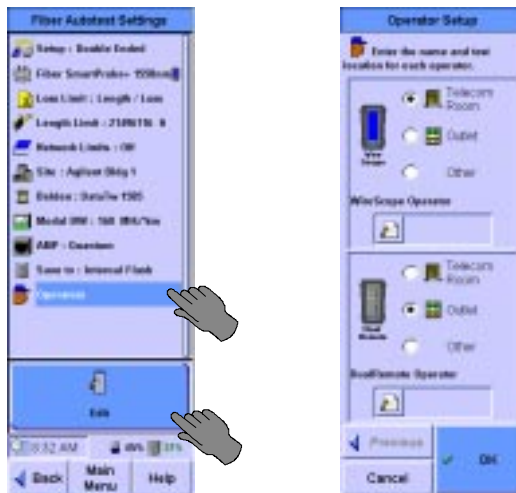
- 3 Enter the name to be added to the database and press **Next**.
- 4 Select the fiber connector type from the list of mono-fiber connectors and multi-fiber connectors shown or select **Unspecified**. Press **OK** and Fiber Autotest Settings screen displays with the new connector description beside the fiber connector icon.

Entering the Operator Names

The names of the technicians performing the tests can be entered, and will appear on the test report.

To enter the test technicians' names:

- 1 On the Fiber Autotest Setup screen, press **Operators**, then **Edit**. The Operator Setup screen displays.

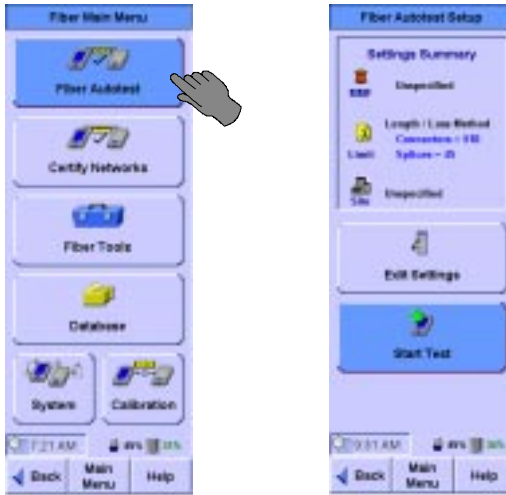


- 2 Choose the WireScope unit's testing location, either **Telecom Room, Outlet, or Other**.
- 3 Press the **WireScope Operator** field. The onscreen keyboard opens, with "WireScope Operator" at the top or a list of previously entered names will appear with the keyboard and keypad buttons available.
- 4 Press the keyboard keys to enter the name of the technician using the WireScope, then press **OK**. The keyboard closes, and the technician's name appears in the **WireScope Operator** field of the Operator Setup screen.
- 5 Choose the DualRemote unit's testing location, either **Telecom Room, Outlet, or Other**.
- 6 Press the **DualRemote Operator** field. The onscreen keyboard opens, with "DualRemote Operator" at the top or a list of previously entered names will appear with the keyboard and keypad buttons available.
- 7 Press the keyboard keys to enter the name of the technician using the DualRemote, then press **OK**. The keyboard closes, and the technician's name appears in the **DualRemote Operator** field of the Operator Setup screen.
- 8 Press **OK** and press **Main Menu**. The Fiber Main Menu displays.

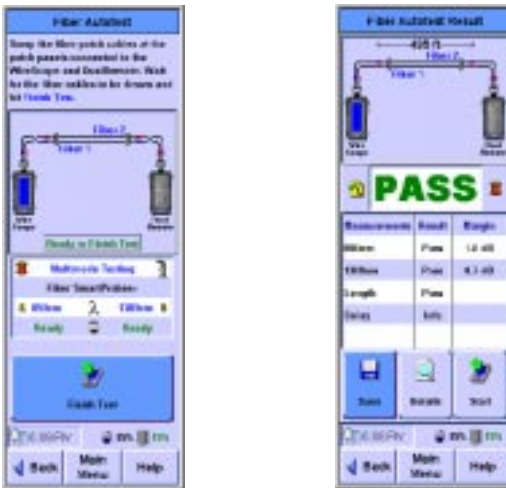
Running an Autotest

To run an autotest:

- 1 Connect the WireScope 350 and Dual Remote 350 to the ends of the circuit needing certification.
- 2 On the WireScope Fiber Main Menu, press **Fiber Autotest**. The Fiber Autotest Setup screen displays.

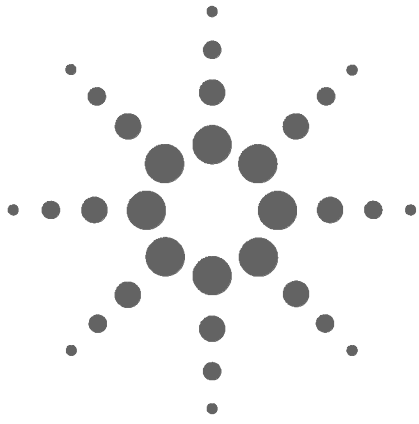


- 3 Press **Start Test**. The autotest executes.
- 4 Follow the on screen directions, which may include swapping fiber connections.



Note: When disconnecting fibers for swapping, disconnect at the end of the test jumpers, not at the Fiber SmartProbe⁺.

- 5 To save the test results, see Chapter 5 *Saving Test Results*.



5

Saving Test Results

Test Results Display 5-2

Saving Test Results 5-3

 Choosing the Data Storage Location 5-3

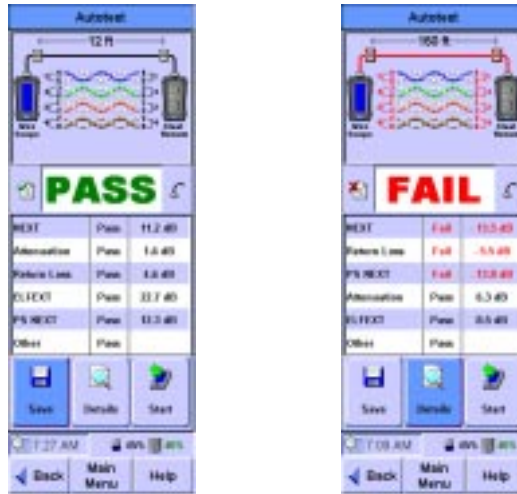
 Saving the Results 5-4

Viewing Result Details 5-5



Test Results Display

When the WireScope completes a test, it displays either a Pass or Fail screen. All the example screens in this chapter are from Category 6 tests; other test result screens are similar.



Both the Pass and Fail screens list the test parameters, with the results of each parameter. On Fail screens, results that failed the test are shown in red.

Saving Test Results

Before saving test results, choose the storage site to save them to.

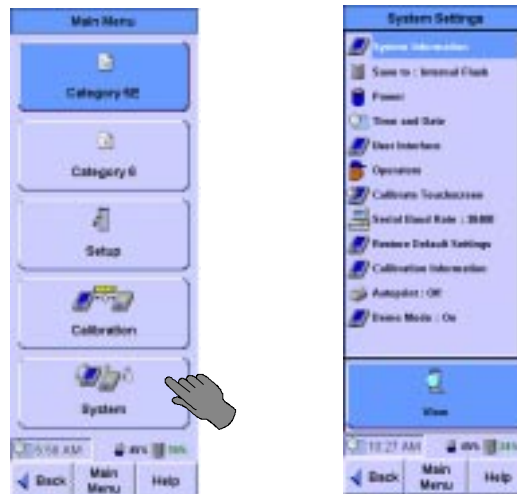
Note: The procedures below show screens from the copper testing configuration. The procedures for fiber testing are essentially the same, but the screens may differ in minor details.

Choosing the Data Storage Location

Test data can be saved to either the WireScope's internal memory or to an installed CompactFlash™ card.

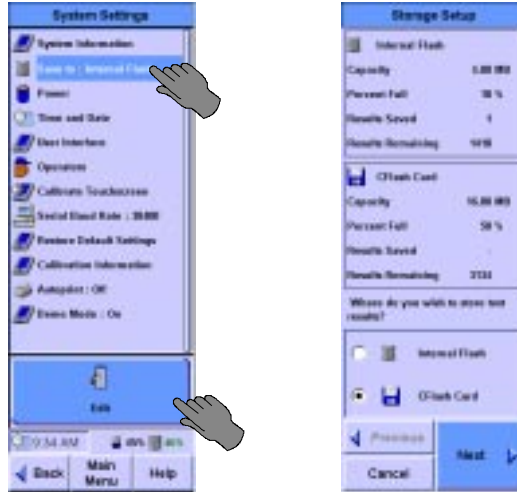
To choose the data storage location:

- 1 On the Main Menu, press **System**. The System Settings screen displays.

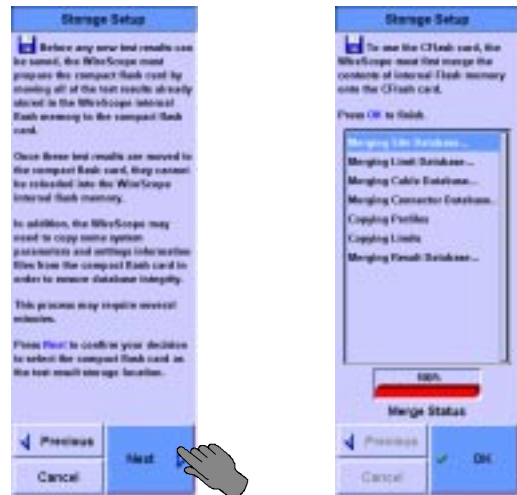


Saving Test Results
 Saving Test Results

- 2 On the System Settings screen, press **Save To**, then press **Edit**. The Storage Setup screen displays.



- 3 Select either **Internal Flash** or **CFlash Card**.
- 4 If you chose **Internal Flash**, press **OK**. The System Settings screen displays, with “Internal Flash” next to **Save To**.
- 5 If you chose **CFlash Card**, press **Next**. The Storage Setup screen displays a message about preparing the CompactFlash™ card. The Storage Setup screen displays a list of the steps in preparing the CF card, and a progress bar.

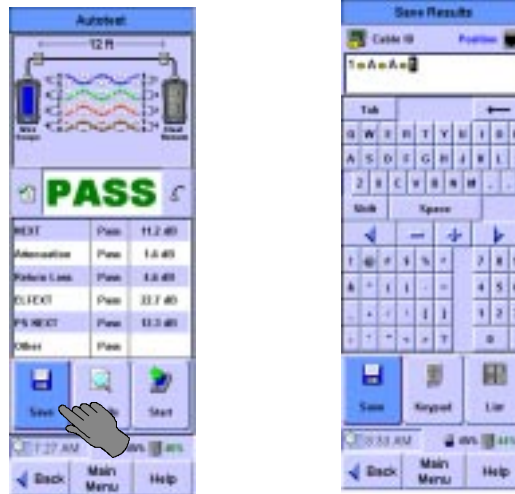


- 6 When the progress bar shows 100%, press **OK**. The System Settings screen displays, with “CFlash Card” next to **Save To**.

Saving the Results

To save the test results for inclusion in certification reports:

- 1 After completing a test, press the **Save** button. The Save Results screen displays.



- 2 If the cable ID in the display is wrong, press the backspace arrow to erase it, and press the keyboard keys to enter the correct cable ID. For a cable ID with multiple fields, press **Shift**, then **Tab** to back up to a prior field, or use your stylus or finger to get to the desired field. An unshifted **Tab** will move the cursor forward one field.
- 3 When the label is correct, press the **Save** button. The WireScope saves the results of the test to the chosen storage site. If you have a multiple-field cable ID, there must be a value in every field, including before the first yellow dot and after the last yellow dot.

