FLUKE networks

OF-500 OptiFiber®

Certifying OTDR

Technical Reference Handbook

September 2002, Rev. 7 10/10

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PO Box 777
Everett, WA 98206-0777
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'zlib' general purpose compression library
Version 1.1.3, July 9th, 1998

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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 7 km at 1300 nm for multimode fiber and up to 60 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 µm and 62.5 µm) and singlemode (1310 nm and 1550 nm; 9 µm) 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.
- FaultMap™ function provides an intuitive diagram of connections that might be bad.
- Optional FiberInspector™ Video Probe lets you inspect fiber endfaces and save the images.
- Optional modules add visual fault locator (OFTM-57xx only), power meter, and loss/length test set functions to the standard OTDR.

- Interchangeable connector adapters on the input ports of the loss/length modules allow ISO-compliant reference and test connections with a variety of connector types.
- 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. The LinkWare Stats option generates browsable, graphical reports of cable test statistics.

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 the online registration form on the Fluke Networks website at **www.flukenetworks.com/registration**.

Additional Resources for Cable Testing Information

The Fluke Networks Knowledge Base answers common questions about Fluke Networks products and provides articles on cable testing techniques and technology.

To access the Knowledge Base, log on to **www.flukenetworks.com**, then click **Support** > **Knowledge Base** at the top of the page.

Contacting Fluke Networks

Note

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


www.flukenetworks.com


support@flukenetworks.com


+1-425-446-4519

- Australia: 61 (2) 8850-3333 or 61 (3) 9329 0244
- Beijing: 86 (10) 6512-3435
- Brazil: 11 3759-7600
- Canada: 1-800-363-5853
- Europe: +31-(0) 40 2675 600
- Hong Kong: 852 2721-3228
- Japan: 03-6714-3117
- Korea: 82 2 539-6311
- Singapore: 65-6799-5566
- Taiwan: (886) 2-227-83199
- USA: 1-800-283-5853

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 numbers followed by a "/50M" include 50/125 µm accessories instead of 62.5/125 µm accessories

Model OF-500-01

- OF-500 OptiFiber tester with battery pack
- OFTM-5610B multimode OTDR module
- 62.5/125 µm multimode launch fiber (gray zipper), 100 m, SC/SC
- Protective carrying case for tester
- Carrying strap
- Memory card
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD

Model OF-500-02

- OF-500 OptiFiber tester with battery pack
- OFTM-5611B multimode OTDR module with power meter option
- 62.5/125 µm multimode launch fiber (gray zipper), 100 m, SC/SC
- Two 62.5/125 µm multimode duplex reference test cords, 2 m, SC/SC
- Two gray mandrels for 62.5/125 µm fiber with 3 mm jackets
- Protective carrying case for tester
- Carrying strap
- Memory card
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD

Model OF-500-03

- OF-500 OptiFiber tester with battery pack
- OFTM-5730 singlemode OTDR module
- 9/125 µm singlemode launch fiber (yellow zipper), 130 m, SC/SC
- Protective carrying case for tester
- Carrying strap
- Memory card
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD

Model OF-500-10

- OF-500 OptiFiber tester with battery pack
- OFTM-5612B multimode OTDR module with power meter and loss/length options
- OFTM-5352 FiberInspector Video Probe (250X/400X) with adapter tip kit
- 62.5/125 µm multimode launch fiber (gray zipper), 100 m, SC/SC
- Two 62.5/125 µm multimode duplex reference test cords, 2 m, SC/SC
- Two gray mandrels for 62.5/125 µm fiber with 3 mm jackets
- Protective carrying case for tester
- Carrying strap
- Soft carrying case for accessories
- Memory card
- USB memory card reader
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD

Model OF-500-13

- OF-500 OptiFiber tester with battery pack
- OFTM-5732 singlemode OTDR module with power meter and loss/length options
- DTX Smart Remote with DTX-SFM2 singlemode fiber module and interchangeable SC adapter
- OFTM-5352 FiberInspector Video Probe (250X/400X) with adapter tip kit
- 9/125 µm singlemode launch fiber (yellow zipper), 130 m, SC/SC
- Two 9/125 µm singlemode duplex reference test cords, 2 m, SC/SC
- Carrying strap
- Hard carrying case for tester
- Soft carrying case for accessories
- Memory card
- USB memory card reader
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD

Model OF-500-15

- OF-500 OptiFiber tester with battery pack
- OFTM-5612B multimode OTDR module with power meter and loss/length options
- DTX Smart Remote with DTX-MFM2 multimode fiber module and interchangeable SC adapter
- OFTM-5352 FiberInspector Video Probe (250X/400X) with adapter tip kit
- 62.5/125 µm multimode launch fiber (gray zipper), 100 m, SC/SC
- Two 62.5/125 µm multimode duplex reference test cords, 2 m, SC/SC
- Two gray mandrels for 62.5/125 µm fiber with 3 mm jackets
- OptiFiber carrying strap
- Smart Remote carrying strap
- Soft carrying case for accessories
- Hard carrying case for tester
- Memory card
- USB memory card reader
- USB cable for PC communications
- Mini-B USB cable for OptiFiber Smart Remote
- Two AC adapters
- OptiFiber Users Manual
- OptiFiber Product Manuals CD
- Smart Remote Users Manual
- Smart Remote Product CD
- LinkWare Software CD

Model OF-500-35

- OF-500 OptiFiber tester with battery pack
- OFTM-5612B multimode OTDR module with power meter and loss/length options
- OFTM-5732 singlemode OTDR module with power meter and loss/length options
- OFTM-5352 FiberInspector Video Probe (250X/400X) with adapter tip kit
- 62.5/125 µm multimode launch fiber (gray zipper), 100 m, SC/SC
- 9/125 µm singlemode launch fiber (yellow zipper), 130 m, SC/SC
- Two 62.5/125 µm multimode duplex reference test cords, 2 m, SC/SC
- Two gray mandrels for 62.5/125 µm fiber with 3 mm jackets
- Two 9/125 µm singlemode duplex reference test cords, 2 m, SC/SC
- Carrying strap
- Soft carrying case for accessories

- Hard carrying case for tester
- Memory card
- USB memory card reader
- USB cable for PC communications
- AC adapter
- Users Manual
- Product Manuals CD
- LinkWare Software CD

Model OF-500-45

- OF-500 OptiFiber tester with battery pack
- OFTM-5612B multimode OTDR module with power meter and loss/length options
- OFTM-5732 singlemode OTDR module with power meter and loss/length options
- DTX Smart Remote with DTX-MFM2 multimode fiber module and interchangeable SC adapter
- DTX-SFM2 singlemode fiber module and interchangeable SC adapter
- OFTM-5352 FiberInspector Video Probe (250X/400X) with adapter tip kit
- 62.5/125 µm multimode launch fiber (gray zipper), 100 m, SC/SC
- 50/125 µm multimode launch fiber (aqua zipper), 100 m, SC/SC
- 9/125 µm singlemode launch fiber (yellow zipper), 130 m, SC/SC
- Two 62.5/125 µm multimode duplex reference test cords, 2 m, SC/SC
- Two 50/125 µm multimode duplex reference test cords, 2 m, SC/SC
- Two red mandrels for 62.5/125 µm fiber with 3 mm jackets
- Two gray mandrels for 62.5/125 µm fiber with 3 mm jackets
- Two 9/125 µm singlemode duplex reference test cords, 2 m, SC/SC
- Carrying strap
- Protective carrying case for accessories
- Hard carrying case for tester
- Protective carrying case for tester
- Memory card reader
- Memory card
- USB cable for PC communications
- Two AC adapters
- Users Manual
- Product Manuals CD
- LinkWare Software CD

Powering the Tester

⚠Warning⚠

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 FUNCTIONS; then select **Battery Status**. Press HELP 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

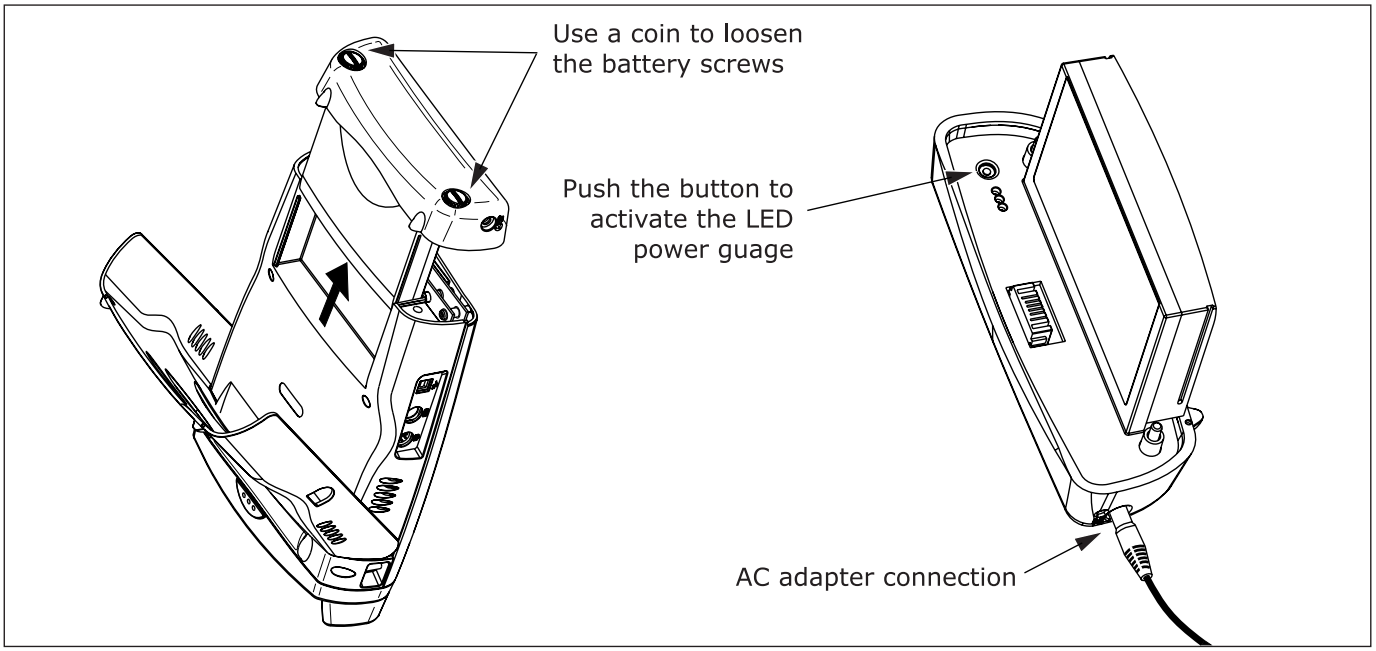

Figure 1-1. Battery Pack Feature

Changing the Language

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

1 Press SETUP.

2 Press ◇ once to select the **System** tab.

3 Press ◇ to select **LANGUAGE**; then press ENTER.

4 Use ◇◇ to select the desired language; then press ENTER.

5 Restart the tester to apply the new language.

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 11 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 11.

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 11.

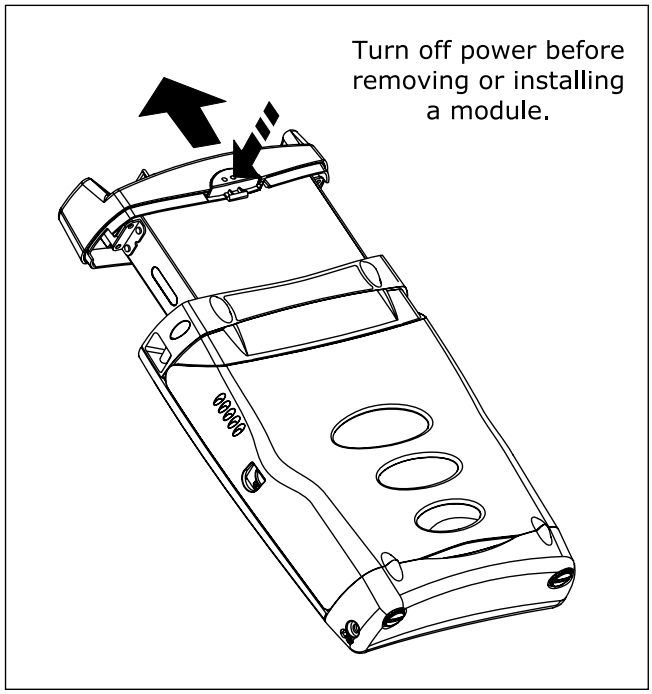

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Figure 1-2. Removing the Module

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.

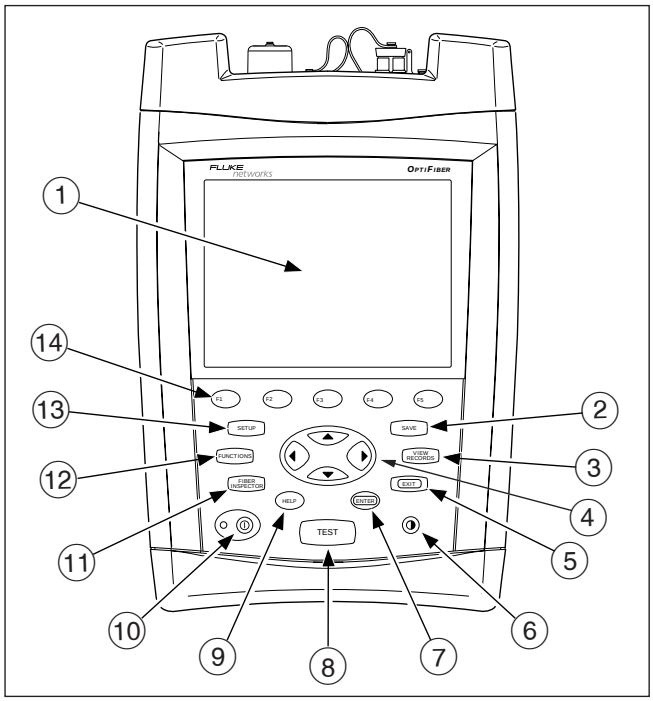

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Figure 1-3. Front Panel Features

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 F1 **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. F1 F2 F3 F4 F5: The five softkeys provide functions related to the current screen. The current functions are shown on the screen above the keys.

Side and Top Panel Features

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

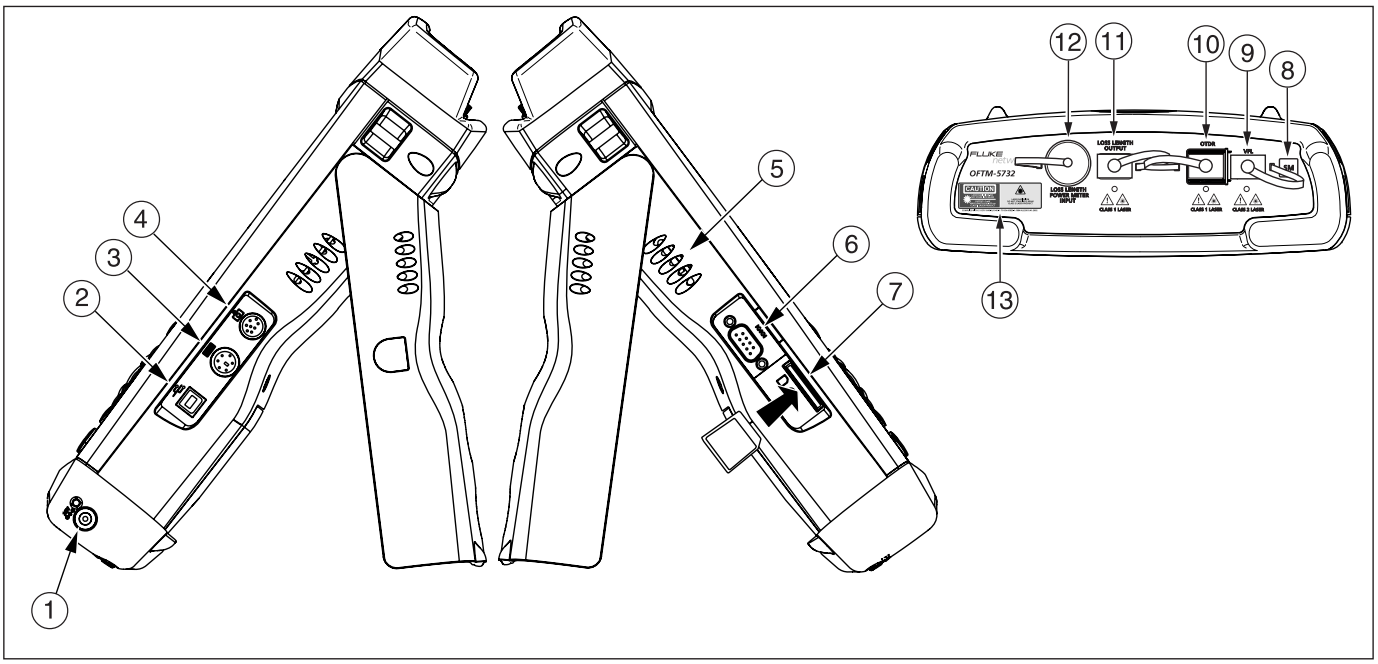

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Figure 1-4. Side and Top Panel Features

① Connector for the ac adapter. The LED turns on when the adapter is connected to ac power.

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.

③ Six-pin mini DIN connector for an optional external PS2 keyboard.

④ Eight-pin mini DIN connector for the optional FiberInspector video probe.

⑤ Fan vents.

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.

⑦ Slot for the removable memory card. The LED lights when the tester is writing to or reading from the memory card.

⑧ Multimode (MM) or singlemode (SM) label for the module.

⑨ OFTM-57xx: Connector for the visual fault locator.

⑩ OTDR connector adapter (SC is standard). The LED lights when the laser is active.

⑪ OFTM-5612B/5732: Loss/length output port (SC). Transmits optical signals for loss/length tests.

⑫ OFTM-5731/5732/5611B/5612B: Loss/length input port with interchangeable connector adapter (SC is standard). Receives optical signals for power measurements and loss/length tests.

⚠Warning

Never look directly into optical connectors. Some sources produce invisible radiation that can permanently damage your eyes.

⑬ Laser safety label (shown below).

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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.

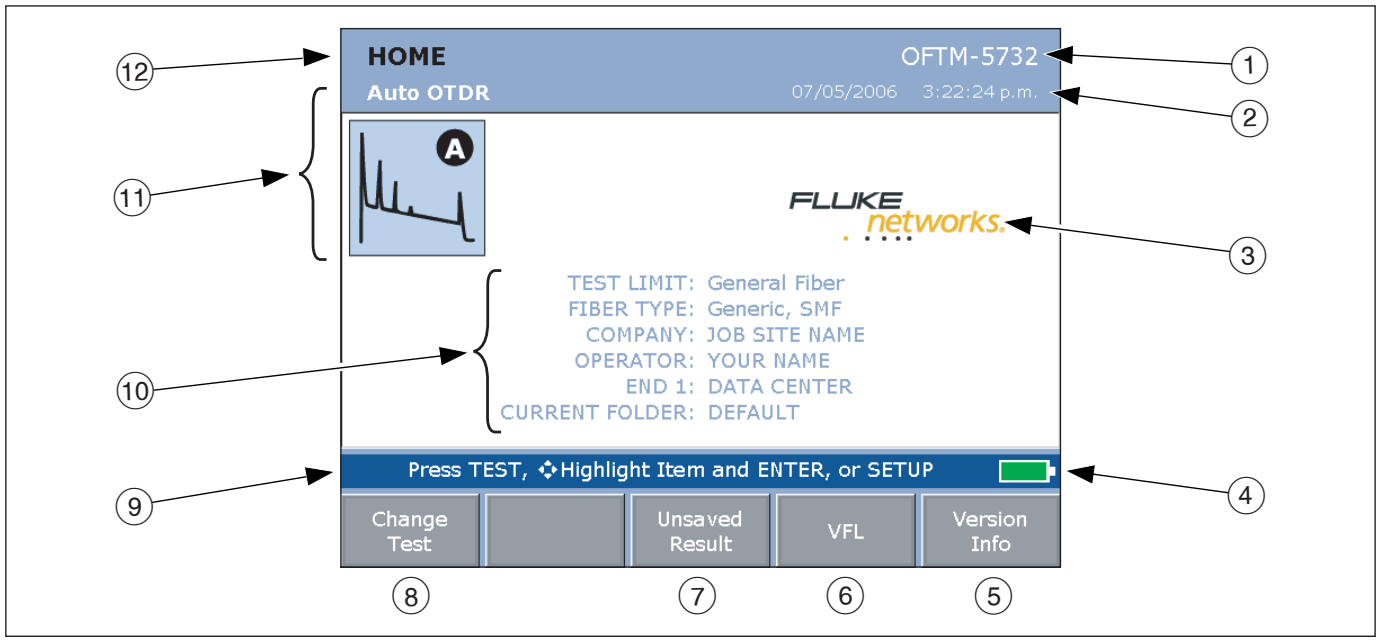

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Figure 1-5. Home Screen for OTDR with Loss/Length Option

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 1-26.

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 Press F4 **VFL** to activate the visual fault locator.

⑦ If the last test run was not saved, you can press F3 **Unsaved Result** to see the test's results.

⑧ Press F1 **Change Test** to switch test modes. See ⑪.

⑨ Action prompts. For most screens, this area prompts you on what keys to press.

⑩ 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.

⑪ 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**.

⑫ The name of the current screen.

Using the Setup Menus

To access the tester's settings press SETUP. Figure 1-18 introduces the **SETUP** menus.

To copy settings between testers, see page 12-5.

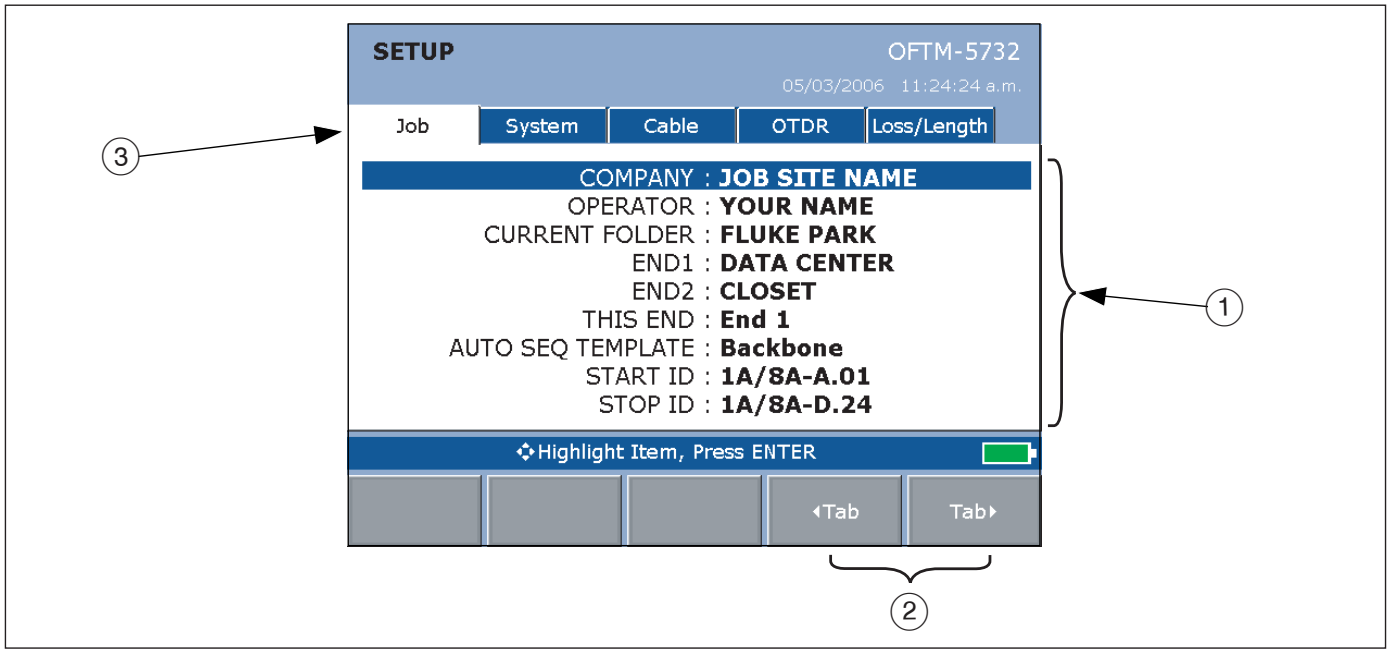

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Figure 1-6. The SETUP Screen

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.

Checking the Software and Hardware Versions

To see the tester's software and hardware versions press F5 **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 HELP, 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 ENTER.

To see an index of all help topics press HELP 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 to switch between the memory card and internal memory status.

See Chapter 9 for details about the tester's memory features.

Using the Memory Card

Figure 1-22 shows how to insert and remove a memory card. You can use MultiMediaCard (MMC) or Secure Digital (SD) memory cards in the tester.

⚠ 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 9 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 1-23 shows which keys you can use on the keyboard.

Note

You cannot use an external keyboard to enter international characters.

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

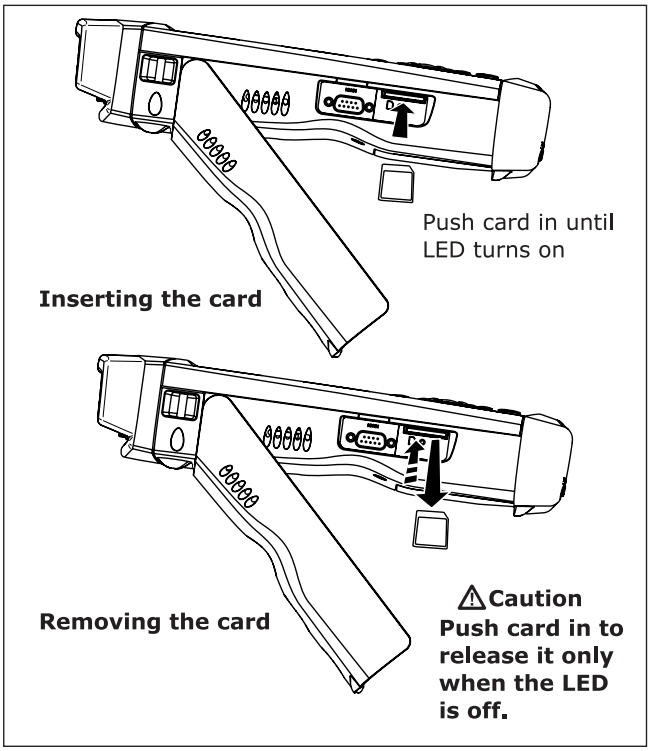


Figure 1-7. Inserting and Removing the Memory Card

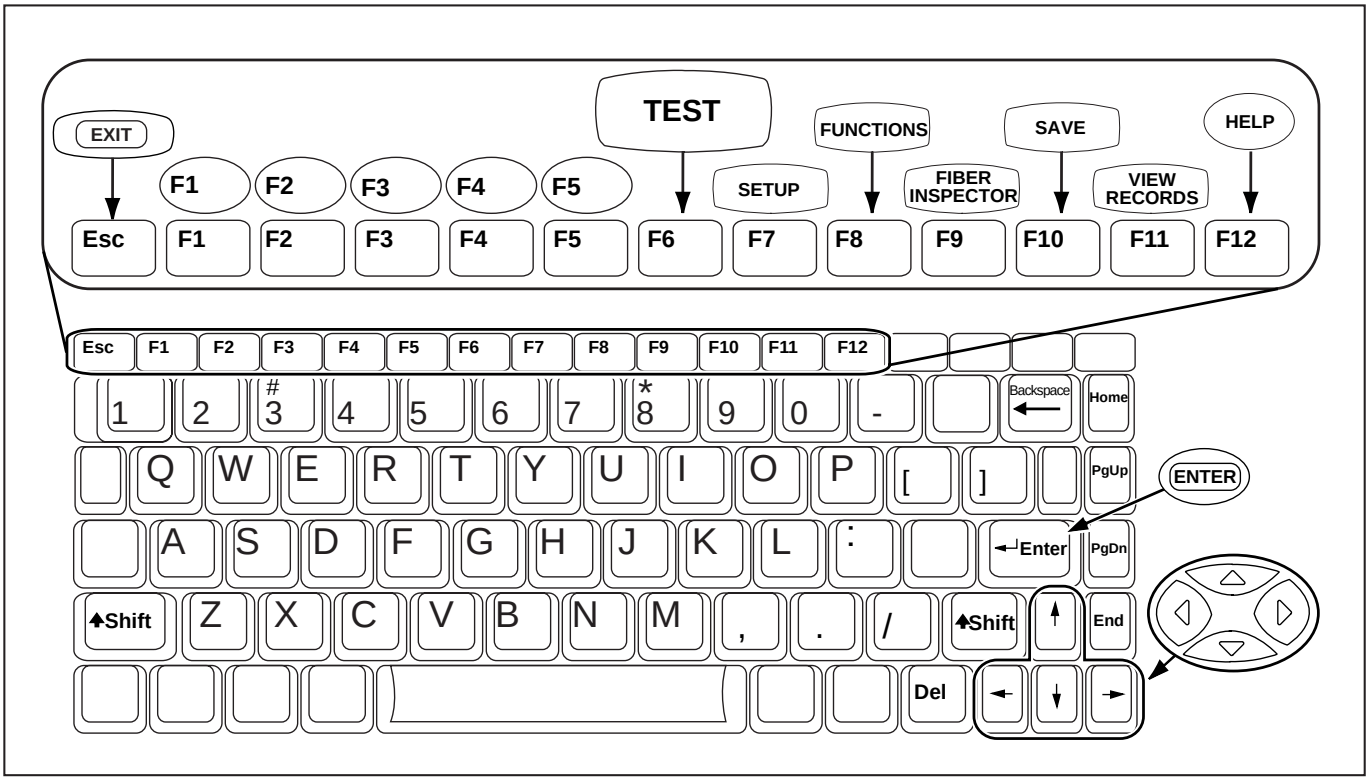


Figure 1-8. Using an External Keyboard

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:

5 Press SETUP; then press F5 to select the **System** tab.

6 Use ▼ to highlight **DATE FORMAT**, **TIME FORMAT**, or **NUMERIC FORMAT**; then press ENTER.

7 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.

