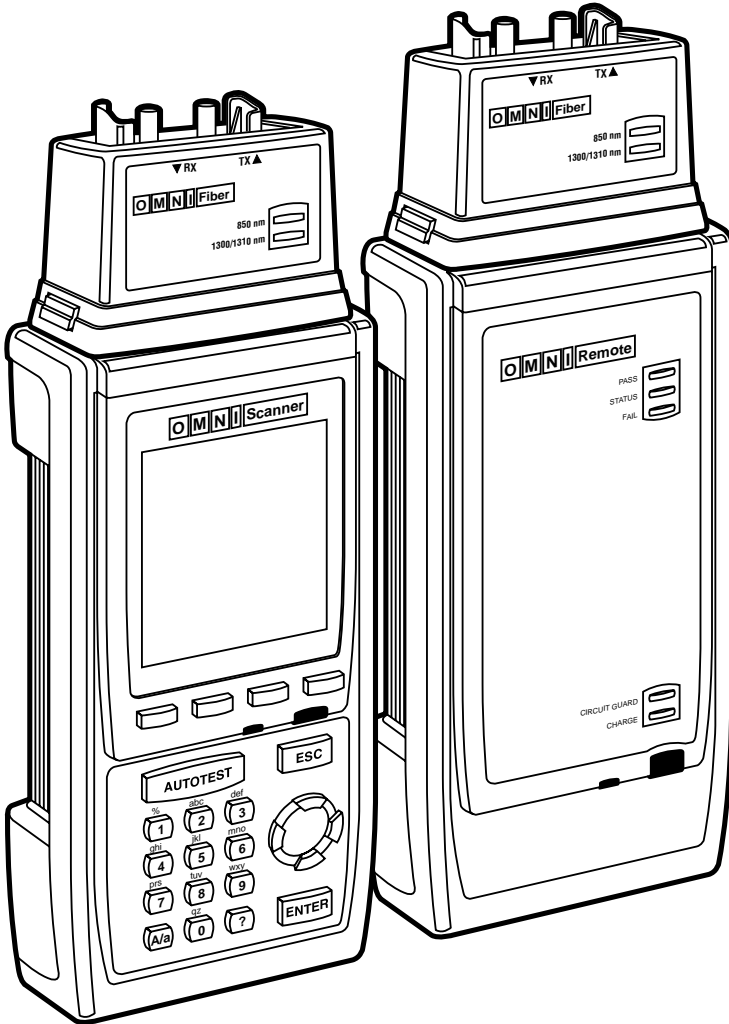




# OMNIScanner



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

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

*This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.*

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

## **NORMAS OFICIALES MEXICANAS (NOM) ELECTRICAL SAFETY STATEMENT**

### **INSTRUCCIONES DE SEGURIDAD**

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
  - A: El cable de poder o el contacto ha sido dañado; u
  - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
  - C: El aparato ha sido expuesto a la lluvia; o
  - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
  - E: El aparato ha sido tirado o su cubierta ha sido dañada.

## TRADEMARKS

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# 1. Introduction

## 1.1 The Digital Solution for Fiber and Copper

OMNIScanner is the most advanced hand-held certification and diagnostic tool for the verification of copper links. The Category 7, 6, 5E (Enhanced), 5 and ISO Class F, E, D, and C tester has 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). In addition, OMNIScanner measures Length, Delay, Impedance, and Resistance on coaxial cabling.

OMNIFiber expands the tester's capabilities to certify installed fiber links against TIA and ISO standards. Fiber cabling can be verified at 850 and 1300 nm wavelengths.

## 1.2 The Graphical User Interface

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.

## 1.3 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.

## 1.4 OMNIFiber

OMNIFiber transforms OMNIScanner and OMNIScanner2 into a fiber optic tool for testing and certification of multimode and single-mode fiber premise networks. OMNIFiber consists of two identical test heads that attach directly onto OMNIScanner and OMNIRemote to become a part of each unit. Using the 1-Button Autotest feature, OMNIFiber measures loss (multimode and single-mode) and length (multimode) over two fibers simultaneously. The measurements are

compared against the selected LAN standard for instant PASS/FAIL analysis. OMNIFiber measures loss at 850 and 1300 nm over multimode fiber and at 1310 nm over single-mode fiber.

Up to 1000 Autotests can be saved to nonvolatile memory. Saved results can be easily uploaded to the PC with Scanlink software.

## **1.5 Scanlink Tools Software**

PC-based software expands OMNIScanner's user interface and aids with the management of projects. Scanlink Tools consist of the OMNIScanner Configuration software, the Scanlink Upload software, and the OMNIScanner Remote Control software. These programs allow you to store, retrieve, manage, edit, and print network cabling information. Scanlink Tools; provide the ability to create professional reports, remote control OMNIScanner, and define cable and project configurations that can be downloaded to OMNIScanner.

## **1.6 OMNIScanner's Display**

<b>Scanner Display</b>	<b>Function</b>
1-2 or 12/36:	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 predefined 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 up-arrow or down-arrow key.
Scrollbars:	Use the up-arrow and down-arrow key on the keypad to move up and down in a scrollable screen.
Graph:	Use the left-arrow or right-arrow keys to move the graph cursor on the frequency axis. Use the up-arrow or down-arrow to zoom in and out of graphs.



## 1.7 OMNIScanner's Keypad

 ON/OFF

When turned on, OMNIScanner will display the project screen.



Backlight

Press the Backlight key to toggle the backlight between its two levels of brightness. Press and hold the Backlight key to display the Contrast screen. Use the up-arrow and down-arrow keys on the keypad to adjust the display contrast. 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

ESC

Press the Escape key to cancel the current operation.



Arrow keys

Press the left, right, up, or down arrow key to navigate within a list, menu, graph, or editable field.

ENTER

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 editing 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     Diagnostics     Results
-  New     Edit     Delete     Save Options
-  Save     Save with Graphs     Save to MMC
-  Save with Graphs to MMC     Copy Project to MMC
-  Copy Results to MMC     Copy Circuit ID
-  Erase a letter     Clear a field     List Circuit IDs
-  Detail     Retest     Graph     Pair
-  Next Page     Previous Page     Select
-  Set Default     Switch to 850 nm     Switch to 1300 nm
-  Set Reference     Continue Test
-  Use Method A     Use Method B     Use Method C
-  Switch to Continuous Wave     Switch to Modulated (2 kHz) Wave
-  Switch to OMNIScanner Info     Switch to OMNIRemote Info

## 1.8 OMNIRemote's LED Indicators



LED	Color	Description
PASS	Green	Overall Autotest Result is PASS.
Status	Green (flashing)	OMNIRemote is ready for testing.
	Green (consistent)	OMNIRemote 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.
REMOVE CABLE FROM HAZARDOUS SOURCE!		
Charge	Green	OMNIRemote is inactive, the AC adapter is present, and the battery pack is being charged.
	Green (flashing)	OMNIRemote battery is fully charged.
	Red (flashing)	OMNIRemote battery is low.

## 1.9 OMNIRemote Keys

**ON/OFF**

When turned on, OMNIRemote will blink the LEDs.

$\lambda$  (Lambda)

When OMNIFiber is attached to OMNIRemote, the remote unit can be used as a light source. With the OMNIFiber adapter attached, press the Lambda key to activate the light source and provide continuous or modulated light at 850 or 1300/1310 nm. The green LED of the appropriate wavelength will blink rapidly when modulated light is transmitted. If the transmitted light is continuous, the green LED will not blink. (See OMNIFiber's LED indicators in this chapter for further information.)



## 1.10 When To Use OMNIRemote

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

Twisted pair measurements requiring the use of OMNIRemote:

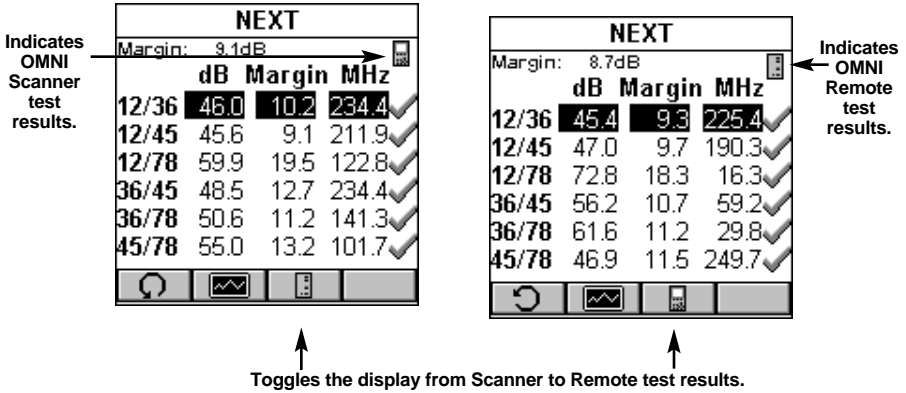
- Autotest
- Wiremap
- NEXT and Power Sum NEXT
- Attenuation
- Return Loss
- ELFEXT and Power Sum ELFEXT
- ACR and Power Sum ACR



Twisted pair measurements not requiring the use of OMNIRemote:

- Length/Delay/Skew
- Resistance

## 1.11 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 either end 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.”



OMNISCANNER2 displays test results for both ends of the link. Press  or  to toggle the display between Scanner and Remote 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.

**1.12 OMNIFiber’s LED Indicators**



<b>LED</b>	<b>Color</b>	<b>Description</b>
850 nm	Green	OMNIFiber is transmitting at 850 nm
850 nm	Green	OMNIFiber is (flashing) transmitting modulated light at 850 nm
850 nm	Orange	Part 1 of Two Way Test completed, switch fibers
1300/ 1310 nm	Green	OMNIFiber is transmitting at 1300/ 1310 nm
1300/ 1310 nm	Green	OMNIFiber is (flashing) transmitting modulated light at 1300/1310 nm
1300/ 1310 nm	Orange	Part 1 of Two Way test completed, switch fibers

**1.13 Attaching the OMNIScanner Fiber Adapters**

**NOTE**

Both OMNIFiber adapters have dust caps to protect the ST connectors from dirt. Keep the ST connectors covered when the Fiber Adapters are not in use. This helps to ensure that contaminants from handling fiber do not affect test measurements.

**NOTE**

Both OMNIFiber adapters have 160-pin connector covers. Keep the 160-pin connectors covered when the Fiber Adapters are not in use.

To attach a fiber adapter to OMNIScanner, proceed as follows:

1. Remove the 160-pin connector cover from the OMNIFiber adapter by gently pressing the black pushbutton latches. The cover will be released.

2. Push the OMNIFiber adapter onto OMNISCanner's 160-pin connector until it snaps into position.
3. To remove OMNIFiber, use the pushbutton latches to release the secured adapter.
4. Protect OMNIFiber's 160-pin connector by snapping the cover back in place.



## 1.14 Editing with OMNISCanner2

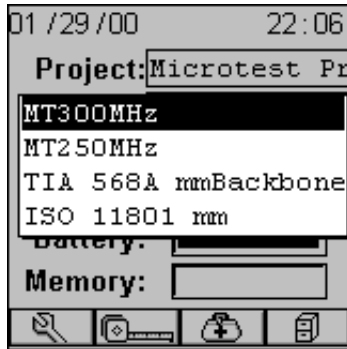
OMNISCanner includes sophisticated easy-to-use editing methods to accommodate a variety of user-definable items. Different fields have different editing procedures. Please follow the described procedures to make editing with the OMNISCanner effortless.

### NOTE

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

### 1.14.1 PREDEFINED LISTS

To quickly and easily select Projects, Autotests, Cables, etc., OMNIScanner2 uses predefined lists.



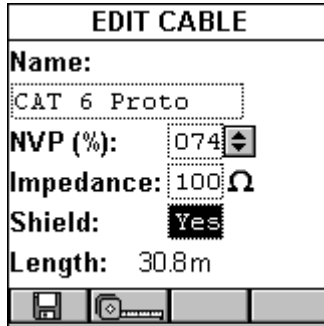
1. Use the up-arrow or down-arrow keys to move the cursor to the field to be edited and press ENTER.

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

2. Use the up-arrow or down-arrow key to move the cursor to the appropriate item or value and press ENTER to select it as the new default.

### 1.14.2 EDITING NUMERIC FIELDS WITH THE SPIN CONTROL

1. Use the up-arrow or down-arrow key 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 up-arrow or down-arrow key on your keypad to scroll through the string of numbers.

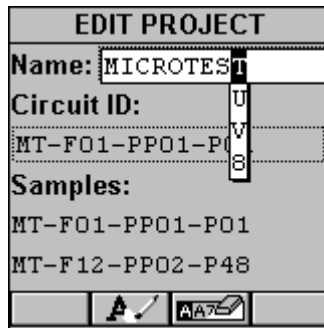


4. Press ENTER or ESC to accept the value and terminate edit mode.

**1.14.3 EDITING ALPHANUMERIC FIELDS**

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




1. Use the up-arrow or down-arrow key 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 any numerical key on your keypad to display a small drop-down list containing letters to choose from. Example: Press 8 key to choose t, u, and v or 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 up-arrow or down-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  key to toggle between uppercase and lowercase letters.
5. Press the right-arrow to close the drop-down list and highlight the next letter to be edited. Notice that OMNIScanner 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.

### **1.15 Technical Support**

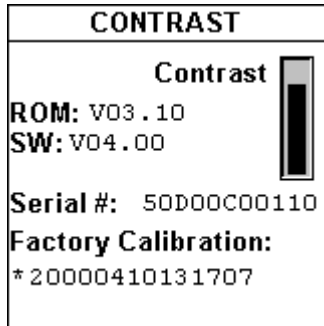
If you have technical questions, call Black Box Technical Support at 724-746-5500.


#### **NOTE**

**Before calling Technical Support, please have your serial number and the hardware and software version numbers available.**

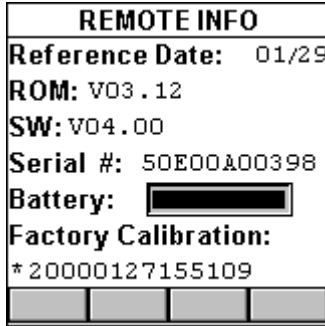
### **1.16 Product Versions**

To display the software version number, the hardware version number, the serial number, 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 OMNIRemote, connect the units with the supplied test cable and press the  function key.

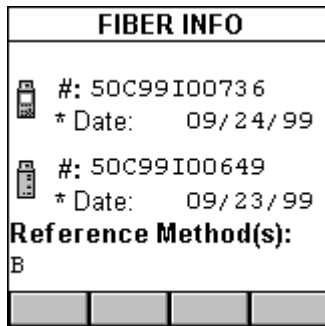
Select **Remote Info** to open the **REMOTE INFO** screen, which contains the date the reference was last set, the hardware and software information, the serial number, the battery indicator, and the factory calibration data.



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

To display information for OMNIFiber, attach the OMNIFiber adapters to OMNIScanner and OMNIRemote, connect the units with the supplied fiber launch cable and press the  (Setup) function key.

Select Fiber Into to open the Fiber Info screen, which contains the serial numbers and the date the adapters were last factory calibrated.





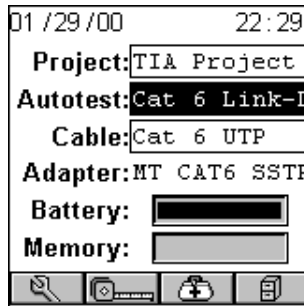
## 2. Getting Started: Twisted Pair Networks

### 2.1 Charging OMNIScanner's Battery

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, Batteries** for more information about the batteries.)

### 2.2 OMNIScanner's Project Screen

OMNIScanner's project screen is designed to allow you to perform all typical workflow 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 down-arrow to move the highlight to the Autotest or Cable field. Press ENTER when a field is highlighted to change the current Project, Autotest, or Cable. 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 select Autotests configure Cables, and more.

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

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

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

## 2.3 Certification of Network Installations

OMNIScanner 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 its cable types are selectable from the OMNIScanner Project screen.

OMNIScanner 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

Before initial certification, do the following:

1. Run a self-test by setting the reference for OMNIScanner and OmniRemote periodically—for example, weekly.
2. Select the appropriate Project, Autotest specification, and Cable type.

### Certification

Do the following for each installed cable to be tested:

3. Attach OMNIScanner to one end of the link, which is typically at the patch panel in a wiring closet.
4. Attach OmniRemote 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 Scanlink Tools software.

Scanlink Tools supports the following:


- Upload test results.
- Storage of test results to files (Scanlink compatible format)
- Print test reports
- Export results in CSV format
- Setup Projects
- View Graphs
- Edit Autotest Information

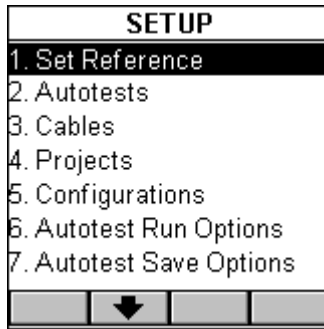
The following sections provide detail on the certification process.

### 2.4 Setting the Reference

A reference must be set when OMNIScanner2 and OMNIRemote are used as a set for the first time. After the initial reference setting, the process should be repeated periodically to insure 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, OMNIScanner displays the REMOTE INFO screen.
7. Press ESC to return to OMNIScanner's SETUP screen.



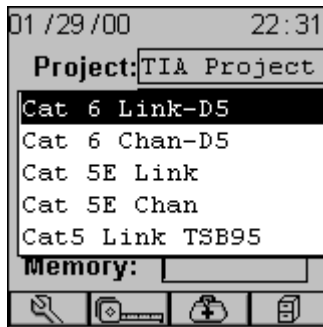
## 2.5 Project Selection

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 OMNIScanner Configuration utility. (See **Chapter 9, Uploading and Printing**, for further information about OMNIScanner Configuration.)

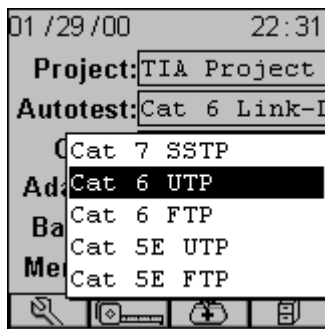
1. Use the up-arrow or down-arrow to highlight **Project** and press ENTER.
2. Select the appropriate Project from the drop-down list and press ENTER.




3. Use the up-arrow or down-arrow to highlight **Autotest** and press ENTER.
4. Select the appropriate Autotest from the pop-up list and press ENTER.



