



OF-500 OptiFiberTM

Certifying OTDR

Technical Reference Handbook

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Chapter 1

Getting Acquainted

Note

While this manual describes specific operating procedures for the OptiFiber tester, the fiber test methods described are provided only as guidelines. Your test methods may vary.

Overview of Features

The OF-500 OptiFiber™ Certifying OTDR (hereafter referred to as the tester) is a hand-held Optical Time Domain Reflectometer (OTDR) that locates and characterizes reflective and loss events in multimode and singlemode fibers. The tester is optimized for use on the shorter fiber runs typically installed in premises (building and campus) networks. Typical test ranges are up to 2 km for multimode fiber and up to 10 km for singlemode fiber.

The tester offers the following features:

- Automated OTDR trace and event analysis help you identify and locate faults on multimode (850 nm and 1300 nm; 50 μ m and 62.5 μ m) and singlemode (1310 nm and 1550 nm; 9 μ m) fiber.
- Displays OTDR results in summary format, as a table of events, or as an interpretive OTDR trace. PASS/FAIL results are based on factory-installed limits or limits you specify.
- ChannelMap™ function provides an intuitive diagram of the connectors and segment lengths in a channel.
- Optional FiberInspector™ Video Probe lets you inspect fiber endfaces and save the images.

- Optional modules add power meter and loss/length test set functions to the standard OTDR.
- Saves hundreds of test results on a removable memory card or in internal memory.
- Context-sensitive online help gives you quick access to operating instructions and fiber troubleshooting information.
- LinkWare™ software lets you upload test results to a PC and create professional-quality test reports.

Registration

Registering your product with Fluke Networks gives you access to valuable information on product updates, troubleshooting tips, and other support services.

To register fill out and return the postage-paid card provided, or fill out the online registration form on the Fluke Networks website at

www.flukenetworks.com/registration.

Contacting Fluke Networks

Note

If you contact Fluke Networks about your tester, have the tester's software and hardware version numbers available if possible.

Visit the Fluke Networks website at
www.flukenetworks.com.

Send email to support@flukenetworks.com.

To call us:

- Australia: 61 (2) 8850-3333 or 61 3 9329 0244
- Beijing: 86 (10) 6512-3435
- Brazil: 11 3044 1277
- Canada: 1-800-363-5853
- Europe: +44 1923 281 300
- Hong Kong: 852 2721-3228
- Japan: +81-3-3434-0181
- Korea: 82 2 539-6311
- Singapore: +65-6738-5655
- Taiwan: (886) 2-227-83199
- USA: 1-800-283-5853
- Anywhere in the world: +1-425-446-4519

Visit our website for a complete list of phone numbers.

Unpacking

The OF-500 OptiFiber packages come with the accessories listed below. If something is damaged or missing, contact the place of purchase immediately.

Model OF-500-01

- OF-500 OptiFiber tester with battery pack
- OFTM-5610 multimode OTDR module
- 62.5/125 μm multimode launch fiber, 100 m, SC/SC
- SC/SC adapter
- Carrying strap
- 16 MB memory card
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD
- Warranty registration card

Model OF-500-02

- OF-500 OptiFiber tester with battery pack
- OFTM-5611 multimode OTDR module with power meter option
- 62.5/125 μm multimode launch fiber, 100 m, SC/SC
- One 62.5/125 μm multimode patch cord, 2 m, SC/SC
- One 62.5/125 μm multimode patch cord, 0.3 m, SC/SC
- SC/SC adapter
- Soft carrying case for tester
- Carrying strap
- 16 MB memory card
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD
- Warranty registration card

Model OF-500-10

- OF-500 OptiFiber tester with battery pack
- OFTM-5612 multimode OTDR module with power meter and loss/length options
- OFTM-5350 FiberInspector Video Probe with adapter tip kit
- 62.5/125 μm multimode launch fiber, 100 m , SC/SC
- One 2.5/125 μm multimode patch cord, 2 m, SC/SC
- One 62.5/125 μm multimode patch cord, 0.3 m, SC/SC
- SC/SC adapter
- Soft carrying case for tester
- Carrying strap
- Soft carrying case for accessories
- Hard carrying case for tester
- 16 MB memory card
- USB memory card reader
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD
- Warranty registration card

Model OF-500-20

- Two OF-500 OptiFiber testers with battery packs
- Two OFTM-5612 multimode OTDR modules with power meter and loss/length options
- Two OFTM-5350 FiberInspector Video Probes with adapter tip kits
- Two 62.5/125 μm multimode launch fibers, 100 m , SC/SC
- Four 62.5/125 μm multimode patch cords, 2 m, SC/SC
- Two 62.5/125 μm multimode patch cords, 0.3 m, SC/SC
- Two SC/SC adapters
- Two soft carrying cases for testers
- Two carrying straps
- Two soft carrying cases for accessories
- Two hard carrying cases for testers
- Two 6 MB memory cards
- USB memory card reader
- Two USB cables for PC communications
- Two ac adapters
- Two Users Manuals
- Two Product Manuals CDs
- LinkWare Software CD
- Warranty registration card

Model OF-500-30

- OF-500 OptiFiber tester with battery pack
- OFTM-5611 multimode OTDR module with power meter option
- OFTM-5631 singlemode OTDR module with power meter option
- OFTM-5354 FiberInspector Video Probe with adapter tip kit
- 62.5/125 μm multimode launch fiber, 100 m , SC/SC
- 9/125 μm singlemode launch fiber, 130 m , SC/SC
- Two 62.5/125 μm multimode patch cords, 2 m, SC/SC
- One 62.5/125 μm multimode patch cord, 0.3 m, SC/SC
- Two 9/125 μm singlemode patch cords, 2 m, SC/SC
- One 9/125 μm singlemode patch cord, 0.3 m, SC/SC
- One SC/SC adapter
- Soft carrying case for tester
- Carrying strap
- Soft carrying case for accessories
- Hard carrying case for tester
- 16 MB memory card
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD
- Warranty registration card

Powering the Tester



Read the safety information at the beginning of Chapter 2 before using the tester.

You can power the tester with the ac adapter included or with the removable lithium ion battery pack.

Press  to turn the tester on.

Charging the Battery

Before you rely on battery power for the first time, charge the battery for about 2 hours with the tester turned off.

You can also charge the battery when it is detached from the tester, as shown in Figure 1-1.

A fully-charged battery lasts about 8 hours during typical use. The battery typically takes about 4 hours to fully charge when the tester is turned off.



Notes

You do not need to fully discharge the battery before recharging it.

The battery will not charge if its temperature is outside the range of 32 °F to 113 °F (0 °C to 45 °C).

Checking the Battery Status

Many of the tester's screens show a battery status icon near the lower-right corner.

To see more information about the battery status press ; then select **Battery Status**. Press  for detailed information about the battery status screen.

The battery pack has its own LED power gauge, which you can activate by pressing the small button near the LEDs, as shown in Figure 1-1. The LEDs indicate the charge level as follows:

- No LEDs lit or 1 flashing: < 10 % charge
- 1 LED lit: 10 % to 33 % charge
- 2 LEDs lit: 33 % to 67 % charge
- 3 LEDs lit: > 67 % charge

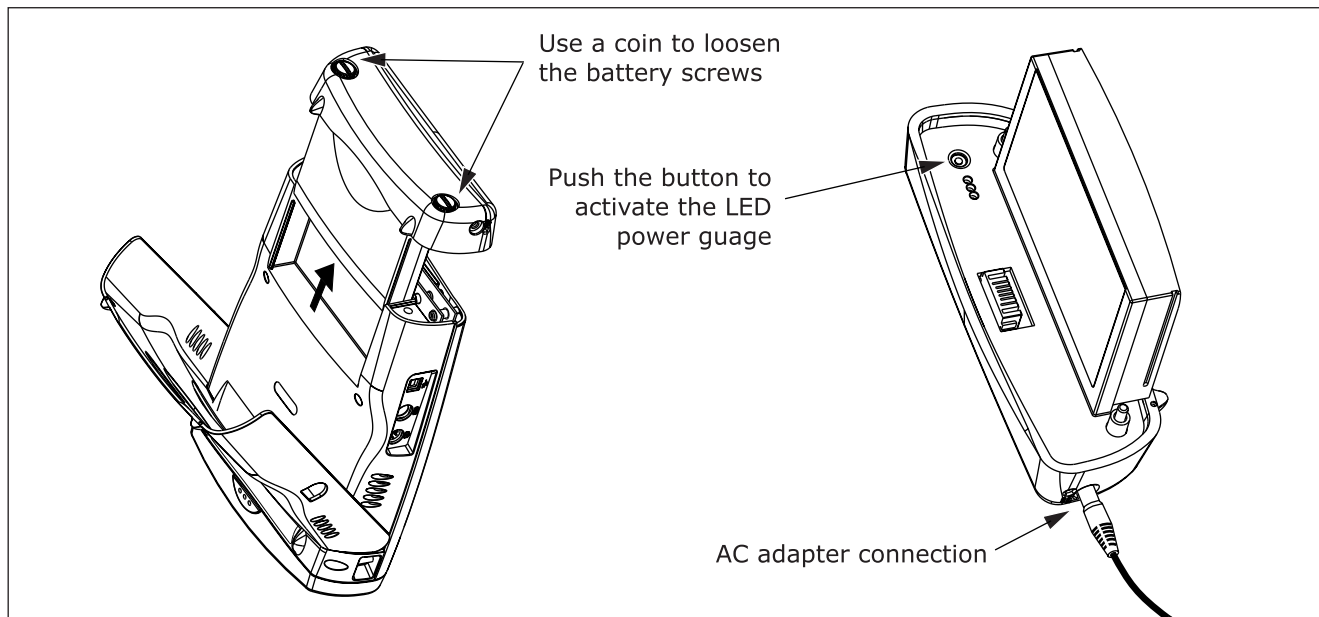









Figure 1-1. Battery Pack Features

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Changing the Language

To change the tester's language, do the following:

1. Press .
2. Press  once to select the **System** tab.
3. Press  to select **LANGUAGE**; then press .
4. Use   to select the desired language; then press .

Additional languages for the tester may be available with software updates available on the Fluke Networks website. Use LinkWare software to install or remove languages. See "Updating the Tester's Software" in Chapter 10 for details.

Removing and Installing the Module

The tester's capabilities depend on which test module is installed. Figure 1-2 shows how to remove the module.

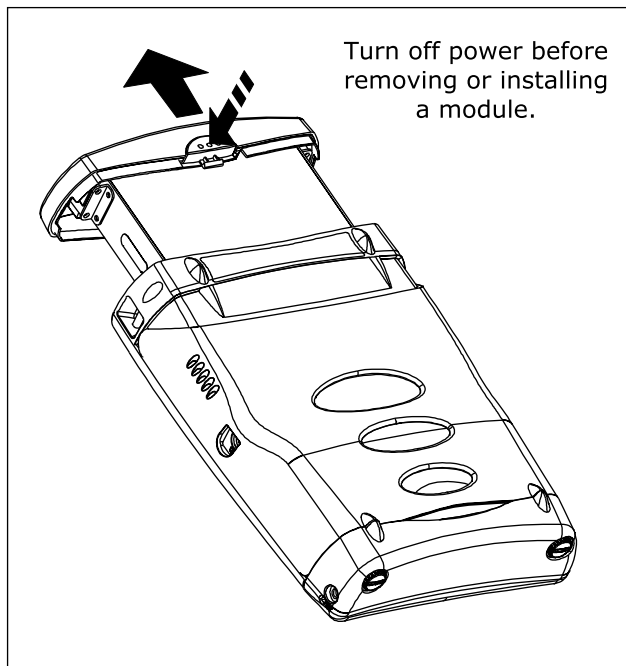
Caution

To avoid corrupting the tester's software, always turn the tester off before removing or installing the module.

Verifying Operation

The tester performs a basic self-test when you turn it on. If the tester reports an error or does not turn on, refer to "If Something Seems Wrong" in Chapter 10.

The tester shows the model number of the installed module in the upper-right corner of the screen. If the screen shows **No Module Installed** or **Problem with Module** or **The module needs a software update** refer to "If Something Seems Wrong" in Chapter 10.



ajt56f.eps

Figure 1-2. Removing the Module

Basic Features

The following sections describe the tester's basic features and introduce the tester's menu system.

Front Panel Features

Figure 1-3 describes the tester's front panel features.

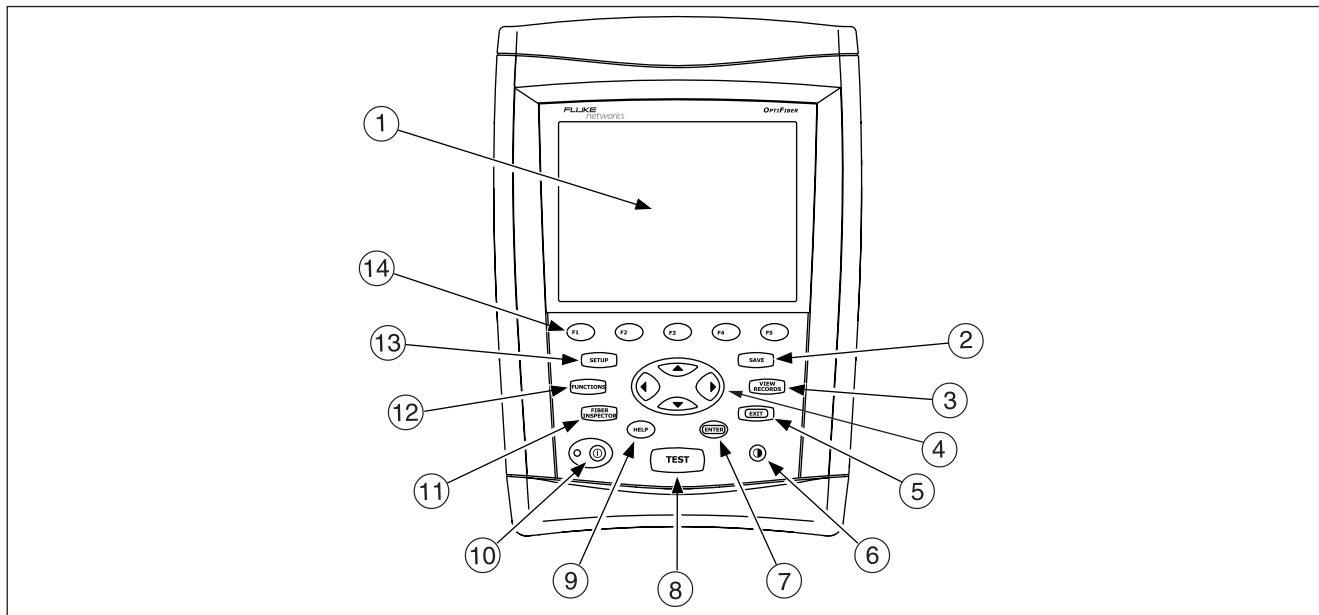


Figure 1-3. Front Panel Features

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


- ① LCD display with backlight and adjustable brightness.
- ② **SAVE**: Saves test results on the removable memory card or in internal memory.
- ③ **VIEW RECORDS**: Shows the test records saved on the memory card or in internal memory.
- ④ : Navigation keys let you move the cursor or highlighted area on the screen and increment or decrement alphanumeric values.
- ⑤ **EXIT**: Exits the current screen.
- ⑥ : Lets you adjust the display brightness.
- ⑦ **ENTER**: Selects the highlighted item on the screen.
- ⑧ **TEST**: Starts the currently selected fiber test. The test that will run is shown in the upper-left corner of the display. To change the test, press  **Change Test** from the **HOME** screen or select a test from the **FUNCTIONS** menu.
- ⑨ **HELP**: Shows a help topic related to the current screen. To see the help index, press **HELP** again.
- ⑩ : On/off key.
- ⑪ **FIBER INSPECTOR**: Activates the optional FiberInspector video probe, which lets you inspect fiber endfaces and save the images with test results.
- ⑫ **FUNCTIONS**: Shows a list of additional test, configuration, and status functions.
- ⑬ **SETUP**: Shows the menus you use to configure the tester.
- ⑭ : The five softkeys provide functions related to the current screen. The current functions are shown on the screen above the keys.

Figure 1-3. Front Panel Features (cont.)

Side and Top Panel Features

Figure 1-4 describes the tester's connectors and other features on the side and top panels.

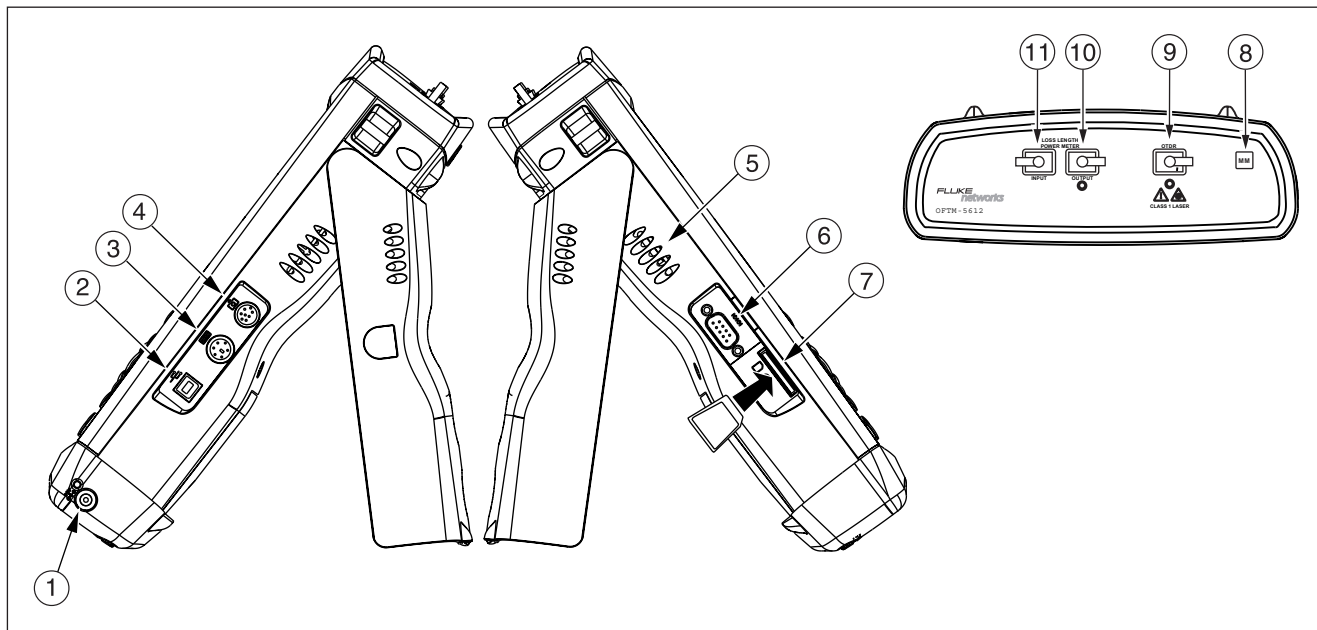


Figure 1-4. Connectors

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- | | |
|---|---|
| ① Connector for the ac adapter. The LED turns on when the adapter is connected to ac power. | ⑦ Slot for the removable memory card. The LED lights when the tester is writing to or reading from the memory card. |
| ② USB port for uploading test reports to a PC and downloading software updates from a PC to the tester. See the LinkWare documentation for details on using the USB port. | ⑧ Multimode (MM) or singlemode (SM) label for the module. |
| ③ Six-pin mini DIN connector for an optional external PS2 keyboard. | ⑨ SC connector for the OTDR. The LED lights when the laser is active. |
| ④ Eight-pin mini DIN connector for the optional FiberInspector video probe. | ⑩ SC output connector. Transmits optical signals for loss/length tests. |
| ⑤ Fan vents. | ⑪ SC input connector. Receives optical signals for power measurements and loss/length tests. |
| ⑥ RS-232C serial port for uploading test reports to a PC and downloading software updates from a PC to the tester. See the LinkWare documentation for details on using the serial port. | <p>⚠️ Warning</p> <p>Never look directly into optical connectors. Some sources produce invisible radiation that can permanently damage your eyes.</p> |

Figure 1-4. Connectors (cont.)

The HOME Screen

The **HOME** screen shows important test and job settings you might need to change to configure the tester for your needs.

Figure 1-5 describes a typical home screen.

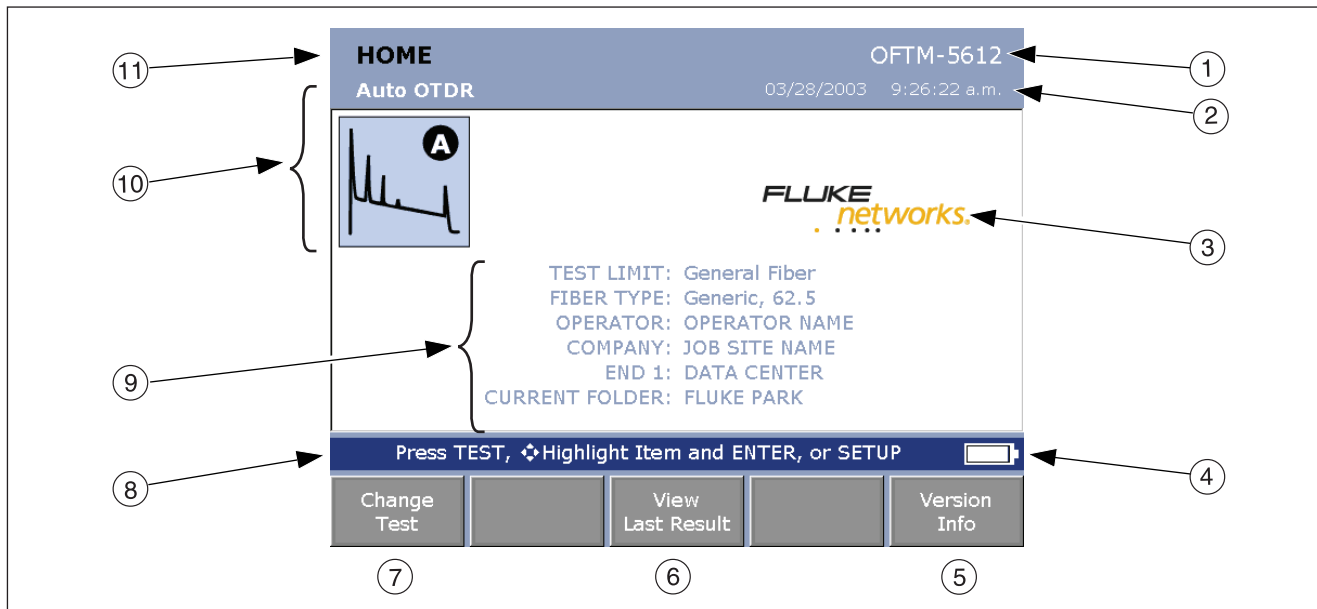


Figure 1-5. Home Screen for OTDR with Loss/Length Option

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- ① Model number of the installed module.
- ② The current date and time.
- ③ Owner's logo. See "Changing the Logo on the HOME Screen" on page 1-24.
- ④ Battery status icon. For more information about the battery, press **FUNCTIONS**; then select **Battery Status**.
- ⑤ Press **F5** to see the hardware and software versions and calibration dates for the tester and the installed module.
- ⑥ If the last test run was not saved, you can press **F3** **View Last Result** to see the test's results.
- ⑦ Press **F1** **Change Test** to switch test modes. See ⑩.
- ⑧ Action prompts. For most screens, this area prompts you on what keys to press.
- ⑨ Important test and job settings. To change these settings, use **◀ ▶ 🔍 ⏏** to highlight a setting; then press **ENTER**. Selecting **TEST LIMIT** or **FIBER TYPE** lets you change the item. Selecting the limit's or type's name lets you see that item's settings. You may also access the tester's settings by pressing **SETUP**.
- ⑩ The test mode, which determines what type of test will run when you press **TEST**. The available modes depend on which module is installed. To change the test mode, press **F1** **Change Test**.
- ⑪ The name of the current screen.

Figure 1-5. Home Screen for OTDR with Loss/Length Option (cont.)

Using the Setup Menus

To access the tester's settings press **SETUP**. Figure 1-6 introduces the **SETUP** menus.

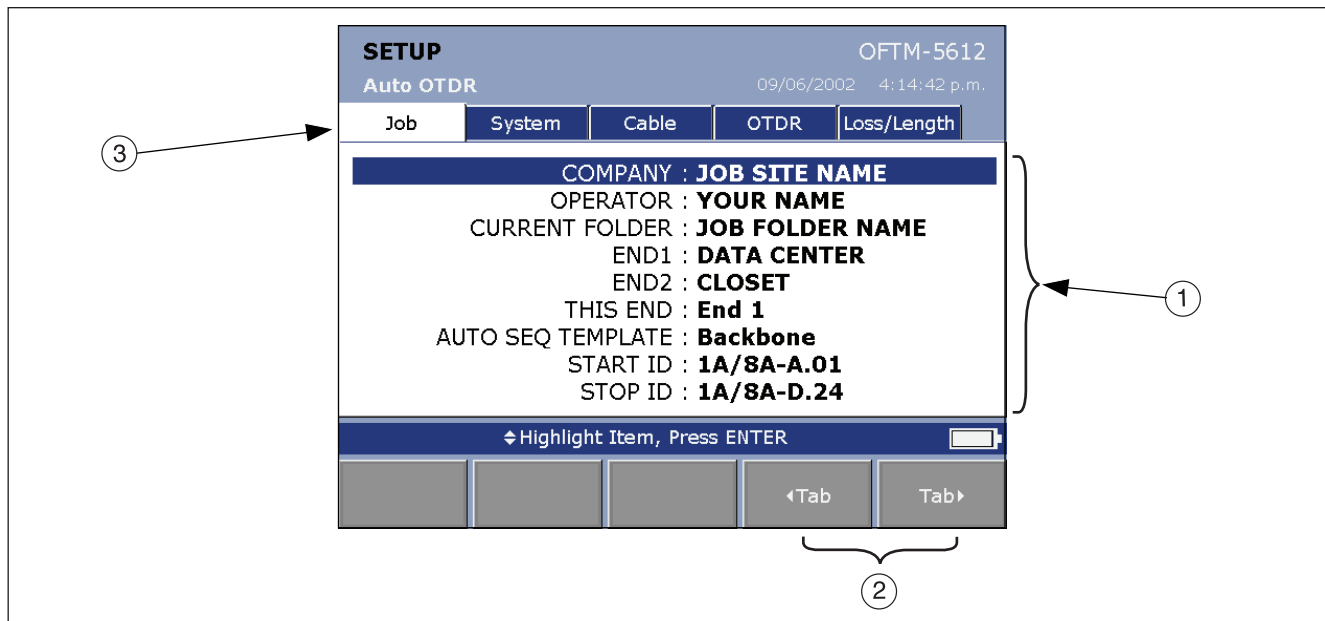


Figure 1-6. The SETUP Screen

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- ① The settings available on the current tab.

Note

To see details about a setting, highlight the setting; then press **HELP**.

- ② Use **F4** **Tab** and **F5** **Tab** to move among tabs on the **SETUP** screen.

- ③ Tabs for the setup menus:

- **Job** settings apply to the fiber installation you are testing and are stored with saved test results. Use these settings to identify the job site, set up cable ID lists, and identify which end of the cabling you are testing. See Chapter 2 for details.
- **System** settings let you localize the tester and set other user preferences, such as the power down timeout and camera type.

- The **Cable** tab lets you select the type of fiber cable you will test and define some cable characteristics for loss/length tests. You can also change the index of refraction if you do not want to use the default values.

Note


Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.

- The **OTDR** tab lets you select a test limit and wavelength for OTDR tests and enable launch fiber compensation. You can also change settings for Manual OTDR mode. See Chapter 3 for details.
- The **Loss/Length** tab appears if the module includes the loss/length option or power meter option (you can run loss tests in Far End Source mode with the power meter option). Use this tab to configure the loss/length test. See Chapter 6 for details.

Different or additional tabs may be available depending on the installed module.

Figure 1-7. The Setup Screen (cont.)

Checking the Software and Hardware Versions

To see the tester's software and hardware versions press  **Version Info.** from the **HOME** screen.

The **VERSION** screen shows the software and hardware versions and serial numbers of the tester and the installed module.


The software version information includes the date the software was compiled at the factory.

To determine if your tester needs a software update visit the Fluke Networks website to see if an update is available.

If "**Unknown**" is shown for the module software version the module software is probably quite old. Update the module software to the latest version.




The module information includes the date the module last received calibration at a Fluke Networks service center. The tester requires a traceable calibration at a Fluke Networks service center once a year to ensure that it meets or exceeds the published accuracy specifications.


Using the Online Help

When you press , the tester shows a help topic that relates to the current screen. Blue, underlined words are links to other topics.

Note

The help files are stored in the mainframe (rather than the module) and may describe features not present in the installed module.

To go to a linked topic (blue, underlined words) use   to highlight the words; then press .

To see an index of all help topics press  any time you are in the help system.

Tip: The highlighted area cycles through the links on the current screen if you continue to press the left or right arrow key.

To mark a topic for quick access later press **(F1) Set Bookmark** when the topic you want to mark is displayed. You can place multiple bookmarks.

To go to a bookmarked topic press **(F2) Go to Bookmark** while viewing help; then select the bookmark from the list.

To go back to the previous topic press **(F3) Back**.

Overview of Memory Features

You can save results on a removable memory card or in the tester's internal memory.

To set the location for saving tests press **(SETUP)** then select **CURRENT FOLDER** on the **Job** tab.

To check the memory status press **(FUNCTIONS)**; then select **Memory Status**. Press **(F1) Memory** to switch between the memory card and internal memory status.

See Chapter 8 for details about the tester's memory features.



Using the Memory Card

The tester comes with one 16 MB MultiMediaCard (MMC format). Figure 1-8 shows how to insert and remove a card.

Caution

Never remove the memory card while the memory card's LED is on. Doing so can corrupt the data on the card.

Press **(SETUP)**; then select **CURRENT FOLDER** on the **Job** tab to do the following:

- See the folders available on the memory card
- Change the destination for saved results. Use  or  to select a folder name; then press **(ENTER)**. You can save results on the memory card or in the tester's internal memory.
- Create a new folder on the memory card. Press **(F1) New Folder**. Enter a name in the **NEW FOLDER NAME** box; then press **(SAVE)**.
- Delete an empty folder on the memory card. Press **(F2) Delete**.

To format the memory card press **(FUNCTIONS)**; then select **Format Memory Card**.

Using the Internal Memory

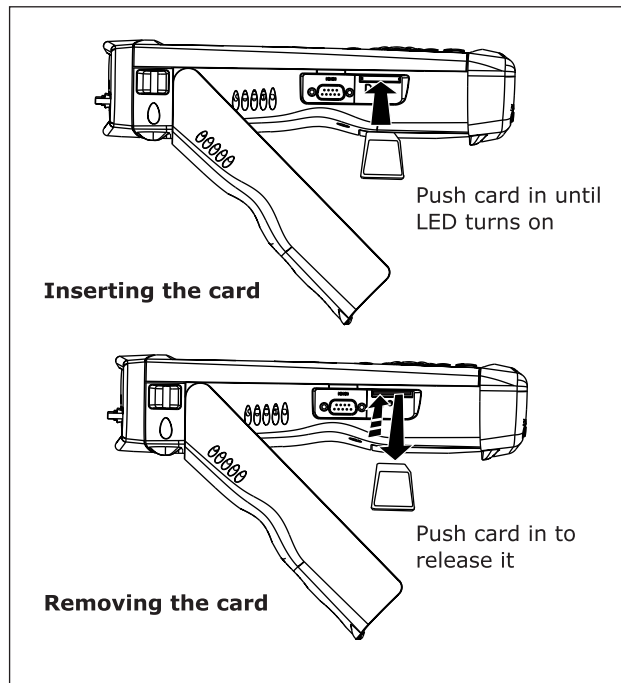
Internal memory lets you continue saving results if you run out of memory card space. Internal memory is in the mainframe (rather than in the module) and is retained when you turn off the tester or remove the battery pack.

See Chapter 8 for more information on the internal memory.

Using an External Keyboard

The keyboard jack on the right side of the tester accepts a 6-pin mini DIN (PS/2) plug. The tester accepts only the characters available on its text editing screen. Figure 1-9 shows which keys you can use on the keyboard.

The OptiFiber Product Manuals CD includes a full-size function key reference diagram that you can print, cut out, and attach to the keyboard.



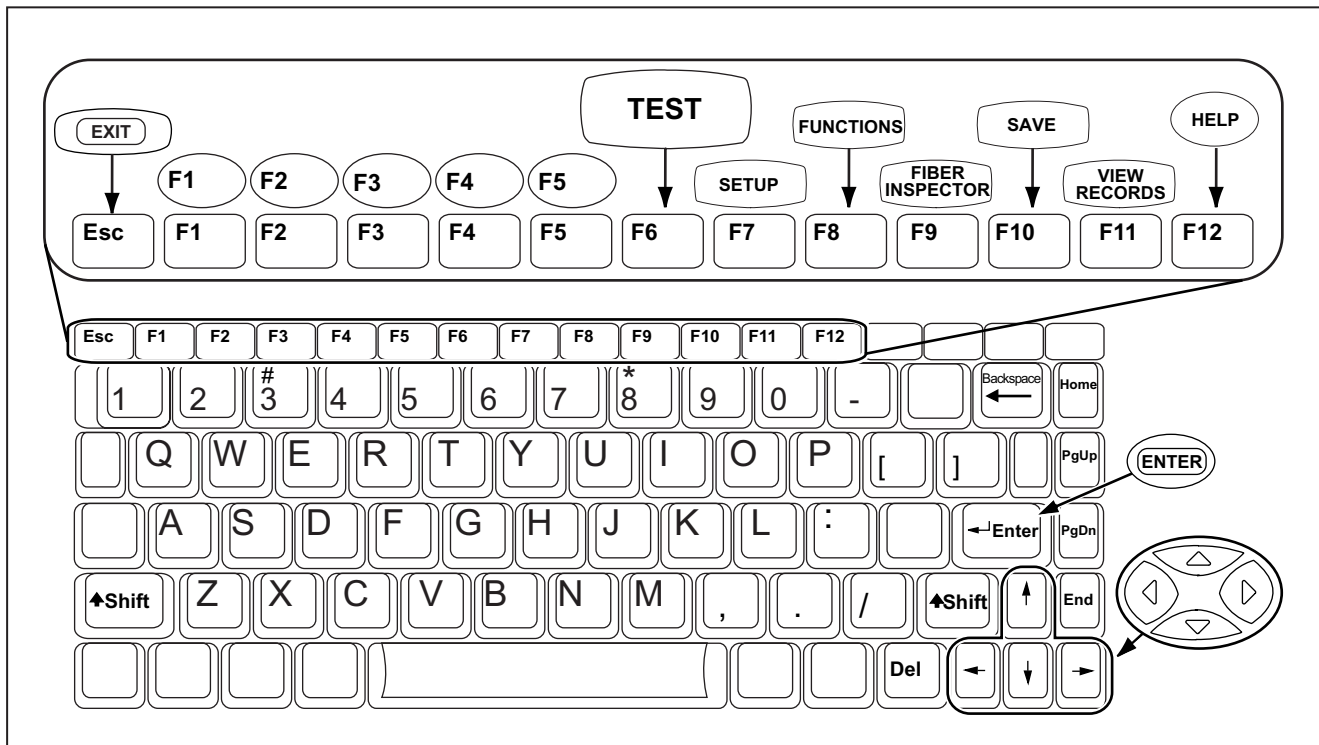


Figure 1-9. Using an External Keyboard






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Setting User Preferences



The following sections describe settings you may want to change when you first start using the tester.