Enabling or Disabling the Save Warning

If you do not save a test, it is deleted from temporary memory when you run another test.

To enable or disable a warning that reminds you about the unsaved test:

1 Press SETUP; then press F5 to select the **System** tab.

2 Use ▼ to highlight **Enabled** or **Disabled**; 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 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 work in the tester.

2 Connect the tester to the PC via the serial or USB port.

3 In LinkWare select **Utilities** > **OptiFiber Utilities** > **Custom Logo**. Locate and select the .bmp or .png logo file; then click **Open**.

4 Restart the tester to see the new logo.

Note

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

To restore the Fluke Networks logo, select **Utilities** > **OptiFiber Utilities** > **Restore Default Logo**; then restart the tester

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 and LinkWare Stats Software

The LinkWare™ Cable Test Management software included with your tester lets you do the following:

- Upload test records to PC.
- View test results.
- Add ANSI/TIA/EIA-606-A administration information to records.
- Organize, customize, and print professional-quality test reports.
- Update the tester's software.

Details about using LinkWare software are provided in the *LinkWare Getting Started Guide* and the online help available under **Help** on the LinkWare menu.

Updates to LinkWare software are available on the Fluke Networks website.

The LinkWare Stats Statistical Report option for LinkWare software provides statistical analysis of cable test reports and generates browsable, graphical reports. LinkWare software includes a demo version of LinkWare Stats. Contact Fluke Networks or visit the Fluke Networks website for more information on LinkWare Stats.

Chapter 2
Getting Started Testing Fiber

Safety Information

Table 2-1 shows the international electrical symbols used on the tester or in this manual.

Table 2-1. International Electrical Symbols

	Warning: Risk of fire, electric shock, or personal injury.
	Warning or Caution: Risk of damage or destruction to equipment or software. See explanations in the manuals.
	Warning: Class 1 (OUTPUT port) and Class 2 (VFL port) lasers. Risk of eye damage from hazardous radiation.
	Do not put products containing circuit boards into the garbage. Dispose of circuit boards in accordance with local regulations.
	THIS PRODUCT CONTAINS MERCURY. DISPOSE OF THIS PRODUCT IN ACCORDANCE WITH LOCAL REGULATIONS.

⚠Warning: Class 1 and Class 2 Laser Products

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 Fluke Networks FiberInspector Video Microscope to periodically inspect the OTDR and loss/length option's OUTPUT 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.**
- **Memory cards may be lost, damaged, or accidentally formatted, resulting in data loss. Therefore, Fluke Networks recommends saving no more than one day's worth of test results on a memory card.**

Cleaning and Inspecting Fiber Connectors and Adapters

Always clean and inspect fiber connectors before making connections.

⚠Caution

See Chapters 3 and 6 for instructions on cleaning the tester's OTDR and loss/length connectors.

Cleaning Bulkhead Connectors

1. Touch the tip of a fiber optic solvent pen or swab soaked in solvent to a lint-free dry wipe or fiber cleaning card.
2. Touch a new, dry swab to the solvent spot on the wipe or card. Push the swab into the connector, twist it around 3 to 5 times against the end-face, then remove and dispose of the swab.
3. Dry the connector with a dry swab by twisting it around in the connector 3 to 5 times.
4. Inspect connectors with a fiber microscope, such as the Fluke Networks FiberInspector™ Video Microscope before making connections.

Cleaning Fiber Adapters

Periodically clean fiber adapters with a swab and fiber optic solvent. Dry with a dry swab before use.

Cleaning Connector Ends

1. Touch the tip of a fiber optic solvent pen or swab soaked in solvent to a lint-free dry wipe or fiber cleaning card.
2. Wipe the connector end-face across the solvent spot, then back and forth once across the dry area of the wipe or card.

Note

Some connector styles, such as VF-45, may require a different cleaning method.

- Always cover unused connectors with protective caps. Clean caps periodically with a swab or wipe and fiber optic solvent.

Testing Your Reference Test Cords and Launch Fiber

You should test your reference test cords and launch fiber before each job. Use another set of known-good cords to set a reference and run an Autotest on each patch cord and launch fiber. Use Smart Remote mode to test two cords at a time, or Loopback mode to test one cord.

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

General Test 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.

To copy settings between testers, see page 12-5.

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 list shows the last 10 fiber types used. To see additional fibers, press F2 **More**; then select a **FIBER GROUP**.

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 10 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 10.

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**. The list shows the last 10 limits used. To see additional limits, press F2 **More**; then select a **LIMIT GROUP**.

The limit lists show 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 10 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 10 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 2-2 describes the job settings.

See "Tutorial: Preparing to Save Tests" on page 2-10 for examples of how to configure the job settings.

Table 2-2. 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 2-23 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 2-23 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.

When **MANUAL CABLE SETTINGS** on the **Cable** tab is disabled, the tester uses the n values specified in the selected fiber type.

When **MANUAL CABLE SETTINGS** 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 CABLE SETTINGS** 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- 25 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 2-26.

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. Figure 2-1 describes the text editing screen.

2-4 Press SAVE when you are finished.

2-5 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.

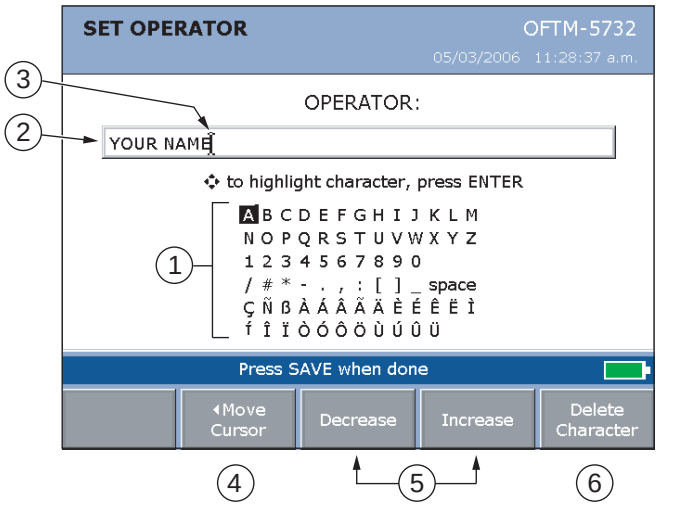
4-3 On the **Job** tab, verify that **THIS END** is set to **END 1**. Change it to **END 1** if necessary.

Step 5: Setting the Save Warning

If you do not save a test, it is deleted from temporary memory when you run another test. To enable or disable a warning that reminds you to save the test, do the following:

5-1 On the **System** tab, select **SAVE WARNING**.

5-2 Use ▲ ▼ to highlight **Enabled** or **Disabled**; then press ENTER.



1. The characters available for use.

   To select a character to enter in the text box, use ◀▶▲▼ to highlight the character; then press ENTER. The character is entered to the left of the cursor.

2. The text you are entering.
3. The cursor. Use F1 F2 to move the cursor.
4. Moves the cursor to the left until it wraps back around to the end of the text.
5. Decreases or increases the character at the cursor by one position in the character list.
6. Deletes the character to the left of the cursor.

Tip: You can use an external keyboard to edit text (except international characters). See Chapter 1.

Figure 2-1. Using the Text Editing Screen

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 2-10 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 F1 **Change Test**; then select **Auto OTDR**.

Step 2: Selecting a Fiber Type and Test Limit

2-1 Press SETUP; then press F4 **Tab** to select the **Cable** tab.

2-2 Press ENTER to select **FIBER TYPE**.

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

If the fiber type you want is not shown, press F2 **More**, select a **FIBER GROUP**; then highlight and select a fiber type.

2-4 On the **SETUP** screen press F5 **Tab** to select the **OTDR** tab. If **TEST LIMIT** is already set to **Document only**, go to step 3.

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

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

If **Document only** is not listed, press F2 **More**, select **Application**, then highlight and select **Document only**.

Step 3: Selecting a Wavelength

3-1 From the **SETUP** screen, press F5 **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 2-2 shows these connections and typical features on an OTDR trace.

4-3 Press TEST.

See page 3-13 for details on the **OTDR Port Connection Quality** gauge shown on the OTDR **TESTING** screen.

-continued-

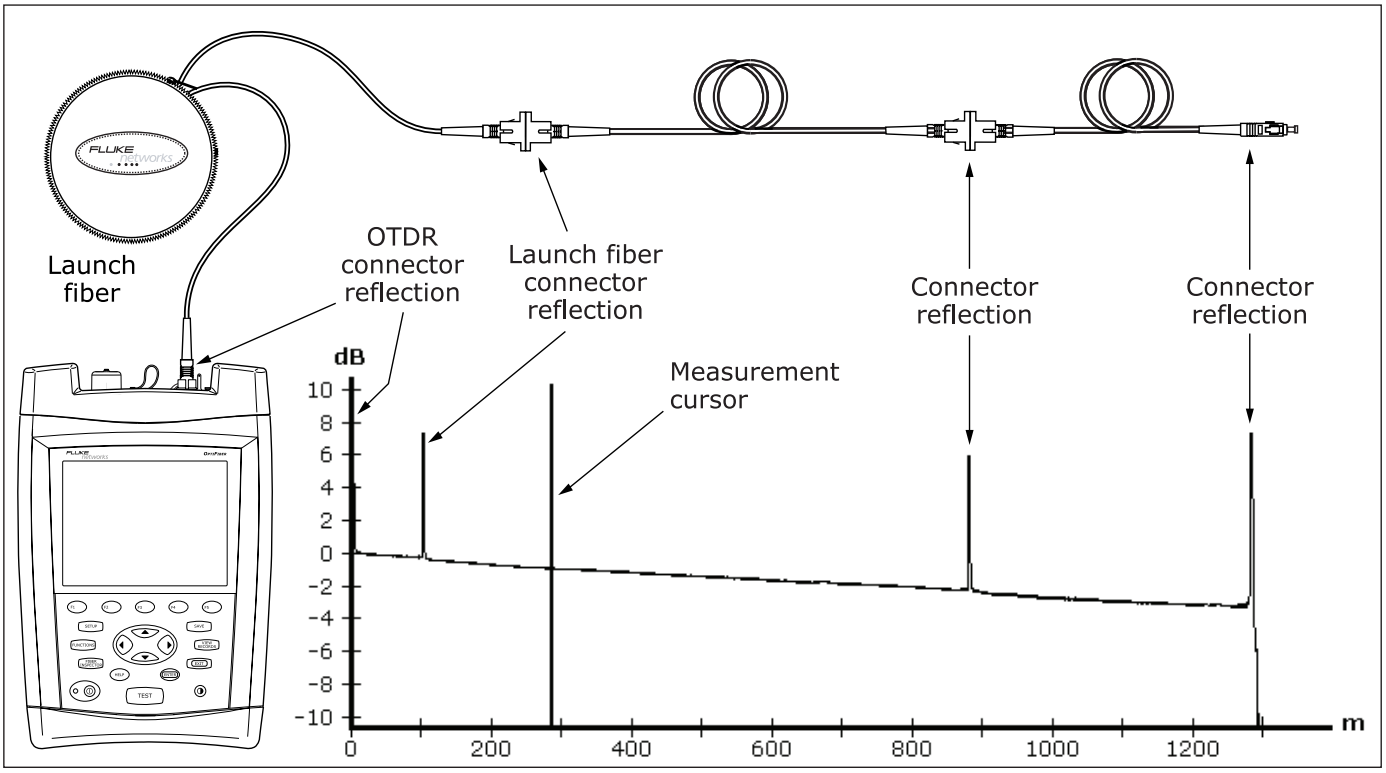


Figure 2-2. Typical OTDR Connections and Trace Features

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 2-2 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

- One OptiFiber tester set up as follows:
  - OFTM-5612B or OFTM-5732 module installed
  - Connector adapter installed on the tester's INPUT port. Match the connectors on the fiber under test.
  - Charged batteries attached or the ac adapters connected
  - Job settings configured as described in the tutorial "Preparing to Save Tests" on page 2-10
- A second OptiFiber tester set up like the first one, or a DTX Smart Remote with a fiber module for the correct wavelength and the correct connector adapter installed
- Two lengths of fiber cabling or a length of duplex cabling to test
- Two known-good duplex reference test cords of the same fiber type as the cabling to be tested. See Figures 2-3 and 2-4 to determine the connector types you will need.
- For testing multimode fiber, two mandrels of the correct size
- 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.

If the fiber type you want is not shown, press F2 **More**, select a **FIBER GROUP**; then highlight and select a 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 F5 **Tab** to select the **Loss/Length** tab.

3-2 Press ENTER to see the available test limits.

3-3 Use ◄► to highlight **Document only**; then press ENTER to select the limit.

If **Document only** is not listed, press F2 **More**, select **Application**, then highlight and select **Document only**.

3-4 Use ◄► to highlight **REMOTE END SETUP**; then press ENTER.

3-5 Use ◄► to highlight **Smart Remote**; then press ENTER.

If a message about setting the reference appears, press F2 **No**. You will set the reference in Step 4.

3-6 Use ◄► to highlight **THIS UNIT**; then press ENTER.

3-7 Use ◄► to highlight **Main**; then press ENTER.

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

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

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

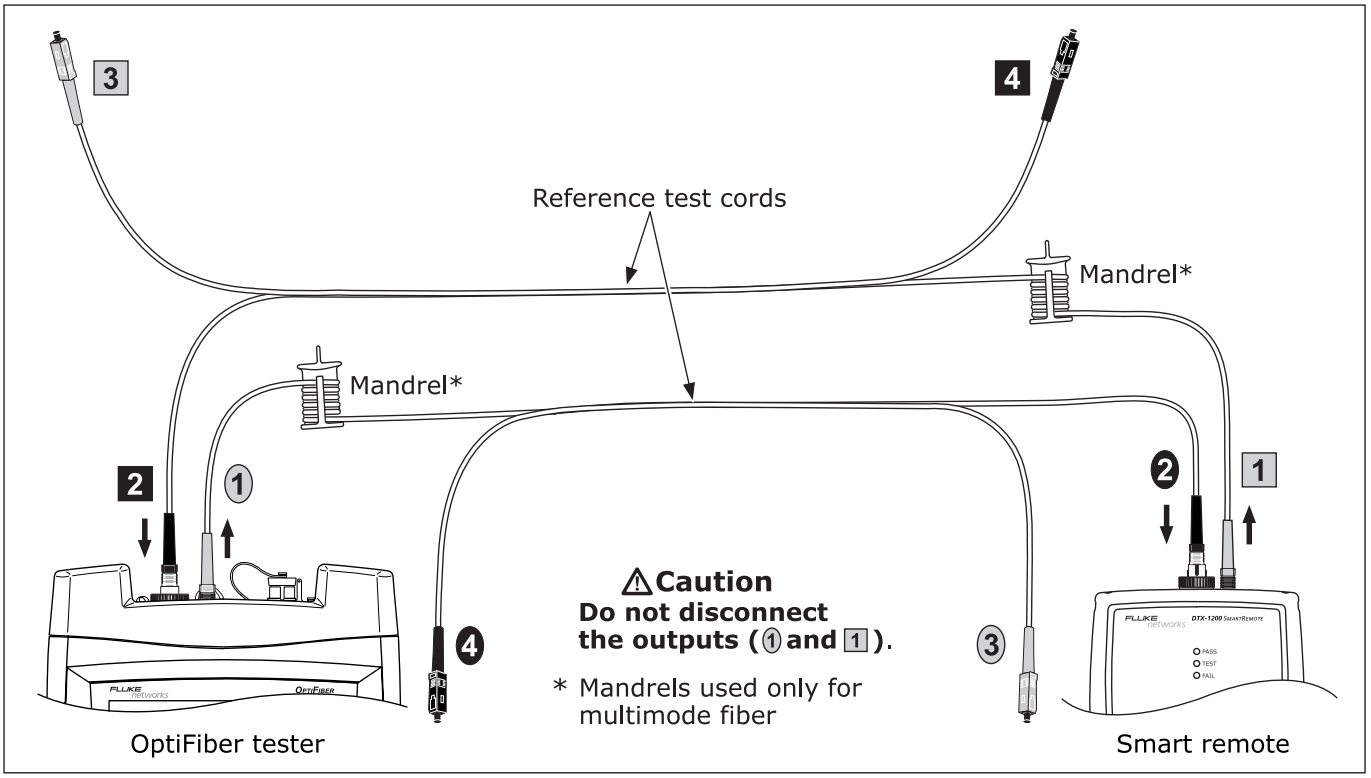
Step 4: Setting the Reference

4-1 Clean the tester's and source's OUTPUT connectors and the reference test cord connectors.

4-2 Press FUNCTIONS. Use ◄► to highlight **Set Loss/Length Reference**; then press ENTER.

4-3 Connect the main and remote testers as shown on the **SET REFERENCE** screen and in Figure 2-3; then press ENTER.

4-4 On the **VIEW REFERENCE** screen press F3 **OK**. (You do not need to enter reference test cord lengths for this tutorial.)



ajt05f.eps

Figure 2-3. Smart Remote Mode Reference Connections

Step 5: Running the Test

5-1 Make the connections for a Smart Remote mode test, as shown in Figure 2-4. 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:

6-1 The **SUMMARY** screen, shown when the test is finished, tells you if the cabling passed or failed based on the selected test limits.

6-2 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.

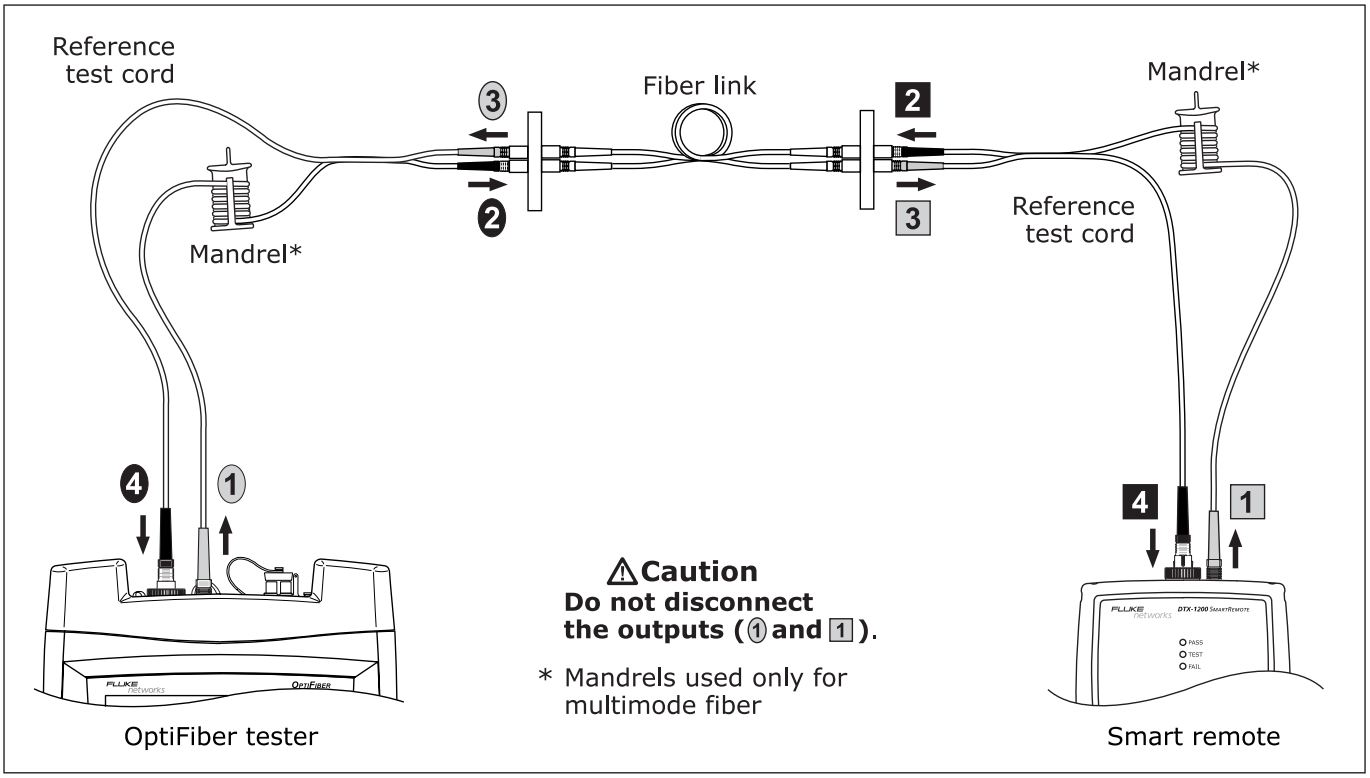


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Figure 2-4. Smart Remote Mode Test Connections

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
- s = telecom room letter
- a = patch panel letter
- n = For a horizontal link: port number
  For a backbone: backbone cable letter or number
- d = copper pair or fiber strand number in backbone cable
- b = building

Horizontal Link Identifier

Horizontal links run between telecommunications closets and work areas.

Format: fs-an

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: fs1/fs2-n.d

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 s1]/[b2-fs2]-n.d

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 2-3 gives solutions to some typical problems you may have with fiber ID lists.

Table 2-3. Solving Problems with Fiber ID Lists

Problem	Solutions
The ID sequence is invalid.	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. 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. Verify that the start and stop IDs have the same numbers of characters. Verify that the START and STOP IDs do not generate a sequence with more than 3000 IDs.
When you press SAVE, you cannot find the ID list.	After you press SAVE, press F1 **Pick ID**; then press the appropriate softkey to see the list. 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.

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.

Cleaning the OTDR Connector

Use a dry, optical-grade wipe to clean the OTDR connector. Figure 3-1 shows how to remove the OTDR adapter to access the connector ferrule.

The OTDR port connection quality screen helps you determine when the OTDR connector needs cleaning. See page 3-13.

If the connector is very dirty, wipe the end of the ferrule with an optical-grade wipe lightly moistened with fiber optic solvent. Dry with a dry wipe.

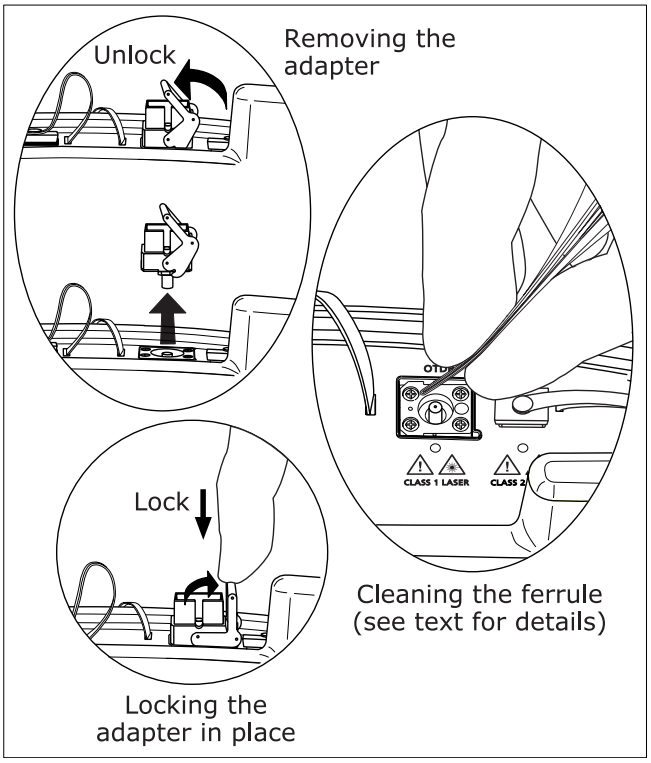

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Figure 3-1. Cleaning the OTDR Connector

Selecting Auto or Manual OTDR Mode

Note

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

From the **HOME** screen, press F1 **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 settings 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 settings to optimize the OTDR for displaying specific events. See "Using Manual OTDR Mode" on page 3-45 for details.

Tip: To see the settings used for an OTDR test, press F3 **View Details** on the OTDR **SUMMARY** screen; then press F1 **OTDR Settings**. The settings used may be slightly different from the nominal values selected on the OTDR tab.

About Launch and Receive Fibers

Launch and receive fibers let the tester measure the loss and reflectance of the first and last connectors in the cabling, and include those connectors in ORL (optical return loss) measurements. Without launch and receive fibers, no backscatter is available before the first connector and after the last, so the tester cannot measure the connectors' characteristics.

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 measurements from 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.

Fluke Networks recommends that you use launch and receive fibers. You should also use launch/receive fiber compensation to remove the effects of these fibers from the OTDR measurements.

⚠ Caution

For testing cabling with angled physical contact (APC) connectors, use only launch/receive fibers with APC connectors at the end connected to the cabling. Other connector types will cause large reflections that may invalidate your test results.

Note

Avoid using hybrid patch cords to connect to the cabling under test. Connect the launch and receive fibers directly to the cabling under test, using a launch fiber with the appropriate connectors. This provides the best measurement of the connectors at the ends of the cabling. Hybrid launch fibers with various connector styles are available from Fluke Networks.

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.

Launch compensation also provides a more accurate ORL (optical return loss) measurement, provided that the correct backscatter coefficient for the fiber under test is entered on the **Cable** tab in **SETUP**.

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

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.

Notes

Launch + Receive compensation usually provides the most accurate measurements.

Avoid using Launch + Fiber + Receive compensation on fibers longer than 8 km. Doing so may degrade measurement accuracy.

Setting the Launch Fiber Compensation

1. Select the fiber type to be tested on the **Cable** tab in Setup.
2. Press FUNCTIONS; 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 ENTER.

