
OMNI *Scanner* TM



MICROTEST®

OMNI*Scanner*TM

USER GUIDE

ENGLISH

A Guide to using the Microtest OMNI*Scanner* to install, manage, and troubleshoot high performance cabling systems.

OMNI*Scanner* verifies installed links against all common cabling and network standards including Category 6/Class E and Gigabit Ethernet.



Contents

Chapter 1 - Introduction 9

The Digital Solution	9
The Graphical User Interface and Accompanying Software	9
OMNIRemote	9
OMNIScanner's Display	9
OMNIScanner's Keypad	11
OMNIRemote's LED Indicators	13
When To Use OMNIRemote	13
Connecting OMNIScanner and OMNIRemote	14
Editing With OMNIScanner	15
Predefined Lists	15
Editing Numeric Fields with the Spin Control	15
Editing Alphanumeric Fields	16
Technical Support	16
Product Versions	17

Chapter 2 - Getting Started 19

Charging OMNIScanner's Battery	19
OMNIScanner's Project Screen	19
Certification of Network Installations	20
Setting the Reference	21
Project Selection	22
Running an Autotest	23
Saving an Autotest	24
Viewing Autotest Results	25
Typical Test Configurations	28
Basic Link	28
Basic Link with 110 Block and Modular 8 Jack	28
Full Channel with Modular 8 Jacks	29

Chapter 4 - Measurements 31

Performing Individual Measurements with OMNIScanner	31
General Information	32
Wiremap	33
Length/Delay	33
NEXT	34

Attenuation	35
Return Loss	36
ELFEXT	37
ACR/Bandwidth	37
Resistance	38
Power Sum NEXT	39
Power Sum ELFEXT	39
Power Sum ACR	40
Office Locator	41

Chapter 5 - Results 43

Autotest Results	43
Viewing Autotest Results	44

Chapter 6 - Uploading and Printing 47

Microtest Utilities	47
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Chapter 7 - Updating Scanner Software 48

Downloading Software from the Microtest WWW	48
Updating OMNIScanner Software from the PC	48
Updating OMNIRemote Software from the PC	49

Appendix A - Technical Specifications 51

Physical Characteristics	51
User Interface	51
Power	51
Environmental	52
Measurement Port (Test Interface)	52
High Voltage Input Protection	52
Serial Port	52
Memory	52
Autotest Functions	52
Test Functions	53
Transmission Performance Measurement Method	53
Transmission Performance Measurement Parameters	53
Wire Map	54
NEXT	54
Return Loss	54
Attenuation	54
ELFEXT (Equal Level FEXT)	55
ACR (Attenuation to Crosstalk Ratio)	55
Bandwidth	55

Length 55
Resistance 55
Power Sum NEXT, ACR and ELFEXT 55
High Voltage Input Protection 56

Appendix B - NiCd Batteries 57

Batteries 57
Battery Charging 58
NiCd Battery Tips 59

Appendix C - Cable Pin-Outs 61

Serial Cable DB-9 Female to DB-9 Male Pin-outs 61
Serial Cable DB-9 Female to DB-25 Male Pin-outs 61
Serial Cable DB-25 Female to DB-25 Male Pin-outs 62
Cable Pin-Out Signals 62

Chapter 1 - Introduction

The Digital Solution

OMNIScanner is the most advanced hand-held certification and diagnostic tool for Category 7, 6, 5E (Enhanced), 5 and ISO Class F, E, D, and C links. With an extended frequency range of 300 MHz, OMNIScanner provides full software compliance with TIA and ISO/IEC requirements for measurement reporting and analysis (including Length, Delay, ACR, NEXT, ELFEXT, Return Loss, Resistance, PSNEXT, PSACR, PSELFEXT and Attenuation).

The Graphical User Interface and Accompanying Software

OMNIScanner's graphical user interface consists of a backlit LCD display, quick access menus, arrow keys, and descriptive menu options that guide you through certifying or troubleshooting cabling systems. PC-based software expands the user interface and aids with the management of projects.

OMNIRemote

For test and certification of twisted pair cabling, the OMNIScanner requires the OMNIRemote unit at the opposite end of the cabling link under test. OMNIScanner communicates with OMNIRemote to obtain status and perform measurements from both ends of the link. OMNIRemote is equipped with a speaker to generate tones, and several colored LEDs to indicate overall test results and status.

OMNIScanner's Display

Scanner Display

1-2 or 12/36:

Function

The paired numbers in the display indicate wire pairs. For example, 1-2 indicates the wire pair of pins 1 and 2. 12/36 indicates two wire pairs tested, the first pair of pins 1 and 2, and the second pair of pins 3 and 6.

- Pop-up lists:** Pop-up lists are available by pressing ENTER when the cursor is located on user definable fields. A selection list will appear, and the rest of the display will be inactive.
- Spin Control:** The spin control is available on editable fields that allow for increasing or decreasing numeric values by depressing the ↑ or ↓ keys.
- Scrollbars:** Use the ↑ and ↓ keys on the keypad to move up and down in a scrollable screen.
- Graph:** Use the ← or → to move the graph cursor on the frequency axis. Use the ↑ or ↓ to zoom in and out of graphs.



OMNIScanner's Keypad

ON/OFF

When turned on *OMNIScanner* will display the project screen.

Backlight

Press the Backlight key to turn the backlight on or off. Press and hold the Backlight key to display the **Contrast** screen. In addition to contrast adjustments, the screen displays hardware version, software version, serial number information, and the date and time when the unit was last **Factory Calibrated**.





Autotest

Press the Autotest key to run a custom or predefined Autotest.

ESC

Press the Escape key to cancel the current operation.

Arrow keys

Press the     arrow keys to navigate within a list, menu, graph, or editable field.

ENTER

When in a selection field press the ENTER key to open the listbox and then select the highlighted item as the new default. When in an editable field press the ENTER key to start the edit process, and press ENTER again when finished with the editing process.


Alphanumeric Keys

- 1 Use the 0 through 9 keys to enter numeric and alphabetic characters in editable fields. Alphabetic and special characters are shown above each numbered key on the keypad. The 1 key allows entry of the following characters: - (hyphen), . (period), and , (comma)

The 0 key allows entry of an empty space.

The alphanumeric keys also allow direct selection of items in numbered lists.

 Use this key to toggle between upper and lower case letters.

 Use this key to quickly display a window listing the functionality of the function keys in the current display.

Function Keys

The functions of the 4 keys located below the display vary depending on the current display. The assigned functions are:



Setup



Measurements



Results



New



Edit



Save



Delete



Erase a letter



Clear a field



Set Default



List



Detail



Retest



Graph



Pair



Save Graphs



Select



Setup Graph Options



Next Page



Previous Page



Switch to OMNI*Scanner* Info



Switch to OMNI*Remote* Info

OMNI Remote's LED Indicators



LED	Color	Description
PASS	Green	Overall Autotest Result is PASS
Status	Green (flashing)	OMNI Remote is ready for testing
	Green (consistent)	OMNI Remote is active
FAIL	Red	Overall Autotest Result is FAIL
Circuit Guard	Orange	Hazard condition is detected. LED will be lit in 5 second intervals until the hazard condition disappears
Charge	Green	OMNI Remote is inactive, the AC adapter is present, and the battery pack is being charged
	Green (flashing)	OMNI Remote battery is fully charged
	Red (flashing)	OMNI Remote battery is low

When To Use OMNI Remote

Most measurements require the use OMNI Remote at the far end of the cable. For other measurements, OMNI Remote can be connected, but its use is optional. OMNI Scanner detects the presence of the remote unit and automatically configures it for the measurement to be performed.

Measurements requiring the use of OMNI Remote:



- Autotest
- Wiremap
- NEXT and Power Sum NEXT
- Attenuation
- Return Loss
- ELFEXT and Power Sum ELFEXT
- ACR and Power Sum ACR

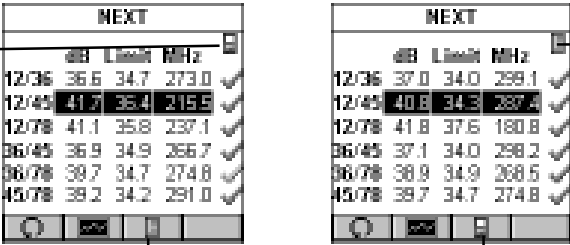
Measurements not requiring the use of OMNIRemote:

- Length / Delay / Skew
- Resistance

Connecting OMNIScanner and OMNIRemote

OMNIScanner and OMNIRemote are used together to perform measurements, which allow the scanner to verify installed links or assist in the diagnosis of physical layer network problems. To accomplish these measurements, OMNIScanner and OMNIRemote are connected at both ends of a network-cabling link. The end at which the scanner is connected, is referred to as the 'Scanner end', and the end at which the remote unit is connected, is referred to as the 'Remote end'.

OMNIScanner displays test results for both ends of the link. Press  or  to toggle the display between Scanner and Remote test results.



Indicates OMNIScanner test results.

NEXT				
dB Loss MHz				
12/36	36.6	34.7	273.0	✓
12/45	41.7	35.4	215.5	✓
12/78	41.1	35.8	237.1	✓
36/45	36.9	34.9	266.7	✓
36/78	39.7	34.7	274.8	✓
45/78	39.2	34.2	291.0	✓

Indicates OMNI Remote test results.

Toggles the display from Scanner to Remote end test results.

Note: Refer to the graphics in Chapter 2 - Getting Started: **Typical Test Configurations** for instructions on connecting OMNIScanner and OMNIRemote for basic link and full channel tests.