Changing the Date, Time, and Numeric Formats



To set the date and time:

1. Press **SETUP**; then press **F5** to select the **System** tab.
2. Use  to highlight **DATE** or **TIME**; then press **ENTER**.
3. Use  or  to highlight the field you want to change; then use  or  to change the setting.
4. Press **SAVE** when you are finished.




To select a date, time, or numeric format:

1. Press **SETUP**; then press **F5** to select the **System** tab.
2. Use  to highlight **DATE FORMAT**, **TIME FORMAT**, or **NUMERIC FORMAT**; then press **ENTER**.
3. Use  to highlight the desired format; then press **ENTER**.

Changing the Length Units

1. Press **SETUP**; then press **F5** to select the **System** tab.
2. Use  to highlight **LENGTH UNITS**; then press **ENTER**.
3. Use  to highlight the setting you want; then press **ENTER**.

Adjusting the Display Brightness

Press  to see the brightness adjustment screen. Use  or  for coarse adjustments; use **F4** and **F5** for fine adjustments. Press **SAVE** when you are finished.

The setting is retained when you turn the tester off.

The brightness setting does not affect the battery life.

Using the Power Down Timer

The power down timer turns off the tester after a selected period of inactivity.

Halfway through the timer period, the tester beeps, the screen dims, and the tester enters a low-power mode. Thirty seconds before the timer reaches zero, the tester beeps again to alert you that it is about to turn off. Pressing any key restarts the timer.

If the timer is disabled, the screen dims after 30 minutes of inactivity to help conserve battery power.

Note

The power down timer is inactive when the ac adapter is connected or when the USB or RS-232 serial port is active.

1. Press **SETUP**; then press **F5** to select the **System** tab.
2. Press **ENTER**. Use **↵** to highlight the setting you want; then press **ENTER**.

Enabling or Disabling the Beeper

To enable or disable the tones for key presses and testing progress

1. Press **SETUP**; then press **F5** to select the **System** tab.
2. Use **↵** to highlight **AUDIBLE TONE**; then press **ENTER**.
3. Use **↵** to highlight the setting you want; then press **ENTER**.

Changing the Logo on the HOME Screen

The tester's **HOME** screen shows the Fluke Networks logo by default.

To change the logo on the **HOME** screen:

1. Register your tester with Fluke Networks to receive a registration key. See "Registration" on page 1-2 for details.
2. Use a graphics application to create a graphic with the following format:
 - Dimensions: 240 x 60 pixels maximum.
 - Colors: 128 colors maximum, with an indexed color palette.
 - File format: Save the graphic as an 8-bit bitmap file (.bmp) or an 8-bit Portable Networks Graphic file (.png).

Note

The graphics application may list 256 colors with the 8-bit setting; however, if your graphic uses only 128 or fewer colors, it should be compatible with the tester.

3. Press **FUNCTIONS**; then select **Enable OptiFiber Options**.
4. On the **OPTIFIBER OPTIONS** screen, highlight **CUSTOM LOGO**; then press **ENTER**.
5. Enter the software key in the **CUSTOM LOGO** key box; then press **SAVE**.
6. Use the OptiFiber custom logo utility in LinkWare software to download the logo to the tester. See the LinkWare documentation for details. The logo appears the next time you reboot.

Note

If the logo's format is not valid, the tester deletes the logo and uses the default logo.

You may also use LinkWare to restore the default Fluke Networks logo.

Enabling Software Options

To see the options available with the version of software installed in the tester press **FUNCTIONS**, highlight **Enable OptiFiber Options**; then press **ENTER**. Additional options may be available with software updates.

To see details about the available options press **HELP** from the **OPTIFIBER OPTIONS** screen.

To enable an option contact Fluke Networks to get a registration key; then select the option on the **OPTIFIBER OPTIONS** screen to enter the key.

About LinkWare Software

LinkWare™ Cable Test Management software lets you upload OptiFiber test records to PC, view test results, add ANSI/TIA/EIA-606-A administration information to records, and organize, customize, and print test reports. Details about using LinkWare software are provided in the LinkWare Getting Started Guide and the online help available under Help on the LinkWare menu.

Chapter 2

Getting Started Testing Fiber

Safety Information



Warning

To avoid possible eye damage caused by hazardous radiation and to avoid possible fire, electric shock, or personal injury:

- Never look directly into optical connectors. Some sources produce invisible radiation that can permanently damage your eyes.
- Never run any tests that activate the tester's outputs unless a fiber is attached to the output.
- Do not open the case; no user-serviceable parts are inside.
- Do not modify the tester.
- Do not use magnification to view the optical outputs without proper filtering.
- Use of controls, adjustments, or procedures not stated herein might result in hazardous radiation exposure.
- Use only ac adapters approved by Fluke Networks for use with the OptiFiber tester to charge the battery or power the tester.

- Do not use the tester if it is damaged. Inspect the tester before use.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Caution

To avoid damaging the tester or cables under test and to avoid data loss:

- Always turn the tester off before removing or installing a module.
- Never connect the OTDR port to an optical source. Doing so can damage the OTDR receiver.
- Never connect the tester to an active network, except when using the power meter. Doing so causes unreliable test results and can disrupt network operations.
- If the tester shows an error because the power reading is too high, immediately disconnect the source from the tester. The tester is not designed for measuring higher power levels, such as produced by CATV, optical amplifiers, and cellular systems.
- Avoid touching reflective surfaces (such as metal) to the end of a fiber cable plugged into the OTDR when the OTDR is operating. An open fiber connector endface has about a 4% reflection. Holding a reflective surface near the connector endface may cause much greater than a 4% reflection, which may damage the photodetector in the OTDR.
- Use proper cleaning procedures to clean all fiber connectors before every use. Neglecting this step or using improper procedures can cause unreliable test results and may permanently damage the connectors.
- Use a FiberInspector video probe to periodically inspect the tester's optical connectors for scratches and other damage.
- Read the instructions for splice machines before using the OTDR to monitor splicing procedures. The OTDR can interfere with the light injection detection techniques used by some splicers.
- To avoid unreliable test results, connect the ac adapter or replace the battery as soon as the low battery indication appears.

- **You may use a PC to move or copy test record (.tst) files from a memory card, but do not rename the .tst files. Doing so may result in loss of data.**
- **Never remove the memory card while the memory card's LED is on. Doing so can corrupt the data on the card.**

Cleaning and Inspecting Fiber Connectors and Adapters

Always clean and inspect fiber connectors before making connections. Use either of the following for cleaning:

- Lint-free swabs or wipes moistened with isopropyl alcohol
- Pre-moistened swabs or wipes approved for use on fiber connectors

Always dry connectors immediately after cleaning.

The FiberInspector video probe lets you inspect connectors and save endface images with test results. See Chapter 5 or the tester's online help for details.

Always cover unused connectors with dust caps or plugs. Clean dust plugs periodically with a swab or wipe and alcohol.

Periodically clean fiber-to-fiber adapters with a clean, dry pipe cleaner and compressed air. Use isopropyl alcohol on a pipe cleaner to remove stubborn dirt. Use a clean, dry pipe cleaner and compressed air to dry the adapter and blow away any remaining particles.

Testing Your Patch Cords and Launch Fiber

For the most reliable test results, test your patch cords and launch fiber before each job. Use the tester's loss/length option in Loopback mode, if available, or a loss test set to measure loss; then compare the loss to previous measurements.

With the loss/length option, you can use the FindFiber™ function in Loopback mode to quickly test patch cord and launch fiber continuity. See Chapter 6 for details.

You should also use a fiber microscope, such as the FiberInspector video probe, to inspect the patch cord and launch fiber connectors for damage at least once a day.

General Settings

The following sections describe settings you will usually need to make before running a test:

- Test mode
- Fiber type
- Test limit
- Job settings

You may also want to change the index of refraction if you do not want to use default values.

Information on settings specific to a particular test is provided in the chapter for that test. For information on setting user preferences, see Chapter 1.

Selecting a Test Mode

The test mode determines what type of test will run when you press **TEST**. The mode is shown in the upper-left corner of the **HOME** screen. To change the test mode, press **F1** **Change Test**; then select a test from the menu.

Selecting a Fiber Type

Note

Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.

To select a fiber type, press **SETUP**; then select **FIBER TYPE** on the **Cable** tab.

The selected fiber type determines which test limits are available, the default index of refraction, and other values used for testing.

You can also create custom fiber types based on specific needs. Custom types are marked with asterisks (*) in the fiber type list.

To create a custom fiber type, press **FUNCTIONS**, select **Edit Custom Test Limit**; then press **F3** **Edit Fiber Types**. See Chapter 9 for details.

Viewing Fiber Properties

To see the properties associated with a fiber type, do the following:

1. Press **SETUP**; then select the **Cable** tab.
2. Select **FIBER TYPE**.
3. Highlight a fiber type; then press **F1** **View Fiber Type**.

For details on fiber properties, see Chapter 9.

Selecting a Test Limit

Note

Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.

The tester offers generic and industry-standard test limits for testing fiber cable. The tester uses the selected limit to produce **PASS/ FAIL** results.

To select a test limit, press **SETUP**, select a test's tab; then select **TEST LIMIT**. Each test's tab shows only the limits that include the selected fiber type and parameters for that test.

Generic limits, such as **General Fiber** and **Document only**, let you run tests when no industry-standard limit applies and you do not want to create a custom limit. The **Document only** limit does not produce PASS/FAIL results.

Custom limits you create are marked with asterisks (*). To create a custom limit, press **FUNCTIONS**; then select **Edit Custom Test Limit**. See Chapter 9 for details.

Viewing Test Limits

To see the values of a test limit that includes the fiber type selected on the **Cable** tab, do the following:

1. Press **SETUP**; then select a test's tab.
2. Select **TEST LIMIT**.
3. Highlight a limit on the **SET TEST LIMIT** screen; then press **F1** **View Limit**.

If the Test Limit or Fiber Type is Not Valid with the Test

- The fiber type was changed on the **Cable** tab in Setup, and the current test limit does not include the fiber type. Select a different test limit.
- The fiber type or test limit is missing a wavelength the test uses. For example, you are trying to run a dual-wavelength OTDR test, but the fiber type or limit does not include both wavelengths. Select a different fiber type or test limit.
- The installed module does not support the selected fiber type or test limit. For example, a singlemode

fiber type is selected, but a multimode module is installed. Select a different fiber type or test limit or install a different module.

- The test limit does not include parameters for the type of test you are trying to run. For example, you are trying to run an OTDR test, but only loss/length limits are defined in the selected test limit. Select a test limit that includes limits for the test you want to run.

If you selected a custom fiber type or limit, you could also edit the fiber type or limit to make it valid with the test. See Chapter 9 for details.

Entering Job Settings

Job settings let you identify and organize the test results you save. To access the job settings press **SETUP**. Table 2-1 describes the job settings.

See “Tutorial: Preparing to Save Tests” on page 2-9 for examples of how to configure the job settings.

Table 2-1. Job Settings

Setting	Description
COMPANY	The customer name, job site, job work order, or other job identifier.
OPERATOR	The name of the OptiFiber user.
CURRENT FOLDER	The destination for tests you save. You can save tests in a folder on the memory card or in the tester's internal memory. Selecting CURRENT FOLDER also lets you create a new folder on the memory card. You cannot create folders in internal memory.
END 1, END 2	Names you assign to the ends of the cabling. The names are saved with test records and also appear on ChannelMap diagrams.
THIS END	The cable end where the tester is located. Based on this setting, the tester labels OTDR, ChannelMap, FiberInspector, and power meter results as END 1 or END 2 to indicate which end of the cabling you tested. Loss/length results are labeled END 1-2 or END 2-1 .
AUTO SEQ TEMPLATE	The name of the pattern selected for the list of sequential fiber IDs. See "Creating a List of Sequential IDs" on page 2-21 for details.
START ID, END ID	The first and last IDs in the auto sequence list. See "Creating a List of Sequential IDs" on page 2-21 for details.

Changing the Index of Refraction

The index of refraction is the ratio of the speed of light in a vacuum to the speed of light in a fiber. The tester uses the index of refraction to determine fiber length.

You can change the index of refraction on the **Cable** tab in Setup.

SetNScreenHelpWhen **MANUAL SETTING FOR n** on the **Cable** tab is disabled, the tester uses the n values specified in the selected fiber type.

When **MANUAL SETTING FOR n** is enabled, the tester uses the n values you enter.

The n values defined in the fiber types are suitable for most applications. Minor differences between the tester's n and a fiber's actual n usually do not make enough difference in length to fail a fiber.

You may want to change the index of refraction if

- The customer wants you to use a specific n value for the job.
- The cable's fibers are longer than its jacket, and you need to precisely locate a point on the cable (such as a fault). In this case, adjust n until the measured length matches a known length of fiber.

Increasing n decreases measured length.

Note

*If you try to enter a value outside the valid range for n, the tester shows **N/A** for the value. The valid range is 1.1 to 1.71 inclusive.*

To use the default n values specified in the selected fiber type, set **MANUAL SETTING FOR n** to **DISABLED**.

Tutorial: Preparing to Save Tests

The tutorial in this section guides you through setting up the tester to save tests.

Step 1: Creating a List of Sequential Fiber IDs

This step assumes the following scenario:




- You will be testing 12 cables in two patch panels: cables 1 through 6 in panel A and cables 1 through 6 in panel B.
- Both panels are located in telecommunications closet A on the third floor of the building.
- Your fiber IDs will follow the ANSI/TIA/EIA-606-A standard for horizontal links. See "About ANSI/TIA/EIA-606-A Fiber IDs" on page 2- 22 for details.

- 1-1. Press **SETUP**; then select **AUTO SEQ TEMPLATE** on the **Job** tab.
- 1-2. On the **AUTO SEQUENCE** screen, press **F1** **Change Template**; then select **Horizontal**.

- 1-3. On the **AUTO SEQUENCE** screen press **F4** **Default** to transfer the default pattern into the **START ID** and **STOP ID**.
- 1-4. On the **AUTO SEQUENCE** screen press **F2** **Edit Start**. Use the softkeys, **←** **→** **↔** **↔**, and **ENTER** to change the default ID to 03A-A01 in the **CURRENT START ID** box. Press **SAVE** when you are finished.
- 1-5. On the **AUTO SEQUENCE** screen press **F3** **Edit Stop**. Use the softkeys and **←** **→** **↔** **↔** to change the default ID to 03A-B06 in the **CURRENT START ID** box. Press **SAVE** when you are finished.
- 1-6. Press **F5** **Sample List**. You should see a list of 12 sequential fiber IDs: 03A-A01 through 03A-B06. If the tester beeps instead of showing the list, see "Solving Problems with Fiber ID Lists" on page 2-24.
- 1-7. Press **EXIT** to leave the sample list.
- 1-8. Press **SAVE** when you are finished setting up the list. The list is saved in the mainframe (not on the memory card or in the module).




Step 2: Setting Up a Job Folder

You can organize test results on the memory card by setting up a folder for each job, as follows:

- 2-1. Insert a formatted memory card into the tester.
- 2-2. Press **SETUP**; then select **CURRENT FOLDER** on the **Job** tab.
- 2-3. Press **F1** **New Folder**. Use the softkeys,   , and **ENTER** to enter a folder name into the **NEW FOLDER NAME** box. Press **SAVE** when you are finished.
- 2-4. Press **ENTER** to select the new folder as the current folder.







Step 3: Entering the Operator Name

For this tutorial you will enter your name as the operator.

- 3-1. Press **SETUP**; then select **OPERATOR** on the **Job** tab.
- 3-2. Use the softkeys,   , and **ENTER** to enter your name into the **OPERATOR** box. Press **SAVE** when you are finished.

Step 4: Identifying the Cabling Ends

For the OTDR and Loss/Length testing tutorials in this chapter, you will save test results from both ends of the cabling. To identify the test directions in the saved results, enter **END** information on the **Job** tab as follows:

- 4-1. On the **Job** tab select **END 1**. Use the softkeys,   , and **ENTER** to enter CLOSET into the **END 1** box. Press **SAVE** when you are finished.
- 4-2. On the **Job** tab select **END 2**. Use the softkeys,   , and **ENTER** to enter WORK AREA into the **END 2** box. Press **SAVE** when you are finished.
- 4-3. On the **Job** tab, verify that **THIS END** is set to **END 1**. Change it to **END 1** if necessary.

Tutorial: Running an OTDR Test

The tutorial in this section familiarizes you with the tester by guiding you through the following tasks:

- Using the tester's menu system
- Connecting the tester to a cable
- Running an OTDR test
- Viewing the results in several levels of detail
- Saving bi-directional test results

Required Equipment

- OptiFiber tester set up as follows:
 - Multimode module installed
 - Charged battery attached or the ac adapter connected



- Job settings configured as follows (see the tutorial "Preparing to Save Tests" on page 2-9 for configuration steps):
 - **START ID** and **STOP ID** set to 03A-A01 and 03A-B06
 - A job folder with any name created on the memory card
 - Your name as the operator
 - **END 1** set to CLOSET; **END 2** set to WORK AREA
 - **THIS END** set to **END 1**
- Fiber cabling to test: 50 m to 2 km (165 ft to 6500 ft) of multimode fiber. If possible, select cabling that has a connector somewhere along its length.
- A launch fiber that matches the type of cable you will test
- Fiber cleaning supplies

Step 1: Selecting Auto OTDR Mode




On the **HOME** screen, verify that **Auto OTDR** appears in the upper-left corner of the screen. If it does not, press


 **Change Test**; then select **Auto OTDR**.


Step 2: Selecting a Fiber Type and Test Limit

2-1. Press ; then press  **Tab** to select the **Cable** tab.

2-2. Use   to highlight **FIBER TYPE**; then press .


2-3. Use   to highlight the type of fiber you will test; then press  to select the fiber type.

2-4. On the **SETUP** screen press  **Tab** to select the **OTDR** tab. If **TEST LIMIT** is already set to **Document only**, go to step 3.

2-5. Press  to see the available test limits.

2-6. Use   to highlight **Document only**; then press  to select the limit.

Step 3: Selecting a Wavelength

3-1. From the **SETUP** screen, press  **Tab** to select the **OTDR** tab.

3-2. Change **WAVELENGTH** to **Dual 850/1300 nm**.

Step 4: Testing in the First Direction

4-1. Clean all fiber connectors.

4-2. Connect the launch fiber to the tester and to the cabling. Figure 2-1 shows these connections and typical features on an OTDR trace.

4-3. Press .

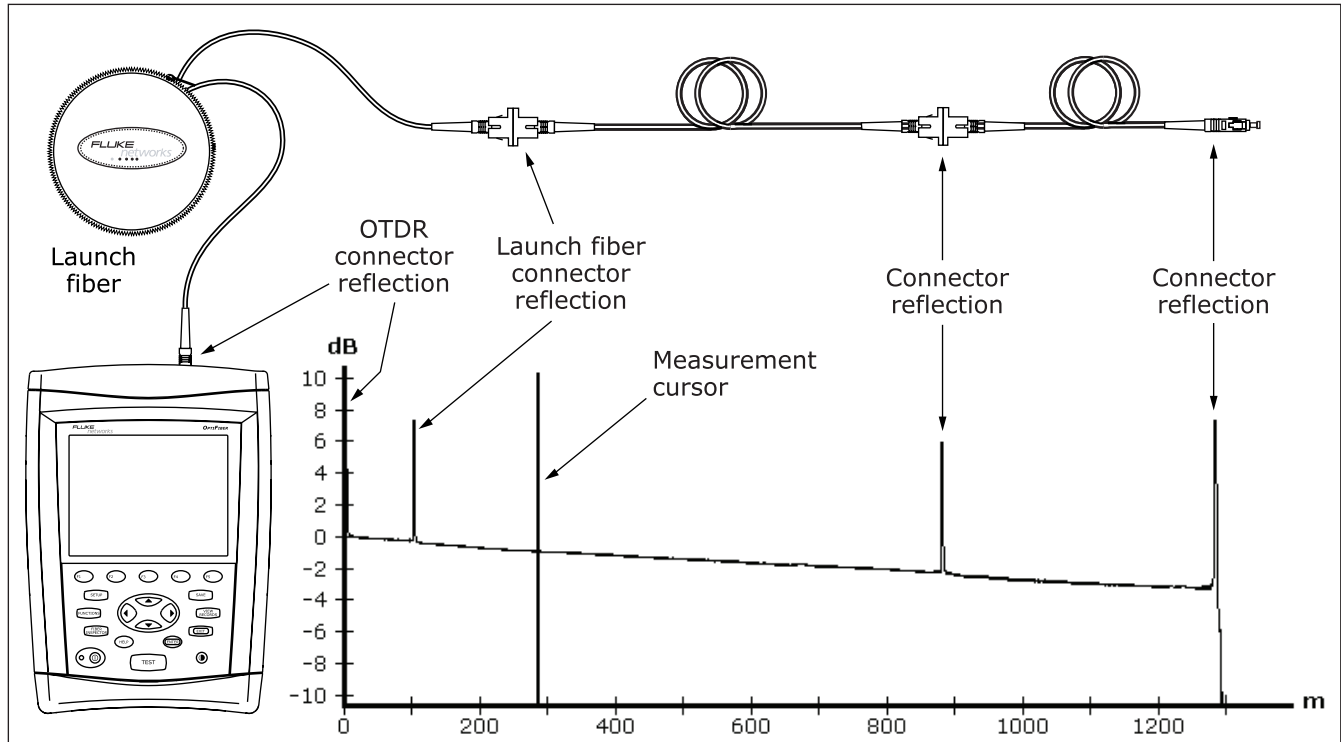


Figure 2-1. Typical OTDR Connections and Trace Features

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Step 5: Viewing the Results

The tester offers the following views of OTDR test results:

- The **SUMMARY** screen, shown when the test is finished, tells you if the cabling passed or failed based on the selected test limits.
- To see the OTDR trace, press **F1** **View Trace**. Figure 2-1 shows some features of a typical OTDR trace.
- To see a table of the events on the cabling, press **F2** **View Events**.

See Chapter 3 for details on OTDR results.

Step 6: Saving Results from the First Direction

- 6-1. Press **SAVE**.
- 6-2. If the tester shows a text editing screen, press **F1** **Pick ID** to access the fiber ID list you configured.
- 6-3. If the **UNUSED AUTO SEQUENCE IDs** list is not showing, press **F3** **Auto Seq IDs**.
- 6-4. The tester highlights the first unused ID in the **UNUSED AUTO SEQUENCE IDs** list. Press **SAVE** to save the test with this ID (03A-A01).

Step 7: Testing in the Second Direction

- 7-1. On the **Job** tab in Setup, change **THIS END** to **END 2**.
- 7-2. Clean the connector at the other end of the cabling, connect the launch fiber to the connector; then press **TEST**.

Step 8: Saving Results from the Second Direction

- 8-1. Press **SAVE**.
- 8-2. Press **F2** **Current Folder IDs** to see the IDs you have already used.
- 8-3. Select the ID 03A-A01; then press **SAVE**. The tester adds the results from the second direction to the test record.

This concludes the tutorial on using the OTDR. For more information on using the OTDR, see Chapter 3.

Tutorial: Running a Loss/Length Test

This section familiarizes you with the basic operation of the loss/length option by guiding you through a loss/length test in Smart Remote mode.

Required Equipment

- Two OptiFiber testers set up as follows
 - OFTM-5612 modules installed
 - Charged batteries attached or the ac adapters connected
 - Job settings configured as described in the tutorial “Preparing to Save Tests” on page 2-9
- Two lengths of fiber cabling or a length of duplex cabling to test
- Four known-good patch cords of the same fiber type as the cabling to be tested, with SC connectors at one end and connectors that match the cabling to be tested at the other end

- Two known-good short patch cords of the same fiber type and with the same connectors as the cabling to be tested
- Two known-good adapters of the appropriate type
- Fiber cleaning supplies

Step 1: Selecting Loss/Length Test Mode

On the **HOME** screen of both testers, verify that **LOSS LENGTH** appears in the upper-left corner of the screen. If it does not, press **(F1)** **Change Test** then select **Loss/Length**.


















Step 2: Selecting a Fiber Type


Do the following on the tester you will use to initiate tests (the main tester):

- 2-1. Press **(SETUP)**; then press **(F4)** **Tab** to select the **Cable** tab.
- 2-2. Use **(←)** **(→)** to highlight **FIBER TYPE**; then press **(ENTER)**.
- 2-3. Use **(←)** **(→)** to highlight the type of fiber you will test; then press **(ENTER)** to select the fiber type.

Step 3: Configuring the Loss/Length Test

Do the following on the tester you will use to initiate tests (the main tester) and on the remote tester where indicated:






- 3-1. From the **SETUP** screen, press  **Tab** to select the **LOSS/LENGTH** tab.
- 3-2. Press  to see the available test limits.
- 3-3. Use   to highlight **Document only**; then press  to select the limit.
- 3-4. Use   to highlight **REMOTE END SETUP**; then press .
- 3-5. Use   to highlight **Smart Remote**; then press .
- 3-6. Use   to highlight **THIS UNIT**; then press .
- 3-7. Use   to highlight **Main**; then press .

3-8. Use   to highlight **BI-DIRECTIONAL**; then press .

3-9. Use   to highlight **Disabled**; then press .

3-10. On the remote unit's **LOSS/LENGTH** tab set **REMOTE END SETUP** to **Smart Remote** and **THIS UNIT** to **Remote**.

Step 4: Setting the Reference

- 4-1. Clean the connectors on the tester and the four patch cords.
- 4-2. Press . Use   to highlight **Set Loss/Length Reference**; then press .
- 4-3. Connect the main and remote testers as shown on the **SET REFERENCE** screen and in Figure 2-2; then press .

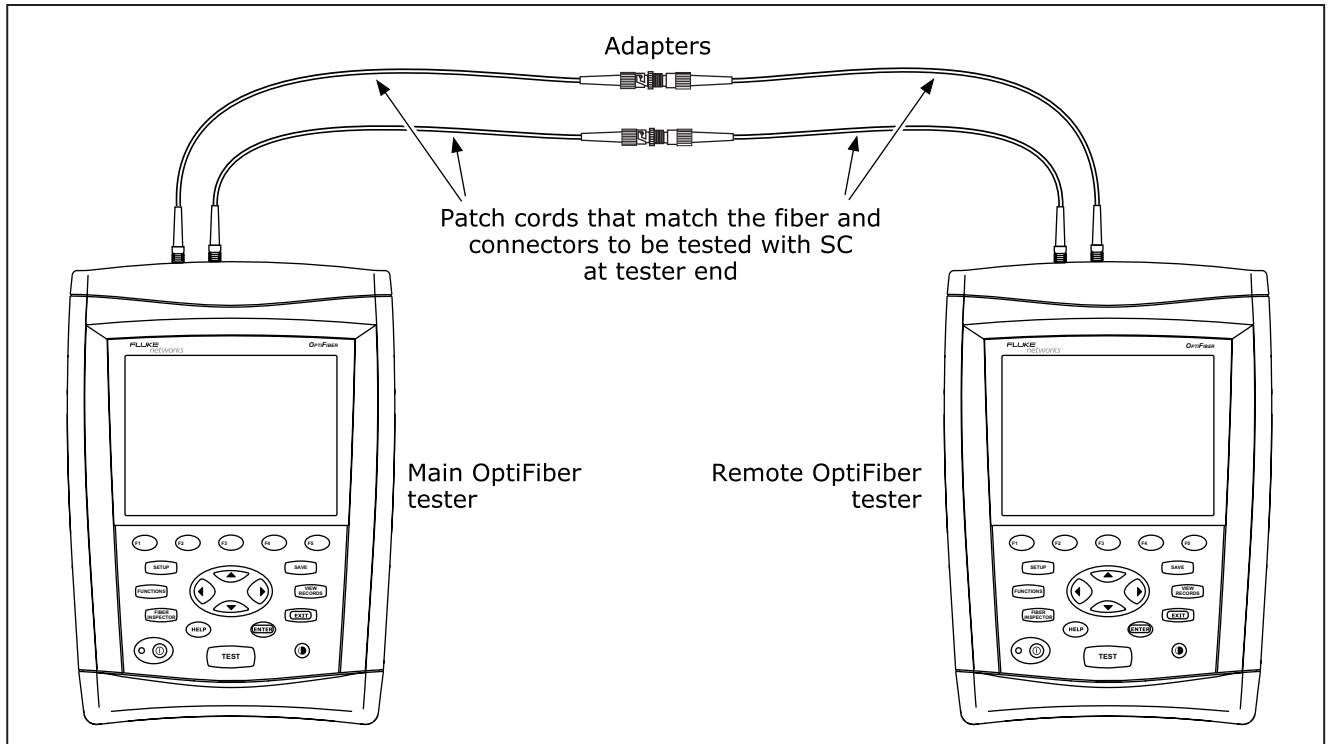


Figure 2-2. Smart Remote Mode Reference Connections

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Step 5: Running the Test

5-1. Make the connections for a Smart Remote mode test, as shown in Figure 2-3. Connect the main unit to the cabling end identified as **END 1** on the **Job** tab.

5-2. Press **TEST**.

Step 6: Viewing the Results

The tester offers the following views of loss/length test results:

- The **SUMMARY** screen, shown when the test is finished, tells you if the cabling passed or failed based on the selected test limits.
- To see more details about the cabling, press **F1** **View Results**.

See Chapter 6 for details on loss/length results.

Step 7: Saving the Results

Note

The tester saves Smart Remote test results in two separate records. One record is used for each fiber.

7-1. Press **SAVE**.

7-2. If the tester shows a text editing screen, press **F1** **Pick ID** to access the fiber ID list you configured.

7-3. The tester highlights the first unused ID in the **UNUSED AUTO SEQUENCE IDs** list. Press **SAVE** to save the results from one fiber.

7-4. Press **SAVE** again to save the results from the second fiber, using the next ID in the list.

This concludes the tutorial on using the loss/length option. See Chapter 6 for additional information on the loss/length option.

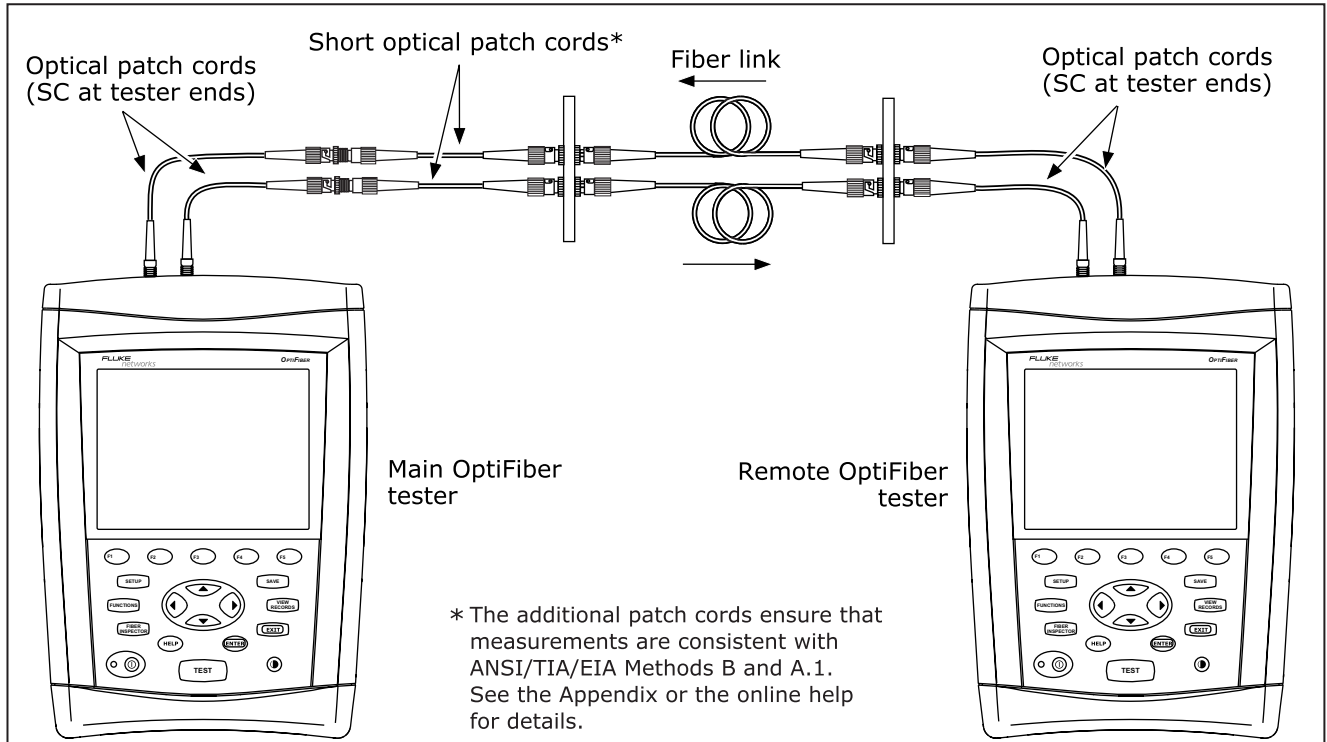


Figure 2-3. Smart Remote Mode Test Connections

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Fiber ID Options

You can create or select fiber IDs as follows:

- You can create an ID after you press **SAVE**. You can also highlight a used or unused ID in a list; then press **ENTER** to edit it into a new ID. The next time you press **SAVE**, the tester increments the last character of the ID you created (the auto increment feature).
- You can create a list of sequential fiber IDs by configuring a template on the **Job** tab in Setup. Select the IDs from the **AUTO SEQ IDs** list after you press **SAVE**.
- You can create ID lists in LinkWare software; then download them to the tester. Select the IDs from the **DOWNLOAD IDs** list after you press **SAVE**.
- After you press **SAVE**, you can use an ID already assigned to a record stored in the current folder. This lets you overwrite existing results or add new results to an existing record. Select the ID from the **IDs IN CURRENT FOLDER** list after you press **SAVE**.