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 3-2, 3-3, or 3-4; 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:

⚠ Caution

Do not set the launch or receive event to a hidden event. Do not set the receive event to an event followed by a hidden event. Doing so may make length and loss results unreliable.

Note

The tester might not identify a low-reflectance connection, such as an angled physical contact (APC) connection, as a launch/receive event. These connections may show as loss events, which you can manually select to be the launch/receive event.

- 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**.

Launch Fiber Compensation is enabled after you perform the compensation function.

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 3-5 shows an example of an OTDR trace with launch and receive markers enabled.

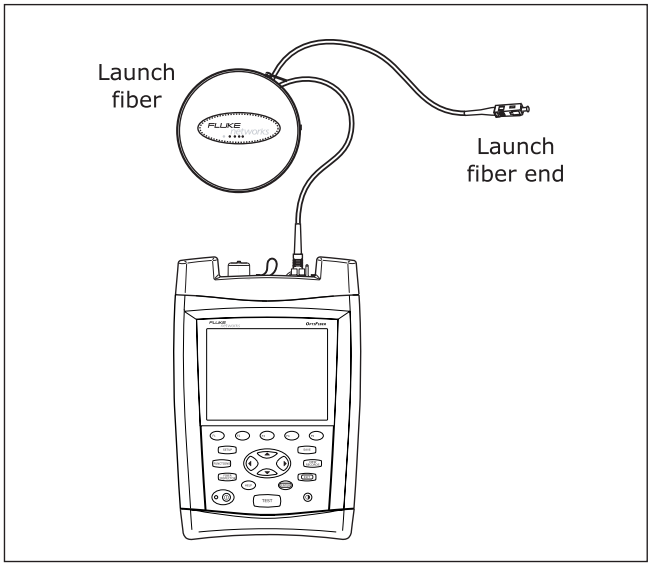

Figure 3-2. Launch Only Compensation Connections

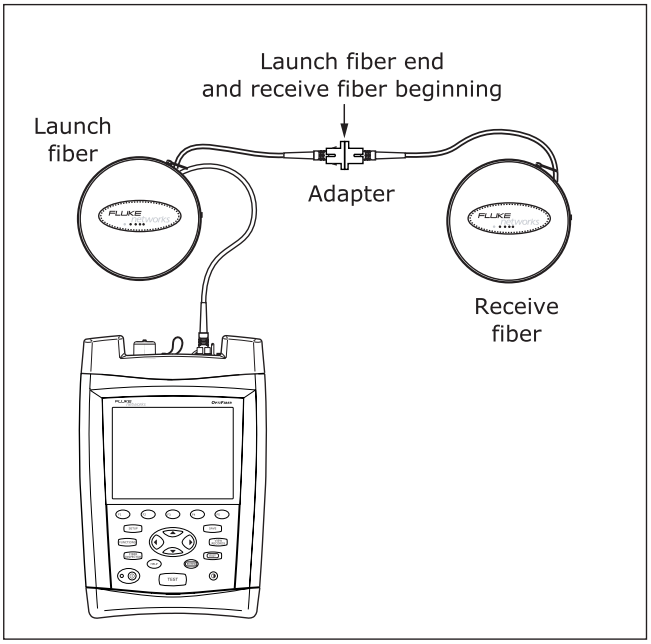

Figure 3-3. Launch + Receive Compensation Connections

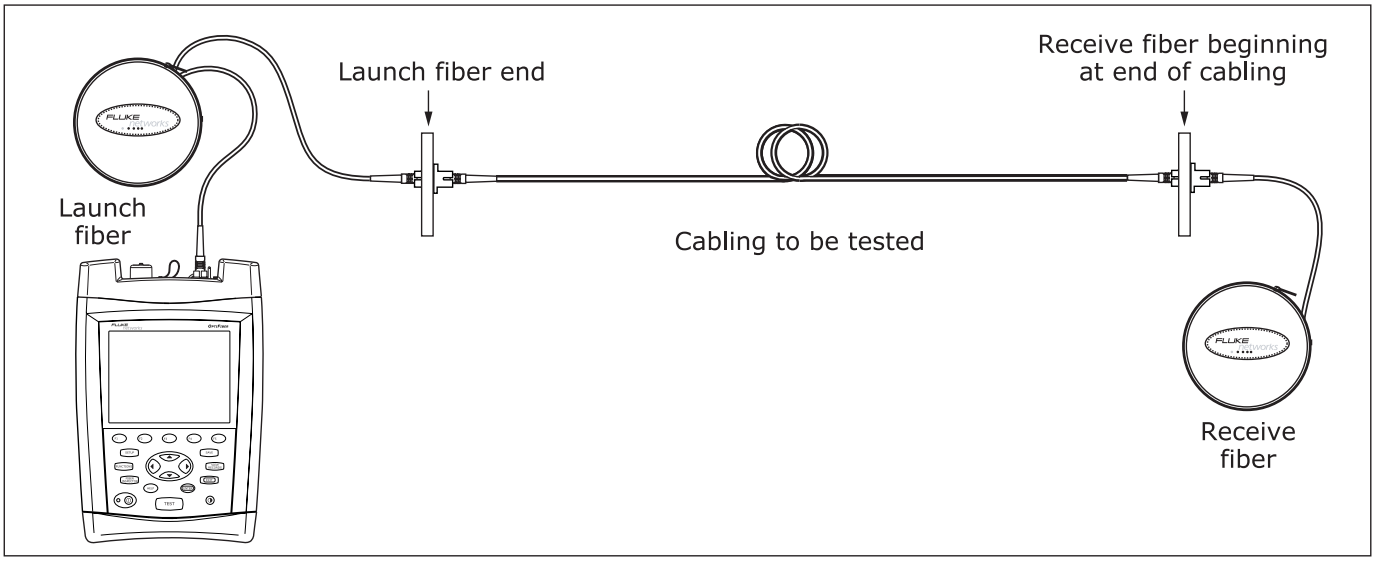

Figure 3-4. Launch + Fiber + Receive Compensation Connections

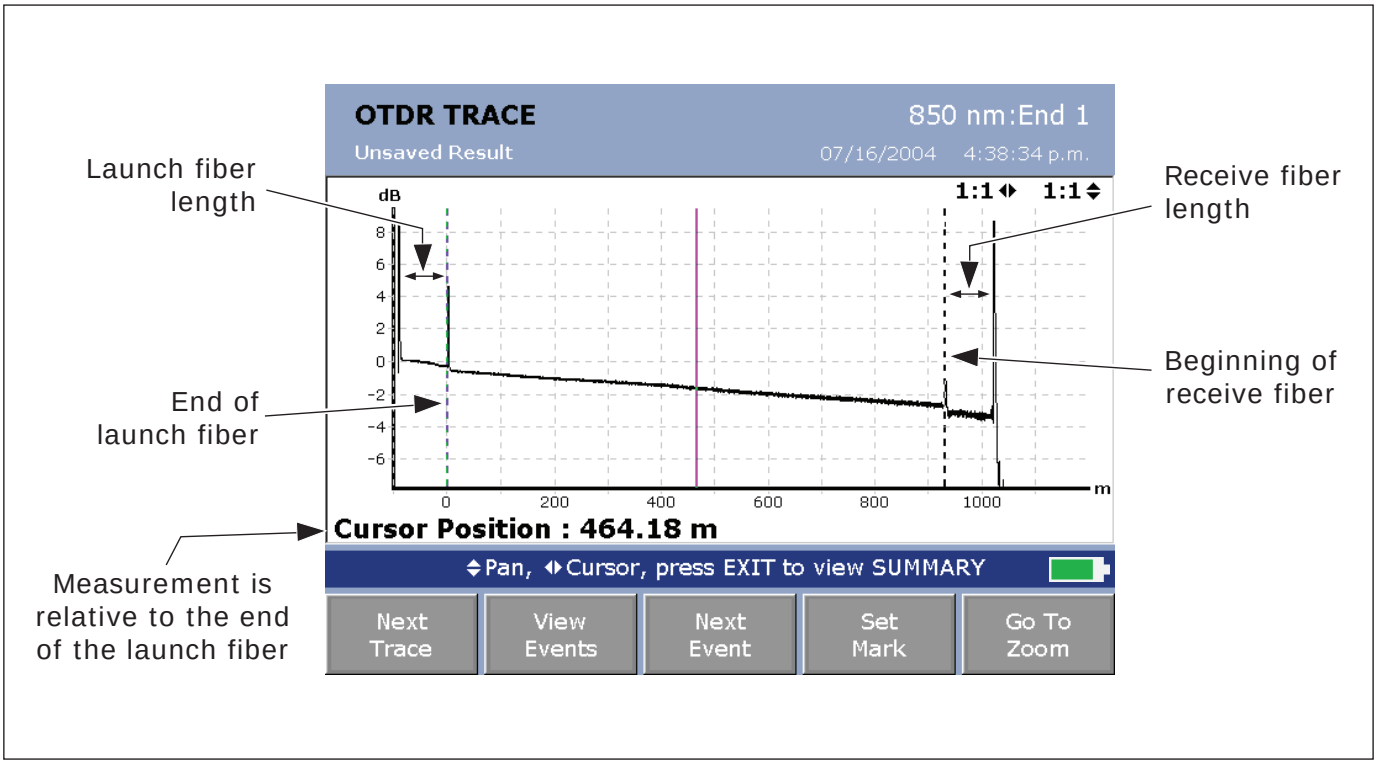

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Figure 3-5. OTDR Trace with Launch Compensation Enabled

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 foGr details.
Cable tab	**FIBER TYPE**	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 10 for information on creating custom fiber types. *Note* *Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.*

-continued-

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

SETUP Tab	Setting	Description
Cable tab	**MANUAL CABLE SETTINGS**	When **MANUAL CABLE SETTINGS** is disabled, the **n** and **BACKSCATTER** values depend on the selected fiber type. When the **MANUAL CABLE SETTINGS** is enabled, the tester enters default values that you can change manually.
	n	The **n** value is the index of refraction. Index of refraction is used to calculate length. The default **n** values defined in the fiber types are suitable for most applications. Minor differences between the default **n** and a fiber's actual **n** usually do not make enough difference in length to fail a fiber. Increasing **n** decreases measured length.*
	BACKSCATTER	**BACKSCATTER** is the backscatter coefficient, which indicates the amount of light the fiber reflects back to the OTDR (using a 1 ns pulse). This value is used to calculate event reflectance for OTDR tests. Enter the backscatter coefficient of the fiber under test, if known. This value is specified by many fiber manufacturers.
* For singlemode modules, the 30 km range and an **n** value greater than 1.52 cause an error. These settings produce propagation times that are beyond the tester's range.		

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

SETUP Tab	Setting	Description
OTDR tab	**TEST LIMIT**	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 10 for information on creating custom limits. *Note* *Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.*
OTDR tab	**WAVELENGTH**	You can test cabling at one or all the wavelengths supported by the installed module and the selected test limit. *Note* *If you select the dual-wavelength setting, be sure to select a fiber type and test limit that supports both wavelengths.*
	LAUNCH COMPENSATION	Enables or disables launch fiber compensation. See **Set Launch Fiber Compensation** below.
	OTDR PLOT GRID	Enables or disables the grid on the OTDR trace.

-continued-

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

SETUP Tab	Setting	Description
OTDR tab	**RANGE** **RESOLUTION** (OFTM-56xxB) **PULSE WIDTH** OFTM-57xx: **AVERAGING TIME** **LOSS THRESHOLD**	These settings apply only to Manual OTDR mode. See "Using Manual OTDR Mode" on page 3-45 for details. To see the settings used for an Auto OTDR test, press F3 **View Details** on the OTDR **SUMMARY** screen; then press F1 **OTDR Settings**.
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 3-4.

OTDR Connection Quality

When you run an OTDR test, the tester determines the quality of OTDR port connection (Figure 3-6).

If the gauge is in the **Poor** range, you should clean the OTDR port and the fiber connector. Use a video microscope, such as the FiberInspector video probe, to inspect the port and fiber connector for scratches and other damage. If a connector on the tester is damaged, contact Fluke Networks for service information.

A poor OTDR connection increases the connector's deadzone, as shown in Figure 3-7. The deadzone can hide faults near the OTDR connector.

A poor connection also decreases the light available for testing the fiber. The weakened test signal causes a noisier trace, poor event detection, and decreased dynamic range.

The port connection quality rating is saved with OTDR result details.

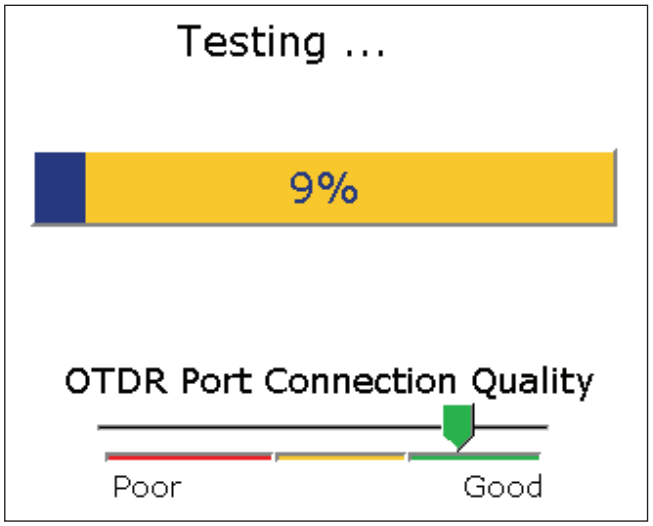

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Figure 3-6. OTDR Port Connection Quality Gauge

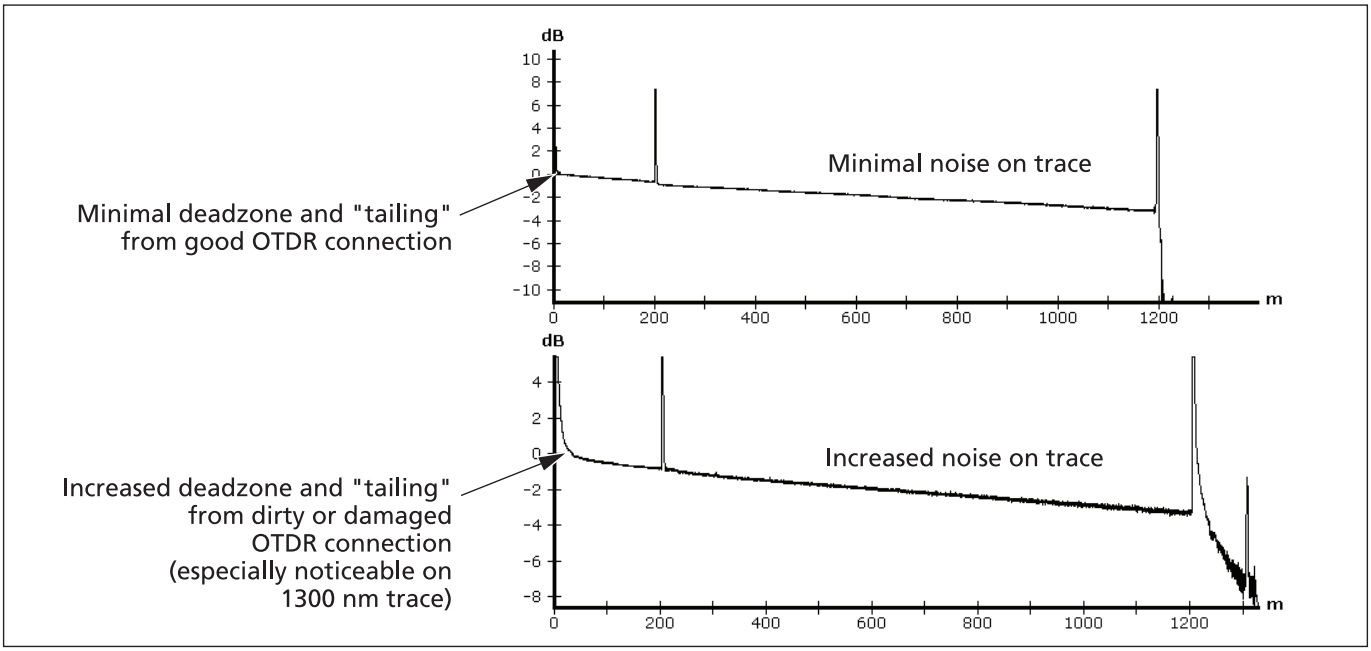


Figure 3-7. Traces Showing Good and Bad OTDR Connections

Progress Screen for Extended Test Times (OFTM-573x Modules)

When the test time exceeds 15 seconds, a tester with an OFTM-573x module shows the developing trace along with the progress indicator. Figure 3-8 shows an example of this screen. The tester updates the trace as measurement averaging proceeds.

To end a Manual OTDR test and see the results after the next trace update, press F3 **Stop Averaging**. For dual-wavelength tests, press F3 twice –once for each wavelength. This softkey is not available for Auto OTDR tests.

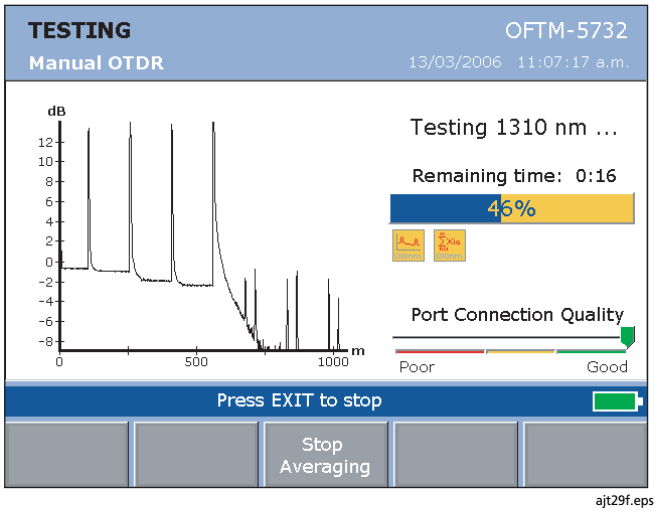


Figure 3-8. Progress Screen for Extended Test Times (OFTM-573x Modules)

Running the OTDR Test

Figure 3-9 shows the equipment needed for OTDR tests.

To run the OTDR test do the following:

1 Verify that the settings described in Table 3-1 are appropriate.

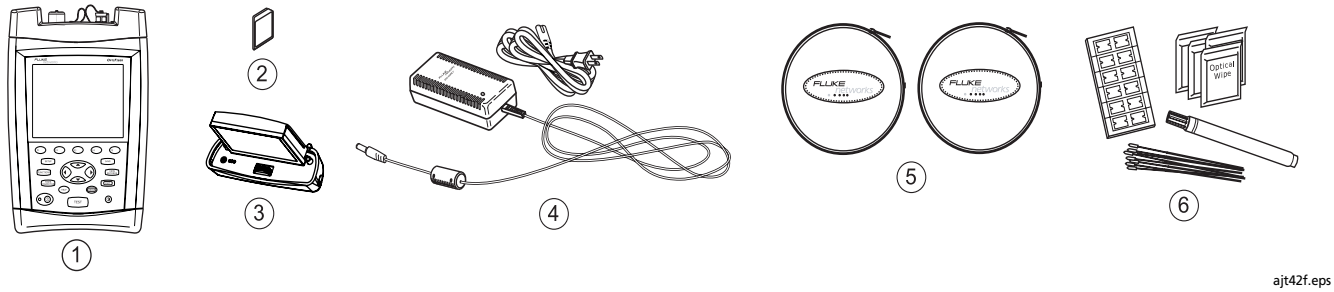
2 Select Auto OTDR mode: On the **HOME** screen, press F1 **Change Test**; then select **Auto OTDR**.

3 Clean the connectors on the launch fiber and the fiber to be tested.

4 Connect to the tester's OTDR port to the cabling as shown in Figure 3-10, 3-11, or 3-12.

5 Press TEST to start the OTDR test.

6 To save the results, press SAVE, select or create a fiber ID; then press SAVE again.



1. Tester with OFTM-56xxB or OFTM-57xx module
2. Memory card (optional)
3. Spare battery pack (optional)
4. AC adapter with line cord (optional)
5. Launch fiber and receive fibers. Match the fiber to be tested. Match cable connectors at one end when possible.
6. Fiber cleaning supplies

Figure 3-9. Equipment for OTDR Tests

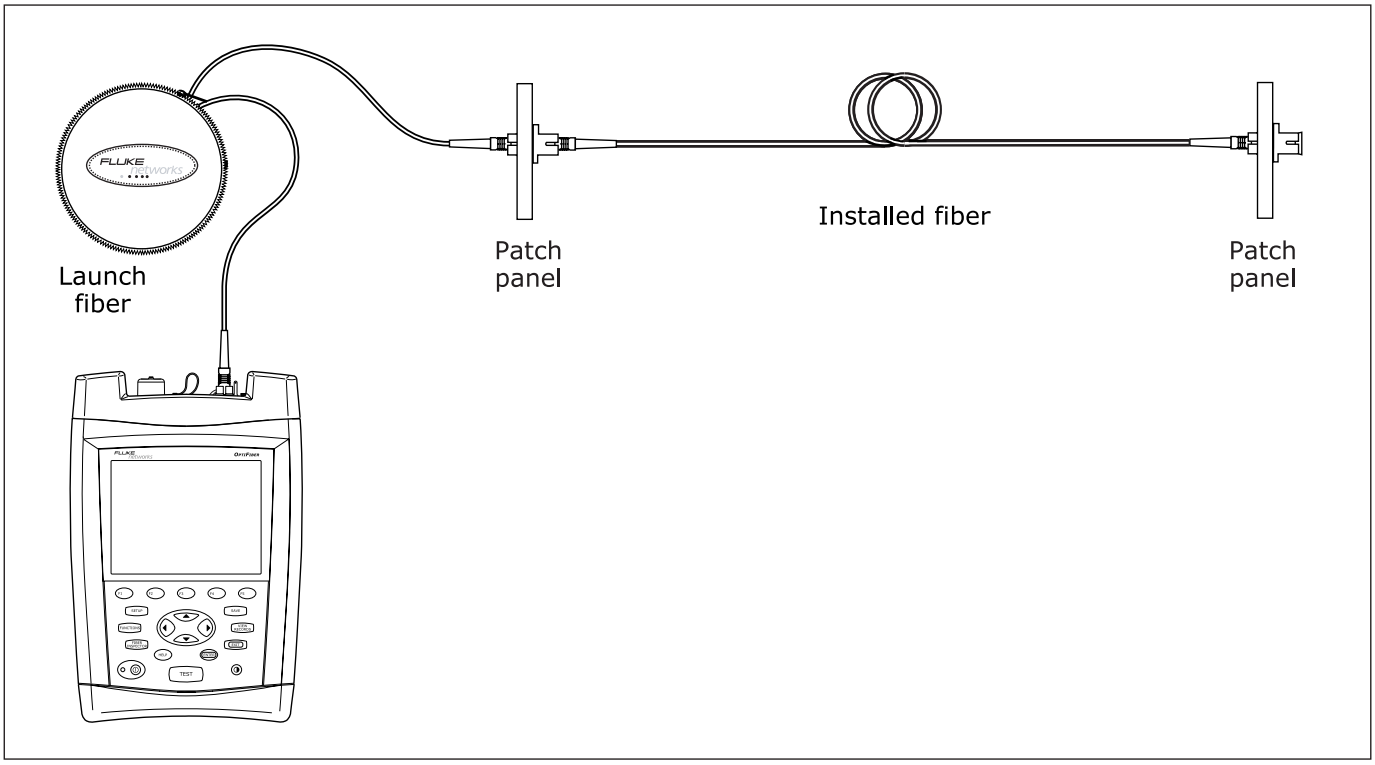


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Figure 3-10. Connecting the OTDR to Installed Fiber (no receive fiber)

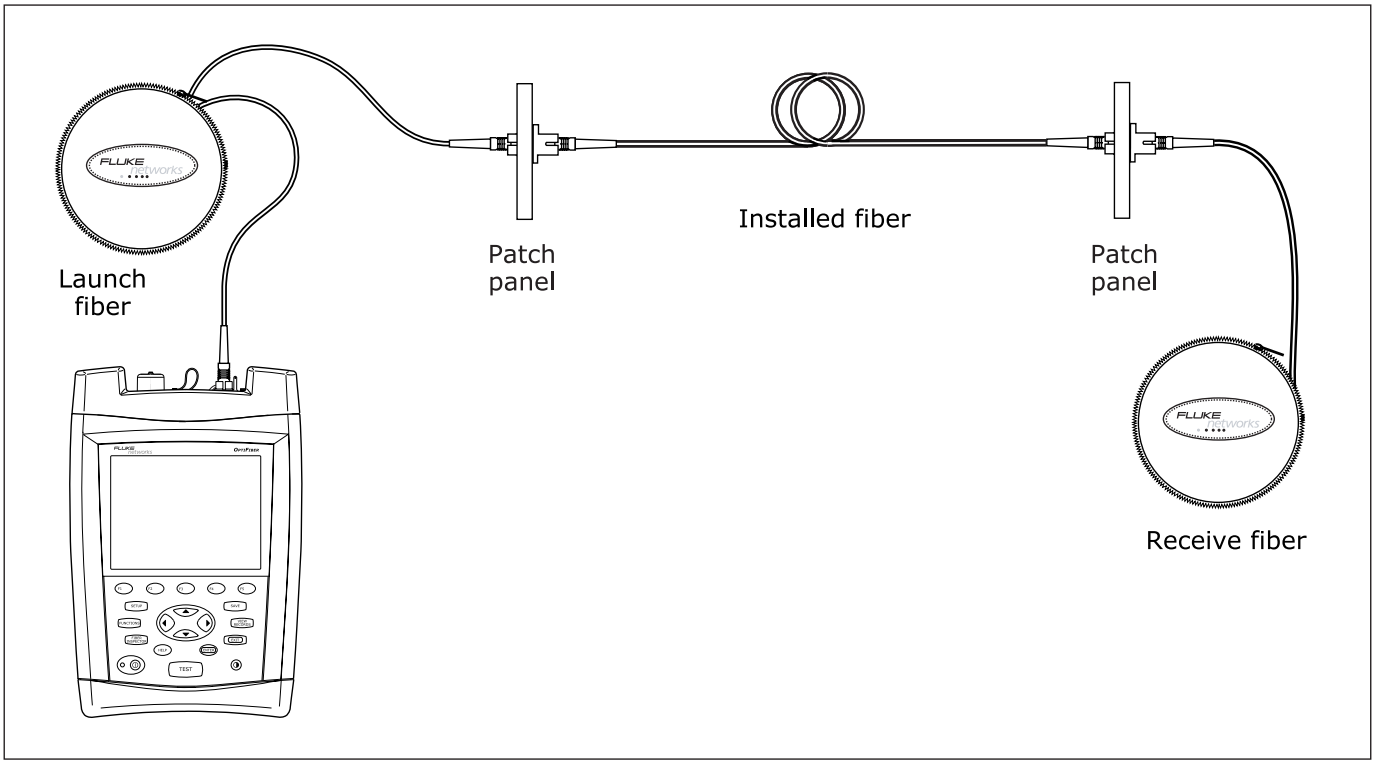

Figure 3-11. Connecting the OTDR to Installed Fiber (with receive fiber)

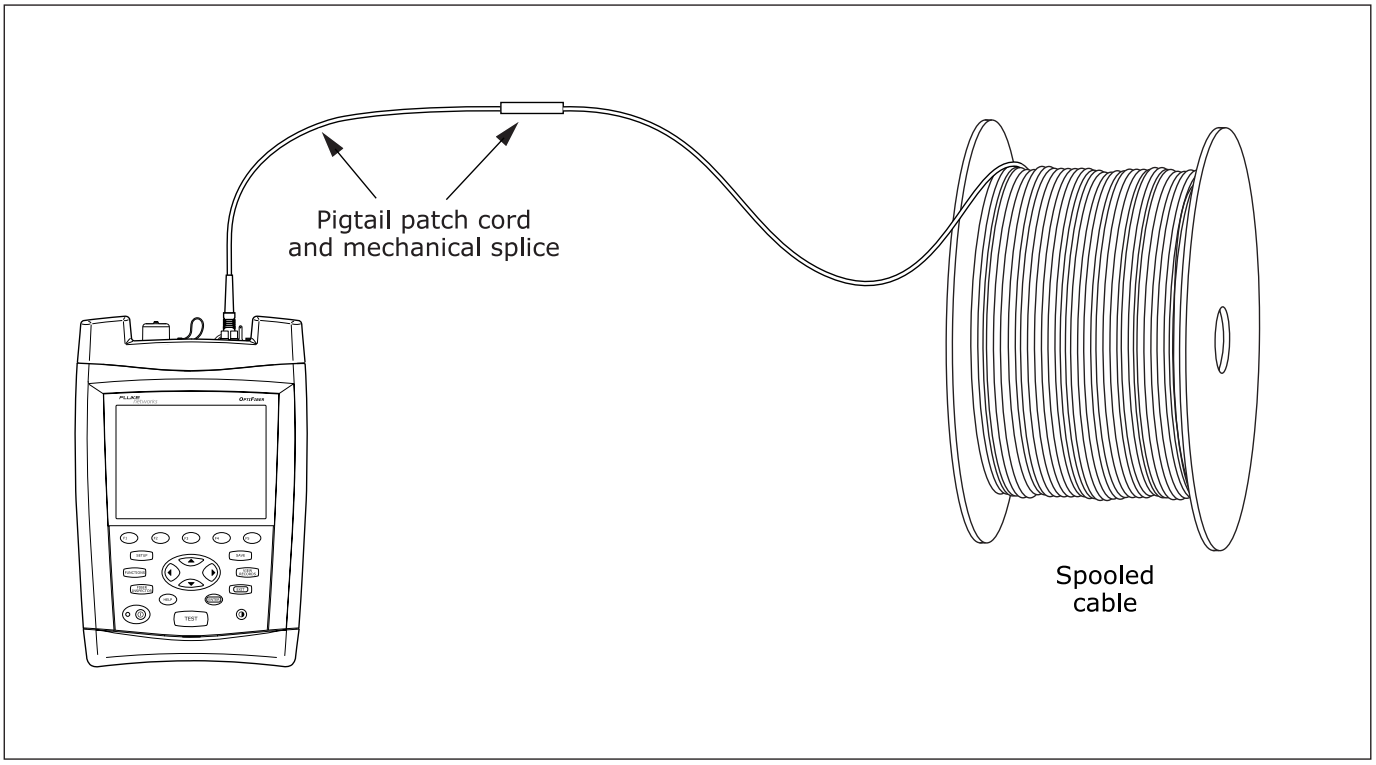

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Figure 3-12. Connecting the OTDR to Spooled Cable

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	**PASS**: All test results are within limits. **FAIL**: One or more test result exceeds the limits. See the OTDR trace or the event table for additional information.
WARNING	The value could not be reliably determined. These values are usually preceded by a "<" or ">" (less than or greater than) symbol. This may occur if the fiber is too long, the signal is weak, or events are too close together to distinguish losses. In many cases, the **OTDR DETAILS** screens show causes of the warning. Press F3 **View Details** to see these screens.
FIBER LENGTH	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. **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.