Editing With OMNIScanner

OMNIScanner includes sophisticated easy-to-use editing methods to accommodate a variety of user-definable items. Different fields have different editing procedures. Please follow the described procedures to make editing with the OMNIScanner effortless.

Note: All editable fields can be easily recognized by their dotted borders.

Predefined Lists

To quickly and easily select Projects, Autotests, Cables, etc. OMNIScanner uses predefined lists.

1. Use the **↑** or **↓** arrow keys to move the cursor to the field to be edited and press ENTER.

A pop-up list will be displayed while the main screen becomes inactive.

2. Use the **↑** or **↓** arrow keys to move the cursor to the appropriate item or value and press ENTER to select it as the new default.



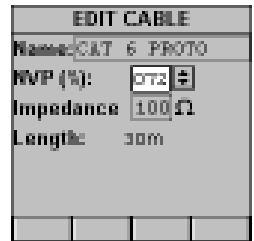
Editing Numeric Fields with the Spin Control

1. Use the **↑** or **↓** arrow keys to move the cursor to the field to be edited. The entire field will be highlighted in black.

2. Press ENTER. Notice that the field is now highlighted in white and the main screen in the background turns gray to indicate that the edit mode has been launched.

3. Press the **↑** or **↓** arrow keys on your keypad to scroll through the string of numbers.

4. Press ENTER or ESC to accept the value and terminate edit mode.



Editing Alphanumeric Fields

To start the editing procedure for fields that contain alphabetic and numeric characters use the alphanumeric keypad.

1. Use the **↑** or **↓** arrow keys to move the cursor to the field to be edited. The entire field will be highlighted in black.





2. Press ENTER. Notice that the field is now highlighted in white and the main screen in the background turns gray to indicate that the edit mode has been launched. The first letter in the field is highlighted in black.

3. Press the **8** key on your keypad to display a small drop-down list containing the letters t, u, v and the number 8.

Note: *Alphabetic and special characters are printed above each numbered key on the keypad. For example, **ABC** is printed above the **2** key.*

4. Use the **↑** or **↓** arrow key to move to the appropriate character, or simply press **8** on your keypad repeatedly until the appropriate letter or number appears in the highlighted field. Press the **A/a** key to toggle between uppercase and lowercase letters.

5. Press the **→** to close the drop-down list and highlight the next letter to be edited. Notice that OMNI Scanner does not overwrite existing characters. To delete single characters use the  function key. To clear an entire field use the  function key.

6. Press ENTER to accept the field and exit the edit mode.

Technical Support

If you have technical questions, you may contact Microtest Technical Support by phone, fax, e-mail, or newsgroup.

Note: *Before calling Technical Support, please have your Serial number, and the Hardware and Software Version numbers available.*

Americas and Asia Pacific:

1-800-NET-FIXR (1-800-638-3497) (U.S. and Canada only)
1-800-419-8991 (FAX) (U.S. and Canada only)
1-602-952-6494 (FAX)

support@microtest.com (E-mail)
support.microtest.com (Newsgroup)

If the 1-800 service is not available, please contact your local authorized Microtest reseller.

Greater Europe, Middle East, and Africa:

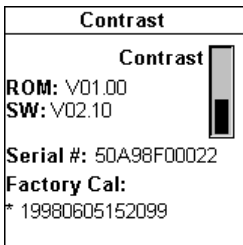
+44 1 293 89 40 25 (Voice), +44 1 293 89 40 08 (FAX)
supportmte@microtest.com (E-mail)


For new product information:

World Wide Web page at <http://www.microtest.com>
sales@microtest.com (E-mail for U.S.)
salesmte@microtest.com (E-mail for Europe)

Product Versions

To display the software version #, the hardware version #, the serial #, and the factory calibration data for OMNIScanner, press and hold the Backlight key. The **CONTRAST** screen will be displayed, which contains information that you may need to provide when calling Technical Support.



To display software, hardware and serial number information for OMNI-Remote, connect the units with the supplied test cable and press the  function key.



Select **Remote Info** to open the **REMOTE INFO** screen, which contains the date the reference was last set, the hardware and software information, the serial number, the battery indicator, and the factory calibration data.

The serial number can also be found on the back of each unit.

Chapter 2 - Getting Started

Charging OMNIScanner's Battery

In order to operate the OMNIScanner and OMNIRemote with battery power, the battery must first be charged. Until the charging cycle is complete, the units can run with the AC adapter plugged in. (See Appendix B - **NiCd Battery** for more information about the batteries.)

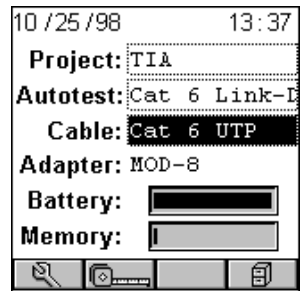
OMNIScanner's Project Screen


OMNIScanner's project screen is designed to allow you to perform all typical work flow operations. The Project, the test specifications, and the cable types are all selectable from the OMNIScanner **Project** screen.


Press the **ON/OFF** key to power the unit on and display the project screen with its three user definable items: **Project**, **Autotest**, and **Cable**.


The first item **Project** name should be highlighted. Use the ↓ to move the highlight to the **Autotest** currently selected. Use the ↓ to highlight the currently selected **Cable** type. OMNIScanner will auto-sense the **Adapter**.

Battery and Memory status are graphically indicated by gauges with a display ranging from empty (left hand side) to full (right hand side).



Press  (Setup) to view OMNIRemote information, select Autotests, configure Cables and Projects, edit User Options, and calibrate OMNIRemote.

Press  (Measurements) to measure a cable's performance, utilizing a variety of tests.

Press  (Results) to view and manage stored test results.

Certification of Network Installations

OMNI Scanner is designed to efficiently certify cabling installations through its Autotest feature. Test results, test specifications, and cable types are organized into Projects. The Project, its test specifications and cable types are selectable from the OMNI Scanner **Project** screen.

OMNI Scanner contains a number a predefined projects, grouped by test standards, to allow easy and fast operation.

The typical order of operations performed when certifying a cable installation is as follows:

Preparation

Prior to initial certification, perform the following:

1. Run a self-test by setting the reference for OMNI Scanner and OMNI-Remote periodically, e.g. weekly.
2. Select the appropriate **Project**, **Autotest** specification, and **Cable** type.

Certification

Perform the following for each installed cable to be tested:

3. Attach OMNI Scanner to one end of the link, which is typically at the patch panel in a wiring closet.
4. Attach OMNI Remote to the corresponding outlet at the other end of the cable link.
5. Run Autotest.
6. Save test results.

Completion

At the end of the day or shift, the test results are uploaded using **Microtest Utilities** or **MT Crimp for Windows** software.

Microtest Utilities support the following:

- Upload of test results.
- Storage of test results to files (MT Crimp compatible format)
- Print test reports
- Export results in CSV format
- Setup Projects
- View Graphs

MT Crimp for Windows supports the following:

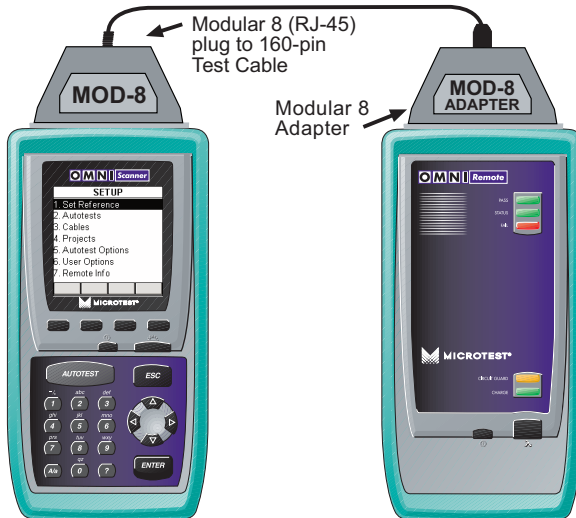
- Upload of test results.
- Storage of test results to files.


- Storage of test results in a database representing the site configuration (i.e. Buildings, floor, closets, patch panels, etc.).
- Print test reports.
- Export results in CSV format.

The following sections provide more detail on the certification process.

Setting the Reference

A reference must be set when OMNIScanner and OMNIRemote are used as a set for the first time. After the initial reference setting, the process should be repeated periodically to ensure unit verification. OMNIScanner stores reference data for up to 5 remote units by serial number.

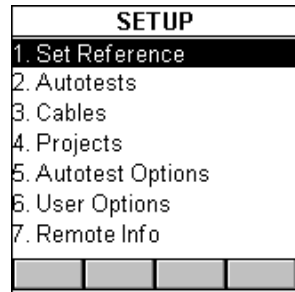


1. To set the reference, connect OMNIScanner and OMNIRemote using the test cable and adapter supplied with the scanner (as shown).
2. Turn OMNIScanner on.
3. Press  (Setup).
4. Select **Set Reference**.
5. On finding OMNIRemote, the scanner reports: **Acquiring Reference**

Data. A gauge will indicate the progress.

6. Once the reference values has been recorded, OMNI Scanner displays the **REMOTE INFO** screen.

7. Press ESC to return to OMNI Scanner's **SETUP** screen.



Project Selection

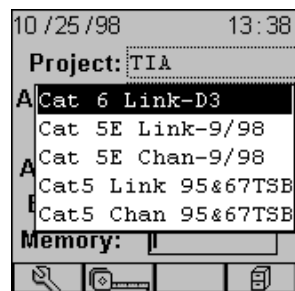
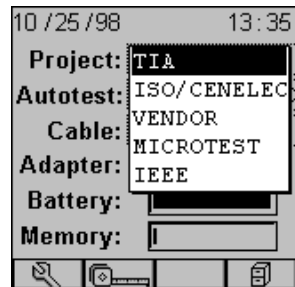
A project name must be selected for test result management. Autotests and Cables were previously assigned to a specific project through the use of the **OMNI Scanner Configuration** utility. (See Chapter 6 - Uploading and Printing for further information about OMNI Scanner Configuration.)