5. Use the up-arrow or down-arrow to highlight **Cable** and press ENTER.
6. Select the cable type to be tested from the pop-up list and press ENTER.



The **Adapter field** will automatically change to reflect the adapter that is currently attached. OMNISCanner auto-senses the adapter. If the adapter is changed, OMNISCanner will automatically adjust the content in the fields Autotest: and Cable: to reflect the new setup.

Every Project has certain Autotests and cables assigned already. These associated lists will appear in the pop-up lists for each item. If the Autotest or Cable you want to use is not in a pop-up list, open  (Setup) to select the appropriate item. (See **Chapter 3, Setup: Autotest, Cable, or Project**, for further information.)


## NOTE

### 2.6 Running an Autotest for Twisted Pair Cabling



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

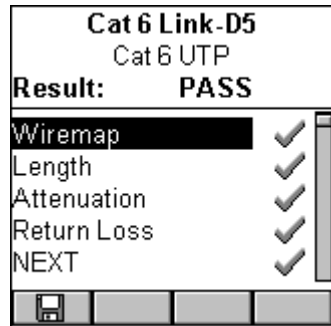
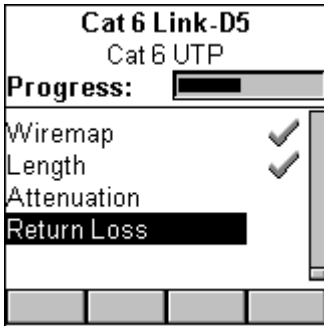
(See the Typical Test Configurations for Twisted Pair Cabling section in this chapter for more information.)

2. Press the  key. When 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 ✓ (PASS) or ✗ (FAIL) results as soon as a test is completed.

Once all tests have been performed, the overall test Result: is displayed as PASS or FAIL.




### 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.

#### 2.6.1 SAVING TWISTED PAIR AUTOTEST RESULTS

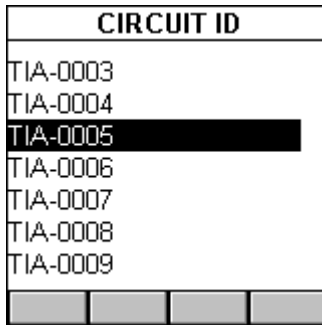
1. Press  (Save) from the Autotest screen to open the SAVE AUTOTEST screen, where the Autotests can be stored into OMNIScanner's memory.
2. The **Project** field contains the name of the project.





3. To assign a unique name to the Autotest, enter a Circuit ID into the **Circuit ID:** field. Circuit IDs can be set up 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.

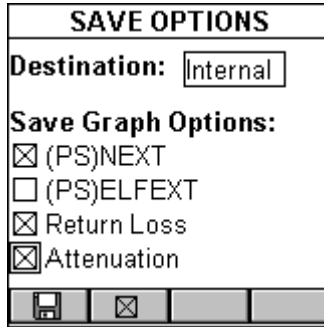
4. To change the name using OMNISCanner's edit feature, highlight the field, and press ENTER to initiate the editing mode. (See **Section 1.9** for more information.)




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 left-arrow or right-arrow to quickly scroll through the pages. Use the up-arrow or down-arrow 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  (Autotest Save Options) to open the SAVE OPTIONS screen.  
OMNISCanner: Select the Destination for saved test results (MMC or internal)





and select or unselect the graphs to be saved. (See **Section 3.7, Autotest Options** for more information.)



Press  (Save) to save the new settings and return to the SAVE AUTOTEST screen.


7. The SAVE AUTOTEST screen's save function key indicates the selected Save Option.

Press  (Save) to save the test results to OMNIScanner's internal memory.

Press  (Save with Graphs) to save the test results with their graphs to OMNIScanner's internal memory.

### NOTE


**Saving graphs will reduce the number of Autotests that can be stored.**

Press  (Save to MMC) to save the test results to the MultiMedia Card (OMNIScanner 2 only).

Press  (Save with Graphs to MMC) to save the test results with their graphs to the MultiMedia Card (OMNIScanner 2 only).


### NOTE

**Saving graphs will reduce the number of Autotests that can be stored.**

8. Press ESC to return to the Autotest screen without saving the Autotest.
9. To run the next Autotest, press the  key.

### 2.6.2 VIEWING TWISTED PAIR 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 6, 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 up-arrow or down-arrow key and press ENTER.
2. Use the left-arrow or right-arrow 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.)

WIREMAP	
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
Pass	

LENGTH/DELAY	
Limit	
Length: 154.4ft	308.3ft
Delay: 436nS	510nS
Skew: 33nS	43nS

Press  
  
 to view

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:	33nS
Limit:	43nS

NEXT			
dB Limit MHz			
12/36	36.6	34.7	273.0 ✓
12/45	41.7	36.4	215.2 ✓
12/78	41.1	35.8	237.1 ✓
36/45	36.9	34.9	268.7 ✓
36/78	39.7	34.7	274.8 ✓
45/78	39.2	34.2	291.0 ✓

ATTENUATION	
dB Limit MHz	
1-2	32.3 37.0 298.1 ✓
3-6	31.4 36.2 289.2 ✓
4-5	33.3 35.9 284.7 ✓
7-8	31.4 35.9 284.7 ✓

RETURN LOSS	
dB Limit MHz	
1-2	14.9 12.0 198.8 ✓
3-6	14.5 12.2 185.3 ✓
4-5	12.5 12.0 194.8 ✓
7-8	14.2 12.1 190.7 ✓

RESISTANCE	
Limit: 188Ω	
1-2	13.3Ω ✓
3-6	13.6Ω ✓
4-5	13.7Ω ✓
7-8	13.1Ω ✓

POWER SUM NEXT	
dB Limit MHz	
1-2	43.5 38.0 172.3 ✓
3-6	40.4 38.0 172.7 ✓
4-5	43.5 37.9 174.1 ✓
7-8	48.5 37.9 173.2 ✓


ELFEXT	
dB Limit MHz	
12/36	26.0 11.3 192.1 ✓
12/45	35.0 13.2 153.8 ✓
12/78	31.2 16.2 109.7 ✓
36/12	26.6 11.3 192.1 ✓
36/45	28.6 12.6 164.6 ✓
36/78	29.2 11.4 190.7 ✓


ACR	
dB Limit MHz	
12/36	19.5 3.2 197.9 ✓
12/45	15.9 3.1 198.8 ✓
12/78	18.3 3.3 197.5 ✓
36/45	12.5 4.4 189.4 ✓
36/78	18.0 3.0 199.7 ✓
45/78	16.3 3.0 199.7 ✓

POWER SUM ELFEXT	
dB Limit MHz	
1-2	26.3 11.3 192.1 ✓
3-6	25.3 11.3 191.6 ✓
4-5	28.1 12.6 164.6 ✓
7-8	27.0 11.4 190.7 ✓

POWER SUM ACR	
dB Limit MHz	
1-2	24.6 3.0 199.7 ✓
3-6	26.0 3.7 194.3 ✓
4-5	24.9 3.1 198.8 ✓
7-8	25.9 4.7 186.7 ✓

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

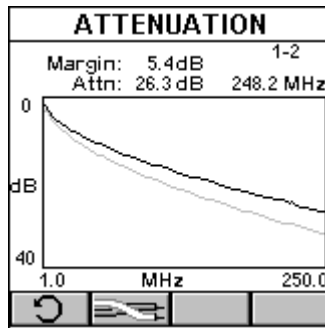
Press  (Retest) to run continuous tests for the same cable. The arrow located on the Retest button will be turning for the duration of the test.

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

LENGTH/DELAY		
<b>Length(ft):</b>	<b>Limit</b>	
288	308	
<b>Delay(nS):</b>		
395	513	
<b>Skew(nS):</b>		
20	42	

LENGTH/DELAY		
<b>Limit:</b>	308ft	513nS
<b>1-2</b>	302ft	415nS
<b>3-6</b>	290ft	399nS
<b>4-5</b>	288ft	395nS ✓
<b>7-8</b>	300ft	412nS
<b>Skew:</b>		20nS ✓
<b>Limit:</b>		42nS

Tests that require the use of OMNIRemote will have small icons in the upper right corner of the titlebar to indicate whether the information is pertinent for



OMNIScanner or




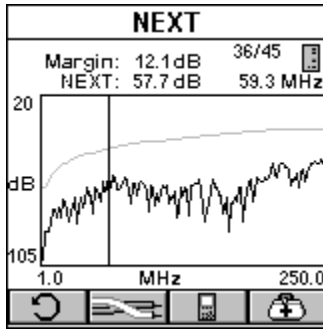
OMNIRemote.

ACR			
Bandwidth:	250 MHz		
	<b>dB</b>	<b>Margin</b>	<b>MHz</b>
<b>12/36</b>	22.1	15.5	234.4 ✓
<b>12/45</b>	53.6	11.8	27.1 ✓
<b>12/78</b>	77.5	21.8	7.0 ✓
<b>36/45</b>	41.8	17.6	96.1 ✓
<b>36/78</b>	74.1	15.8	5.2 ✓
<b>45/78</b>	58.8	15.9	24.6 ✓

To toggle between the two screens, press to open the screen that contains the information for OMNIScanner.

Press to display the information for OMNIRemote.

The RETURN LOSS and NEXT Graph screens have  (Diagnostic) function keys to help you with the interpretation of failed test results. (See **Chapter 5, TDRL and TDNXT** for detailed information.



## 2.7 Typical Test Configurations for Twisted Pair Cabling

### 2.7.1 BASIC LINK

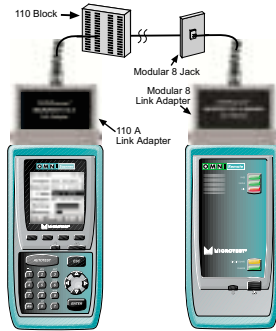
The graphic shows the connection of OMNISCanner to a Modular 8 Jack in the wiring closet, and OMNIRemote to a Modular 8 jack in the work area.



Use the supplied Link Adapters at both ends of the link to attach OMNISCanner and OMNIRemote to the Modular 8 jacks.

### 2.7.2 BASIC LINK WITH 110 BLOCK AND MODULAR 8 JACK

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

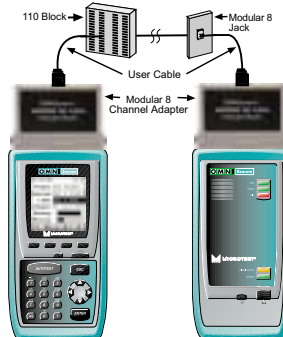


The Punch Down Block Adapter kits 110 A Link Adapter and 110 B Link Adapter are available (as optional accessories) to interface the OMNIScanner and OMNIRemote with IDC (110) punch-down blocks.

Use the 110 A or B Link Adapter to attach OMNIScanner to the 110 Punch Down block. At the other end of the link, use the 110 A or B Link Adapter to attach OMNIRemote to the Modular 8 jack.

### 2.7.3 FULL CHANNEL WITH MODULAR 8 JACKS

A Full Channel consists of all the link elements from the hub to the workstation.



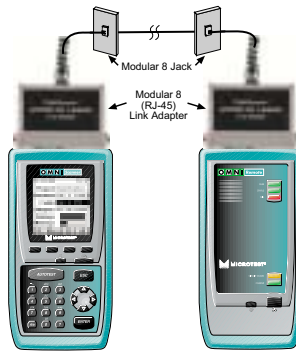
For cables terminated with a Modular 8 plug, use the supplied modular 8 Channel Adapter to attach OMNIScanner and OMNIRemote to channel patch cords.

## NOTE

Best results for Category 6 channel tests will be obtained when using OMNISCANNER software version 4.0 or higher.

### 2.7.4 PERMANENT LINK

For Permanent Link Autotests, connect the supplied Link adapters in the same manner as the Basic Link.



During permanent link Autotests, the effects of the link adapters are removed from the measurements.

The Permanent Link method measures the link only, from jack to jack (including the Modular 8 plug that plugs into the Jack).



## 3. Getting Started: Fiber Optic Networks

### 3.1 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, Batteries, for more information about the batteries.)


### 3.2 OMNIScanner's Project Screen


The 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 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 will be highlighted. Use the down-arrow to move the highlight to the Autotest currently selected. Use the down-arrow 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 select Autotests, configure Cables and Projects, view Fiber Adapter information, edit User Options, and more.

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

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



### 3.3 Certification of Fiber Installations

OMNISCanner and OMNIFiber are designed to efficiently certify fiber optic cabling installations through the 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 OMNISCanner Project screen.

OMNISCanner 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. Attach an OMNIFiber adapter to OMNISCanner. This will be referred to as the OMNIFiber Main.
2. Attach an OMNIFiber adapter to OMNIRemote. This will be referred to as the OMNIFiber Remote.
3. Establish a reference power by setting the reference. See Chapter 8 - Fiber Optic Reference Methods for further information.
4. Select the appropriate Project, Autotest specification, and Cable type.

#### CERTIFICATION

Perform the following for each installed fiber to be tested:

5. Attach OMNIFiber Main to one end of the link, which is typically at the patch panel in a wiring closet.

6. Attach OMNIFiber Remote to the corresponding patch panel or outlet at the other end of the cable link.
7. Run Autotest.
8. Save test results.

### COMPLETION

At the end of the day or shift, the test results are uploaded using Scanlink Tools software.


Scanlink Tools support the following for fiber Autotests:

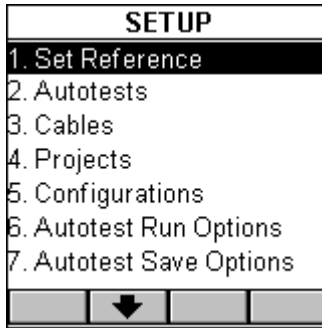
- Upload test results
- Storage of test results to files (Scanlink proprietary format)
- Print test reports
- Export results in CSV format
- Setup Projects
- Edit Autotest Information

### 3.4 Setting the Reference for Fiber Optic Cabling

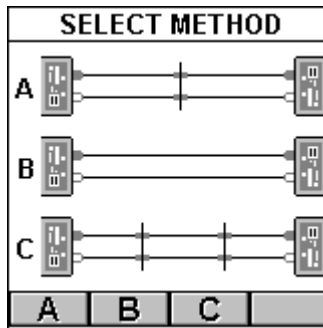
#### NOTE

**To ensure consistent accurate measurements, the reference value must be set at least once each calendar day that the Fiber Adapters are used. The reference value expires each day at midnight.**

1. To set the reference value, connect the OMNIFiber main and OMNIFiber Remote using launch cables and couplers. See Chapter 8, Fiber Optic Reference Methods, for further information.
2. Press  (Setup) and then select Set Reference to record the reference value.



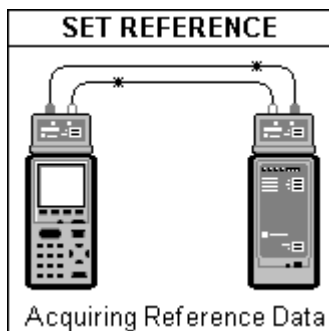
3. Select the appropriate Reference Method: A, B, or C.



OMNISCanner will store a separate reference value for each wavelength. OMNISCanner will store reference data for up to 5 OMNIFiber pairs. See Chapter 8, Fiber Optic Reference Methods for further information.

### **NOTE**

Once the reference value has been set, ensure that both launch cables remain attached to the fiber adapters. When setting the Reference using Loopback or Method B, ensure that the TX (transmit) connections are not disturbed.



4. Once the reference value has been set, OMNIScanner will display the FIBER INFO screen.
5. Press ESC to return to the SETUP screen.

### NOTE

If the test configuration changes, a new reference value needs to be established.

### 3.5 Project Selection

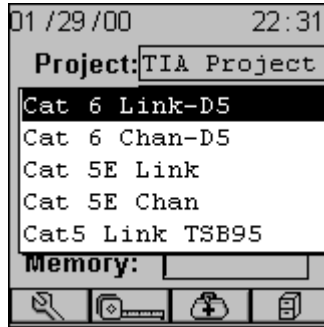
A project name must be selected for test result management. Autotests and Cables were previously assigned to a specific project through the use of the OMNIScanner Configuration software. (See Chapter 9, Uploading and Printing for further information about OMNIScanner Configuration.)

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

1. Use the up-arrow or down-arrow to highlight Project: and press ENTER.
2. Select the appropriate Project from the pop-up list and press ENTER.




3. Use the up-arrow or down-arrow to highlight Autotest: and press ENTER.
4. Select the appropriate Autotest from the pop-up list and press ENTER.

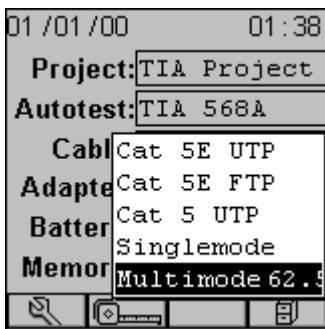


5. Use the up-arrow or down-arrow to highlight Cable: and press ENTER.
6. Select the cable type to be tested from the pop-up list and press ENTER.

The Adapter: field will automatically change to reflect that OMNIFiber is currently attached.

OMNISCanner auto-senses the adapter. If the adapter is changed, OMNISCanner will automatically adjust the content in the fields Autotest: and Cable: to reflect the new setup.

Every Project has certain Autotests and cables assigned already. These associated lists will appear in the pop-up lists for each item. If the Autotest or Cable you want to use is not in a pop-up list, open  (Setup) to select the appropriate item. (See Chapter 4, Setup: Autotest, Cable, or Project for further information.)



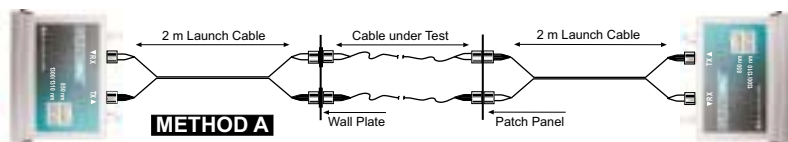
## 3.6 Running An Autotest for Fiber Optic Cabling

### 3.6.1 PREPARING AN AUTOTEST

1. Connect OMNIFiber Main to the near end of the RX/TX fiber pair you are testing and connect OMNIFiber Remote to the far end. Depending on the method that was used to obtain the reference, connect your fibers as follows:

#### *METHOD A*

To run an Autotest when Method A was used to set the Reference proceed as follows:

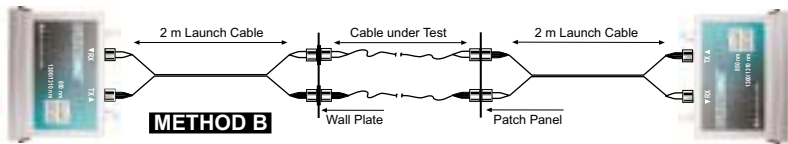



1. Do not disconnect the launch cables from the OMNIFiber Adapters.
2. Remove the connector adapters (sleeves) that connect the two launch cables.
3. Connect the OMNIFiber Main to one end of the duplex link under test, and the OMNIFiber Remote to the opposite end.