Viewing Result Details

A **Details** button on Pass and Fail screens opens the Test Data screen.



Saving Test Results
Viewing Result Details

The Test Data screen lists the test parameters and indicates passing or failure for each.

To view detailed test data for one of the test parameters:

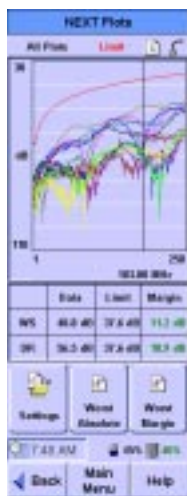
- 1 Press the name of the test parameter. The Test Data screen displays buttons appropriate for the selected parameter.

For example, when **NEXT** is selected, the screen includes **Data**, **Plots**, and **Locator** buttons, while pressing **Wiremap** shows only the **Data** button.

- 2 To view the Data screen for the selected test parameter, press **Data**. The Data screen displays.



- 3 To view the Plots screen for the selected test parameter (if the Plots button is present), press **Plots**. The Plots screen displays.



- To view the Locator screen for the selected test parameter (if the Locator button is present), press **Locator**. The Locator screen displays.



Interpreting Test Results Detail Screens

The various test detail screens present test data in different formats, as explained below.

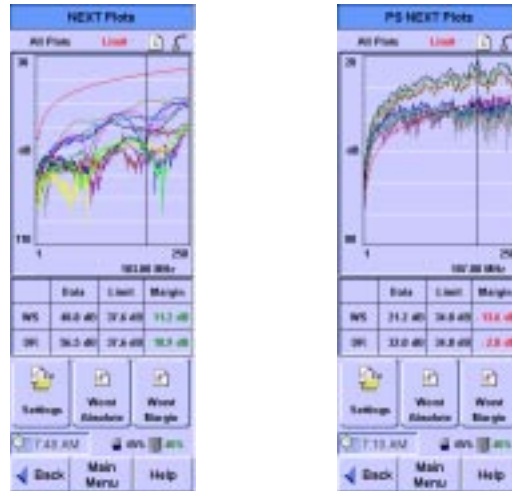
Data Screens



The Data screen shows detail of the selected test parameter results. The examples above show data of a passing test, at left, and a failing one, at right. The data included depends on which parameter is selected. (See steps 2, 3, and 4 of the *Viewing Result Details* procedure on page 5-5.)

The Data screens shown above include a table that displays details of the test results for two twisted pairs of copper cable. To view the results for a different set of twisted pairs, press it on the list.

Plots Screens



Plots screens display test results as plots on a graph. The examples above show plots of a passing test, at left, and a failing one, at right. A smooth red line on the plot indicates the limit boundary between passing and failure. The **Worst Margin** button places a vertical line on the plot at the frequency where the test results come closest to the pass/fail boundary on passing test plots. On failing test plots, the **Worst Margin** button places the line at the frequency where the results exceed the acceptable limits the most. You can move the cursor around the plot screen by pressing the area you want to see and then using the scroll rocker to fine tune the location. The frequency of the cursor is displayed and the values in the table correspond to the cursor location.

A chart below the plot shows detailed results of the current location of the cursor at the WireScope and DualRemote, and the limits for the test parameter, as follows:

Data: This is the worst case of the test results at the cursor location.

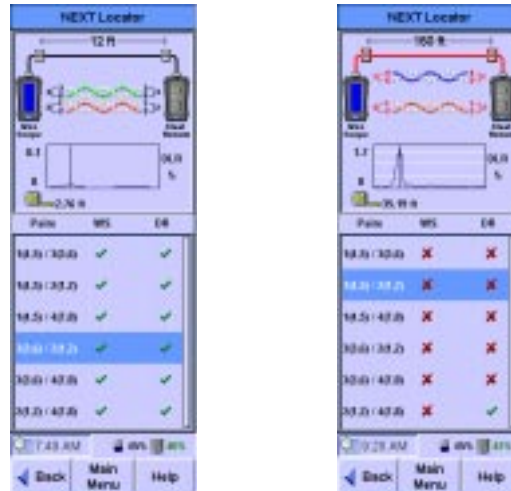
Limit: The limit of passing results, set when the test standard is chosen at the cursor location.

Margin: The difference between the Data value and the Limit value at the cursor location.

The plots are color coded for different wire pairs. The plot lines displayed can be changed by pressing **Settings** and selecting All Plots, All Local Plots, All Remote Plots, Worst Case Plot, or Select Single Plot.

You can also choose to show plots to 100 MHz, 250 MHz, or 350 MHz as long as the test was run to the frequency selected. See *Setting the Maximum Frequency*, on page 6-16.

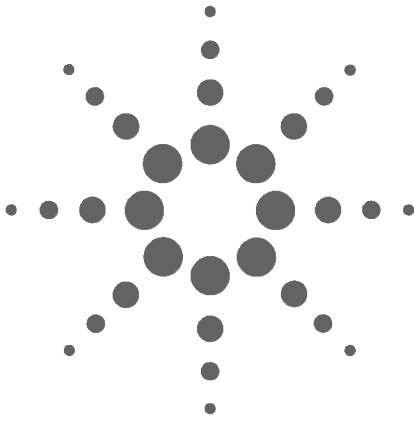
Locator Screens



Locator screens aid in finding faults on the tested cable. The examples above show Locator screens for a passing test, at left, and a failing one, at right. Note the difference in the plots, where the failing result shows a peak where the failure occurs. The tape measure provides a reading of where the failure occurs. It will be placed on the right-hand side of the screen if showing the distance from the DualRemote. If there are more than one peak, you can press the plot area near the peak and fine tune the location using the scroll rocker to find the exact distance to the peak. By default, the distance shown is how far away the worst test result is from the closest of the WireScope or DualRemote. To see the locator results for the different sets of twisted pair cables, press them on the list.

Note: Failures very near the ends of a cable run are usually because of termination errors such as a bad crimp. Failures far from the ends of a cable run are usually a fault with the cable itself.

Saving Test Results
Viewing Result Details



6

Expert Mode for Copper Testing

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Expert Mode for Copper Testing

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COAX Testing 6-25

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About Expert Mode

WireScope's Expert mode includes many configuration and testing options not included in the standard test configurations.

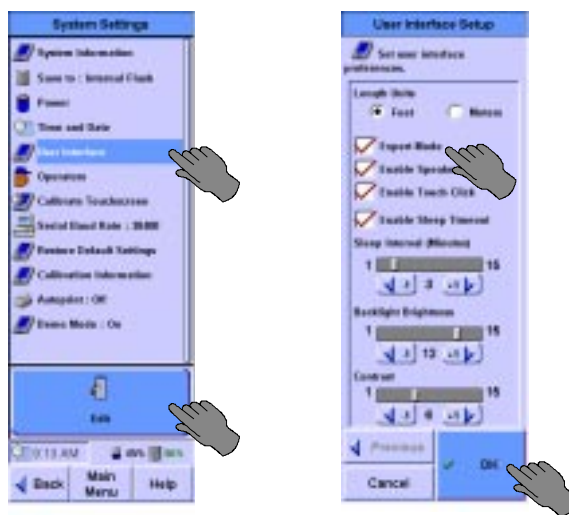
Changing to Expert Mode

To change the WireScope from standard configuration to Expert mode:

- 1 On the Main menu, press **System**. The System Settings screen displays.



- 2 On the System Settings screen, press **User Interface**, then press **Edit**. The User Interface Setup screen displays.



- 3 On the User Interface Setup screen, press **Expert Mode** to turn it on (a check mark will appear in the box,) then press **OK**. The System Settings screen displays.

The Expert Autotest Setup

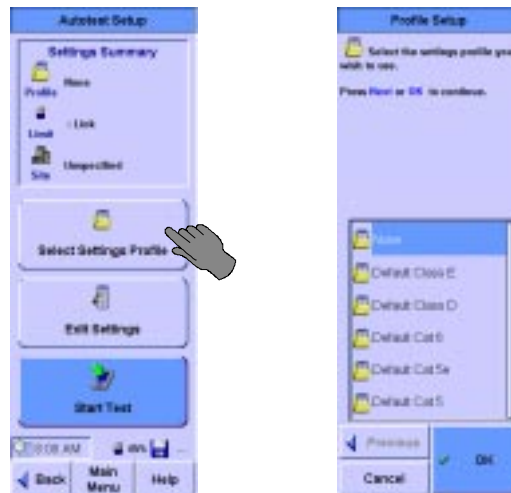
When in the Expert Mode, additional Autotest setup choices are available.



Choosing an Existing Settings Profile

A profile is a predefined locked set of Autotest settings, locked to prevent the user from changing them. Default settings profiles exist for Cat 5, Cat 5E, Cat 6, Class D, and Class E. Previously defined settings profiles are added to the list of default profiles. To select an existing settings profile:

- 1 In Expert Mode, press Autotest on the Main Menu.
- 2 In the Autotest Setup screen, press **Select Settings Profile**.



- 3 In the Profile Setup screen, press the desired profile. If the scroll bar is not full length, use the scroll rocker to scroll down to see more stored profiles

- 4 Press **OK** when done.
- 5 Press **Start Test** to run the Autotest.

Note: Locked settings are displayed with a padlock icon along the right edge of the Autotest Settings screen, reached by pressing **Autotest**, then pressing **Edit Settings**. If a locked setting needs to be changed, edit the profile as described below. Realize that you are violating the existing profile settings selection when doing this.

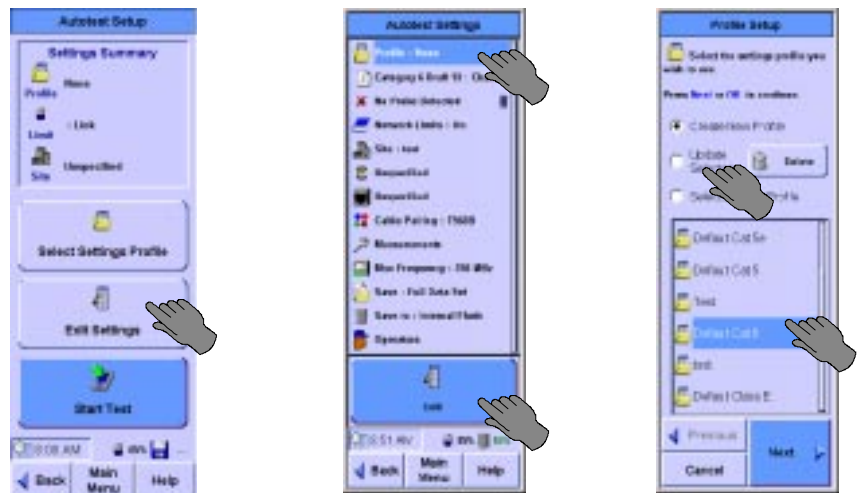
Note: When selecting a setting profile, only the locked settings are set by the selection. Unlocked settings need to be verified as appropriate for the environment being tested.

Editing an Existing Settings Profile to Remove a Lock

You may also edit or delete existing profiles, including the Default profiles. It is recommended that you do not edit nor delete the Default profiles, as you must reload the software to get them back in their original form to meet the standards. To create a profile similar to a default profile, first select the desired default profile to set the locked settings. Then create a new profile as described in the next section.