The Project feature is very useful for grouping test results and eases uploading and sorting of Autotests stored in the scanner.

1. Use the **↑** or **↓** to highlight **Project:** and press ENTER.
2. Select the appropriate Project from the drop-down list and press ENTER.
3. Use the **↑** or **↓** to highlight **Autotest:** and press ENTER.
4. Select the appropriate Autotest from the drop-down list and press ENTER.
5. Use the **↑** or **↓** to highlight **Cable:** and press ENTER.
6. Select the cable type to be tested from the drop-down list and press ENTER.

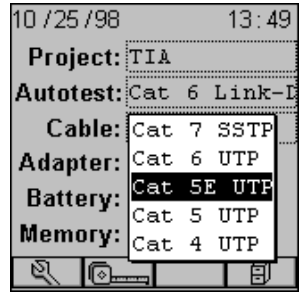
The field **Adapter:** will automatically change to reflect the adapter that is currently attached.

Every Project has certain Autotests and cables assigned already. These associated lists will appear in the drop-down lists for each item. If the Autotest or Cable you want to use is not in a



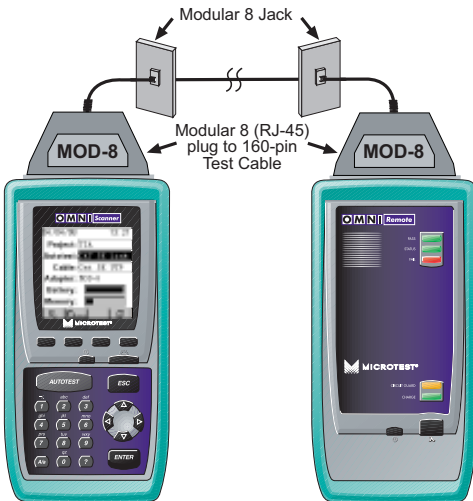
drop-down list, open  (Setup) to select the appropriate item. (See Chapter 3 - Setup: **Autotest**, **Cable**, or **Project** for further information.)

Note: When using an Autotest or a cable that was selected from a Setup menu and not from a predefined drop-down list, the Autotest or cable will not be stored within the project.



Running an Autotest

1. Connect OMNIScanner to the near end of the twisted pair cable you are testing and connect OMNIRemote to the far end.



(See the **Typical Test Configurations** section in this chapter for more information.)

2. Press the  key.

If you are testing twisted pair cable, OMNIScanner will immediately verify that OMNIRemote is attached. If OMNIRemote is not attached, OMNIScanner will wait until it is attached before running the Autotest.

3. Press ESC at any time to cancel the Autotest.

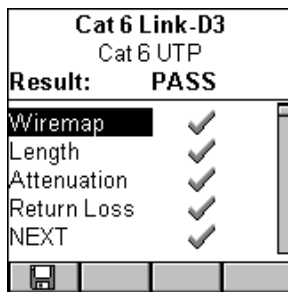
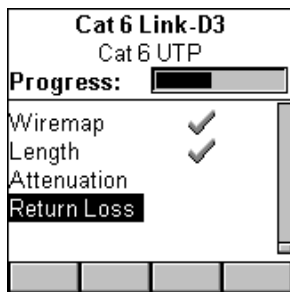
4. The **AUTOTEST** screen is displayed while Autotest is running. The **Autotest** and the **Cable name** are displayed at the top of the screen. A gauge indicates the test progress. Tests will be listed with their individual results as soon as a test is completed.

Once all tests were performed, the overall test **Result:** is displayed.


Note: The list of tests varies depending on the kind of Autotest that was performed.

An Autotest will PASS

✓ if all the selected tests meet the specified criteria. An Autotest will FAIL ✗ if one or more selected tests failed.



Saving an Autotest

1. Press  (Save) from the **Autotest** screen to open the **SAVE AUTOTEST** screen, where the Autotests can be stored into OMNIScanner's memory.

2. The **Project:** field contains the name of the project.


3. To assign a unique name to the Autotest, enter a Circuit ID into the **Circuit ID:** field.

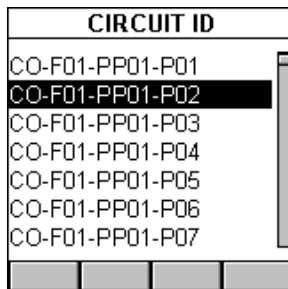
Circuit IDs can be setup to automatically increment. (See *Chapter 3 - Setup: **Editing a Circuit ID** for further information.*)


If an incremental Circuit ID was created in the **PROJECT** Setup screen, the **Circuit ID:** field will already contain the next available Circuit ID that can be used as a default.

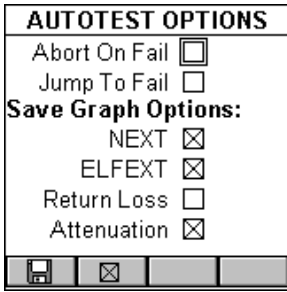
4. To change the name using OMNIScanner's edit feature, highlight the field, and press ENTER to initiate the editing mode. (See *Chapter 1 - Introduction: **Editing with OMNIScanner** for more information.*)


5. To change the Name using the list function,


press  (List). The **CIRCUIT ID** screen opens and displays all Circuit IDs available for the project. Use the ↑ or ↓ to highlight a Circuit ID and press ENTER to select it as the name for the Autotest to be saved and return to the **SAVE AUTOTEST** screen.






6. Press  (Setup Autotest Options) to open the **AUTOTEST OPTIONS** screen and select or unselect the graphs to be saved. (See Chapter 3 - Setup: **Autotest Options** for more information.)




7. Press  (Select) to select or unselect an item


8. Press  (Save) to save the new settings and return to the **SAVE AUTOTEST** Screen

9. Press  (Save) or  (Save Graphs).


The  (Save) function is available, if no graph data is selected to be stored.



The  (Save Graphs) is available, if any Graph option is selected to be stored. (See Chapter 3 - Setup: **Autotest Options** for more information on storing graphs.) **Note:** Saving graphs will reduce the number of Autotests that can be stored.



10. Press ESC to return to the Autotest screen without saving the Autotest.

11. To run the next Autotest press the  key.

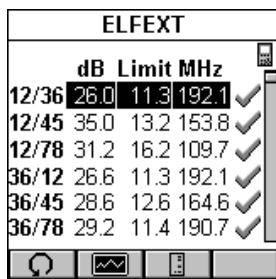
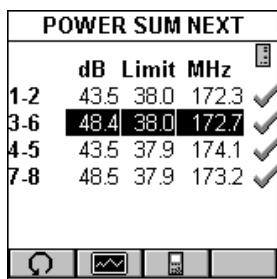
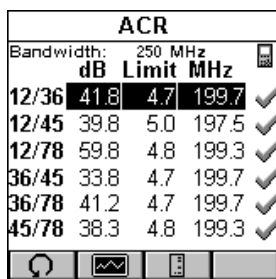
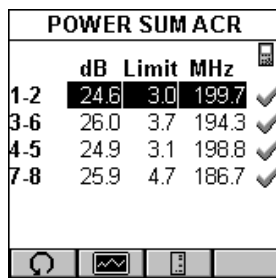
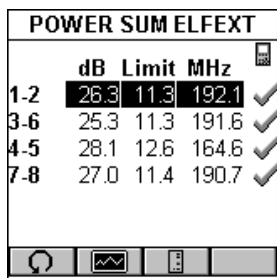
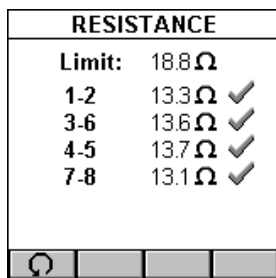
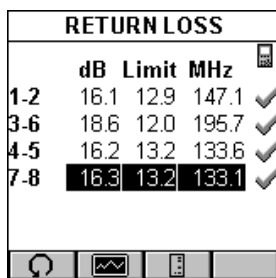
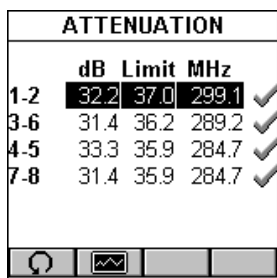
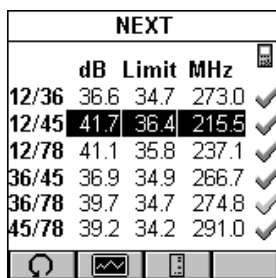
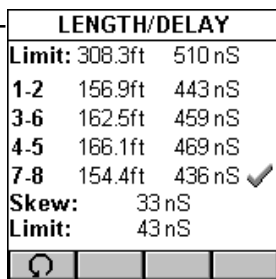
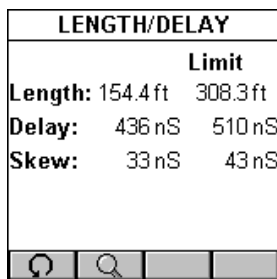
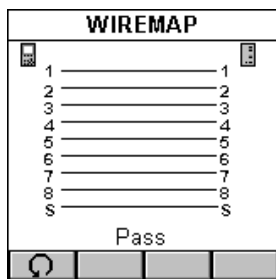
Viewing Autotest Results

This viewing option is only available immediately after the Autotest was performed. To view stored test results at a later time, press the  (Results) function key located in the Project screen. (See Chapter 5 - Results for more information.) **Note:** The list of tests varies depending on the kind of Autotest that was performed.