4. Press  .

## METHOD B

To run an Autotest when Method B was used to set the Reference proceed as follows:

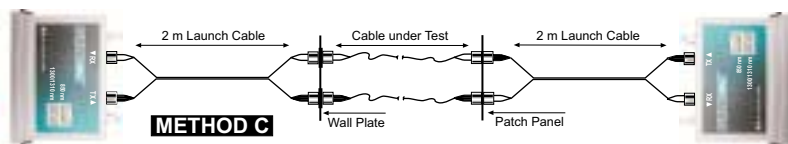



1. Do not disconnect the black connectors which are attached to the TX port of the OMNIFiber Adapters.
2. Disconnect the black connectors that are attached to the RX ports of the OMNIFiber Adapters.
3. Connect the white connectors to the RX ports on the OMNISCanner fiber adapters.
4. Connect the OMNIFiber Main to one end of the duplex link under test and the OMNIFiber Remote to the opposite end.
5. Press  .

## METHOD C

To run an Autotest when Method C was used to set the Reference, proceed as follows:





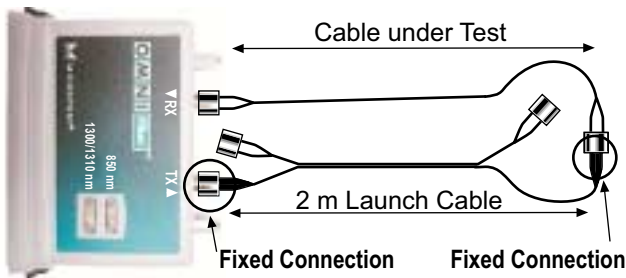
1. Do not disconnect the launch cables that are attached to the OMNIFiber adapters.
2. Remove the middle launch cable and the connector adapters (sleeves) that were attached to the middle launch cable.
3. Connect the OMNIFiber Main to one end of the duplex link under test and the OMNIFiber Remote to the opposite end.
4. Press  .


### 3.6.2 LOOPBACK AUTOTEST USING OMNIFIBER MAIN

This configuration is used to test single fibers, reels and short cables when both ends of the fiber under test are accessible from the same location. Note: The loopback Autotest assumes that reference Method A (2 jumper method) was used to make the reference measurement.

To run a Loopback Autotest, proceed as follows:

1. Do not disconnect the **black** launch cable, which is attached to the TX port of the OMNIFiber adapter (it is circled in the graphic).



2. Do not disconnect the coupler from the **black** launch cable (it is circled in the graphic).
3. Disconnect the **white** launch cable from the RX port of the OMNIFiber adapter and the connector adapter (sleeve). Leave the two white connectors dangling.
4. Attach the cable to be tested to the RX port on the OMNISCANNER Fiber adapter and the connector adapter (sleeve).
5. Press  .

### 3.7 Running a Fiber Autotest

Some Autotests do not have a fixed loss limit. The Optical Link Budget (OLB) is calculated based on the wavelength, the length of the cable, and the number of connectors and splices.

OMNISCANNER will automatically display the CONNECTIONS screen if you are running an equation based Autotest (TIA 568A, ISO 11801, or 1000BASE-F).

1. With the Connections: field highlighted, press ENTER. Use the up-arrow or down-arrow key to adjust the number of connections in your link. To determine the total number of connections, simply count all of the connections (connector pairs) on one fiber. OMNISCANNER will assume that both fibers of a duplex link have the same number of connections.

**CONNECTIONS**

Enter TOTAL number of

Connections:  ↕

Splices:  ↕

on one fiber.

▶▶

2. To change the number of Splices, use the down-arrow to highlight the field and press ENTER. Use the up-arrow or down-arrow key to adjust the number of splices in your link. To determine the total number of splices, simply count all of the splices on one fiber. OMNIScanner will assume that both fibers of a duplex link have the same amount of splices.

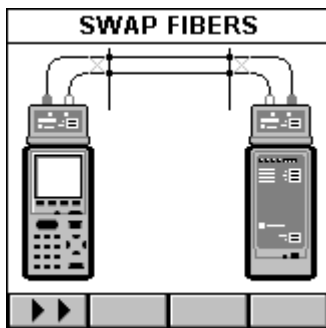
3. After editing the fields, press ▶▶ to run the Autotest.

OMNIScanner starts the Autotest after the number of connections and splices has been entered.

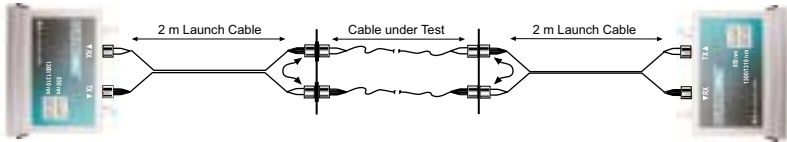
## NOTE

**If you are running a Fiber Test Options for further information.)**

4. Swap the Launch Cable's connectors as indicated in the graphic. Do not disconnect the Launch Cables from the OMNIFiber adapters!



5. Press ▶▶ to complete the Autotest.



### 3.8 Fiber Autotest Results

Once the Autotest is completed the Autotest screen will be displayed.



The arrows at the top of the screen indicate the direction of the light.



→ , points to the result measured from OMNIRemote to OMNISCanner.







← points out the result measured from OMNISCanner to OMNIRemote.

The overall test result for each fiber is located right below the arrows, ✓ (PASS) or ✗ (FAIL).

The name of the Autotest is displayed at the top of the screen followed by the name of the fiber.


When a bidirectional test was performed an icon for  OMNISCanner or  OMNIRemote will appear next to the fiber's name.

Press  or  to view results for the fibers with light transmission in the opposite direction. The arrows flip vertically to indicate that there are two results for each fiber, one from TX to RX and one from RX to TX.

TIA 568A		
 ▼	Multimode	▲ 
✓	<b>Result</b>	✓
7 m 		39 nS
0.00 dB	<b>850</b>	1.24 dB
0.14 dB	<b>1300</b>	0.60 dB
1.97 dB	<b>Margin</b>	0.88 dB
<b>Conn.:</b>	2	<b>Splices:</b> 2
		


## NOTE


Values measured with OMNIFiber will be compared against the preprogrammed PASS/FAIL limits. OMNIScanner will report independent PASS/FAIL indication for both fibers.

The Autotest Results screen displays the  (Length) of multimode fiber at 850 and 1300 nm, or the loss of single-mode fiber at 1310 nm.

OMNIScanner displays the margin in the RESULTS screen. It is the worst case margin for all wavelengths on each fiber in both directions. A positive margin indicates that the measured loss was less than the PASS/FAIL value, a negative margin indicates a fail and shows how much the measurement exceeded the maximum allowable PASS/FAIL amount.

The number of Connections and Splices is displayed at the bottom of the screen (if applicable).


To store the Autotest Result for the fiber listed on the right side, press the  (Save) function key located on the right side.

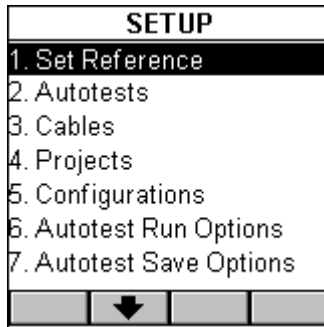
To store the Autotest Result for the fiber listed on the left side, press the  (Save) function key located on the left side.

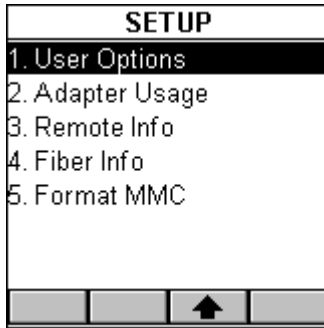
# 4. Setup

## 4.1 Configuring OMNIScanner

OMNIScanner’s easy-to-use setup feature allows you to define, edit and preset many items. They are conveniently organized and can easily be accessed by pressing the assigned number on your alphanumeric keypad, or by highlighting the item and then pressing ENTER.

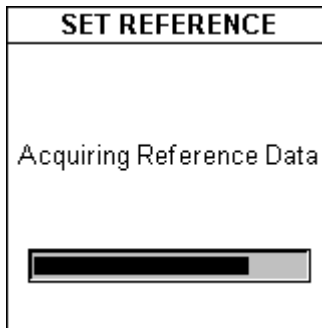
From the Project screen, press the  (SETUP) screen.





## 4.2 Set Reference

Connect OMNIScanner and OMNIRemote through their test connector ports using the test cable and the MOD 8 adapter. Select Set Reference to display the SET REFERENCE screen. OMNIScanner will immediately start to communicate with OMNIRemote.



While the reference data is being established, a gauge indicates the progress.

OMNIScanner notifies you when the process has been completed. The Remote Info screen will be displayed.

### NOTE

**Set Reference is only needed to periodically verify and establish the signal reference for attenuation. The function does not affect any other measurements.**

Press ESC to return to the Setup screen.

## SET REFERENCE WITH THE OMNIFIBER ADAPTERS

### NOTE

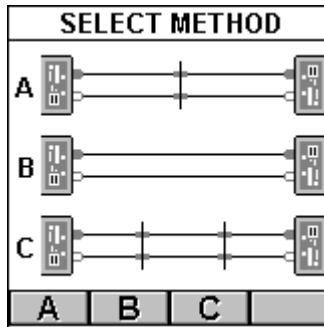
The fiber reference expires each day at midnight. It must be set each calendar day that OMNIFiber adapters are used. The reference value should also be set every time a fiber is removed from either OMNIFiber TX port.

A reference value must be established before a loss measurement can be calculated.

With the OMNIFiber adapters attached to OMNISCanner2 and OMNIRemote, and the launch cable(s) in place, select Set Reference to display the Select Method screen.

### NOTE

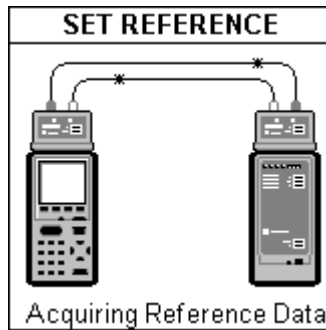
The Select Method screen will not be displayed if a fiber is attached to the TX and RX ports of the same OMNIFiber adapter (Loopback).



To select a Reference Method A, B, or C, press the appropriate function key.

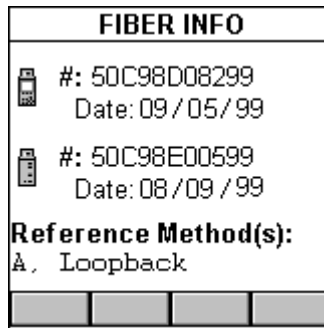
See **Chapter 8, Fiberoptic Reference**, for detailed information about establishing a reference value with fiberoptic launch cables.





The Set Reference screen will be displayed while the reference data is being established.

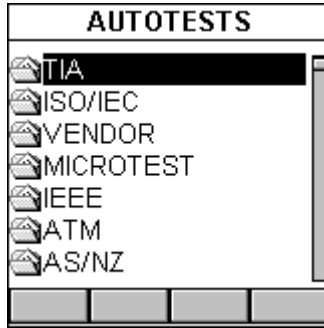
OMNIScanner notifies you when the process has been completed. The Fiber Info screen will be displayed.





Press ESC to return to the Setup screen.

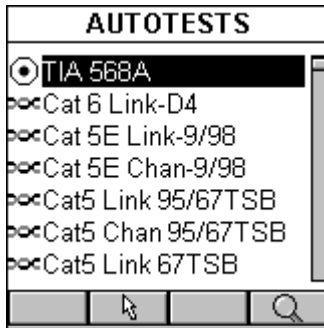
### 4.3 Autotests

Select Autotests to display the Autotests screen. It contains a list of standard Autotest specifications supported by the OMNIScanner2. Standards are grouped by TIA, ISO, VENDOR, MICROTTEST, IEEE, ATM, and AS/NZ.



If there are Autotest specifications in a folder, it will appear full  ; otherwise it will be empty  .


Highlight a folder containing  items and press ENTER to display the list of Autotests contained in that folder.




Use the up-arrow or down-arrow key to highlight a specific Autotest.


Copper tests are marked with a twisted pair icon.



Fiber optic tests are marked with a  fiber icon.

Press  (Set Default) to select it as the Autotest to run.

Press  (Detail) to review the Autotest's limits.


## VIEWING DETAILS FOR COPPER AND FIBER AUTOTESTS

For  twisted-pair cabling, the Autotest Detail screen consists of four pages.



Use the  and  function keys to browse through the pages.

The screen titles show the standard being used to set the limits (for example, Cat 6 Link).

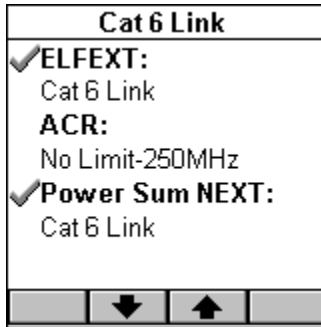
The first page displays the Configuration of the Autotest (Basic Link, Channel, or Permanent Link). Wiremap, Length, Delay, and Skew limits are also displayed. The Wiremap numbers show the pairs that are being tested.

Cat 6 Link	
<b>Configuration:</b>	
Basic Link	
<input checked="" type="checkbox"/> <b>Wiremap:</b>	12 36 45 78
<input checked="" type="checkbox"/> <b>Length:</b>	308ft
<input checked="" type="checkbox"/> <b>Delay:</b>	513nS
<input checked="" type="checkbox"/> <b>Skew:</b>	42nS
	

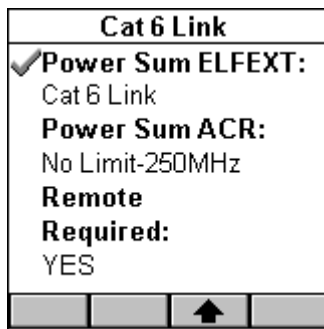
The second page shows limits for Resistance, NEXT, Attenuation, and Return Loss.

Cat 6 Link	
<b>Resistance:</b>	$\Omega$
<input checked="" type="checkbox"/> <b>NEXT:</b>	Cat 6 Link
<input checked="" type="checkbox"/> <b>Attenuation:</b>	Cat 6 Link
<input checked="" type="checkbox"/> <b>Return Loss:</b>	Cat 6 Link
 	

The third page lists limits for ELFEXT, ACR, and Power Sum NEXT measurements.




The fourth page shows limits for Power Sum ELFEXT and Power Sum ACR. This screen also informs you whether or not OMNIRemote is required to perform the selected Autotest.




Tests that are performed during an Autotest are clearly marked ✓. Tests that are not required when performing an Autotest have no icon.


Disabled tests may or may not show limits in the description field. An **i** precedes the test name for tests being performed during the Autotest, but the results are not used to determine PASS or FAIL.


Defined test limits will be displayed right below the test name. If a test has no limit, the limit description field will be empty.

For  fiberoptic cabling the View Autotest Detail screen shows the standard being used in the titlebar.

TIA 568A	
<b>MultiMode Limits</b>	
✓ Length:	2000m
i Delay:	0nS
✓ Loss/km 850:	3.75dB
✓ Loss/km 1300:	1.50dB
Connector:	.75dB
Splice:	.30dB
↓	

The tests that are performed during an Autotest are clearly marked  .

If an  precedes the test name, the test will be performed for information purposes only. The results are not used to determine PASS or FAIL.

The View Autotest Detail screen displays the current scanner configuration for multimode fibers. Use the  function key to view the limits for single-mode fibers.

TIA 568A	
<b>Single Mode Limits</b>	
i Length:	0m
i Delay:	0nS
✓ Loss/km 1310:	1.00dB
Connector:	.75dB
Splice:	.30dB
↑	

When viewing limits for equation-based Autotests like TIA 568A, ISO 11801, and 100BASE-F, the Loss per km (kilometer) will be displayed.



10BASE-FB	
<b>MultiMode Limits</b>	
✓Length:	2000m
✓Delay:	10000nS
✓Loss 850 nm:	12.50dB
✓Loss 1300 nm:	0.00dB
Connector:	dB
Splice:	dB
↓	


For all other tests, the Loss for 850, 1300, and/or 1310 is displayed.








Press ESC to return to the Setup screen.



### 4.4 Cables


Select Cables to display the Cables screen. It contains a list of cable manufacturers.


If there are cables in a folder the manufacturer folder will appear  full, otherwise it will be  empty.

Highlight a cable manufacturer that is marked by a folder containing items  and press ENTER to display the list of cables in that manufacturer's folder.


CABLES	
 Generic	
 AMP	
 Belden	
 Berk-Tek	
 BICC	
 Champlain	
 CommScope	


Use the  or  to highlight the desired cable.

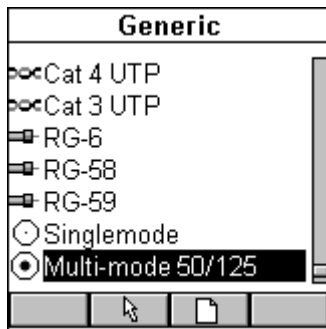
Copper cables are marked with a  twisted pair icon.

Multimode fiber cables are marked with a  multimode fiber icon.


Single-mode fiberoptic cables are marked with a  single-mode fiber icon.

Coaxial cables are marked with the  COAX icon.

Press  (Set Default) to choose it as the cable to be tested.






Selecting the correct cable type will ensure accurate measurements. If you cannot find or do not know the name of your cable manufacturer, simply select a cable from the Category folder, or create a new cable (see below).

Press  (Delete) to permanently remove a custom cable.




## NOTE

**Default cables cannot be removed.**

With a  twisted pair or a  coax cable highlighted, press  (Edit) to edit an existing custom cable. Cable Name, NVP, or Impedance can be changed.




## NOTE






**Default cables cannot be edited.**

With a  twisted pair or a  coaxial cable highlighted, press  (Edit) to edit an existing custom cable. Cable Name, NVP, or Impedance can be changed.

## NOTE

**Default cables cannot be edited.**

With a  twisted pair or  coax cable highlighted, press  (New) to create a new cable based on the NVP and Impedance values of the highlighted default cable. Name, NVP, and Impedance are definable.