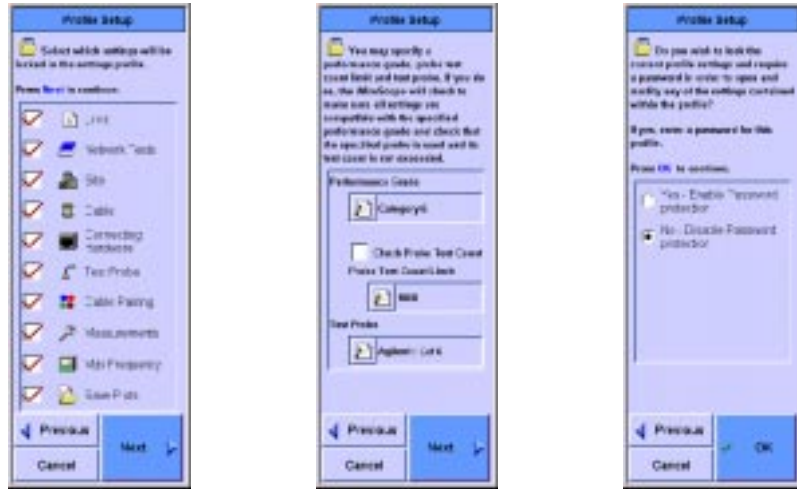
To edit an existing settings profile:

- 1 In Expert Mode, press **Autotest**. On the Autotest Settings screen, press **Edit Settings**, then press **Profile**, then press **Edit**.



- 1 On the Profile Setup Screen, press the selected profile, then press Update Selected, then press **Next**.
- 2 Change the lock settings by pressing the appropriate boxes. The check marks toggle with subsequent presses. Then press **Next**. If the Test Probe setting is locked, you will see the center screen below, which will prompt you to select the Performance Grade of the probe as well as the Probe Test Count Limit, if desired. Then press **Next**. If the Test Probe setting is not locked you will go directly to the

Password Screen, where you can choose to password protect your profile.



- 3 If you choose to password protect your profile, you will be prompted to enter the password. Once you are satisfied with your password selection, press **OK** to return to the Autotest Settings screen, where the locks will be shown. If it is password protected, you will now be prompted to enter the password in order to modify this profile.

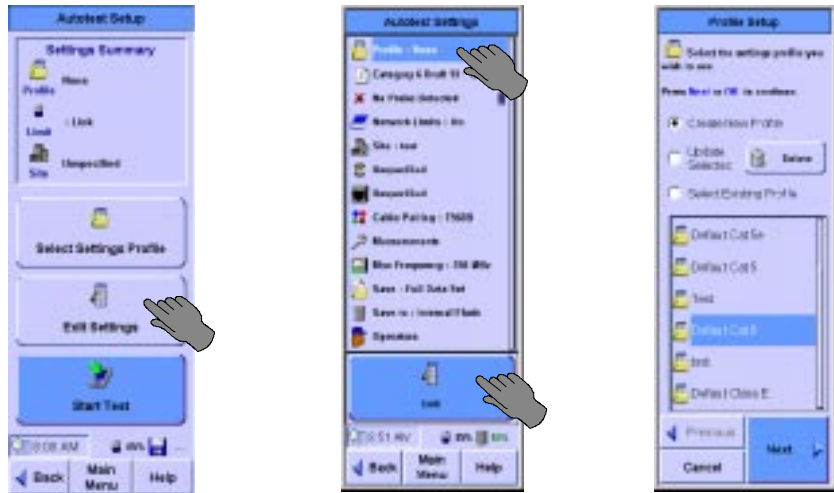


Creating a New Settings Profile

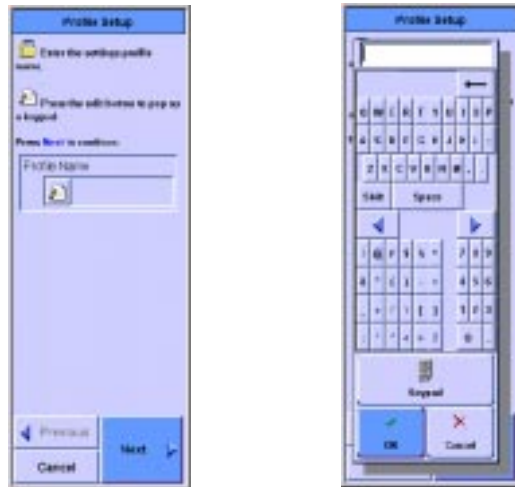
A new profile may be created either directly on the WireScope 350 or on a PC using ScopeData Pro and subsequently downloaded into the WireScope 350. To create a settings profile directly on the WireScope 350:

- 1 You must configure all the Autotest Settings to the desired settings prior to creating a new profile. Profiles created on the WireScope 350 use the existing settings for all the parameters. See the remainder of this section to configure the other settings.

- In Expert Mode, press **Autotest**. On the Autotest Settings screen, press **Edit Settings**, then press **Profile**, then press **Edit**.

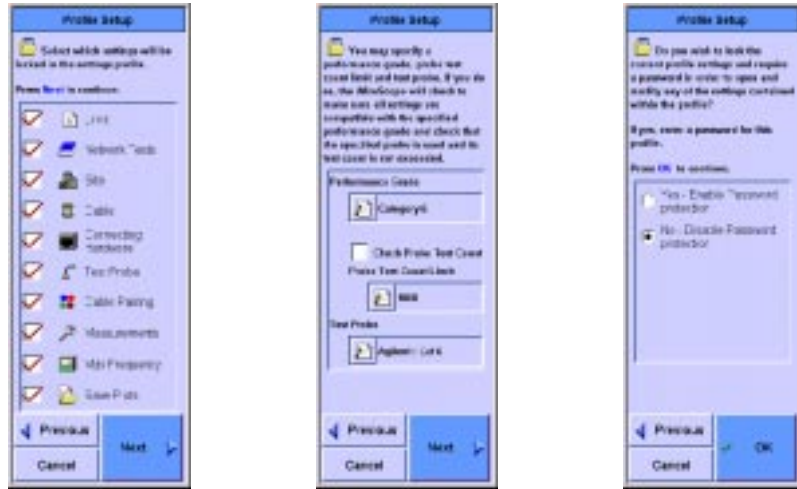


- On the Profile Setup Screen, press **Create New Profile**, then press **Next**. Press anywhere in the Profile Name area to open a keyboard to allow you to enter the new profile name. After entering the new name, press **OK**, then press **Next**.



- Change the lock settings by pressing the appropriate boxes. The check marks toggle with subsequent presses. Then press **Next**. If the Test Probe setting is locked, you will see the center screen below, which will prompt you to select the Performance Grade of the probe as well as the Probe Test Count Limit, if desired. Then press **Next**. If the Test Probe setting is not locked you will go directly to the

Password Screen, where you can choose to password protect your profile.



- 5 If you choose to password protect your profile, you will be prompted to enter the password. Once you are satisfied with your password selection, press **OK** to return to the Autotest Settings screen, where the locks will be shown. If it is password protected, you will now be prompted to enter the password in order to modify this profile.

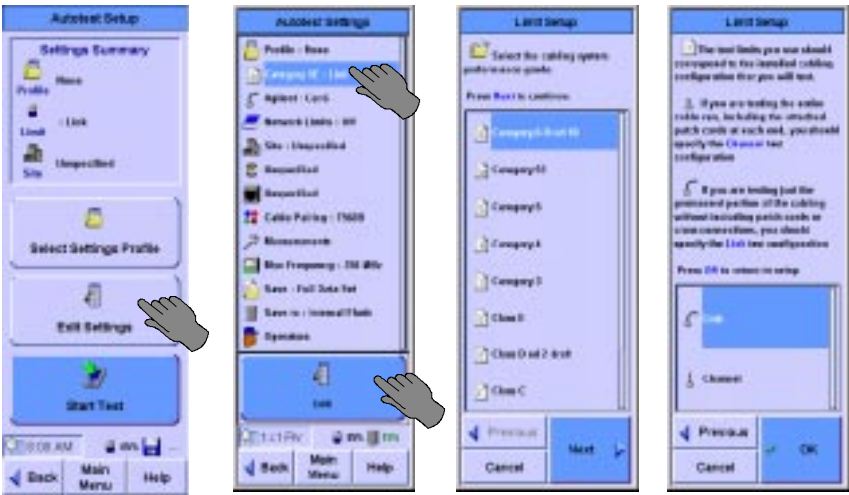


Setting the Test Limit

The Expert Mode allows you to set the test limit according to several standards. To set the test limit to a certain standard:

- 1 In Expert Mode, press **Autotest** on the Main menu.
- 2 On the Autotest Setup screen press **Edit Settings**. On the Autotest Settings screen press the icon second from the top of the list that looks like a page with a number or letter superimposed on it.

- Then on the Limit Setup screen, select the desired cabling system performance grade.



Note: The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll use the scroll rocker at the lower right of the WireScope.

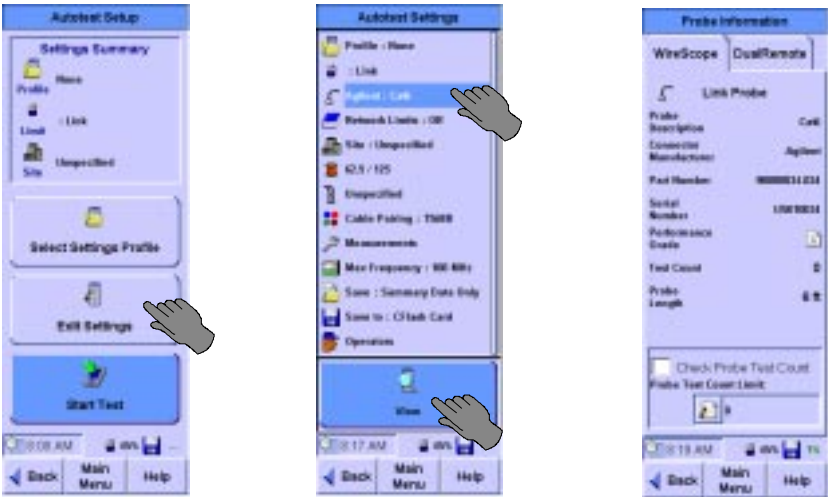
- Then press **Next**. The next Limit Setup screen allows you to select **Link** or **Channel** test configuration.

Viewing Probe Information

The WireScope can display details about the probes inserted in the tester. If the probes are SmartProbes, the information includes the number of tests the probes have performed.

To view detailed information on the probe currently inserted:

- In Expert mode, press **Autotest** on the Main Menu. The Autotest Setup screen displays.