1. To view detailed results of all the tests that were performed during Autotest, highlight a specific test in the Autotest screen using the  or  and press ENTER.


2. Use the  or  to quickly browse through all other detailed test result screens and their results.

All Tests that can run during Autotest are displayed on the next page. (See Chapter 4 - Measurements for detailed descriptions of each available test.)




Most Autotest result screens have a retest feature for diagnostic purposes.


Press  (Retest) to run continuous tests for the same cable. The arrow located on the Retest button will be turning for the duration of the test.

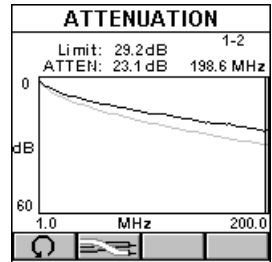
Press  (Retest) once more to stop the continuous measurement. OMNIScanner will display the last computed data.



Note: Retest invalidates an Autotest. After using the retest feature, the Autotest must be repeated before results can be saved.


The NEXT, Attenuation, Return Loss, Power Sum NEXT, ELFEXT, ACR, Power Sum ELFEXT, and Power Sum ACR test result screens have a graphic feature to display the graph associated with the test. To avoid misinterpretation, the limit line is shown in a gray color, while the actual measurement is represented in black.


Press  (Graph) to display a graph for a pair or a pair combination.

The Length results screen has a  (Detail) function key that allows you to view detailed test results for each pair.



Tests that require the use of OMNI*Remote* will have small icons in the upper right corner of the titlebar to indicate whether the information is pertinent for  OMNI*Scanner* or  OMNI*Remote*.

To toggle between the two screens press  to open the screen that contains the information for OMNI*Scanner*.

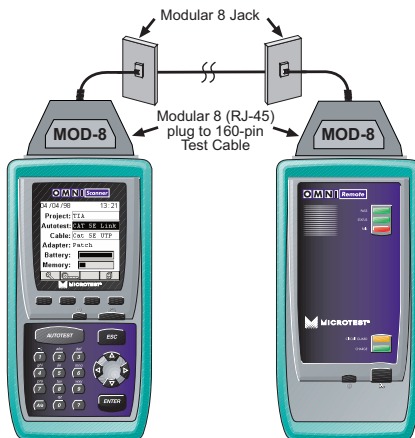
Press  to display the information for OMNI*Remote*.

Typical Test Configurations

Basic Link

The graphic shows the connection of OMNI Scanner to a Modular 8 Jack in the wiring closet, and OMNI Remote to a Modular 8 jack in the work area.

Use the supplied Modular 8 plug to 160 pin test cables at both ends of the link to attach OMNI Scanner and OMNI Remote to the Modular 8 jacks.

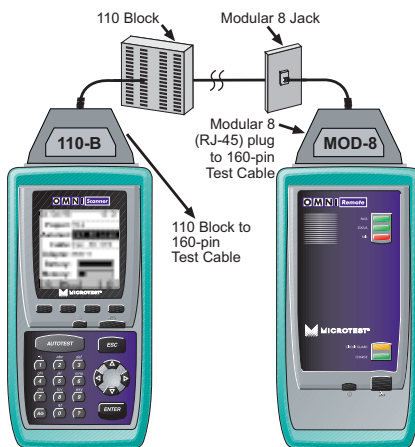


Basic Link with 110 Block and Modular 8 Jack

The graphic shows the connection of OMNI-Scanner to an IDC (110) block in the wiring closet, and OMNI-Remote to a Modular 8 jack in the work area.

Punch Down Block Adapter kits 110-A and 110-B are available (as optional accessories) to interface the OMNI Scanner and OMNI-Remote with IDC (110) punch-down blocks.

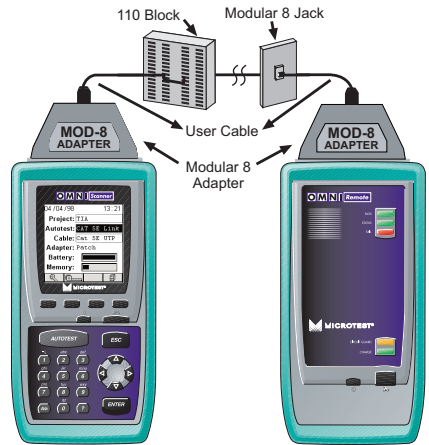
Use 110 Block to 160-pin test cable to attach OMNI Scanner to the 110 Punch Down block. At the other end of the link, use the Modular 8 plug to 160-pin test cable to attach OMNI-Remote to the Modular 8 jack.



Full Channel with Modular 8 Jacks

A Full Channel consists of the different link elements from the hub to the wallplate. For cables terminated with a Modular 8 plug, use the Modular 8 Adapter to interface OMNI*Scanner* with these cables.


Use the supplied Modular 8 Adapters to attach OMNI*Scanner* and OMNI*Remote* to channel patch cords.

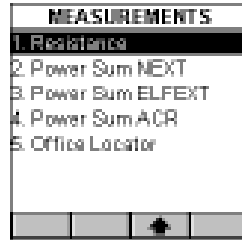



Chapter 4 - Measurements


Performing Individual Measurements with OMNIScanner



OMNIScanner allows you to run various individual tests. The tests are conveniently grouped into two screens and can be accessed separately with the alphanumeric keypad.

Press the  (Measurements) function key to display the **MEASUREMENTS** screen.



Press the  (Page Down) function key to scroll to the second screen containing **MEASUREMENTS**.


Press the  (Page Up) function key to return to the first screen containing **MEASUREMENTS**.



Highlight the test you want to perform using the  or  keys on your keypad and press ENTER, or direct-dial a test by pressing its associated number on the OMNIScanner keypad.



General Information

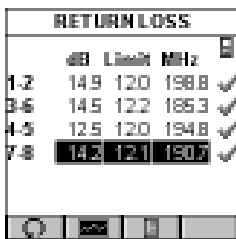
Most test result screens have a retest feature for diagnostic purposes.

Press  (Retest) to run continuous tests for the same cable.


Press  (Retest) once more to stop the continuous measurement. OMNIScanner will display the last computed data.


Tests that require the use of OMNIRemote will have small icons in the upper right corner of the titlebar indicating whether the information on the screen is pertinent for  OMNIScanner or  OMNIRemote.



Toggle between the screens by pressing  to open the screen that contains the information for OMNIScanner, and  to display the information for OMNIRemote.



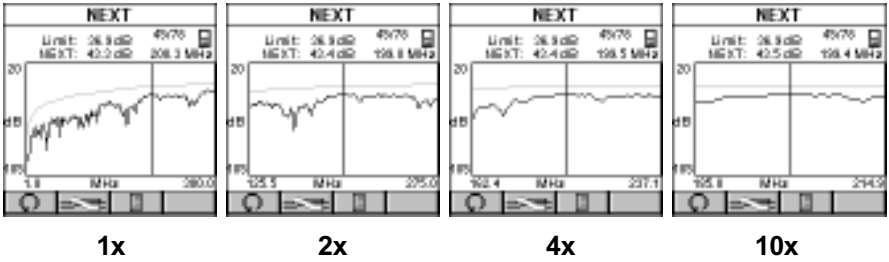
Note: The PASS/FAIL criteria are based on the Autotest currently selected in the Project screen.

Several measurements will display certain results in a graph format. When a graph can be displayed, the  (Graph) function key is available.

Press  (Graph) to display test results for the highlighted pair or pair combination.

Use the  or  keys to magnify the area of the graph where the cursor is located. The graph can be magnified 1x, 2x, 4x, or 10x.

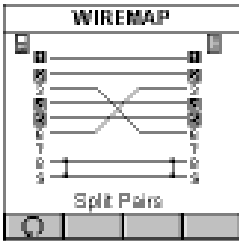
Use the  or  keys to move the cursor within the graph.



The cursor indicates the frequency of the worst case dB value. The value and limit are displayed for the current cursor position.

Wiremap

The **Wiremap** function tests twisted-pair cabling for proper wiring. Your cabling configuration is checked for shield continuity, opens, shorts, crossed pairs, split pairs, and reversed pairs. The screen displays a graphical representation of the wiring in your cable, where the near end wiring is shown on the left side, and far end wiring on the right side of the screen.



- A reversed number **1** indicates a split pair
- A straight line between pairs indicates a good pair
- No line between wire pairs indicates an open
- An **X** between wire pairs indicates a reversed pair
- A **]** between wirepairs indicates a short

In the example, OMNIScanner displays split pairs on 1 - 2 and 4 - 5 (although they are wired straight through), a reversed pair 3 - 6, an open on wire 7, and a short on wire 8 to the Shield.

Press ESC to exit the **WIREMAP** screen.





Length/Delay

The **Length/Delay** function measures a cable's length, propagation delay and skew. OMNIScanner will determine whether the cable is open or shorted.

The accuracy of the NVP (Nominal Velocity of Propagation) setting determines the exactness of the Length measurements. The NVP specified by cable manufacturers is used for all the cables in OMNIScanner's library. When creating or editing cables, the NVP value can be customized. (See Chapter 3 - Setup: **Cables** for further information.)



Delay is a measure of the time required for a pulse to travel from one end of the circuit to the other. OMNIScanner measures the delay between when the pulse was sent and when the reflection was received. Knowing the speed that the pulse propagates down the cable (NVP), OMNIScanner then calculates the length of the cable.

Skew is the difference between the delay on the longest and shortest wirepairs.