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

Item	Description
OVERALL LOSS	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 and receive fiber compensation are enabled. 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 fiber compensation. If the test ran at two wavelengths, the highest loss of the two wavelengths is reported.
LARGEST EVENT	The largest loss event on the cabling.
F3 **View Details** softkey	Lets you see the overall results and event results along with the test limits. These results include values measured by the selected test limit but not shown on other OTDR screens, such as segment attenuation coefficients, optical return loss, and reflectance. Use the softkeys on the **OTDR DETAILS** screens to switch between overall results details and event details. See "OTDR Details Screens" on page 3-37 or press HELP for information about OTDR details.

Reading the OTDR Trace

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

Figure 3-13 describes the readouts and navigational features on the OTDR screen. Figure 3-14 describes the features of a typical OTDR trace.

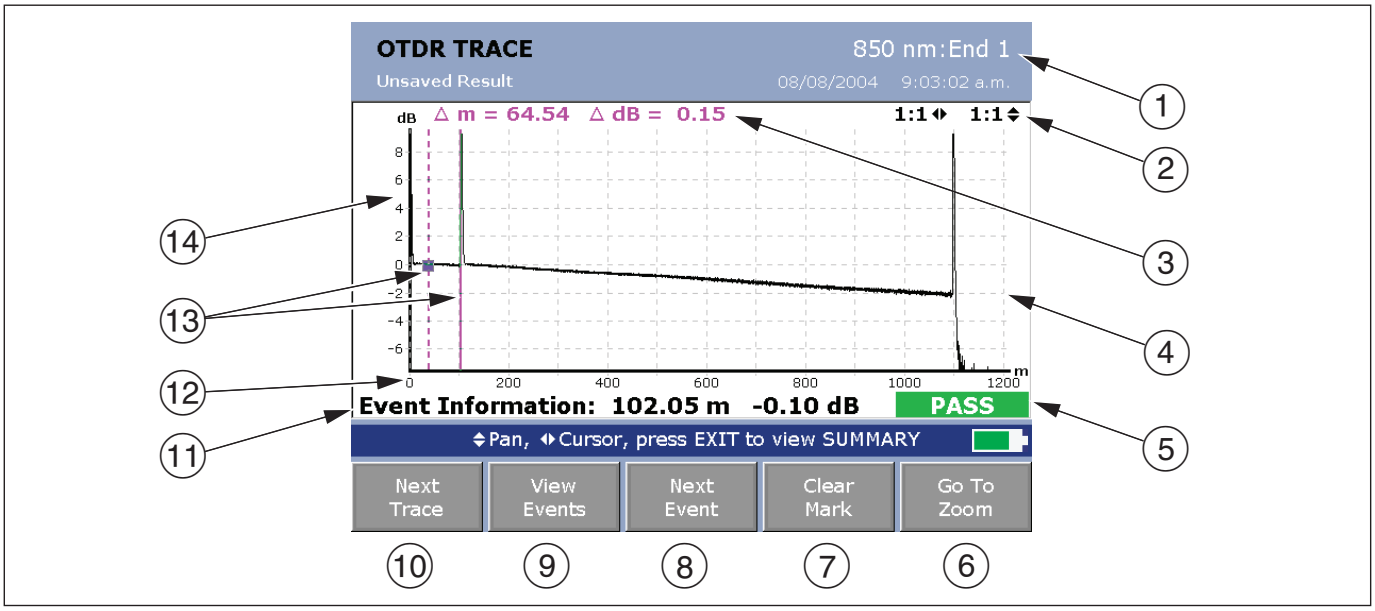

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Figure 3-13. OTDR Trace Screen (launch compensation disabled)

1. Wavelength for the trace and the **End** setting on the **Job** tab in **SETUP**. If the test ran at two wavelengths, press F1 to switch wavelengths. You can set the wavelengths on the **OTDR** tab in Setup.
2. Magnification factors for the trace. See "Zooming the Trace" on page 3-27.
3. The distance (**m** or **ft**) and the power loss (**dB**) between the cursor and the measurement marker (13).
4. OTDR plot grid. You can enable or disable the grid on the **OTDR** tab in **SETUP**.
5. **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.
6. Press F5 to change the arrow keys' function from moving the cursor to zooming to moving the trace if trace overlay is active (see page 3-39). The navigational cue above the softkey labels describes the arrow keys' current function.
7. Key for setting and clearing the measurement cursor. See "Using the Measurement Cursor" on page 3-26.
8. Moves the cursor to the next event on the trace. If you use ◊ to move the cursor, F3 changes to **Previous Event** and moves the cursor to the previous event.
9. Displays the event table.
10. For dual-wavelength tests, press F1 to switch wavelengths.
11. Event information appears if the cursor is on an event. Otherwise, the distance to the cursor is shown.
12. Scale for the distance along the cabling under test.

    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.
13. Measurement marker and cursor. See "Using the Measurement Cursor" on page 3-26.
14. Decibel scale for the OTDR backscatter.

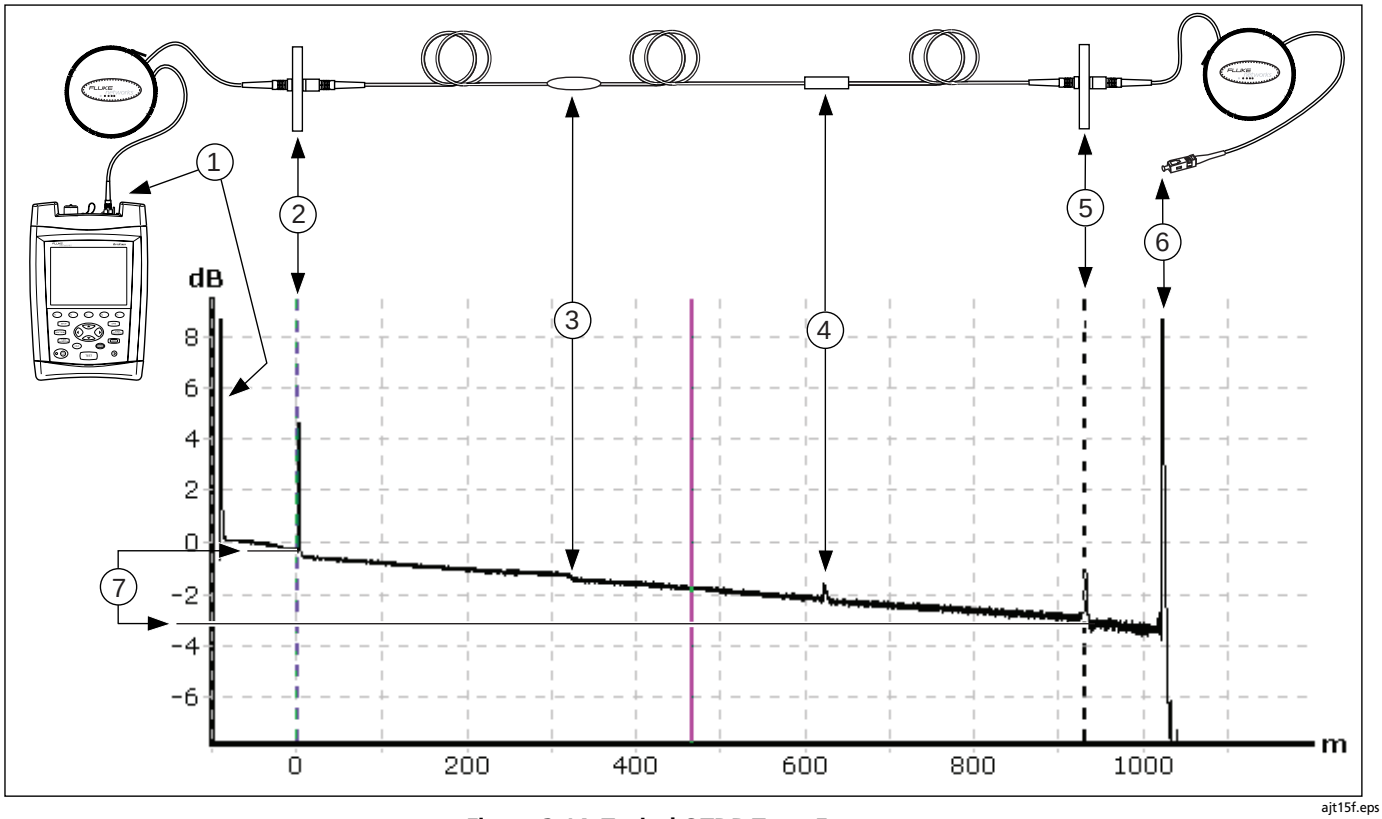


Figure 3-14. Typical OTDR Trace Features

① Reflective event caused by the OTDR connection.

② Reflective event caused by the first connection in the cabling. This trace was produced using launch fiber compensation, so the end of the launch fiber is marked with a dashed line.

③ Loss event caused by a fusion splice. Could also be an APC (angled physical contact) connection.

④ Small reflective event caused by a mechanical splice.

⑤ Reflective event caused by the last connection in the cabling. The dashed line marks the end of the fiber under test and the beginning of the receive fiber.

⑥ Reflective event caused by the end of the receive fiber.

⑦ Overall loss of the cabling. Since launch and receive fiber compensation was used, the overall loss excludes the loss of the launch and receive fibers.

See "Diagnosing OTDR Test Failures" on page 3-49 for descriptions of faults on fiber cabling.

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.

As you move the cursor, the tester calculates averages around the mark and cursor positions. This reduces the effects of noise on measurements.

To use the cursor, do the following:

1 If the navigational cue above the softkey labels does not say ▲▼**Pan,** ◀▶**Cursor,** press F5 until it does.

2 Use F3 **Next Event/Previous Event** or ◀ ▶ to move the cursor to a starting point on the trace. Pressing ◀ or ▶ sets the direction for the F3 softkey.

3 Press F4 **Set Mark** to set the mark; then use ◀ ▶ or F3 **Next Event/Previous Event** to move the cursor to the desired ending point.

The following readouts appear on the screen:

Note

*To change between Δ **dB** and Δ **dB/km** / Δ **dB/kft** press FUNCTIONS from the **OTDR TRACE** screen; then select **MARKER DELTA MODE** from the **OTDR FUNCTIONS** menu.*

- Δ **m** or Δ **ft**: The distance between the cursor and the mark.
- Δ **dB**: The difference in the power levels (in decibels) between the cursor and the mark.
- Δ **dB/km** or Δ **dB/kft**: Power loss (in decibels) that would occur over 1 km (1000 m) or 1 kft (1000 ft) of cable based on the loss between the cursor and the mark.

4 Press F4 **Clear Mark** to clear the mark.

Zooming the Trace

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

To zoom the trace, do the following:

1 Use ◀ ▶ to place the cursor near the feature you want to magnify. (Press F5 first if necessary so you can move the cursor.)

2 Press F5 until the navigational cue above the softkey labels says ✥**Zoom**.

3 Use ▲ ▼ and ◀ ▶ to magnify the trace vertically and horizontally.

If zooming places the feature you want to see off the screen, press F5 unit the navigational cue says say ▲▼**Pan,** ◀▶**Cursor,**; then use ▲ ▼ ◀ ▶ to move the feature into view.

Note

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

4 To reset the trace to a 1:1 magnification, press F4 **Reset**.

Reading the Event Table

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

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

Table 3-3. Event Table Features

Item	Description
LOCATION	The distance to the event, measured from the OTDR port.
db@<wavelength	The loss of each event at a wavelength. Negative dB values indicate a gain. To measure loss, the tester determines the best-fit line between two points, using the "least squares" method to reduce the effects of noise.
N/A	**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. **Tip:** The tester can measure the loss of the last connector on the fiber if you use a receive fiber during OTDR tests.

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	**PASS**: The event's loss is less than the limit for both wavelengths. **FAIL:** • 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 measured by the selected test limit but not shown on other OTDR screens, such as segment attenuation coefficients, optical return loss, and reflectance. Use the softkeys on the **OTDR DETAILS** screens to switch between overall results details and event details. See "OTDR Details Screens" on page 3-37 or press HELP for information about OTDR details.
F2 **Sort Field** softkey	See "Sorting Events" on page 3-36 for details.

Event Types

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

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

Table 3-4. Event Types

Event	Possible Causes and Solutions
REFLECTION A pulse of light reflected back to the OTDR.	Caused by a connector, tight bend, or crack in the fiber. Small reflective events may actually be ghosts. 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.
OTDR PORT The tester's OTDR connector.	The tester identifies the OTDR port connection and grades its quality, as shown on the **OTDR DETAILS** screen. See "OTDR Connection Quality" on page 3-13.
LAUNCH EVENT The end of the launch fiber. **RECEIVE EVENT** The beginning of the receive fiber.	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 3-4 for more information.

Table 3-4. Event Types (cont.)

Event	Possible Causes and Solutions
HIDDEN The event is within the attenuation deadzone of the previous event.	The event is detected, but not enough information is available to measure its loss separately from the previous event. Since the hidden event's loss can't be determined, it is included with the loss of the previous event. This loss is displayed as "NA". The hidden event may be a connection, a sharp bend, or a crack within the deadzone of the previous connection. If the event is not a connection, inspect the fiber near the event's location. Use a visual fault locator to reveal faults. Also see **N/A** in Table 3-3.
GHOST The event is a duplicate reflection caused by light bouncing back and forth between connectors.	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. 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. If the ghost source is a hidden event, the tester may not identify a ghost event as a ghost.

-continued-

Table 3-4. Event Types (cont.)

Event	Possible Causes and Solutions
GHOST SOURCE A reflective event that is causing a ghost.	**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. 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. 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. 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 Figure 3-7 on page 3-14 or the online help for examples of tailing.)
LOSS A point where the level of reflected light suddenly decreases.	Caused by a splice, bend, or a low-reflectance connection , such as an angled physical contact (APC) connection. If the loss event is not caused by a splice or APC connection, inspect the cable for tight bends. Use a visual fault locator to verify the fault.

Table 3-4. Event Types (cont.)

Event	Possible Causes and Solutions
GAINER An apparent gain in the strength of the returned signal.	Caused by a splice between two fibers with different backscatter coefficients, numerical apertures, core diameters, or mode field diameters. 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. **Tips:** If you test the fiber from the other end, the gainer event will show a loss. Adding this loss to the event's gain gives the true loss of the event. If you do a bi-directional test, then upload the results to LinkWare software, you can use the bi-directional averaging utility in LinkWare to calculate the true loss of gainers. Gainers at launch events can occur when the launch fiber does not have the same properties as the fiber you are testing. In this situation, you can get more reliable results if you do a bi-directional test and calculate the true loss as described above. Use a receive fiber that has the same properties as the launch fiber and use Launch + Receive compensation.
OUT OF RANGE The tester did not find an end event.	This can occur in Manual mode when the selected range is too short. 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. For Manual mode, select a higher range on the OTDR tab in Setup. 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.

-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.

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.

OTDR DETAILS Screens

The **OTDR DETAILS** screens show additional OTDR test information and measurements, some of which is described below. Press HELP from the **OTDR DETAILS** screen for more information on these screens.

Warning Messages

Warnings occur when a value could not be reliably determined. These values are usually preceded by a "<" or ">" (less than or greater than) symbol. This may occur if the fiber is too long, the signal is weak, events are too close together to distinguish measurements, or a measurement is beyond the tester's range.

Attenuation Coefficient

The attenuation per kilometer for the entire length of the cabling. This value may not be shown if it could not be measured accurately.

ORL (Optical Return Loss)

The difference between the power of the OTDR's test pulse and the power of the light reflected back to the OTDR from the fiber, connectors, splices, and faults along the fiber. Larger ORL values mean less light is reflected back, which corresponds to better fiber performance. For example, a fiber with an ORL of 40 dB reflects less light back to a source than a fiber with an ORL of 32 dB.

Segment Attenuation Coefficient

The attenuation per kilometer for the fiber segment before the event. This value may not be shown if it could not be measured accurately. This can occur on short segments or if the connector before the segment has excessive tailing.

Reflectance

The difference between the power of the OTDR's test pulse and the power of the light reflected back to the OTDR from an event. A smaller (more negative) reflectance value means less light is reflected back. For example, a good connection may have a reflectance of -45 dB. A dirty connection that reflects more light back to the OTDR may have a reflectance of -20 dB.

Reflectances that exceed the tester's measurement range are marked with ">" (greater than). If any reflection is marked with ">", ORL is marked with "<" (less than).

Reflectances from hidden events may be marked with "<" because the tester cannot measure the backscatter before the event.

Reflectance measurements are affected by the backscatter value entered on the **Cable** tab in Setup.

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.

Note

You can do bi-directional averaging in LinkWare software. See the LinkWare online help for details.

Comparing OTDR Traces

The trace overlay function lets you see two OTDR traces at the same time. This lets you do the following:

- Compare a link's current trace with a past trace to see if the link has changed.
- Compare traces from links in the same run to check for differences.

To compare two traces, do the following:

1 Run an OTDR test; then press F1 **View Trace**.

or

View an OTDR trace from a saved record.

This trace is the **Comparison Trace**.

2 Press FUNCTIONS. This brings up the **OTDR FUNCTIONS** menu (Figure 3-15).

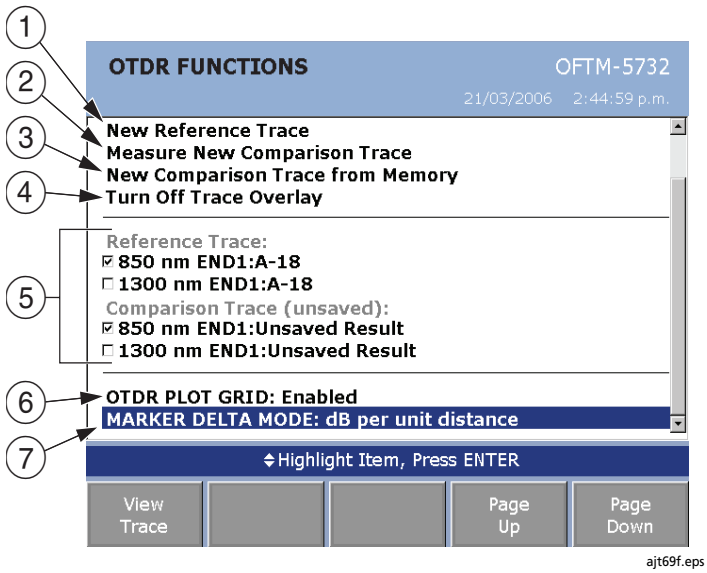
3 Select **New Reference Trace**.

4 On the **VIEW RECORDS** screen, select a record. Only records with OTDR traces are shown.

The test's trace becomes the **Reference Trace** on the **OTDR FUNCTIONS** menu.

5 Press EXIT.

The reference trace stays on the plot until you turn off the trace overlay function.



① **New Reference Trace**: Turns on the trace overlay function. Lets you select a new reference trace from memory.

② **Measure New Comparison Trace**: Runs the OTDR test to get a new trace to compare to the reference trace.

③ **New Comparison Trace from Memory**: Lets you select a new trace from memory to compare to the reference trace.

④ **Turn Off Trace Overlay**: Removes the reference trace from the OTDR plot.

⑤ **Reference Trace/Comparison Trace**: The traces and wavelengths currently selected for the trace overlay function. To select or deselect a wavelength, highlight a trace name; then press ENTER.

⑥ **OTDR PLOT GRID**: Turns the OTDR plot grid on and off.

⑦ **MARKER DELTA MODE**: Sets the mode for the measurement cursors on the OTDR plot:

- **Δ distance Δ dB**: The cursor readout shows the difference in the power levels (in decibels) between the cursors.
- **dB per unit distance**: The cursor readout shows the power loss (in decibels) that would occur over 1 km or 1 kft of cable based on the loss between the cursors.

Figure 3-15. OTDR Functions Menu

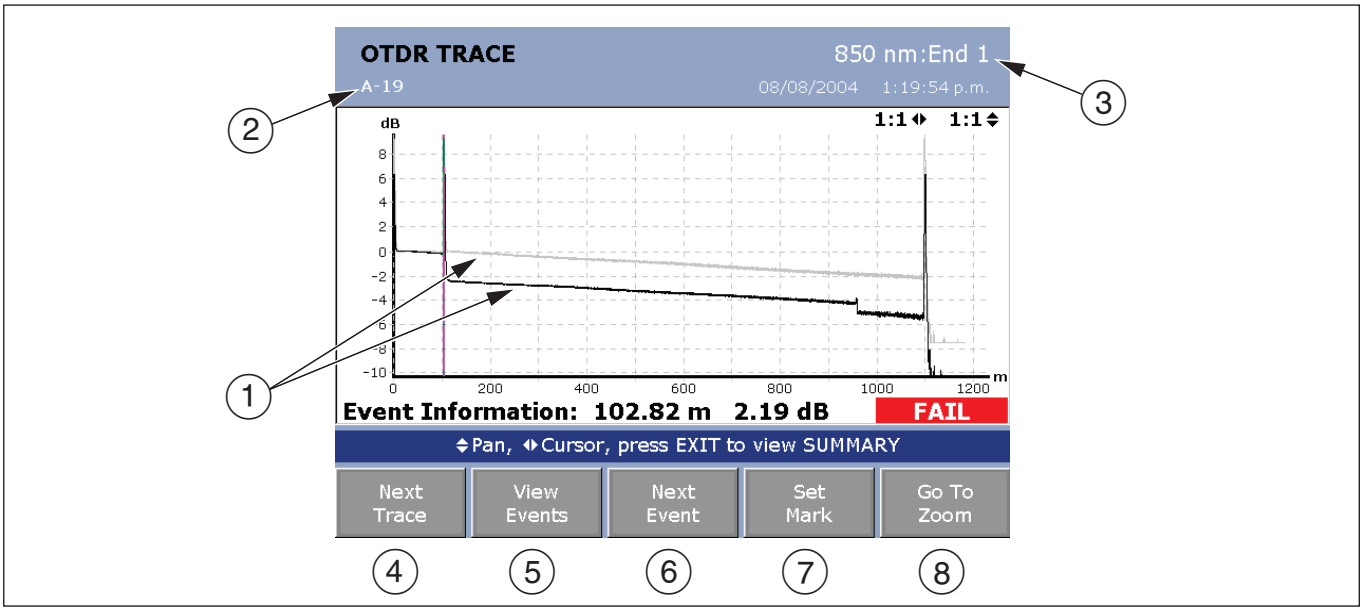


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Figure 3-16. Comparing OTDR Traces

1. The traces being compared. The reference trace is first shown in gray behind the comparison trace.
2. The trace shown in black in the foreground. To switch the positions of the traces, press F1 **Next Trace**.
3. The wavelength and **End** setting for the foreground trace.

   To switch between wavelengths for either trace, press FUNCTIONS; then select a wavelength for a trace.
4. Switches the foreground and background traces.
5. Displays the event table.
6. Moves the cursor to the next event on the trace. If you use ◀ to move the cursor, F3 changes to **Previous Event** and moves the cursor to the previous event.
7. Sets and clears the measurement cursor. See "Using the Measurement Cursor" on page 3-26.
8. Changes the softkey and arrow key functions. The navigational cue above the softkey labels indicates the arrow key functions:

   ▲▼Pan, ◀▶Cursor: Use ◀▶ to move the cursor on the trace. Use ▼▲ to move both traces up and down if the vertical zoom is greater than 1:1.

   Zoom: Use ◀▶ and ▼▲ to magnify both traces vertically and horizontally.

   Move Trace: Use ◀▶ and ▼▲ to move the foreground trace vertically and horizontally.
   Use F3 **Next Event/Previous Event** to align the foreground trace with events on the background trace.

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.

For OFTM-56xxB modules with the dual wavelength setting selected on the OTDR tab, real time trace runs at 850 nm for multimode and 1310 nm for singlemode.

For OFTM-57xx modules with dual wavelength selected, the tester uses the wavelength that produces the higher dynamic range for the fiber length.

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 F2 **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 F2 again returns the trace to **Auto Length** mode.

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 run the real time trace test by pressing TEST, use F1 **Change Test** on the **HOME** screen to set the test mode to **Real Time Trace**.

4 During the test, you may do the following:

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

To magnify the trace or use the measurement cursors, press EXIT; then use the softkeys and arrow keys to zoom or set the cursors.

5 To save the results, press SAVE, select or create a fiber ID; then press SAVE again.

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**.

Tip: To see the settings used for an OTDR test, press F3 **View Details** on the OTDR **SUMMARY** screen; then press F1 **OTDR Settings**. The settings used may be slightly different from the nominal values selected on the OTDR tab.

Table 3-5. Manual OTDR Settings

Setting	Description and Selection Guidelines
RANGE*	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. **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.