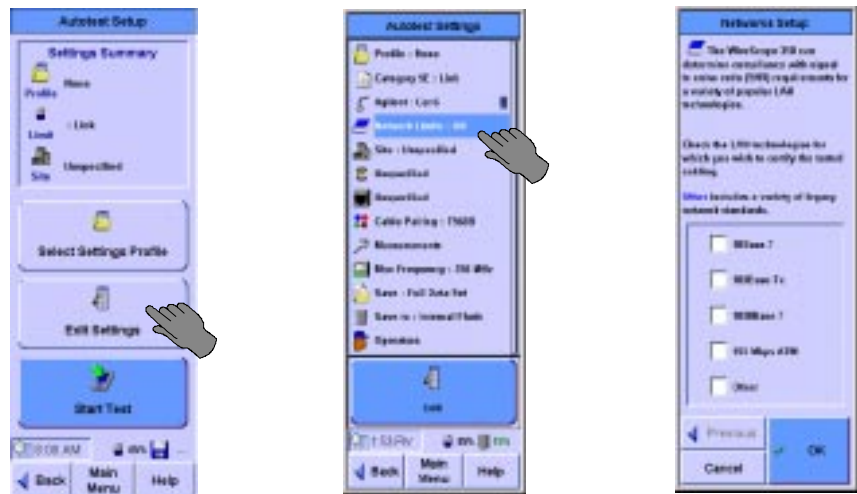


- 2 On the Autotest Setup screen, press **Edit Settings**. The Autotest Settings screen shows a menu of parameters and functions.
- 3 Press the name of the probe, then press **View**. The Probe Information screen displays, with information on the probe inserted in the WireScope.
- 4 If you desire to check the probe test count before each test, press **Check Probe Test Count** and enter the limit to be tested against.
- 5 To view information on the probe installed in the DualRemote, press the DualRemote tab. The Probe Information screen displays information about the probe in the DualRemote after running an Autotest.
- 6 If you desire to check the DualRemote probe test count before each test, press **Check Probe Test Count** and enter the limit to be tested against.

Setting Network Limits

The WireScope 350 can determine compliance with signal to noise ratio (SNR) requirements for a variety of popular LAN technologies. To do this:

- 1 In Expert Mode, press **Autotest** on the Main Menu. The Autotest Settings screen displays.
- 2 On the Autotest Setup screen press **Edit Settings**.
- 3 On the Autotest Settings screen press **Network Limits**. Then press **Edit**.



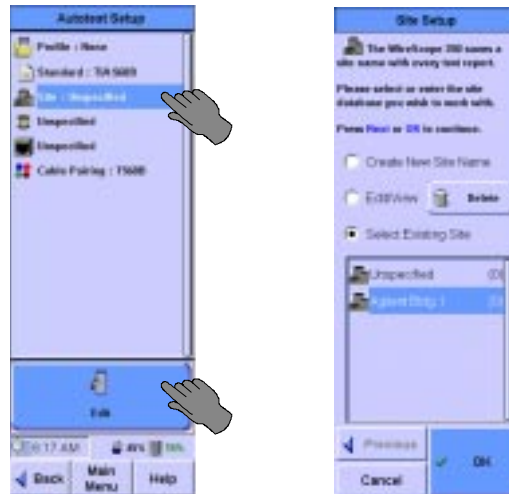
- 4 On the Networks Setup screen press on the appropriate technology for which you want to certify the tested cabling. A red check will appear in each technology selected. **Other** includes a variety of legacy network standards.

Entering the Site Name

The site name identifies the group of settings used on a job, and can be applied to test records for that site.

To enter the site name:

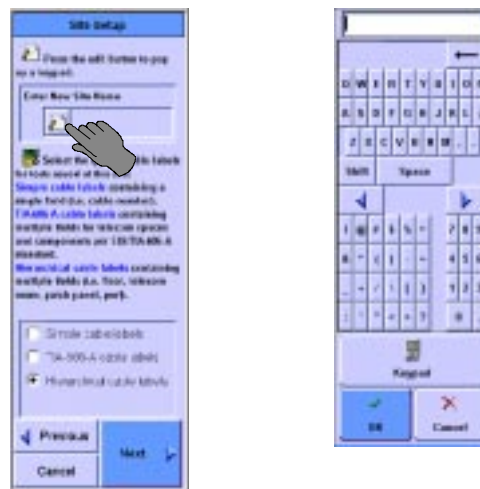
- 1 On the Autotest Setup screen, press **Site**, then press **Edit**. The Site Setup screen displays.



- 2 Press **Create a New Site Name**, then press **Next**. (The **OK** button changes to a **Next** button when you select **Create a New Site Name**.) The screen changes, to allow naming the site.

Note: To change the name or labeling format for an existing site, press the site name on the list, then press **Edit/View** and **Next**.

- 3 Press the icon under Enter New Site Name. The onscreen keyboard opens.



- 4 Press the keyboard keys to enter the site name, then press **OK**. The keyboard closes.

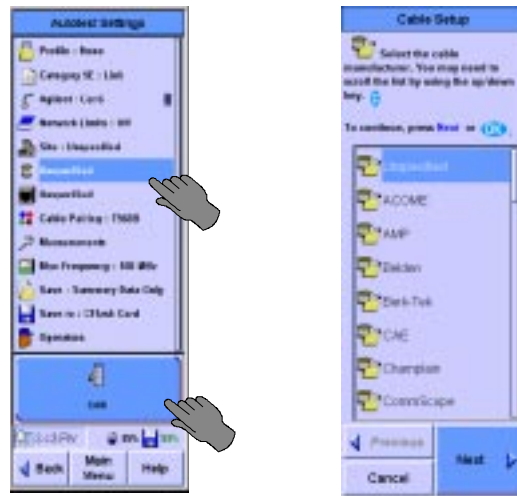
Choosing the Labeling Format

The labeling format for Expert Mode is the same as that previously described in Chapter 3, *Certifying Copper Cabling*. See *Choosing the Labeling Format*, on page 3-6 for more information.

Choosing the Cable Type

Cable from different manufacturers has different transmission characteristics. The WireScope 350 compensates for those differences if you tell it what cable is used on the job. A grey cable spool icon indicates UTP cabling, a black cable spool icon indicates shielded cabling.

- 1 On the Autotest Setup screen, press the cable spool icon, then press **Edit**. The Cable Setup screen displays.



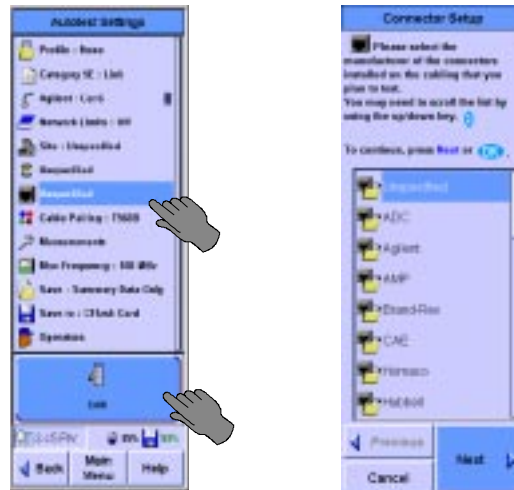
Note: The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll use the scroll button at the lower right of the WireScope.

- 2 Select the cable manufacturer, and press **Next**. The Cable Database screen displays.
- 3 Select a cable on the list, and press **OK**. The Autotest Setup screen displays, with the selected cable type next to the cable spool icon. If the cable is not in the cable database, see *Adding a new cable type*, on page 3-14.

Choosing the Connector Type

Connectors from different manufacturers have different transmission characteristics. The WireScope 350 compensates for those differences, if you tell it what connectors are used on the job.

- 1 On the Autotest Setup screen, press the connector icon, then press **Edit**. The Connector Setup screen displays.



Note: The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll use the scroll button at the lower right of the WireScope.

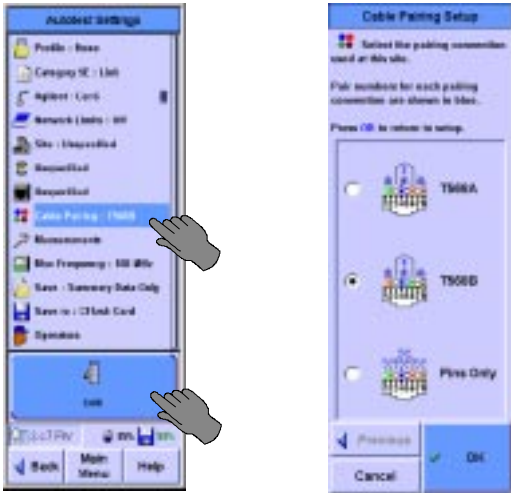
- 2 Press the manufacturer of the connector, then **Next**. A list of that manufacturer's connectors displays.
- 3 Press the name of the connector, then press **OK**. The Autotest Setup screen displays, with the selected connector type next to the connector icon. If the connector type is not in the connector database, see *Adding a new connector type*, on page 3-16.

Choosing the Cable Pairing Convention

To identify the correct pair in the test results, the WireScope must be told what cable pairing convention is used. For example, if the 3,6 pair fails a test, it would be "Pair 2" if using T568A pairing, but it would be "Pair 3" if using T568B pairing.

Expert Mode for Copper Testing
The Expert Autotest Setup

- 1 On the Autotest Setup screen, press **Cable Pairing**, then press **Edit**. The Cable Pairing Setup screen displays.

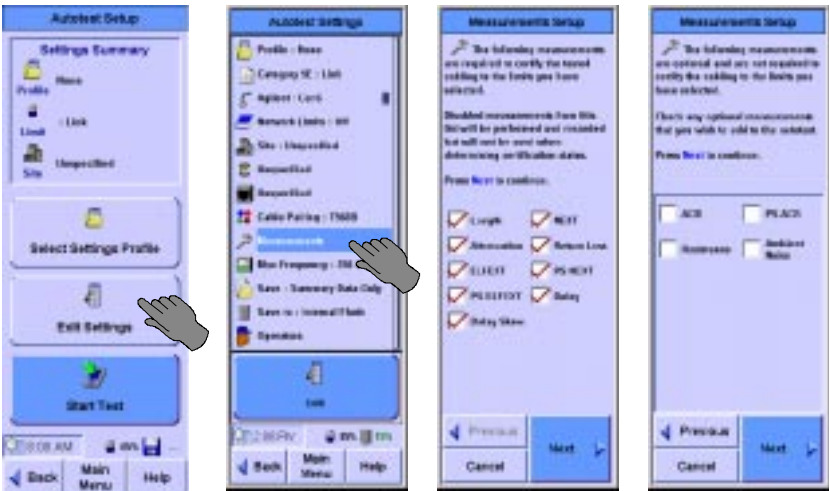


Press the cable pairing convention used on the job, then press **OK**. The Autotest Setup screen displays, with the cable pairing convention named.

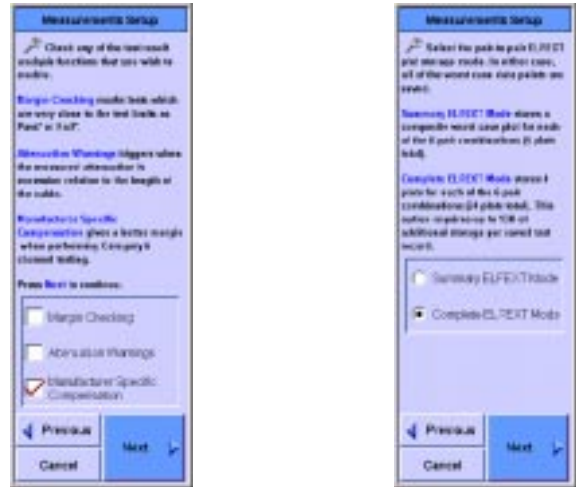
Setting the Measurements

In Expert Mode, you have the ability to specify in detail what measurements are used to determine the certification status of your test. In addition, there are choices for optional features.