EDIT CABLE	
Name:	<input type="text" value="New Cable"/>
NVP (%):	<input type="text" value="084"/> 
Impedance	<input type="text" value="93"/> $\Omega$
Shield:	<input type="text" value="Yes"/>
Length:	30.8m
   	


## NOTE

**A new or edited cable will be saved in the Custom Cables folder.**

For an accurate Length test, the NVP (Nominal Velocity of Propagation) must be set correctly. The value is usually specified by the cable vendor, and OMNIScanner has a large library of cables with the manufacturer's specified NVP.



EDIT CABLE	
Name:	CAT 6 Proto
NVP (%):	074 
Impedance:	100 $\Omega$
Shield:	Yes
Length:	30.8m
   	





To determine the NVP of a cable with a known length, press  (Measure) to capture the length of the cable using the displayed NVP. Use the down-arrow to highlight the NVP field and press ENTER. Use the up-arrow or down-arrow key to increase or decrease the value by 1% (percent) and adjust the NVP until the known length is displayed. The Length changes accordingly.

## NOTE

The known cable must have a length of at least 50 feet or 15 meters.





To change the impedance, use the down-arrow to highlight the field and press ENTER. Use the up-arrow or down-arrow key to select the appropriate Impedance in  $\Omega$  (ohms) from the predefined list.

To setup whether or not the cable is shielded, use the down-arrow key to highlight **Shield:** and press ENTER. Use the up-arrow or down-arrow key to make the appropriate selection. If “Yes” is selected, the wiring for the shield will be measured during the Autotest and used to determine if the Wiremap will PASS or FAIL.

With a  or  fiberoptic cable highlighted, press  (Edit) to edit an existing custom cable, or press  (New) to create a new fiber based on the GRI values of the highlighted cable. Cable Name and GRI @ 850 and 1300 can be viewed and changed.


## NOTE

Default fibers cannot be edited.

EDIT FIBER	
<b>Name:</b>	New Cable
<b>GRI @ 850:</b>	1.4000
<b>GRI @ 1300:</b>	1.4660
	Multi-Mode
   	

A fiber cable's Graded Refractive Index (GRI) differs depending on the supplier. To receive accurate length results, OMNIScanner allows you to define the GRI values for both wavelengths.



To change the fiber's mode, use the up-arrow or down-arrow key to highlight the mode. Press Enter to select Multimode or Single-mode.

Press  (Save) to save the edited cable into the Custom Cable folder.

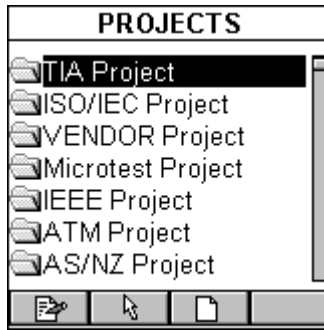
Press ESC to return to the SETUP screen.


## 4.5 Projects


Select Projects to display the Projects screen. It contains a list of all projects that are currently stored in OMNIScanner. Predefined default projects are: TIA, ISO, VENDOR, MICROTTEST, IEEE, ATM, AS/NZ, ANSI. OMNIScanner's project feature allows you to organize test specifications, cable types, and test results into Projects.

If there are tests stored in a project, the folder will appear full  ; otherwise it will be empty  .

Use the up-arrow or down-arrow key to highlight a specific Project.




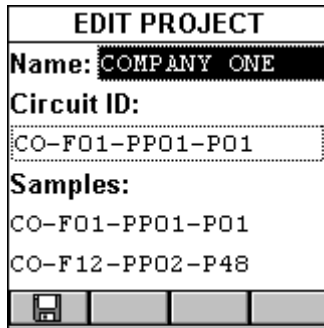
Press  (Set Default) to select it as the Project to be used and to return to the Setup screen.

Press  (Delete) to permanently remove a project.

## NOTE


**Default projects cannot be deleted. Only projects without stored Autotests can be deleted.**


Press  (Edit) to edit an existing project name and its Circuit ID.

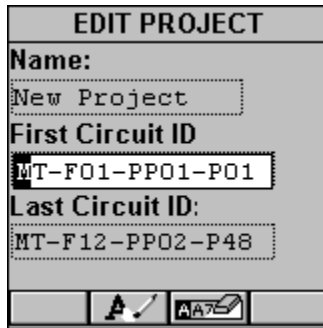


The project name will appear in the **Name:** field. The first and last Circuit ID fields contain a default circuit ID. (See Editing a Circuit ID for further information.)

Press  (List) to display the **Circuit ID** screen. It contains a scrollable list of all Circuit IDs created for the project.

Press  (New) to create a new project.



New Project will be displayed in the **Name:** field. Press ENTER to edit the name. The first and last Circuit ID fields contain the default Circuit ID from the Project that was highlighted when the  (New) key was pressed.



## NOTE

New and edited project names are placed at the bottom of the list in the PROJECTS screen. OMNIScanner can store up to 16 projects.

### EDITING A CIRCUIT ID

To edit or create a Circuit ID, highlight an item in the PROJECTS screen and press  (New) or  (Edit).

Use the down-arrow to highlight the **First Circuit ID:** field and press ENTER.

The Circuit ID field consists of 16 characters, which allows the sophisticated construction of Circuit IDs. Each character can be incremented.

The example shows how to quickly create an incremental Circuit ID.


Enter **MT-F01** (MICROTEST - Floor 01) **-PP01** (-Patch Panel 01) **-P01** (Position 01) in the **First Circuit ID:** field.

Press ENTER to terminate the edit mode.

Use the down-arrow key to highlight the **Last Circuit ID:** field and press ENTER.

Enter **MT-F12** (MICROTEST-Floor 12) -**PP02** (Patch Panel 02) -**P48** (Position 48) in the **Last Circuit ID** field. Press ENTER to terminate the edit mode.

The Circuit IDs will increment from right to left. The positions will change first from 01 to 48. Next the Patch Panels will increase from 01 to 02. Last, the floors will increase from 01 to 12.

Press  (List) to review the continuous list of circuit IDs that were just created.

CIRCUIT ID			
MT-F12-PP02-P47			
MT-F12-PP02-P48			
MT-F01-PP01-P01			
MT-F01-PP01-P02			
MT-F01-PP01-P03			
MT-F01-PP01-P04			
MT-F01-PP01-P05			

MT-F01-PP01-P01 (1st Circuit ID to be used)

MT-F01-PP01-P02 (2nd Circuit ID to be used)

MT-F01-PP01-P03 (3rd Circuit ID to be used)


MT-F01-PP02-P01 (49th Circuit ID to be used)

MT-F02-PP01-P01 (97th Circuit ID to be used)

MT-F12-PP02-P48 (last Circuit ID to be used)

Press  (Save) to save the Circuit ID and return to the Projects screen.

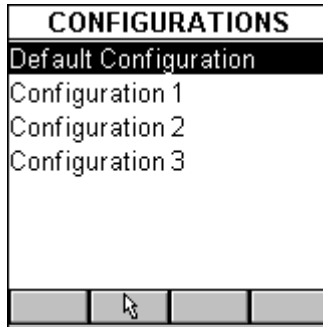
## NOTE

To quickly edit the Last Circuit ID, press  (Copy) once you have completed the First Circuit ID. This function will copy the First Circuit ID into the Last Circuit ID field. Now edit the Last Circuit ID field.

Press ESC to return to the SETUP screen.


## 4.6 Configurations

Select Configurations to display the CONFIGURATIONS screen. It contains a list of all configurations which are currently stored on the MultiMedia Card that can be read by OMNISCanner2. (See Chapter 11, MultiMedia Card for more information about the MMC).



The predefined Default Configuration is always present and can be used to reset OMNISCanner to the factory default. It contains the following projects: TIA, ISO/IEC, VENDOR, Microtest, IEEE, ATM, AS/NZ, ANSI.

**OMNISCanner2 only:** Use the up-arrow or down-arrow key to highlight a specific Configuration.



Press  (Set Default) to select it as the Configuration to be used and to return to the SETUP screen.

While the selected Configuration is being loaded onto OMNISCanner2, a gauge indicates the progress. Do **not** remove the MultiMedia Card from the MultiMedia Card reader during the data transfer.



## 4.7 Autotest Run Options

Select Autotest Run Options to display the RUN OPTIONS screen. With the presented options you are able to further customize the way OMNISCanner will perform an Autotest.

Press  if you want OMNISCanner to abort the Autotest if a FAIL occurs. The Abort on Fail box will be checked .

RUN OPTIONS	
<input type="checkbox"/>	Abort On Fail
<input type="checkbox"/>	Jump To Fail
Report:	Margin
<b>Fiber Test Option</b>	
<input type="checkbox"/>	Test in both directions
	

Use the down-arrow to highlight the other checkbox.



Press  if you want OMNIScanner to automatically move to the failed test result. The Jump to Fail box will be checked .


Use the down-arrow to advance to the Report: field and press ENTER. Select Margin if you want OMNIScanner to report the result, measured in dB, for the worst margin. Select Worst dB if you want the worst overall dB value to be reported, as in OMNIScanner software versions prior to v4.0. Press ENTER to set the default.

## NOTE

**Attenuation results in dB will always be reported for the worst value, regardless of what is selected in the Report: listbox.**

Use the down-arrow to highlight the Fiber Test Options checkbox. You will be able to define the way fiber optic Autotests are performed.

Press  if you want OMNIFiber to test the fiber link in both directions. The Test in Both Directions box will be checked .

Press  (Save) to save your changes and return to the SETUP screen.


Press ESC to discard all changes and return to the SETUP screen.

## 4.8 Autotest Save Options

Select **Autotest Save Options** to display the **SAVE OPTIONS** screen. This screen contains several options that allow you to customize the way OMNIScanner will save Autotests.

**OMNIScanner2 only:** Press ENTER to change the **Destination:** from **MMC** (MultiMediaCard™) to **Internal**. Use the up-arrow and down-arrow keys to highlight the desired destination and press ENTER to select it as the default destination. Select **MMC** if you want to collect test results on the MultiMediaCard. (See **Chapter 11, MultiMediaCard** for more information about MMC.) Select **Internal** if you want to save the results to OMNIScanner's internal memory. In either case, results can be transferred to the Scanlink Tools software program. (See **Chapter 9, Uploading and Printing**, for more information.)

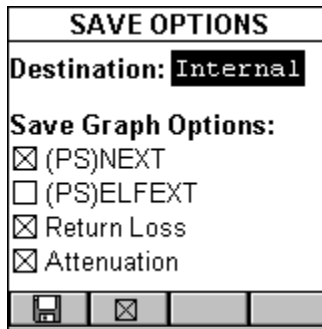
In the **Save Graph Options** section, you will be able to define which of the graphs will be saved.

If a checkbox is checked , OMNIScanner will store an Autotest with the graph information for that particular test.


## NOTE


**Saving graphs reduces the number of Autotests that can be stored.**

Depending on the performed Autotest, NEXT/PSNEXT, ELFEXT/PSELFEXT, Return Loss, and Attenuation graphs can be saved.



Use the up-arrow and down-arrow keys to highlight the Save Graph Option checkboxes.

Press  to select the graph to be saved.

Press  (Save) to save your changes and return to the SETUP screen.

Press ESC to discard the changes and return to the SETUP screen.



## 4.9 User Options

Select User Options to display the USER OPTIONS screen. This screen contains several user-definable preferences.

USER OPTIONS	
<b>Units:</b>	<b>Auto Shutoff:</b>
Meters	Yes
<b>Date:</b>	<b>Time:</b>
06/06/98	10:57
<b>Owner Name:</b>	
Thompson, M.	
<b>Language:</b> English	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

Press ENTER to switch the **Units** from Meters to Feet. Use the up-arrow and down-arrow keys to highlight the desired measurement unit and press ENTER to select it as the default measurement unit.

Use the right-arrow to advance to the **Auto Shutoff** field and press ENTER. Select YES if you want OMNIScanner to automatically shut off after 10 minutes when operated with battery power. Select NO if you don't want to use the function. Press ENTER to set the default.


To edit the **Date** use the right-arrow key to highlight the portions you want to change. Press ENTER to edit the highlighted segment. Use the up-arrow and down-arrow keys to change the displayed values in increments of 1. Press ENTER when done.

To edit the **Time** use the right-arrow key to highlight the portions you want to change. Press ENTER to edit the highlighted segment. Use the up-arrow and down-arrow keys to change the displayed values in increments of 1. Press ENTER when done.

Use the right-arrow to highlight the **Owner Name**. Press ENTER to start the edit mode. You can enter up to 19 characters for the Owner Name. They will appear on printed reports. Press ENTER to end the edit mode.

The USER OPTIONS screen displays the Language that is currently selected. To change the language, use the right-arrow key to highlight the field. Press ENTER

and use the up-arrow and down-arrow keys to highlight a language. Press ENTER once more to select it as the default language.

Press  to save all settings and return to the SETUP screen.

## 4.10 Adapter Usage

Select **Adapter Usage** to display the **ADAPTER USAGE** screen.

ADAPTER USAGE	
Autotests executed:	
OMNI: MT CAT6 SSTP	
	14
Remote: MT CAT6 SSTP	
	14

The number of Autotests that have been performed with the Adapter that is currently attached to **OMNI:** and **Remote:** is displayed below each adapter's name (Adapter ID String).

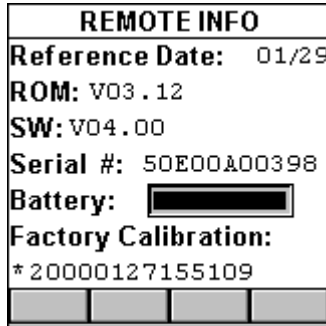
Press ESC to return to the **SETUP** screen.

## 4.11 Remote Info

Select Remote Info to display the **REMOTE INFO** screen.

The date the **Reference** value for OMNIScanner and OMNIRemote was last set is shown at the top of the screen.

The **Hardware** and **Software Versions**, and the **Serial** number of the remote unit are displayed.



The Battery status is represented as a gauge. Factory calibration\* data is displayed at the bottom of the screen.

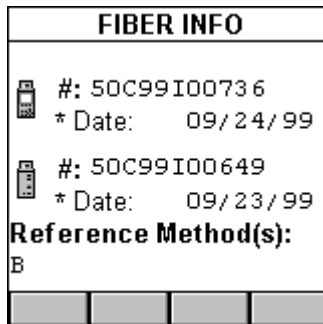
You may need to provide Serial Number and Factory Calibration data when having repairs or refurbishments done, or when calling for Technical Support.

### \*NOTE

**OMNIScanner and OMNIRemote should be calibrated annually with specialized equipment. Contact Technical Support for information on calibration and service requirements.**

## 4.12 Fiber Adapter Information

Select Fiber Info to display the FIBER INFO screen.



The serial numbers and the date the adapters were last factory calibrated are displayed.

The currently used reference method(s) are displayed on the bottom of the screen.

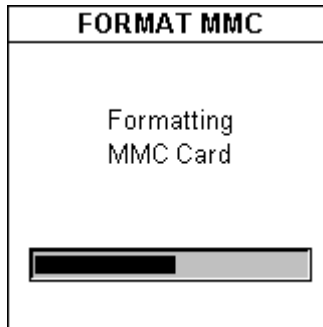
Press ESC to return to the SETUP screen.

### **4.13 Format MMC**

**OMNIScanner2 only:** When using the MultiMediaCard for the first time, it may require formatting.

Insert the MMC into OMNIScanner2's MMC slot.

Select **Format MMC** to open the **FORMAT MMC** screen. Formatting will start immediately, a gauge will indicate the progress.



The formatting time depends on the capacity of the MultiMediaCard; 8 MB will require 2 minutes.

# 5. Measurements

## NOTE


The list of tests in the Measurement screen changes depending on the adapter that is currently attached to OMNIScanner.

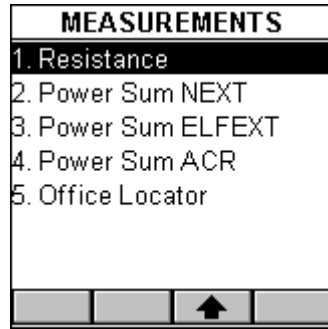
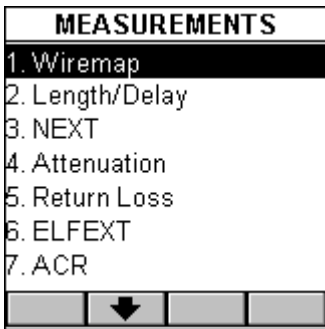
### 5.1 Performing Individual Measurements with OMNIScanner


OMNIScanner allows you to perform tests on twisted pair, fiber optic, and coaxial cabling.


#### 5.1.1 MEASURING TWISTED PAIR CABLING

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.

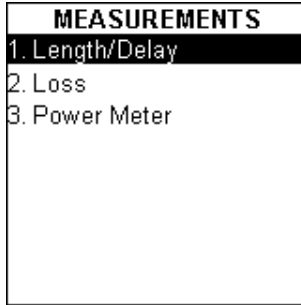


Press the  (Page Down) function key to scroll to the second screen containing MEASUREMENTS.

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


#### 5.1.2 MEASURING FIBER OPTIC CABLING

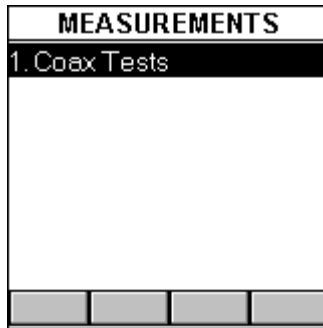
With the OMNIFiber adapter attached, press the  (Measurements) function key to display the MEASUREMENTS screen for fiberoptic cabling.



Highlight the test you want to perform using the up-arrow or down-arrow key on your keypad and press ENTER, or direct-dial a test by pressing its affiliated number on the OMNIScanner keypad.

### 5.1.3 MEASURING COAXIAL CABLING

With the coax adapter attached, press the  (Measurements) function key to display the MEASUREMENTS screen for coaxial cabling.






Press ENTER or direct-dial the test by pressing its associated number on the OMNIScanner keypad.



## 5.2 General Information

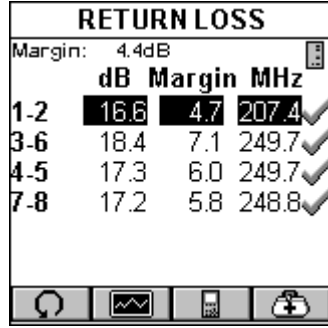
Most test result screens have a retest feature for diagnostic purposes.