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

Setting	Description and Selection Guidelines
RESOLUTION (OFTM-561xB modules)	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. **Minimum Resolution for Each Range** • 400 m: 3 cm • 1 km: 6 cm • 2 km: 12 cm • 4 km: 25 cm • 8 km: 50 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.
* "Resolution" is called "data spacing" in Telcordia standards and "sample spacing" in other documents.	

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

Setting	Description and Selection Guidelines
AVERAGING TIME (OFTM-573x modules)	The averaging time sets the number of measurements averaged together to create the final trace. Longer times reduce noise on the trace which increases dynamic range and accuracy and reveals more details, such as smaller non-reflective events. Shorter times decrease test time, but produce a noisier trace with less dynamic range and decreased visibility of events. **Auto**: Adjusts the test parameters for a typical test time of 15 seconds per wavelength. This setting is used for **Auto OTDR** mode and is the default for **Manual OTDR** mode. **Auto Test Time**: Adjusts the test parameters for a typical test time of 5 seconds per wavelength. This setting speeds up testing but provides less accuracy and increased deadzones. **Auto Deadzone**: Adjusts the test parameters to minimize deadzones, which reveals more detail in and around reflective events. This usually takes longer than testing with **Auto** or **Auto Test Time** selected. Testing with **Auto**, **Auto Test Time**, or **Auto Deadzone** selected can take up to 3 minutes per wavelength, depending on the fiber's characteristics. Manual time selections: Lets you set the test time to 15 seconds, 30 seconds, 1 minute, or 3 minutes per wavelength. The tester adjusts the test parameters to meet the selected time.

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

Setting	Description and Selection Guidelines
PULSE WIDTH	The pulse width determines the deadzones of the trace and affects dynamic range. 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. With narrower pulses, you may not be able to distinguish small loss events from the noise on the trace. The narrowest pulses are not suitable for measuring loss, since linearity is not guaranteed (except on OFTM-57xx modules). The backscatter level may be so low that it does not appear on the trace. Wider pulses raise the backscatter level, which provides a better signal-to-noise ratio around non-reflective events. This helps you see smaller loss events and measure their loss more accurately, but increases the deadzones of events. **Auto**: The tester selects the narrowest pulse that still reveals loss events.

-continued-

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

Setting	Description and Selection Guidelines
LOSS THRESHOLD (OFTM-573x modules)	Lets you set the threshold (in decibels) for reporting loss events. Events at or above the threshold are included in the event table. The range for this setting is 0.01 dB to 1.50 dB inclusive. For smaller threshold values (0.01 dB to 0.3 dB), the tester reduces noise on the trace by taking more measurements for averaging or by using wider pulse widths. Therefore, smaller values may increase test times or deadzones on the trace. **Auto** sets the threshold to the default value of 0.1 dB. To set the threshold to **Auto**, press F1 **Set to Auto** on the **SET LOSS THRESHOLD** screen. *Note* *Setting a loss threshold does not guarantee that all events at or above the threshold will be found. The fiber's characteristics or using a manual **AVERAGING TIME** or **PULSE WIDTH** may also limit which events are found.* *If the loss threshold is set to less than 0.1 dB, the tester may find many false events due to inherent imperfections in the fiber.*

Diagnosing OTDR Test Failures

Tables 3-6 and 3-7 describes some typical causes of OTDR test failures.

See also the table in Appendix C, which shows results from a survey on common causes of fiber link 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 3-6. Diagnosing OTDR Test Failures

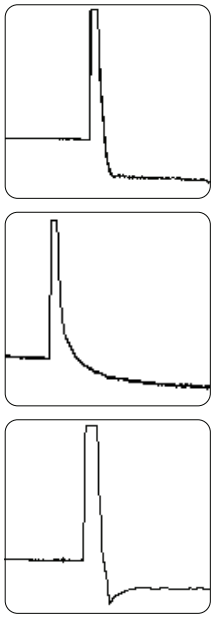
OVERALL LOSS fails • There is one or more dirty or damaged connections in the cabling. Check the OTDR trace or event table for high-loss reflective events. • The wrong fiber type is selected on the OTDR tab in Setup. • A patch cord, launch fiber, or fiber segment has the wrong core size, backscatter 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. *Note* ***OVERALL LOSS** may show a **WARNING** if the first or last event is hidden.*

-continued-

Table 3-6. Diagnosing OTDR Test Failures (cont.)

LARGEST EVENT fails • 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. • The fiber is broken or there is an open connection where the trace shows the fiber end. • 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, F3 **View Details** from the **EVENT TABLE** or the **OTDR SUMMARY** screen.

Table 3-7. 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 3-7. Diagnosing Faults on OTDR Traces (cont.)

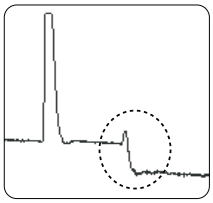
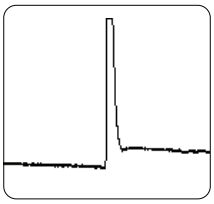
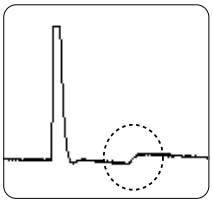
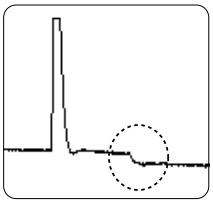
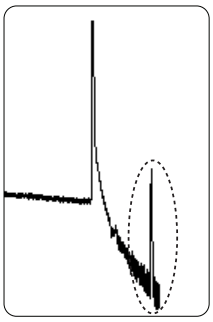
	**Small reflective event with high loss. May be identified as an end event though it occurs before the end of the cabling.** May be caused by very sharp bend, a crack, or a mechanical splice with high loss. If the event is a bend, it may show higher loss at a longer wavelength. Use a visual fault locator to verify the problem. Bad mechanical splices should be reworked.
	**Large reflective event with gain (a "gainer").** 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.

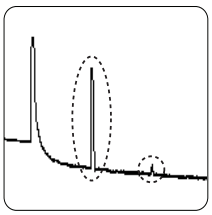
Table 3-7. Diagnosing Faults on OTDR Traces (cont.)

	**Small gain event (a "gainer").** 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.
	**Small loss event.** Bad fusion splice, a splice between mismatched fibers, a bend, or a low-reflectance connection, such as an angled physical contact (APC) connection. 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.

-continued-

Table 3-7. 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.

Note

Since the ChannelMap function identifies only reflections, it is not appropriate for finding fusion splices or angled physical contact (APC) connectors.

Running the Test

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

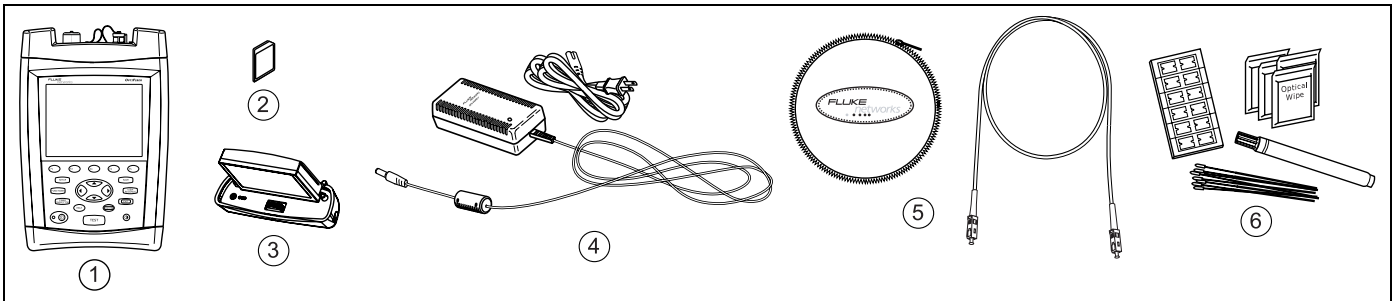
1. Select ChannelMap mode: On the **HOME** screen, press F1 **Change Test**; then select **ChannelMap.**
2. Select a fiber type on the **Cable** tab in Setup. You do not need to select a test limit for ChannelMap tests.
3. Enter names for the ends of the channel to be mapped: Press SETUP; then select 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 the connectors on the launch fiber or patch cord and the channel to be tested.

-continued-

6 Connect the launch fiber to the OTDR port and the channel to be mapped, as shown in Figure 4-2.

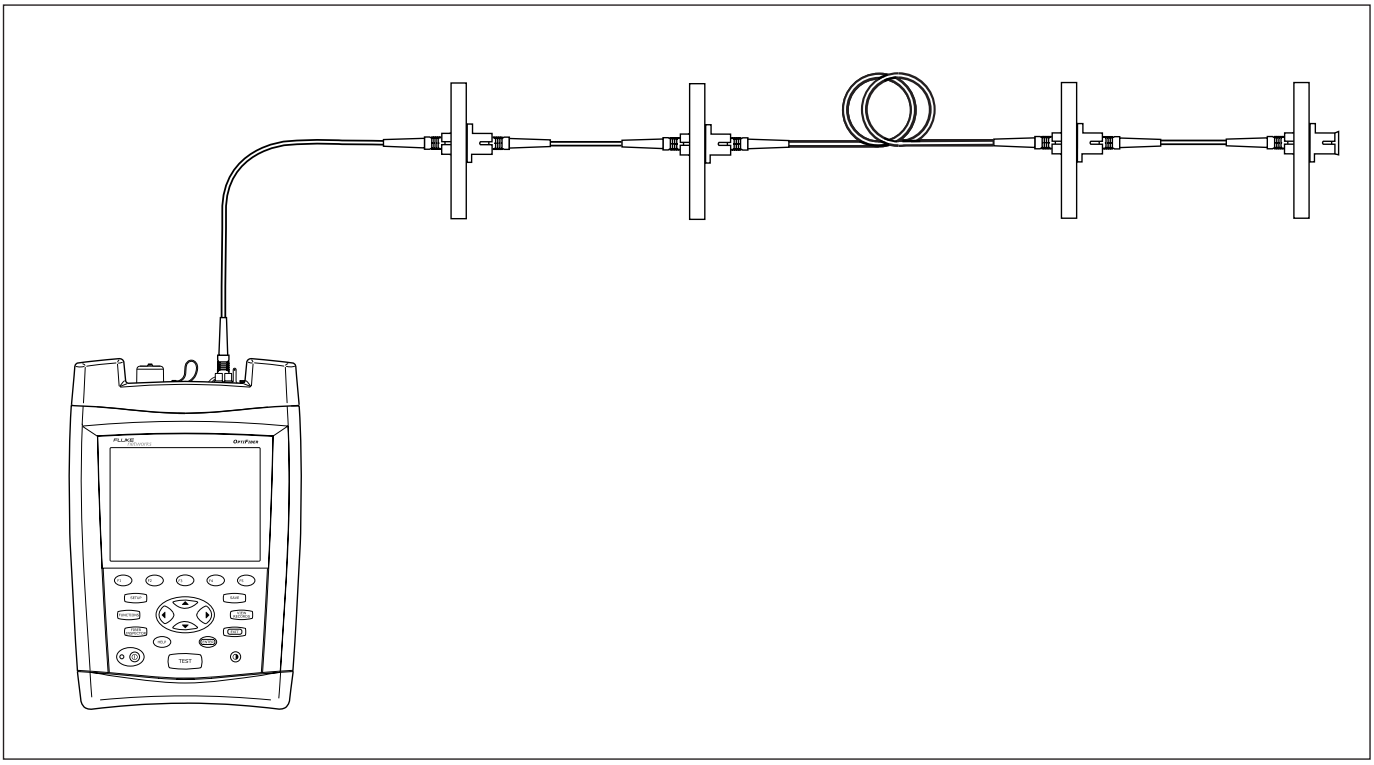
7 Press TEST.

8 To save the results, press SAVE, select or create a fiber ID; then press SAVE again.



1. Tester with OTDR module
2. Memory card (optional)
3. Spare battery pack (optional)
4. AC adapter with line cord (optional)
5. Launch fiber or patch cord. Match fiber to be tested. Match cable connectors at one end. SC at the other end.
6. Fiber cleaning supplies

Figure 4-1. Equipment for ChannelMap Tests

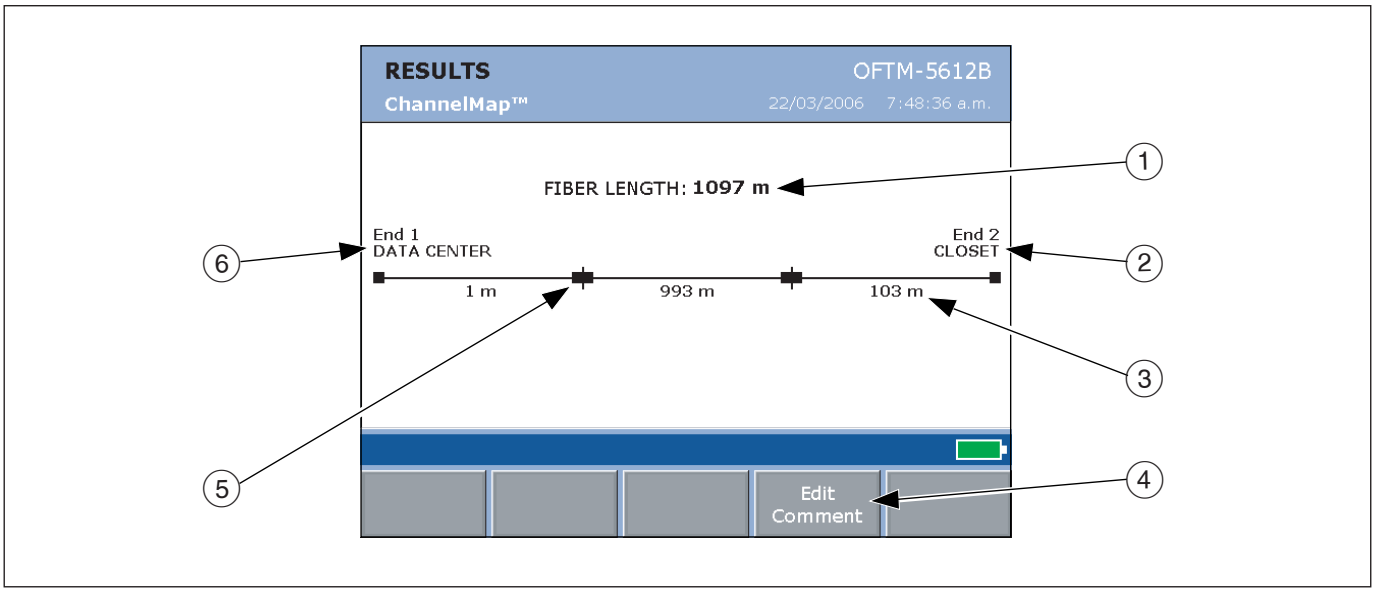


ajt55f.eps

Figure 4-2. ChannelMap Test Connections

ChannelMap Diagram Features

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



ajt25f.eps

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.

Chapter 5
Using the FaultMap Function

The FaultMap™ function is a troubleshooting tool that shows you connections that might have problems. This function uses event reflectance as the criteria for identifying connections that might be bad. It 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.

Note

The FaultMap function uses a reflectance threshold of approximately -35 dB for identifying connections that might have problems. (More negative values mean less reflectance and a better connection. For example, a connector with a reflectance of -40 dB is better than one with -35 dB.)

Since the FaultMap function identifies only reflections, it is not appropriate for finding bad fusion splices or bad angled physical contact (APC) connectors.

Running the Test

Figure 5-1 shows the equipment required for FaultMap tests.

1 Select FaultMap mode: On the **HOME** screen, press F1 **Change Test**; then select **FaultMap.**

2 Select a fiber type on the **Cable** tab in Setup. You do not need to select a test limit for FaultMap tests.

3 Clean the connectors on the launch fiber or patch cord and the channel to be tested.

4 Connect the launch fiber to the OTDR port and the channel to be tested, as shown in Figure 5-2.

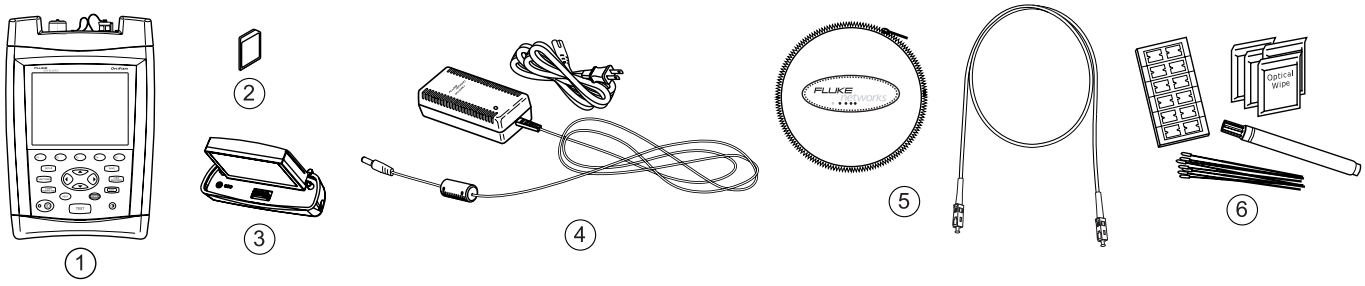
Optional: To evaluate the far-end connector, connect a launch fiber or patch cord to the far end of the link.

-continued-

5 Press TEST. Figure 5-3 describes the features of the FaultMap diagram.

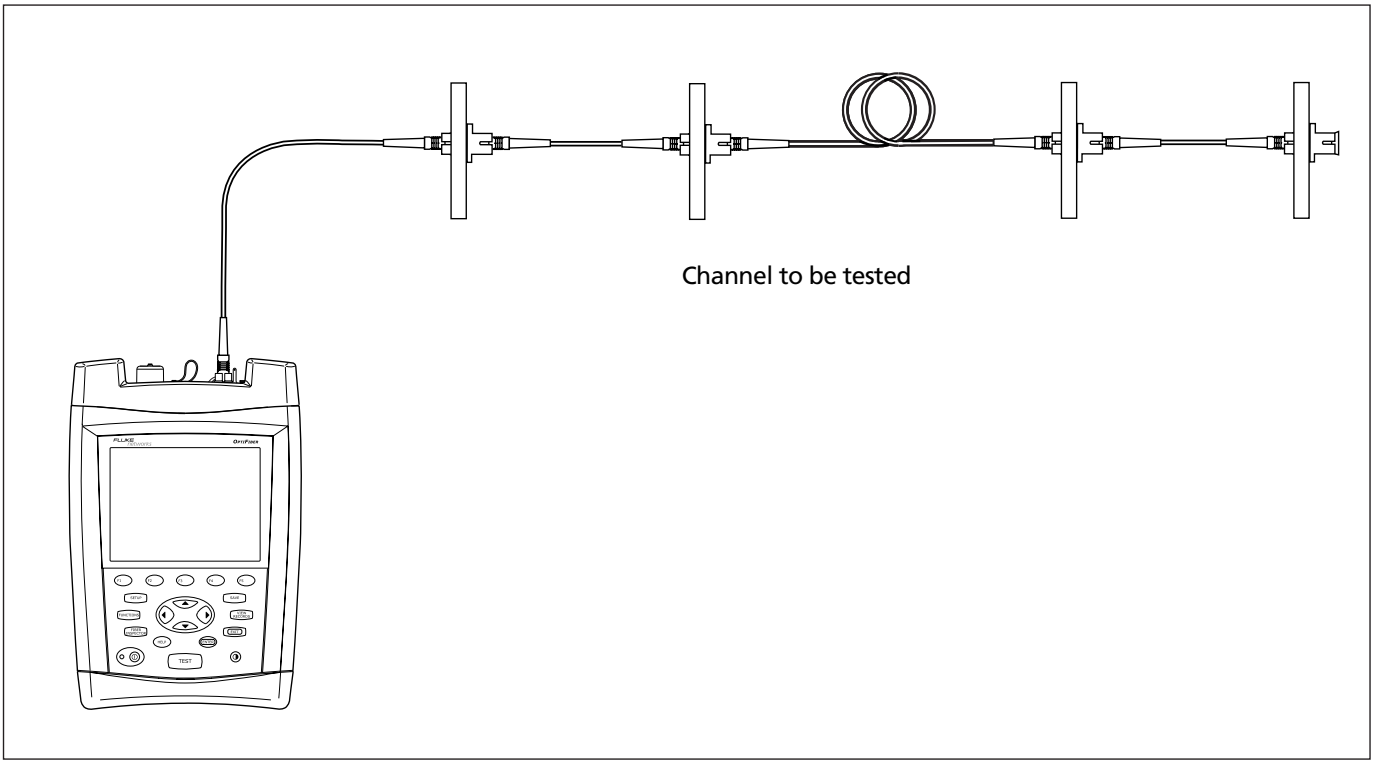
Note

You cannot save FaultMap tests.



1. Tester with OTDR module
2. Memory card (optional)
3. Spare battery pack (optional)
4. AC adapter with line cord (optional)
5. Launch fiber or patch cord. Match fiber to be tested. Match cable connectors at one end. SC at the other end.
6. Fiber cleaning supplies

Figure 5-1. Equipment for FaultMap Tests

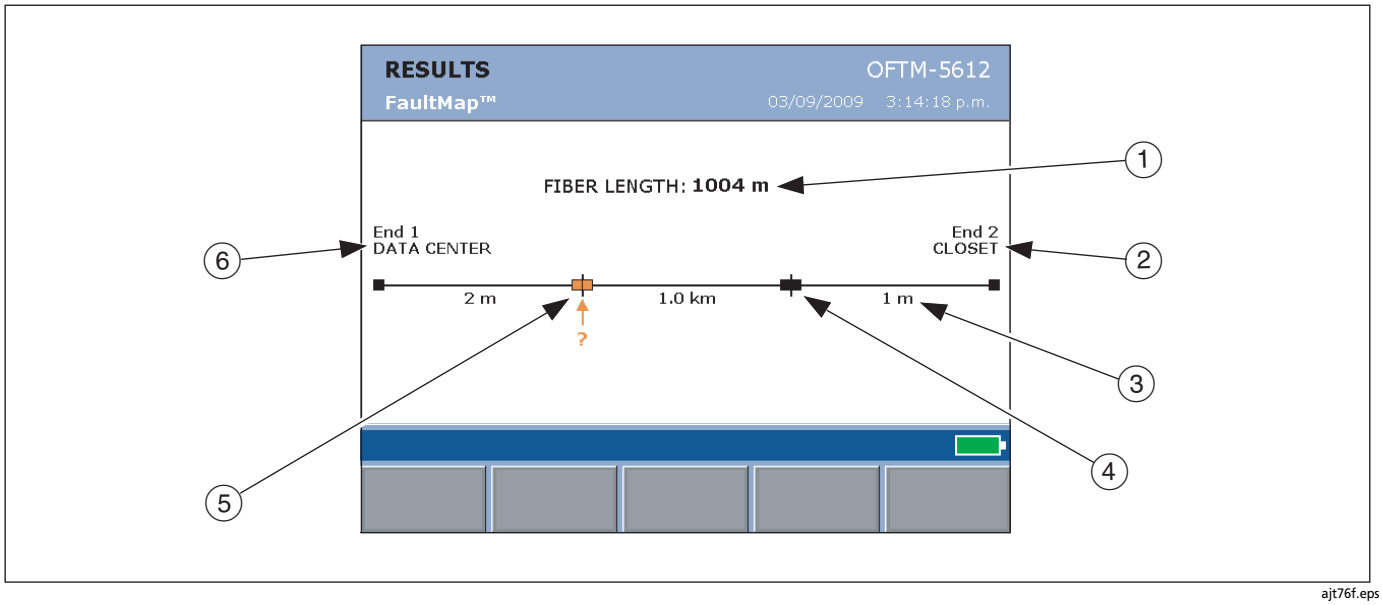


ajt55f.eps

Figure 5-2. FaultMap Test Connections

FaultMap Diagram Features

Figure 5-3 describes the features of a FaultMap diagram.



ajt76f.eps

Figure 5-3. FaultMap 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 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.

⑤ A connection that might have a problem. The connector might be dirty, poorly polished, scratched, cracked, misaligned, unseated, worn, or the wrong type.

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.

Chapter 6
Using the FiberInspector Option

The OFTM-5352 FiberInspector™ Video Probe connects to an OptiFiber fiber tester to let you inspect the ends of fiber optic connectors. The probe's 250X and 400X magnifications reveal dirt, scratches, and other defects that can cause poor performance or failures in fiber optic networks.

The 250X magnification shows dirt and other defects on the fiber endface and surrounding ferrule. The 400X magnification allows a more detailed inspection of the cladding and core.

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 a few minutes.

Using the Probe

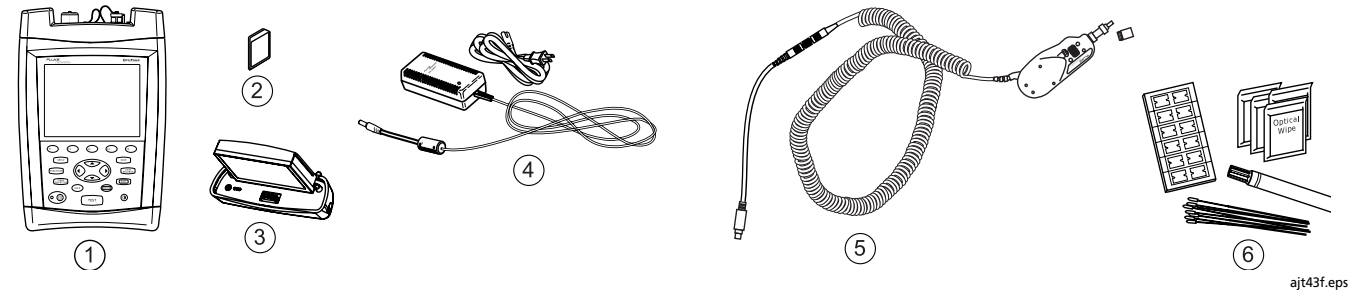
Figure 6-1 shows the equipment required for FiberInspector tests. Figure 6-2 shows how to use the probe.

1 Use the adapter cable provided to connect the probe to the video input jack on the side of the tester.

2 Screw an adapter tip that matches the connector type being inspected onto the fiber probe.

3 Clean the connector to be inspected.

4 Press FIBER INSPECTOR. If the message **"Camera Image Unavailable"** appears check the connections between the probe and the tester.



1. OptiFiber tester
2. Memory card (optional)
3. Spare battery pack (optional)
4. AC adapter with line cord (optional)
5. FiberInspector probe with adapter cable and appropriate adapter tip
6. Fiber cleaning supplies

Figure 6-1. Equipment for FiberInspector Tests

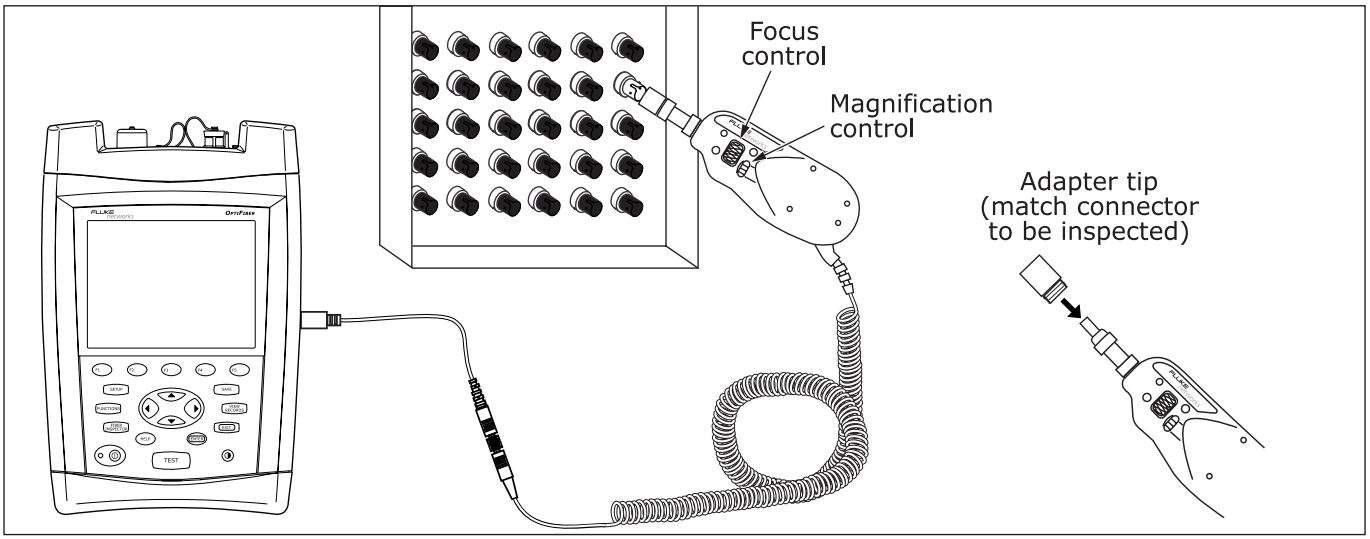
5 Place the probe on the fiber connector.