Using the Auto Increment Feature

The auto increment feature increments the last alphanumeric character in the fiber ID you enter. For example, if you save a test with the ID "A0", the tester increments the ID to "A1" the next time you save a test. As you save more tests, the ID increments from "A1" through "A9"; then back to "A0". Consecutive digits increment from right to left, but other characters do not.

To use this feature, do the following:

1. Run a test; then press **SAVE**.
2. Enter a fiber ID in the **SAVE RESULT IN FIBER ID:** box. You may need to press **F1** **Edit ID** to see this box.
3. Press **SAVE** again.
4. The next time you press **SAVE**, the incremented fiber ID appears in the editing box. Press **SAVE** again to use the ID.

Creating a List of Sequential IDs

The tester includes templates for creating a list of sequential fiber IDs. Three of these templates meet the ANSI/TIA/EIA-606-A standard for documenting cabling installations, as summarized in the next section. A fourth template lets you create your own ID pattern.

Letters and numbers in sequential IDs increment from right to left. Special characters, accented letters, and matching letters do not increment. For example, the following start and stop IDs could be used for testing the cabling in two rooms where each room has three cable drops:

Start ID: ROOM A DROP#1

Stop ID: ROOM B DROP#3

These IDs produce the following ID list:

ROOM A DROP#1

ROOM A DROP#2

ROOM A DROP#3

ROOM B DROP#1

ROOM B DROP#2

ROOM B DROP#3

To create a list of sequential IDs, do the following:

1. Select **AUTO SEQ TEMPLATE** from the **Job** tab in Setup, press **(F1)** **Change Template**; then select a template.
2. Press **(F4)** **Default** to transfer the pattern to the **START ID** and **STOP ID**.
3. Press **(F2)** **Edit Start** or **(F3)** **Edit Stop** to enter appropriate characters into the start and stop IDs. Press **(SAVE)** when you are finished editing each ID.
4. To preview the list, press **(F5)** **Sample List**.
5. Press **(SAVE)** when you are finished.

The sequential ID list is stored in the mainframe (not on the memory card or in the module).

To use an ID from the list, do the following:

1. Run a test; then press **(SAVE)**.
2. Press **(F3)** **Auto Seq IDs** to select the list. You may need to press **(F1)** **Pick ID** first.
3. Highlight an ID; then press **(SAVE)**.

About ANSI/TIA/EIA-606-A Fiber IDs

The following sections give basic examples of the 606-A IDs. For detailed information, including ID formats for other elements in cabling installations, contact the TIA to purchase a copy of the 606-A standard.

The examples use the following abbreviations:

- f=floor number
- t=telecom room letter
- pp=patch panel letter
- p=port number
- c=backbone cable letter or number
- n=copper pair or fiber strand in backbone cable
- b=building

Horizontal Link Identifier

Horizontal links run between telecommunications closets and work areas.

Format: [f][t]-[pp][p]

Example: 11C-D32

The link tested was on floor 11 in telecom room C, patch panel D, port 32.

Backbone Cable Identifier

Backbone cables run between telecommunication closets, usually on different floors.

Format: [f1][t1]/[f2][t2]-[c].[nn]

Example: 01B/5C-D.10

The fiber tested is in the backbone cable that runs between floor 1, telecom room B and floor 5, telecom room C. The backbone cable is cable D. The fiber tested is fiber 10 in backbone cable D.

Campus Cable Identifier

Campus cables are backbone cables that run between buildings.

Format: [b1]-[f 1][t1]/[b2]-[f2][t2]-[c].[n]

Example: LBRY-01A/AUD-01A-5.16

The cable tested is in the backbone cable that runs between the library (LBRY), floor 1, telecom room A and the auditorium (AUD), floor 1, telecom room A. The backbone cable is cable 5. The fiber tested is number 16 in backbone cable 5.

Using Downloaded Fiber IDs

Use LinkWare software to create and download ID lists from a PC to the tester.

Downloaded ID lists are associated with a folder name you select when you download the list from a PC, but are saved in the tester's internal memory.

To use downloaded IDs, do the following:

1. Verify that the current folder has the same name as the folder selected when the list was downloaded to the tester. Change the current folder or create a new folder with the correct name, if necessary.
2. Run a test; then press **SAVE**.
3. Press **F4** **Download IDs** to select the list. You may need to press **F1** **Pick ID** first.
4. Highlight an ID; then press **SAVE**.

Solving Problems with Fiber ID Lists

Table 2-2 gives solutions to some typical problems you may have with fiber ID lists.

Table 2-2. Solving Problems with Fiber ID Lists

Problem	Solutions
The ID sequence is invalid.	<p>Verify that the types of characters in each position match between the start and stop IDs. For example, using the letter "O" as the third character in the start ID and the number "0" as the third character in the end ID causes an error.</p> <p>Verify that you are not trying to use accented characters as incrementing characters. You may use accented characters in IDs, but they must match between the start and stop IDs.</p> <p>Verify that the start and stop IDs have the same numbers of characters.</p> <p>Verify that the START and STOP IDs do not generate a sequence with more than 3000 IDs.</p>
When you press SAVE , you cannot find the ID list.	<p>After you press SAVE, press F1 Pick ID; then press the appropriate softkey to see the list.</p> <p>You can access downloaded IDs only if the name of the current folder matches the folder name selected when the list was downloaded from the PC. Downloaded ID lists are associated with a folder name, but are saved in internal memory. Switch to the correct folder or create a new folder with the correct name.</p>
You saved a test with an ID from a list, but the ID was not removed from the list.	<p>To use an ID from a list, highlight the ID; then press SAVE. If you highlight the ID, press ENTER, then press SAVE, the record is saved with the ID, but the ID is not removed from the list. In this case, you could test the fiber again, then save the results with the ID from the list, which will overwrite the results you saved previously and remove the ID from the list.</p>

Adding Comments to Test Results

After you run a test, you can press **F4** **Edit Comment** to add a comment to the results. You can select predefined comments or create a new comment.

The comment list is stored in the mainframe, not in the module or on a memory card.

To edit or create a comment press **F5** **Edit Text** on the **EDIT COMMENT** screen.

To add a predefined comment to the list press **F4** **Pick Comment** on the **EDIT COMMENT** screen; then press **F1** **New Comment**.

To select a predefined comment press **F4** **Pick Comment** on the **EDIT COMMENT** screen.

Press **SAVE** when you finished editing or selecting a comment.

Chapter 3

Using the OTDR



Warning

Read the safety information at the beginning of Chapter 2 before using the OTDR.

Setting Up for OTDR Testing

For information on configuring the tester's job settings, such as fiber IDs and folders for saving test results, see "General Settings" in Chapter 2.

For information on setting user preferences, such as length units and numeric formats, see "Setting User Preferences" in Chapter 1.

Selecting Auto or Manual OTDR Mode

Note

You should use Auto OTDR mode when certifying cabling with the OTDR.

From the **HOME** screen, press  **Change Test**. Select **Auto OTDR** or **Manual OTDR** from the popup menu.

You can also switch between test modes by selecting **Auto OTDR** or **Manual OTDR** from the **FUNCTIONS** menu.

In **Auto OTDR** mode, the tester automatically selects an appropriate range, resolution, and pulse width based on the length and overall loss of the cabling. This mode is the easiest to use, provides the most comprehensive view of the events on the cabling, and is the best choice for most applications.

Manual OTDR mode lets you change the range, resolution, and pulse width to optimize the OTDR for displaying specific events. See “Using Manual OTDR Mode” on page 3-32 for details.

About Launch and Receive Fibers

A launch fiber lets the tester measure the loss of the first connector in the cabling. If you connect the cabling directly to the OTDR, the backscatter before the first connector is unknown, so the tester cannot measure the connector's loss.

A receive fiber lets the tester measure the loss of the last connector on the cabling. Without a receive fiber, no backscatter is available after the last connector, so the tester cannot measure the connector's loss.

If the first or last connection in the cabling is bad, and you do not use launch and receive fibers, the OTDR test may pass because it does include the loss of the bad connection.

OVERALL LOSS and **FIBER LENGTH** include the loss and length of the launch and receive fibers, unless you use the launch fiber compensation function.

Compensating for Launch and Receive Fibers

The launch fiber compensation function marks the end of the launch fiber and the beginning of the receive fiber, if used, on OTDR traces and labels these events in the event table. It also removes these fibers' losses, lengths, and attenuation coefficients from overall OTDR results. The losses of the connections at the launch and receive fibers are not removed from the results.

The compensation function does not affect ChannelMap and real time trace results.

Launch/receive fiber compensation may have the following additional effects on test results:



- Cables that are comparable in length to the launch/receive fibers and have poor or marginal performance may pass the OTDR test when launch fiber compensation is not used, but fail when compensation is used. This is because the launch/receive fibers improve the overall attenuation coefficient when they are included in the measurements.
- Length results may pass when compensation is used, but fail when it is not used if the length of the cabling plus the launch/receive fibers exceeds the limit.

Types of Compensation

The tester offers three types of compensation:

- **Launch Only:** Lets you compensate for a launch fiber.
- **Launch + Receive:** Lets you compensate for a launch fiber and a receive fiber.
- **Launch + Fiber + Receive:** Lets you compensate for a launch and receive fiber if you have forgotten to do so before the receive fiber was taken to the other end of the cabling.

To use the compensation function, do the following:

1. Select the fiber type to be tested on the **Cable** tab in Setup.
2. Press ; then select **Set Launch Fiber Compensation**.
3. On the **SET LAUNCH METHOD** screen highlight the type of compensation you want to do, but do not press .
4. Clean the tester's OTDR port and launch fiber connectors.

5. Connect the launch fibers to the tester's OTDR port as shown on the screen and in Figure 3-1, 3-2, or 3-3; then press **ENTER**.
6. The tester attempts to automatically identify the launch and receive fiber ends based on the launch method you selected. If necessary, you can change these settings on the **SET LAUNCH EVENTS** screen, as follows:
 - For **Launch Only** compensation, highlight the event that is the end of the launch fiber; then press **F2**.
 - For **Launch + Receive** compensation, highlight the event that is the end of the launch fiber and the beginning of the receive fiber; then press **F2** and **F3** as necessary to move or set the launch and receive fibers.

- For **Launch + Fiber + Receive** compensation, highlight the event that is the end of the launch fiber; then press **F2** **Set Launch** or **F2** **Move Launch**. Next, highlight the event that is the beginning of the receive fiber; then press **F3** **Set Receive** or **F3** **Move Receive**.

To see where the markers are set on the trace, press **F1** **View Trace**.

7. Press **SAVE**; then press **F3** **OK**.
8. On the **OTDR** tab in Setup, set **LAUNCH COMPENSATION** to **Enabled**.

To view the launch compensation settings, press **FUNCTIONS**, select **Set Launch Fiber Compensation**; then press **F1** **View Settings**.

You should run the compensation function again if you start using a different launch or receive fiber.

Figure 3-4 shows an example of an OTDR trace with launch and receive markers enabled.

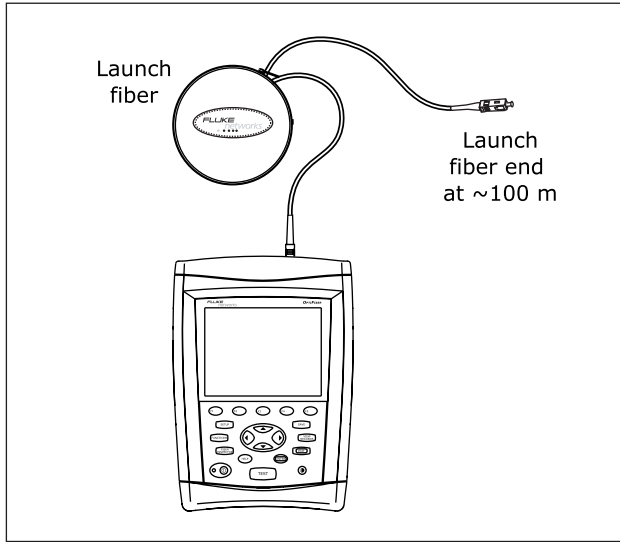


Figure 3-1. Launch Only Compensation Connections

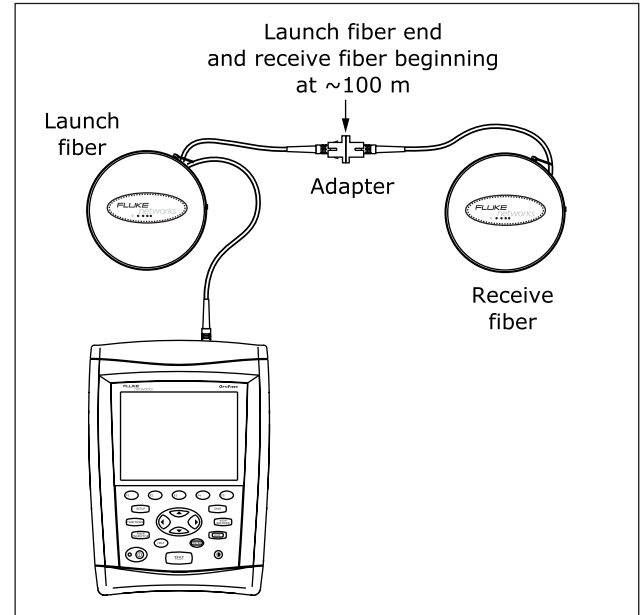
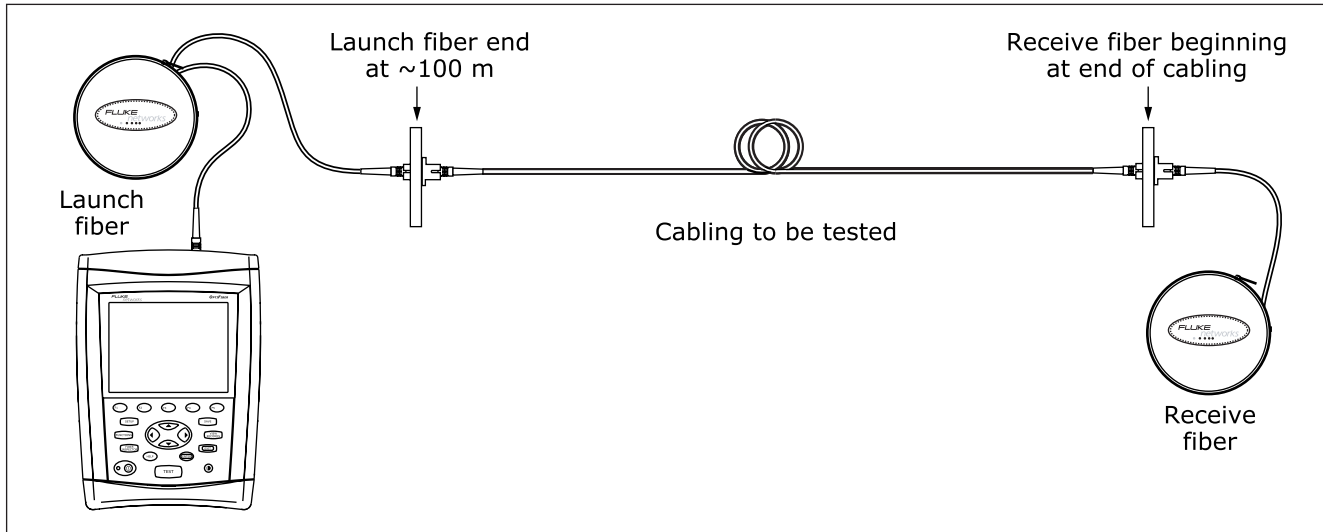


Figure 3-2. Launch + Receive Compensation Connections



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Figure 3-3. Launch + Fiber + Receive Compensation Connections

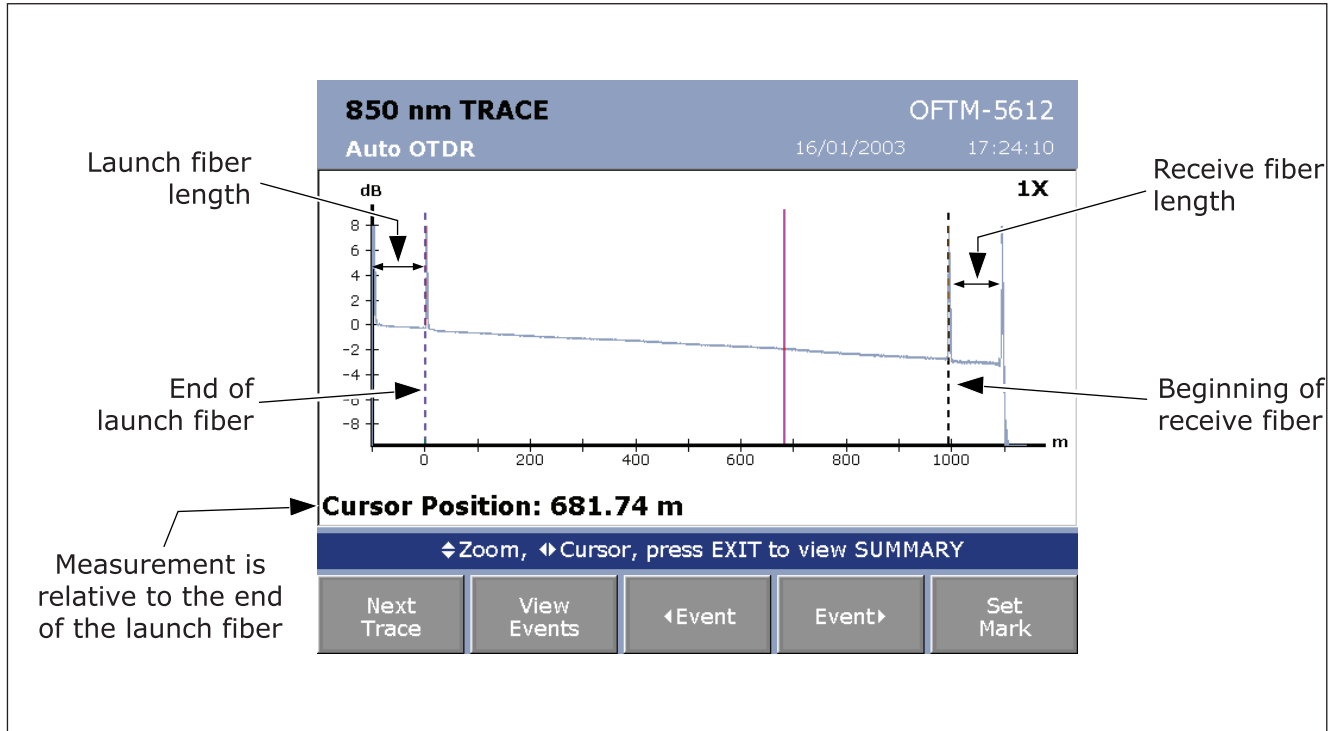


Figure 3-4. OTDR Trace with Launch Compensation Enabled

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Settings for OTDR Tests

Table 3-1 describes the settings that apply to OTDR tests.

Table 3-1. Settings for OTDR Tests

SETUP Tab	Setting	Description
Job tab	Job settings	Before you run a test you will save, you may want to set the job, fiber ID, and cabling end information. These settings are saved with test results to identify the job site, the cabling tested, and the test direction. See Chapter 2 for details.
Cable tab	FIBER TYPE	<p>Select a fiber type that is appropriate for the type you will test. You can select factory-installed fiber types or custom types, which you configure with the Edit Custom Test Limit function in FUNCTIONS. See Chapter 9 for information on creating custom fiber types.</p> <p><i>Note</i></p> <p><i>Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.</i></p>

-continued-

Table 3-1. Settings for OTDR Tests (cont.)

SETUP Tab	Setting	Description
Cable tab	MANUAL SETTING FOR n n (index of refraction)	<p>When MANUAL SETTING FOR n is disabled, the n values depend on the selected fiber type. When the MANUAL SETTING FOR n is enabled, the tester enters default values that you can change manually.</p> <p>The n values defined in the fiber types are suitable for most applications. Minor differences between the tester's n and a fiber's actual n usually do not make enough difference in length to fail a fiber.</p> <p>Increasing n decreases measured length.</p>
OTDR tab	TEST LIMIT	<p>The tester compares the OTDR test results to the selected test limit to produce PASS/FAIL results. You can select factory-installed limits or custom limits, which you configure with the Edit Custom Test Limit function in FUNCTIONS. See Chapter 9 for information on creating custom limits.</p> <p style="text-align: center;"><i>Note</i></p> <p><i>Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.</i></p>

-continued-

Table 3-1. Settings for OTDR Tests (cont.)

SETUP Tab	Setting	Description
OTDR tab	WAVELENGTH	<p>You can test cabling at one or all the wavelengths supported by the installed module and the selected test limit.</p> <p style="text-align: center;"><i>Note</i></p> <p><i>If you select the dual-wavelength setting, be sure to select a fiber type and test limit that supports both wavelengths.</i></p>
	LAUNCH COMPENSATION	Enables or disables launch fiber compensation. See Set Launch Fiber Compensation below.
	RANGE RESOLUTION PULSE WIDTH	These settings apply only to Manual OTDR tests. See “Using Manual OTDR Mode” on page 3-32 for details.
On Functions menu	Set Launch Fiber Compensation	Compensating for the launch fiber marks the end of the launch fiber and the beginning of the receive fiber (if used) on the OTDR trace and removes these fibers’ losses, lengths, and attenuation coefficients from overall OTDR results. See “Compensating for Launch and Receive Fibers” on page 3-2.

Running the OTDR Test

Figure 3-5 shows the equipment needed for OTDR tests.

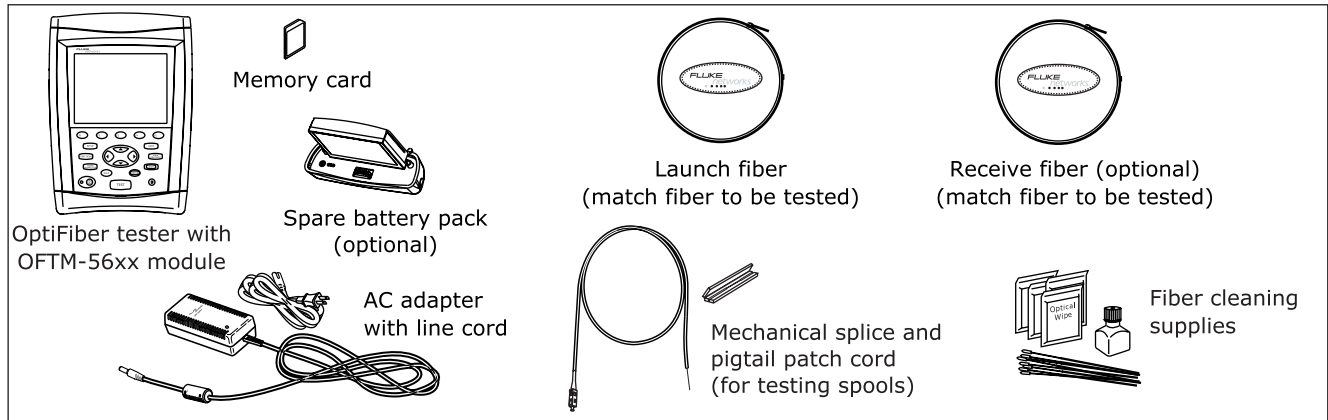






Figure 3-5. Equipment for OTDR Tests

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To run the OTDR test do the following:

1. Verify that the settings described in Table 3-1 are appropriate.
2. Select Auto OTDR mode: On the **HOME** screen, press  **Change Test**; then select **Auto OTDR**.
3. Clean all connectors that will be used.
4. Connect to the tester's OTDR port to the cabling as shown in Figure 3-6, 3-7, or 3-8.
5. Press  to start the OTDR test.
6. To save the results, press , select or create a fiber ID; then press  again.

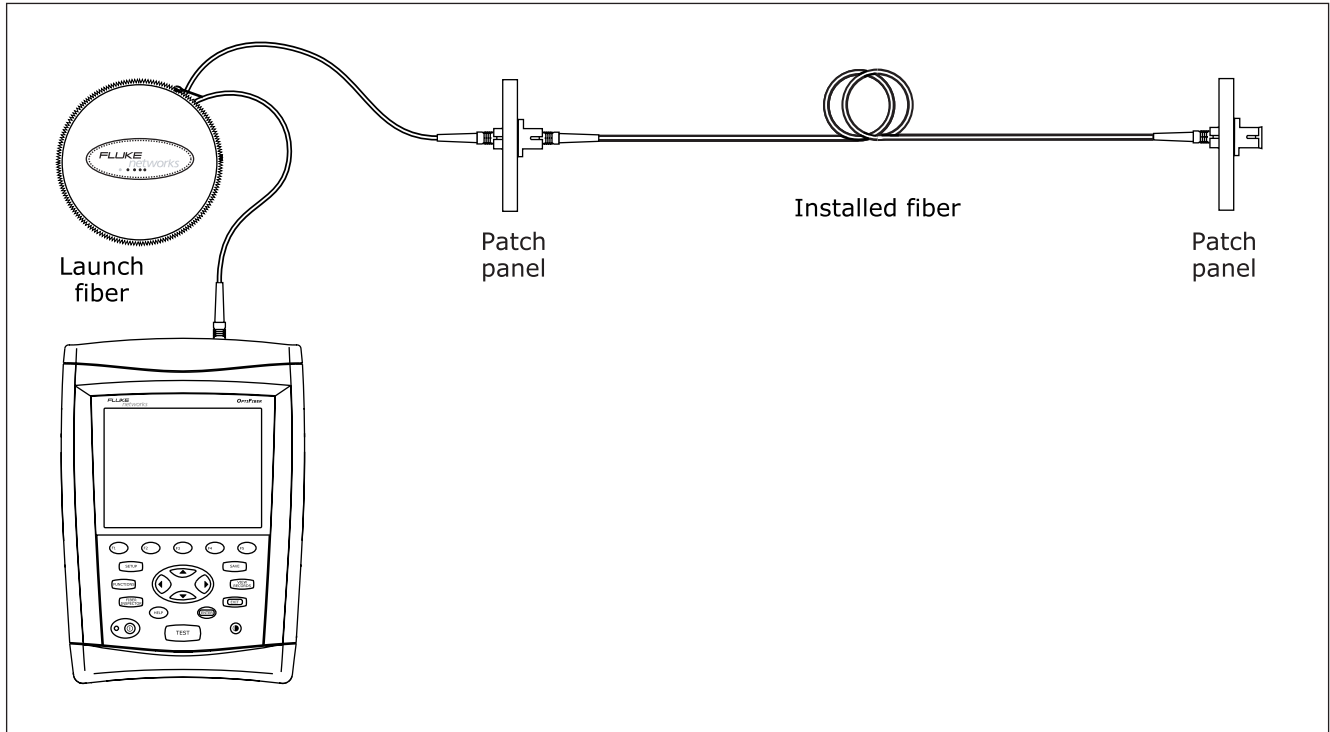


Figure 3-6. Connecting the OTDR to Installed Fiber (no receive fiber)

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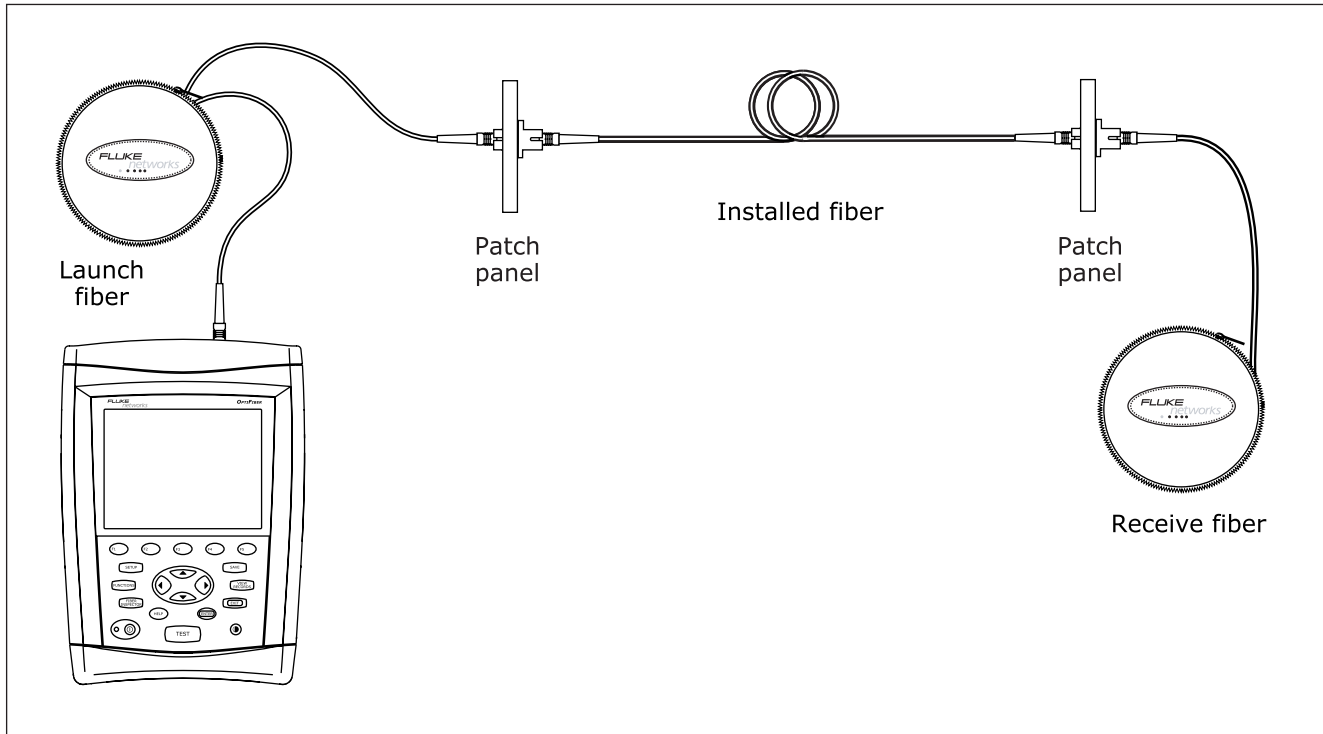


Figure 3-7. Connecting the OTDR to Installed Fiber (with receive fiber)

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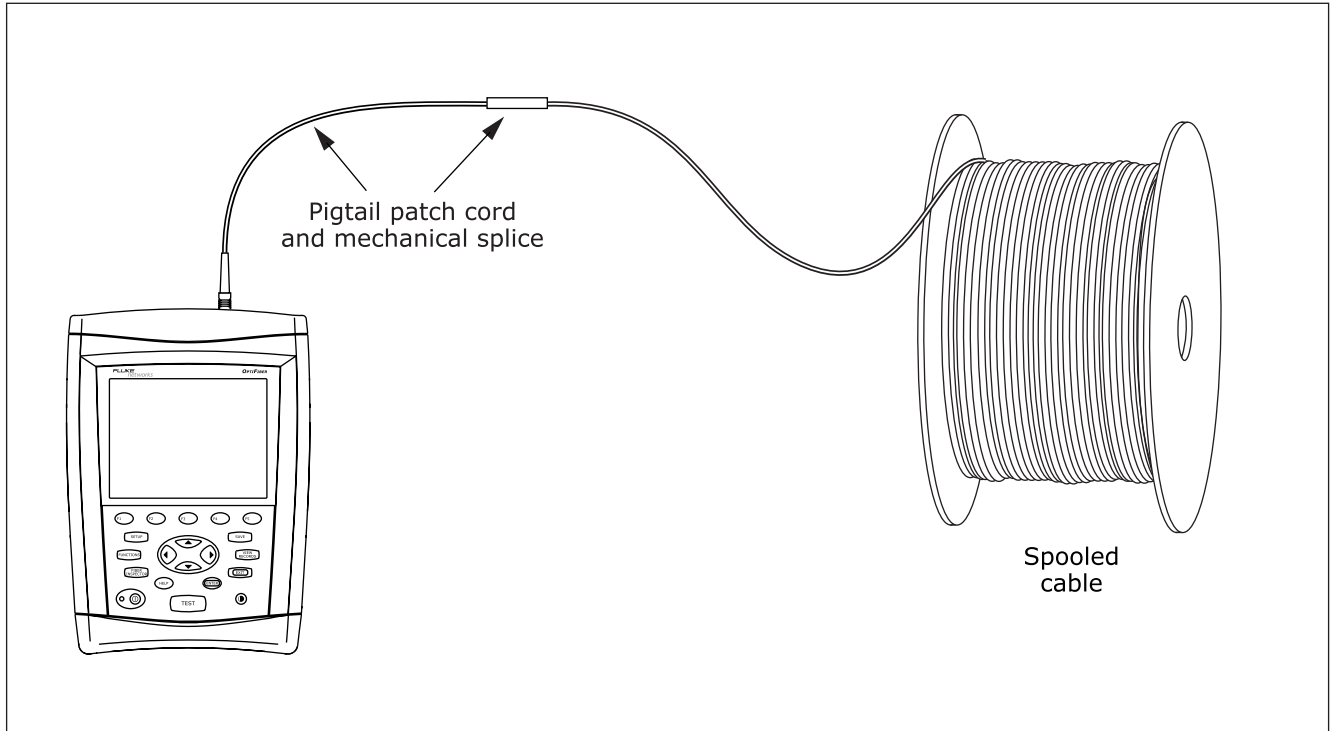


Figure 3-8. Connecting the OTDR to Spooled Cable

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Looking at OTDR Test Results

The tester offers three different views of OTDR test results: a summary, an event table, and an OTDR trace.

Reading the SUMMARY Screen



The **SUMMARY** screen, which appears when the test is finished, is described in Table 3-2.