LENGTH/DELAY			
Limit:	308.3ft 510nS		
1-2	156.9ft 443nS		
3-6	162.5ft 459nS		
4-5	166.1ft 469nS		
7-8	154.4ft 436nS ✓		
Skew:	33 nS		
Limit:	43 nS		
			

The **LENGTH/DELAY** screen shows the test result information for all pairs.

The Limit is displayed at the top of the screen.

The pairs are displayed in the first column followed by small icons to indicate whether the pair is open  or shorted .

The measured Length and the Delay are displayed for each pair. The result for the shortest pair is tagged with a PASS ✓ or FAIL ✗ indicator.

The length result can be displayed in meters or feet.

Delay is displayed in nS (nanoseconds).

The Skew value and the Skew limit are displayed right below the pairs.

Press ESC to exit the **LENGTH/DELAY** screen.



NEXT

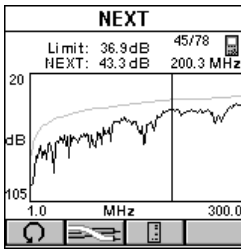
The **NEXT (Near End Crosstalk)** function measures the electromagnetic coupling that occurs between pairs at the near end. OMNIScanner and OMNIRemote allow NEXT to be measured at both ends of the link without having to swap ends.


OMNI*Remote* functions as a terminator while OMNIScanner transmits a signal which is monitored on the receive pair. The received signal is compared to the transmitted signal and the difference is reported as the NEXT value in dB. When measuring the NEXT for the OMNI*Remote* end, the roles of the two units are reversed. OMNIScanner provides the termination; OMNI*Remote* transmits and receives the signal.


NEXT			
	dB	Limit	MHz
12/36	36.6	34.7	273.0
12/45	41.7	35.4	215.9
12/78	41.1	35.8	237.1
36/45	36.9	34.9	266.7
36/78	39.7	34.7	274.8
45/78	39.2	34.2	291.0

The **NEXT** screen displays the pair combinations on the left side. The measured NEXT value, limit, and frequency are displayed for each pair combination. The result for each pair combination is tagged with a PASS ✓ or FAIL ✗ indicator.

Press  or  to toggle between the NEXT results for OMNIScanner and OMNI*Remote*.



Press  (Graph) to display the NEXT graph for the highlighted pair combination. NEXT is displayed for the frequency indicated by the cursor position.

Press  (Pairs) to view NEXT graphs for other pair combinations.


Press ESC to exit the **NEXT** screen.

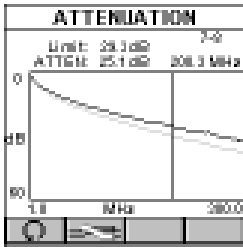
Attenuation

The **Attenuation** function measures signal loss in a cable as a function of frequency. OMNI*Remote* generates and injects a signal at the far end of the cable. OMNIScanner measures the signal at the other end of the cable to determine cable loss.


ATTENUATION			
	dB	Limit	MHz
1-2	32.2	37.0	288.1
3-6	31.4	35.2	288.2
4-5	33.3	35.9	284.7
7-8	31.4	35.9	284.7

The **ATTENUATION** screen displays the pair in the column on the left side, followed by the Attenuation in decibels (dB), the Attenuation Limit values, and the frequency. The result for each pair is tagged with a PASS ✓ or FAIL ✗ indicator.

Press  (Graph) to display the Attenuation



graph for the highlighted pair. The Attenuation is displayed for the frequency indicated by the cursor position.

Press  (Pairs) to view Attenuation results for other pairs.


Press ESC to exit the **ATTENUATION** screen.

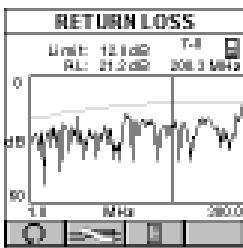
Return Loss


The **Return Loss** function measures the uniformity of a cable's impedance. OMNIScanner injects a signal into the cable and measures the reflected signal strength. Return Loss measures the difference between the transmitted signal delivered to the cable and the reflected signal at the input port of the cable. The reflected signal is the result of impedance mismatches in the link under test.


	dB	Limit	MHz	
1-2	16.1	12.9	147.1	✓
3-6	18.6	12.0	195.7	✓
4-5	16.2	13.2	133.6	✓
7-8	16.3	13.2	133.1	✓

The **RETURN LOSS** screen displays the pairs in the column on the left side, followed by the Return Loss in decibels (dB), the Return Loss Limit, and the frequency. The result for each pair is tagged with a PASS ✓ or FAIL ✗ indicator.

Press  or  to toggle between the Return Loss results for OMNIScanner and OMNIRemote.



Press  (Graph) to display the Return Loss graph for the highlighted pair. The Return Loss is displayed for the frequency indicated by the cursor position.

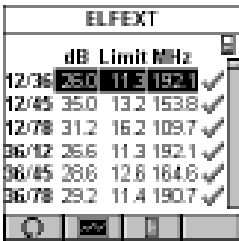
Press  (Pairs) to view Return Loss graphs for other pairs.

Press ESC to exit the **RETURN LOSS** screen.

ELFEXT

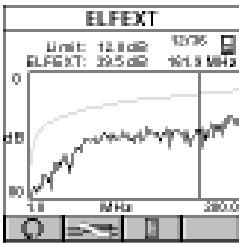
ELFEXT (Equal Level Far End Crosstalk) measures the electromagnetic coupling at the far end and normalizes the result to account for the cable's attenuation. ELFEXT is reported in dB and results are computed for twelve pair combinations at both the OMNIScanner and OMNIRemote ends of the cabling.


The **ELFEXT** screen displays the pair combinations in the column on the left side, followed by the ELFEXT value, the limit and the frequency. The result for each pair combination is tagged with a PASS ✓ or FAIL ✗ indicator.




The scrollbar indicates that there are more test results. Use the ↓ on OMNIScanner's keypad to scroll through the list and view results for the other six pair combinations.

Press  or  to toggle between the ELFEXT results for OMNIScanner and OMNIRemote.



Press  (Graph) to display the ELFEXT graph for the currently highlighted pair combination. ELFEXT is displayed for the frequency indicated by the cursor position.

Press  (Pairs) to view ELFEXT graphs for other pair combinations.

Press ESC to exit the **ELFEXT** screen.

ACR/Bandwidth

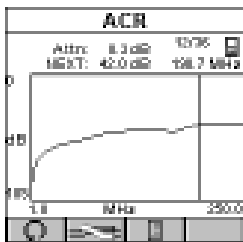
Attenuation to Crosstalk Ratio (ACR) is an indication of how much larger the received signal is compared to the Near End Crosstalk (NEXT) on the same pair. ACR is calculated from the measured NEXT and Attenuation. The ACR value is computed at each measured Attenuation frequency. The worst case ACR is reported for each pair combination. Bandwidth is a measure of the usable frequency range of the link under

test. For most networks, this is the highest frequency at which the signal can easily be distinguished from background noise. The worst pair to pair ACR is 3dB.

In the **ACR** screen the Bandwidth is displayed at the top of the screen. The pair combinations are located in the column on the left side, followed by the measured ACR, the ACR limit, and the frequency. The result for each pair combination is tagged with a PASS ✓ or FAIL ✗ indicator.

Pair	ACR (dB)	Limit (dB)	Freq (MHz)	Result
12/36	41.8	4.7	199.7	✓
12/45	38.8	5.0	197.5	✓
12/78	58.8	4.8	199.3	✓
36/45	33.8	4.7	199.7	✓
36/78	41.2	4.7	199.7	✓
45/78	38.3	4.8	199.3	✓

Press or to toggle between ACR results for OMNIScanner and OMNIRemote.



Press (Graph) to view the graph for the currently highlighted pair combination. The values for Attenuation and NEXT are shown at the top of the screen. Attenuation and NEXT graphs are displayed for the frequency indicated by the cursor position.

Press (Pairs) to view Attenuation/NEXT graphs for other pair combinations.

Press ESC to exit the **ACR** screen.

Resistance

Resistance is measured in a loop through each pair in the cable. In a twisted pair cable, Resistance is measured by using OMNIRemote to short the far end of the pair under test.

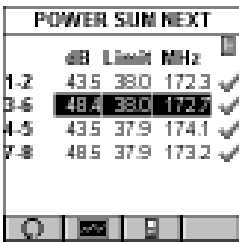
Pair	Limit (Ω)	Result
Limit:	188 Ω	
1-2	133 Ω	✓
3-6	137 Ω	✓
4-5	137 Ω	✓
7-8	132 Ω	✓

The **RESISTANCE** screen displays the Resistance Limit and the test results in Ohms for each pair. The result for each pair is tagged with a PASS ✓ or FAIL ✗ indicator.

Press ESC to exit the **RESISTANCE** screen.

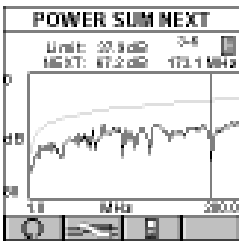
Power Sum NEXT

Like NEXT, **Power Sum NEXT** is a measurement of electromagnetic coupling between adjacent pairs. While NEXT reports test results for each pair combination, Power Sum NEXT is calculated from NEXT for individual pair combinations and takes into account the crosstalk from multiple transmission pairs. When Power Sum mode is enabled, OMNIScanner displays results for pairs, rather than pair combinations. The PS NEXT measurement is required to assure proper operation of networks employing simultaneous transmission on more than one pair in a link (i.e. Gigabit Ethernet).