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**

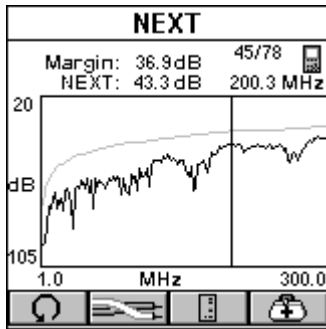
The PASS/FAIL criteria are based on the Autotest currently selected in the Project screen.

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

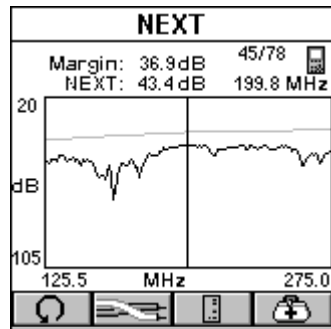
Press  (Graph) to display test results for the highlighted pair or pair combination.

Use the up-arrow or down-arrow key to magnify the area of the graph where the cursor is located. The graph can be magnified 1x, 2x, 4x, or 10x.

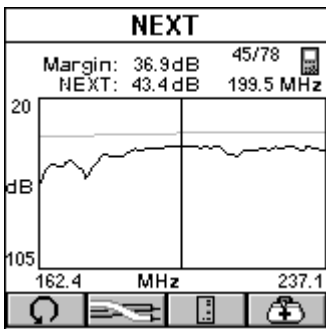
Use the left-arrow or right-arrow keys to move the cursor within the graph.



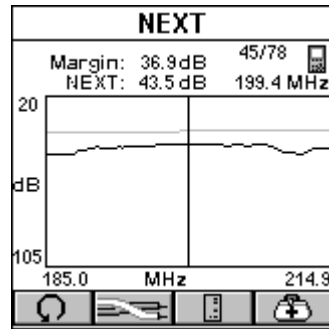
1X



2X



4X





10X

Use the cursor to display values for the desired frequency.

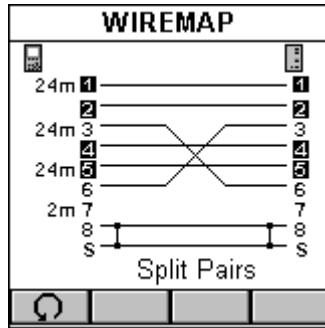
## 5.3 Twisted Pair Measurements with OMNISCanner

### 5.3.1 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. For each pair, Wiremap displays the length.

The screen displays a graphical representation of the wiring in your cable, where the  near end wiring is shown on the left side, and the  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 wire pairs indicates a short.
- The measured length of the pairs 1-2, 3-6, 4-5, and 7-8 are shown on the left side.

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.

### 5.3.2 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 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 **Section 3.5, Setup: Cables**, for further information.)

Delay is a measure of the time required for a signal to travel from one end of the circuit to the other. OMNIScanner measures the delay from 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.

The Length/Delay screen shows the test result information for all pairs.

The Limit is displayed at the top of the screen.

LENGTH/DELAY		
<b>Limit:</b>	308ft	513nS
<b>1-2</b>	302ft	415nS
<b>3-6</b>	290ft	399nS
<b>4-5</b>	288ft	395nS ✓
<b>7-8</b>	300ft	412nS
<b>Skew:</b>		20nS ✓
<b>Limit:</b>		42nS

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

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 (see **Chapter 4: Setup User Options**).

Delay is displayed in nS (nanoseconds).

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

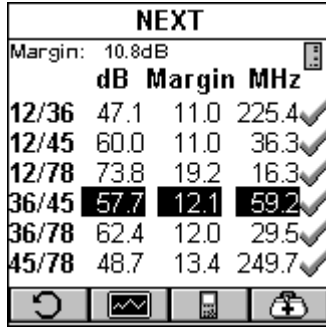
Press ESC to exit the LENGTH/DELAY screen.

### 5.3.3 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.

OMNIRemote 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 OMNIRemote end, the roles of the two units are reversed. OMNIScanner provides the termination; OMNIRemote transmits and receives the signal.

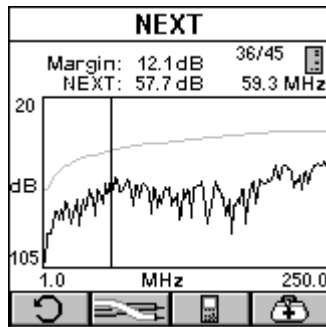


In the NEXT screen, the worst case margin for all near and far pair combinations is shown at the top of the screen.


The pair combinations are displayed in the column on the left side, followed by the measured NEXT value, margin/limit, and frequency. 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 OMNIRemote.

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 the NEXT graphs for other pair combinations.

Press  (Diagnostics) to display the TDNXT screen, where cabling and/or connection faults can be identified. (See **Chapter 6, Diagnostics**, for further information.)

Press ESC to exit the NEXT screen.


### 5.3.4 ATTENUATION


The Attenuation function measures signal loss in a cable as a function of frequency. OMNIRemote 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.

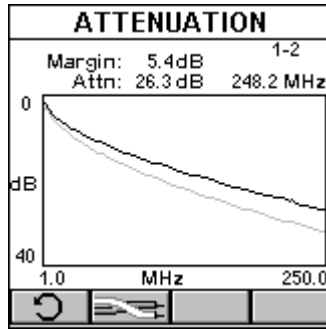
ATTENUATION				
Margin: 5.3dB				
	dB	Margin	MHz	
1-2	26.4	5.3	248.8	✓
3-6	26.2	5.6	248.8	✓
4-5	26.1	5.6	247.9	✓
7-8	26.0	5.8	248.8	✓

In the ATTENUATION screen, the worst case margin for all pairs is shown at the top of the screen.

The pairs are displayed in the column on the left side, followed by the Attenuation in decibels (dB), the Attenuation margin/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.

### NOTE

Attenuation always reports the worst dB value regardless of the Report: setting in the RUN OPTIONS screen.

#### 5.3.5 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.



Pair	dB	Margin	MHz	Status
1-2	26.7	7.7	5.0	✓
3-6	26.6	7.6	5.5	✓
4-5	26.3	7.3	5.2	✓
7-8	27.1	8.1	7.5	✓


Summary values shown at the top of the screen:

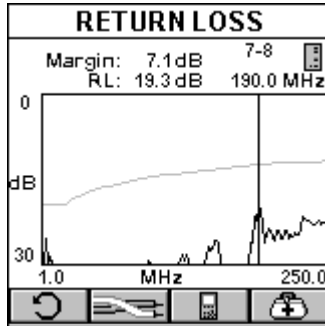
- Margin: 7.0dB

In the RETURN LOSS screen, the worst case margin for all near end and far pairs is shown at the top of the screen.


The pairs are displayed in the column on the left side, followed by the Return Loss in decibels (dB), the Return Loss margin/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  (Diagnostics) to display the TDRL screen, where cabling and/or connection faults can be identified. (See **Chapter 6, Diagnostics**, for further information.)

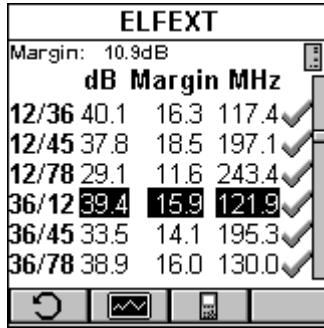
Press ESC to exit the RETURN LOSS screen.

### 5.3.6 ELFEXT

ELFEXT (Equal Level Far End Cross Talk) 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 the OMNIScanner and OMNIRemote end of the cabling.

In the ELFEXT screen, the worst case margin for all near and far pair combinations is shown at the top of the screen.

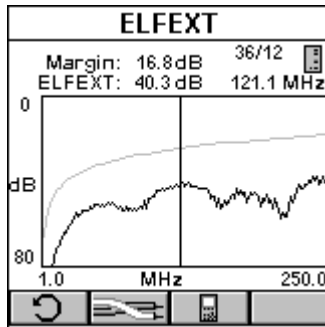
The pair combinations are displayed in the column on the left side, followed by the ELFEXT value, the margin/limit, and the frequency. The result for each pair combination is tagged with a  PASS or  FAIL indicator.



The scrollbar indicates that there are more test results. Use the down-arrow 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 OMNIScanner2 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.

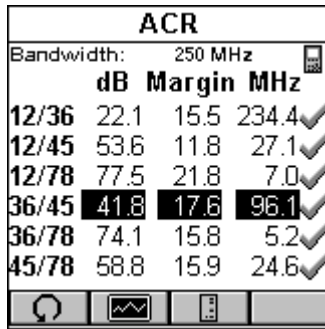
### 5.3.7 ACR/BANDWIDTH



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. Depending on the selected Autotest, the worst pair to pair ACR is typically 3 dB.

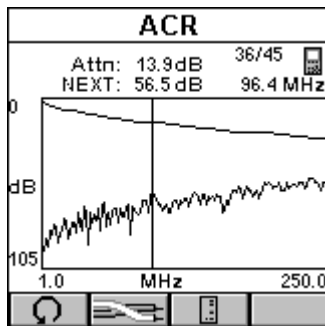
In the ACR screen, the Bandwidth is displayed at the top of the screen.

The pair combinations are located in the column on the left side, followed by the measured ACR, the ACR margin/limit, and the frequency. The result for each pair combination is tagged with a  PASS or  FAIL indicator.




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.

**5.3.8 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.

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.



RESISTANCE	
Limit:	40.0Ω
1-2	13.5Ω 
3-6	13.4Ω 
4-5	13.5Ω 
7-8	13.0Ω 

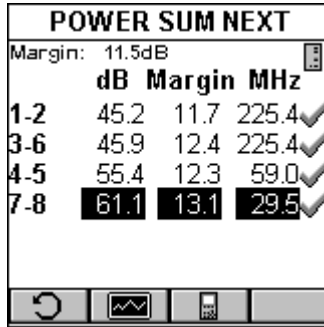
Press ESC to exit the RESISTANCE screen.



**5.3.9 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 reporting Power Sum NEXT, 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 (Gigabit Ethernet, for example).

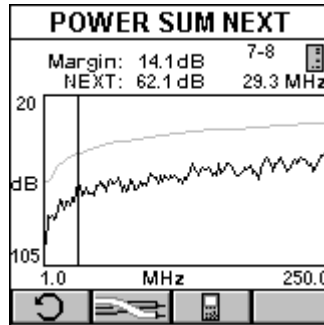
In the POWER SUM NEXT screen, the worst case margin for all near and far pairs is shown at the top of the screen.

The pairs are displayed in the column on the left side, followed by the PS NEXT in decibels (dB), the margin/limit, and the frequency. The result for each pair is tagged with a  PASS or  FAIL indicator.



Press  or  to toggle between the PS NEXT results for OMNISCanner and OMNIREmote.

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





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





Press ESC to exit the POWER SUM NEXT screen.



### 5.3.10 POWER SUM ELFEXT


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

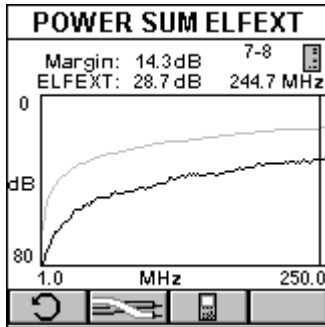
In the POWER SUM ELFEXT screen, the worst case margin for all near and far pairs is shown at the top of the screen.

The pairs are displayed in the column on the left side, followed by the PSEFLEXT in decibels (dB), the margin/limit, and the frequency. The result for each pair is tagged with a  PASS or  FAIL indicator.

POWER SUM ELFEXT			
Margin: 12.8dB			
	dB	Margin	MHz
1-2	27.3	12.8	241.6 
3-6	34.5	14.6	131.4 
4-5	32.3	15.9	195.3 
7-8	28.5	14.1	244.3 

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

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





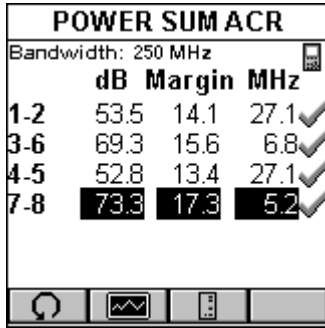
Press  (Pairs) to view PS ELFEXT graphs for other pairs.



Press ESC to exit the POWER SUM ELFEXT screen.


**5.3.11 POWER SUM ACR**

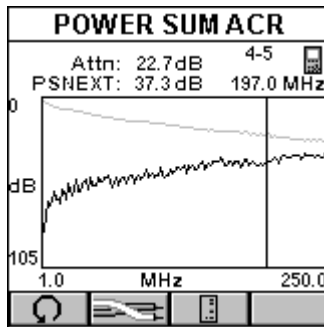
Power Sum ACR is calculated from the Attenuation of the disturbing pair subtracted from the Power Sum NEXT for the pair. The worst case Power Sum ACR is reported for each pair.


The POWER SUM ACR screen displays the pairs in the column on the left side, followed by the PS ACR in decibels (dB), the margin/limit, 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 OMNIREMOTE.

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

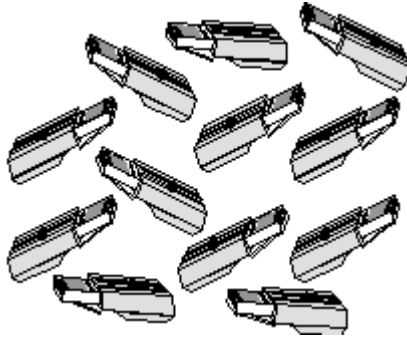


Press  (Pairs) to view Attenuation and PS NEXT graphs for other pairs.

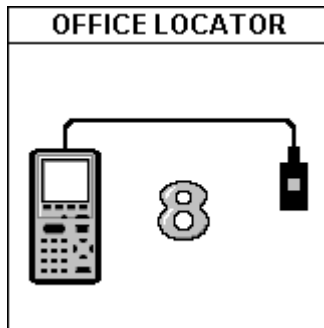
Press ESC to exit the POWER SUM ACR screen.

### 5.3.12 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.



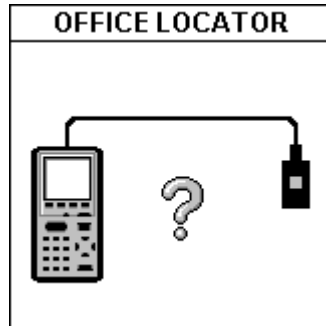
1. Connect the cable to be tested to OMNIScanner.
2. Insert the RJ-45 Office Locator adapters into wall outlets in the offices you wish to identify. You can connect any or all of the twelve Office Locators before beginning your test.



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.

## **5.4 Fiber Optic Measurements with OMNIFiber**

### **5.4.1 LENGTH/DELAY**

The Length/Delay function measures a fiber's length and propagation delay. Length measurements are derived from the propagation delay results using the GRI (Graded Refractive Index) at the appropriate wavelength.

Propagation Delay is the measure of the time required for a signal to advance from one end of the link to the other. When measuring propagation delay, OMNISCanner measures the round trip delay through both fibers, and then divides the result by two, assuming that the cables are equal in length.

Propagation Delay cannot be measured on a single-mode fiber; this measurement is available for multimode fiber only.

OMNISCanner measures the full length of the fibers under test.

LENGTH/DELAY	
GRI @ 1300:	1.4810
Limit:	200 m
Length:	7 m
Delay:	39 nS

The LENGTH/DELAY screen displays the GRI @ 1300 nm (nanometers).

The length limit and the actual derived length are displayed in meters or feet.

The delay is displayed in nanoseconds (nS).

Press ESC to exit the LENGTH/DELAY screen.

**5.4.2 Loss**

The Loss function measures the signal loss in a fiberoptic cable. The adapters inject a signal into the fiber cable and OMNIScanner and OMNIRemote measure the received signals at 850 and 1300 nm for multimode fiber cables and 1310 for single-mode fiber cables.

The LOSS screen displays the measured power in dBm (decibels, one milliwatt reference) for each wavelength.

LOSS		
▼	<b>850</b>	▲
11.65	<b>Power dBm</b>	12.01
0.00	<b>Loss dB</b>	1.24
2.12	<b>Limit dB</b>	2.12
	<b>1300</b>	
14.96	<b>Power dBm</b>	14.10
0.15	<b>Loss dB</b>	0.60
2.11	<b>Limit dB</b>	2.11

The measured loss and limit values in decibel (dB) are displayed for both wavelengths.

For dual fiber testing, the arrows at the top of the screen point out the direction of the light and indicate which fiber the result is for.

## NOTE

**When measuring single-mode fiber cables, OMNIScanner displays results for the wavelength; the upper (850 nm) section will be blank.**

Press ESC to edit the LOSS screen.



### 5.4.3 POWER METER

The Power Meter function reports the overall received power. Use it to quickly verify and correct cabling and equipment problems.



The Power Meter screen shows the currently selected wavelength and light source mode.



The overall power is displayed.

OMNIFiber is designed to provide a consistent, calibrated light source for effectively measuring signal loss in fiberoptic cables. The transmitted light can be operated continuously or modulated.

<b>POWER METER</b>	
1300 nm Continuous Wave	
<b>Power:</b>	68.27 dBm
<b>Ref.:</b>	68.23 dBm
<b>Loss:</b>	0.04 dB
	850
	REF

When testing loss, use the continuous light source. When identifying fiber cables with a tone locator, use the 2 kHz modulated mode.

Press  (Continuous) or  (Modulated) to change the light source.

Press  or  to change the wavelength of the OMNIFiber main transmitted and received wavelengths. Either main or remote can be used as the light source with the main power meter.



When OMNIFiber is attached to OMNIRemote, the remote unit can be used as a light source. With the OMNIFiber adapter attached, press the lambda key to activate the light source and provide continuous or modulated light at 850 or 1300/1310 nm. The green LED of the appropriate wavelength will blink rapidly when modulated light is transmitted. If the transmitted light is continuous, the green LED will not blink.

Press **REF** to find the reference value, place it in the appropriate field, and start calculating the loss.

Press ESC to exit the Power Meter screen.

## 5.5 Coaxial Measurements with OMNIScanner

### COAX TESTS






In coaxial cable, an insulated wire runs through the middle of the cable and a second wire, called the shield, surrounds the insulation of the inner wire like a sheath. The outer insulation jacket wraps around the second wire.



The Coax Tests screen displays the measured Length, Impedance, and Termination.



The Length function measures the cable length. OMNIScanner will display the overall length in meters or feet. If NEF (No End Found) is displayed instead of a value, the cable is either too long or terminated in its characteristic impedance.