Table 3-2. OTDR SUMMARY Screen Features

Item	Description
PASS/FAIL	<p>PASS: All test results are within limits.</p> <p>FAIL: One or more test result exceeds the limits. See the OTDR trace or the event table for additional information.</p>
FIBER LENGTH	<p>The length of the fiber in the cabling. If the measured length seems wrong, check the index of refraction on the Cable tab in Setup. The length does not include launch and receive fibers if launch fiber compensation is enabled.</p> <p>Tip: In some cable types, some or all of the fibers may be longer than the cable jacket and some fibers may be longer than others in the same cable. To adjust the length measurements to represent cable jacket length, change the index of refraction until the measured length matches the jacket length.</p>

-continued-

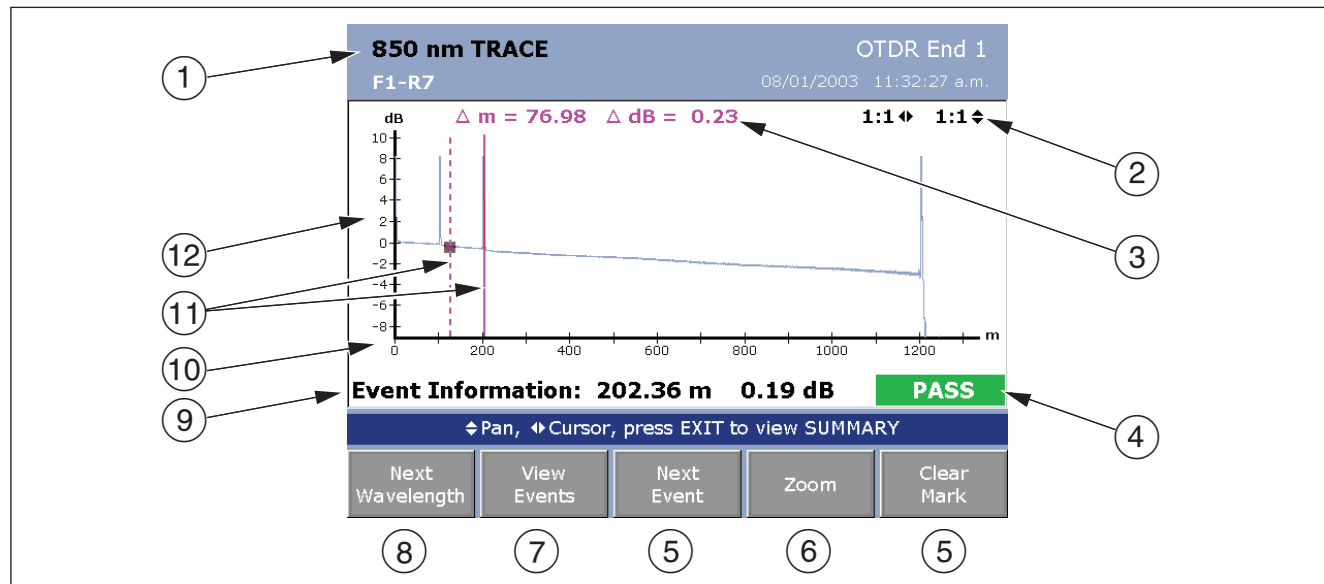
Table 3-2. OTDR Summary Screen Features (cont.)

Item	Description
OVERALL LOSS	<p>The end-to-end loss of the cabling, excluding the OTDR connection and the end event. The loss does not include launch and receive fibers if launch fiber compensation is enabled.</p> <p>Note that OVERALL LOSS does not include the losses of the first and last connectors in the cabling if you did not use launch and receive fibers.</p> <p>If the test ran at two wavelengths, the highest loss of the two wavelengths is reported.</p>
LARGEST EVENT	The largest loss event on the cabling.
 View Details softkey	<p>Lets you see the overall results and event results along with the test limits. These results include values that are measured by the selected test limit but not shown on other OTDR screens, such as segment attenuation coefficients. Use the softkeys on the OTDR DETAILS screens to switch between overall results details and event details. Press  for information about OTDR details.</p>

Reading the OTDR Trace

To see the OTDR trace, press **F1** **View Trace** from the OTDR **SUMMARY** screen or **EVENT TABLE**.

Figure 3-9 describes the readouts and navigational features on the OTDR screen. Figure 3-10 describes the features of a typical OTDR trace.



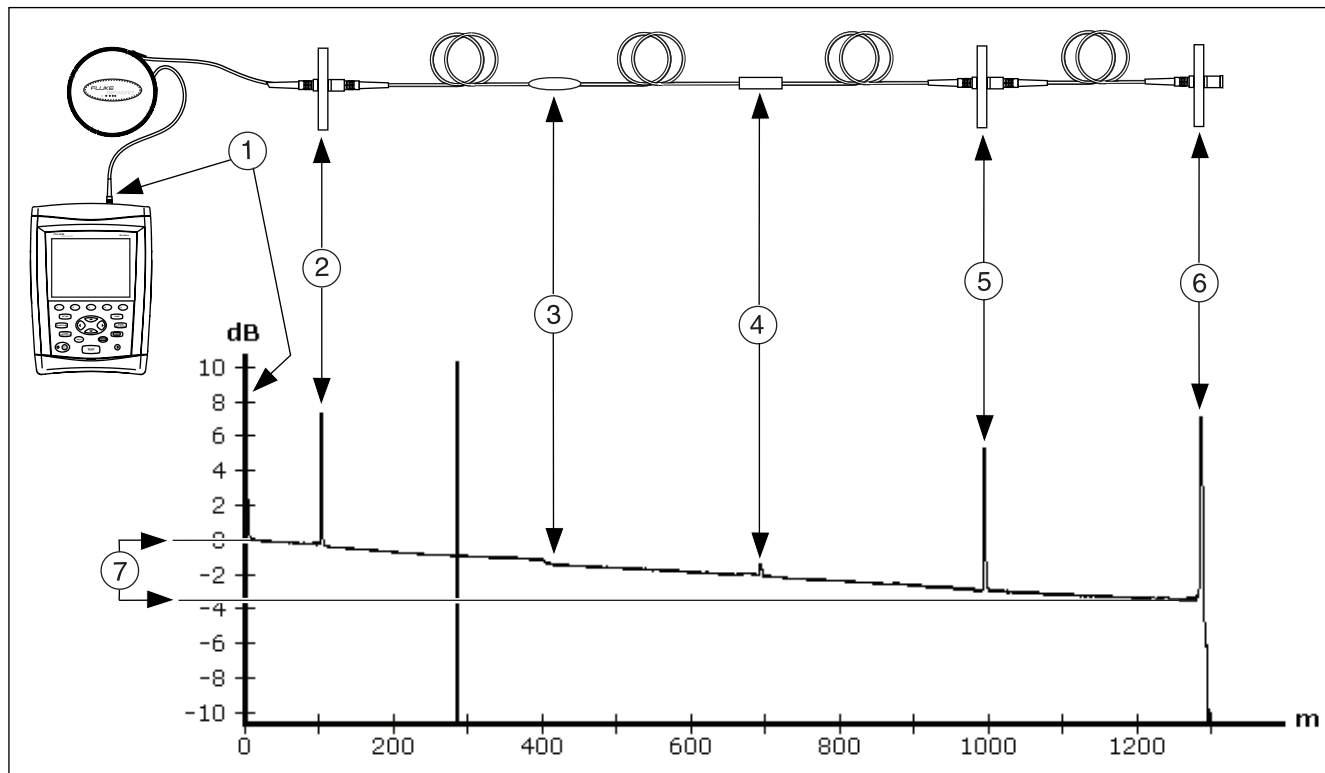
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Figure 3-9. OTDR Trace Screen

- | | |
|--|--|
| <p>① Wavelength for the trace. If the test ran at two wavelengths, press F1 to switch wavelengths. You can set the wavelengths on the OTDR tab in Setup.</p> <p>② Magnification factors for the trace. See “Zooming the Trace” on page 3-22.</p> <p>③ The distance (m or ft) and the power loss (dB) between the cursor and the measurement marker (⑪).</p> <p>④ PASS/FAIL status appears if the cursor is on an event. The status may refer to the event or the fiber segment before the event. If the event looks ok, press F3 View Details from the EVENT TABLE screen or the SUMMARY screen to see results for the segment.</p> <p>⑤ Key for setting the measurement cursor. See “Using the Measurement Cursor” on page 3-22.</p> <p>⑥ Press F4 to switch between using the arrow keys for zooming and for moving the cursor.</p> | <p>⑦ Press F2 to see the event table.</p> <p>⑧ For dual-wavelength tests, press F1 to switch wavelengths.</p> <p>⑨ Event information appears if the cursor is on an event. Otherwise, the distance to the cursor is shown.</p> <p>⑩ Scale for the distance along the cabling under test.</p> <p>Tip: The distance scale represents the distance along the fiber, which may be different from the distance along the cable jacket. To adjust the length measurements to represent cable jacket length, change the index of refraction until the measured length matches the jacket length.</p> <p>⑪ Measurement marker and cursor. See “Using the Measurement Cursor” on page 3-22.</p> <p>⑫ Decibel scale for the OTDR backscatter.</p> |
|--|--|

See Figure 3-4 on page 3-7 for details on launch and receive fiber markers on the OTDR trace.

Figure 3-9. OTDR Trace Screen (cont.)



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Figure 3-10. Typical OTDR Trace Features

- | | |
|---|---|
| ① Reflective event caused by the OTDR connection. | ⑤ Reflective event caused by a connection in the cabling. |
| ② Reflective event caused by the first connection in the cabling. | ⑥ Reflective event caused by the end of the cabling. |
| ③ Loss event caused by a fusion splice. | ⑦ Overall loss of the cabling. |
| ④ Small reflective event caused by a mechanical splice. | See "Diagnosing OTDR Test Failures" on page 3-39 for descriptions of faults on fiber cabling. |



Figure 3-10. OTDR Trace Features (cont.)



Using the Measurement Cursor

You can use the cursor on the OTDR trace to measure distances and losses along the cabling. The cursor position and readouts are stored with saved results.

1. Use **F3** **Event** or   to move the cursor to a starting point on the trace. Pressing  or  sets the direction for the **F3** **Event** softkey.

Note

The   keys let you pan vertically only when the vertical zoom is greater than 1:1.





2. If the **F4** label is **Cursor**, press **F4** to enter cursor mode.
3. Press **F5** **Set Mark** to set the mark; then use   or **F3** **Event** to move the cursor to the desired ending point.





The following readouts appear on the screen:

- Δ m or Δ ft: The distance between the cursor and the mark.
 - Δ dB: The difference in the power levels between the cursor and the mark.
4. Press **F5** **Clear Mark** to clear the mark.

Zooming the Trace

The zoom function lets you magnify the trace horizontally or vertically.

1. Place the cursor near the feature you want to magnify. (Press **F4** **Cursor** first if necessary to enter cursor mode.)
2. If the **F4** label is **Zoom**, press **F4** to enter zoom mode.
3. Use   to zoom vertically. Use   to zoom horizontally.

If zooming places the feature you want to see off the screen, go back to cursor mode (press **F4** **Cursor**) and use     to move the feature into view.

Reading the Event Table

Table 3-3 describes the features of the event table.

To see a list of the events along the cabling, press **F2**
View Events.

Table 3-3. Event Table Features

Item	Description
LOCATION	The distance to the event, measured from the OTDR port.
db@<wavelength>	<p>The loss of each event at a wavelength. Negative dB values indicate a gain.</p> <p>To measure loss, the tester determines the best-fit line between two points, using the “least squares” method to reduce the effects of noise.</p>
N/A	<p>N/A is shown if the tester did not test at the wavelength. N/A is also shown if the tester could not determine the event’s loss. This occurs for hidden events because the event’s details are obscured by the previous event’s reflection. This occurs for end events because no backscatter is available after the fiber end to compare to the backscatter detected before the fiber end.</p> <p>Tip: The tester can measure the loss of the last connector on the fiber if you use a receive fiber during OTDR tests.</p>

-continued-

Table 3-3. Event Table Features (cont.)

Item	Description
EVENT TYPE	What the event appears to be. See Table 3-4 for details on event types.
STATUS	<p>PASS: The event's loss is less than the limit for both wavelengths.</p> <p>FAIL:</p> <ul style="list-style-type: none"> • The event's loss exceeds the limit at one or both wavelengths. • The event is causing a ghost farther down the fiber. • The fiber segment before the event failed. To see results for the segment, press F3 View Details from the EVENT TABLE or the OTDR SUMMARY screen. Then use F2 Previous Event/F3 Next Event to view the details for the segment before the event.
F3 View Details softkey	Lets you see the overall results and event results along with the test limits. These results include values that are measured by the selected test limit but not shown on other OTDR screens, such as segment attenuation coefficients. Use the softkeys on the OTDR DETAILS screens to switch between overall results details and event details. Press HELP for information about OTDR details.
F2 Sort Field softkey	See "Sorting Events" on page 3-30 for details.

Event Types

Table 3-4 describes the events the tester can identify.

The tester analyzes events on the trace and assigns a type to each event.

Table 3-4. Event Types

Event	Possible Causes and Solutions
REFLECTION A pulse of light reflected back to the OTDR.	<p>Caused by a connector, tight bend, or crack in the fiber. Small reflective events may actually be ghosts.</p> <p>If the reflection is not caused by a connector, inspect the cable for tight bends or damage. Use a visual fault locator to verify the fault.</p>
LAUNCH EVENT The end of the launch fiber. RECEIVE EVENT The beginning of the receive fiber.	<p>The tester identifies these events if launch and receive fibers are connected and LAUNCH COMPENSATION is enabled on the OTDR tab in Setup. See “Compensating for Launch and Receive Fibers” on page 3-2 for more information.</p>

-continued-

Table 3-4. Event Types (cont.)

Event	Possible Causes and Solutions
<p>HIDDEN The event is within the deadzone of the previous event.</p>	<p>The event is detected, but not enough information is available to measure its loss separate from the previous event.</p> <p>The hidden event may be a connection, a sharp bend, or a crack within the deadzone of the previous connection.</p> <p>If the event is not a connection, inspect the fiber near the event's location. Use a visual fault locator to reveal faults.</p> <p>Also see N/A in Table 3-3.</p>
<p>GHOST The event is a duplicate reflection caused by light bouncing back and forth between connectors.</p>	<p>Caused by a dirty or unseated connector, highly-reflective connector, a connector with the wrong polish, a sharp bend, or a crack in a fiber.</p> <p>Find the GHOST SOURCE in the event table to determine where to look for the fault. The ghost source is always before the ghost. The event table does not show ghosts that occur after the end event.</p> <p>If the ghost source is a hidden event, the tester may not identify a ghost event as a ghost.</p>

-continued-

Table 3-4. Event Types (cont.)

Event	Possible Causes and Solutions
<p>GHOST SOURCE A reflective event that is causing a ghost.</p>	<p>Tip: On some traces with multiple ghosts, only the first ghost may be identified in the event table. You can usually determine that other reflections are ghosts because they occur at multiples of distances to connectors and they show almost no loss.</p> <p>Caused by a dirty or unseated connector, highly-reflective connector, a connector with the wrong polish, a sharp bend, or a crack in a fiber.</p> <p>Verify that the connector is seated properly. Inspect connectors that cause ghosts. If a connector does not seem to be the ghost source, use a visual fault locator to check for bends or cracks near the ghost source.</p> <p>A ghost may have multiple sources. The tester identifies only one possible source. Look for reflective events with high loss or excessive tailing for other possible sources. (See Chapter 10 or the online help for examples of tailing.)</p>
<p>LOSS A point where the level of reflected light suddenly decreases.</p>	<p>Caused by a splice or bend.</p> <p>If the loss event is not caused by a splice, inspect the cable for tight bends. Use a visual fault locator to verify the fault.</p>

-continued-

Table 3-4. Event Types (cont.)

Event	Possible Causes and Solutions
<p>GAINER An apparent gain in the strength of the returned signal.</p>	<p>Caused by a splice between two fibers with different backscatter coefficients, numerical apertures, core diameters, or mode field diameters.</p> <p>Check the fiber type on either side of the splice. Replace fiber if necessary. Matching fibers may have different tolerances, which can cause gainers at a splice. In these cases, the splice is good and does not require rework.</p> <p>Tip: If you test the fiber from the other end, the gainer event will show a loss. Adding this loss to the event's gain provides the true loss of the event.</p>
<p>OUT OF RANGE The tester did not find an end event.</p>	<p>This can occur in Manual mode when the selected range is too short.</p> <p>In Auto mode, OUT OF RANGE can occur when the cabling is much longer than the module's range. Rarely, very bad connections along the cabling can cause the OTDR to select a range that is too short.</p> <p>For Manual mode, select a higher range on the OTDR tab in Setup.</p> <p>For Auto mode, compare the expected cabling length to the module's test range. If the length is within range, try testing in Manual mode with the maximum range setting.</p>

-continued-

Table 3-4. Event Types (cont.)

Event	Possible Causes and Solutions
WEAK SIGNAL The signal is attenuated below the background noise level before the end event is reached.	No fiber is attached to the OTDR port, the fiber is too short, or there is a bad connector or broken fiber somewhere near the tester. May also occur if the fiber has very high loss, or if the tester is in Manual OTDR mode and the PULSE WIDTH is too narrow. If the OTDR trace and event table show that the fiber is very short, check for bad connections and broken fibers within a few meters of the tester.
NO FIBER No fiber is attached or the fiber is too short to measure.	No fiber is attached to the OTDR port, the fiber is too short, or there is a bad connector or broken fiber somewhere near the tester. Check for bad connections and broken fibers within a few meters of the tester.
NO SIGNAL There is a problem with the module.	If this continues to occur, contact Fluke Networks for assistance.

-continued-

Table 3-4. Event Types (cont.)

Event	Possible Causes and Solutions
END The end of the cabling.	The tester identifies the end of the cabling as the point where the backscatter stops. The tester does not measure the loss of END events. Note that a very high-loss event, such as a sharp bend, can appear to be the end of the cabling. Also see N/A in Table 3-3.

Sorting Events

You can sort the event table in ascending or descending order by the items in a column. For example, you could sort by the loss values in a wavelength column to put the events with the highest loss at the top of the table. By default, the table is sorted in ascending order by event location. The table returns to this order when you exit the **EVENT TABLE** screen.

To sort the event table, use ◀ ▶ to highlight a column heading; then press **F2** **Sort Field**. Pressing **F2** again sorts the table in the opposite order.

Bi-Directional Testing

To test cabling in both directions and save the bi-directional results, proceed as follows:

1. On the **Job** tab, enter names for **END 1** and **END 2** to identify the ends of the cabling. Name **END 1** as the end you will test first.
2. Set **THIS END** to **END 1**.
3. Test all the cabling and save the results from **END 1**.
4. On the **Job** tab, change **THIS END** to **END 2**; then test all the cabling from the other end. When you save each result, use the same fiber ID you used for the results from the first end. The ID will be in the **IDs IN CURRENT FOLDER** list.

Using the Real Time Trace

The OTDR's real time trace is updated several times each second, depending on the length of the fiber and the wavelength used. This function is useful for locating intermittent problems, such as those that appear when a connector or cable is stressed. You can also use the real time trace to monitor splicing procedures.

If the dual wavelength setting is selected on the OTDR tab, real time trace runs at 850 nm for multimode and 1550 nm for singlemode. If a single wavelength is selected, real time trace runs at the selected wavelength.


Caution


Read the instructions for splice machines before using the OTDR to monitor splicing procedures. The OTDR can interfere with the light injection detection techniques used by some splicers.

Tip: The real time trace function uses a lot of battery power. To maximize the battery's life, plug in the ac adapter when using this function for an extended period of time.

The real time trace has two modes: auto length and fixed length.

Auto Length: The tester updates its range and pulse width at least every tenth screen update or whenever the trace changes. These adjustments make the trace fill the screen for the best overall view of the fiber. The locations of connections and other trace features change if the range changes. The real time trace starts in Auto Length mode.

Fixed Length: When you press  **Fixed Length**, the tester uses parameters based on the current OTDR parameters, even if the trace changes. (The tester may adjust the resolution and range slightly at first for a faster test.) This mode makes changes in the fiber's length more obvious, since the range is not adjusted to make the trace fill the screen.

Pressing  again returns the trace to **Auto Length** mode.

You cannot save the real time trace. The measurement cursors and launch/receive fiber markers are not active on the real time trace.

To use the real time trace, do the following:

1. Clean all fiber connectors.
2. Connect the launch fiber between the tester and the fiber under test.
3. Press **FUNCTIONS**; then select **Real Time Trace**. To stop the test, press **EXIT**.

To switch between **Auto Length** and **Fixed Length**, press **F3**.

Using Manual OTDR Mode

Note

You should use Auto OTDR mode when certifying cabling with the OTDR.

Manual OTDR mode lets you optimize the OTDR trace for viewing specific events.

To select Manual OTDR mode, exit to the **HOME** screen, press **F1** **Change Test**; then select **Manual OTDR**.

Table 3-5 describes the settings you can change in Manual OTDR mode and how the settings affect the trace. You can access these settings on the **OTDR** tab in **SETUP**.

Table 3-5. Manual OTDR Settings

Setting	Description and Selection Guidelines
RANGE	<p>The range setting determines the maximum distance shown on the trace. Select the range that is nearest to, but not less than, the distance to the event you want to study. If the tester does not correctly identify the end event, run the OTDR test again using the next highest range.</p> <p>Auto: the tester selects the maximum range that is valid with the RESOLUTION setting. If RESOLUTION is set to Auto, the tester selects the range that is nearest to, but not less than the end of the fiber. These ranges are not limited to the fixed ranges provided.</p> <p style="text-align: center;"><i>Note</i></p> <p><i>Manual mode provides a 4 km range for multimode and a 15 km range for singlemode; however, the tester's specifications apply only up to 2 km and 10 km respectively.</i></p>

-continued-

Table 3-5. Manual OTDR Settings (cont.)

Setting	Description and Selection Guidelines	
RESOLUTION	The resolution setting determines the distance between measurement samples. Shorter resolution settings improve measurement accuracy and let you see more detail in and around reflective events, but also increase test time. Longer settings decrease test time, but provide less accuracy and event detail.	
	Multimode: Valid Range/Resolution Combinations	Singlemode: Valid Range/Resolution Combinations
	<ul style="list-style-type: none"> 400 m: 3 cm, 6 cm, 12 cm, 25 cm, 50 cm 1 km: 12 cm, 25 cm, 50 cm 2 km: 25 cm, 50 cm 4 km: 50 cm 	<ul style="list-style-type: none"> 400 m: 3 cm, 6 cm, 12 cm, 25 cm, 50 cm, 100 cm 1 km: 12 cm, 25 cm, 50 cm, 100 cm 2 km: 25 cm, 50 cm, 100 cm 4 km: 50 cm, 100 cm 8 km: 100 cm 15 km: 100 cm
	Auto: the tester selects the shortest resolution that is valid with the RANGE setting. Generally, Auto is appropriate unless a shorter test time is more important than accuracy and detail.	

-continued-

Table 3-5. Manual OTDR Settings (cont.)

Setting	Description and Selection Guidelines
PULSE WIDTH	<p>The pulse width determines the resolution of the trace and affects dynamic range.</p> <p>Narrower pulses let you see more detail in and around reflective events and help you see events that are close together (hidden events). However, narrower pulses limit the OTDR's range and produce traces with more background noise between events. Narrower pulses are not suitable for measuring loss. With the narrowest pulse, you may not be able to distinguish loss events on the trace. The backscatter level may be so low that it does not appear on the trace.</p> <p>Wider pulses raise the backscatter level, which provides more detail between reflective events. This helps you see loss events and measure their loss more accurately, but increases the deadzones of reflective events.</p> <p>Tables 3-6 through 3-8 show the characteristics of the pulse width settings.</p> <p>Auto: The tester selects the narrowest pulse that still reveals loss events.</p>

Table 3-6. Pulse Width Characteristics for 850 nm¹

Pulse Width	Event Deadzone²	Attenuation Deadzone³	Signal Energy	Gain
20 ns (+2.0 dB)	4 m	5 m	+2.0 dB	High
20 ns	3 m	4.5 m	+0.0 dB	Medium
4 ns	0.7 m	N/A ⁴	-4.5 dB	Low
<ol style="list-style-type: none"> 1. These are typical values. Actual deadzones may vary depending on the quality of connections, launch conditions, and other characteristics of the cabling. 2. An event deadzone represent the tester's ability to distinguish events that are close together. 3. An attenuation deadzone represents the distances after a reflective event where the tester can detect the backscatter level and make loss measurements. 4. Not enough backscatter may be available for loss measurements. 				

Table 3-7. Pulse Width Characteristics for 1300 nm¹

Pulse Width	Event Deadzone²	Attenuation Deadzone³	Signal Energy	Gain
650 ns	64 m	67 m	+6.0 dB	Medium
400 ns	41 m	44 m	+5.0 dB	Medium
200 ns	23 m	27 m	+3.5 dB	Medium
100 ns	11 m	15 m	+2.0 dB	Medium
40 ns	5 m	10.5 m	+0.0 dB	Medium
8 ns	1.5 m	N/A ⁴	-4.5 dB	Low
<ol style="list-style-type: none"> 1. These are typical values. Actual deadzones may vary depending on the quality of connections, launch conditions, and other characteristics of the cabling. 2. An event deadzone represent the tester's ability to distinguish events that are close together. 3. An attenuation deadzone represents the distances after a reflective event where the tester can detect the backscatter level and make loss measurements. 4. Not enough backscatter may be available for loss measurements. 				

Table 3-8. Pulse Width Characteristics for 1310 nm and 1550 nm¹

Pulse Width	Event Deadzone	Attenuation Deadzone	Signal Energy	Gain
1000 ns	107 m	107 m	+7.0 dB	Medium
500 ns	54 m	55 m	+5.5 dB	Medium
250 ns	29 m	31 m	+4.0 dB	Medium
100 ns	12 m	16 m	+2.0 dB	Medium
40 ns	6 m	10.5 m	+0.0 dB	Medium
8 ns	1.5 m	NA ²	-5.0 dB	Low
<p>1. These are typical values for a connection with -50 dB backreflection. Actual deadzones may vary depending on the quality of connections, launch conditions, and other characteristics of the cabling.</p> <p>2. Not enough backscatter may be available for loss measurements.</p>				

Diagnosing OTDR Test Failures

Tables 3-9 and 3-10 describes some typical causes of OTDR test failures.

Tip: If a trace shows multiple failing or unusual events, it's usually best to start looking for faults at the nearest event. Some faults can cause misleading events farther down the cabling.

Table 3-9. Diagnosing OTDR Test Failures

OVERALL LOSS fails
<ul style="list-style-type: none"> • There is one or more dirty or damaged connections in the cabling. Check the OTDR trace or event table for high-loss reflective events. • The wrong fiber type is selected on the OTDR tab in Setup. • A patch cord, launch fiber, or fiber segment has the wrong core size, backscatter coefficient, or mode field diameter. If the patch cords and launch fiber are the correct type, check the OTDR trace for mismatched cable in the cabling. • The cabling has a bad fusion or mechanical splice or a sharp bend. Use the OTDR trace or event table to locate these faults.

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Table 3-9. Diagnosing OTDR Test Failures (cont.)


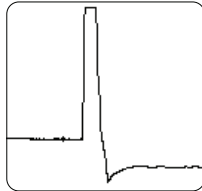
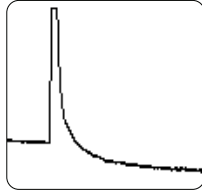
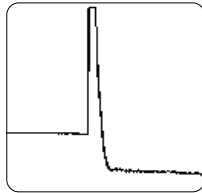
LARGEST EVENT fails
<ul style="list-style-type: none"> • The event is a dirty or damaged connector. Check the OTDR trace or event table for high-loss reflective events. • A patch cord, launch fiber, or fiber segment has the wrong core size, backscatter coefficient, or mode field diameter. If the patch cords and launch fiber are the correct type, check the OTDR trace for mismatched cable in the cabling. • The event is a bad fusion or mechanical splice or a sharp bend. Use the OTDR trace or event table to locate these faults.
FIBER LENGTH fails, a known length of cabling measures too long or too short, or the distance to an event is wrong.
<ul style="list-style-type: none"> • The wrong fiber type is selected on the Cable tab in Setup. • The index of refraction needs adjustment. Change n on the Cable tab in Setup. • The wrong test limit is selected on the OTDR tab in Setup.
An event shows a FAIL result, but the event does not exceed any limit.
The segment before the event exceeds a limit. To see results for the segment,  View Details from the EVENT TABLE or the OTDR SUMMARY screen

Table 3-10. Diagnosing Faults on OTDR Traces

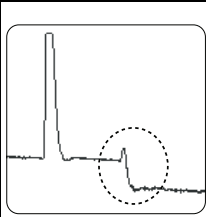
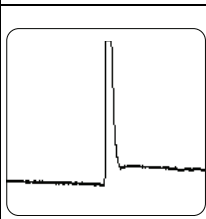


Large reflective event with high loss (top), excessive tailing (middle), or a hook on the falling edge of the trace (bottom). May be identified as an end event though it occurs before the end of the cabling. May be caused by the following:

- A dirty, scratched, cracked, misaligned, or unseated connector. Misaligned or unseated connectors can also cause large reflections that produce ghosts. Bad connectors should be cleaned, repolished, or replaced. A hook, as shown in the bottom example, can occur when a large reflection causes the OTDR detector's gain to become non-linear.
- A good connector with a sharp bend or crack within its deadzone. If the cable is tightly bent the tester may indicate a break, especially at longer wavelengths or in Manual OTDR mode with smaller resolution settings. Use a visual fault locator to precisely locate the fault.
- A crack in the fiber. Use a visual fault locator to precisely locate the fault.
- A connection between mismatched fibers (different backscatter coefficients, core sizes, numerical apertures, or other parameters). The top example could be caused by a larger core (on the left) connected to a smaller core.

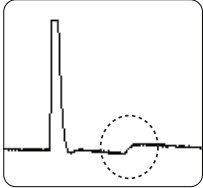
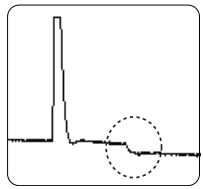
-continued-

Table 3-10. Diagnosing Faults on OTDR Traces (cont.)

	<p>Small reflective event with high loss. May be identified as an end event though it occurs before the end of the cabling.</p> <p>May be caused by very sharp bend, a crack, or a mechanical splice with high loss. If the event is a bend, it may show higher loss at a longer wavelength. Use a visual fault locator to verify the problem. Bad mechanical splices should be reworked.</p>
	<p>Large reflective event with gain (a "gainer").</p> <p>A connector between mismatched fibers (different backscatter coefficients, core sizes, numerical apertures, or other parameters). This example shows a smaller core size (on the left) connected to a larger core size. Testing from the other end would show a large reflective event with more loss than a connector should have.</p>

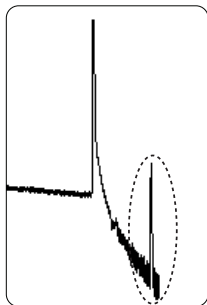
-continued-

Table 3-10. Diagnosing Faults on OTDR Traces (cont.)

	<p>Small gain event (a "gainer").</p> <p>Typically caused by a splice between mismatched fibers (different backscatter coefficients, core sizes, numerical apertures, or other parameters). Testing from the other end would show a loss at the event's location. The difference between the gainer's value and the loss value is what the event's loss would be if the fibers were not mismatched.</p>
	<p>Small loss event.</p> <p>Bad fusion splice, a splice between mismatched fibers, or a bend. A good fusion splice between matching fiber types typically shows only 0.1 dB to 0.3 dB of loss. If the event is a bend, it may show higher loss at a longer wavelength. Use a visual fault locator to precisely locate bends.</p>

-continued-

Table 3-10. Diagnosing Faults on OTDR Traces (cont.)

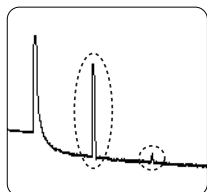


Top: Ghost after the cabling end.

These are not listed in the event table and generally do not indicate a fault in the cabling.

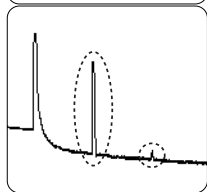
Bottom: Ghosts in the middle of the cabling.

Ghosts occurring in the middle of the cabling are listed in the event table, along with the source of the ghosts. These can be caused by a dirty connector, a highly-reflective connector or a connector that is not seated properly. A poorly-seated connector usually shows significant loss, as shown in the example. A connector with the wrong type of polish can also cause strong reflections that result in ghosts.



Ghosts caused by hidden events may not be identified as ghosts in the event table.

Tip: On traces with multiple ghosts, only the first ghost may be identified in the event table. You can usually determine that other reflections are ghosts because they occur at multiples of distances to connectors and they show almost no loss. Multiple ghosts from the same source are spaced equally apart.



Chapter 4

Using the ChannelMap Function

The ChannelMap™ function provides an intuitive map of the cabling under test. You can use this function to quickly survey connections and the lengths of fibers in a channel.

This function is optimized for resolving connections as close as 1 m apart on multimode fiber and 2 m apart on singlemode fiber. Reflective events that do not appear to be connectors are not shown on the map. Loss events are also not shown.

Running the Test

Figure 4-1 shows the equipment required for ChannelMap tests.

1. Select ChannelMap mode: On the **HOME** screen, press **F1** **Change Test**; then select **ChannelMap**.
2. Select a fiber type on the **Cable** tab in Setup. You do not need to select a test limit for ChannelMap tests.
3. Enter names for the ends of the channel to be mapped: Press **SETUP**; then select the **Job** tab. Enter names for **END 1** and **END 2**.
4. Set **THIS END** to the end where the tester is located.

5. Clean all connectors.
6. Connect the launch fiber to the OTDR port and the channel to be mapped, as shown in Figure 4-2.
7. Press **TEST**.
8. To save the results, press **SAVE**, select or create a fiber ID; then press **SAVE** again.