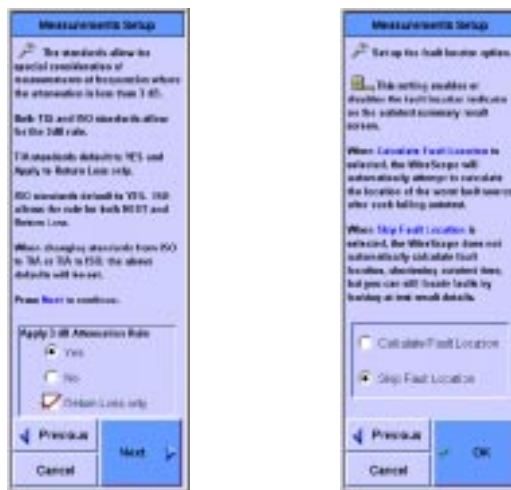
- 1 In Expert Mode, press **Autotest** on the Main menu.
- 2 On the Autotest Setup screen press **Edit Settings**. On the Autotest Settings screen press **Measurements**. The first Measurements Setup screen identifies the required measurements for the limits you have selected. It is possible to disable the measurements, but it is not recommended. Press **Next** to view the optional measurements you may want to add to your test. Add them by pressing the name or box.



- After you have made your optional choices, press **Next** to allow you to enable test result analysis functions. It is recommended that you should choose Manufacturer Specific Compensation when you are performing Category 6 channel testing. Press **Next** when done.



- The next Measurements Setup screen allows you to choose between Summary ELFEXT data and Complete ELFEXT data storage modes. If you have storage space and/or you will wish to recertify in the future using the stored data, the **Complete ELFEXT Mode** is recommended. When complete, press **Next**.
- The next Measurement Setup Screen allows the user to apply the 3 dB attenuation rule, which provides for special consideration of measurements where the attenuation is less than 3 dB or in certain ISO cases, 4 dB. This rule applies to both NEXT and Return Loss in the ISO case, but only to Return Loss in the TIA case. The WireScope 350 automatically sets this choice based upon the standard chosen previously. It also implements the 4 dB appropriately even though it is called the 3 dB rule. When you are satisfied with the choice, press **Next**.

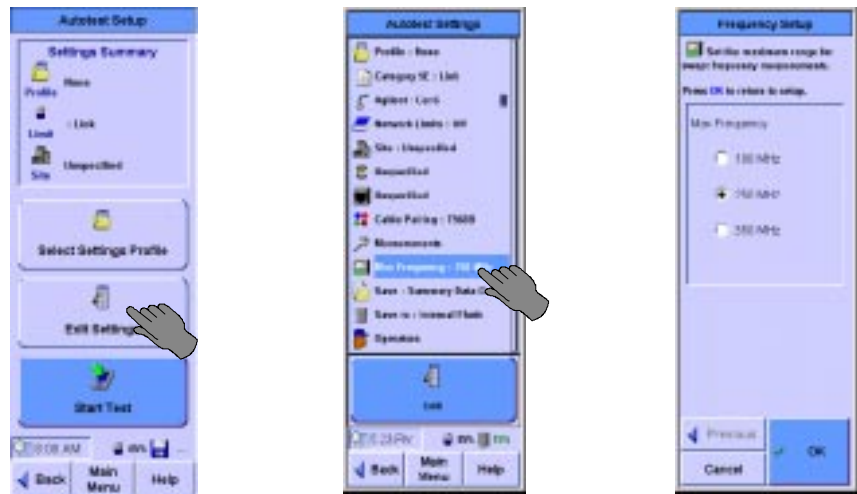


- 6 The last Measurements Setup screen allows you to skip the automatic fault location calculation. This does not prevent you from using the locator in the Results Details function, but prevents the calculation on each test, including the passing tests. When this selection has been made, press **Next** to return to the Autotest Settings screen.

Setting the Maximum Frequency

The WireScope 350 allows you to select the maximum range for swept frequency measurements. The choices depend somewhat on the standard selected previously, for example for Category 6, the 100 MHz choice is not available. To set the maximum frequency:

- 1 In Expert Mode, press **Autotest** on the Main menu.
- 2 On the Autotest Setup screen press **Edit Settings**. On the Autotest Settings screen press **Max Frequency**. On the Frequency Setup screen select the maximum frequency of the data being stored.



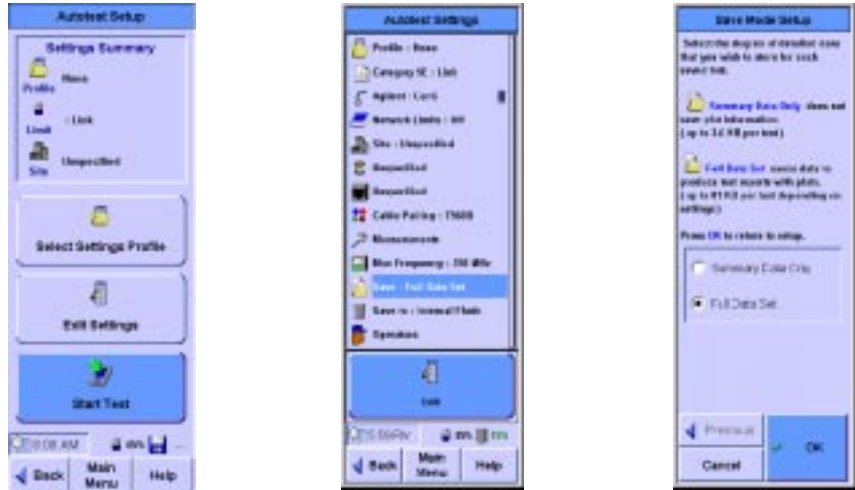
Note: The reason to select the lowest frequency is to decrease test time and decrease memory storage. The additional optional data is for information only, unless you wish to preserve the data for possible later recertification at a higher frequency standard with ScopeData Pro software on a PC. If you have not saved the higher frequency data, the recertification may not be available. For example, if you test to the Category 5E (Class D) standard, but have limited your maximum frequency to 100 MHz, then you will not be able to recertify later with the stored data to Category 6 (Class E) which requires data to 250 MHz.

Setting the Plot Storage Requirements

Another storage choice is available, whether to save plots or not. Saving plots stores the entire swept frequency measurement. Summary data is the worst case value for each test and is the minimum required for standards compliance. To set the data being stored:

- 1 In Expert Mode, press **Autotest** on the Main menu.

- 2 On the Autotest Setup screen press **Edit Settings**. On the Autotest Settings screen press **Save**, then **Edit** to bring up the Save Mode Setup screen. Press **Summary Data Only** or **Full Data Set**.



Note: If you save summary data only, you will not be able to recertify later with the saved data, since the plots will not be part of the stored data used for recertification by ScopeData Pro.

Setting the Storage Location

This is the same function as that shown in the System Settings screen. Also when a CompactFlash™ card is inserted, this function will automatically set the storage location to the CompactFlash™ card See *Configuring CompactFlash™ Cards*, on page 2-6.

Setting the Operator Names

The names of the technicians performing the tests can be entered, and will appear on the test report. This is the same function as that shown in the System Settings section See *Entering the Operator Names*, on page 3-18. If it has been done already there, it is reflected here.

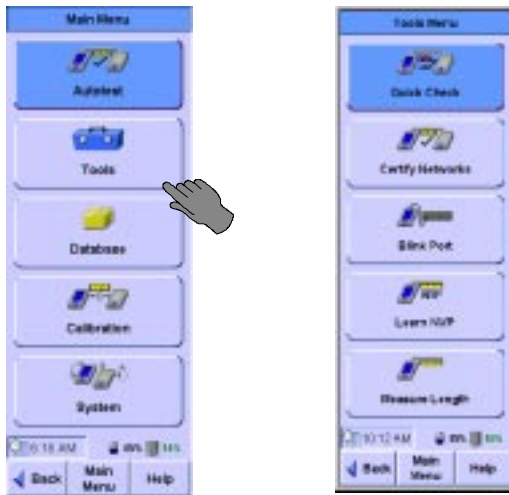
The Expert Tools Menu

The Expert mode Tools menu includes the following:

- **Quick Check** tests the continuity and length of a cable run. See *Running a Quick Check*, on page 6-19.
- **Certify Networks** lets you choose standards for certification of the network. See *Certifying a Network*, on page 6-20.
- **Blink Port** blinks the LED on a circuit at an Ethernet hub or switch port. This helps locate the far end of a circuit. See *Blinking the Port*, on page 6-21.
- **Learn NVP** allows the user to determine the NVP (Nominal Velocity of Propagation) of a sample of cable. See *Learning the NVP of a Cable*, on page 6-22.
- **Measure Length** measures the length of each pair of a cable whose type is in the Cable Database. See *Measuring the Cable Length*, on page 6-23.

To open the Tools menu:

- 1 Change to Expert mode (see page 6-3).
- 2 On the Main Menu, press **Tools**. The Tools Menu displays.

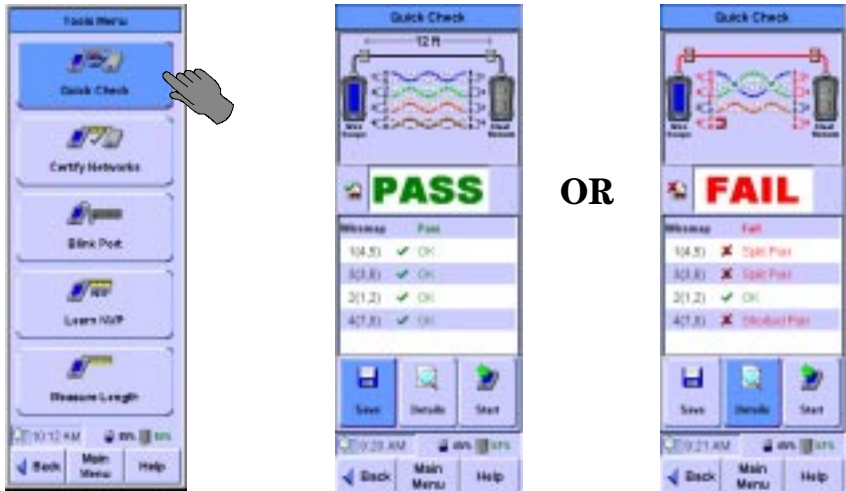


Running a Quick Check

The Quick Check function tests a cable run for shorts, opens, shield integrity, correct termination, and length.

To run a Quick Check:

- 1 On the Tools menu (see page 6-18), press **Quick Check**. The test runs, and a Pass or Fail screen displays.

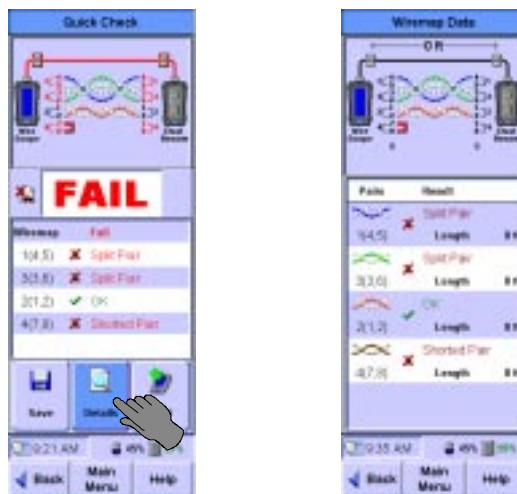


Viewing Details of Quick Check Results

The WireScope can display detailed information about both passing and failing results of a Quick Check.

To view results details:

- 1 On the Quick Check PASS or FAIL screen, press **Details**. The Wiremap Data screen displays.