6 To focus the image, turn the larger ring on the probe. To change magnification, turn the smaller ring. Figure 6-3 describes the FiberInspector screen.

7 If you want to save the image or use the core size scale, verify that the **Magnification** shown on the screen matches the probe's setting. Press F2 **Camera** to change the magnification indicator.

8 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.



ajt57f.eps

Figure 6-2. Using the FiberInspector Probe

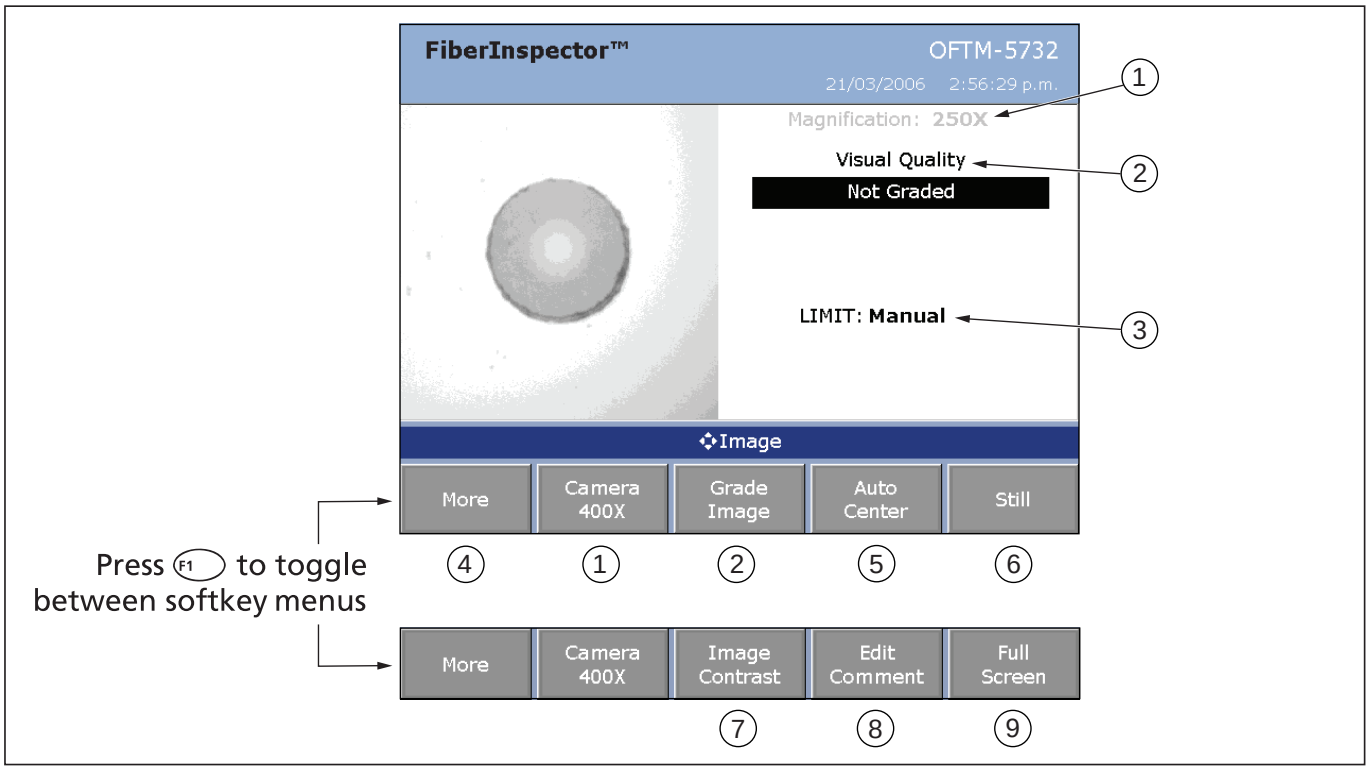
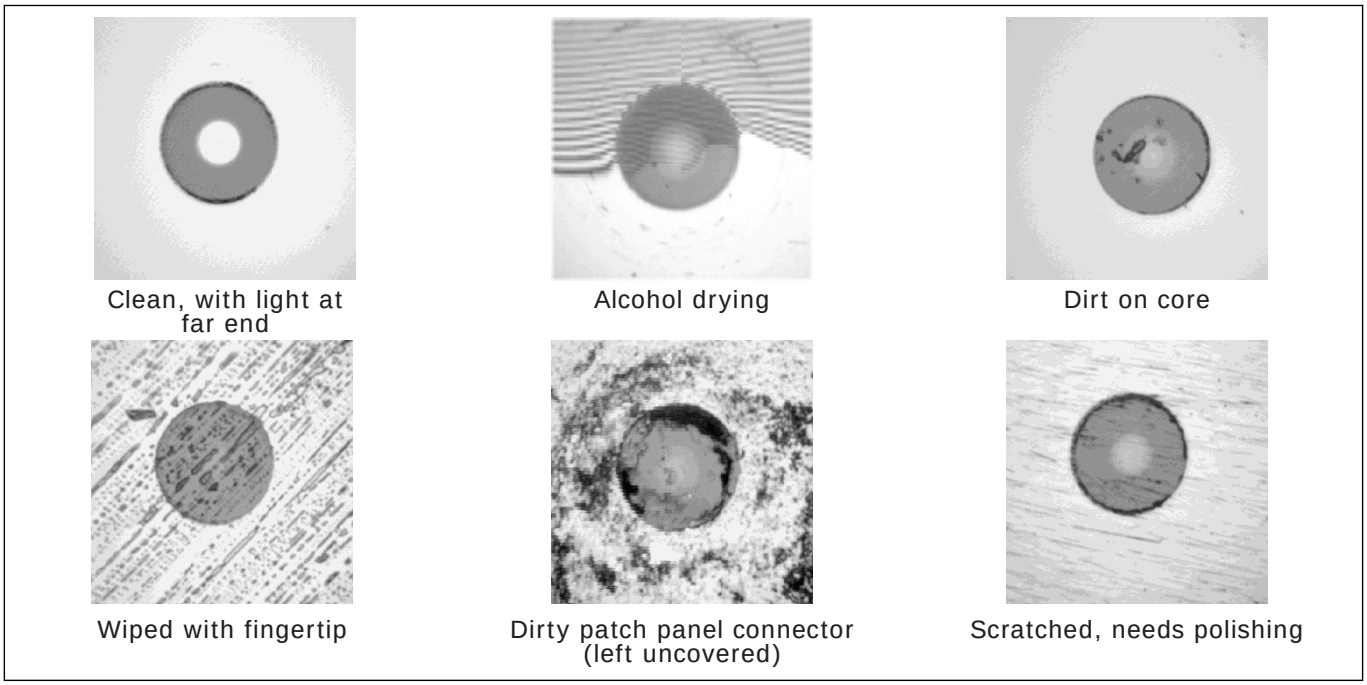


Figure 6-3. FiberInspector Screen

1. The magnification indicator. Press F2 **Camera** to set the magnification to match the FiberInspector probe's setting (250X or 400X). The setting determines the size of the scale used for measuring core sizes. The setting is also stored with saved images.
2. The **Visual Quality** result is stored with saved images. Press F3 **Grade Image** to assign a **PASS**, **FAIL**, or **Not Graded** result to the image.
3. The limit used to grade the image. Future software releases may include limits for automatically grading endface images. When the limit is **Manual**, press F3 **Grade Image** to manually assign a grade.
4. Press F1 **More** to toggle between the softkey sets.
5. Press F4 **Auto Center** to quickly center the image. You can also use the arrow keys to move the image.
6. Press F5 **Still** to conserve battery life by capturing the image and turning off the probe. In still mode you can also use the core size scale. See "Using the Core Scale" on page 5-7.
7. Press F3 **Image Contrast** to adjust the brightness and contrast of the image.
8. Press F4 **Edit Comment** to add a comment that will be stored with the saved image.
9. Press F5 **Full Screen** to use the entire screen for the endface image.

FiberInspector Image Examples

Figure 6-4 shows some examples of FiberInspector images.



ajt23f.eps

Figure 6-4. FiberInspector Image Examples

Getting a Good Image

Table 6-1 describes how to solve some common problems with FiberInspector images.

Table 6-1. Getting a Good FiberInspector Image

Problem	Solution
The image is indistinguishable or cannot be focused.	Press F5 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.	Press F2 **Camera** to set the magnification to match the FiberInspector probe's setting (250X or 400X), or turn the smaller ring on the probe to change magnification.
The image is just a black square.	Press F5 **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 Core Scale

Figure 6-5 shows the rings of the scale you can use on FiberInspector images to measure core and cladding sizes.

To use the scale, do the following:

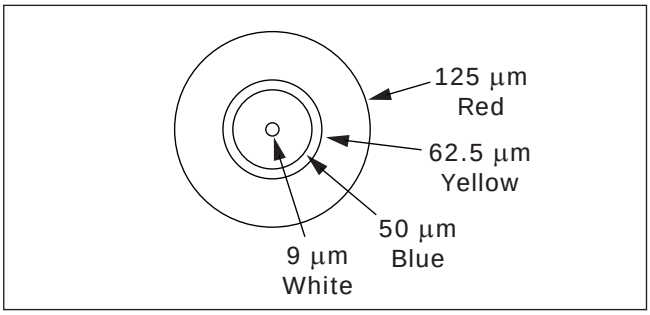
1 Verify that the correct magnification is shown on the FiberInspector screen. The magnification must match the setting on the FiberInspector probe. To change the magnification, press F2 **Camera**.

2 Center the image, press F5 **Still** to put the image in still mode; then press F2 **Show Scale**.

The scale defaults to the core and cladding rings for the **FIBER TYPE** selected on the **CABLE** tab in **SETUP**.

If the wrong **Core Size** and scale rings are shown, press F4 **Change Scale.**

3 Use the ✥ softkeys to center the scale over the image if necessary.



ajt24f.eps

Figure 6-5. FiberInspector Core Scale (all rings shown)

Chapter 7
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.

The loss/length option is available with OFTM-5612B and OFTM-5732 modules.

About Smart Remotes

You can use the following as the remote for loss/length testing and FindFiber tests in Smart Remote mode:

- A second OptiFiber tester with the loss/length option
- A Fluke Networks DTX Series CableAnalyzer™ smart remote with a multimode or singlemode fiber module. The DTX remote can also be used as a manually-controlled source for testing in Far End Source mode. You can buy a DTX smart remote separately for this purpose. See the Fluke Networks website or contact Fluke Networks for details.

Note

The OptiFiber tester must have software version 2.0 or later to work with a DTX-xFM2 smart remote. OptiFiber software updates are available on the Fluke Networks website.

Changing the Connector Adapter

You can change the module's input connector adapter (Figure 7-1) to connect to SC, ST, LC, and FC fiber connectors. Additional adapter styles may be available. Check the Fluke Networks web site for updates.

⚠Caution

- **Cover all connectors with protective caps when not in use.**
- **Store the extra connector adapters in the canisters provided.**
- **Do not touch the photodiode lens (see Figure 7-2).**
- **Do not overtighten the adapter or use tools to tighten the adapter.**

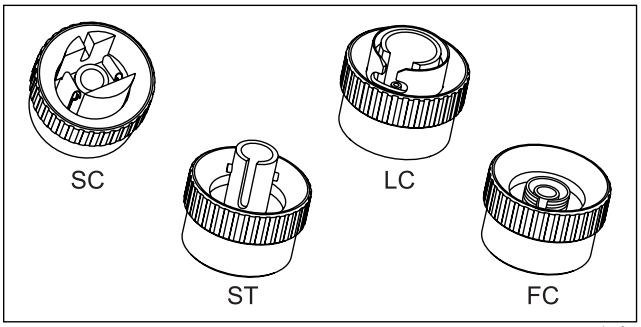


Figure 7-1. SC, ST, LC, and FC Connector Adapters

To install a connector adapter, refer to Figure 7-2 and do the following:

1. Locate the slot in the module connector and the key on the adapter ring.
2. Holding the adapter so it does not turn in the nut, align the adapter's key with the module connector's slot and slide the adapter onto the connector.
3. Screw the nut onto the module connector.

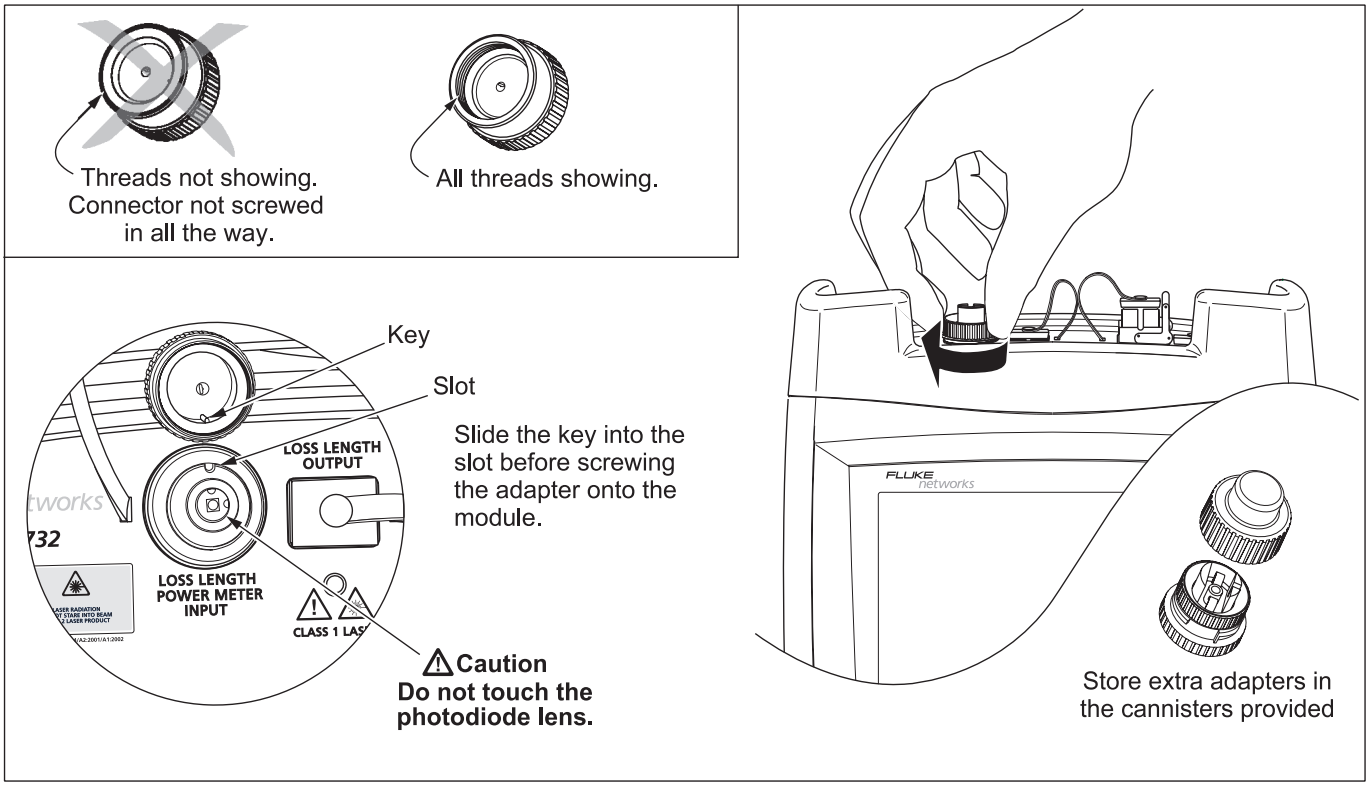


Figure 7-2. Changing the Connector Adapter

Cleaning the Loss/Length Connectors

Always clean and inspect fiber connectors before making connections.

Cleaning the Loss/Length OUTPUT Connector

1. Touch the tip of a fiber optic solvent pen or swab soaked in solvent to a lint-free dry wipe or fiber cleaning card.
2. Touch a new, dry swab to the solvent spot on the wipe or card.
3. Push the swab into the connector, twist it around 3 to 5 times against the end-face, then remove and dispose of the swab.
4. Dry the connector with a dry swab by twisting it around in the connector 3 to 5 times.
5. Inspect the connector regularly with a fiber microscope, such as the Fluke Networks FiberInspector Video Microscope.

Cleaning the Loss/Length and Power Meter INPUT Connector

1. Remove the connector adapter to expose the photodiode lens (see Figure 7-2).
2. Use the method described above for the loss/length OUTPUT connector to clean the lens.

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 7-1 summarizes the loss/length test settings. To access these settings, press SETUP.

Table 7-1. 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	**FIBER TYPE**	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.
Cable tab	**MANUAL CABLE SETTINGS** **n (index of refraction)**	When **MANUAL CABLE SETTINGS** is disabled, the n values depend on the selected fiber type. When **MANUAL CABLE SETTINGS** is enabled, the tester enters default values that you can change manually. 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. Increasing n decreases the reported length.
Loss/Length tab	**TEST LIMIT**	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 (*). See Chapter 9 for information on creating custom test limits. *Note* *Select a fiber type before selecting a test limit. The fiber type determines which test limits are available.*

Table 7-1. 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 reference test cords, patch cords, and cable spools. Use Far End Source mode with an optional, stand-alone source for testing individual fibers. For Smart Remote mode using an OptiFiber tester as the remote, set both units to **Smart Remote**.
	THIS UNIT*	For Smart Remote mode using an OptiFiber tester as the remote, 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 7-36 for details.

* For Smart Remote mode using an OptiFiber tester as the remote, only the **REMOTE END SETUP** and **THIS UNIT** settings need to be set on the remote tester.

Table 7-1. Loss/Length Test Settings (cont.)

SETUP Tab	Setting	Description
Loss/Length tab	**TEST METHOD**	Loss results include connections added after referencing. The reference and test connections determine which connections are included in results. The **Test Method** refers to the number of end connections included: **2 Jumper**: Loss results include one connection at one end of the link. **1 Jumper**: Loss results include connections at both ends of the link. The reference and test connections shown in this Chapter produce 1 jumper results. See "About 1 Jumper Connections" on page 7-10. **3 Jumper**: Loss results exclude connections at the ends of the link. Only the fiber loss is measured. Different standards have different names for the three test methods. See Appendix A for details. The **TEST METHOD** setting does not affect loss results. It is only saved with the results to record which method you used. This setting does affect the reference and test diagrams shown on the tester's display. The diagrams show connections for the method selected.
	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**.

-continued-

Table 7-1. Loss/Length Test Settings (cont.)

SETUP Tab	Setting	Description
Loss/Length tab	**NUMBER OF ADAPTERS** **NUMBER OF SPLICES**	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 7-3 shows an example of how to determine the **NUMBER OF ADAPTERS** setting. 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. For example, fiber backbone limits 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. These settings do not apply to Far End Source mode because the loss per km calculation requires a length measurement, and length is not measured in Far End Source mode. To see the limit's values, select **TEST LIMIT** on the **Loss/Length** tab; then press F1 **View Limit**.
Set from the **TEST SETUP** screen after setting a reference or press F2 **Test Setup** from the **Loss/Length HOME** screen	Reference test cord length (optional)	After you set a reference, you can enter the lengths of the reference test cords used. The lengths are saved with results to meet TSB-140 reporting requirements for fiber test results.
Set after pressing TEST.	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.

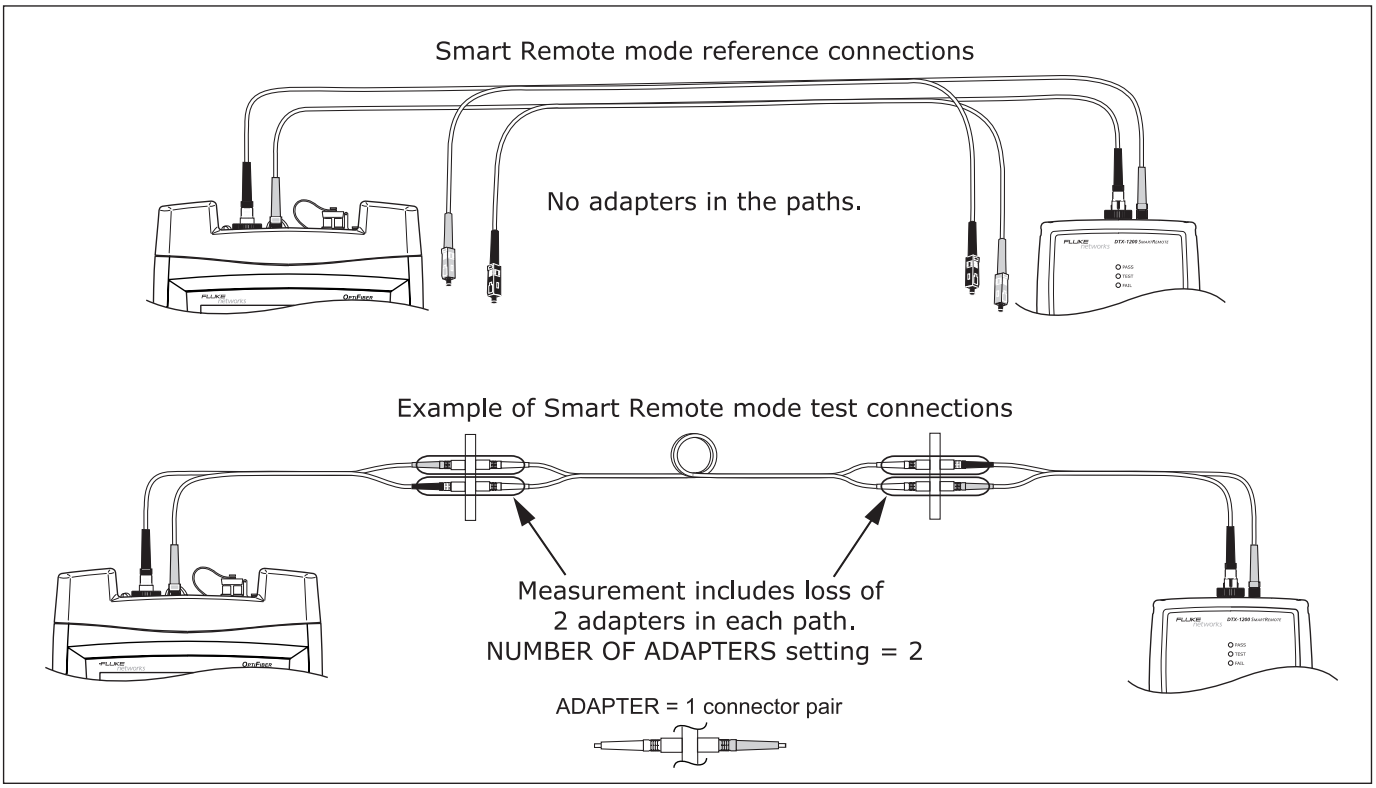


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Figure 7-3. Example of How to Determine the NUMBER OF ADAPTERS Setting

About 1 Jumper Connections

The reference and test connections shown in this manual produce 1 jumper results. 1 jumper results include the loss of the fiber plus the loss of the connections at both ends of the link. To ensure accurate results, the connection to the fiber module's output port must not be disconnected after the reference is set. Using connector adapters that match the connectors in the fiber under test lets you connect to the fiber without disturbing the output port connection.

⚠Caution

If you disconnect the reference test cords from the tester's or smart remote's output port after setting the reference, you must set the reference again to ensure valid measurements.

If you do not have the correct connector adapters, see "Modified 1 Jumper Method" in Appendix B for alternative connections that produce 1 jumper results.

To test links with different connectors at each end, visit the Fluke Networks Knowledge Base for suggestions.

About Setting the Reference

The reference serves as the baseline power level for loss measurements. Regular referencing helps account for minor variations in source power and connection integrity. Also, since the reference is the baseline for measurements, the losses of the reference test cords and adapters used during referencing are excluded from test results.

Note

Turn on the tester and smart remote and let them sit for 5 minutes before setting the reference. Allow additional time if the modules have been stored above or below room temperature.

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 7-6 through 7-13) 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 reference test 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 7-2 shows typical reference values.

Table 7-2. Typical Reference Values

	Smart Remote and Loopback Modes			Far End Source Mode*	
Module	**Minimum**	**Nominal**	**Maximum**	**Minimum**	**Maximum**
OFTM-5612B Multimode	-27 dBm	-20 dBm	-17.5 dBm	-28 dBm	-5 dBm
OFTM-5732 Singlemode	-10 dBm	-7 dBm	-4.5 dBm	-15 dBm	-3 dBm

* For Far End Source mode with OFTM-5xx1 and 5xx2 modules, values are determined by the source and should not exceed the maximum values. See the source's documentation for the source's values.

Using Mandrels for Testing Multimode Fiber

You should use mandrels when testing multimode fiber. Mandrels can improve measurement repeatability and consistency. They also allow the use of LED light sources to certify 50 µm and 62.5 µm fiber links for current and planned high bit-rate applications, such as Gigabit Ethernet and 10 Gigabit Ethernet.

The gray mandrels included with some OptiFiber models are compliant with TIA-568-C for 62.5 µm fiber with a 3 mm jacket. Mandrels for 50 µm fiber are available from Fluke Networks. Refer to the appropriate standard for mandrel requirements if you follow other standards.

Table 7-3 shows a partial list of mandrel requirements for TIA and ISO standards.

Figure 7-4 shows how to wrap the fiber around a mandrel. Place mandrels on the tester's output fibers, as shown in Figures 7-6 through 7-13.

In the reference and test connection diagrams shown on the tester, mandrels are indicated by a loop in the fiber.