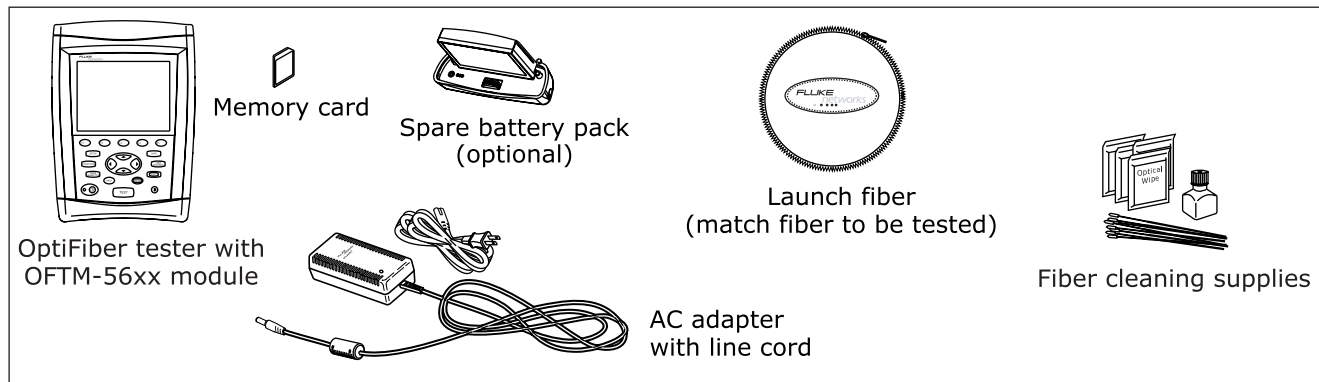


Figure 4-1. Equipment for ChannelMap Tests

ajt48f.eps

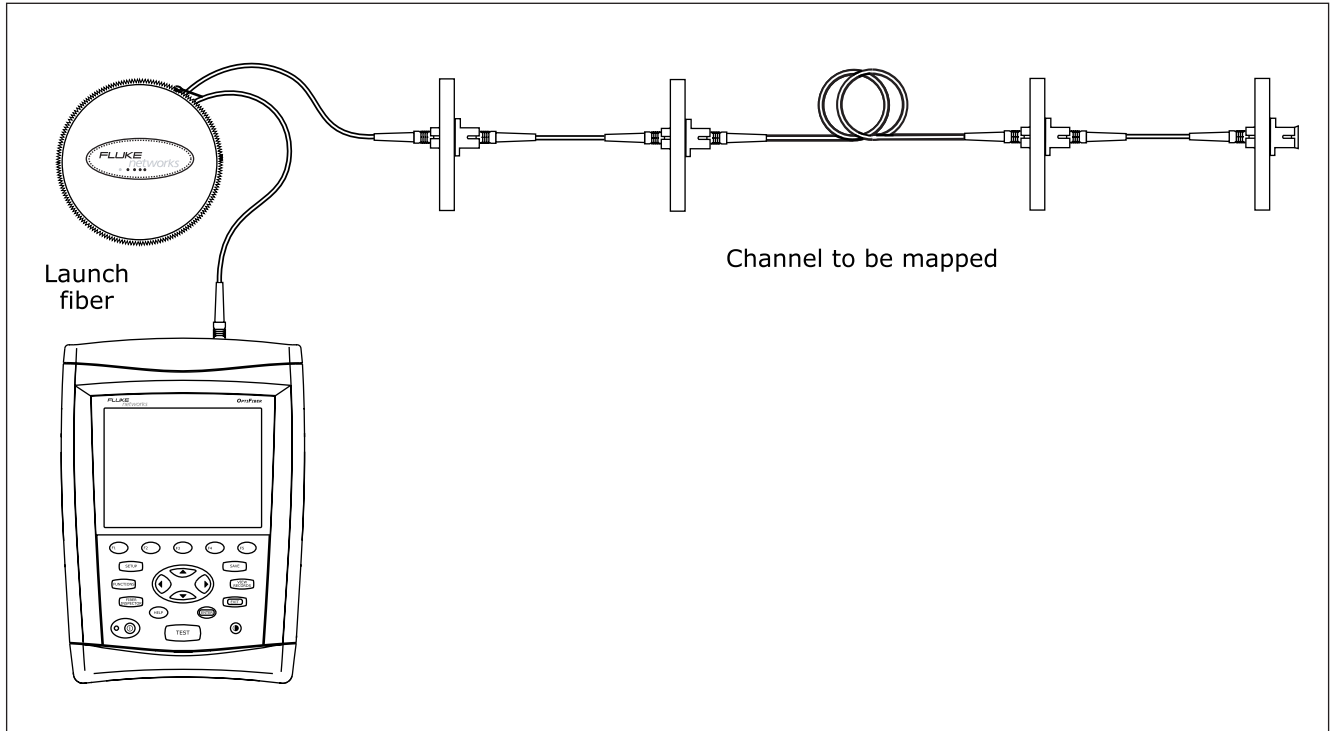


Figure 4-2. ChannelMap Test Connections

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ChannelMap Diagram Features

Figure 4-3 describes the features of a ChannelMap diagram.

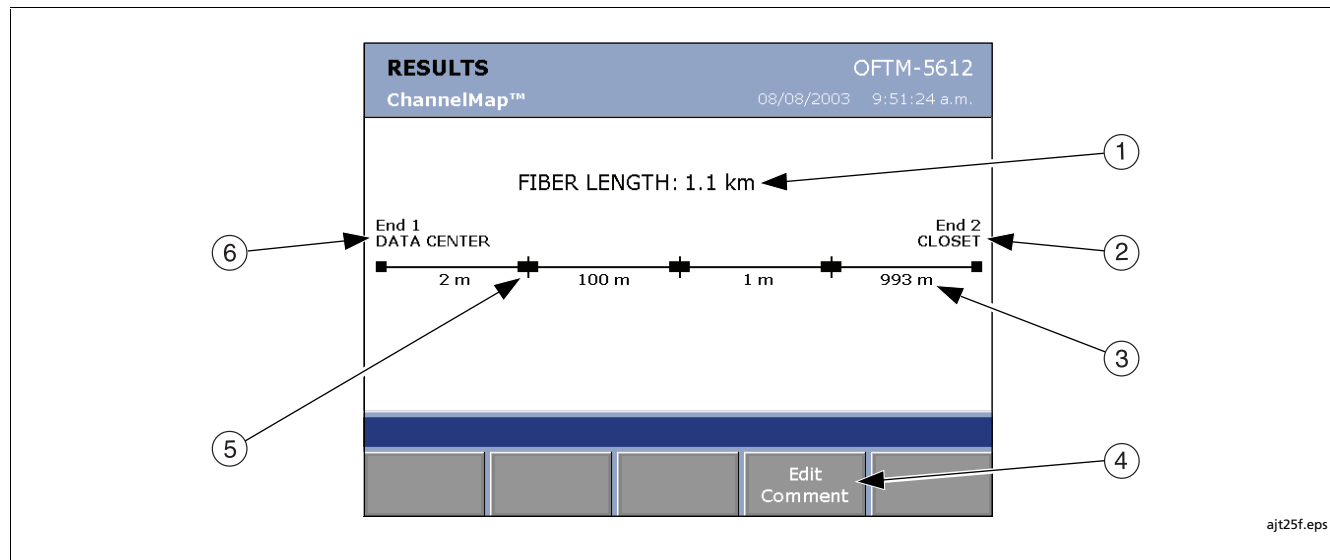


Figure 4-3. ChannelMap Diagram Features

- ① The length of the channel, including the launch fiber.

Note

*The **FIBER LENGTH** shown is the actual length of the channel rounded to the nearest meter or foot (not the sum of the displayed segment lengths).*

- ② The far end of the channel. The name is set by the **END 1** or **END 2** setting on the **Job** tab in Setup.

- ③ The length of a segment or patch cord rounded to the nearest meter or foot.

- ④ Press **F4** to add a comment to the ChannelMap results.

- ⑤ A reflective event, usually a connector. Could also be a mechanical splice or a reflective fault such as a sharp bend or a crack in the fiber.

- ⑥ The near end of the channel. The name is set by the **END 1** or **END 2** setting on the **Job** tab in Setup.

Figure 4-3. ChannelMap Diagram Features (cont.)

Chapter 5

Using the FiberInspector Option

The OFTM-535x FiberInspector™ Video Probe connects to an OptiFiber fiber tester to let you inspect the ends of fiber optic connectors. The probe's magnification reveals dirt, scratches, and other defects that can cause poor performance or failures in fiber optic networks.

Model OFTM-5350 provides 250X magnification, which is suitable for multimode fiber.

Model OFTM-5354 provides 400X magnification, which is suitable for multimode and singlemode fiber.

Tip: The FiberInspector function uses a lot of battery power. To maximize battery life, plug in the ac adapter when using this function for more than 1 minute.

Using the Probe

Figure 5-1 shows the equipment required for FiberInspector tests. Figure 5-2 shows how to use the probe.

1. On the **System** tab in Setup, set **CAMERA TYPE** to match the probe's magnification. This selects the correct size for the core size scale. Model OFTM-5350 is 250X; model OFTM-5354 is 400X.

2. Use the adapter cable provided to connect the probe to the video input jack on the side of the tester.
3. Screw an adapter tip that matches the connector type being inspected onto the fiber probe.

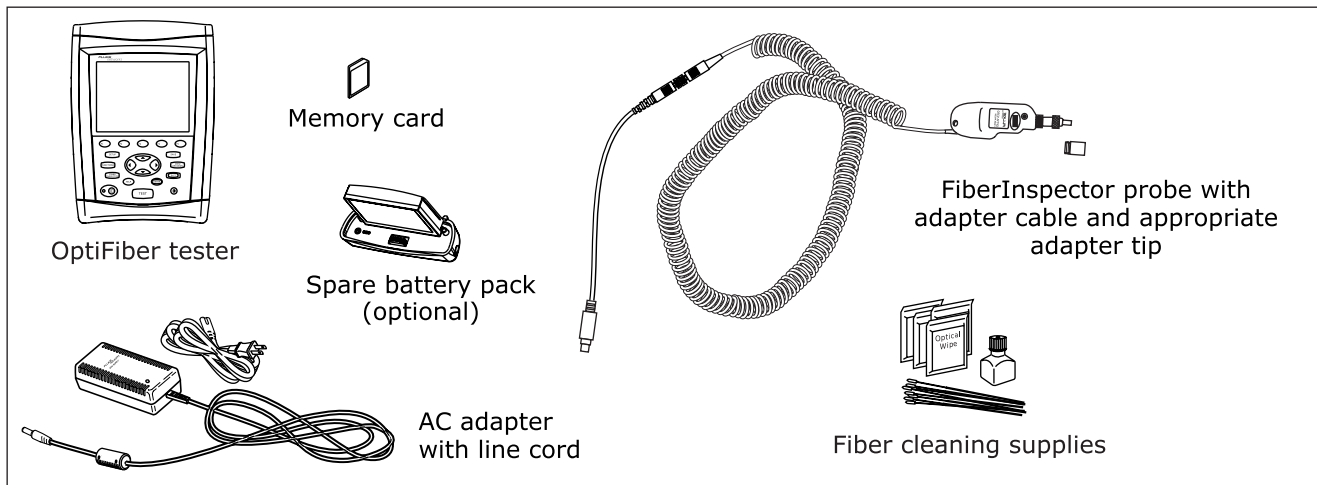


Figure 5-1. Equipment for FiberInspector Tests

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4. Clean the connector to be inspected.
5. Press **FIBER INSPECTOR**. If the message **"Camera Image Unavailable"** appears check the connections between the probe and the tester.
6. Place the probe on the fiber connector. To focus the image, turn the focusing ring on the probe.

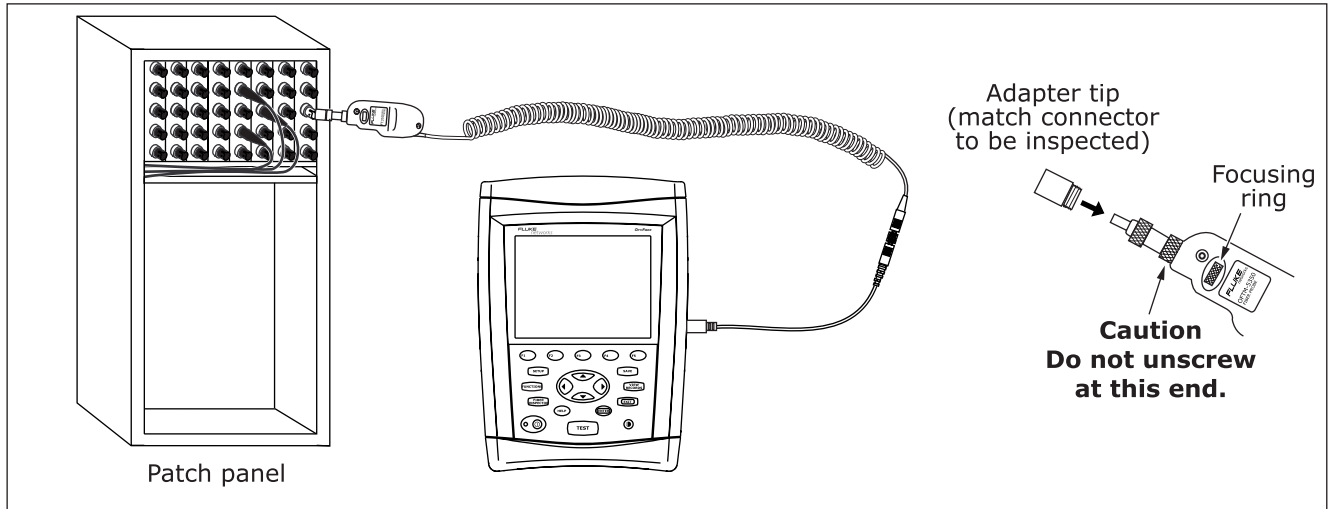


Figure 5-2. Using the FiberInspector Probe

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The tester's softkeys provide additional functions:

- To move the image on the screen, use the arrow keys. Press **(F4) Auto Center** to quickly center the image.
- To conserve battery life by capturing the image and turning off the probe, press **(F5) Still**.
- To adjust the brightness or contrast of the image, press **(F1) More** if necessary; then press **(F3) Image Contrast**.
- To see a full-screen image, which shows more of the ferrule, press **(F1) More** if necessary, then press **(F5) Full Screen**.
- To use a scale to help you determine core size, see "Using the Scale" on page 5-7.
- To manually assign a PASS or FAIL result to the image, press **(F3) Grade Image** until the desired result appears under **Visual Quality**.

7. To save the results, press **(SAVE)**, select or create a fiber ID; then press **(SAVE)** again.

Tip: If you are saving FiberInspector images with test results, save the image before testing the cabling.

FiberInspector Image Examples

Figure 5-3 shows some examples of FiberInspector images.

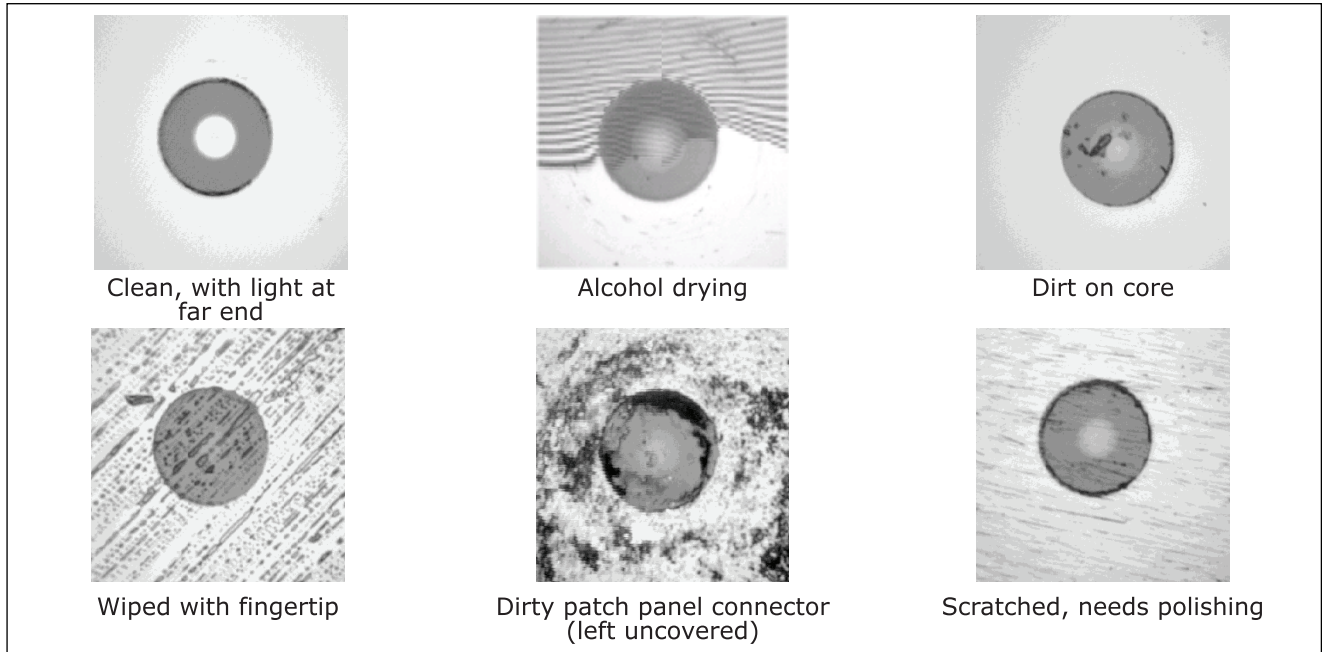




Figure 5-3. FiberInspector Image Examples (250X on multimode fiber)

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Getting a Good Image

Table 5-1 describes how to solve some common problems with FiberInspector images.

Table 5-1. Getting a Good FiberInspector Image

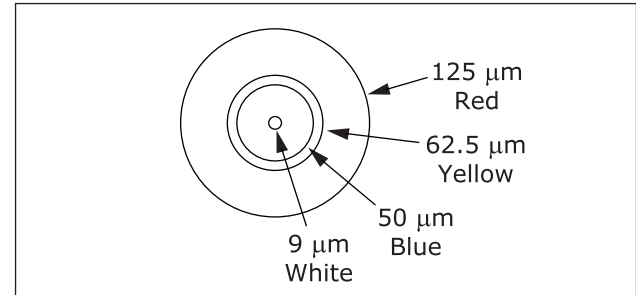
Problem	Solution
The image is indistinguishable or cannot be focused.	Press  to switch to Real Time mode before focusing and to refresh the image. Verify that the style of adapter tip on the probe matches the style of connector you are inspecting and that the probe is slid all the way onto the connector.
The core is not visible.	Shine a visible light into the other end of the fiber.
The scale for measuring core sizes is wrong and the wrong magnification value is shown.	On the System tab in Setup, set CAMERA TYPE to match the probe's magnification.
The image is just a black square.	Press  Real Time to activate the probe.
The image cannot be centered.	Try moving the probe around on the connector. If the image still cannot be centered, the probe's detector may have been knocked out of alignment by rough handling. Contact Fluke Networks for service information.

Using the Scale

Figure 5-4 shows the scale you can use on FiberInspector images to measure core and cladding sizes.

To use the scale, do the following:

1. Verify that the correct magnification is shown on the FiberInspector screen. Model OFTM-5350 is 250X; model OFTM-5354 is 400X. You can change this on the **System** tab in Setup.
2. Center the image, put the image in **Still** mode; then press **F2** **Show Scale**.



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Figure 5-4. FiberInspector Scale

Chapter 6

Using the Loss/Length Option



Warning

Read the safety information at the beginning of Chapter 2 before using the loss/length option.

Overview of Features

The loss/length measurement option provides the following features, in addition to the OTDR module features described in Chapter 1:

- Measures optical power loss, length, and propagation delay on dual-fiber cabling. Provides pass/fail results based on limits you enter or on factory-installed limits.
- FindFiber™ function helps you identify and verify optical connections.

Note

The power meter option on the OFTM-5611 and OFTM-5631 modules also lets you run loss tests in Far End Source mode.

Verifying Operation

When you install the loss/length module in the tester, the module's model number should show in the upper-right corner of the screen. If the screen shows **No Module Installed**, refer to "If Something Seems Wrong" in Chapter 10.

Loss/Length Test Settings


Table 6-1 summarizes the loss/length test settings. To access these settings, press **SETUP**.

Table 6-1. Loss/Length Test Settings

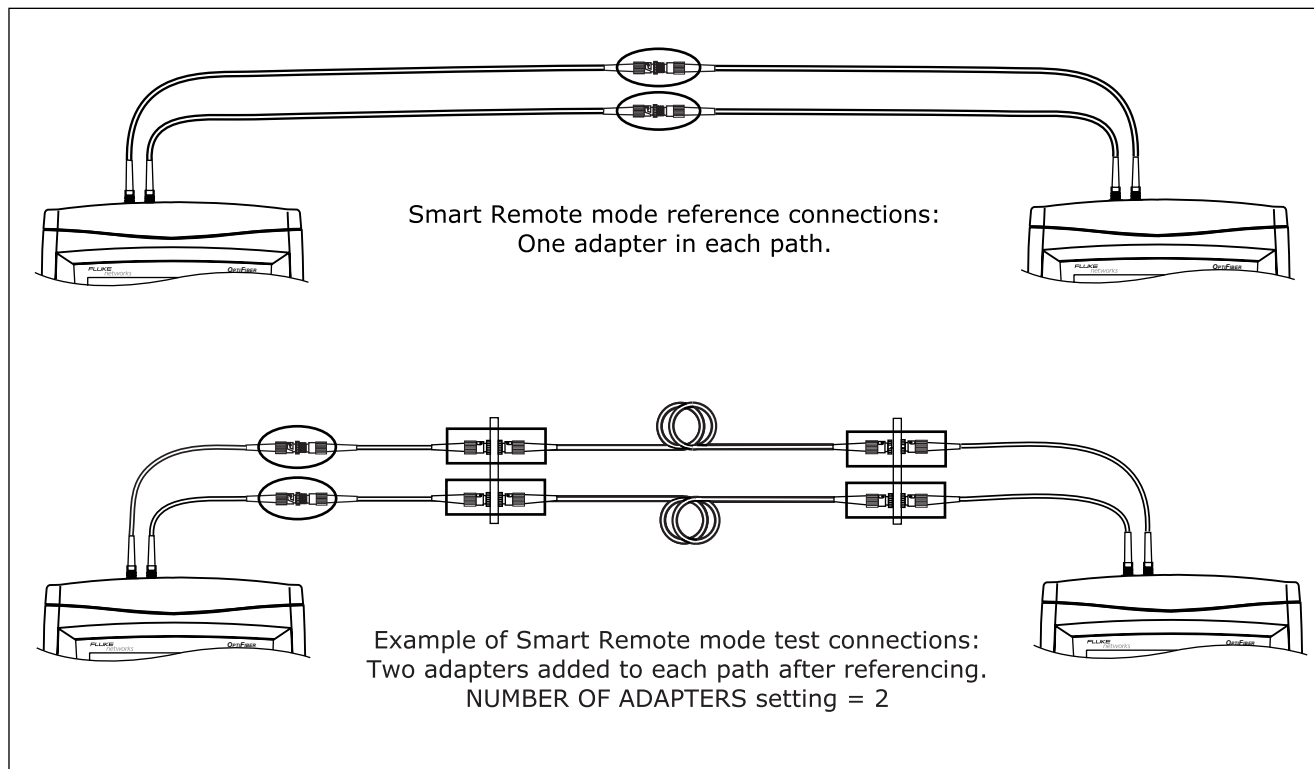
SETUP Tab	Setting*	Description
Job tab	Job settings	The job settings are saved with test results to identify the job site, the cables tested, and the test direction. Before you run a test you will save, verify that the job and fiber ID information is correct. See Chapter 2 for details.
Cable tab	CONNECTOR TYPE	Select the type of connector used in the cabling. This setting affects the diagrams shown for reference connections. If the cabling's connector type is not listed, use General .
* For Smart Remote mode, only the REMOTE END SETUP and THIS UNIT settings need to be set on the remote tester.		

-continued-

Table 6-1. Loss/Length Test Settings (cont.)

SETUP Tab	Setting*	Description
Cable tab	NUMBER OF ADAPTERS NUMBER OF SPLICES	<p>If the selected limit uses a calculated loss limit, enter the number of adapters and splices that will be added to the fiber path after the reference is set. Figure 6-1 shows an example of how to determine the NUMBER OF ADAPTERS setting.</p> <p>Loss/length test limits that include maximum values for the loss per km, loss per connector, and loss per splice use a calculated limit for overall loss. Only limits with all three values use a calculated loss limit. The OVERALL LOSS value should be N/A in these limits. If a loss value is entered, it is ignored.</p> <p>To see the limit's values, select TEST LIMIT on the Loss/Length tab; then press  View Limit.</p>
	FIBER TYPE	<p>Select a fiber type that is appropriate for the type you will test. You can select factory-installed fiber types or custom types, which you configure with the Edit Custom Test Limit function in FUNCTIONS. See Chapter 9 for information on creating custom fiber types.</p>
* For Smart Remote mode, only the REMOTE END SETUP and THIS UNIT settings need to be set on the remote tester.		

-continued-



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Figure 6-1. Example of How to Determine the NUMBER OF ADAPTERS Setting

Table 6-1. Loss/Length Test Settings (cont.)

SETUP Tab	Setting*	Description
Cable tab	MANUAL SETTING FOR n n (index of refraction)	<p>When MANUAL SETTING FOR n is disabled, the n values depend on the selected fiber type. When MANUAL SETTING FOR n is enabled, the tester enters default values that you can change manually.</p> <p>The n values defined in the fiber types are suitable for most applications. Minor differences between the tester's n and a fiber's actual n usually do not make enough difference in length to fail a fiber.</p> <p>Increasing n decreases measured length.</p>
Loss/Length tab	TEST LIMIT	<p>The tester compares the loss/length test results to the selected test limits to produce PASS or FAIL results. You can select factory-installed limits or custom limits configured with the Edit Custom Test Limit function in FUNCTIONS. Custom limits are marked with asterisks (*).</p> <p style="text-align: center;"><i>Note</i></p> <p style="text-align: center;"><i>Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.</i></p> <p>See Chapter 9 for information on creating custom test limits.</p>
* For Smart Remote mode, only the REMOTE END SETUP and THIS UNIT settings need to be set on the remote tester.		

-continued-

Table 6-1. Loss/Length Test Settings (cont.)

SETUP Tab	Setting*	Description
Loss/Length Tab	REMOTE END SETUP	Use Smart Remote mode for testing dual-fiber cabling. Use Loopback mode for testing patch cords and cable spools. Use Far End Source mode with an optional, stand-alone source for testing individual fibers. For Smart Remote mode, set both units to Smart Remote.
	THIS UNIT	For Smart Remote mode, set one tester to Main and the other to Remote . Use the Main tester to run tests and save results. For Loopback and Far End Source modes, set the tester to Main .
	BI-DIRECTIONAL	When enabled in Smart Remote or Loopback mode, the tester prompts you to swap the test connections halfway through the test. The tester can then take bi-directional measurements for each fiber. See "Bi-Directional Testing" on page 6-34 for details.

-continued-

Table 6-1. Loss/Length Test Settings (cont.)

SETUP Tab	Setting*	Description
Loss/Length Tab	TEST METHOD	<p>The TEST METHOD refers to the number of adapters that are represented in the loss results. This setting does not affect loss results. It is only saved with the results to record which method you used. See the Appendix for details on test methods.</p> <p style="text-align: center;"><i>Note</i></p> <p><i>ANSI/TIA/EIA-526-14A and 526-7 specify Method B for measuring loss on multimode premises fiber and Method A.1 for singlemode premises fiber, respectively. All reference and test procedures described in the OptiFiber documentation produce Method B or A.1 results.</i></p>
Not in Setup	Wavelength	In Smart Remote and Loopback modes, the tester automatically tests at both wavelengths supported by the installed module. In Far End Source mode, the tester prompts you to select a wavelength after you start a test.
* For Smart Remote mode, only the REMOTE END SETUP and THIS UNIT settings need to be set on the remote tester.		

About Setting the Reference

Setting a reference lets the tester automatically subtract out the losses due to patch cords and the main and remote tester.

Note

Always let your test equipment warm up for 5 minutes before setting a reference.

For the most accurate test results, you should set the reference at these times:

- At the beginning of each day using the remote end setup (Figures 6-4 through 6-10) you will use that day. The tester reminds you to set the reference if the reference is more than 12 hours old.
- Anytime you reconnect a patch cord to the tester or other source.
- Anytime the tester warns you that the reference is out of date.

The tester requires you to set the reference at these times:

- Anytime you change the loss/length module in the main or remote tester.
- Anytime you start using a different remote tester.
- Thirty days after the reference was previously set.

The tester warns you if the reference value is outside of an acceptable range.

See the sections "Testing in Smart Remote Mode", "Testing in Loopback Mode", and "Testing in Far End Source Mode" for details on setting the reference for each mode.

To see the reference information for the current remote end setup

Select **Set Loss/Length Reference** from the Functions menu; then press **F1** **View Settings**.

Table 6-2 shows typical reference values.

Table 6-2. Typical Reference Values

Module	Minimum*	Nominal*	Maximum*	Maximum for Far End Source Mode*
OFTM-5612 Multimode	-28 dBm	-20 dBm	-15 dBm	-5 dBm
OFTM-5632 Singlemode	-15 dBm	-10 dBm	-5 dBm	-3 dBm
* Values apply to Smart Remote and Loopback modes. For Far End Source mode with OFTM-56x1 and 56x2 modules, values are determined by the source and should not exceed the maximum values given for Far End Source mode. See the source's documentation for the source's values.				

Using Mandrels for Testing Multimode Fiber

Your loss testing procedures for multimode fiber may include using mandrels to meet the launch conditions specified in TIA/EIA-568-B standards. Mandrels for 50 μm /125 μm and 62.5 μm /125 μm fiber with 3 mm jackets are available from Fluke Networks. See the accessories list for model numbers.

Mandrels are used on the tester's output fibers during referencing and testing. The tester's online help provides illustrations of how to use mandrels.

Testing in Smart Remote Mode

Use Smart Remote mode to test and certify dual-fiber cabling. In this mode, the tester measures loss, length, and propagation delay on two fibers at two wavelengths in one or both directions.

Figure 6-2 shows the equipment required for loss/length testing in Smart Remote mode.

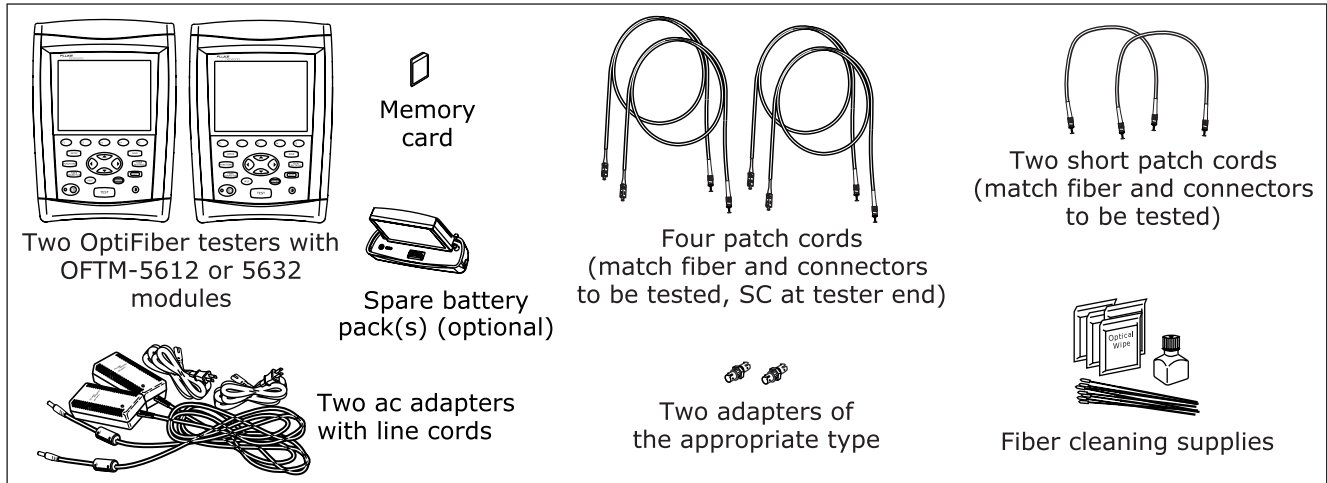


Figure 6-2. Equipment for Testing in Smart Remote Mode

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Setting the Reference in Smart Remote Mode

1. Turn on both testers and let them warm up for 5 minutes.
2. **On the main tester:** set the following on **Loss/Length** tab in Setup:
 - Set **REMOTE END SETUP** to **Smart Remote**.
 - Set **THIS UNIT** to **Main**.
3. **On the remote tester:** set the following on **Loss/Length** tab in Setup:
 - Set **REMOTE END SETUP** to **Smart Remote**.
 - Set **THIS UNIT** to **Remote**.
4. Clean the connectors on the tester and the patch cords.

5. **On the main tester:** press **FUNCTIONS**; then select **Set Loss/Length Reference**.
6. Make the connections shown on the **SET REFERENCE** screen and in Figure 6-3; then press **TEST**.

Caution

Do not disconnect the patch cords from the tester after setting the reference. If you do, you must set the reference again to ensure valid measurements.

See “About Setting the Reference” on page 6-8 for more information about referencing.

Running the Test in Smart Remote Mode

Caution

If the patch cords have been disconnected from the tester since the reference was set, you must set the reference again to ensure valid measurements.

1. Verify that the settings described in Table 6-1 are appropriate. Let the testers warm up for 5 minutes.
2. Set the main tester to loss/length mode: On the **HOME** screen, press **F1** **Change Test**; then select **Loss/Length**.
3. Clean the connectors on the cabling to be tested.
4. Connect the tester to the cabling as shown in Figure 6-4.
5. Press **TEST** to start the loss/length test.
6. If **Open** or **Unknown** appears as the status, try the following:
 - Verify that all connections are good.
 - Verify that the remote tester is set to **Remote** on its **Loss/Length** tab in Setup.
 - Verify that the remote tester is still active. You may need to press **F1** **Start** on the remote tester to reactive the tester.
 - Try different connections to the cabling until the test continues. See “Using FindFiber in Smart Remote Mode” on page 6-37 for details on FindFiber messages.
 - Use a visible light source to verify fiber continuity.
7. To save the results, press **SAVE**, select or create a fiber ID for one fiber; then press **SAVE**. Select or create a fiber ID for the other fiber; then press **SAVE** again.