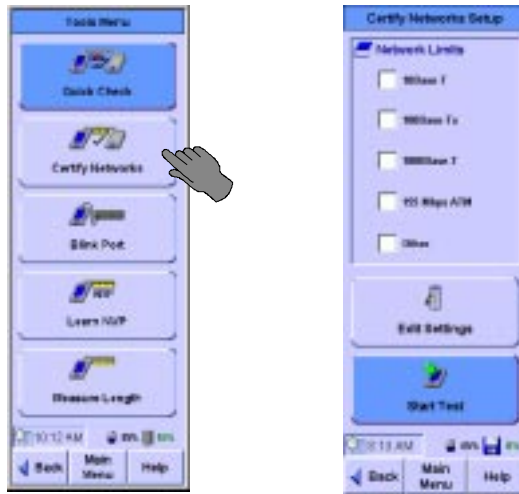
- 2 The results may be saved, if desired.

Certifying a Network

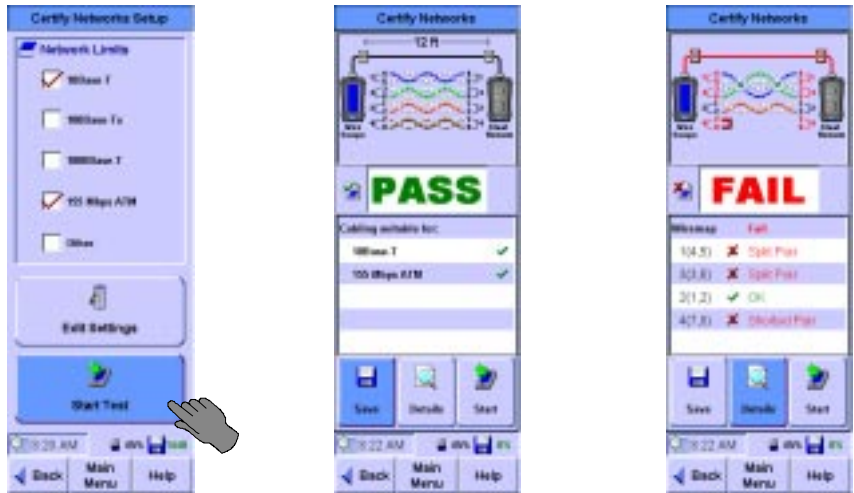
The Expert mode Tools menu includes **Certify Network**, which lets you test a cable for conformance to different network standards.

To certify a network:

- 1 Connect the WireScope and DualRemote to the cable.
- 2 On the Expert mode Tools Menu (see page 6-18), press **Certify Network**. The Certify Networks Setup screen displays.



- 3 Press a standard in the list to select it. A checkmark appears next to each selected standard.
- 4 To test the network to the selected standards, press **Start Test**. The test executes, and WireScope displays a Pass or Fail screen.



You can save and view details of the test results as with any test by pressing **Details**. See *Saving Test Results*, on page 5-3, and *Viewing Result Details*, on page 5-5.

Blinking the Port

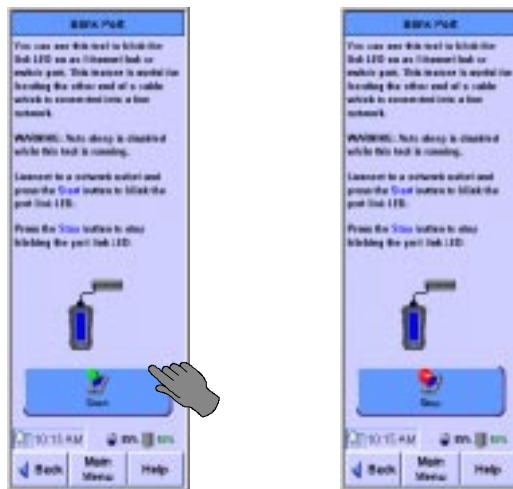
To locate the switch or hub a cable is connected to, the WireScope 350 can blink the switch or hub port. The technician using the WireScope at the wall plate end of the circuit blinks the indicator on the panel at the hub or switch end.

To blink the port:

- 1 On the Tools menu (see page 6-18), press **Blink Port**. The Blink Port screen displays.



- 2 Press **Start**. The port begins blinking, and the **Start** button changes to a **Stop** button.



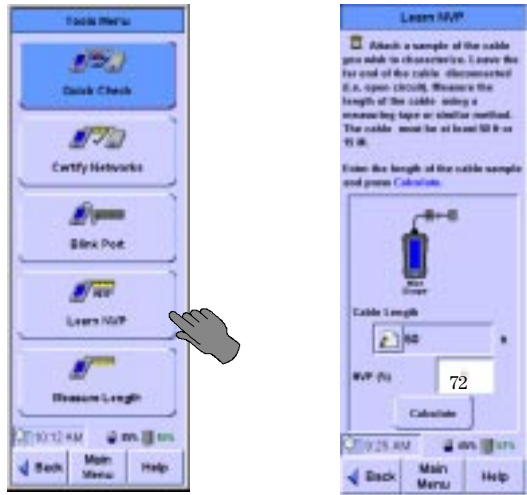
- 3 To stop the blinking, press **Stop**. The blinking stops.

Learning the NVP of a Cable

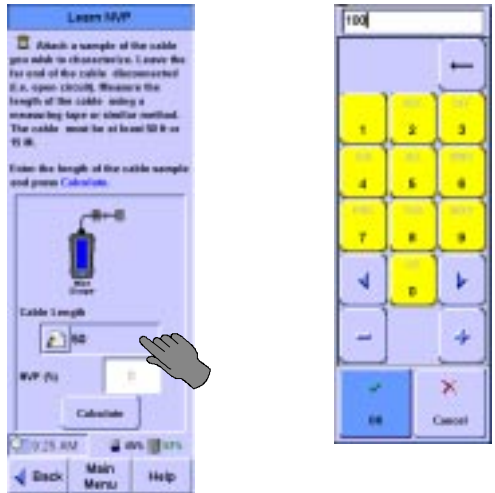
The WireScope can determine the NVP (Nominal Velocity of Propagation) of a cable, for use in certification testing. NVP is expressed as a percentage of the speed of light. you must use a sample of the cable at least 50 feet (15 meters) long. Longer cable samples produce more accurate results.

To learn the NVP:

- 1 Measure the length of a sample of the cable.
- 2 Connect the cable sample to the WireScope. Do not connect the DualRemote.
- 3 On the Expert mode Tools menu (see page 6-18), press **Learn NVP**. The Learn NVP screen displays.

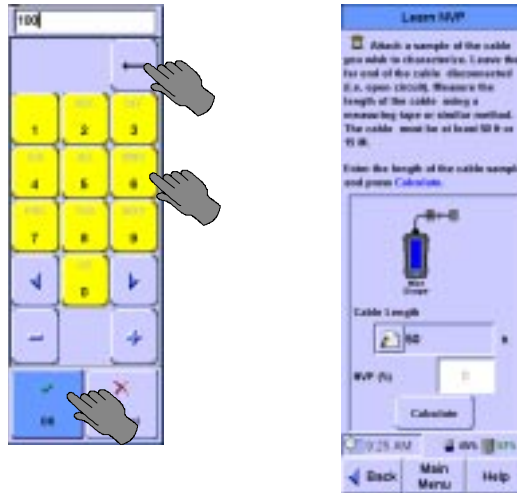


- 4 Press the Cable Length field. The numeric keyboard opens.



- 5 Press the backspace arrow to erase any value in the number field, then enter the length of the cable sample, in or meters. Press **OK**. The

keyboard closes, and the Learn NVP screen displays new number in the Cable Length field.



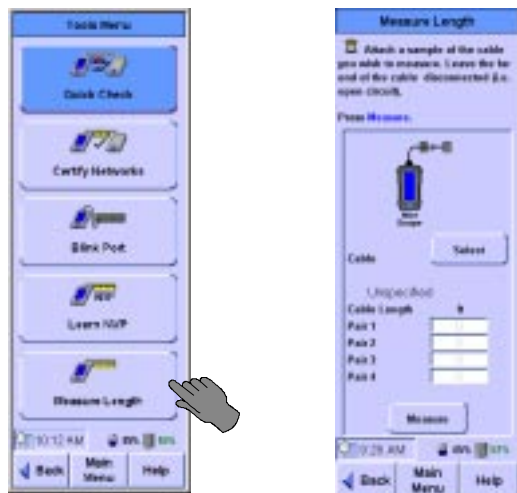
- 6 Press **Calculate**. The WireScope calculates the NVP of the sample cable, and displays it in the NVP field.

Measuring the Cable Length

The WireScope 350 can measure the length of an attached cable if the cable type is in its database.

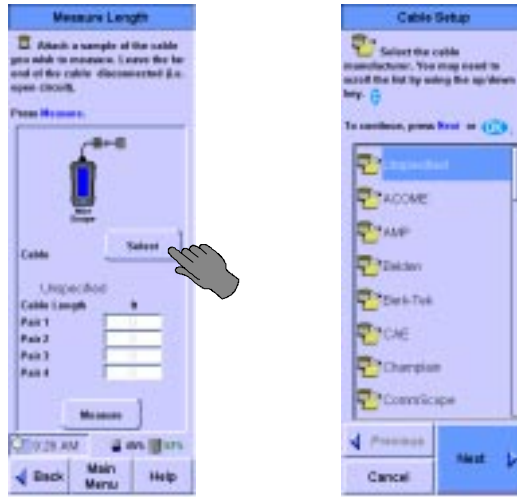
To measure the length of a cable:

- 1 Connect the WireScope to the cable. Do not attach the DualRemote.
- 2 On the Tools menu, press **Measure Length**. The Measure Length screen displays.



Expert Mode for Copper Testing
The Expert Tools Menu

3 Press **Select**. The Cable Setup screen displays.

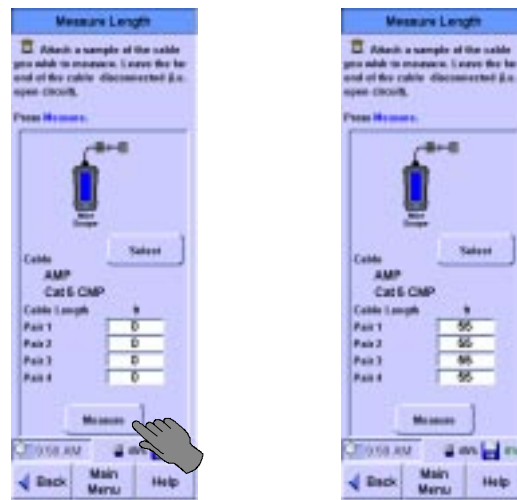


4 Select the cable manufacturer, and press **Next**. The Cable Database screen displays.

Note: The reason to select the cable type is that in order for the WireScope 350 to accurately measure length, it needs the proper NVP value stored with the cable specifications.

5 Select a cable on the list, and press **OK**. The Measure Length screen displays, with the selected cable type shown.

6 Press **Measure**. The WireScope calculates the length of the cable, and displays the length of each twisted pair on the Measure Length screen.



Running COAX and TWINAX Autotests

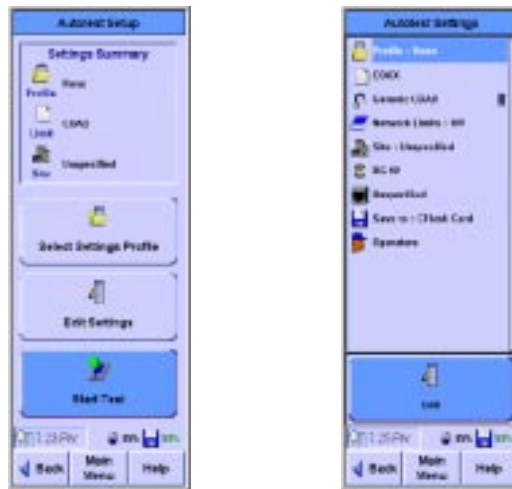
The WireScope 350 and the DualRemote 350 support both Coaxial and Twinaxial standards. This section will instruct you how to test to these standards.