Table 7-3. TIA-568-C.3 Mandrel Requirements

Fiber core size	Standard	Wraps Around Mandrel	Mandrel Diameter for 250 µm Buffered Fiber	Mandrel Diameter for 3 mm (0.12 in) Jacketed Cable
50 µm	TIA-568-C.3 7.1	5	25 mm (1.0 in)	22 mm (0.9 in)
62.5 µm	TIA-568-C.3 7.1	5	20 mm (0.8 in)	17 mm (0.7 in)

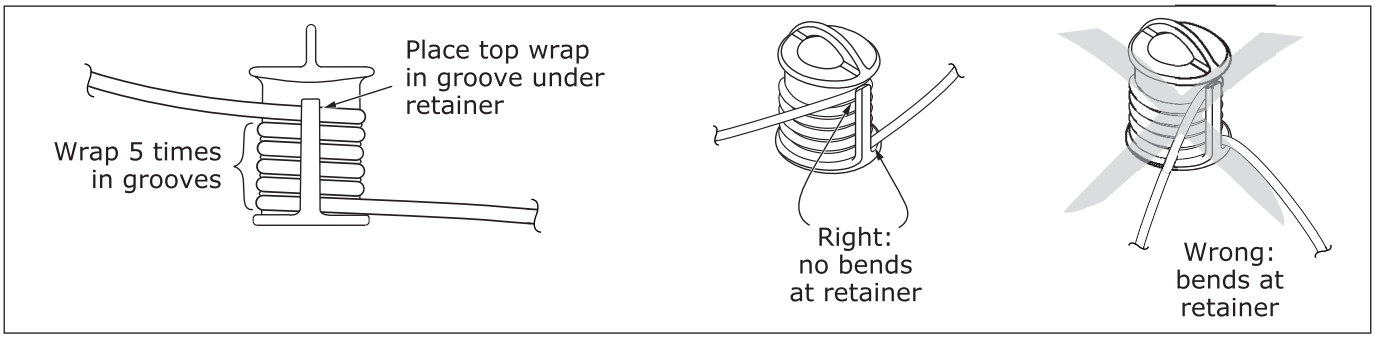
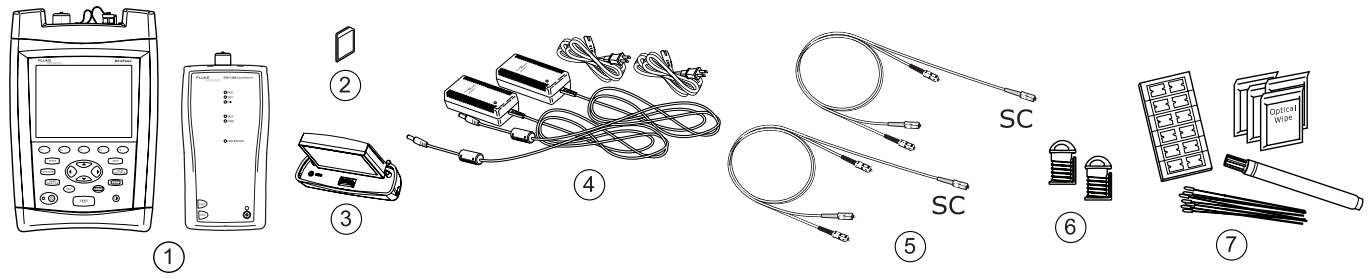


Figure 7-4. Wrapping a Reference Test Cord Around a Mandrel

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 7-5 shows the equipment required for loss/length testing in Smart Remote mode.



1. Tester with OFTM-5612B or OFTM-5732 module and smart remote (DTX remote shown). Match connector adapters to the connectors in the link.
2. Memory card (optional)
3. Spare battery pack (optional)
4. Two ac adapters with line cords (optional)
5. Two duplex reference test cords. Match the fiber to be tested. Connectors for the tester and remote outputs must be SC. For the others match the connectors in the link.
6. Two mandrels. Recommended when testing multimode fiber. See page 7-11.
7. Fiber cleaning supplies

Figure 7-5. Equipment for Testing in Smart Remote Mode

Setting the Reference in Smart Remote Mode

1 Turn on the tester and remote 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 **For an OptiFiber smart remote:** set the following on **Loss/Length** tab in Setup:

- Set **REMOTE END SETUP** to **Smart Remote**.
- Set **THIS UNIT** to **Remote.**

4 Clean the tester's and source's OUTPUT connectors and the reference test cord connectors.

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 7-6; then press ENTER.

7 **Optional:** From the **TEST SETUP** screen, you can enter reference test cord lengths to meet TSB-140 reporting requirements:

Use ◡ to highlight a reference test cord number, press ENTER; then enter a length. Press SAVE when you are done.

8 Press F3 **OK** to leave the **TEST SETUP** screen.

⚠ Caution

Do not disconnect the reference test cords from the tester's or remote's outputs after setting the reference. If you do, you must set the reference again to ensure valid measurements.

See "About Setting the Reference" on page 7-10 for more information about referencing.

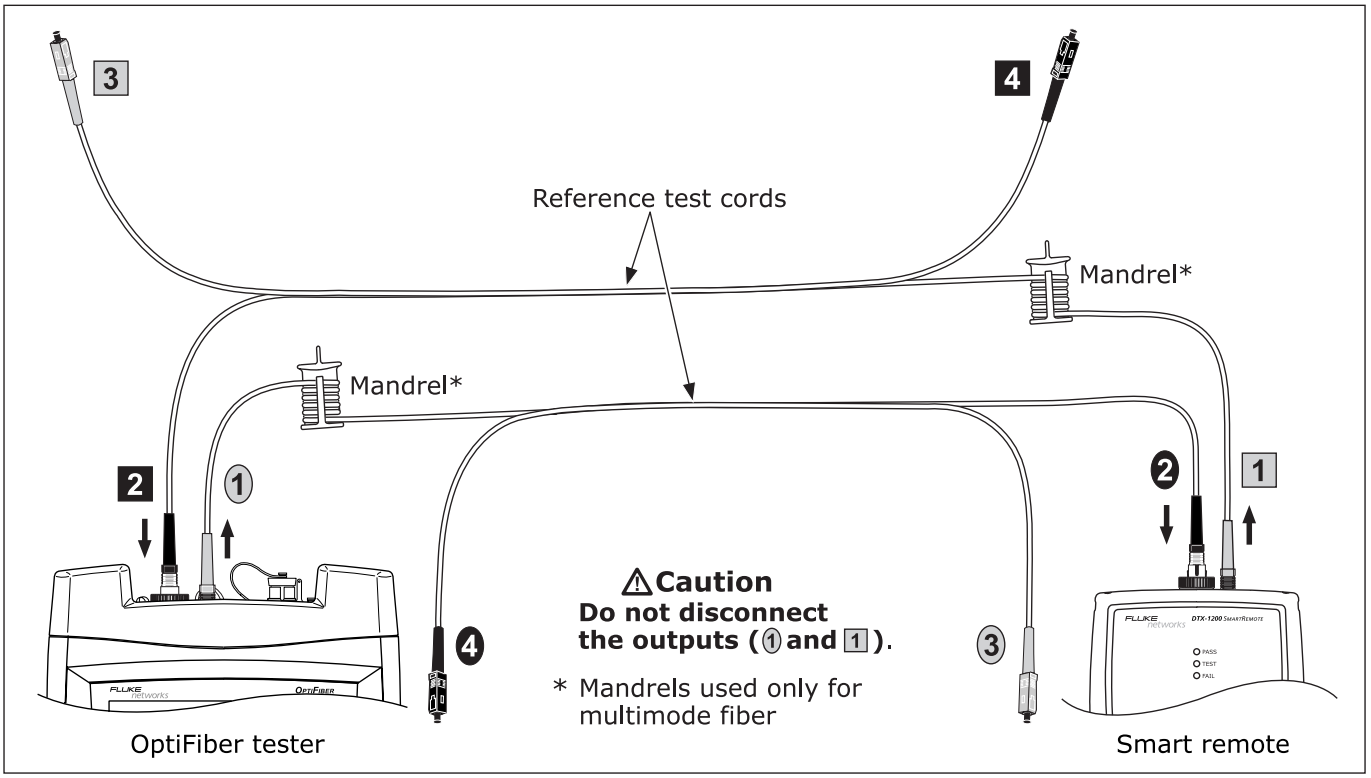


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Figure 7-6. Smart Remote Mode Reference Connections (1 Jumper Method)

Running the Test in Smart Remote Mode

⚠Caution

If you disconnected the reference test cords from the tester's or remote's output, you must set the reference again to ensure valid measurements.

1 Verify that the settings described in Table 7-1 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; then connect the tester to the cabling as shown in Figure 7-7.

For auto-incrementing fiber IDs, connect the fiber with the lower ID to the main tester's INPUT port. For auto-incrementing fiber IDs with bi-directional testing, connect the fiber with the lower ID to the main tester's OUTPUT port.

4 Press TEST to start the loss/length test.

5 If **Open** or **Unknown** appears as the status, try the following:

- Verify that all connections are good.
- For an OptiFiber smart remote verify that the remote tester is set to **Remote** on its **Loss/Length** tab in Setup.
- Verify that the remote tester is still active. For an OptiFiber smart remote you may need to press (F1) **Start** to reactive the tester.
- Try different connections to the cabling until the test continues. See "Using FindFiber in Smart Remote Mode" on page 7-39 for details on FindFiber messages.
- Use a visible light source to verify fiber continuity.

6 To save the results, press SAVE, select or create a fiber ID for the INPUT fiber; then press SAVE. Select or create a fiber ID for the OUTPUT fiber; then press SAVE again.

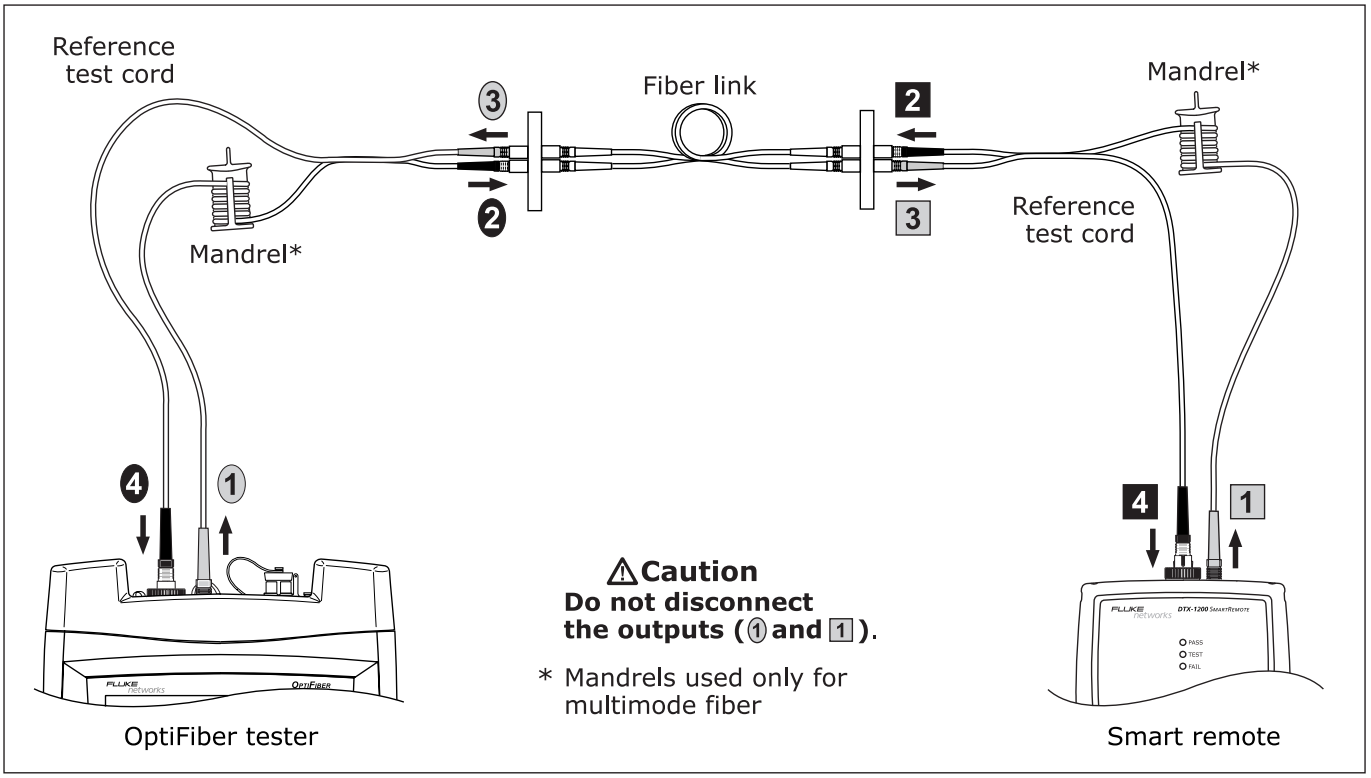


Figure 7-7. Smart Remote Mode Test Connections (1 Jumper Method)

Smart Remote Mode Test Results

The **SUMMARY** screen, which appears when the test is finished, is described in Table 7-4.

To see more detailed results, press F1 **View Results**. Table 7-5 describes the **RESULTS** screen.

Table 7-4. 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 7-5. Smart Remote Mode RESULTS Screen Features

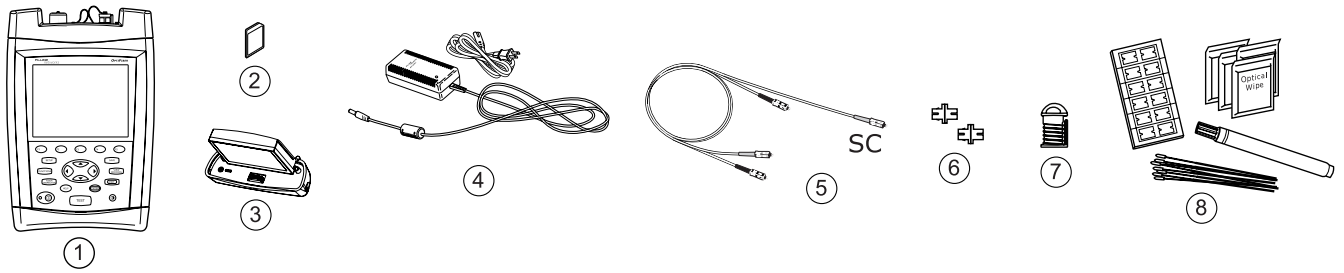
Item	Description
END 1-2 **END 2-1** **Output Fiber** **Input Fiber**	These refer to the direction of the test results. If **THIS END** on the main tester is set to **END 1**, **END 1-2** shows results for the main tester's output fiber; **END 2-1** shows results for the input fiber. The results are reversed if the main tester is set to **END 2**. Press F1 to switch between the results for each fiber. 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. **PASS:** The measurement in the column is within the limit. **FAIL:** The measurement in the column exceeds the limit.
RESULT	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 test 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 7-10 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 Loopback Mode

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

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

Figure 7-8 shows the equipment required for loss/length testing in Loopback mode.



1. Tester with OFTM-5612B or OFTM-5732 module. Match connector adapter to the connectors in the link.
2. Memory card (optional)
3. Spare battery pack (optional)
4. AC adapter with line cord (optional)
5. Duplex reference test cord. Match the fiber to be tested. Connector for the tester's output must be SC. For the others match the connectors in the link.
6. Two adapters of the appropriate type
7. Mandrel. Recommended when testing multimode fiber. See page 7-11.
8. Fiber cleaning supplies

Figure 7-8. Equipment for Testing in Loopback Mode

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 tester's OUTPUT connector and the reference test cord connectors.

4 Press FUNCTIONS; then select **Set Loss/Length Reference**.

5 Make the connections shown on the **SET REFERENCE** screen and in Figure 7-9; then press ENTER.

6 **Optional:** From the **TEST SETUP** screen, you can enter reference test cord lengths to meet TSB-140 reporting requirements:

Use ◡ to highlight a reference test cord number, press ENTER; then enter a length. Press SAVE when you are done.

7 Press F3 **OK** to leave the **TEST SETUP** screen.

⚠ Caution

Do not disconnect the reference test 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 7-10 for more information about referencing.

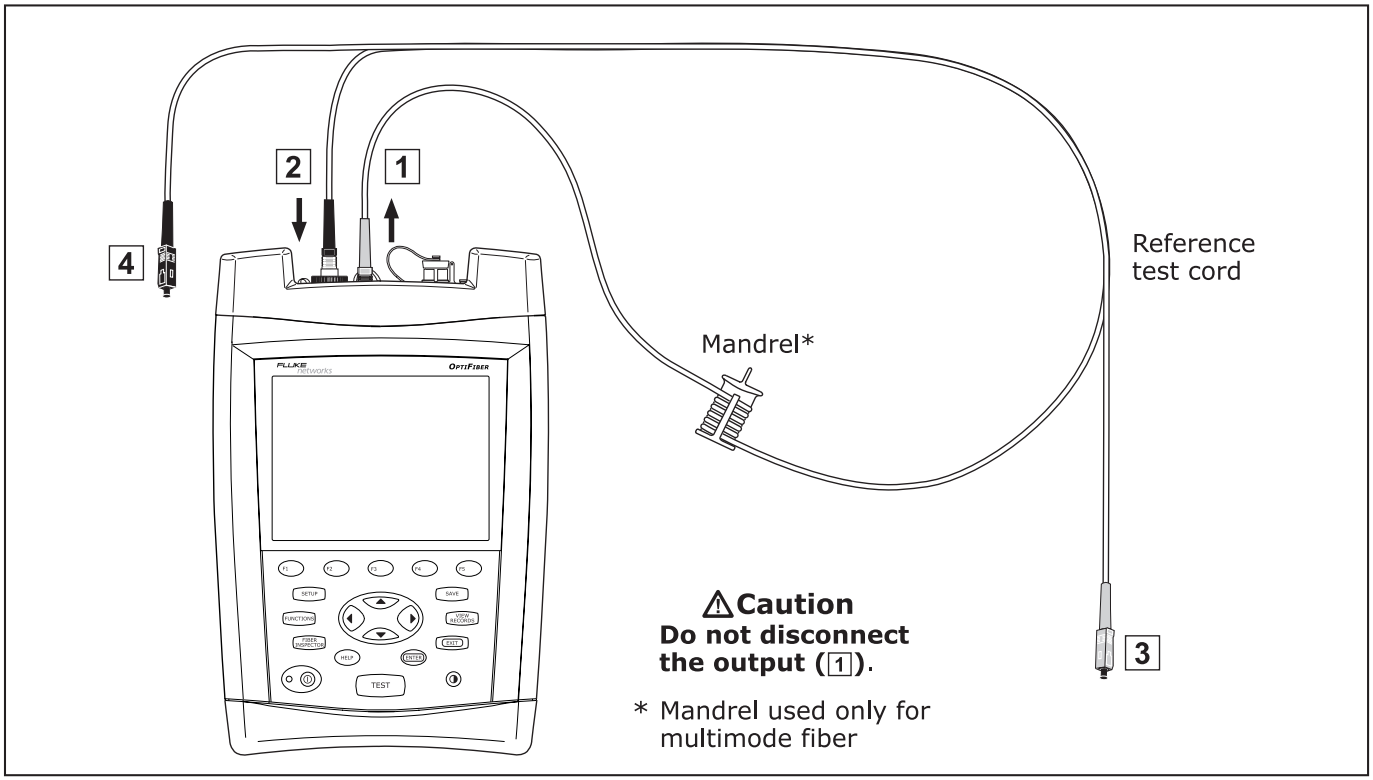


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Figure 7-9. Loopback Mode Reference Connections (1 Jumper Method)

Running the Test in Loopback Mode

⚠ Caution

If you disconnected the reference test cord from the tester's output, you must set the reference again to ensure valid measurements.

1. Verify that the settings described in Table 7-1 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 7-10.
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 7-6.

To see more detailed results, press F1 **View Results**. Table 7-7 describes the **RESULTS** screen.

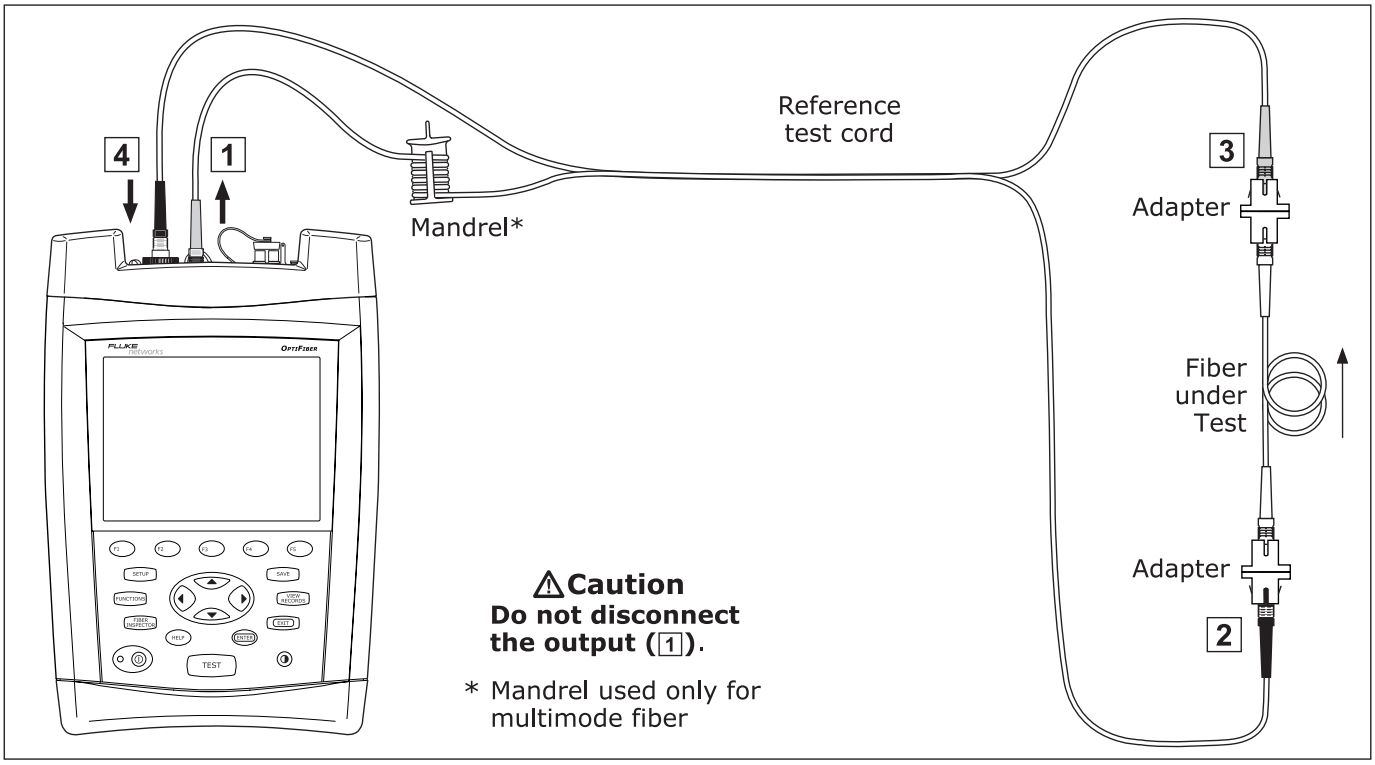


Figure 7-10. Loopback Mode Test Connections (1 Jumper Method)

Table 7-6. 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 F1 **View Results**.
PASS/FAIL	**PASS**: All measurements are within the limits. **FAIL**: One or more measurements exceeds the limits.

Table 7-7. Loopback Mode RESULTS Screen Features

Item	Description
END 1-2 **END 2-1**	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. 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. **PASS:** The measurement in the column is within the limit. **FAIL:** The measurement in the column exceeds the limit.
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 test 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 7-10 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

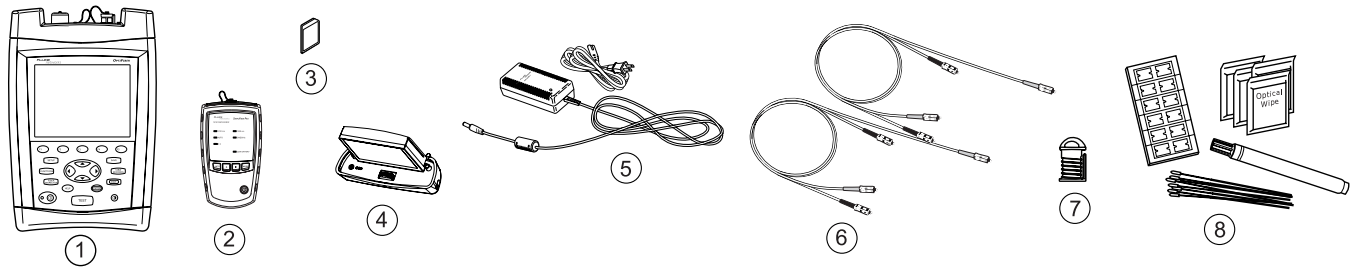
Use Far End Source mode to measure power or power loss at one wavelength on individual fibers. A Far End Source mode record can store dual-wavelength results from both directions.

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

Far End Source mode is available on OFTM-5611B, OFTM-5612B, OFTM-5731, and OFTM-5732 modules.

Required Equipment

Figure 7-11 shows the equipment required for measuring loss in Far End Source mode.



1. Tester with OFTM-5611B, OFTM-5612B, OFTM-5731 or OFTM-5732 module. Match the connector adapter to the connectors in the link.
2. Optical source (SimpliFiber source shown)
3. Memory card (optional)
4. Spare battery pack (optional)
5. AC adapter with line cord (optional)
6. Two reference test cords. Match the fiber to be tested. Match the tester, source, and link connectors as shown in Figures 7-12 and 7-13.
7. Mandrel. Recommended when testing multimode fiber. See page 7-11.
8. Fiber cleaning supplies

Figure 7-11. Equipment for Testing in Far End Source Mode

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 Clean the connectors on the source and the reference test cords.

4 Press FUNCTIONS; then select **Set Loss/Length Reference**.

5 Make the connections shown on the **SET REFERENCE** screen and in Figure 7-12.

6 Turn on the far end source and verify the output is set to the correct wavelength and is in continuous-wave mode.

7 Highlight a wavelength; then press ENTER.

8 **Optional:** From the **TEST SETUP** screen, you can enter reference test cord lengths to meet TSB-140 reporting requirements:

Use ◡ to highlight a reference test cord number, press ENTER; then enter a length. Press SAVE when you are done.

9 Press F3 **OK** to leave the **TEST SETUP** screen.

⚠ Caution

Do not disconnect the reference test 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 7-10 for more information about referencing.

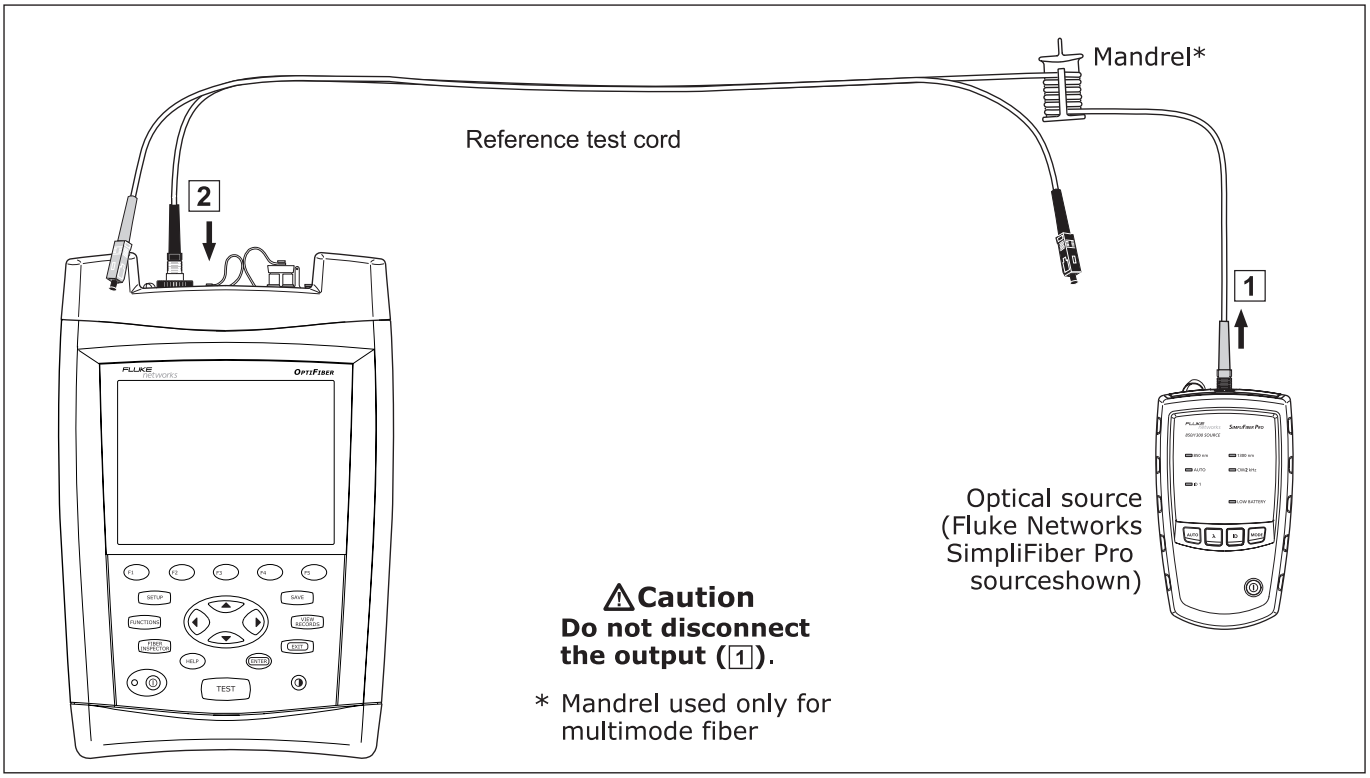


Figure 7-12. Far End Source Mode Reference Connections (1 Jumper Method)

⚠Caution

If you disconnected the reference test cord from the source's output, you must set the reference again to ensure valid measurements.