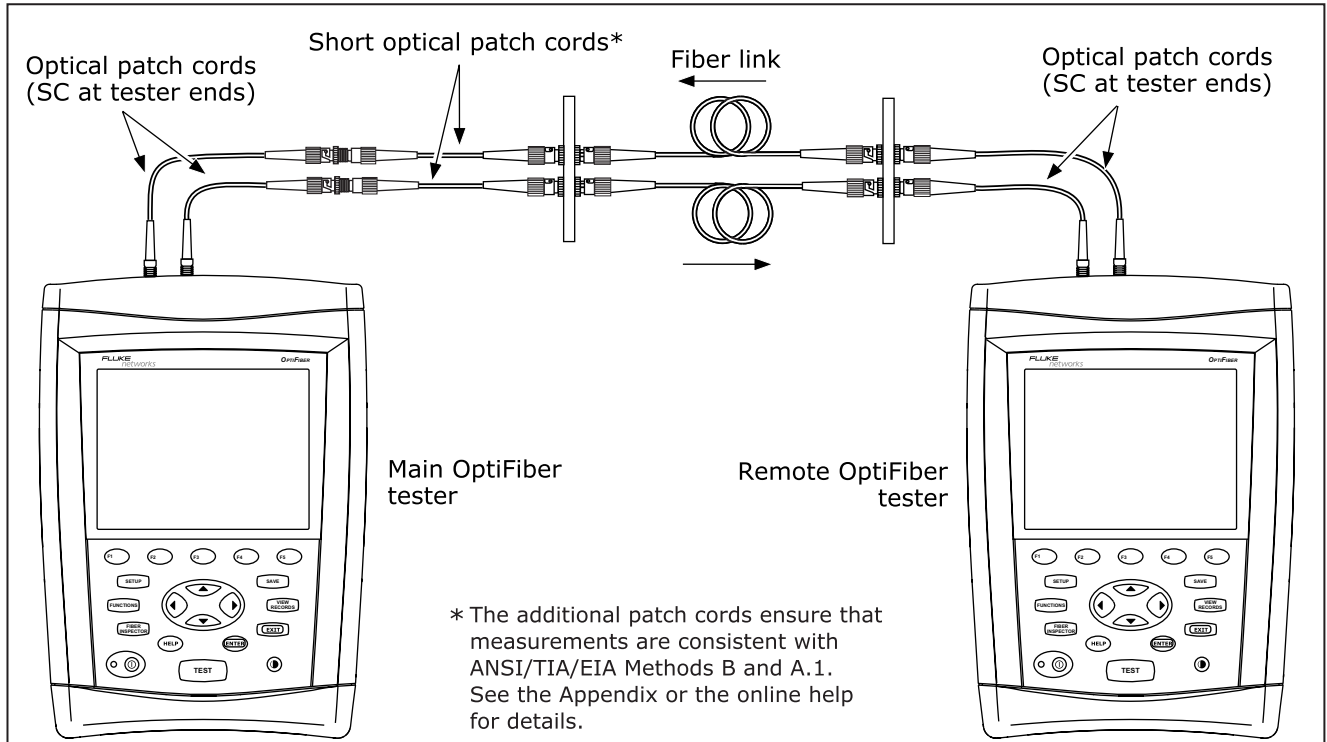


Figure 6-4. Smart Remote Mode Test Connections

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Smart Remote Mode Test Results

The **SUMMARY** screen, which appears when the test is finished, is described in Table 6-3.

To see more detailed results, press **F1** **View Results**.
Table 6-4 describes the **RESULTS** screen.

Table 6-3. Smart Remote Mode SUMMARY Screen Features

Item	Description
FIBER LENGTH	The length of the fiber in the cabling.
HEADROOM	The smallest loss margin found for all the wavelengths and directions tested. To see all the margins, press F1 View Results .
PASS/FAIL	PASS: All measurements are within the limits. FAIL: One or more measurements exceeds the limits.

Table 6-4. Smart Remote Mode RESULTS Screen Features

Item	Description
END 1-2 END 2-1 Output Fiber Input Fiber	<p>These refer to the direction of the test results. If THIS END on the main tester is set to END 1, END 1-2 shows results for the main tester's output fiber; END 2-1 shows results for the input fiber. The results are reversed if the main tester is set to END 2. Press F1 to switch between the results for each fiber.</p> <p>When bi-directional testing is enabled, Output Fiber and Input Fiber refer to the fiber connections at the main tester after you swapped the fibers. The tester shows results for both test directions. Press F1 to switch between the results for each fiber.</p> <p>PASS: The measurement in the column is within the limit.</p> <p>FAIL: The measurement in the column exceeds the limit.</p>
RESULT	<p>The loss, length, or propagation delay result for the fiber. Propagation delay is half of the time taken for the signal to travel from the tester's OUTPUT connector to the INPUT connector (minus the delay of the reference patch cords and adapters). "Too High" is shown if the loss is too high to measure.</p> <p>If loss is negative, set the reference and test the cabling again. See Table 6-9 for details.</p>
LIMIT	The maximum loss, length, or propagation delay allowed by the selected test limit.
MARGIN	The difference between the limit and the measured value. Margin is negative for measurements that fail.
N/A	The results show N/A for values not defined by the selected test limit.

Testing in Loopback Mode

Use Loopback mode to test spools of cable, segments of uninstalled cable, patch cords, and launch fibers.

In this mode, the tester measures loss, length, and propagation delay at two wavelengths in one or both directions.

Figure 6-5 shows the equipment required for loss/length testing in Loopback mode.

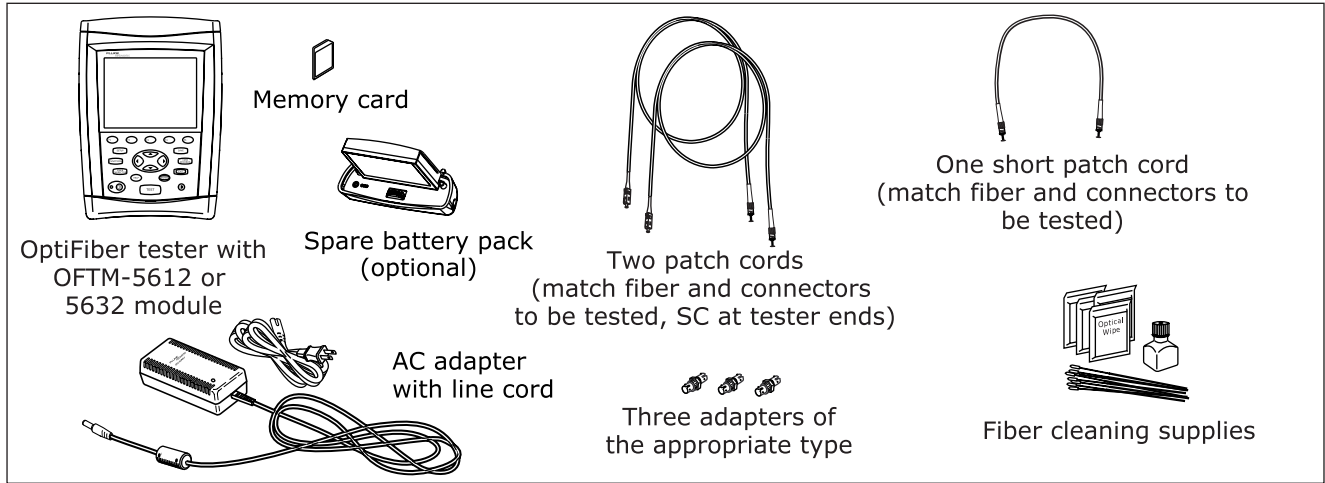


Figure 6-5. Equipment for Testing in Loopback Mode

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Setting the Reference in Loopback Mode

1. Turn on the tester and let it warm up for 5 minutes.
2. On the **Loss/Length** tab in Setup set **REMOTE END SETUP** to **Loopback**.
3. Clean the connectors on the tester and the patch cords.
4. Press **FUNCTIONS**; then select **Set Loss/Length Reference**.

5. Make the connections shown on the **SET REFERENCE** screen and in Figure 6-6; then press **TEST**.

Caution

Do not disconnect the patch cords from the tester after setting the reference. If you do, you must set the reference again to ensure valid measurements.

See “About Setting the Reference” on page 6-8 for more information about referencing.

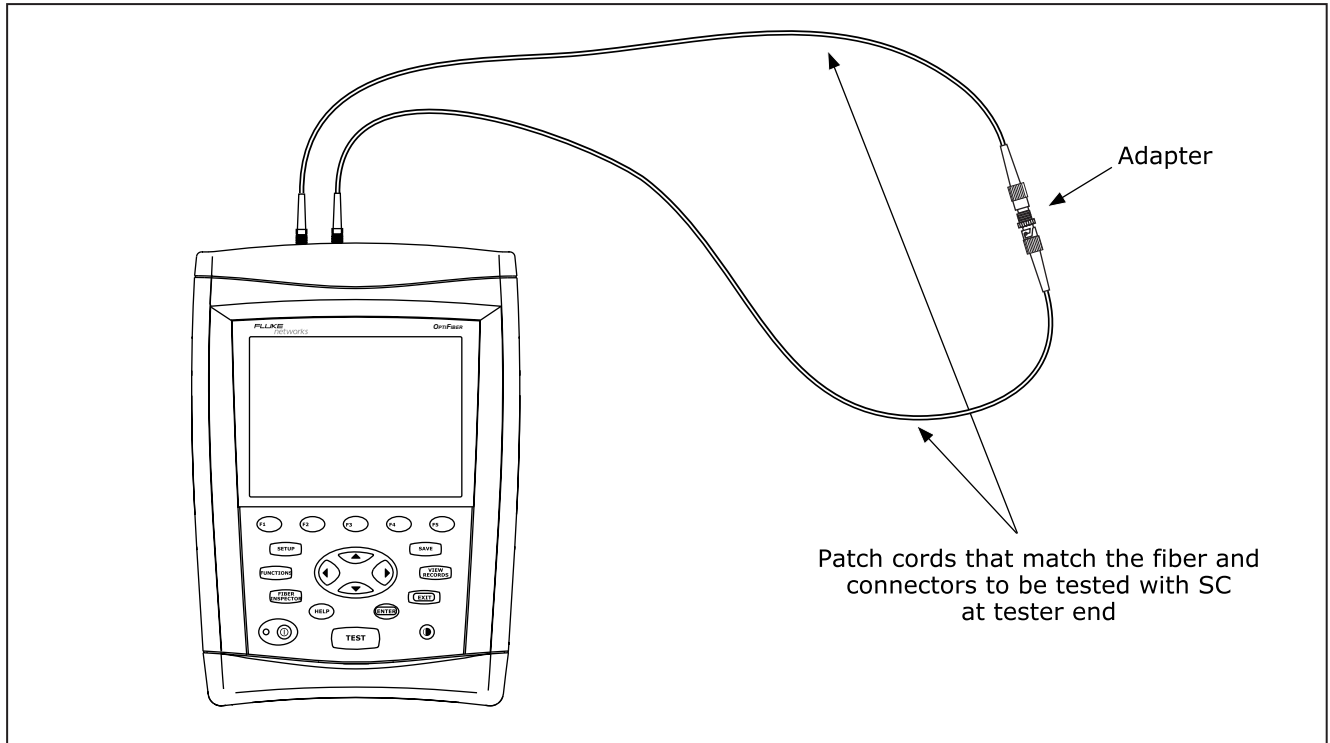


Figure 6-6. Loopback Mode Reference Connections

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Running the Test in Loopback Mode

Caution

If the patch cords have been disconnected from the tester since the reference was set, you must set the reference again to ensure valid measurements.

1. Verify that the settings described in Table 6-1 are appropriate. Let the tester warm up for 5 minutes.
2. Select Loss/Length mode: On the **HOME** screen, press **F1** **Change Test**; then select **Loss/Length**.
3. Clean the connectors on the cabling to be tested.
4. Connect the tester to the cabling as shown in Figure 6-7.

5. Press **TEST** to start the loss/length test.
6. To save the results, press **SAVE**; select or create a fiber ID; then press **SAVE** again.

Loopback Mode Test Results

The **SUMMARY** screen, which appears when the test is finished, is described in Table 6-5.

To see more detailed results, press **F1** **View Results**. Table 6-6 describes the **RESULTS** screen.

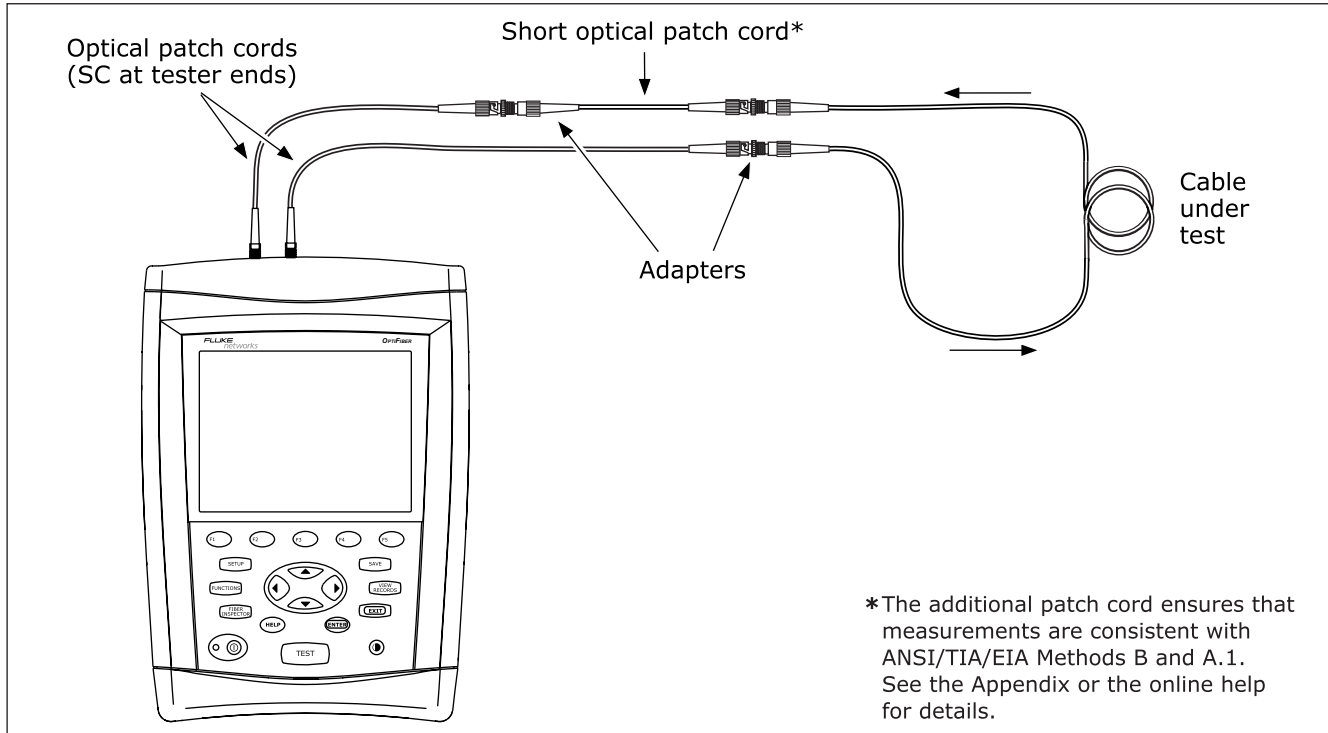


Figure 6-7. Loopback Mode Test Connections

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Table 6-5. Loopback Mode SUMMARY Screen Features


Item	Description
FIBER LENGTH	The length of the fiber in the cabling. This is the total length between the INPUT and OUTPUT connectors.
HEADROOM	The smallest margin found for all the wavelengths tested. To see all the margins, press  View Results .
PASS/FAIL	PASS: All measurements are within the limits. FAIL: One or more measurements exceeds the limits.

Table 6-6. Loopback Mode RESULTS Screen Features

Item	Description
END 1-2 END 2-1	<p>These refer to the direction of the test results. If THIS END in Setup is set to END 1, END 1 is the fiber end connected to the INPUT port. If THIS END in Setup is set to END 2, END 2 is the fiber end connected to the INPUT port.</p> <p>When bi-directional testing is enabled, the tester shows results for both directions. If THIS END in Setup is set to END 1, END 1 is the fiber end connected to the INPUT port when the test was finished.</p> <p>PASS: The measurement in the column is within the limit.</p> <p>FAIL: The measurement in the column exceeds the limit.</p>
RESULT	The loss, length, or propagation delay result for the fiber loop. Propagation delay is time taken for the signal to travel from the tester's OUTPUT connector to the INPUT connector (minus the delay of the reference patch cords and adapters). "Too High" is shown if the loss is too high to measure. If loss is negative, set the reference and test the cabling again. See Table 6-9 for details.
LIMIT	The maximum loss, length, or propagation delay allowed by the selected test limit.
MARGIN	The difference between the limit and the measured value. Margin is negative for measurements that fail.
N/A	The results show N/A for values not defined by the selected test limit.

Testing in Far End Source Mode

Use Far End Source mode to measure power or power loss at one wavelength on individual fibers. You can save results from one or both directions.

Far End Source mode requires a stand-alone optical source, such as a Fluke Networks SimpliFiber® source or LS-1310/1550 Laser Source.

Far End Source mode is available on the OFTM-5611 and OFTM-5631 modules.

Required Equipment

Figure 6-8 shows the equipment required for measuring loss in Far End Source mode.

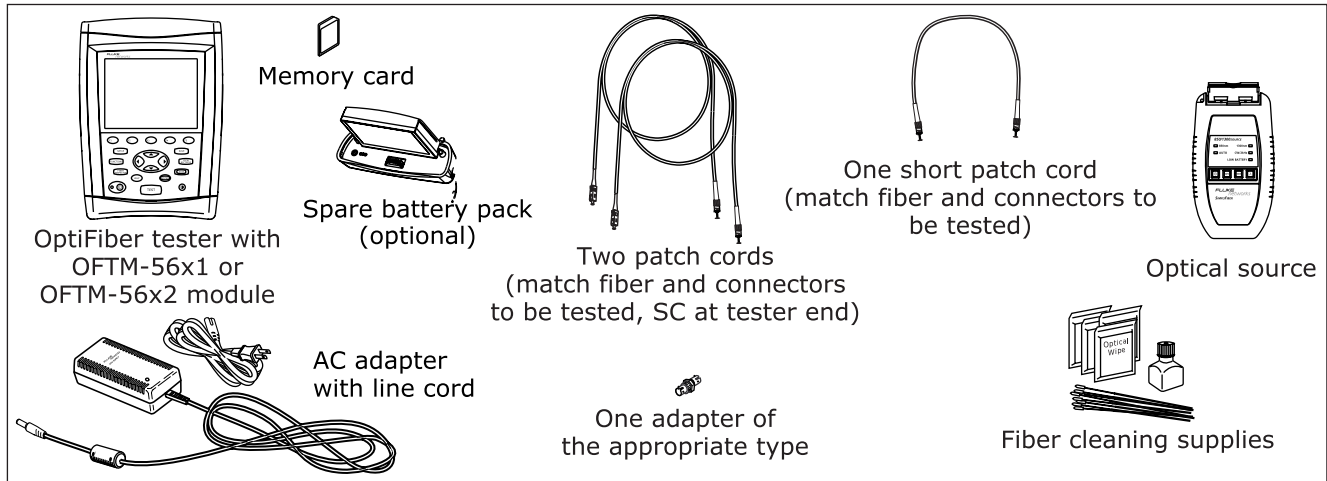




Figure 6-8. Equipment for Testing in Far End Source Mode

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Setting the Reference in Far End Source Mode

1. Turn on the tester and source and let them warm up for 5 minutes.
2. On the **Loss/Length** tab in Setup set **REMOTE END SETUP** to **Far End Source**.
3. Set the source to the correct wavelength and to continuous-wave output.
4. Clean the connectors on the tester the patch cords.
5. Press ; then select **Set Loss/Length Reference**.

6. Make the connections shown on the **SET REFERENCE** screen and in Figure 6-9.
7. Highlight a wavelength; then press .

Caution

Do not disconnect the patch cord from the tester or source after setting the reference. If you do, you must set the reference again to ensure valid measurements.

See “About Setting the Reference” on page 6-8 for more information about referencing.

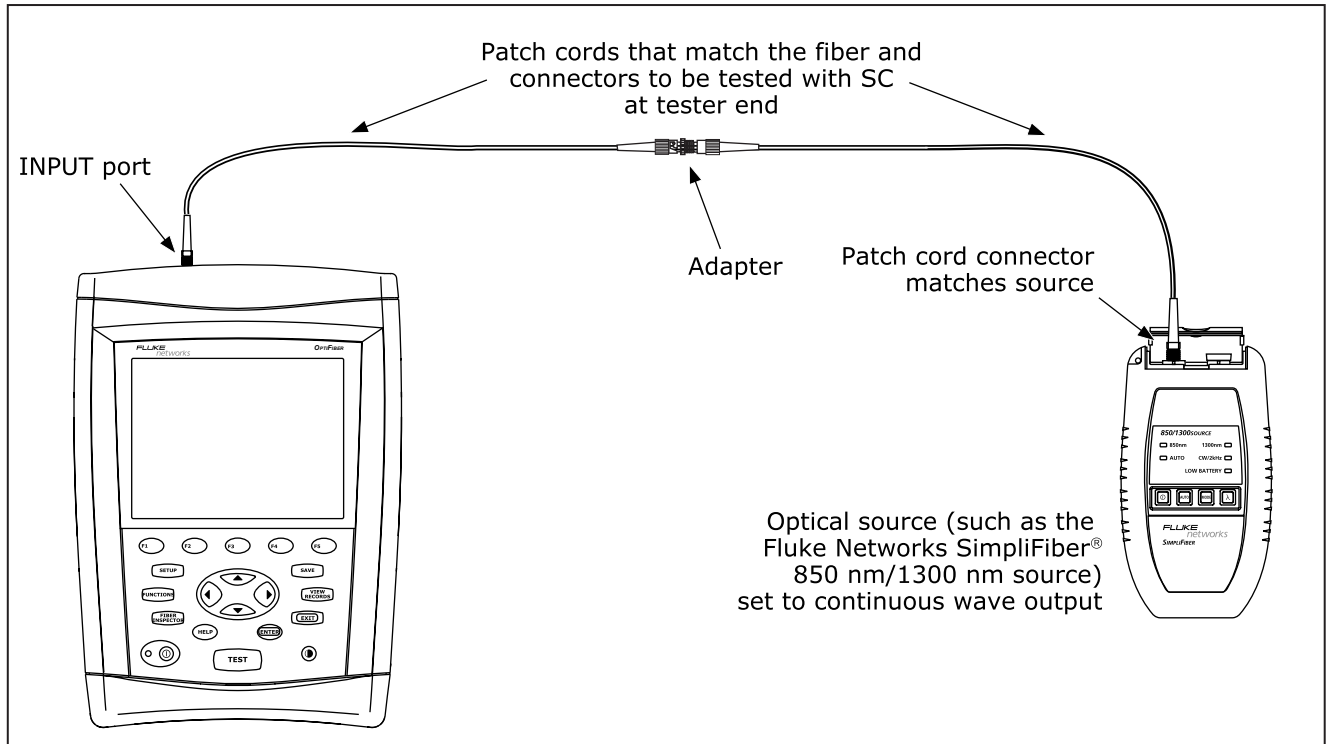






Figure 6-9. Far End Source Mode Reference Connections

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Running the Test in Far End Source Mode

Caution

If the patch cord has been disconnected from the tester or source since the reference was set, you must set the reference again to ensure valid measurements.

1. Verify that the settings described in Table 6-1 are appropriate. Let the tester and source warm up for 5 minutes.
2. Select Loss/Length mode: On the **HOME** screen, press  **Change Test**; then select **Loss/Length**.
3. Clean the connectors on the cabling to be tested.
4. Connect the tester to the cabling as shown in Figure 6-10.
5. Verify the source is set to the correct wavelength and to continuous wave output.
6. Press  to start the loss/length test.
7. To save the results, press , select or create a fiber ID; then press  again.

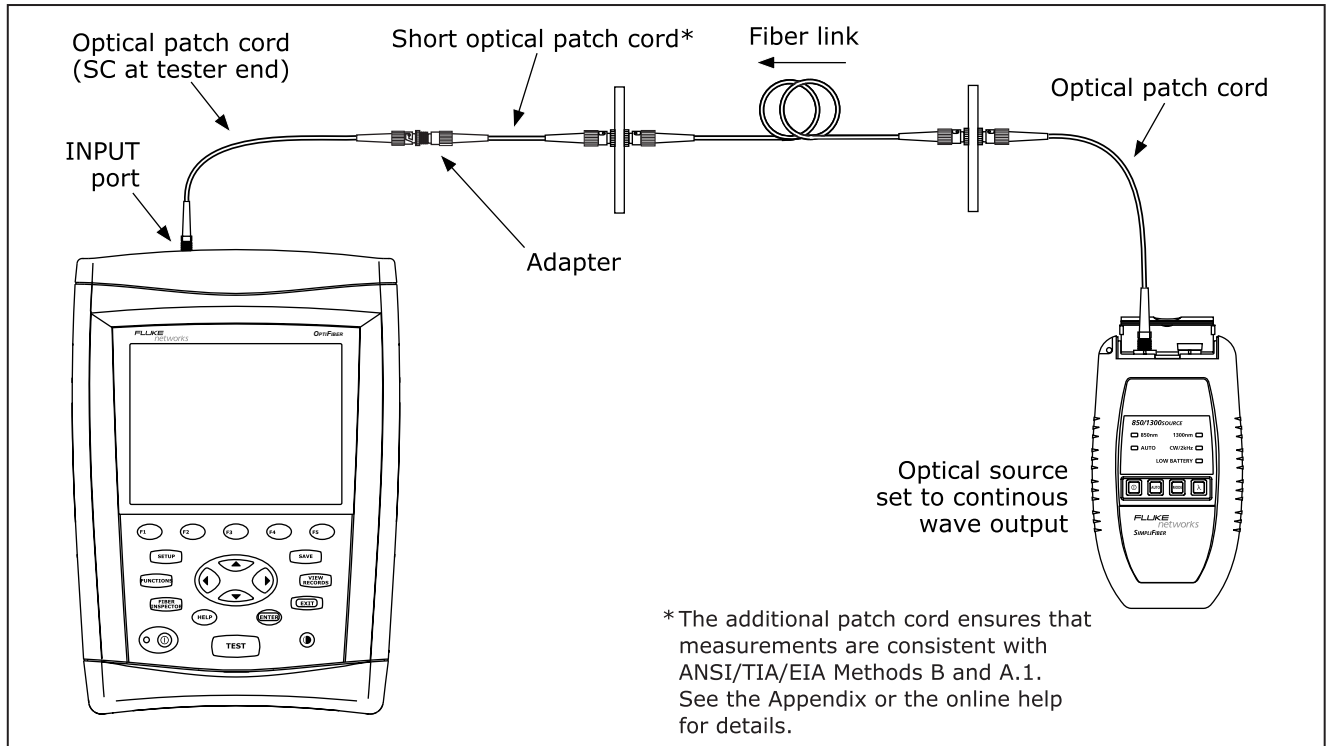


Figure 6-10. Far End Source Mode Test Connections

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Far End Source Mode Test Results

The **SUMMARY** screen, which appears when the test is finished, is described in Table 6-7.


To see more detailed results, press  **View Results**.
Table 6-8 describes the **RESULTS** screen.

Table 6-7. Far End Source Mode SUMMARY Screen Features

Item	Description
HEADROOM	The difference between the measured loss and the limit.
PASS/FAIL	PASS: The loss is within the limit. FAIL: The loss exceeds the limit.

Table 6-8. Far End Source Mode RESULTS Screen Features

Item	Description
END 1-2 END 2-1	<p>These refer to the direction of the test results. In Far End Source mode, the tester assigns END 1-2 to the results if THIS END on the Job tab in Setup is set to END 2, or END 2-1 if THIS END is set to END 1.</p> <p>PASS: The measurement in the column is within the limit.</p> <p>FAIL: The measurement in the column exceeds the limit.</p>
RESULT	The loss of the fiber. "Too High" is shown if the loss is too high to measure. If loss is negative, set the reference and test the cabling again. See Table 6-9 for details.
LIMIT	The maximum loss allowed by the selected test limit.
MARGIN	The difference between the limit and the measured value. Margin is negative for measurements that fail.
N/A	The results show N/A for values not defined by the selected test limit.

Bi-Directional Testing

You can test cabling in both directions and save the bi-directional test results in all test modes.

Bi-Directional Testing in Smart Remote or Loopback Mode

1. On the main unit's **Job** tab in Setup, enter names for **END 1** and **END 2** to identify the ends of the cabling. Name **END 1** as the end where the main unit will be located.
2. Set **THIS END** to **END 1**.
3. On the main tester's **Loss/Length** tab, set **BI-DIRECTIONAL** to **Enabled**.
4. Run a loss/length test on the cabling. Halfway through the test, the tester prompts you to swap the fibers at each end of the cabling. Swap the connections at the patch panel, not at the tester's ports.
5. Press **SAVE** to save the test.

Bi-Directional Testing in Far End Source Mode

1. On the **Job** tab in Setup, enter names for **END 1** and **END 2** to identify the ends of the cabling. Name **END 1** as the end you will test first.
2. Set **THIS END** to **END 1**.
3. Test all the cabling and save the results from **END 1**.
4. On the **Job** tab, change **THIS END** to **END 2**; then test all the cabling from the other end. When you save each result, use the same fiber ID you used for the results from the first end. The used IDs will be in the **IDS IN CURRENT FOLDER** list.

Diagnosing Loss/Length Test Failures

Table 6-9 describes some typical causes of loss/length test failures.

Table 6-9. Diagnosing Loss/Length Test Failures

<p>Loss is more than expected or is reported as “Too High”.</p> <ul style="list-style-type: none"> • The fibers are connected to the wrong ports on the tester, or are swapped at one end of the cabling. • A patch cord is broken. • There is one or more dirty, damaged, misaligned, or unseated connections in the cabling. Check all connections and clean all fiber endfaces, then retest. Or use the OTDR locate bad connections. <p>Tip: An OTDR cannot measure the loss of the first and last connections in the cabling unless you use a launch and receive fiber during the OTDR test. If the first or last connection is bad, and you do not use launch and receive fibers, the OTDR test may pass because it does include the loss of the bad connection. See “About Launch and Receive Fibers” in Chapter 3 for details.</p> <ul style="list-style-type: none"> • The number of adapters or splices on the Cable tab in Setup is too low (for limits that use a calculated loss value). • The wrong fiber type is selected on the Cable tab in Setup. • The reference is incorrect. Set the reference again using the same patch cords to be used for testing. • A patch cord or fiber segment has the wrong core size. If the patch cords are the correct type, use the OTDR to look for mismatched fiber in the cabling. • The cabling has a bad fusion or mechanical splice or a sharp bend. Use the OTDR to locate these faults. <p style="text-align: center;">Caution</p> <p>Disconnect the source before connecting the OTDR to the cabling. Live sources can damage the OTDR’s receiver.</p>

-continued-

Table 6-9. Diagnosing Loss/Length Test Failures (cont.)

Loss is negative.
<ul style="list-style-type: none"> • The connections to the tester were disturbed after referencing. • The fiber ends were dirty during referencing. • There was a kink in a reference patch cord during referencing. • The connectors were not properly aligned during referencing. • Some other problem caused a bad reference value. <p>If loss is negative, set the reference again and retest the cabling.</p>
A known length of cable measures too long or too short.
<ul style="list-style-type: none"> • The wrong fiber type is selected on the Cable tab in Setup. • The index of refraction needs adjustment. Change n on the Cable tab in Setup.

Finding Connections with FindFiber

The FindFiber function is available with the loss/length test option. This function helps you trace connections at patch panels and quickly check fiber continuity.

Note

The FindFiber function is not available in Far End Source mode.

Using FindFiber in Smart Remote Mode

Use FindFiber in Smart Remote mode to help you determine which fibers go to which connectors at a patch panel.

Figure 6-11 shows the equipment needed for using FindFiber in Smart Remote mode.

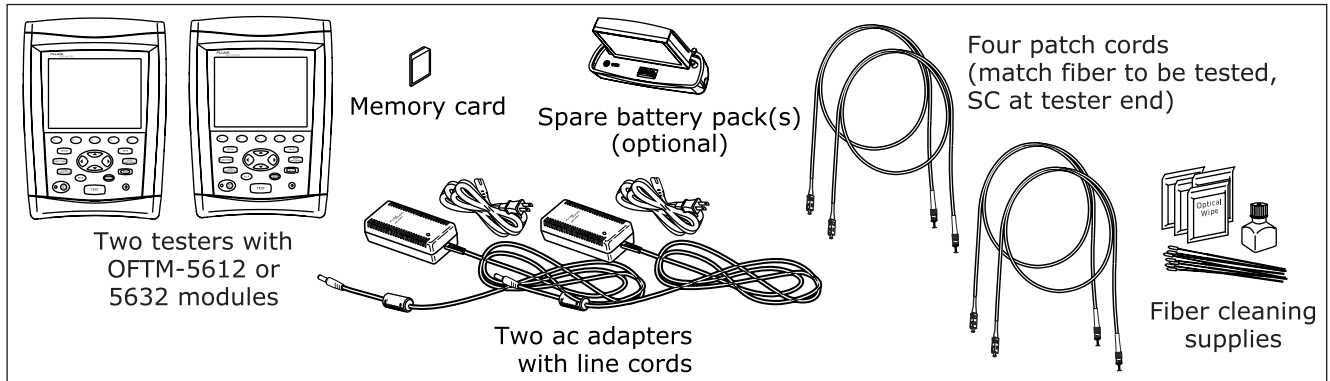


Figure 6-11. Equipment for Using FindFiber in Smart Remote Mode

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1. On the **Loss/Length** tab in Setup, set the main and remote testers to **Smart Remote** mode.
2. Clean all connectors; then make the connections shown in Figure 6-12.
3. On both testers press , select FindFiber; then press .
4. Try various connections to the patch panel with the main tester's INPUT fiber until the input fiber's **Link Status** shows **CONNECTED**.
5. Then try various connections with the main tester's OUTPUT fiber until the output fiber's **Link Status** shows **CONNECTED**. Table 6-10 shows the main tester results for Smart Remote mode.

Table 6-10. Main Tester Results for FindFiber Test (Smart Remote Mode)

Link Status		Description
INPUT Fiber	OUTPUT Fiber	
OPEN	UNKNOWN	The main tester's INPUT fiber path is not complete. The main tester cannot determine the state of the OUTPUT fiber path.
CONNECTED	OPEN	The main tester's INPUT fiber path is complete. The main tester's OUTPUT fiber path is not complete.
CONNECTED	CONNECTED	Both fiber paths are complete.