The **POWER SUM NEXT** screen displays the pairs in the column on the left side, followed by the PSNEXT in decibels (dB), the limits, and the frequency. The result for each pair is tagged with a PASS ✓ or FAIL ✗ indicator.

Press or to toggle between the PSNEXT results for OMNIScanner and OMNI-Remote.



Press (Graph) to display the PSNEXT graph for the currently highlighted pair. PSNEXT is displayed for the frequency indicated by the cursor position.

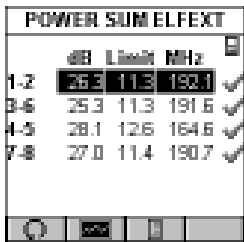
Press (Pairs) to view PSNEXT graphs for other pairs.

Press ESC to exit the **POWER SUM NEXT** screen.

Power Sum ELFEXT

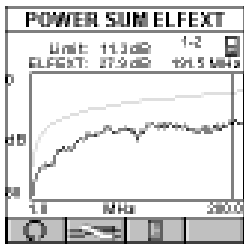
Power Sum ELFEXT is calculated from the summation of the individual ELFEXT effects on each pair by the other three pairs.

The **POWER SUM ELFEXT** screen displays the pairs in the column on the left side, followed by the PSELFEXT in decibels (dB), the limits, and the frequency.



The result for each pair is tagged with a PASS ✓ or FAIL ✗ indicator.

Press or to toggle between the PSELFEXT results for *OMNIScanner* and *OMNI-Remote*.



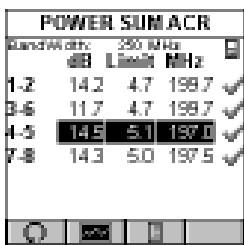
Press (Graph) to display the PSELFEXT graph for the currently highlighted pair. PSELFEXT is displayed for the frequency indicated by the cursor position.

Press (Pairs) to view PSELFEXT graphs for other pairs.

Press ESC to exit the **POWER SUM ELFEFT** screen.

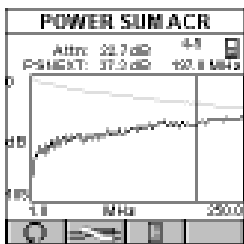
Power Sum ACR

Power Sum ACR is calculated from the Attenuation of the disturbing pair subtracted from the Power Sum NEXT for the pair. The worst case Power Sum ACR is reported for each pair.




The **POWER SUM ACR** screen displays the pairs in the column on the left side, followed by the PSACR in decibels (dB), the limits, and the frequency. The result for each pair is tagged with a PASS ✓ or FAIL ✗ indicator.

Press or to toggle between Power Sum ACR results for *OMNIScanner* and *OMNI-Remote*.



Press (Graph) to view the graph for the currently highlighted pair. Attenuation and PSNEXT are displayed for the frequency indicated by the cursor position.

Press  (Pairs) to view Attenuation and PS NEXT graphs for other pairs.

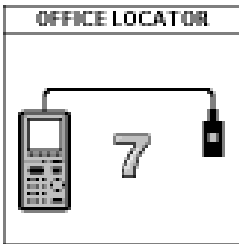
Press ESC to exit the **POWER SUM ACR** screen.

Office Locator

The **Office Locator** function allows you to find the termination of an office cable drop from a wiring closet. It eliminates the need to trace cables through walls and ceilings.



1. Connect the cable to be tested to *OMNIScanner*.



2. Insert the RJ-45 Office Locator adapters into wall outlets in the offices you wish to identify. You can connect any or all of the twelve Office Locators before beginning your test.

3. At the patch panel run the Office Locator function to identify, which office is connected to a given port.

OMNIScanner will identify office locations and display the ID of the Office Locator adapter found at the far end of the attached cable.










If you are testing a cable that does not have an Office Locator attached at the other end, *OMNIScanner* will display a question mark.


Press ESC to exit the **OFFICE LOCATOR** screen.

Chapter 5 - Results

Autotest Results

To view previously saved Autotests press the  (Results) function key. The **RESULTS** screen displays Project names together with the number of Autotests that are stored within each project. In the bottom row you will find the total number of Autotests currently stored in OMNIScanner's memory.

RESULTS	
 TIA	49
 ISO	2
 VENDOR	37
 MICROTEST	190
 IEEE	50
 ATM	70
Total	467


To quickly remove all Autotests from a project, highlight the project in the RESULTS screen and press the  (Delete) function key. A message will prompt you to confirm the operation.

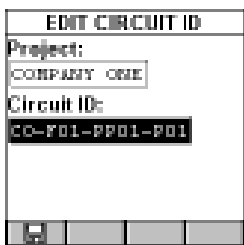
To view more detailed test information highlight a project name and press ENTER.

Microtest	7/190
MT-F01-PP01-P07	<input checked="" type="checkbox"/>
MT-F01-PP01-P08	<input checked="" type="checkbox"/>
MT-F01-PP01-P09	<input checked="" type="checkbox"/>
MT-F01-PP01-P10	<input checked="" type="checkbox"/>
MT-F01-PP01-P11	<input checked="" type="checkbox"/>
MT-F01-PP01-P12	<input checked="" type="checkbox"/>
MT-F01-PP01-P13	<input checked="" type="checkbox"/>

The previously highlighted **PROJECT NAME** will now appear in the title bar together with a numeric test counter that shows the number of Autotest results stored within the project.


To remove an Autotest from the list press the  (Delete) function key.

Press  (Edit) to move the Autotest to another project or to change the **Circuit ID**.



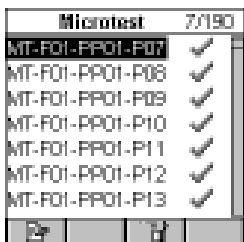
Press ENTER with the **Project:** highlighted to reveal a list of all projects that are currently stored. Use the $\uparrow\downarrow$ to highlight the project you want to store the Autotest within, and press ENTER to select it.

Use the \downarrow to highlight the **Circuit ID:** and press ENTER to edit the field. Press ENTER to terminate the edit mode.

Press  (Save) to save the changes and return to the **PROJECT NAME** screen. If the PROJECT NAME was changed, it will now appear in the title bar together with the numeric test counter.

Viewing Autotest Results

To view detailed information about a saved Autotest use the $\uparrow\downarrow$ on your keypad to highlight a Circuit ID in the Project screen and press ENTER.



Microtest	7/190
MT-F01-PP01-P07	✓
MT-F01-PP01-P08	✓
MT-F01-PP01-P09	✓
MT-F01-PP01-P10	✓
MT-F01-PP01-P11	✓
MT-F01-PP01-P12	✓
MT-F01-PP01-P13	✓

The Autotest Results screen will be displayed. The name of the Autotest, the cable that was used to run the test, and the overall test result (PASS or FAIL) are shown.

All measurements that were performed during the Autotest are listed in the left column. Passed tests will be marked with a ✓. If a test result did not pass, the test name will be followed a ✗ (Fail) symbol.

Note: The list of tests varies depending on the kind of Autotest that was performed.


(See Chapter 4 - **Measurements** for detailed information about each measurement screen.)



Use the **↑↓** on your keypad to highlight a test.

Press **ENTER** to open the test result screen for that particular test.

Use the **←** or **→** on your keypad to quickly page through all test results.

Note: If the  (Save Graphs) option was selected when saving the Autotest, graphs associated with NEXT, Attenuation, Return Loss, PSNEXT, ELFEXT, ACR, PSELFEXT, and/or PSACR are available when viewing Autotest results. Only the graphs that were selected in the Autotest Options screen will be saved. (See Chapter 3 - Setup: **Autotest Options** for information about selecting graphs to be saved.)

Press **ESC** to return to the **PROJECT NAME** screen.

Press **ESC** to return to the **RESULTS** screen.

Chapter 6 - Uploading and Printing

Microtest Utilities

Microtest Utilities consists of three parts: the ScanLink program, the OMNIScanner Configuration program, and the OMNIScanner Remote Control program.

ScanLink is designed to upload data measured with OMNIScanner, PentaScanner or CertiFiber. Collected data can be viewed, saved to disk, or transferred into the **MT Crimp for Windows** database, where Autotests can be managed. **Autotest Certification Reports** can be printed from the PC to a printer.

Note: *MT Crimp for Windows products are available separately.*

OMNIScanner Configuration allows for easy setup and management of projects, the configuration of OMNIScanner, the specification of tests, and the construction and structuring of cable libraries. Projects can easily be downloaded to several OMNIScanners.

OMNIScanner Remote Control is designed to control OMNIScanner from your PC. It allows you to run Autotests that can be uploaded, viewed, and printed. OMNIScanner Remote Control contains an extensive graphing utility allowing you to view and print saved graphs of uploaded test results.

Refer to the Microtest Utilities User Guide for detailed instructions about the installation and the use of the application. The User Guide together with the software is part of the OMNIScanner kit. If your kit did not include the Microtest Utilities, they are also available for download from the Microtest web site at www.microtest.com.

Chapter 7 - Updating Scanner Software

Downloading Software from the Microtest WWW

Software updates can be easily downloaded from the Microtest World Wide Web site. If you are connected to the Internet, you can access our web site by entering **http://support.microtest.com** in the URL address field.

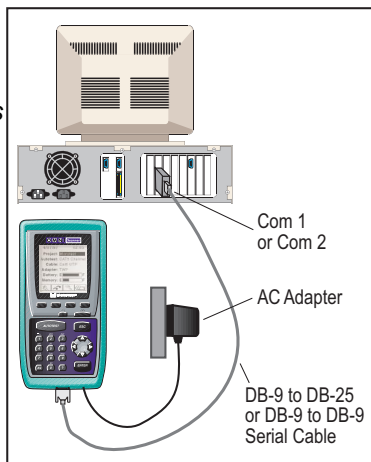
1. Select the **Software Download Index** in the **Microtest Customer Support** section.
2. Click on **Network Management Software**, and then click **Product Updates**.
3. Select the file you need by clicking on it, and save it to a disk.
4. Extract the .exe file.