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.

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.

- 1 Insert the Coax probe in the WireScope 350's SmartProbe port and connect it to the coaxial cable to be tested. The WireScope 350 will automatically detect it and change several settings. 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. Press the **Edit Settings** button to change any settings.



Note: 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)).

- 2 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.
- 3 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.

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

Results

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.



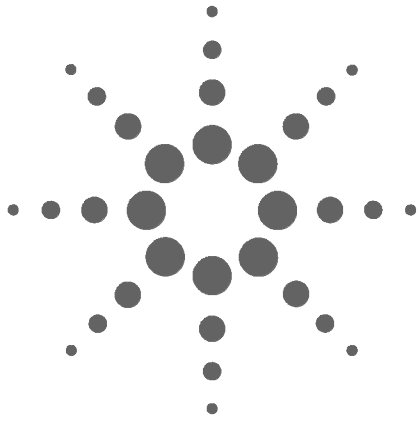
Twinax Testing

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.

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.

- 1 Insert the Twinax probe in the WireScope 350's SmartProbe port and connect it to the Twinax cable to be tested. Press the **Autotest** button on the Main Menu to bring up the Autotest Setup screen shown above. When the Twinax probe is inserted a default Twinax

Expert Mode for Copper Testing
Running **COAX** and **TWINAX** Autotests



7

Expert Mode for Fiber Testing

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About Fiber Expert Mode

WireScope's Expert Mode includes many configuration and testing options not included in the standard test configurations.

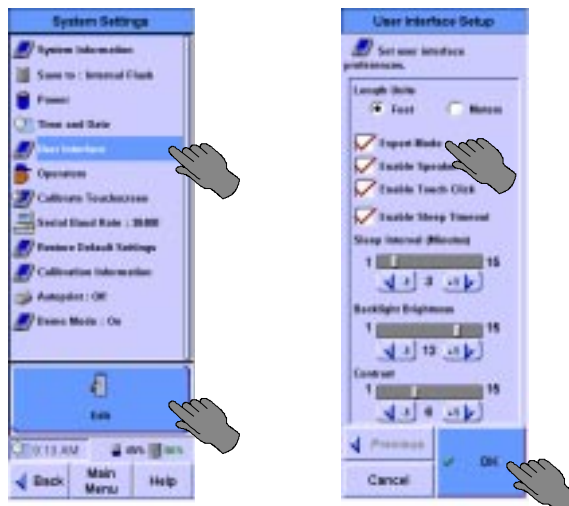
Changing to Expert Mode

To change the WireScope tester from standard configuration to Expert Mode:

- 1 On the Fiber Main menu, press **System**. The System Settings screen displays.



- 2 On the System Settings screen, press **User Interface**, then press **Edit**. The User Interface Setup screen displays.



On the User Interface Setup screen, press **Expert Mode** to turn it on, then press **OK**. The System Settings screen displays.

Viewing Probe Information

The WireScope can display details about the probes installed in the tester.

To view detailed information on the installed probes:

- 1 In Expert mode, press **Fiber Autotest** on the Main Menu. The Fiber Autotest Setup screen displays.

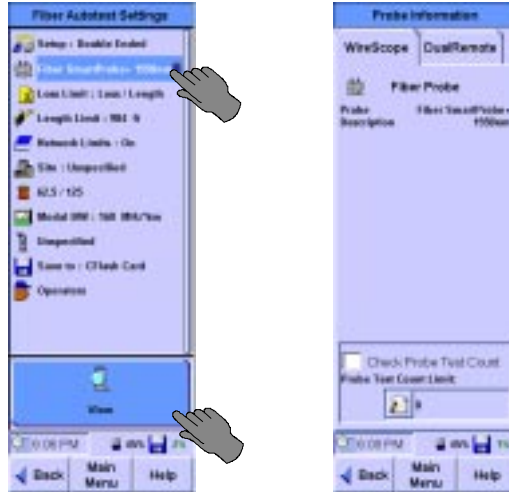


- 2 On the Fiber Autotest Setup screen, press **Edit Settings**. The Fiber Autotest Settings screen displays.



Expert Mode for Fiber Testing
Viewing Probe Information

- 3 Press the name of the probe, then **View**. The Probe Information screen displays, with information on the probe installed in the WireScope.



- 4 To view information on the probe installed in the DualRemote, press the DualRemote tab. The Probe Information screen displays information about the probe in the DualRemote.



The Fiber Tools Menu

The Expert mode Fiber Tools menu contains the following:

- **Loss Meter** This tool continuously measures and reports the loss on connected fiber cables.
- **Length & Delay** This tool measures the length and propagation delay of connected fiber cables.
- **Power Meter** This tool measures the power level reaching the Fiber SmartProbe from a light source connected to the fiber cable.
- **Trace Mode** This activates the transmitter on the Fiber SmartProbe, to verify that light reaches the other end of a connected cable.
- **Learn Fiber NVP** This tool teaches the WireScope the NVP of a cable sample.

To open the Fiber Tools menu:

- 1 Change to Expert mode. (See *Changing to Expert Mode*, on page 7-2.)
- 2 On the Expert Mode Main Menu, press **Fiber Tools**. The Fiber Tools screen displays.

Using the Loss Meter

To use the Loss Meter:

- 1 On the Fiber Tools menu, press **Loss Meter**. The Fiber Loss Meter screen displays.



- 2 To clear the values in the data table at the center of the screen, press **Clear Peak**.
- 3 To write the current data table to the results database, press **Save**.
- 4 To select the test configuration or to specify the fiber type, press **Quick Setup**.

Measuring Length and Delay

To use the Length & Delay tool:

- 1 On the Fiber Tools menu, press **Length & Delay**. The Fiber Length Test screen displays. If a valid fiber connection is present, a **Measure** button appears.



- 2 To begin the test, press **Measure**.
- 3 To select the test configuration, fiber type, or NVP, press **Quick Setup**.

Using the Power Meter

To use the Power Meter:

- 1 On the Fiber Tools menu, press **Power Meter**. You may be prompted to calibrate upon entering this tool. This is *not* the same calibration as the one used for testing. This calibration is just for the Fiber Power Meter. After calibration the Fiber Power Meter displays.

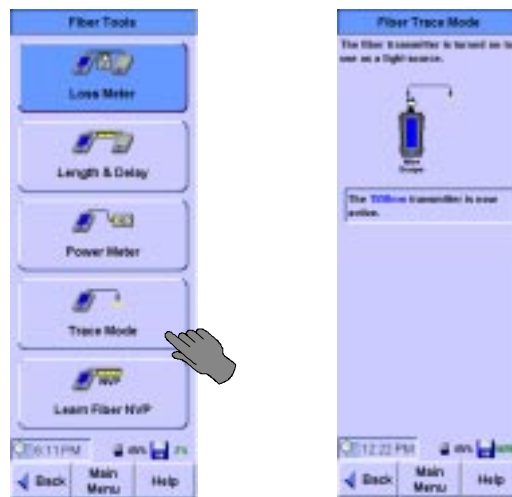


- 2 To set the current power value as a reference, press **Set Reference**. The difference is shown in the Delta field. The actual measurement is shown in the Optical Power field.
- 3 To write the current data table to the results database, press **Save**.
- 4 To calibrate the Power Meter, press **Calibrate**.

Using Trace Mode

To turn on the Fiber SmartProbe's transmitter:

- On the Fiber Tools menu, press **Trace Mode**. The Fiber Trace Mode screen displays and indicates that the transmitter is active.



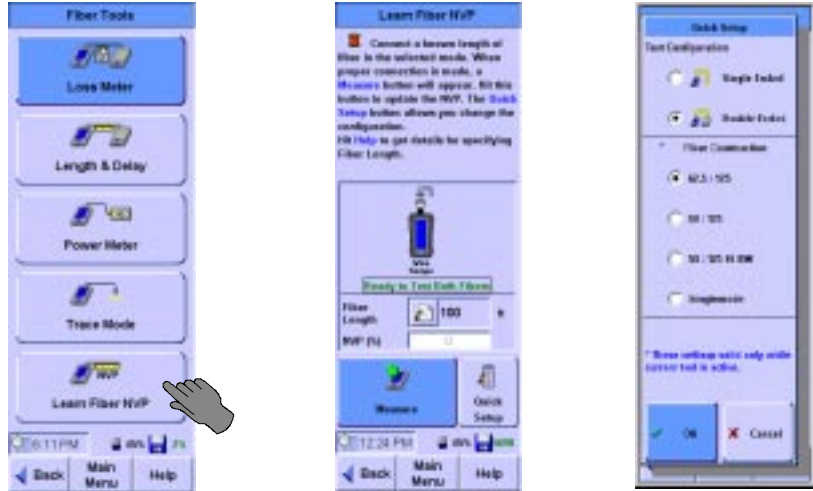
Learning the NVP of a Fiber

To learn the NVP of a fiber cable sample:

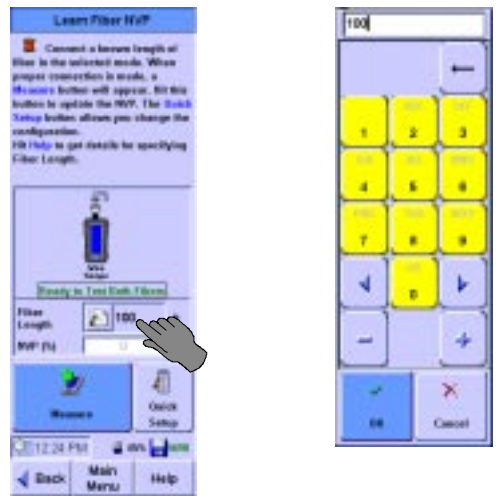
- 1 Connect a known length sample of the fiber to the Fiber SmartProbe. The sample must be at least 50 feet (15 meters) long.
- 2 On the Fiber Tools menu, press **Learn Fiber NVP**. The Learn Fiber NVP screen displays. Use the Quick Setup to help configure the cable for single ended or double ended test configuration and to provide fiber construction details prior to the test. You may need to calibrate using the test jumper depending on which test configuration you

Expert Mode for Fiber Testing
The Fiber Tools Menu

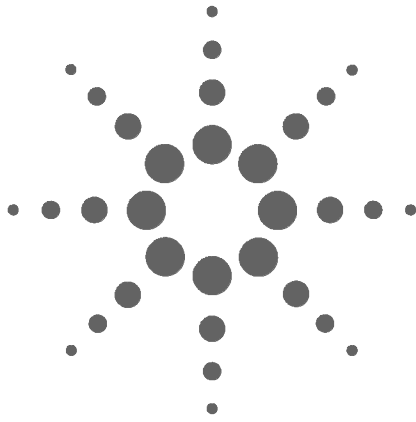
choose. If you need to calibrate, use the Calibration tool on the Main Menu.



3 Press the Fiber Length field. The numeric keyboard opens.



- 4 Enter the length of the sample fiber, and press **OK** to close the keyboard. Make sure to use the correct length units (feet or meters.)
 - When measuring two fibers, enter the average length of the two.
 - When measuring one length of fiber looped back to the WireScope, enter the entire length of the fiber.
- 5 Press **Measure** to learn the NVP of the fiber sample. The NVP displays in the NVP (%) field of the Learn Fiber NVP screen.