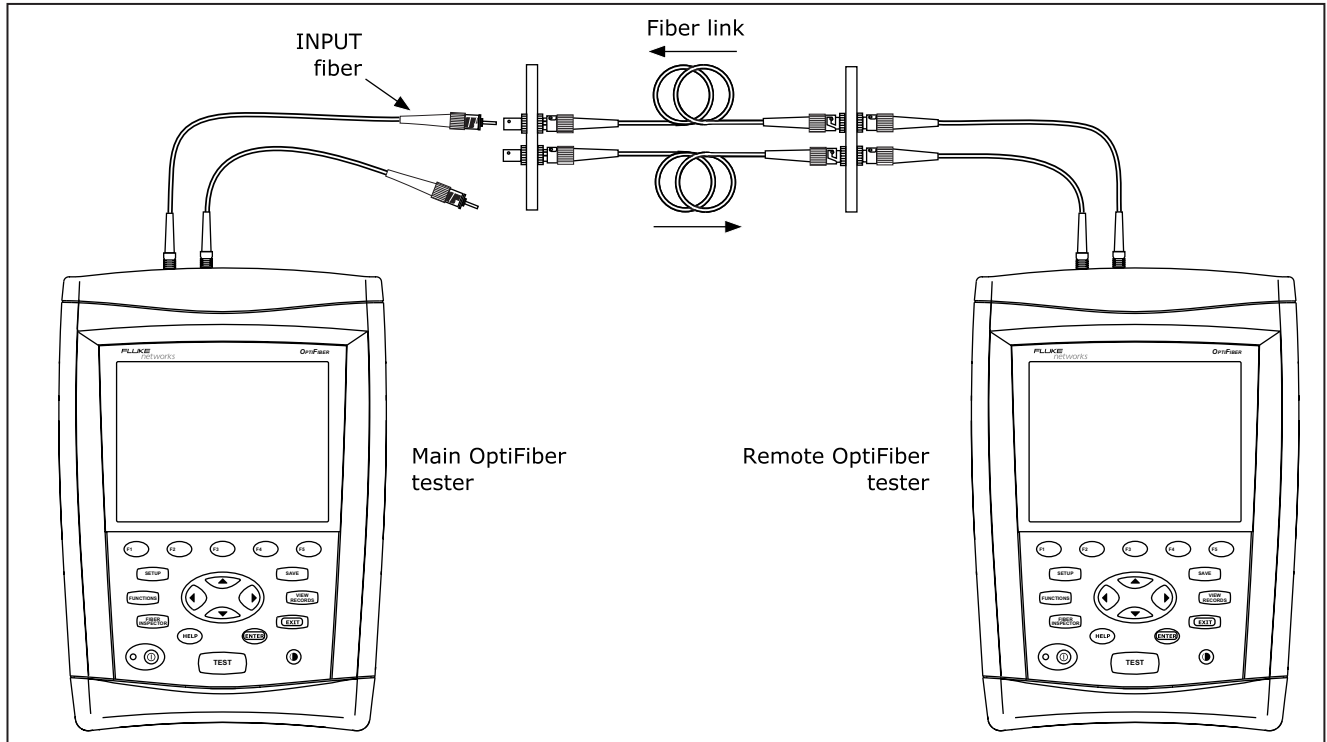


Figure 6-12. Using FindFiber in Smart Remote Mode

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Using FindFiber in Loopback Mode

Use FindFiber in Loopback mode to quickly check the continuity of patch cords, launch fibers, and fiber spools. Figure 6-13 shows the equipment needed for using FindFiber in Loopback mode.

1. On the **Loss/Length** tab in Setup, select Loopback mode.

2. Clean all connectors; then connect the tester's OUTPUT fiber to one end of the fiber path, as shown in Figure 6-14.
3. Press **FUNCTIONS**, select FindFiber; then press **TEST**.
4. Try various connections with the INPUT fiber. The **Link Status** shows **LOOPBACK** for both fibers when the path is complete.

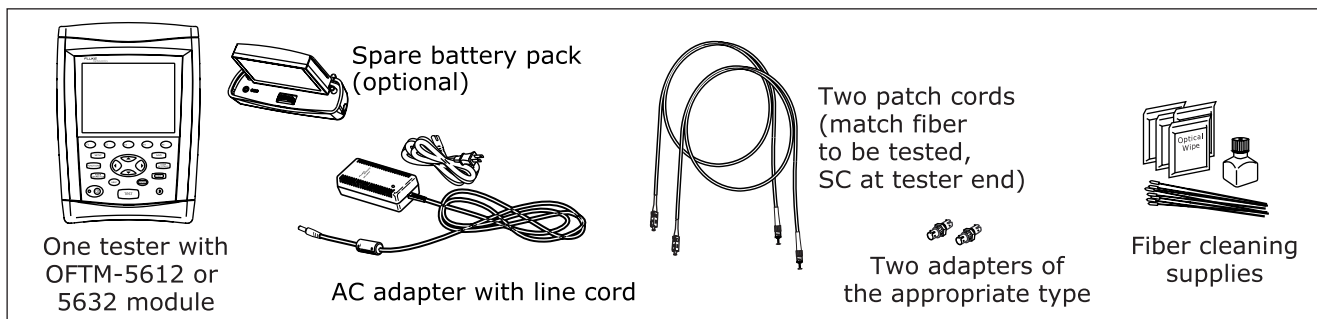


Figure 6-13. Equipment for Using FindFiber in Loopback Mode

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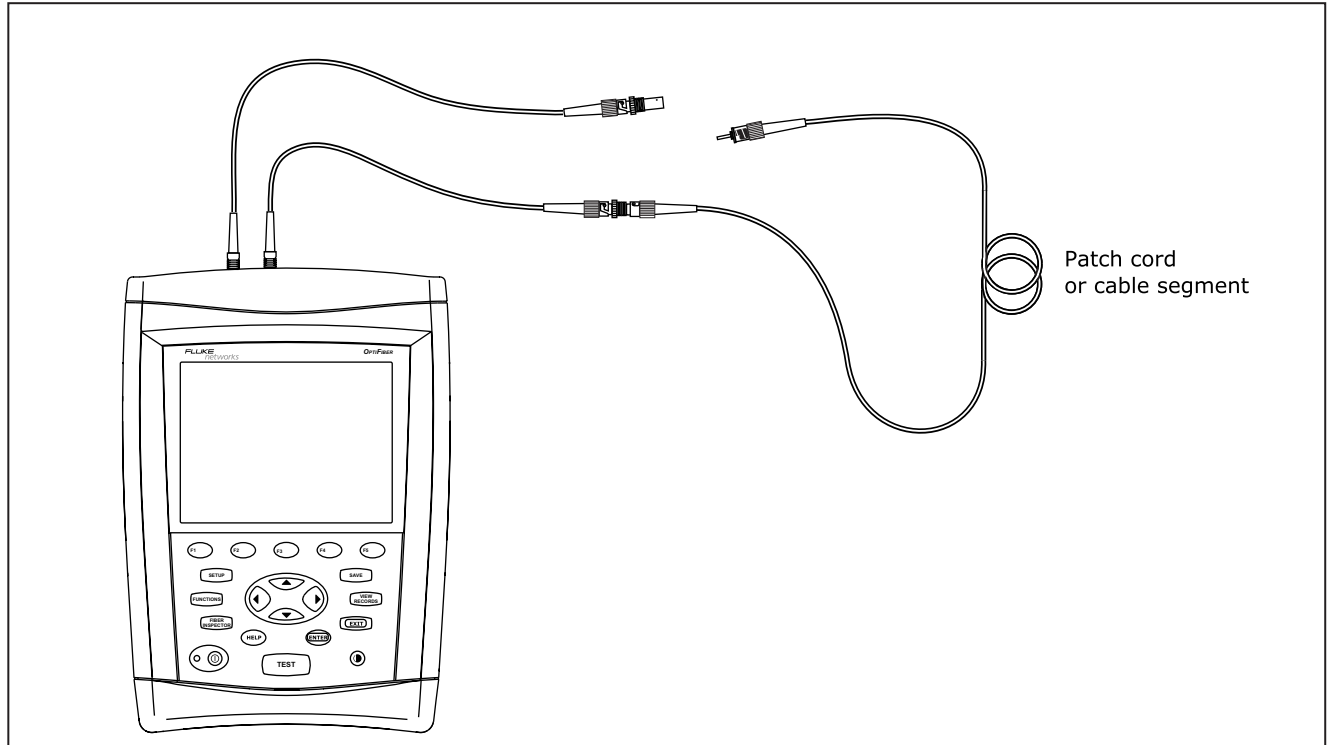


Figure 6-14. Using FindFiber in Loopback Mode

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Chapter 7

Using the Power Meter Option

The power meter option lets you monitor the output power produced by a source such as an optical network interface card or optical test equipment. You can also monitor the power received at the end of the cabling.

You can monitor power at 850 nm, 1300 nm, 1310 nm, and 1550 nm.

The power meter option is available with OFTM-5611, OFTM-5612, OFTM-5631, and OFTM-5632 modules.

Note

The power meter option also lets you measure loss in Far End Source mode. See Chapter 6 for details.

Running the Test

Figure 7-1 shows the equipment required for power meter tests.

1. Select power meter mode: Exit to the **HOME** screen, press **(F1) Change Test**; then select **Power Meter**. You do not need to select a fiber type or test limit.
2. Clean the tester's INPUT port and the patch cord and source connectors.

3. Use the patch cord to connect the source to the tester's INPUT port, as shown in Figure 7-2; then turn on the source.
4. Press **(TEST)**; then select the appropriate wavelength. To change the wavelength after starting the test, press **(F2) Change Wavelength**.

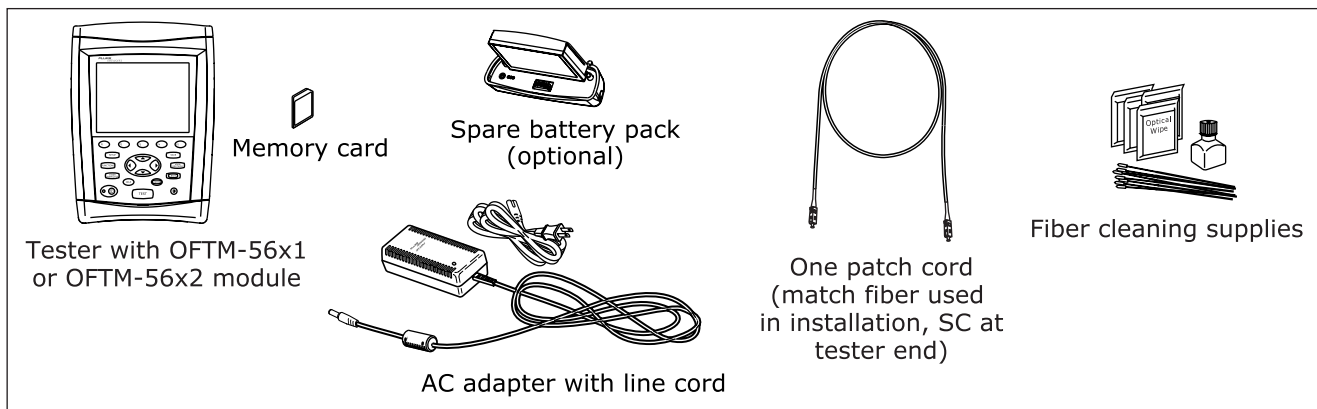


Figure 7-1. Equipment for Power Meter Tests

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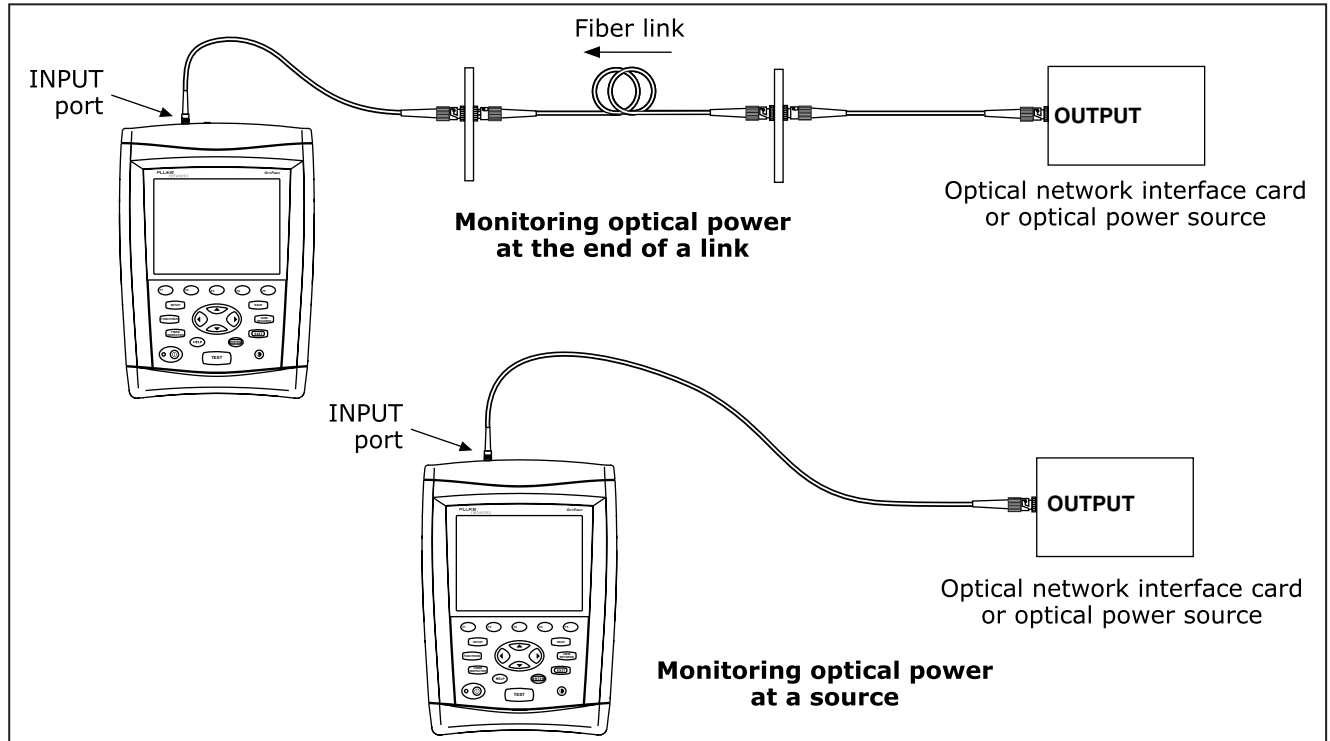


Figure 7-2. Connections for Monitoring Optical PowerPower Meter Results

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Power Meter Results

The power meter **RESULTS** screen shows the power received at the tester's INPUT port. The power meter test does not produce a PASS or FAIL result.

The test runs continuously until you press **SAVE** or **EXIT**. Press **F1** **dBm/μW** to switch between decibels and microwatts.

To determine if the power reading is correct, check the output power specification for the equipment you are testing.

If the power reading is below the tester's measurement range, the reading shows or **Too Low**.

If the power reading is above the tester's measurement range, the tester shows an error.

Caution

If the tester shows an error because the power reading is too high, immediately disconnect the source from the tester. The tester is not designed for measuring higher power levels, such as produced by CATV, optical amplifiers, and cellular systems.

To switch wavelengths, press **F2** **Change Wavelength**; then select a wavelength.

If the Power Reading is Low

- Verify that the patch cord is connected to the tester's INPUT port and that all other connections are secure.
- Verify that the wavelength you selected on the tester matches the source's wavelength.
- If you are measuring the output of a source used for testing, verify that the source's output is set to continuous wave. The modulated output produces a lower power reading than the continuous wave output.
- Verify that all patch cords and adapters are good and are of the appropriate type and core size for the source.

- If you are measuring the power received through cabling, use the OTDR to check the cabling for faults.

Caution

Disconnect the source before connecting the OTDR to the cabling. Live sources can damage the OTDR's receiver.


- Clean all fiber connections, then retest.
- Use a fiber microscope, such as the Fluke Networks FiberInspector probe, to inspect the fiber connectors. Polish the connectors if necessary, then retest.

Chapter 8

Memory Functions

About Saving Tests

You can save test results on a removable memory card or in the tester's internal memory. The tester can use MultiMediaCard (MMC) or Secure Digital memory cards (SD).

To select a location for saving tests, press  then select **CURRENT FOLDER** on the **Job** tab.

Tip: To avoid confusion regarding the location of test records, save test results on a memory card whenever possible.

You can save results from any fiber test, except the real time trace.

Each test record can hold bi-directional results from each type of test (except ChannelMap, which you run in just one direction). The test direction assigned to saved results is determined by the **THIS END** setting (in Setup) used when the test was run.

You can save the last test you ran anytime before you run another test or view stored records. This excludes FiberInspector images and power meter results, which you must save at the time of viewing. The tester warns you if you are about to do something that will delete an unsaved test from temporary memory. The unsaved test is retained in temporary memory even if you turn off the tester or remove the battery pack.

Memory Capacity

The number of test records you can save in a given amount of memory space depends on what you save in the records. For example, records that include video probe endface images take more memory than records without images.

The maximum amount of internal memory available for test results depends on the space taken by the tester's software and custom limits.

Notes

Memory card folders can store a maximum of 500 records each.

Loss/length tests in Smart Remote mode take up two test records—one for each fiber.


To see the memory space available, press **FUNCTIONS**; then select **Memory Status**. Press **F1** **Memory** to switch between the memory card and internal memory status.

Table 8-1 describes the features of the memory status screen.

Formatting a Memory Card

To format a memory card, insert the card into the tester, press **FUNCTIONS**; then select **Format Memory Card** from the **FUNCTIONS** menu.

Table 8-1. Memory Status Screen Features

Feature	Description
Memory Card or Internal Memory	The memory status currently displayed. Press  Memory to switch between the memory card and internal memory status.
Memory Usage	This bar graph shows the space used in the current memory destination. For memory cards, this includes space used by files other than test records. For internal memory, this includes space used by the tester's software and test limits.
Saved Records	The number of records saved in the current memory destination.
Available Memory	The approximate number of test records you can save in the memory destination. The exact number depends on the selected test mode, test limits, and other test settings, as well as the length of the cables you test.
Bar graphs for test types: PM: Power Meter tests L/L: Loss/Length tests OTDR: Optical Time Domain Reflectometer and ChannelMap tests ENDFACE: FiberInspector images	<p>The bar graphs show approximately how many of each type of test you can save. If you will be saving different types of tests in each record, you will have to estimate the available memory space based on the relative sizes of the tests.</p> <p>All bar graphs on this screen change from green to yellow to red as the available memory decreases.</p>

Memory Card Care

- Store the card in the memory card carrying case provided with the tester.
- Clean the card by wiping it with a slightly damp cloth. If the card's electrical contacts are dirty, use a pencil eraser to clean them.
- Keep the card out of direct sunlight and away from extreme heat or humidity.











- Do not drop the card on hard surfaces.
- Keep the card dry.

Reviewing and Managing Saved Records

Table 8-2 describes the functions available for managing saved records on the tester.






To manage records on a PC, use LinkWare software. See the LinkWare documentation for details.

Table 8-2. Record Viewing and Management Functions

Function	Method
See the records in the current folder	<p>Press . To change folders, press  Change Folder.</p> <p>You can view records by their SUMMARY results, the DATE or TIME the last test was saved in each record, the HEADROOM results*, or LENGTH of the cables. Use  or  to move among the tabs.</p>
Sort records on the VIEW RECORDS screen	<p>Press  Sort Field on the VIEW RECORDS screen. Select a field name; then press  Ascending or  Descending.</p> <p>The sorting order applies to all folders.</p> <p>The default order is ascending by date and time (the most recent test is at the top of the list). The sorting order reverts to the default when you upload the records to a PC.</p>
See the tests saved in a record	<p>Use  or  to highlight the record on the VIEW RECORDS screen; then press .</p>
<p>* Headroom is the smallest margin found among all measurements for all the wavelengths and directions tested. (Margin is the difference between a measurement and its limit.)</p>	

-continued-

Table 8-2. Record Viewing and Management Functions (cont.)

Function	Description
See the results of a test in a record	On the RECORD SUMMARY screen, use  to highlight the test; then press  .
Delete records	On the VIEW RECORDS screen, press  Delete ; then select the desired delete function.
Rename a record	Select the record on the VIEW RECORDS screen; then press  Rename Record on the RECORD SUMMARY screen.
Clear the internal memory, which moves records from internal memory to a memory card	<ol style="list-style-type: none"> 1. On the Job tab in Setup, set the CURRENT FOLDER to the desired location on the memory card. 2. Press ; then select Empty Internal Memory.

About Memory Card Folders




When you insert a new memory card into the tester or format a memory card, the tester creates a default folder on the card. You may use this folder or delete it and create a folder with a different name.

Note

Memory card folders can store a maximum of 500 records each.

Changing or Creating Folders

To change the **CURRENT FOLDER** or create a new folder:



- Press ; then press  **Change Folder**.
or
- Press ; then select **CURRENT FOLDER** on the **Job** tab.

Note

You cannot create folders in internal memory.

Deleting Folders

To delete a folder:

1. Delete all the records in the folder you want to delete.
2. On the **Job** tab in Setup or from the **VIEW RECORDS** screen, set the **CURRENT FOLDER** to a folder other than the one you want to delete.
3. Do one of the following:
 - Press  **Change Folder** from the **VIEW RECORDS** screen.
or
 - Select **CURRENT FOLDER** on the **Job** tab in Setup.
4. Highlight the folder you want to delete; then press  **Delete**.

Viewing Folders on a PC

When you look at a memory card's directory on a PC, you will see a "jobfolders" folder, which contains all the job folders created on the card. The "jobfolders" folder is not visible on the tester or in LinkWare. Test records are stored in job folders as .tst files.

Caution

You may use a PC to move or copy test record (.tst) files from a memory card, but do not rename the .tst files. Doing so may result in loss of data.

Chapter 9

Creating Custom Fiber Types and Test Limits

Note

For loss/length tests in Smart Remote mode, custom fiber types and test limits need to exist only in the main tester.

Creating Custom Fiber Types

You can create up to 10 custom fiber types. Custom fiber types are marked with asterisks (*) in the list of fiber types and are stored in the mainframe (not the module).

1. Press **FUNCTIONS**; then select **Edit Custom Test Limit**.
2. Press **F3** **Edit Fiber Types**.

3. On the **FIBER TYPE LIST** screen, do one of the following:

- To see any fiber's properties, select it from the list.

Note

Selecting a factory-installed fiber type lets you see the fiber's properties, but you cannot edit them.

- To edit a custom fiber type, select it from the list.
- To create a new fiber type, press **F1** **Create Fiber Type**; then select a wavelength.

4. On the **FIBER PROPERTY SETTINGS** screen enter the desired properties. Table 9-1 describes the fiber property settings.

To add another wavelength to fiber's properties, press **F1** **Add Wavelength**.

5. When you are finished editing the fiber's properties, do one of the following:
 - To save the fiber type using the existing fiber type name, press **SAVE**.
 - To edit the name, press **F5** **Edit Name**. Press **SAVE** when you are finished entering a fiber name.

- To select a custom fiber type to use for testing, press **SETUP**, select **FIBER TYPE** on the **Cable** tab; then select the fiber type from the list. Custom fiber types are marked with asterisks (*).

To delete a custom fiber type, do the following:

1. Press **FUNCTIONS**; then select **Edit Custom Test Limit**.
2. Press **F3** **Edit Fiber Types**.

On the **FIBER TYPE LIST** screen, highlight the fiber type you want to delete; then press **F2** **Delete Fiber Type**.

Table 9-1. Fiber Property Settings

Setting	Description
Index of Refraction	Enter the value specified for the fiber. If you are not sure of the value, and the accuracy of length measurements is not critical, you could use the values given in the appropriate factory-installed Generic fiber type.
Scattering Coefficient*	Indicates the amount of light the fiber reflects back to the OTDR. This value is used for documentation purposes only. If you want to record the fiber's scattering coefficient, enter the value specified by the manufacturer.
Modal Bandwidth*	Limitation on the bandwidth of multimode fiber due to different arrival times of the fiber's modes. This value is specified by the manufacturer. The valid range for MBW starts at 160 MHz-km.
Core Diameter	Enter the core diameter specified for the fiber.
* For most applications, you may enter N/A for these values.	

Creating Custom Test Limits

You can create up to 10 custom test limits. Each custom limit can include up to 5 fiber types.

1. Press **FUNCTIONS**; then select **Edit Custom Test Limit**.
2. On the **CUSTOM LIMIT LIST** screen, do one of the following:
 - Select an existing custom limit to edit.
 - Press **F1** **Add Limit** to select any existing limit as a baseline for a new limit.

Note







When you add a new limit, 3 generic fiber types are placed in the new limit by default.

3. Use the **LIMIT TABLE EDITOR** screen to see or define test parameters for the fiber types you will test. Figure 9-3 shows an example of this screen.
 - To see the properties of a factory-installed fiber type or to edit the properties of a custom fiber type already used in the limit, use **←** **→** **⏏** **⏏** to highlight a fiber type; then press **ENTER**.

Note

Selecting a factory-installed fiber type lets you see the fiber's properties, but you cannot edit them.

- To add a fiber type to the custom limit press **F1** **Add Fiber Type**; then select a fiber type from the list or press **F1** **Create Fiber Type** to create a new type. See the previous section for details on fiber properties.
- To remove a fiber type, highlight the fiber; then press **F2** **Remove Fiber Type**.

4. To add or edit test parameters, use  to highlight a limit cell in the table; then press . Tables 9-2 and 9-3 describe the parameters available for OTDR and loss/length test limits. It is not necessary to enter test parameters for tests you will not run.
5. When you are finished entering test parameters on the **LIMIT TABLE EDITOR** screen, do one of the following:
 - To save the custom limit using the existing limit name, press .
 - To edit the name, press  **Edit Name**. Press  when you are finished entering a limit name; then press  again to save the limit.

LIMIT TABLE EDITOR OFTM-5612
 09/06/2002 8:04:00 AM

Limit Name: **

FIBER TYPE	OTDR LIMIT	LL LIMIT		
Avaya OptiSPEE	-	-	-	-
Generic, 50	Exist	Exist	-	-
Generic, 62.5	Exist	Exist	-	-
Generic, SMF	Exist	Exist	-	-

Highlight Item, Press ENTER

Add Fiber Type Remove Fiber Type Edit Name

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- ① The fiber types tested by this limit. A custom limit can include up to 5 fiber types. Three generic fiber types are added by default to new custom limits.
 To add an existing fiber type or create a new type, press **F1 Add Fiber Type**. To delete a fiber type, press **F2 Remove Fiber Type**.
- ② The limit's name. Press **F3 Edit Name** to change the name.
- ③ Lists of OTDR and loss/length limits for each fiber type. **Exist** is shown if a limit is present; a dash is shown if no limit is present.
 To see or edit a limit, highlight a cell under **OTDR LIMIT** or **LL LIMIT**; then press **ENTER**.
- ④ Space for test limits supported by future products.

Figure 9-1. LIMIT TABLE EDITOR Screen

Table 9-2. Custom Limit Settings for OTDR Tests

Setting	Description*
Length	Enter a maximum length for the cabling.
Reflective Event Loss	Enter a maximum value for connector loss. A typical value is 0.75 dB.
Non-reflective Event Loss	Enter a maximum value for splice loss. A typical value is 0.3 dB.
Overall Loss	Enter a maximum value for the loss of all components and fiber in the cabling. You may also enter a minimum loss value if receiver saturation is an issue in the installation.
Segment Attenuation Coeff	Enter a maximum value of attenuation per kilometer for a fiber segment in the cabling.
Overall Attenuation Coeff	Enter a maximum value of attenuation per kilometer for the entire length of the cabling.
Event Reflectance	Enter a maximum value of back reflection from a single event.
* Minimum values are usually not used, but are available for special situations.	

Table 9-3. Custom Limit Settings for Loss/Length Tests

Setting	Description*
Length	Enter a maximum length for the cabling.
Overall Loss	<p>Enter a maximum total loss for all components and fiber in the cabling. The tester uses this value only if you do not enter values for Loss per km, Loss per Adapter, and Loss per Splice. If you enter those three values and an Overall Loss value, the tester ignores the Overall Loss value.</p> <p>To avoid confusion, delete the Overall Loss value to change it to N/A if you enter values for Loss per km, Loss per Adapter, and Loss per Splice.</p>
Loss per km	Enter a maximum value of attenuation per kilometer for the entire length of the cabling.
Loss per Connector	Enter a maximum loss for one connector.
Loss per Splice	<p>Enter a maximum loss for one splice.</p> <p>The tester uses these values only if you enter all three. Otherwise, it uses the Overall Loss value. When you enter all three values, the tester calculates the maximum loss using those values and the NUMBER OF ADAPTERS and NUMBER OF SPLICES values on the Cable tab in Setup. The Overall Loss value is ignored.</p> <p>To avoid confusion, delete these values to change them to N/A if you do not enter all three.</p>
Power	Enter power values specified for the installation. Typically, you test for power only in Far End Source mode.
* Minimum values are usually not used, but are available for special situations.	

To select a custom limit to use for testing, do the following:

1. Verify that the fiber type selected on the **Cable** tab in Setup is used in the test limit you want to select. The test limit will not appear if it does not support the selected fiber type.
2. Press **SETUP**, select **TEST LIMIT** on a test's tab; then select the limit from the list. Custom test limits are marked with asterisks (*).

To delete a custom limit, do the following:

1. Press **FUNCTIONS**; then select **Edit Custom Test Limit**.
2. Select the limit; then press **F2** **Delete Limit**.

If the Limit or Fiber Type is Not Valid

If the tester says that the limit or fiber type is not valid when you try to run a test, you may need to add more parameters to the configuration. For details, see "If the Test Limit or Fiber Type is Not Valid with the Test" in Chapter 2 or press **HELP** when the message appears.

Chapter 10

Maintenance and Specifications

Maintenance

Warning

To avoid possible fire, electric shock, personal injury, or damage to the tester:

- Do not open the case. No user-serviceable parts are inside.
- Replacing electrical parts yourself will void the test tool's warranty and might compromise its safety features.
- Use only specified replacement parts for user-replaceable items.
- Use only Fluke Networks authorized service centers.


Caution

Replacing electrical parts yourself might void the test tool's calibration and compromise its accuracy. If the calibration is void, cable manufacturers might not extend their warranty to the cabling you install.

Updating the Tester's Software

Keeping your tester's software current gives you access to new features and the latest test limits. Software updates are available on the Fluke Networks website.

The software update procedure also lets you install or remove languages. Additional languages for the tester may be available with software updates.

To see the software version installed in your tester and module exit to the **HOME** display; then press  **Version Info**.

To determine if your tester needs a software update visit the Fluke Networks website to see if an update is available.

You can update an OptiFiber tester's software with LinkWare via a PC or with the tester's software update function via a memory card.

Caution

To avoid unexpected loss of power, connect the ac adapter to the tester when updating the software.

Notes


Updating the software does not affect test records saved in internal memory, but may affect factory-installed fiber types or test limits.

You may install multiple languages; however, adding languages decreases the internal memory available for saving test results.

Changes to the update procedure may be posted on the OptiFiber software page on the Fluke Networks website.

Updating via the USB or Serial Port

1. Install the latest version of LinkWare software on your PC. LinkWare is available on the Fluke Networks website.
2. Download the OptiFiber update file ("upgrade.ofu") from the Fluke Networks website, or contact Fluke Networks to get the update by other means. You can access the software page at www.flukenetworks.com/support. Save the file to your hard drive.
3. Connect the tester's serial or USB port to the PC. Install a module in the OptiFiber mainframe, then turn on the tester.
4. Select **Utilities > OptiFiber Utilities > Software Update** from the LinkWare menu, locate and select the .ofu (OptiFiber update) file; then click **Open**. LinkWare makes initial choices on which software to install based on the versions currently installed in the mainframe and the module. Generally, you should not change these choices except to select languages to install or remove.
5. Click **Start** to start the update process.

6. The OptiFiber tester reboots after the update is complete. To verify the update, press  **Version Info** from the **HOME** screen.
7. If you have additional modules to update, install each module in the tester and repeat steps 4, 5, and 6.

Updating via a Memory Card Created with LinkWare

Caution

Do not use the Windows® operating system to copy the update file to a memory card. The file must be unzipped first. Use LinkWare software to create a memory card for updating the tester.

1. Install the latest version of LinkWare software on your PC. LinkWare is available on the Fluke Networks website.
2. Download the OptiFiber update file ("upgrade.ofu") from the Fluke Networks website, or contact Fluke Networks to get the update by other means. You can access the software page at www.flukenetworks.com/support. Save the file to your hard drive.
3. Put a memory card into the PC's memory card drive.

4. On the LinkWare menu select **Utilities > OptiFiber Utilities > Create Software Update MMC**.
5. Locate and select the .ofu file you downloaded; then click **Open**.
6. Locate and select the memory card drive; then click **OK**. LinkWare unzips the update file and copies the files to the memory card.

Caution

If you remove the memory card from the MMC reader before the files are completely copied the Windows operating system may report an error and OptiFiber shows the message “Bad update file”. If this happens, repeat steps 4 through 6; then leave the card in the reader for a minute or so to ensure the files are completely copied.

7. Put the memory card into the OptiFiber tester.
8. Install a module in the OptiFiber mainframe, then turn on the tester.
9. Press **FUNCTIONS** on OptiFiber; then select **Install Software Update**. The tester makes initial choices on which software to install based on the versions currently installed in the mainframe and the module. Generally, you should not change these choices except to select languages to install or remove.
10. Press **F5** **Start** to start the update process.
11. The OptiFiber tester reboots after the update is complete. To verify the update, press **F1** **Version Info** from the **HOME** screen.
12. If you have additional modules to update, insert each module and repeat steps 9, 10, and 11.

Optical Connector Care

- Periodically clean and inspect the tester's optical connectors as described in Chapter 2.
- Cover the connectors with the dust plugs when no cable is connected.
- Periodically clean the dust plugs with a lint-free swab or wipe and isopropyl alcohol.

Replacing Patch Cords and Launch Fibers

Choose replacement patch cords and launch and receive fibers that meet the following requirements:

- Core and cladding size: match the fiber to be tested
- Connector polish: PC or UPC for patch cords; UPC for launch fibers
- Patch cord length: minimum 2 m; maximum 5 m
- Launch and receive fiber length: 100 m minimum for multimode; 130 m minimum for singlemode

To ensure optimum performance from your tester, get replacement patch cords and launch fibers from Fluke Networks.

Replacing the Battery

Replace the lithium ion battery pack when its life becomes noticeably shorter. The battery is normally good for up to 400 charge/discharge cycles.



Dispose of the lithium ion battery pack in accordance with local regulations.

An internal lithium battery maintains the tester's clock when you remove the battery pack. This battery typically lasts about 5 years. When the battery begins to fail, the tester will lose the current date and time when you remove the battery pack. If the lithium battery fails, send the tester to a Fluke Networks service center for a replacement.

Cleaning

Clean the display with glass cleaner or isopropyl alcohol and a soft, lint-free cloth. Clean the case with a soft cloth dampened with water or water and a mild soap.