Impedance defines the relationship of voltage and current in an electrical circuit.

COAX TESTS			
<b>Length:</b>	101ft 		
<b>Delay:</b>	155nS		
<b>Impedance:</b>	49.0 $\Omega$		
<b>Resistance:</b>	OVR $\Omega$		
			

Each Cable or transmission line is designed to have specific impedance, which allows proper matching to the currents of the transmitter and receiver.

OMNIScanner measures the characteristic impedance of the coax cable in ohms.

The Termination function displays whether a cable is open  or shorted .

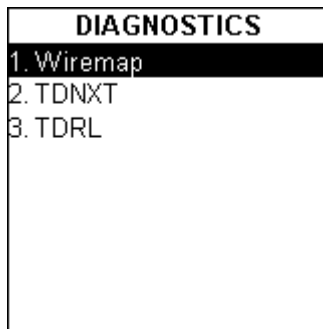
When the field Length displays NEF, the Termination will display .

## 6. Diagnostics

### 6.1 OMNIScanner's Diagnostic Functions

OMNIScanner has several advanced diagnostic test functions to help you with the identification of network cabling faults. Diagnostics allows you to locate opens, breaks, and short circuits as well as NEXT and Return Loss cabling faults quickly and easily.

Press the  (Diagnostics) function key to display the Diagnostics screen.



### 6.2 Wiremap

Wiremap identifies the location of opens, breaks, and pairs that are shorted. This allows quick identification of the fault location.

Select Wiremap to display the WIREMAP screen. The screen displays the wire connections between OMNIScanner and OMNIRemote. The pairs that are being tested are defined by the selected test standard. Shield continuity is tested if a shielded cable type is selected. (See **Chapter 4, Setup** for further information about shielded cables.)

For each of the 8 conductors and the Shield, Wiremap can indicate proper pin termination on each end, continuity to OMNIRemote, shorts between any two or more conductors, crossed pairs, reversed pairs, split pairs, and any other miswiring. For each pair, Wiremap displays the length. When a pair is faulty the length indicates the distance to the fault.

#### WIREMAP DISPLAYS

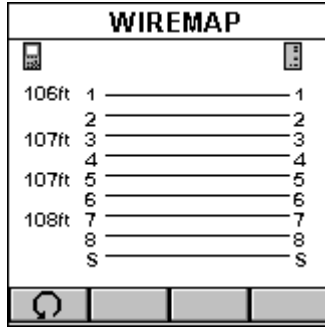
The OMNIScanner icon on the left side indicates the wiring at the OMNIScanner end of the cable link.

The OMNIRemote icon on the right side indicates the wiring at the OMNIRemote end of the cable link.

*Correct connectivity:*

The measured lengths of pairs 1-2, 3-6, 4-5, and 7-8 are shown on the left side of the Wiremap.

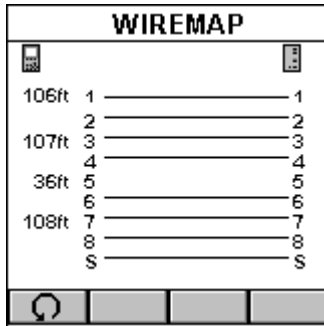
If the selected cable is shielded or screened, shield continuity will be measured, and if the shield fails the test, Wiremap will display the error.



*Wire is open:*

Wiremap checks the continuity of each wire.

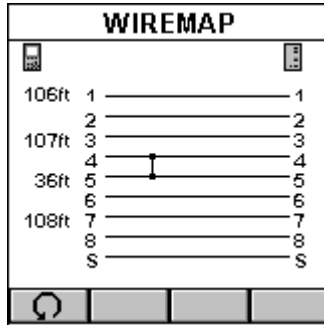
In this example, there is no line between pin 5 at each end, which indicates a break in connection. Use the number on the left side of the screen to find the exact location of the open. For example if 36 ft is displayed, the open can be found 36 feet away from OMNISCANNER.



*Wires are shorted:*

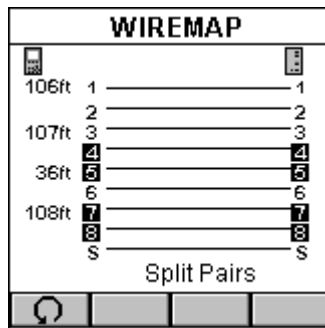
Wiremap finds shorts in cable.

In this example, the wiremap indicates that wires 4-5 are shorted. Use the number on the left side of the screen to find the exact location of the short. For example if **36 ft** is displayed, the short can be found 36 feet away from OMNIScanner.



*Split Pairs:*

If a cable is wired correctly, pin-to-pin, but there is a split pair, Wiremap displays Split Pairs and highlights the pins in error.



In our example, one wire from the 4-5 pair is twisted with one wire in the 7-8 pair. The Split Pair will be highlighted with reversed numbers.

The message SPLIT PAIRS will be displayed below the Wiremap.

Press ESC to exit the WIREMAP screen.

## 6.3 TDNXT

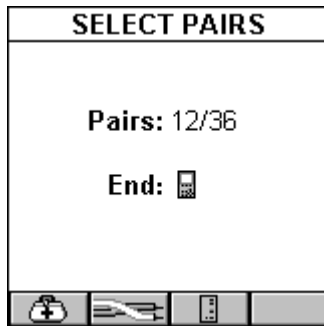
NEXT faults are diagnosed by using the TDNXT (Time Domain NEXT) function. OMNIScanner uses TDNXT to determine the amount of NEXT as a function of distance. TDNXT with new S-Band technology (Standard Connector band technology) can help you to distinguish between connection and cable faults. It assists you with diagnosis and troubleshooting of NEXT failures and the verification of test cables, connectors, and plugs.


While the NEXT graph shows the link test limits and the frequency at which a failure occurred, the TDNXT graph displays NEXT vs. distance.



S-Bands provide a time domain limit to verify that the connections are within the desired category of performance. In a typical link, failures are a result of either a non-compliant connection or a faulty cable. The ability to determine if a connection meets the expected performance requirement significantly simplifies the diagnosis of a failure.


To diagnose a failure, select TDNXT in the DIAGNOSTICS screen and press ENTER. The TDNXT function is also available from the NEXT Graph screen.

The select pairs screen opens.



Use the  (Pair) function key to select the pairs you want to analyze.

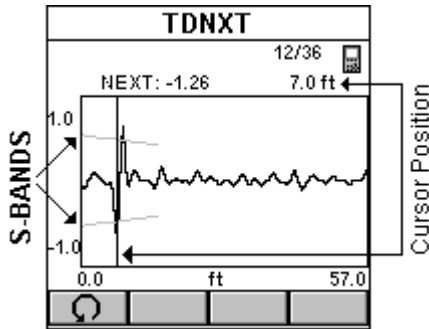
Use  or  to select which end, OMNIScanner or OMNIRemote, you want to view the results for.

Press  (Diagnostics) to open the TDNXT screen.

The screen displays the TDNXT (Time Domain NEXT) graph. The funnel-like lines are the upper and lower S-Bands. S-Bands are limit lines for connections as a function of distance from the cable end. They provide a quantitative measure of

the NEXT at the connection point, which is typically located at the end of the test cable at 2 meters (7 ft). The measurement unit for the horizontal graph can be displayed in meters (m) or feet (ft). (See **Chapter 3, Setup** for further information about units.)

Initially, the cursor is located at the point with the worst NEXT.



The NEXT at the cursor position relative to the S-Band, the corresponding pair combination, and the distance to the cursor position are displayed above the graph.

The example shows a Time Domain NEXT that exceeds the S-Bands. The worst NEXT is displayed at 7.0 ft, the connection location. The conclusion is that the connection caused the failure.



Press ESC to exit the TDNXT screen.

**6.3.1 USING TDNXT TO DIAGNOSE A LINK**

The S-Band limit lines provide an easy method to pinpoint faults located at the connection or the cable. S-Bands allow you to determine if the connections in a link meet the desired performance level. They are designed to match the standard category of the selected Autotest.

A graph containing peaks that are located outside the S-bands at the connection distance indicates that the connection and not the installed cable is the most likely reason for failure.

If NEXT failed but the TDNXT graph displays peaks within the S-Bands at the connection distance, the fault is caused by the cable portion of the link.

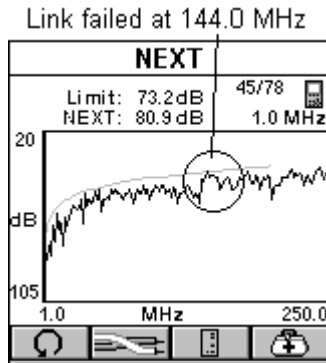
If failures occur at both ends of the link, use  or  to diagnose each end. Failures at both ends of the link can interact.


### 6.3.2 TDNXT EXAMPLES

The following examples show the diagnostics process that is performed to identify failures on typical links with 2 meter test cables.

#### GOOD CABLE, BAD CONNECTION:

The cursor in the NEXT graph is located at the worst NEXT at 144.0 MHz, which is outside the limit line. (For an easier interpretation the cursor was moved.) The Link failed. Why?

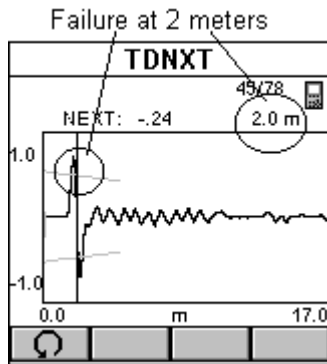


Press  to open the TDNXT screen to further review and diagnose the graph.

The cursor is positioned at the worst peak, which is outside the S-Bands.

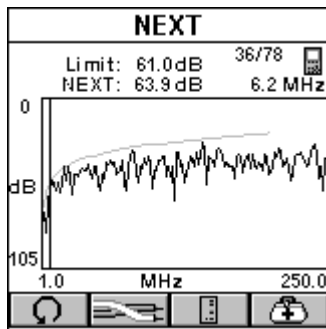
Looking at the TDNXT graph we can reach the conclusion that the connection located at 2 meters did not meet the required performance and is the cause of failure.






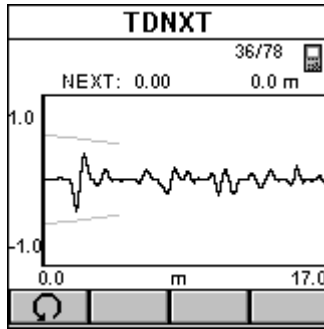
BAD CABLE, GOOD CONNECTION:

The cursor in the NEXT graph is located at the worst NEXT at 6.2 MHz, which is outside the limit line. (For display purposes the cursor is moved to the Zero-position.) The Link failed. Why?



Press  to open the TDNXT screen to further review and diagnose the graph.

The NEXT response from the connector located at 2 m is well within the S-Bands and performs significantly better than the requirements. The NEXT in the cable is the source of the failure even though the cable's NEXT response peaks are less than those of the connection. By knowing that the connection meets its performance requirement, the cable is easily identified as the non-compliant component of the link.



The following table summarizes the typical diagnosis process.

<b>NEXT</b>	<b>TDNXT exceeds S-Band limits</b>	<b>Conclusion</b>
PASS	N/A	NEXT at link is good
FAIL	YES	Connection fails. Replace or reterminate. Plug and/or jack can be at fault.
FAIL	NO	Cable is not within specifications

## 6.4 TDRL

Return Loss is a measure of the amount of reflected energy in a link. Reflections occur at points of impedance discontinuity, such as connectors, transitions from patch cables to horizontal cables, and impedance structure within a cable.

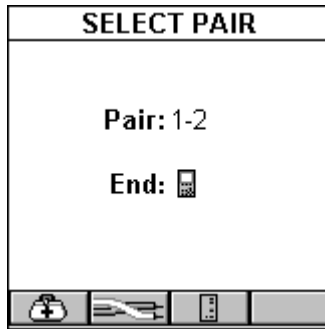
Return Loss faults are diagnosed by using the TDRL (Time Domain Return Loss) function. OMNIScanner uses TDRL to determine the amount of Return Loss as a function of distance. TDRL with new S-band technology (Standard Connector Band technology) can help you to distinguish and between connection faults and cable faults. It assists you with diagnosis and troubleshooting of Return Loss failures and the verification of test cables, connectors, and plugs.


While the Return Loss graph shows the link test limits and the frequency at which a failure occurred, the TDRL graph displays Return Loss vs. distance.



S-Bands provide a time domain limit to verify that the connections are within the desired category of performance. In a typical link, failures are a result of either a non-compliant connection or a faulty cable. The ability to determine if a connection meets the expected performance requirement significantly simplifies the diagnosis of a failure.


Select TDRL in the DIAGNOSTICS screen and press ENTER. The TDRL function is also available from the RETURN LOSS Graph screen.

The Select Pair screen opens.



Use the  (Pair) function key to select the Pair you want to analyze.

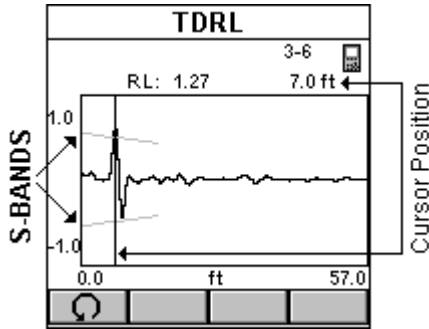
Use  or  to select which end, OMNIScanner or OMNIRemote, you want to view the results for.

Press  to open the TDRL screen.

The screen displays the TDRL (Time Domain Return Loss) graph. The funnel-like lines are the upper and lower S-Bands. S-Bands are limit lines for connections as a function of distance from the cable end. They provide a quantitative measure of Return Loss at the connection point, which is typically located at the end of the test cable, at about 2 meters (7 ft). The measurement unit for the horizontal graph can be displayed in meters (m) or feet (ft.).

Initially, the cursor is located at the point with the worst Return Loss.

The Return Loss at the cursor position, the corresponding pair, and the distance to the cursor position are displayed above the graph.



The example shows a Time Domain Return Loss that exceeds the S-Bands. The worst Return Loss is displayed at 7.0 ft, the connection. The conclusion is that the reflection at the connection is the cause of the failure. This could be due to a connector problem or excessively untwisted pairs at the connector.



Press ESC to exit the TDRL screen.

**6.4.1 USING TDRL TO DIAGNOSE A LINK**

S-Bands provide an easy method to pinpoint if the fault is located at the connection or at the cable. The S-Bands allow you to determine if the connections in a link meet the desired performance level. They are designed to match the standard category of the selected Autotest.

A graph containing peaks that are located outside the S-Band at the connection distance indicates that the connection and not the installed cable failed.

If Return Loss fails but the TDRL graph displays peaks within the S-Band at the connection distance, the fault is caused by the cable portion of the link.

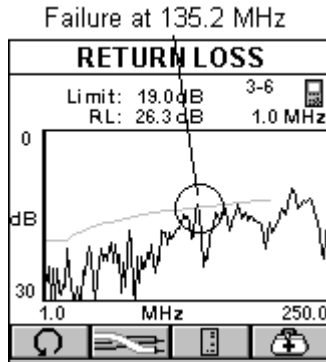
If failures occur at both ends of the link, use  or  to diagnose each end. Failures at both ends of the link can interact.

**6.4.2 TDRL EXAMPLES**

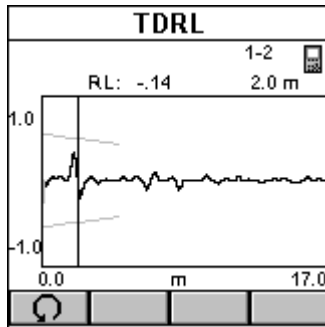
The following examples show the diagnostics process that is performed to identify failures on typical links with 2 meter test cables.

**GOOD CABLE, BAD CONNECTION:**

The cursor in the Return Loss graph is located at the worst Return Loss at 135.2 MHz, which is outside the limit line. (For display purposes the cursor was moved.) The Link failed. Why?



Press  to open the TDRL screen to further review and diagnose the graph.

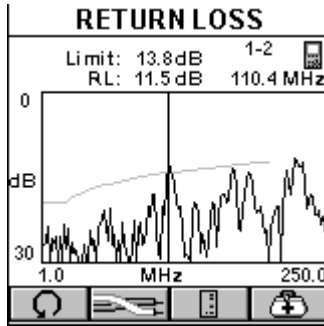



The cursor is positioned at the worst peak, which is outside the S-Bands.

Looking at the TDRL graph we can reach the conclusion that the connection located at 2 meters did not meet the required performance and is the cause of failure.

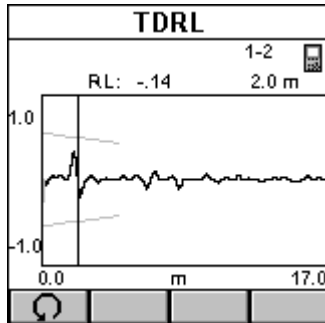
#### BAD CABLE, GOOD CONNECTION:

The cursor in the Return Loss graph is located at the worst Return Loss at 110.4 MHz, which is outside the limit line. The Link failed. Why?



Press  to open the TDRL screen to further review and diagnose the graph.

The Return Loss response from the connector located at 2 m is well within the S-Bands and performs significantly better than the requirements. The Return Loss in the cable is the source of the failure even though the cable’s Return Loss response peaks are less than those of the connection. By knowing that the connection meets its performance requirement, the cable is easily identified as the non-compliant component of the link.










The following table summarizes the typical diagnosis process.


<b>Return Loss</b>	<b>TDRL exceeds S-Band limits</b>	<b>Conclusion</b>
PASS	N/A	Return Loss of link is good
FAIL	YES	Connection fails. Replace or reterminate. Plug and/or jack can be at fault.
FAIL	NO	Cable is not within specifications


# 7. Results


## 7.1 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.

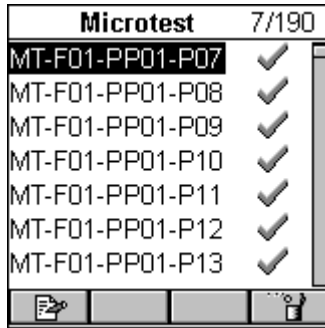
RESULTS	
 TIA	49
 ISO	2
 VENDOR	37
 MICROTEST	190
 IEEE	MMC
 ATM	MMC
<b>Total</b>	<b>467</b>

Light  Project folders identify internally stored results.


Black  Project folders identify results stored on MMC.

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.