8

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Measurements

The WireScope 350 makes the following test measurements.

Wiremap

Wiremap testing checks for proper continuity and termination of cables. The test identifies the following faults:

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

Length

Length measurements determine the electrical length of cable runs up to 1100 feet (335 meters). Accurate length measurements require accurate NVP settings. Choosing a cable type from the WireScope's database automatically loads NVP settings, or the NVP for a cable can be measured on a sample (see *Learning the NVP of a Cable*, on page 6-22).

Length Measurement Specifications

Accuracy	$\pm 4\%$ or ± 2 feet (0.6 M), whichever is greater
Resolution	± 1 foot (0.3 M) < 100M
Minimum Distance	0 feet (0 M)
Maximum Distance	1,100 feet (335 M)

Propagation Delay and Skew

The Propagation Delay test measures the one-way propagation delay over each pair of the tested cable run. Skew is the difference in propagation delay between the pairs with the longest and shortest delay in a cable.

Propagation Delay and Skew Measurement Specifications

Accuracy	$\pm 4\%$ or ± 1 nanoseconds, whichever is greater
Resolution	± 1 nanoseconds
Minimum Delay	0 nanoseconds
Maximum Delay	2,000 nanoseconds

Delay Skew	The difference in nanoseconds between the longest and shortest measured propagation delay among the four pairs of a single cable run
-------------------	--

Near-end Crosstalk (NEXT)

NEXT measures near-end coupling between pairs in the tested cable run, at both ends of a cable, over 6 pair combinations.

NEXT Measurement Specifications

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

¹ 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

Attenuation

Attenuation measures the decrease in signal strength over the length of all pairs in a cable.

Attenuation Measurement Specifications

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

¹ 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

Return Loss

Return Loss measures the degradation of signal over all four pairs from each end of the tested cable run.

Return Loss Measurement Specifications

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

¹ 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

Equal Level Far-End Crosstalk (ELFEXT)

ELFEXT measures far-end coupling between pairs in the tested cable, for all pair combinations.

ELFEXT Measurement Specifications

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

¹ 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

Attenuation-to-Crosstalk Ratio (ACR)

The ratio of the measured attenuation and the 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)

The ratio of the measured attenuation and the computed power sum near-end crosstalk (PSNEXT) at each frequency point.

Resistance

The DC loop resistance for each pair in the tested cable run.

Resistance Measurement Specifications

Range	5 – 1,000 Ω
Accuracy	$\pm 5\%$

Ambient Noise

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

Ambient Noise Measurement Specifications

Frequency Range	1 – 350 MHz
Sensitivity	0.1 mV RMS
Accuracy	$\pm 5\%$

Calibration

Measurement Calibration

Remote Calibration

Remote calibration establishes a common zero reference for the WireScope 350 and its associated DualRemote 350, before any end-to-end measurements are taken.

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

Agilent Technologies recommends running the remote calibration once a day, at the beginning of a testing session.

Environmental Calibration (Internal)

Environmental calibration compensates 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, establishing a local calibration reference before each measurement. 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 uses the SmartProbe port interface to automate the required setups for this function.

To run a Self Test on the WireScope 350:

- 1 Make sure that the WireScope 350 display displays the main menu.
- 2 Insert the Self-Test probe in the SmartProbe port
- 3 Press the **OK** key. A PASS or FAIL screen displays.

The PASS screen indicates that the WireScope's baseline calibration data is valid.

If a FAIL screen displays, contact Agilent Technical Support (see *Technical Support*, on page 1-21).

To run a self test on the DualRemote 350:

- 1 Insert the Self-Test probe in the SmartProbe port of the DualRemote 350.
- 2 Press the **OK** key. The Pass/Fail 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. Contact Agilent Technical Support (see *Technical Support*, on page 1-21).

Touch-Screen Calibration

If it seems that the WireScope 350 is not responding correctly to taps on the touch screen, you may need to calibrate the touch screen to bring it into alignment with the underlying display.

To calibrate the touch screen:

- 1 Ensure that you have the stylus available.
- 2 On the Main Menu, press **System**. The System Settings screen displays.
- 3 On the System Settings screen, press **Calibrate Touch Screen**, then press **Edit**. A Calibration screen displays.
- 4 Using the stylus, press the screen where the onscreen instructions direct.

When the calibration is complete, the System Settings screen displays.

Memory Requirements

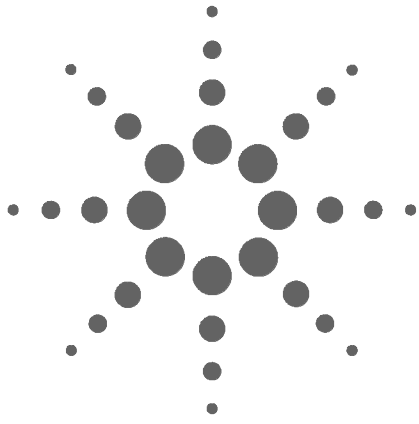
The amount of memory that each test result takes up depends on the options that you set before starting the test. Generally, if you save plots with each test, test result files are larger than if you omit plots. When you save plots, the size of the result file depends on the maximum frequency selected, and on how many additional measurements each autotest includes.

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.

The following table lists approximate record storage capacities for the internal Flash memory when configured for 4MB and for a 32 MB removable CompactFlash™ card and for comparison, a 192 MB card. All sizes of CompactFlash™ will work as extra storage.

Saved Test Capacities

Autotest Type	Configuration	Stored NEXT Frequency Points	Capacity (# of Records)		
			Internal 4 MB Flash	32 MB CFlash Card	192 MB CFlash Card
Category 5E or 6 without plots	None	12	1,200	9,900	59,550
Category 5E or 6 without plots	Ambient noise sweep on and network tests	12	1,150	9,250	55,700
Category 5E with plots saved	Plots to 100 MHz	6288	94	750	4,500
Category 6 with plots saved	Plots to 250 MHz	9816	60	480	2,880
Category 6 with plots saved	Plots to 350 MHz; Ambient noise spectrum, Networks (All Options ON)	12,204	45	360	2,150



9 Specifications

Physical	9-2
Environmental	9-2
Electrical	9-3
Ports	9-4
Display	9-5
Fiber SmartProbe+	-6



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.*

Physical

The WireScope and DualRemote are the same size, and weigh the same.

Size	9.125" x 4.625" x 2.625" HWD (23.17 x 11.75 x 6.66 cm)
Weight	2.86 lbs. (1.3 kg)

Environmental

Indoor / Outdoor	Intended for indoor use; not weatherized
Operating temperature range	0 to 40° C (32 to 104° F)
Storage temperature range	-10 to 55° C (14 to 131° F)
Maximum humidity	80% for temperatures to 31° C (88° F)
Altitude	To 3000 meters
Pollution degree	2

Electrical

Battery	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
External power	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.
Mains supply voltage	Must be within 10% of nominal voltage
Installation overvoltage	Category II

Caution: Use only the ac adapter supplied in the WireScope Kit. Using other power adapters may damage the tester, and will void its warranty.

Note: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Ports

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 @ 5 Vdc 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. Accepts Agilent talkset (Part Number N2605A-137).

CompactFlash™ card slot

Provides removable non-volatile storage for test result files. Supports any standard CompactFlash™ Flash storage card. Densities as high as 512MB are presently available. Data stored in standard format compatible with PCMCIA-ATA specification.

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.

Specifications

Fiber SmartProbe+

Fiber SmartProbe+

General	FiberSmartProbe+850nm, Fiber SmartProbe+ 1300nm	Fiber SmartProbe+ 1310nm, Fiber SmartProbe+ 1550nm
<i>Size</i>	2.4" x 1.6" x 0.8" (6.0 cm x 4.0 cm x 2.5 cm)	2.4" x 1.6" x 0.8" (6.0 cm x 4.0 cm x 2.5 cm)
<i>Optical Connectors</i>	ST@ x 2	SC x 2
<i>Power Source</i>	Draws power from WireScope 155 or DualRemote 155 via intelligent test port interface	Draws power from WireScope 155 or DualRemote 155 via intelligent test port interface
<i>Operating Temperature</i>	0° to 40° C	0° to 40° C
<i>Storage Temperature</i>	- 10° to 55° C	- 10° to 55° C
<i>Operating Humidity</i>	10 to 90% non-condensing	10 to 90% non-condensing
<i>Maximum Relative Humidity</i>	80% for temperatures up to 31 C, decreasing linearly to 50% relative humidity at 40 C	80% for temperatures up to 31 C, decreasing linearly to 50% relative humidity at 40 C
<i>Altitude</i>	Up to 2000 meters	Up to 2000 meters
Detector	FiberSmartProbe+850nm, Fiber SmartProbe+ 1300nm	Fiber SmartProbe+ 1310nm, Fiber SmartProbe+ 1550nm
<i>Receive Wavelengths</i>	850 and 1300nm	1310nm and 1550nm
<i>Measurement Accuracy</i>	+/-0.2dB @ -20dBm	+/-0.2dB @ -20dBm
<i>Dynamic Range</i>	0 to -40 dBm	0 to -40 dBm
<i>Detector Type</i>	Germanium	Germanium
Transmitter	FiberSmartProbe+850nm, Fiber SmartProbe+ 1300nm	Fiber SmartProbe+ 1310nm, Fiber SmartProbe+ 1550nm
<i>Power Output</i>	(into 62.5/125 multimode fiber) -10dBm (850nm), -15dBm (1300nm)	(into 9/125 singlemode fiber) -3 dBm (1310nm and 1550nm)
<i>Source Type</i>	LED	Stabilized Class 1 LASER ² product in accordance with EN 60825.1 and FDA 21 CFR 1040.10.
<i>Center Wavelength</i>		1310nm +/- 30nm, 1550nm +/- 30nm
<i>Spectral Bandwidth (RMS)</i>		< 5nm
<i>Stability</i>	N/A	+/- 0.1dB, 1Hr. @ 25 C
<i>Stabilization Time</i>	N/A	< 5 min.
Cable Length	FiberSmartProbe+850nm, Fiber SmartProbe+ 1300nm	Fiber SmartProbe+ 1310nm, Fiber SmartProbe+ 1550nm
<i>Accuracy (whichever is greater)</i>	+/- 4% or +/- 1.5 meters	+/- 4% or +/- 1.5 meters
<i>Resolution</i>	+/- 1.5 meters	+/- 1.5 meters
<i>Distance¹ Range</i>	0 – 4 km for 3.75 dB/km @ 850nm 0 – 10 km for 1.50 dB/km @ 1300nm	0 – 50 km for 0.5dB/km @ 1310nm and 1550nm
Propagation Delay	FiberSmartProbe+850nm, Fiber SmartProbe+ 1300nm	Fiber SmartProbe+ 1310nm, Fiber SmartProbe+ 1550nm
<i>Accuracy (whichever is greater)</i>	+/- 4% or +/- 6 nanoseconds	+/- 4% or +/- 6 nanoseconds
<i>Resolution</i>	+/- 6 nanoseconds	+/- 6 nanoseconds
<i>Range</i>	0 – 300 microseconds	0 – 300 microseconds

¹ Assumes double-ended configuration with -15dB maximum multimode link loss and 25dB maximum singlemode link loss. Divide by two for single-ended configuration.

² For safety the transmitter should never be viewed directly with the naked eye, a lens, or magnifying device.



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