Caution


To avoid damaging the display or the case, do not use solvents or abrasive cleansers.

Storage

- Before storing the tester or an extra battery for an extended period, charge the battery to between 70 % and 90 % of full charge (2 or 3 LEDs lit on the battery's gauge). Check the battery every 4 months and recharge if necessary.
- Keep a battery attached to the tester during storage. Removing the battery for long periods shortens the life of the lithium battery that maintains the clock.
- See "Environmental and Regulatory Specifications" on page 10-17 for storage temperatures.

Calibration


The tester requires a traceable calibration once a year to ensure that it meets or exceeds the published accuracy specifications. Contact an authorized Fluke Networks Service Center for information on getting your tester calibrated.

To see when the tester last received a traceable calibration, press  **Version Info** from the **HOME** display.


If Something Seems Wrong

If something seems wrong with the tester, refer to Table 10-1.

If the problem continues, refer to “Getting Help” below.

Tip: Online help is available for many error messages. Press  when an error message appears to see information about the error.

Getting Help

If Table 10-1 does not help you solve a problem with the tester, contact Fluke Networks for additional help. See Chapter 1 for contact information. If possible, have the tester’s serial number, software and hardware versions, and calibration date available. Press  **Version Info** from the **HOME** display to see this information.


For warranty information, refer to the warranty at the beginning of this manual. If the warranty has lapsed, contact Fluke Networks for repair prices.

Table 10-1. Troubleshooting the Tester

Symptom 1: The keypad does not respond.
Press and hold Ⓢ until the tester turns off. Then turn the tester on again. If the problem persists, try updating the tester's software.
Symptom 2: System error occurs.
Press F3 OK , or press HELP for more information. If the tester does not recover, press and hold Ⓢ until the tester turns off. If the error recurs, update the tester's software. If the tester already has the latest software, contact Fluke Networks for assistance.
Symptom 3: A module is installed, but the message "No Module Installed", "Problem with Module", or "The module needs a software update" shows on the screen.
The module and mainframe may have incompatible software versions. Install the latest software version in the module and mainframe. Verify that the module is pushed completely into the mainframe. Inspect the module and mainframe connectors for contamination or damage.
Symptom 4: The tester will not turn on, even with the ac adapter connected.
The battery may be completely discharged. Let the battery charge for a few minutes with the tester off.
Symptom 5: The tester will not turn on even though the battery is charged.
The battery's safety switch has tripped. Connect the ac adapter for a few minutes to reset the switch.

-continued-

Table 10-1. Troubleshooting the Tester (cont.)

Symptom 6: The noise level on the OTDR trace has increased or the OTDR connector reflection has a large deadzone. (See Figure 10-1.)
The fiber endface in the OTDR connector may be dirty or damaged. Clean the connector and inspect the endface with a fiber video microscope. If an endface is damaged, contact Fluke Networks for service information.
Symptom 7: The reference patch cords and adapters are good, but the reference power level is too low.
Clean the tester's INPUT and OUTPUT connectors and use a fiber microscope to inspect the endfaces. If an endface is damaged, contact Fluke Networks for service information.
Symptom 8: A loss/length test produces a negative loss reading.
There is a problem with the reference. Set the reference and test the cabling again. See "Diagnosing Loss/Length Test Failures" in Chapter 6 for details.
Symptom 9: Test results appear to be incorrect.
The tester may not be configured correctly. If you are using Manual OTDR mode, try testing in Auto OTDR mode. See "Diagnosing OTDR Test Failures" in Chapter 3, "Diagnosing Loss/Length Test Failures" in Chapter 6, and "Power Meter Results" in Chapter 7 for information on how misconfigurations may affect your test results.
Symptom 10: The message "Selected test limit or fiber type is not valid with this test" appears.
You need to select a different test limit or fiber type. For details see "If the Test Limit or Fiber Type is Not Valid with the Test" in Chapter 2 or press  when the message appears.

Signs of a Bad OTDR Connector

Figure 10-1 shows traces from OTDRs with good and bad connectors. Use a fiber microscope to inspect the tester's connectors for dirt and damage.

If a connector on the tester is damaged, contact Fluke Networks for service information.

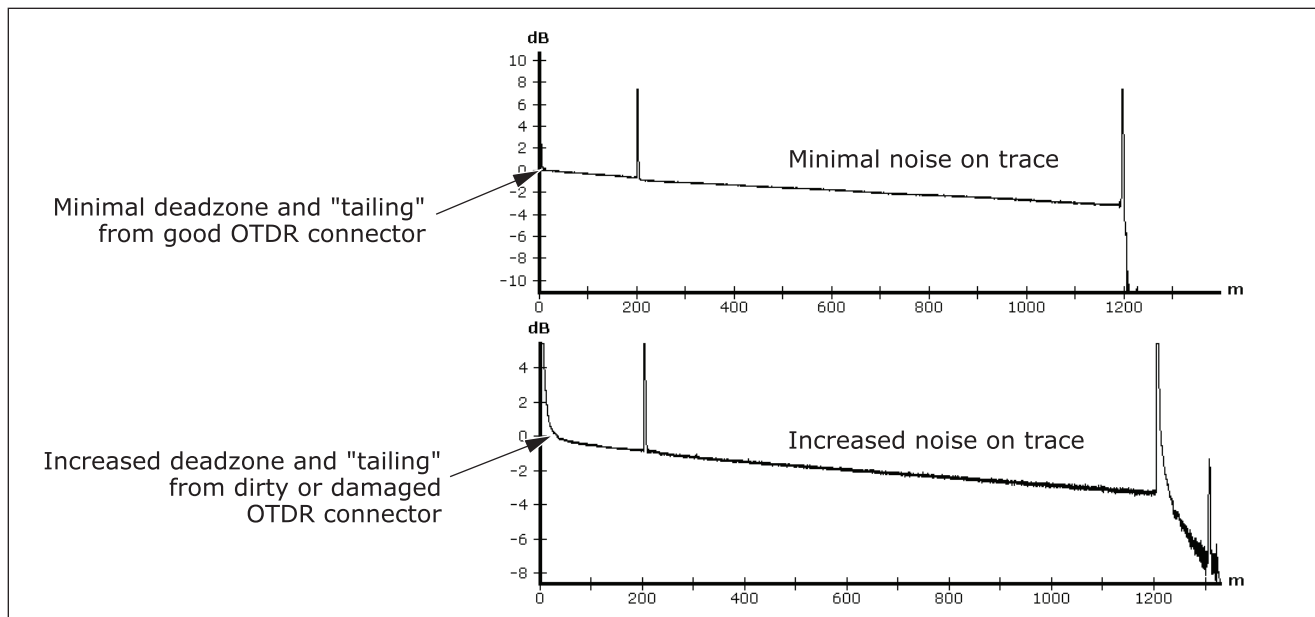


Figure 10-1. Traces Showing Good and Bad OTDR Connectors

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Options, Accessories, and Replacement Parts

To order options, accessories, or replacement parts (Tables 10-2 through 10-4), contact Fluke Networks as described in Chapter 1.

For the latest list of OptiFiber options and accessories and a complete list of fiber test accessories visit the Fluke Networks website at www.flukenetworks.com.

Table 10-2. Options

Option	Fluke Networks Model Number
Multimode OTDR module	OFTM-5610
Multimode OTDR module with power meter option	OFTM-5611
Multimode OTDR module with power meter and loss/length options	OFTM-5612
Singlemode OTDR module	OFTM-5630
Singlemode OTDR module with power meter option	OFTM-5631
Singlemode OTDR module with power meter and loss/length options	OFTM-5632
FiberInspector™ Video Probe, 250X	OFTM-5350
FiberInspector™ Video Probe, 400X	OFTM-5354

Table 10-3. Accessories

Accessory	Fluke Networks Model or Part Number
16 MB multimedia card	DSP-MMC16
32 MB multimedia card	DSP-MMC32
Memory card reader with USB interface	DSP-MCR-U
Launch fiber, multimode, 62.5 μm , 100 m	NFK1-LAUNCH
Launch fiber, multimode, 50 μm , 100 m	NFK2-LAUNCH
Launch fiber, singlemode, 9 μm , 130 m	NFK3-LAUNCH
Mandrel kit: two mandrels for 50 μm /125 μm fiber with 3 mm jackets; two mandrels for 62.5 μm /125 μm fiber with 3 mm jackets	NF-MANDREL-KIT
Mandrel for 50 μm /125 μm	NF-MANDREL-50
Mandrel for 62.5 μm /125 μm	NF-MANDREL-625
External keyboard	OPV-KB
12 V car battery adapter	800695
AC adapter with line cord (specify country)	OPV-PS

-continued-

Table 10-3. Accessories (cont.)

Accessory	Fluke Networks Model or Part Number
Lithium ion battery pack	OFBP-LI
Soft carrying case	OFCC-SCASE
Hard carrying case	OFCC-HCASE
Memory card softcase	MMC-CASE
RS-232 serial interface cable	944806
9- to 25-pin serial interface adapter	929187
USB cable	1626219
Fiber optic cleaning kit	NF430
Fiber optic reference guide	NF460
MT-RJ adapter tip for FiberInspector Video Probe	NF360
LC adapter tip for FiberInspector Video Probe	NF362
MU adapter tip for FiberInspector Video Probe	NF364

-continued-

Table 10-3. Accessories (cont.)

Accessory	Fluke Networks Model or Part Number
SimpliFiber® 1310 Source (SC)	8251-11
SimpliFiber® 1550 Source (SC)	8251-12
SimpliFiber® 850/1300 Source (SC)	8251-13
LinkWare™ Cable Test Management Software CD	LinkWare
OF-500 OptiFiber™ Product Manuals CD (includes Technical Reference Handbook)	1779478
OF-500 OptiFiber™ Users manual, English	1779484

Table 10-4. Replacement Parts

Part	Fluke Networks Part Number
Line cord, North America	1552374
Line cord, UK	1552342
Line cord, continental Europe	1552388
Line cord, South Africa	1552363
Line cord, Switzerland	1552356
Line cord, Australia	1552339
Adapter cable for FiberInspector Video Probe	1638801
ST adapter tip for FiberInspector Video Probe	1587344
SC adapter tip for FiberInspector Video Probe	1587359
FC adapter tip for FiberInspector Video Probe	1587367
Universal 2.5 mm patch cord tip for FiberInspector Video Probe	1587371

-continued-

Table 10-4. Replacement Parts (cont.)

Part	Fluke Networks Part Number
Bail	1608721
Carrying strap	1541888
Dust cap	1675689
Dust cap rivet	1675704
Dust cap tie	1675692

Specifications

Specifications apply at 23 °C (73 °F), unless otherwise noted.

Environmental and Regulatory Specifications

Operating temperature*	32 °F to 104 °F (0 °C to 40 °C)
Storage temperature	-4 °F to +140 °F (-20 °C to +60 °C)
Operating relative humidity (% RH without condensation)	95 % (50 °F to 95 °F; 10 °C to 35 °C) 75 % (95 °F to 104 °F; 35 °C to 40 °C) uncontrolled < 50 °F (< 10 °C)
Vibration	Random, 2 g, 5 Hz-500 Hz
Shock	1 m drop test with and without module
Safety	CSA C22.2 No. 1010.1: 1992 EN 61010-1 1 st Edition + Amendments 1, 2
Altitude	3000 m
EMC	EN 61326-1
Laser safety	Class I CDRH Complies to EN 60825-2
FDA registration number	0220836
* Real Time Trace function used for no more than 5 minutes in a 15-minute period. Maximum ambient temperature is 35 °C for continuous use of the Real Time Trace function.	

OTDR Specifications

Specification	OFTM-5610, 5611, 5612 Multimode Modules	OFTM-5630, 5631, 5632 Singlemode Modules
Testing speed	< 10 s for two wavelengths at 2 km with 25 cm resolution < 24 s for two wavelengths at 400 m with 3 cm resolution	< 22 s for two wavelengths at 10 km with 1 m resolution ¹ < 30 s for two wavelengths at 400 m with 3 cm resolution ¹
Output/input connector	SC with UPC polish	SC with UPC polish
Emitter type	Fabry-Perot laser diode	Fabry-Perot laser diode
Laser classification	Class 1	Class 1
Output wavelengths	850 nm ± 20 nm 1300 nm ± 20 nm	1310 nm ± 20 nm 1550 nm ± 20 nm
Fiber types tested	50/125 μ m or 62.5/125 μ m multimode	9/125 μ m singlemode
1. For Auto OTDR mode. Manual OTDR mode: < 50 s.		

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OTDR Specifications (cont.)

Specification	OFTM-5610, 5611, 5612 Multimode Modules	OFTM-5630, 5631, 5632 Singlemode Modules
Event deadzones²	850 nm: 0.7 m typical; 1 m maximum 1300 nm: 1.5 m typical; 2 m maximum	1310/1550 nm: 2.5 m typical; 3 m maximum
Attenuation deadzones³	850 nm: 4.5 m typical; 5.5 m maximum 1300 nm: 10.5 m typical; 15 m maximum	1310/1550 nm: 10.5 m typical; 15 m maximum
Maximum range⁴	2 km	10 km
Dynamic range⁵	850 nm: >10 dB 1300 nm: >10 dB	1310 nm: > 11 dB 1550 nm: > 9 dB
<p>2. Event deadzones are measured to Telcordia standards for OTDR performance. Multimode: <-27 dB connector backreflection using -4.5 dB signal energy (4 ns pulse width) for 850 nm and 8 ns pulse width for 1300 nm. Singlemode: <-50 dB connector backreflection using -5 dB signal energy (8 ns pulse width).</p> <p>3. Attenuation deadzones are measured to Telcordia standards for OTDR performance. < -50 dB connector backreflection using 0 dB signal energy (20 ns pulse width for multimode; 40 ns pulse width for singlemode) in Manual OTDR mode.</p> <p>4. Manual mode provides a 4 km range for multimode and a 15 km range for singlemode; however, the tester's specifications apply only up to 2 km and 10 km respectively.</p> <p>5. Effective dynamic range using Telcordia standards.</p>		

-continued-

OTDR Specifications (cont.)

Specification	OFTM-5610, 5611, 5612 Multimode Modules	OFTM-5630, 5631, 5632 Singlemode Modules
Output power	850 nm: > 110 mW-pk 1300 nm: > 22 mW-pk	1310 nm: > 38 mW-pk 1550 nm: > 30 mW-pk
Loss threshold⁶	0.2 dB	0.2 dB
Distance accuracy⁷	$\pm 1 \text{ m} \pm 0.005 \% \text{ of distance}$ $\pm 50 \% \text{ of resolution} \pm \text{index of refraction error} \pm \text{event location error}$	$\pm 1 \text{ m} \pm 0.005 \% \text{ of distance}$ $\pm 50 \% \text{ of resolution} \pm \text{index of refraction error}$ $\pm \text{event location error}$
Linearity⁸	$\pm 0.07 \text{ dB/dB}$	$\pm 0.05 \text{ dB/dB}$
Sampling resolution	3 cm to 25 cm	3 cm to 1 m
Minimum pulse width⁹	850 nm: 4 ns 1300 nm: 8 ns	8 ns

6. 6 dB above the noise floor.

7. Does not apply to event table.

8. Not applicable to OTDR tests at pulse widths of 4 ns or 8 ns for multimode and 8 ns for singlemode.

9. Pulse widths for Manual OTDR mode are given in Chapter 3.

Power Meter Specifications: OFTM-5611, 5612, 5631, 5632

Testing speed, worst case	4.5 s (Far End Source mode)
Input connector	SC
Detector type	InGaAs
Calibrated wavelengths	850 nm, 1310 nm, 1550 nm
Power measurement range	1300/1310 nm and 1550 nm: 0 dBm to -60 dBm 850 nm: 0 dBm to -52 dBm
Display resolution	dB or dBm: 0.01 Linear (μ W): >400: 1 >40: 0.1 >4: 0.01 >0.4: 0.001 \leq 0.4: 0.0001

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Power Meter Specifications: OFTM-5611, 5612, 5631, 5632 (cont.)

Power measurement uncertainty (accuracy)	$\pm 0.25 \text{ dB}^1$
Measurement linearity (18 °C to 28 °C constant temperature)	1300/1310 nm and 1550 nm: $\pm 0.1 \text{ dB}^2$ 850 nm: $\pm 0.15 \text{ dB}^3$
Re-calibration period	1 year
Display update rate	1 reading per second
<div> <div> 1. Under the following conditions: <ul style="list-style-type: none"> Power level: -20 dBm, continuous wave At 850 nm: 62.5/125 μm fiber with 0.275 NA At 1310 nm and 1550 nm: 9/125 μm Ambient temperature: 23 °C ± 5 °C </div> <div> 2. Linearity for 1300 nm, 1310 nm, and 1550 nm: <ul style="list-style-type: none"> Between 0 dBm and -55 dBm: $\pm 0.1 \text{ dB}$ < -55 dBm: $\pm 0.2 \text{ dB}$ </div> <div> 3. Linearity for 850 dBm: <ul style="list-style-type: none"> Between -15 dBm and -52 dBm: $\pm 0.15 \text{ dB}$ typical performance Between 0 dBm and -15 dBm: $\pm 0.5 \text{ dB}$ typical performance </div> </div>	

Loss/Length Specifications

Specification	OFTM-5612 Multimode Modules	OFTM-5632 Singlemode Modules
Testing speeds (excluding referencing times)	Far End Source mode: 4.5 s Loopback mode: 5 s typical Smart Remote detection: 3 s Smart Remote mode, unidirectional: 15 s Smart Remote mode, bi-directional: 30 s plus time to swap fibers	Far End Source mode: 4.5 s Loopback mode: 5 s typical Smart Remote detection: 3 s Smart Remote mode, unidirectional: 15 s Smart Remote mode, bi-directional: 30 s plus time to swap fibers
Output/input connectors	SC/SC	SC/SC
Fiber types tested	9 /125 μ m to 62.5 /125 μ m multimode	9 /125 μ m singlemode
Output wavelengths	Multimode LED source: 850 nm and 1300 nm	Laser source: 1310 nm and 1550 nm
Laser classification	Class 1	Class 1
Maximum length measurement	2 km of 50 μ m or 62.5 μ m multimode fiber	10 km of 9 μ m singlemode fiber

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Loss/Length Specifications (cont.)

Specification	OFTM-5612 Multimode Modules	OFTM-5632 Singlemode Modules
Length measurement accuracy	± 1.5 m plus ± 2 % of length	± 1.5 m plus ± 2 % of length
Propagation time accuracy	± 15 ns plus ± 2 % of propagation time	± 15 ns plus ± 2 % of propagation time
Output power (nominal)	> -20 dBm	> -8 dBm
Output power stability over 8-hour period (after 5 minute warmup)	± 0.1 dB at 73 °F (23 °C)	± 0.1 dB at 73 °F (23 °C)
Detector type	InGaAs	InGaAs

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Loss/Length Specifications (cont.)

Specification	OFTM-5612 Multimode Modules and OFTM-5632 Singlemode Modules
Calibrated wavelengths	850 nm, 1310 nm, 1550 nm
Power measurement range	850 nm: 0 dBm to -52 dBm 1300/1310 nm and 1550 nm: 0 dBm to -60 dBm
Display Resolution	dB or dBm display: 0.01 Linear display (μ W): >400: 1 >40: 0.1 >4: 0.01 >0.4: 0.001 \leq 0.4: 0.0001

-continued-

Loss/Length Specifications (cont.)

Specification	OFTM-5612 Multimode Modules	OFTM-5632 Singlemode Modules
Power measurement uncertainty (accuracy)	$\pm 0.25 \text{ dB}^1$	$\pm 0.25 \text{ dB}^1$
Measurement linearity (18 °C to 28 °C constant temperature)	1300 nm: $\pm 0.1 \text{ dB}^2$ 850 nm: $\pm 0.15 \text{ dB}^3$	$\pm 0.1 \text{ dB}^2$
Dynamic Range for main-remote communication and nominal length measurement	12 dB	22 dB
Re-calibration period	1 year	1 year
Display update rate	1 reading per second	1 reading per second
<div> <div> 1. Under the following conditions: <ul style="list-style-type: none"> Power level: -20 dBm, continuous wave At 850 nm: 62.5/125 μm fiber with 0.275 NA At 1310 nm and 1550 nm: 9 /125 μm Ambient temperature: 23 °C ± 5 °C </div> <div> 2. Linearity for 1300 nm, 1310 nm, and 1550 nm: <ul style="list-style-type: none"> Between 0 dBm and -55 dBm: $\pm 0.1 \text{ dB}$ < -55 dBm: $\pm 0.2 \text{ dB}$ </div> <div> 3. Linearity for 850 dBm: <ul style="list-style-type: none"> Between -15 dBm and -52 dBm: $\pm 0.15 \text{ dB}$ typical performance Between 0 dBm and -15 dBm: $\pm 0.5 \text{ dB}$ typical performance </div> </div>		

Power

Battery type	Lithium ion battery pack, 7.2 V
Battery life	8 hr Auto OTDR operation with OFTM-5612 module, dual wavelength, 1 test run and saved every 5 minutes, no FiberInspector probe attached, 150 m of fiber
Charge time	6 hours maximum from total discharge

Traceable Calibration Period

To ensure maximum accuracy of test results, have the tester calibrated at a Fluke Networks authorized service center every 12 months.

Certifications and Compliance



Conforms to relevant European Union directives.




Listed by the Canadian Standards Association.

Memory for Test Results

Test results can be stored on a removable MultiMediaCard (MMC), Secure Digital (SD) memory card, or in internal memory. Memory card capacity depends on the type of records saved. Typical capacity for a 16 MB card is over 400 OTDR tests.

The amount of internal memory available for test results depends on the space used by the tester's software and custom test limits.

To see the memory space available for different record types on an installed memory card or in internal memory, press ; then select **Memory Status**.

Serial Interfaces

The tester has a USB client interface and an EIA/TIA-232 (RS-232; DB9) interface for uploading test results to a PC and updating the tester's software.

The RS-232 serial port connects to a PC with a null-modem cable. Tables 10-5 and 10-6 and show the pin connections for the cable and the 9-to-25-pin adapter available from Fluke Networks .

Table 10-5. RS-232 Interface Cable Connections

Tester End (female DB9)		Direction	PC End (female DB9)	
Signal Name	Pin		Pin	Signal Name
Data carrier detect	1	←	4	Data terminal ready
Receive data	2	←	3	Transmit data
Transmit data	3	→	2	Receive data
Data terminal ready	4	→	1	Data carrier detect
Signal ground	5	←→	5	Signal ground
Not connected	6		6	Not connected
Request to send	7	→	8	Clear to send
Clear to send	8	←	7	Request to send
Not connected	9		9	Not connected

Table 10-6. 9-to-25-Pin Adapter

9-pin Connector	25-pin Connector
3	2
2	3
7	4
8	5
6	6
5	7
1	8
4	20
9	22
Shell	Shell

Keyboard Port

Six-pin mini DIN (PS/2)

Video Port for FiberInspector Probe

NTSC input jack

Dimensions (with module and battery installed)

10.6 in x 7.5 in x 2.5 in (26.9 cm x 19.1 cm x 6.4 cm)

Weight (with module and battery installed)

4.5 lb (1.9 kg)


Display

Six-inch diagonal, full VGA, passive color, transmissive LCD with backlight.

Fan

The fan turns on when the module temperature reaches about 95 °F (35 °C) and turns off at about 86 °F (30 °C).

FiberInspector Probe Specifications

Magnification	OFTM-5350: 250X; OFTM-5354: 400X
Camera type	0.33 in (8.38 mm) CCD with adjustable focus
Light source	LED
Connection to OptiFiber tester	8-pin mini DIN to NTSC video port
Power source	Powered by the OF-500 OptiFiber tester
Lighting technique	Coaxial
Dimensions	Probe: 1.3 in x 1.3 in x 4.3 in (3.3 cm x 3.3 cm x 10.92 cm) (length depends on adapter tip)
Weight	1.4 oz (40 g)
Temperature range	Operating: 32 °F to 104 °F (0 °C to 40 °C) Storage: 14 °F to 140 °F (-10 °C to +60 °C)
Humidity range	Operating: 0 % to 45 % RH non-condensing Storage: 0 % to 95 % RH non-condensing
Certifications	 (when used with the OF-500 OptiFiber tester)

Appendices

Appendix	Title	Page
A	Loss Test Methods	A-1

Appendix A

Loss Test Methods

Introduction

The number of fiber connections represented in loss test results depends on the method used for making reference and test connections. This appendix describes the three common methods, A, B, and C, which are defined in the ANSI/TIA/EIA-526-14A multimode standard, and their equivalents, A.1, A.2, and A.3, which are defined in the ANSI/TIA/EIA-526-7 singlemode standard.

Use the **TEST METHOD** setting on the tester's **Loss/Length** tab in Setup to record the method used. This setting does not affect loss results. It is only saved with the results to record which method you used.

Note

ANSI/TIA/EIA-526-14A and 526-7 specify Method B for measuring loss on multimode premises fiber and Method A.1 for singlemode premises fiber, respectively. All reference and test procedures described in the OptiFiber documentation produce Method B or A.1 results.

Methods A and A.2

Methods A and A.2 results account for the loss of one connection plus the fiber in the cabling under test. This method is suitable for links where the fiber's loss is a significant portion of the total loss, such as when the link is long or a patch cord is used at only one end. Method A is defined in the ANSI/TIA/EIA-526-14A multimode standard. Method A.2 is defined in the ANSI/TIA/EIA-526-7 singlemode standard.

Methods A and A.2 reference connections cancel out the effects of one connection and two reference patch cords in each fiber path, as shown in Figure A-1.

The test connections add one connection and the fiber in the cabling under test to each path. Loss results for Methods A and A.2 therefore represent only one connection plus the fiber in the cabling under test. Because the results omit one connection, ANSI/TIA/EIA-526-14A and 526-7 do not recommend these methods for testing premises fiber, where patch cords are typically used at both ends of a link and connector loss is a significant portion of total loss.



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Methods B and A.1

Methods B and A.1 results account for the loss of two connections plus the fiber in the cabling under test. This method is suitable for testing premises fiber, where patch cords are typically used at both ends of the link and connector loss is a significant portion of the total loss. Method B is defined in the ANSI/TIA/EIA-526-14A multimode standard. Method A.1 is defined in the ANSI/TIA/EIA-526-7 singlemode standard.

The Methods B and A.1 reference connections shown in Figure A-2 cancel out the effects of one connection and two reference patch cords in each fiber path. Note that this method of achieving Methods B and A.1 results includes adapters in the reference connections. The adapters do the following:

- The adapters let you use patch cords that match the tester's connectors at one end, and match the connectors in the cabling under test at the other end.
- The standard Methods B and A.1 reference connections use just one patch cord for each fiber path. With the standard connections, you can test only cabling with the same connector style as the

tester. To test cabling with different connectors you would have to add adapters after referencing, which would add the loss of a connection not present in the cabling under test.

- The adapters reduce wear on the tester's connectors, since it is not necessary to disconnect the patch cords from the tester to connect to the cabling under test.

The test connections add two connections and the fiber in the cabling under test to each path. Note that you use two short patch cords to connect the main unit's reference patch cords to the link. The extra cords ensure that the measured loss accounts for two connections in the cabling under test, since one connection was canceled out during referencing.

Loss results for Methods B and A.1 therefore represent both connections plus the fiber in the cabling under test. ANSI/TIA/EIA-526-14A and 526-7 specify these methods for testing multimode and singlemode premises fiber, where connector loss is a significant portion of the total loss.

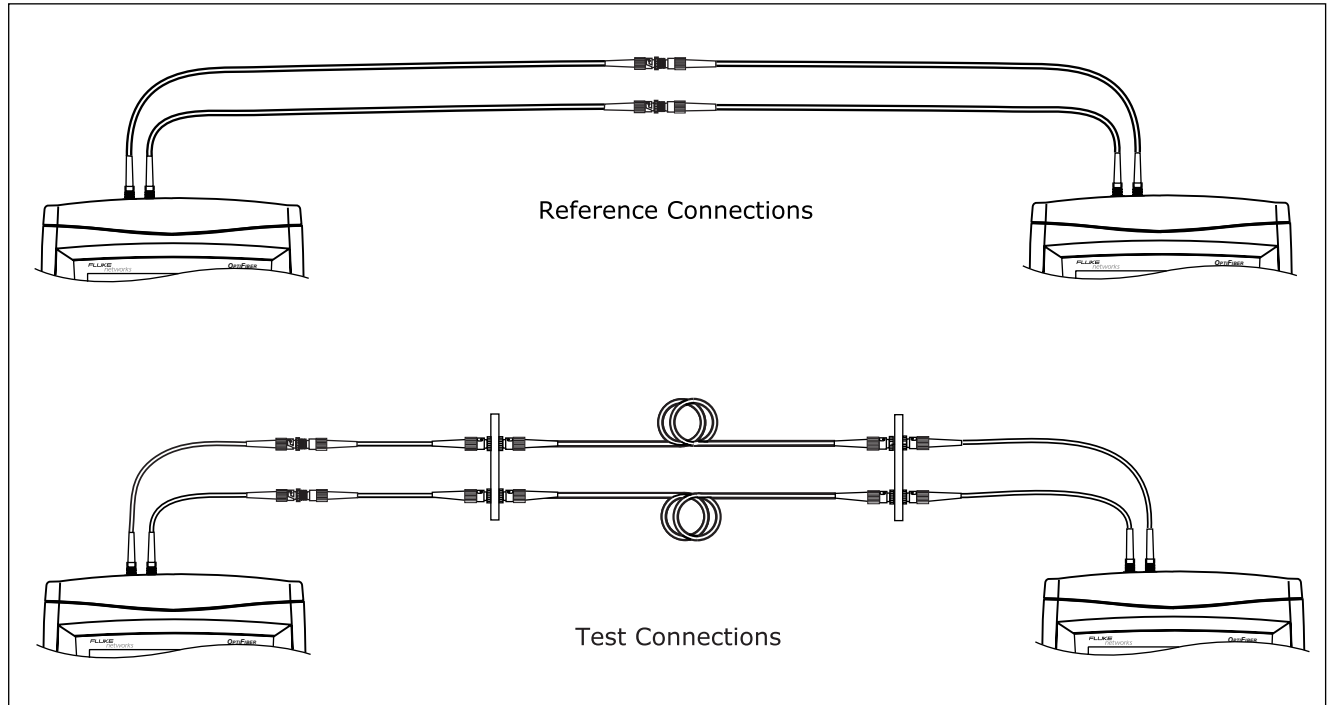


Figure A-2. Methods B and A.1 Reference and Test Connections (Smart Remote Mode)

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Methods C and A.3

Methods C and A.3 results account for the loss of only the fiber in the cabling under test. This method is suitable for testing links where the fiber's loss is the majority of the total loss, such as when the link is very long or patch cords are not used at either end. Method C is defined in the ANSI/TIA/EIA-526-14A multimode standard. Method A.3 is defined in the ANSI/TIA/EIA-526-7 singlemode standard.

Methods C and A.3 reference connections cancel out the effects of two connections and three reference patch cords in each fiber path, as shown in Figure A-3.

The test connections add the fiber in the cabling under test to each path. Loss results for Methods C and A.3 therefore represent only the fiber in the cabling under test. Because the results omit both connections in the cabling under test, ANSI/TIA/EIA-526-14A and 526-7 do not recommend these methods for testing premises fiber, where patch cords are typically used at both ends of the link and connector loss is a large portion of the total loss.

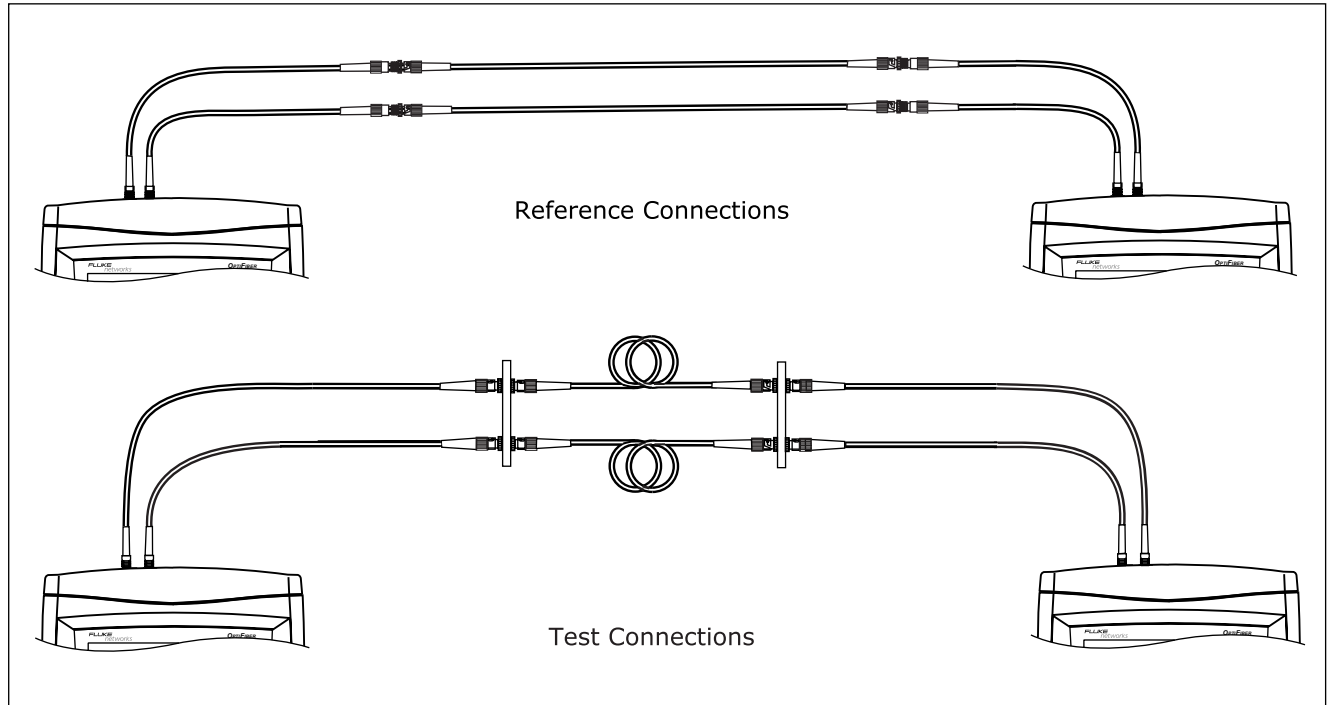


Figure A-3. Methods C and A.3 Reference and Test Connections (Smart Remote Mode)

ajt60f.eps

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