Updating OMNI Scanner Software from the PC

Note: *The update process will erase all test results stored in memory. Use **Scan-Link** or **MT Crimp for Windows** to upload the results before updating OMNI Scanner's software.*

To update OMNI Scanner with the files you have downloaded from the WWW to your PC proceed as follows:

1. Connect the DB-9 end of the serial cable to OMNI Scanner's serial port, and then connect the DB-9 or DB-25 end of the serial cable to your PC's serial port.



2. Turn *OMNIScanner* off.
3. Plug the AC adapter into *OMNIScanner*.
4. Turn *OMNIScanner* back on.

You are now ready to download the new flash update from the PC. Follow the instructions in the ReadMe that accompanies the update file.

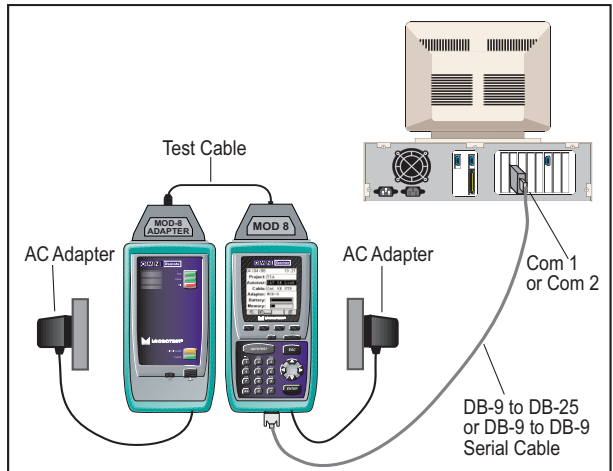
5. To verify the software update, press and hold the Backlight key (located right above the ESC key). The software version # will be displayed

Updating OMNIRemote Software from the PC

Note: The update process will erase all test results stored in memory. Use **ScanLink** or **MT Crimp for Windows** to upload the results before updating OMNIRemote's software.

To update OMNI-Remote with the files you have downloaded from the WWW to your PC proceed as follows:


1. Connect the DB-9 end of the serial cable to OMNIScanner's serial port, and then connect the DB-9 or DB-25 end of the serial cable to your PC's serial port.
2. Turn OMNIScanner off.
3. Plug the AC adapter into OMNIScanner.



4. Connect OMNIScanner and OMNIRemote using the provided test cable.
5. Plug the AC adapter into OMNIRemote.

6. Turn both units on.

You are now ready for the new flash update from the PC. Follow the instructions in the ReadMe that accompanies the update file.

7. To verify the update, press OMNI*Scanner's*  (Setup) function key, and then select the option **Remote Info**. The new software version will be displayed.

Appendix A - Technical Specifications

Specifications apply to both *OMNIScanner* and *OMNIRemote* unless otherwise noted.

Physical Characteristics

OMNIScanner

- Dimensions: 8.75" x 4.50" x 2.12" (22.25 cm x 11.4 cm x 5.4 cm)
- Weight: 2.20 lbs (1 kg)

OMNIRemote

- Dimensions: 8.75" x 4.50" x 2.12" (22.25 cm x 11.4 cm x 5.4 cm)
- Weight: 1.96 lbs (0.89 kg)

User Interface

OMNIScanner

- 62 x 62 mm Graphic LCD with backlight
- Keypad with tactile feedback, numeric input, dedicated functions, four soft functions, and cursor pad
- Context sensitive help and operating instructions
- Tone generating audio for warning or other user feedback
- Date stamp of all tests

OMNIRemote LED Displays

- Pass Indicator (GREEN) for test results
- Status Indicator (GREEN) for *OMNIRemote* status, various blink rates
- Fail Indicator (RED) for test results
- Circuit Guard (ORANGE) for high voltage input protection warning
- Charge (RED) for *OMNIRemote* low battery status
- Charge (GREEN) while *OMNIRemote* battery is charged

Power

- Removable, rechargeable battery pack
- 9.6 Volts @ 1200 mA-Hr NI-CAD
- Built-in fast charger using AC adapter
- Charging Time: 3 hours for fully discharged batteries.

- Battery life : 10+ hours operation
- AC: 15 VDC - 1 amp AC adapter for continuous operation or charging

Environmental

- Operating Temperature: 0°C to 50°C (32°F to 122°F)
- Storage Temperature: -10°C to 55°C (14°F to 131°F)
- Operating Humidity: (non-condensing): 5% to 90%
- Storage Humidity: 5% to 95%
- Regulatory Compliance: CE Class A

Measurement Port (Test Interface)

- Ultra low Crosstalk test interface that supports testing of all four pairs
- 160 pin test interface connector which exceeds 10,000 mating cycles
- Variety of test cables and adapter modules support testing of BNC, 110 block, and shielded modular jack and plug interfaces

High Voltage Input Protection

- The test interface withstands input hazard conditions that arise from normal telephone interfaces (48 VDC at less than 80 mA) or 24 VAC power used on many telephone keysets.

Serial Port

- Connector: Cable: DB-9
- Baud Rate: 300 to 38,400 baud
- Parity: None
- Length: 8 Bits
- Handshaking: None, RTS/CTS, and XON/XOFF

Memory

- Control: Flash Memory allows electronic upgrading of both OMNIScanner and OMNIRemote programs.
- Test Storage: Up to 1000 complete Autotest results can be stored in permanent flash memory. They are not subject to loss due to power or battery failures.

Autotest Functions

- Full suite of tests to determine if cable meets generic cabling or network type requirements.
 - Extended performance range Cabling (CAT 6 and CAT 7)
 - **TIA:** CAT 6 Link - D3, CAT 5E Link - 9/98, CAT 5E Channel - 9/98,

CAT 5 Link 95 & 67 TSB, CAT 5 Channel 95 & 67 TSB,
CAT 3 Link, CAT 3 Channel

- **ISO:** Class F Link - 3/98, Class E Link - 5/98, Class D Link - 50173, Class D Channel - 50173, Class D - 11801 - 95, Class C Link - 50173, Class C Channel - 50173
- **Vendor:** Millennium, Siemon Sys 6
- **MICROTEST:** MT 300 MHz, MT 250 MHz
- **IEEE:** 10 BASE-T, 100 BASE-X, 1000 BASE-T, 16Mb Token Ring, 4Mb Token Ring
- **ATM:** ATM155 Mbps, ATM 51 Mbps
- **AS/NZ:** AS/NZ D Link, AS/NZ D Channel, AS/NZ C Link, AS/NZ C Channel

Test Functions

- Wire Map
- NEXT (Near End Crosstalk)
- Return Loss
- Attenuation
- ELFEXT (Equal Level FEXT)
- ACR (Attenuation to Crosstalk Ratio)
- Bandwidth
- Length/Delay
- Resistance
- Power Sum NEXT, ACR and ELFEXT

Transmission Performance Measurement Method

All cabling transmission performance measurements (NEXT, RL, Attenuation, and ELFEXT) are implemented using swept frequency domain, vector, digital signal processing measurement methods to ensure accurate, repeatable results.

Transmission Performance Measurement Parameters

The accuracy of the RF transmission performance measurements is calculated in accordance with error models documented in related TIA documents. OMNIScanner is designed to exceed Level III accuracy requirements. The following table provides specifications for important instrument parameters relating to the measurement accuracy models.

Instrument Parameter	@ 100 MHz	@ 200 MHz	@ 300 MHz
Residual NEXT	> 105 dB	> 105 dB	> 100 dB
Noise Floor	> 100 dB	100 dB	> 95 dB
Detector Accuracy	0.5 dB	0.5 dB	0.5 dB
Output Signal Balance	45 dB	39 dB	35 dB
Common Mode Rejection	45 dB	39 dB	35 dB
Port Match Error	0.1 dB	0.2 dB	0.5 dB

Wire Map

- Finds miswires, opens, shorts, crossed and split pairs and presents results in a schematic format
- Includes shield test if connected
- Uses *OMNIRemote* for complete mapping of wiring at both ends of the cable

NEXT

- Test all six pair combinations from both directions using *OMNIRemote*
- Frequency Range: 1 to 300 MHz
- Dynamic Range: >100dB
- Measurement Accuracy: Calculated per TIA error model
- Measurement Resolution: 0.1dB

NEXT Accuracy Table

Cat 5 Link Limit @ 100 MHz	0.8 dB
Cat 6 (Draft Link Limit @ 200 MHz)	1.0 dB
Cat 7 Link limit @ 300 MHz	1.6 dB

Return Loss

- Measures Return Loss on all four pairs from both directions using *OMNIRemote*
- Frequency Range: 1.0 to 300 MHz
- Dynamic Range: 0- 25dB
- Factory Calibrated to ensure measurement port match to reference 100 ohm impedance.
- Measurement accuracy: Designed to meet Level III accuracy requirements.
- Measurement resolution: 0.1dB

Attenuation

- Tests all four pairs using *OMNIRemote* as far end active signal injector.
- Frequency Range: 1.0 to 300 MHz
- Dynamic Range: > 80 dB

- Measurement Accuracy: Calculated per TIA error model
Accuracy: 100 MHz - 0.6 dB, 200 MHz - 0.7 dB, 300 MHz - 1.0 dB
- Measurement resolution: 0.1dB

ELFEXT (Equal Level FEXT)

- Tests from both directions using *OMNIRemote* and reports all 24 pair combinations.
- Frequency Range: 1 to 300 MHz
- Dynamic Range: >100dB
- Measurement Accuracy: Designed to meet Level III accuracy requirements.
- Measurement Resolution: 0.1dB

ACR (Attenuation to Crosstalk Ratio)

- Computed for 4 pairs from both ends at all frequency points from the respective pair to pair NEXT and Attenuation measurements.