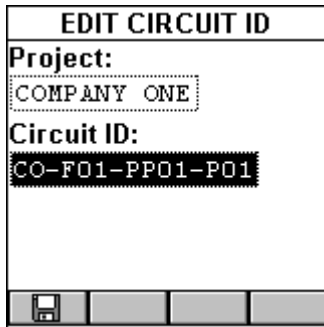
To view more detailed test information, highlight a project name and press ENTER.



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 up-arrow and down-arrow to highlight the project you want to store the Autotest within, and press ENTER to select it.

Use the down-arrow 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.



## 7.2 Viewing Autotest Results

The Project Name screen shows a Circuit ID and a PASS/FAIL icon for each saved Autotest. The following PASS/FAIL icons can be displayed.

- ✓ Passed twisted pair Autotest.
- ✗ Failed twisted pair Autotest.
- ✓ Passed twisted pair Autotest with graphs.
- ✗ Failed twisted pair Autotest with graphs.
- 🔍 Passed fiber Autotest.
- 🔍 Failed fiber Autotest.

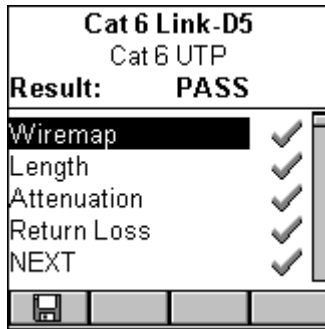
Microtest	7/190
MT-F01-PP01-P07	✓
MT-F01-PP01-P08	✓
MT-F01-PP01-P09	✓
MT-F01-PP01-P10	✗
MT-F01-PP01-P11	✗
MT-F01-PP01-P12	🔍
MT-F01-PP01-P13	🔍

To view detailed information about a saved Autotest, use the up-arrow and down-arrow on your keypad to highlight a Circuit ID in the Project screen and press ENTER.

### FOR TWISTED PAIR CABLING:

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 Autotests varies depending on the kind of Autotest that was performed.



(See **Chapter 5, Measurements**, for detailed information about each measurement screen.)

Use the up-arrow and down-arrow keys on your keypad to highlight a test.

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

Use the left-arrow or right-arrow on your keypad to quickly page through all test results.



**NOTE**








If the  (Save Graphs) or  (Save with Graphs to MMC) 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.

 **FOR FIBEROPTIC CABLING:**



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) for both fibers are shown.

<b>TIA 568A</b>		
<b>B</b> ▼	Multimode	▲ 
	<b>Result</b>	
7 m 	39 nS	
0.00 dB	<b>850</b>	1.24 dB
0.14 dB	<b>1300</b>	0.60 dB
1.97 dB	<b>Margin</b>	0.88 dB
<b>Conn.: 2 Splices: 2</b>		
		

**A** , **B** , **C** or **D** (Loopback) is displayed to inform you what method was used to set the reference. See **Chapter 8, Fiberoptic Reference**, for further information.

When dual fiber was measured, arrows at the top of the screen point out the direction of the light. The arrows also indicate the fiber that the  (PASS) or  (FAIL) result is for.

The number of connectors and splices is shown at the bottom of the screen if the Autotest loss criteria is formula-based. (See **Appendix C** for further information.)


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








Press ESC to return to the Project Name screen.

Press ESC to return to the Results screen.

### 7.3 Results Stored on a MultiMedia Card




OMNIScanner2 allows you to view results that are stored on the MMC.


Internally stored results are identified by a light  Project folder.

RESULTS	
 TIA	49
 ISO	92
 VENDOR	37
 MICROTEST	190
 IEEE	0
 ATM	0
<b>Total</b>	<b>467</b>
	

Viewing is accomplished as described above.

When a MultiMedia Card is inserted, OMNIScanner2 will allow you to copy results to the portable card.

To copy the test results(s) contained in one project to the MMC, highlight the appropriate  Project folder in the RESULTS screen and then press  (Copy Project to MMC). This function is available only for Projects in the internal flash  (black Project folder).

To copy all Projects that are listed in the RESULTS screen, press  (Copy Results to MMC).

# 8. Fiber Optic Reference

## 8.1 Establishing the Reference

Different methods can be used when making a reference measurement with OMNIFiber. The reference measurement to use depends on how the standard defines the link, and how the end equipment is interconnected. There are three basic link definitions and three corresponding reference methods.

Link Definition	Reference Method	Multimode Standard	Single-mode Standard	Where Used
link=2 cross connects + cable plant	1 jumper method or equivalent	TIA-526-14A Method B	TIA-526-7 Method A	TIA-568A, ISO 11801 100BASE-X, ATM, Fibre Channel, FDDI, Token Ring
link=1 cross connect + cable plant	2 jumper method or equivalent	TIA-526-14A Method A	TIA-526-7 Method A.2	10BASE-X, TIA 455-171 Method B
link=cable plant	3 jumper method or equivalent	TIA-526-14A Method C	TIA-526-7 Method A.3	

## 8.2 The Launch/Jumper Cable

The launch/jumper cables are 2 m fiber cables and need to be of good quality and in excellent condition. Always clean the launch cable before use.

### NOTE

The launch cable used to set the reference value should be the same type of fiber as the cables to be tested and certified, 50/125, 62.5/125 or singlemode.



The fiber cables included with your OMNIFiber kit are duplex launch cables with ST-style connectors. One fiber has white connector boots and the other fiber has black boots.

## 8.3 The Reference Methods

OMNIFiber has ST-style connector port adapters. The following diagrams show how to establish references with duplex launch cables for testing of ST-terminated networks. For testing of networks terminated with different connector styles, please call Black Box Technical Support at 724-746-5500.

It is very important that the transmitter (TX port) connections are not disturbed after the reference value is established

### NOTE

**When a connector is removed and then reattached, it is unlikely to go back into the exact same position. As a result, measurements will change when connections are made or broken.**

OMNIFiber measures two fibers of a duplex link in one Autotest operation. Four reference values will be stored, two from OMNISCanner to OMNIRemote (TX - RX), the others from OMNIRemote to OMNISCanner (TX - RX).

#### 8.3.1 METHOD B: ONE JUMPER REFERENCE METHOD

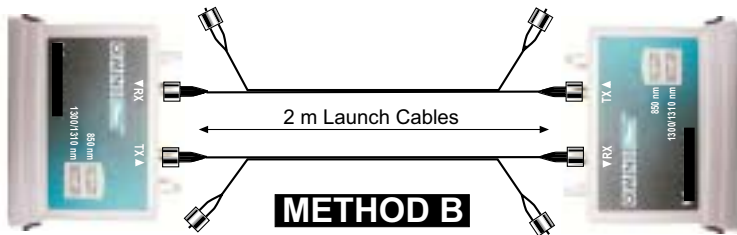
This method is used when the link includes:

- the loss of one connection at the near end cross connect
- the loss of one connection at the far end cross connect/outlet
- the loss of the cable plant

TIA/EIA-568A, ISO 11801, and IEEE 802.3 (100BASE-X, 1000BASE-X) specify this method.

**NOTE**

This method is called “Method B” in TIA-526-14A and “Method A.1” in TIA-526-7.



1. Connect one end of a black launch cable to the TX (transmit) port of the fiber adapter that is attached to OMNIScanner.
2. Connect the other end of that black launch cable to the RX (receive) port of the fiber adapter that is attached to OMNIRemote.
3. Leave the two white fiber connectors dangling and unconnected.
4. Connect one end of another black launch cable to the TX (transmit) port of the fiber adapter that is attached to the OMNIRemote.
5. Connect the other end of that black launch cable to the RX (receive) port of the fiber adapter that is attached to the OMNIScanner.
6. Leave the two white fiber connectors dangling and unconnected.
7. Set the Reference.
8. ;Disconnect only the following two ends: OMNIFiber main RX (receive) and OMNIFiber remote RX (receive). OMNIFiber main TX and OMNIFiber remote TX stay connected.
9. Connect the white fibers to the appropriate RX ports.

**8.3.2 METHOD A: TWO JUMPER REFERENCE METHOD**

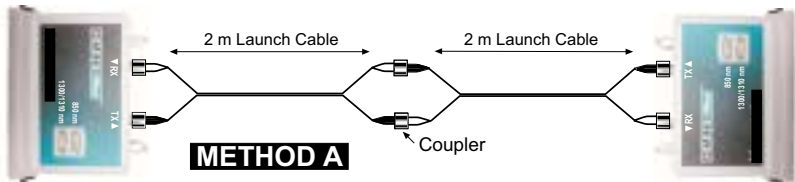
This method is used when the link includes:

- the loss of one connection at the near or far end cross connect
- the loss of the cable plant

TIA/EIA-455-171 and IEEE 10BASE-X specify this method.

**NOTE**

This method is called “Method A” in TIA-526-14A and “Method A.2” in TIA-526-7.



1. Connect a launch cable to the fiber adapter that is attached to OMNISCanner. The black fiber attaches to the TX (transmitter) port and the white fiber to the RX (receiver) port.
2. Connect a launch cable to the fiber adapter that is attached to OMNIRemote. The black fiber attaches to the TX (transmitter) port and the white fiber to the RX (receiver) port.
3. Use a connector adapter to mate the two black fiber connectors.
4. Use a connector adapter to mate the two white fiber connectors.
5. Set the Reference.
6. Disconnect the connectors from the connector adapters without disturbing the fiber connections to the OMNIFibers.
7. Set the connector adapters aside.

**8.3.3 METHOD C: THREE JUMPER REFERENCE METHOD**

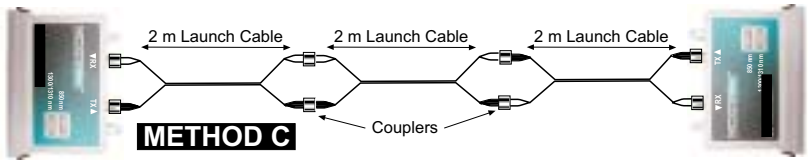
This method is used when the link includes:

- the loss of the cable plant

**NOTE**

This method is called “Method C” in TIA-526-14A and “Method A.3” in TIA-526-7.





1. Connect the first launch cable to the fiber adapter that is attached to OMNIScanner. The black fiber attaches to the TX (transmitter) port and the white fiber to the RX (receiver) port.
2. Connect the second launch cable to the fiber adapter that is attached to OMNIRemote. The black fiber attaches to the TX (transmitter) port and the white fiber to the RX (receiver) port.
3. Use two connector adapters to mate the black TX connector to the white RX connector through a third jumper cable.
4. Use two connector adapters to mate the other black TX connector to the white RX connector through a third jumper cable.
5. Set the Reference.
6. Remove the third jumper cable, located in the center, and the connector adapters without disturbing the OMNIFiber connections.

### 8.3.4 METHOD A: TWO JUMPER REFERENCE METHOD IN LOOPBACK MODE

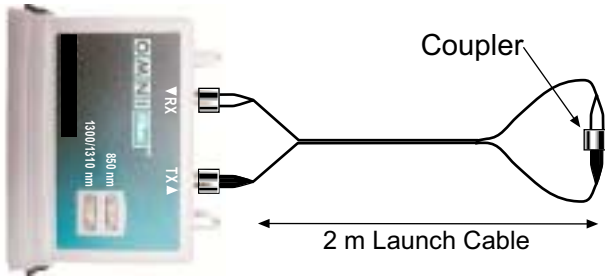
The OMNIFiber main can be used without the remote to make measurements on a single fiber. In this state, the TX fiber is looped back to the RX port of the same OMNIFiber Adapter.

## NOTE

**During the Autotest, the loss and length of the white fiber will be subtracted from the length of the fiber under test. Since the loss in a short jumper cable is negligible, the loss measurement of the fiber under test will be accurate. The length measurement will be off by the length of the jumper cable (about 2 meters). This primarily affects the length accuracy of very short cables.**

1. Connect the launch cable to the OMNIFiber. The black fiber attaches to the TX (transmit) port and the white fiber to the RX (receive) port.
2. Use a connector adapter to mate the connections on the other end.

3. Set the Reference.
4. Disconnect the white connector from both the RX port and the connector adapter. Do not disturb the black fiber attached to OMNIFiber's TX port.



5. Leave the two white ends dangling.
6. Attach the cable to be tested to the connector adapter and the OMNIFiber's open RX connector.

# 9. Uploading and Printing

## 9.1 Scanlink Tools

Scanlink Tools consist 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 or saved to disk. Scanlink supports different report formats, like Autotest Certification and Summary Reports that can be printed from the PC to a printer or a file.

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 Configuration allows you to create Limits that can be used in custom Autotests. These limits can be viewed and printed with the extensive graphing utility.

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 Scanlink Tools online help 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.

# 10. Updating Scanner Software

## 10.1 Downloading Software from the WWW

Software updates can be easily downloaded from the Black Box World-Wide Web site. If you are connected to the Internet, you can access our web site by entering <http://www.blackbox.com> in the URL address field.

1. Select the “Connectivity” option.
2. Select the file you need by clicking it, and save it to a disk.
3. Extract the .exe file.

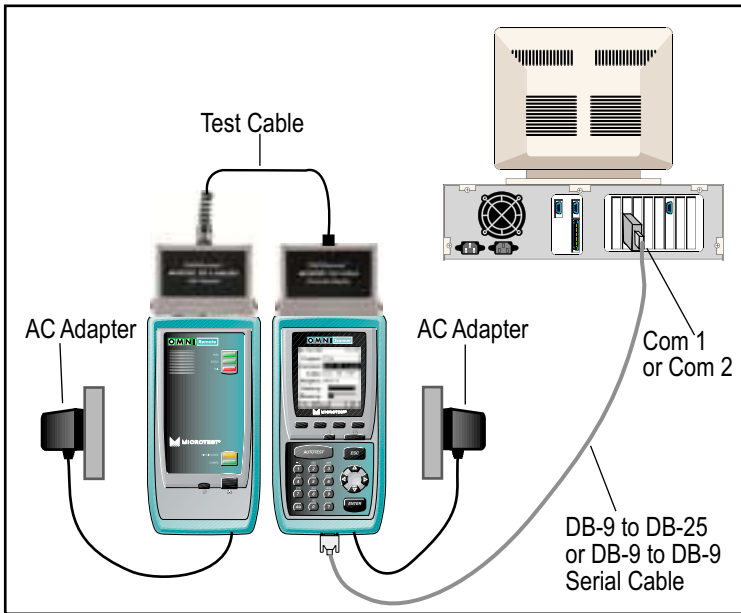
## 10.2 Updating OMNISCanner Software and OMNIRemote Software


### NOTE

**The update process will erase all test results stored in memory. Use ScanLink to upload the results before updating OMNISCanner’s software.**

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

1. Connect the DB9 end of the serial cable to OMNISCanner’s serial port, and then connect the DB9 or DB25 end of the serial cable to your PC’s serial port.
2. Plug the AC adapter into the OMNISCanner.
3. Connect OMNISCanner and OMNIRemote using the provided test cable and adapter.
4. Plug the AC adapter into OMNIRemote.
5. Turn on OMNISCanner. You are now ready to download the new flash update from the PC. Follow the instructions in the ReadMe that accompanies the update file.



6. To verify the software update, press and hold the Backlight key (located right above the ESC key). The software version number will be displayed.
7. To verify the update, press OMNISCANNER's  (Setup) function key, and then select the option Remote Info. The new software version will be displayed.

### NOTE

Always update the OMNISCANNER software together with the Scanlink Tools software to ensure compatibility.

# 11. Multi Media Card

The MultiMediaCard is the world’s smallest solid state storage device. It weighs less than two grams and is the size of a postage stamp (32 mm high by 24 mm wide and 1.4 mm thick). The card is available in 8 MB, 16 MB, and 32 MB capacities.



The MMC can store OMNIScanner2 test results that can then be uploaded to Scanlink. Configurations that were creates with OMNIScanner Configuration software can be downloaded onto the card for easy replacement of the current OMNIScanner configuration. (See **Chapter 9** for further information about Uploading and Downloading.)







## 11.1 Portable Data

OMNIScanner2 can store data on a very small, removable MultiMediaCard. This allows for unlimited expansion of memory capacity and transferral of test data without taking OMNIScanner2 out of service.

Available MulitMediaCard readers and adapters allow data to be uploaded directly to laptops or PCs.

Tests can be saved in OMNIScanner2’s internal flash memory or to the optional removable MultiMediaCard. If the MultiMediaCard slot is empty, OMNIScanner will automatically save the test results to the internal memory area.

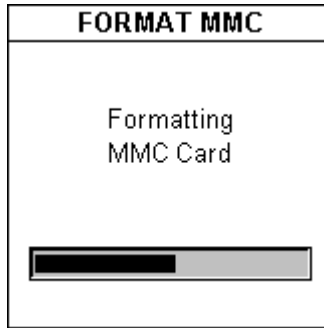
When the MultiMediaCard is inserted, OMNIScanner will allow you to save the  selected project or  all test results to the card. See Chapter 7, Results: Copying Results to a MultiMediaCard for further information about saving results to the MMC.

RESULTS	
 TIA	49
 ISO	2
 VENDOR	37
 MICROTEST	190
 IEEE	50
 ATM	70
<b>Total</b>	<b>467</b>

## 11.2 MultiMediaCard Maintenance

Multi Media Flash memory cards can store data just like a PC stores data on the hard disk. Saved files are broken into segments and stored in any free segment of the Multi Media Flash memory card. Prior to the initial use, the MMC may require formatting. Use the OMNIScanner2 Format MMC function to perform this task.

To format the MultiMediaCard, select Format MMC in the SETUP screen. A gauge will indicate the progress. See Chapter 4, Setup: Format MMC for further information.



Formatting time varies depending on the size of the MultiMediaCard; the 8 MB card can be formatted in about 2 minutes.

## 11.3 The MMC Structure

The file structure on the MMC is Windows® file system compatible.

When saving test results to the MMC, Project folders will be created, which allow you to easily retrieve the files with Scanlink. Each folder can be expanded to view all tests (Circuit IDs) it contains.

Configurations stored on the MMC by the OMNIScanner Configuration software will be contained in a Configuration folder.

## 12. Universal Serial Bus Port

USB allows you to instantly connect OMNISCanner2 to your computer running Windows® 98 (2nd Edition) or Windows® 2000.

A standardized plug and port replaces all the different kinds of serial and parallel port connectors and combinations.

When using a USB-compliant PC, you just turn on your PC, attach OMNISCanner2 to the USB port, and turn on the scanner. USB makes the connection process automatic and hassle free. Up to 10 OMNISCanner2s can be connected simultaneously.