Bandwidth

- Computed for the link or channel under test, bandwidth indicates the highest frequency for which the worst case pair to pair crosstalk (NEXT) is at least 3dB less than the attenuation.

Length

- Range: 0 to maximum distance, where max. distance = 457 m (1500 ft.) for twisted pair cable
- Accuracy: $\pm K \pm \text{Length resolution} \pm \text{NVP uncertainty}$, where $K = \pm 4\%$ of length or 0.6 m (2ft.), whichever is greater.
Length resolution: 0.3 m (1ft.)

Resistance

- Range: 0 - 500 W
- Accuracy: $\pm 0.5 \text{ W} @ 0 \text{ to } 15 \text{ W}$
 $\pm 2\% @ 15 \text{ to } 500 \text{ W}$
- Resolution: 0.1 W

Power Sum NEXT, ACR and ELFEXT

- Computed for both ends from the respective pair to pair NEXT, Attenuation and FEXT measurements.

High Voltage Input Protection

- The test interface withstands input hazard conditions that arise from normal telephone interfaces (48 VDC at less than 80 mA) or 24 VAC power used to power many telephone keysets. The unit detects when a voltage of greater than ± 15 volts is applied on the inputs and sounds a warning to alert the user to remove the hazard condition immediately to prevent possible damage to the input circuits. **Note:** *Measurements cannot be performed when hazard conditions are present.*

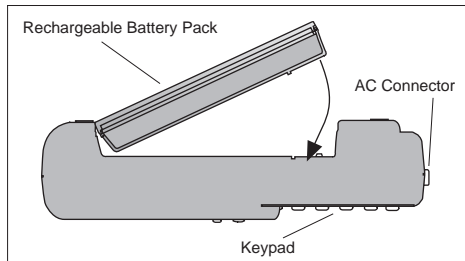
Appendix B - NiCd Batteries

Batteries

OMNIScanner and OMNIRemote are powered by rechargeable, recyclable Nickel Cadmium (NiCd) battery packs.

Under various state and local laws, it may be illegal to dispose of this battery pack into the municipal waste stream. Check with your local solid waste officials for details in your area for recycling options or proper disposal.

To remove the NiCd battery pack, place the instrument face down and slide the arrow-shaped tab downward. Then lift the battery pack up towards you. To install the battery pack, insert the two tabs on the top of the battery in the Scanner and press down on the battery pack until it clicks into place.



NI-CAD batteries have a limited number of recharge cycles. Typically, capacity is warranted by the battery manufacturer for about 200 recharge cycles. The capacity of a battery is highly dependent on the way it is recharged. Generally batteries that are fully discharged before the recharge cycle may have a longer life than those subject to extended cycles of shallow discharge. Conditions of shallow discharge promote a phenomenon known as voltage depression, which gives the appearance of reduced capacity. Battery life can also be effected by the temperature conditions under which charging is performed. Charging by room temperature (77°F/ 25°C) maximizes the battery life.

OMNI*Scanner* and OMNI*Remote* use a charging mechanism that minimizes the effects of shallow discharging. To maximize battery life, the battery temperature is monitored and maintained within limits during the charging process. Charging under high temperature conditions may result in longer recharge times or premature termination of charging.

Battery Charging

Charging of the battery is enabled in the OMNI*Scanner* and OMNI*Remote* whenever the AC adapter is plugged in and the units are powered off.

The recharge time is typically 3 hours to completely charge a fully discharged battery.

Charging is automatically terminated by the units when full capacity or over temperature conditions are reached. To enhance long term life and capacity of the battery a maintenance and topping charge period starts right after the rapid charge is completed. The charging status is displayed on both units. The graphic LCD displays charging status on the OMNI*Scanner*, while LEDs indicate the status on the OMNI*Remote* unit.

Status conditions are as follows:

- Pass Indicator (GREEN) for test results
- Status Indicator (GREEN) for OMNI*Remote* status, various blink rates
- Fail Indicator (RED) for test results
- Circuit Guard (ORANGE) for high voltage input protection warning
- Charge (RED) for OMNI*Remote* low battery status
- Charge (GREEN) while OMNI*Remote* battery is charged
- All LEDs blink once when OMNI*Remote* is powered on

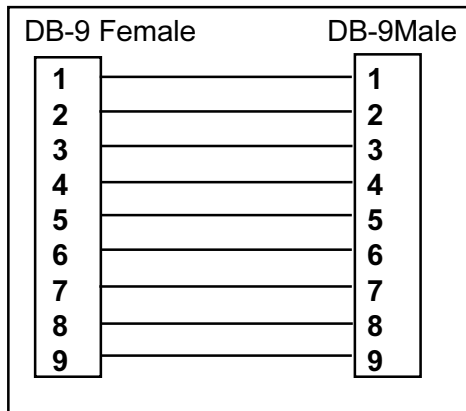
NiCd Battery Tips

- Power off the unit before changing the NiCd battery pack. Charging is only enabled when the unit is off or operate unit from AC.
- If not on AC power, the NiCd battery packs must be replaced within five minutes to avoid loss of time and date in the OMNIScanner unit.
- If the display goes blank while the AC adapter is plugged in to the Scanner, it indicates that the NiCd battery pack is on maintenance (“trickle”) charge.
- The average time to recharge the NiCd battery pack is about 3 hours
- To maximize NiCd battery pack life, avoid extreme temperatures.
- Backlighting the display causes increased battery drain.
- Average daily life of the NiCd battery pack is about eight hours.
- An external charger is also available. Contact your Microtest distributor for details on the external charger, Microtest Part Number 8003-01.

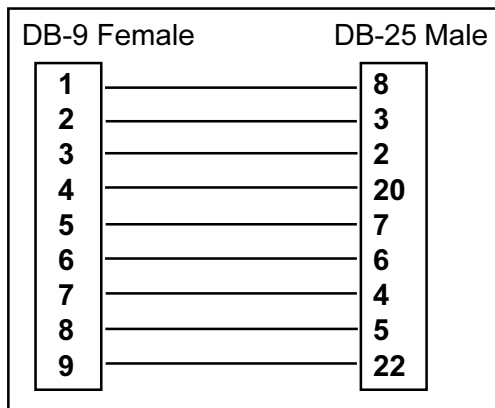
Appendix C - Cable Pin-Outs

Described below are the functions of the electronic signals transmitted through each pin in a connector.

Serial Cable DB-9 Female to DB-9 Male Pin-outs



Serial Cable DB-9 Female to DB-25 Male Pin-outs



Cable Pin-Out Signals

The signals for the cable pin-outs are as follows:

DB-9 Male Pin	DB-25 Male pin	Signal	DB-25 Female Pin	DB-9 Female Pin	Signal Description
5	7	GND	7	5	Protective Ground
3	2	TXD	2	3	Transmitted Data
2	3	RXD	3	2	Received Data
7	4	RTS	4	7	Request to Send
8	5	CTS	5	8	Clear to Send
4	20	DTR	20	4	Data Term Ready
6	6	DSR	6	6	Data Set Ready
1	8	RLSD	8	1	Received Line Signal Detector
9	22	RI	22	9	Ring Indicator

Index

A

ACR 37
ACR graph 38, 41
Attenuation 35
Attenuation graph 35
Attenuation Limit 35
Attenuation results 36
Attenuation to Crosstalk Ratio 37
Autotest 23
Autotest Results 43, 44

B

Backlight 11
Basic Link 28
Battery 19
 tips 59

C

CONTRAST 17
Crossed pairs 33

D

Delay 33
Detail 27

E

Editing methods 15
ELFEXT 37
ELFEXT graph 37
Equal Level Far End Cross Talk 37

F

FAIL 24
Frequency 35
Full Channel 29
Function Keys 12

G

Graph 10, 27

I

IDC (110) block 28
Impedance 36

K

Keypad 11

L

LED Indicators 13
Length 33
Length Limit 34
List 24

M

Measurements 31
Modular 8 Jack 28
MT Crimp for Windows 20

N

Near End Crosstalk 34
NEXT 34
NEXT graph 35
NEXT value 35
NVP 34

O

OMNIRemote 13
Opens 33

P

Pairs 35
PASS 24
PASS/FAIL 32
Pop-up 10
Power Sum ACR 40
Power Sum ELFEXT 39
Power Sum NEXT 39
Predefined Lists 15
Product Versions 17
PROJECT NAME 44
Project screen 19
Project Selection 22
propagation delay 33
PS ELFEXT 39
PS ELFEXT graph 40
PS NEXT graph 39

R

Resistance 38
Results 43
Retest 27, 32
Return Loss 36
Return Loss graph 36
Reversed pairs 33
Running an Autotest 23

S

SAVE AUTOTEST 24
Scanner Display 9

Scrollbars 10
Serial number 17
Shield continuity 33
Shorts 33
Skew 34
Skew limit 34
Spin Control 10, 15
Split pairs 33

T

Technical Support 16
Test cable 21
Test standards 20

U

Updating OMNIRemote 49
Updating OMNI*Scanner* Software 48

V

Viewing Autotest Results 25, 44

W

Warranty 65
Wiremap function 33
World Wide Web 17

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2950-4500-03E Rev. 01 12/98

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