### NOTE

**Most PCs, including many notebooks, on the market today are fully USB-ready.**

The “Hot-swapping” feature allows you to attach or remove OMNISCanner2 on the fly, without having to shut down and restart your PC. OMNISCanner2 will be detected automatically. This feature is especially useful when uploading results from several scanners.

Of course the USB works with Scanlink Upload Utility, OMNISCanner Configuration and OMNISCanner Remote Control. (See Chapter 9, Uploading and Printing for more information.)

### 12.1 Installing the USB Driver

### NOTE

**OMNISCanner2 supports high speed USB connections. Please use only high-speed USB cables. Make sure the length of the cable does not exceed 5 meters (1 m recommended).**

To install the USB driver on your PC proceed as follows:

### NOTE

**Make sure that you are running Windows® 98 (2nd Edition) or Windows® 2000.**

1. Turn your PC on.
2. Connect the PC with OMNISCanner2 via the high-speed USB cable.



3. Turn OMNIScanner2 on.
4. Insert the OMNIScanner Companion CD which contains the USB driver software.
5. Follow the instructions on the screen to install the driver.

First, the install wizard will find the new device: Microtest OMNIScanner2. Click Next > to continue.

The wizard searches for new drivers for:

Microtest OMNIScanner 2

A device driver is a software program that makes a hardware device work.

Then, it will search for a driver for OMNIScanner2. We recommend accepting the default setting: Search for the best driver for your device. Click Next > to continue.

What do you want Windows to do?

Search for the best driver for your device. (Recommended).

Display a list of all the drivers in a specific location, so you can select the driver you want.

Now, select the option: CD-ROM drive to start the search for the USB driver. Click Next > to continue.

Windows will search for new drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.

Floppy disk drives

CD-ROM drive

Microsoft Windows Update

Specify a location

Next, Windows will detect the location of the file OMNIScanner2 USB. Click Next > to install the driver file.

Windows driver file search for the device:

OMNIScanner2 USB

Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.

Location of driver:


D:\MTUSB.INF

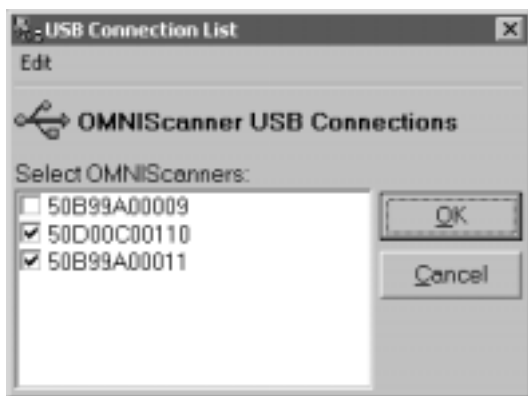
Once windows has finished installing the driver, OMNIScanner2 USB will appear in your PC's driver list.

*Windows 98:* When connecting OMNIScanner2 to a different USB port, the driver will be automatically installed.

*Windows 2000:* When connecting OMNIScanner2 to a different USB port, a separate installation of the driver from the OMNIScanner Companion CD is required

## 12.2 Uploading OMNIScanner2 Test Results to the PC

1. To send test results from OMNIScanner2(s) to a PC, first turn your PC on.
2. Connect the PC with OMNIScanner2 via the high-speed USB cable.
3. Turn on OMNIScanner2.
4. Run the Scanlink software and click on the  (Upload) button in the toolbar, or select Upload in the File menu.
5. In the Scanner Type field, select OMNIScanner.
6. Select the appropriate port (USB).
7. Click Upload to establish communications between Scanlink and OMNIScanner2 and upload the Autotest data that are stored in the scanner's memory.
8. Scanlink can upload data from several scanners at once. If you have more than one scanner connected, the USB Connection List will appear and allow you to select the scanners you wish to upload from. The OMNIScanner2s are listed by serial number. Select the appropriate scanner(s) and click OK to continue.



9. If more than one Project is found, the Project List will appear and allow you to select the project(s) you wish to upload. Make the appropriate choice and press OK to continue the upload process.



Once the connection is established, the scanner's serial number is displayed in the lower left display panel. A gauge in the lower right display panel indicates the progress during the upload process.

Scanlink will transfer all of the Autotest results from the scanner and display a summary of the tests in the main program window.

10. Click Cancel to abort the upload process.

To review collected Autotest data, select the items to be viewed, then select View Autotest from the View menu. (Consult the Scanlink on-line help for further information.)

## 12.3 Downloading Configurations to OMNISCanner2

1. To download Configurations from OMNISCanner Configuration software to one or several OMNISCanner2s, first turn your PC on.
2. Connect the PC with OMNISCanner2 via the high-speed USB cable.
3. Turn OMNISCanner2 on.
4. Run the OMNISCanner Configuration software, highlight a  Configuration and click the  Download button.
5. To make sure that you are downloading the desired Configuration, the Download Configuration dialog box displays the name of the Configuration.
6. The Scanner Type is OMNISCanner.
7. Select the Port (USB) and click OK to continue.

### NOTE

**OMNISCanner Configuration can be used to download configurations to several scanners at once. If you have more than one scanner connected, the USB Connection List will appear and allow you to select the scanners you wish to download to. The OMNISCanner2s are listed by serial number. Select the appropriate scanner(s) and click OK to continue.**


8. Click Cancel to abort the Download process.

During the Download operation, the Download Status screen appears and a gauge indicates the progress. The OMNISCanner2 keypad is locked during the download process.

9. The message 'Download complete' will be displayed to inform you when the Configuration is downloaded. Click OK to return to the main screen.

The new Configuration is now implemented, and OMNIScanner2 displays the Project screen. (Consult the OMNIScanner Configuration on-line help for further information.)

## 12.4 Remote Controlling OMNIScanner2

1. To remote control OMNIScanner2, first turn your PC on.
2. Connect OMNIScanner2 and OMNIRemote via the link to be tested.
3. Use the USB Cable to connect OMNIScanner2 to the PC and then turn on OMNIScanner2.
4. Run the OMNIScanner Remote Control software.
5. Select Setup|Communication Port and select USB as the Port.
6. Click the  (Connect) button.

As soon as the connection occurs, the OMNIScanner's serial number will be displayed.

OMNIScanner Remote Control will detect the Adapter that is currently attached to OMNIScanner2 and display the name of the adapter. If an OMNIFiber adapter is attached the serial number will be displayed.

The Remote Control program will read OMNIScanner's Configuration (Projects, Autotest, and cables).

Once the connection is completed the Connection Status bar displays Ready!. (Consult the OMNIScanner Remote Control on-line help for further information.)

### **NOTE**

**OMNIScanner Remote Control software can be connected to several OMNIScanner2s, but only one at a time can be remote controlled. If you have more than one scanner connected, the USB Connection List will appear and allow you to select the scanner you wish to remote control. The OMNIScanner2s are listed by serial number. Select a scanner and click OK to continue.**

# Appendix A: Technical Specifications

Specifications apply to both OMNIScanner2 and OMNIRemote unless otherwise noted.

## A.1 Physical Characteristics

### *OMNIScanner2*

**Size**—8.75"H x 4.50"W x 2.12"D (22.25 cm x 11.4 cm x 5.4 cm)

**Weight**—2.2 lb. (1 kg)

### *OMNIRemote*

**Size**—8.75"H x 4.5"W x 2.12"D (22.25 x 11.4 x 5.4 cm)

**Weight**—1.96 lb. (0.89 kg)

### *OMNIFiber*

**Size**—3.54"H x 3.88"W x 1.55"D (9 x 9.85 x 3.94 cm)

**Weight**—0.24 lb. (0.11 kg)

## A.2 User Interface

### *OMNIScanner*

- 62 x 62 mm Graphic LCD with backlight
- Backlit keypad with tactile feedback, numeric input, dedicated functions, 4 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

#### *OMNIFiber LED Displays*

- 850 nm Indicator (GREEN) for transmitting at 850 nm
- 1300 nm Indicator (GREEN) for transmitting at 1300 nm
- 850 nm Indicator (ORANGE) for switching fibers
- 1300 nm Indicator (ORANGE) for switching fibers

### **A.3 Power**

- Removable, rechargeable battery pack
- 9.6 volts @ 1200 mA-hr NNI-CD
- 9.6 volts @ 1900 mA-hr NiMH (OMNIScanner2)
- Built-in fast charger using AC adapter
- Charging Time: 3.5 hours for fully discharged batteries.
- Battery life: 10+ hours operation
- AC: 15-VDC, 1-amp AC adapter for continuous operation or charging

### **A.4 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

## **A.5 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

## **A.6 Serial Port**

**Connector**—DB9

**Baud Rate**—300 to 57,600 baud

**Parity**—None

**Length**—8 bits

**Handshaking**—None, RTS/CTS, and X-ON/X-OFF

## **A.7 Universal Serial Bus**

- Type: Self-powered device
- Link: 12 MBps full-speed bulk transfer with two 128-byte FIFOs and automatic retry
- Connector: Type “B” receptacle
- Recommended cable: Full-speed shielded twisted-pair with A-B plugs (USB V1.1 compliant)

## **A.8 MultiMediaCard Interface**

- Link: 4.6 MBps SPI mode with 16-bit CRC
- Format: 512-byte sector size, 32-bit FAT file system
- Socket: Non-locking seven-contact with ejector
- Recommended Media: Scandisk SDMB-xx or Infineon MultiMediaCard-F00xx (xx denotes memory size in megabytes)



## **A.9 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.

## **A.10 OMNIScanner 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, CAT 5E Link, CAT 5E Channel, CAT 5 Link 95 and 67 TSB, CAT 5 Channel 95 and 67 TSB, CAT 3 Link, CAT 3 Channel, TIA 568A
- ISO/IEC: Class F Link, Class E Link, Class D Link 50173, Class D Channel 50173, Class D 11801-95, Class C Link 50173, Class C Channel 50173, ISO 11801 Equation
- Vendor: OMNIScanner supports several vendor-specific Autotests
- IEEE: 10 BASE-T, 100 BASE-X, 1000 BASE-T, 16-Mbps Token Ring, 4-Mbps Token Ring, 1000BASE-SX (50-micron), 1000BASE-SX (65.2-micron), 1000BASE-LX (50-micron), 1000BASE-LX (65.2-micron), 100BASE-F, 10BASE-FL, 10BASE-FB, Token Ring
- ATM: ATM155 Mbps, ATM 51 Mbps, ATM 155, ATM 155 SWL, ATM 622 (62.5 micron)
- FDDI
- Fiber Channel
- AS/NZ: AS/NZ D Link, AS/NZ D Channel, AS/NZ C Link, AS/NZ C Channel
- ANSI: FDDI Orig. 62.5 uM, FDDI Orig 50 uM, FDDI L/C 62.5 uM, FDDI L/C 50 uM, Fiber Channel 266 62.5 uM, Fiber Channel 266 50 uM

## **A.11 OMNISCanner 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
- Coax Tests: Length, Delay, Impedance, Resistance

## **A.12 OMNIFiber Test Functions**

- Multi-mode fiber: Length, Propagation Delay, Loss
- Single-mode fiber: Loss

## **A.13 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.

## **A.14 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 typical specifications for important instrument parameters relating to the measurement accuracy models.

<b>Instrument Parameter</b>	<b>@100 MHz</b>	<b>@200 MHz</b>	<b>@300 MHz</b>
Residual NEXT	>105 dB	>105 dB	>100 dB
Noise Floor	>100 dB	100 dB	>95 dB
Detector Accuracy	0.2 dB	0.2 dB	0.2 dB
Output Signal Balance	50 dB	45 dB	40 dB
Common Mode Rejection	50 dB	45 dB	40 dB
Port Match Error	0.1 dB	0.2 dB	0.5 dB
Directivity	50 dB	50 dB	45 dB
RL Tracking	0.05 dB	0.05 dB	0.05 dB
RL Source Match	50 dB	45 dB	40 dB

### **A.15 Wire Map**

- Finds miswires, opens, shorts, and 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

### **A.16 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
- Accuracy: Significantly exceeds Level III requirements
- Measurement Resolution: 0.1dB

### **A.17 Return Loss**

- Measures Return Loss on all four pairs from both directions using OMNIRemote
- Frequency Range: 1.0 to 300 MHz
- Dynamic Range: > -35 dB

- Factory-calibrated to ensure measurement port match to reference 100 ohm impedance.
- Measurement accuracy: Significantly exceeds Level III accuracy requirements.
- Measurement resolution: 0.1dB

## A.18 Attenuation

- Tests all four pairs using OMNIRemote as far-end active signal injector.
- Frequency Range: 1.0 to 300 MHz
- Dynamic Range: > 60 dB
- Measurement Accuracy: Significantly exceeds Level III requirements
- Measurement resolution: 0.1 dB

## A.19 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: Significantly exceeds Level III accuracy requirements.
- Measurement Resolution: 0.1 dB

## A.20 ACR (Attenuation to Crosstalk Ratio)

Computed for 6 pair combinations from both ends at all frequency points from the respective pair to pair NEXT and Attenuation measurements.

## A.21 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 3 dB less than the attenuation.

**A.22 Length**

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

**A.23 Resistance**

- Range: 0 to 500  $\Omega$
- Accuracy:  $\pm 0.5 \Omega @ 0$  to 15  $\Omega$ ;  $\pm 2\% @ 15$  to 500  $\Omega$
- Resolution: 0.1  $\Omega$

**A.24 Power Sum NEXT, ACR and ELFEXT**

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

**A.25 Optical Measurements (OMNIFiber)**

- +3 dBm to -55 dBm
- 0.01 dB resolution
- $\pm 0.25$  dB typical accuracy

**A.26 Length (OMNIFiber)**

- Maximum 6600 ft. (2000 m)
- 1 ft. (1 m) resolution

**A.27 Delay (OMNIFiber)**

- 0 to 10,000 nS
- 1 nS resolution

## **A.28 High-Voltage Input Protection**

The test interface withstands input hazard conditions that arise from normal telephone interfaces (48 VDC at less than 80 nA) 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.**

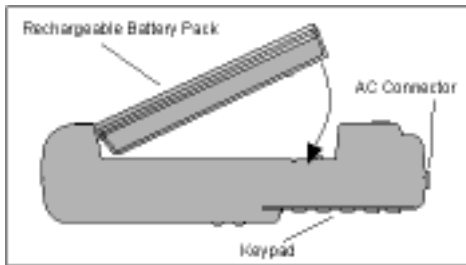
# Appendix B: Batteries

## B.1 Batteries

OMNIScanner and OMNIRemote are powered by rechargeable, recyclable battery packs.

Under various state and local laws, it may be illegal to dispose of this battery pack in 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 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.



The 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 affected by the temperature conditions under which charging is performed. Charging at room temperature (77°F/25°C) maximizes the battery life.

OMNIScanner and OMNIRemote 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.

## **B.2 Battery Charging**

Charging of the battery is enabled in the OMNIScanner and OMNIRemote whenever the AC adapter is plugged in and the units are powered off.

The recharge time is typically 4.5 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 OMNIScanner, while LEDs indicate the status on the OMNIRemote unit.

Status conditions are as follows:

- Charge (RED) for OMNIRemote low-battery status
- Charge (GREEN) while OMNIRemote battery is charged
- Charge (GREEN) when battery is charged

## **B.3 Battery Tips**

- Power off the unit before changing the battery pack. Charging is only enabled when the unit is off.
- If not on AC power, the 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 battery pack is on maintenance (“trickle”) charge.
- The average time to recharge the battery pack is about 4.5 hours.
- To maximize battery pack life, avoid extreme temperatures.
- Using OMNIScanner with the backlight turned ON causes increased battery drain. (See Chapter 1, Introduction: OMNIScanners Keypad: Backlight.)
- Average daily life of the battery pack is about 10 hours.
- An external charger is also available. Contact Black Box for details.



# Appendix C: OMNIFiber PASS/FAIL Criteria

For the latest cable installation, international standards, and conformance techniques:

[http://cabletesting.com/Fiber\\_Standards.html](http://cabletesting.com/Fiber_Standards.html)

**Formula 1:** 568A Equation for 850 nm fiber:

$(\# \text{ of mated connections} \times 0.75) + (\# \text{ of splices} \times 0.3) + (\text{length} \times 3.75 \text{ dB}/1000 \text{ m}) = \text{OLB}^*$

**Formula 2:** 568A Equation for 1300 nm fiber:

$(\# \text{ of mated connections} \times 0.75) + (\# \text{ of splices} \times 0.3) + (\text{length} \times 1.5 \text{ dB}/1000 \text{ m}) = \text{OLB}^*$

**Formula 3:** 11801 Equation for 850 nm fiber:

$(\# \text{ of mated connections} \times 0.75) + (\# \text{ of splices} \times 0.3) + (\text{length} \times 3.5 \text{ dB}/1000 \text{ m}) = \text{OLB}^*$

**Formula 4:** 11801 Equation for 1300 nm fiber:

$(\# \text{ if mated connections} \times 0.75) + (\# \text{ of splices} \times 0.3) + (\text{length} \times 1 \text{ dB}/1000 \text{ m}) = \text{OLB}^*$

\*Optical Link Budget (OLB) is the loss measured in a fiber link. Loss in the connectors, the splices, and the cable are added up to the total link loss or OLB.

The TIA 568A Equation and the ISO 11801 Equation specify the OLB. Each has certain PASS/FAIL criteria based on the number of connectors and splices located along the cable to be tested. These amounts can be entered as test limits. OMNIScanner then calculates optical power loss as follows: Max. Loss (dB) = Cable Loss + Connector Loss + Splice Loss.

The Optical Link Budget (OLB) is the PASS/FAIL point in dB. The number of connections and splices is entered in the first Autotest screen.

# Appendix D: Cable Pinouts

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

## D.1 Serial Cable DB9 Female to DB9 Male Pinouts

DB9 Female	DB9 Male
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

## D.2 Serial Cable DB9 Female to DB25 Male Pinouts

DB9 Female	DB25 Male
1	8
2	3
3	2
4	20
5	7
6	6
7	4
8	5
9	22

**D.3 Serial Cable DB25 Female to DB25 Male Pinouts**

DB25 Female		DB25 Male	
2	-----	2	
3	-----	3	
4	-----	20	
5	-----	5	
6	-----	6	
7	-----	7	
8	-----	8	
20	-----	4	
22	-----	22	

**D.4 Cable Pinout Signals**

The signals for the cable pinouts are as follows:

DB9 Male Pin	DB25 Male Pin	Signal	DB25 Female Pin	DB9 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 Terminal 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

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