1 Verify that the settings described in Table 7-1 are appropriate. Let the tester and source 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 7-13.

5 Set the source to the correct wavelength and to continuous wave output.

6 Press TEST.

7 Select a wavelength for the test. **Auto** is used with SimpliFiber sources, as described in the next section.

8 To test at a second wavelength, repeat steps 5 through 7.

9 To save the results, press SAVE, select or create a fiber ID; then press SAVE again.

If you tested at two wavelengths, both are stored in the same record.

Using Auto Wavelength Detection with SimpliFiber Sources (OFTM-5731 and OFTM-5732 Modules)

A Fluke Networks SimpliFiber source can transmit wavelength information that can be read by OFTM-5731 and OFTM-5732 modules. This feature helps eliminate wavelength selection errors when testing in Far End Source mode.

To use auto wavelength detection, do the following:

1 Verify that the SimpliFiber source is set to Auto mode. The **Auto** LED should be lit. Press AUTO if it is not.

2 Press λ to select a wavelength (**850 nm** or **1300 nm**). For SimpliFiber Pro sources, only one wavelength LED must be on. The LEDs must not be blinking alternately.

3 Run the Far End Source test, selecting **Auto** on the tester's **SET SOURCE WAVELENGTH** screen.

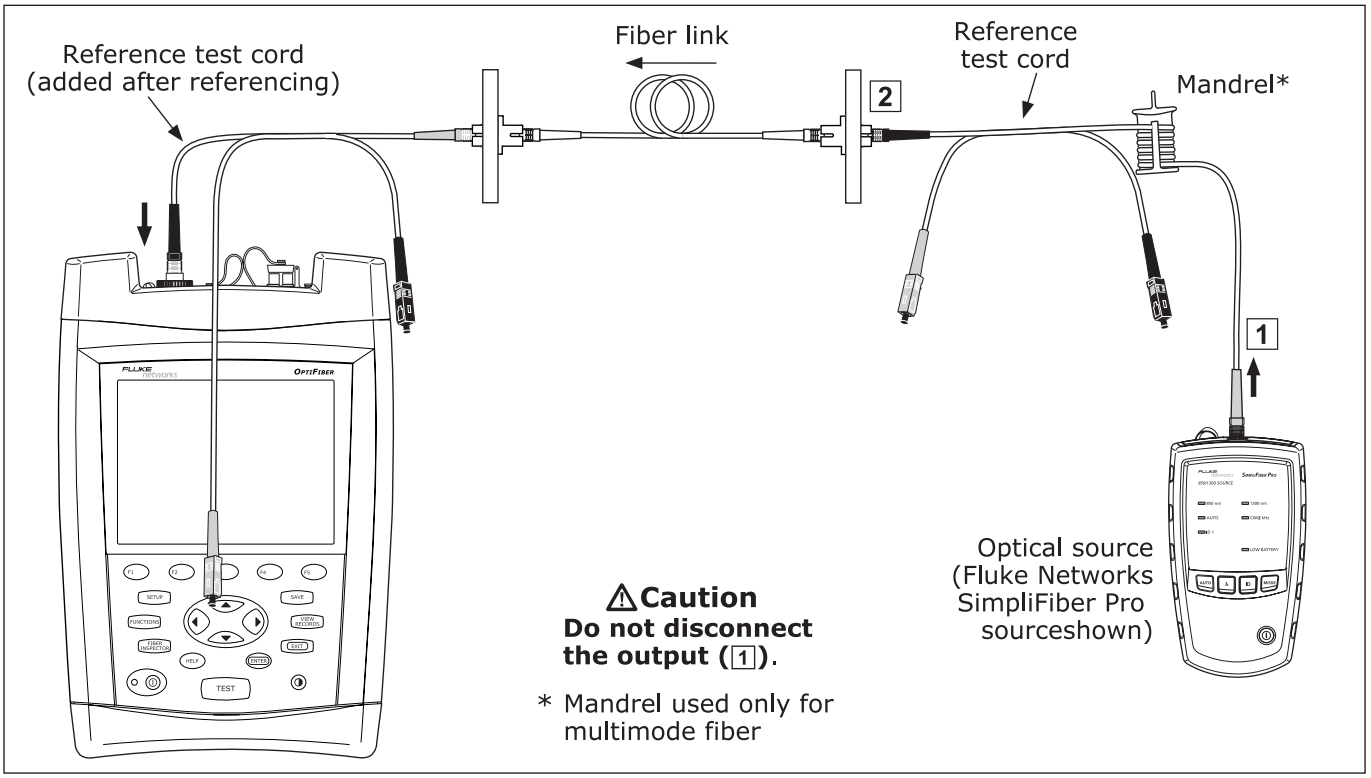


Figure 7-13. Far End Source Mode Test Connections (1 Jumper Method)

Far End Source Mode Test Results

The **SUMMARY** screen, which appears when the test is finished, is described in Table 7-8.

To see more detailed results, press F1 **View Results**. Table 7-9 describes the **RESULTS** screen.

Table 7-8. 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 7-9. Far End Source Mode RESULTS Screen Features

Item	Description
END 1-2 **END 2-1**	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**. **PASS:** The measurement in the column is within the limit. **FAIL:** The measurement in the column exceeds the limit.
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 7-10 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 tester'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 tester 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 7-10 describes some typical causes of loss/length test failures.

See also the table in Appendix C, which shows results from a survey on common causes of fiber link failures.

Table 7-10. Diagnosing Loss/Length Test Failures

Loss is more than expected or is reported as "Too High".

- The fibers are connected to the wrong ports on the tester, or are swapped at one end of the cabling.
- A reference test 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.

  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.
- 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 reference test cords to be used for testing.
- A reference test cord or fiber segment has the wrong core size. If the reference test 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.

⚠ Caution

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

-continued-

Table 7-10. Diagnosing Loss/Length Test Failures (cont.)

Loss is negative. • The connections to the tester were disturbed after referencing. • The fiber ends were dirty during referencing. • There was a kink in a reference test cord during referencing. • The connectors were not properly aligned during referencing. • Some other problem caused a bad reference value. • If loss is negative, set the reference again and retest the cabling.
A known length of cable measures too long or too short. • 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.

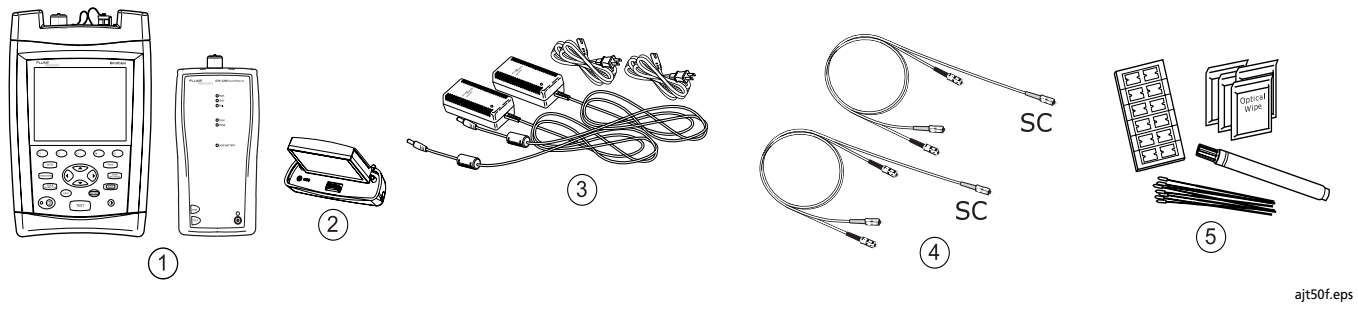
Note

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 7-14 shows the equipment needed for using FindFiber in Smart Remote mode.



1. Tester with OFTM-5612B or OFTM-5732 module and smart remote (DTX remote shown). Match connector adapters to the connectors in the link.
2. Spare battery pack (optional)
3. Two ac adapters with line cords (optional)
4. Two duplex reference test cords. Match the fiber to be tested. One connector on each cord must be SC. For the others match the connectors in the link.
5. Fiber cleaning supplies

Figure 7-14. Equipment for Using FindFiber in Smart Remote Mode

1 On the **Loss/Length** tab in Setup, set the main and remote testers to **Smart Remote** mode.

2 Clean the tester's and source's OUTPUT connectors and the reference test cord connectors; then make the connections shown in Figure 7-15.

3 On both testers press FUNCTIONS, select FindFiber; then press TEST.

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 7-11 shows the main tester results for Smart Remote mode.

Table 7-11. 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.

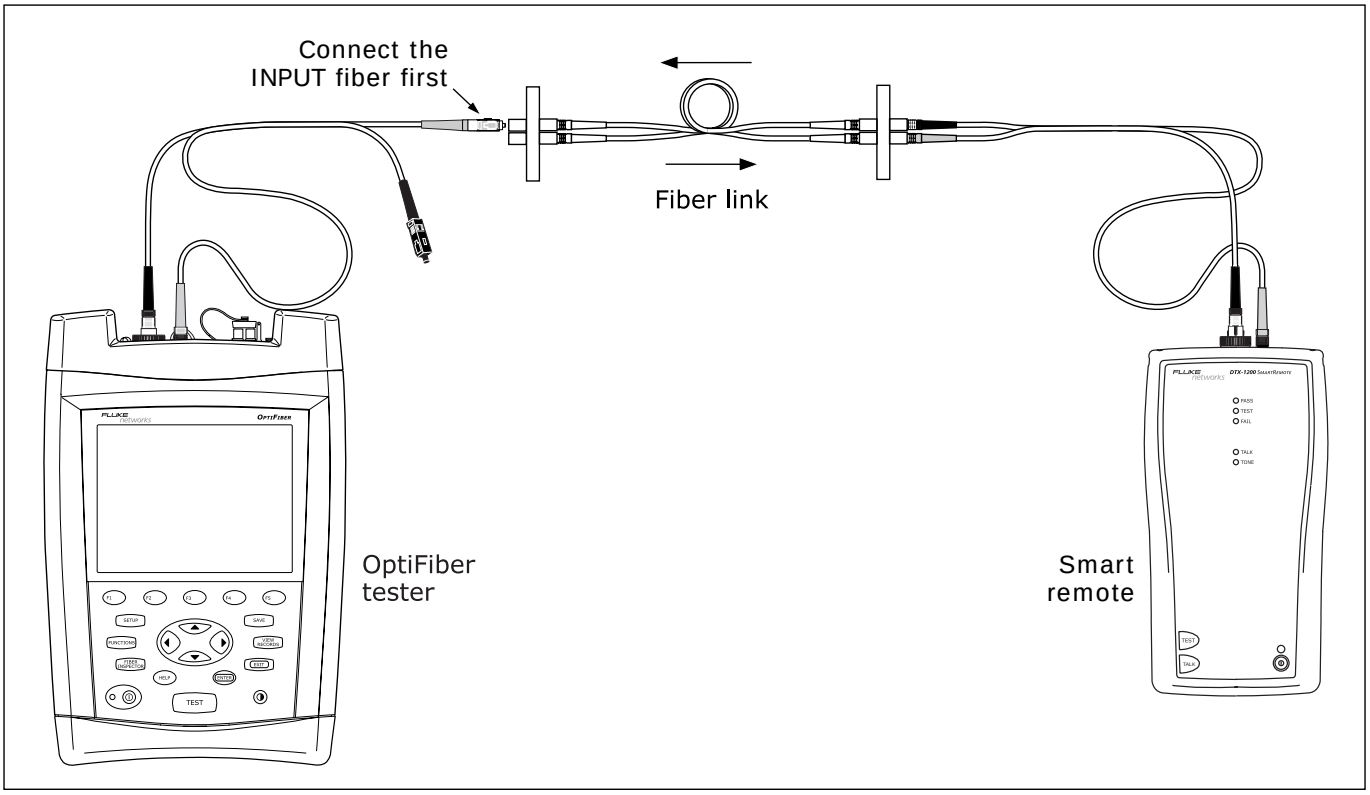


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Figure 7-15. Using FindFiber in Smart Remote Mode

Using FindFiber in Loopback Mode

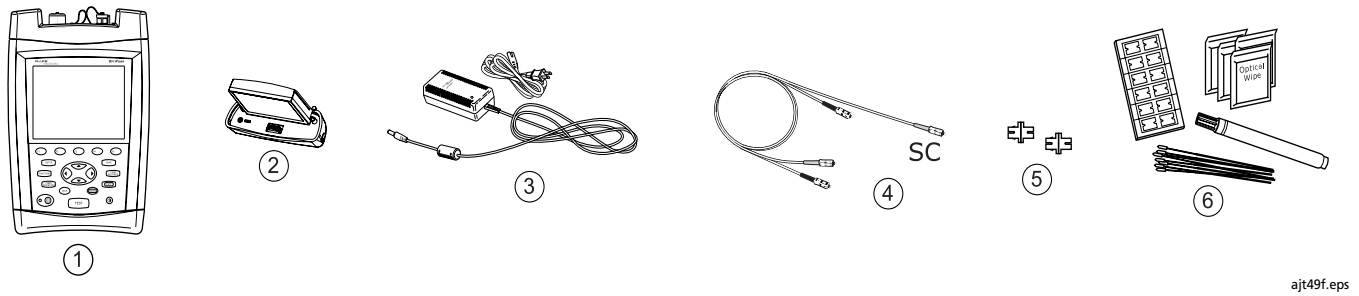
Use FindFiber in Loopback mode to quickly check the continuity of reference test cords, launch fibers, and fiber spools. Figure 7-16 shows the equipment needed for using FindFiber in Loopback mode.

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

2 Clean the tester's OUTPUT connector and the reference test cord connectors; then connect the tester's OUTPUT fiber to one end of the fiber path, as shown in Figure 7-17.

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.



① Tester with OFTM-5612B or OFTM-5732 module. Match connector adapter to the connectors in the link.

② Spare battery pack (optional)

③ AC adapter with line cord (optional)

④ Duplex reference test cord. Match the fiber to be tested. One connector must be SC. For the others match the connectors in the link.

⑤ Two adapters of the appropriate type

⑥ Fiber cleaning supplies

Figure 7-16. Equipment for Using FindFiber in Loopback Mode

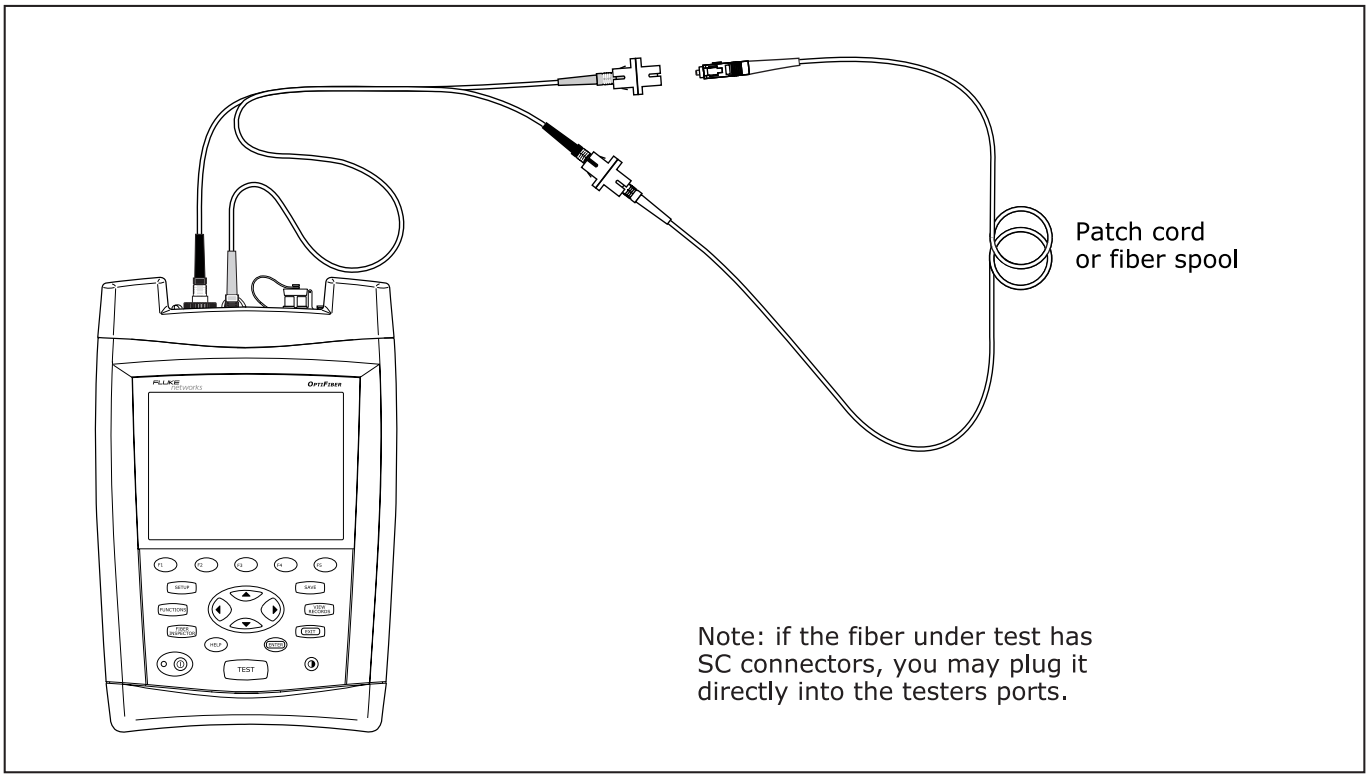


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Figure 7-17. Using FindFiber in Loopback Mode

Chapter 8
Using the Visual Fault Locator

Visual Fault Locator Applications

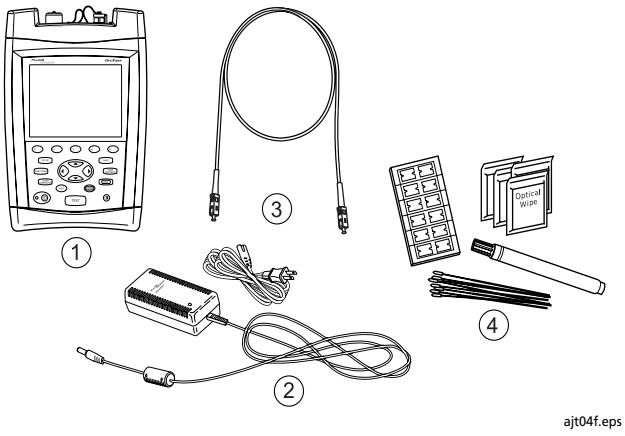
The visual fault locator (VFL) is available with OFTM-573x modules. The VFL helps you do the following:

- Quickly check fiber continuity.
- Trace fibers to determine the polarity of duplex connections and identify connections between patch panels.
- Locate breaks and bad splices. These faults scatter the locator's light, causing a red glow in the affected area.
- Reveal high-loss bends. If the locator's light is visible around a bend in a fiber, the bend is too sharp.
- Reveal problems in connectors. A damaged fiber inside a connector causes a red glow in the connector.
- Optimize mechanical splices and pre-polished connectors: Before sealing the splice or connector, adjust the fiber alignment for minimal glow where the fibers meet. (Follow the manufacturer's assembly instructions for splices and connectors.)

Using the VFL

Figure 8-1 shows the equipment required for using the VFL.

The visual fault locator port accepts connectors with 2.5 mm ferrules (SC, ST, or FC). To connect to other ferrule sizes, use a patch cord with the appropriate connector at one end and a SC, ST, or FC connector at the tester end.



1. Tester with OFTM-573x module
2. AC adapter with line cord (optional)
3. One patch cord. Match the fiber and connectors to be tested; SC, ST, or FC at tester end. (optional)
4. Fiber cleaning supplies

Figure 8-1. Equipment for Using the Visual Fault Locator

1 Clean the connectors on the patch cord, if used, and the fiber to be tested.

2 Connect the fiber directly to the tester's VFL port or connect using the patch cord.

3 Turn on the VFL as follows:

- Press F4 **VFL** from the **HOME** screen.

  or

- Press FUNCTIONS; then select **Visual Fault Locator**.

4 To toggle between continuous wave and pulse modes, press F2.

5 To turn the VFL off and on, press F4.

6 Look for the glow to locate fibers or faults, as shown in Figure 8-2.

Tip: To more quickly locate the VFL's light at a patch panel, view the light indirectly by holding a white card or paper in front of the fiber connector emitting the light.

Note

The locator's light may not be visible through dark-colored fiber jackets.

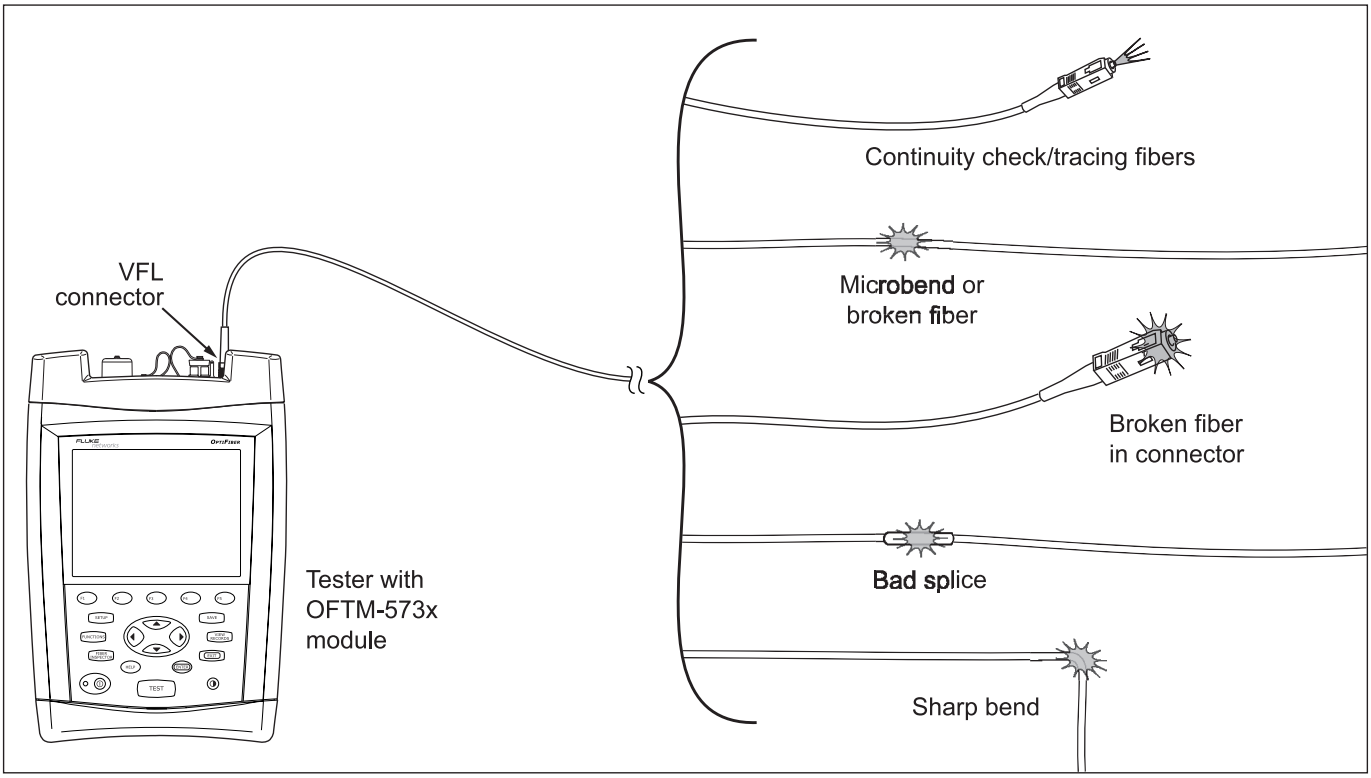


Figure 8-2. Using the Visual Fault Locator

Chapter 9
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-56x1B, OFTM-56x2B, OFTM-5731, and OFTM-5732 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 9-1 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 connectors on the reference test cord, source, and link (if tested).

3 Use the reference test cord to connect the source to the tester's INPUT port, as shown in Figure 9-2; then turn on the source.

4 Press TEST; then select the appropriate wavelength. **Auto** is used with SimpliFiber sources, as described in the next section.

5 To change the wavelength after starting the test, press F2 **Change Wavelength**.

⚠ 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.

Figure 9-3 describes the power meter screen.

Using Auto Wavelength Detection with SimpliFiber Sources (OFTM-5731 and OFTM-5732 Modules)

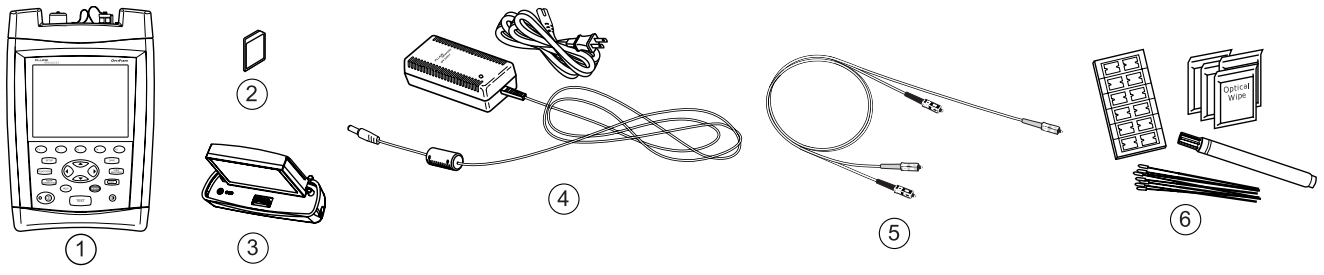
A Fluke Networks SimpliFiber® source can transmit wavelength information that can be read by OFTM-5731 and OFTM-5732 modules. This feature helps eliminate wavelength selection errors when testing in Far End Source mode.

To use auto wavelength detection, do the following:

1 Verify that the SimpliFiber source is set to Auto mode. The **Auto** LED should be lit. Press AUTO if it is not.

2 Press λ to select a wavelength (**850 nm** or **1300 nm**). For SimpliFiber Pro sources, only one wavelength LED must be on. The LEDs must not be blinking alternately.

3 Run the power meter test, selecting **Auto** on the tester's **SET WAVELENGTH** screen.



1. Tester with OFTM-5611B, OFTM-5612B, or OFTM-5731, or OFTM-5732 module. Match the connector adapter to the connectors on the link or optical source to be tested.
2. Memory card (optional)
3. Spare battery pack (optional)
4. AC adapter with line cord (optional)
5. One reference test cord. Match the fiber in the link or the type usually connected to the source. Match the tester's INPUT connector at one end and the link or source connector at the other end.
6. Fiber cleaning supplies

Figure 9-1. Equipment for Power Meter Tests

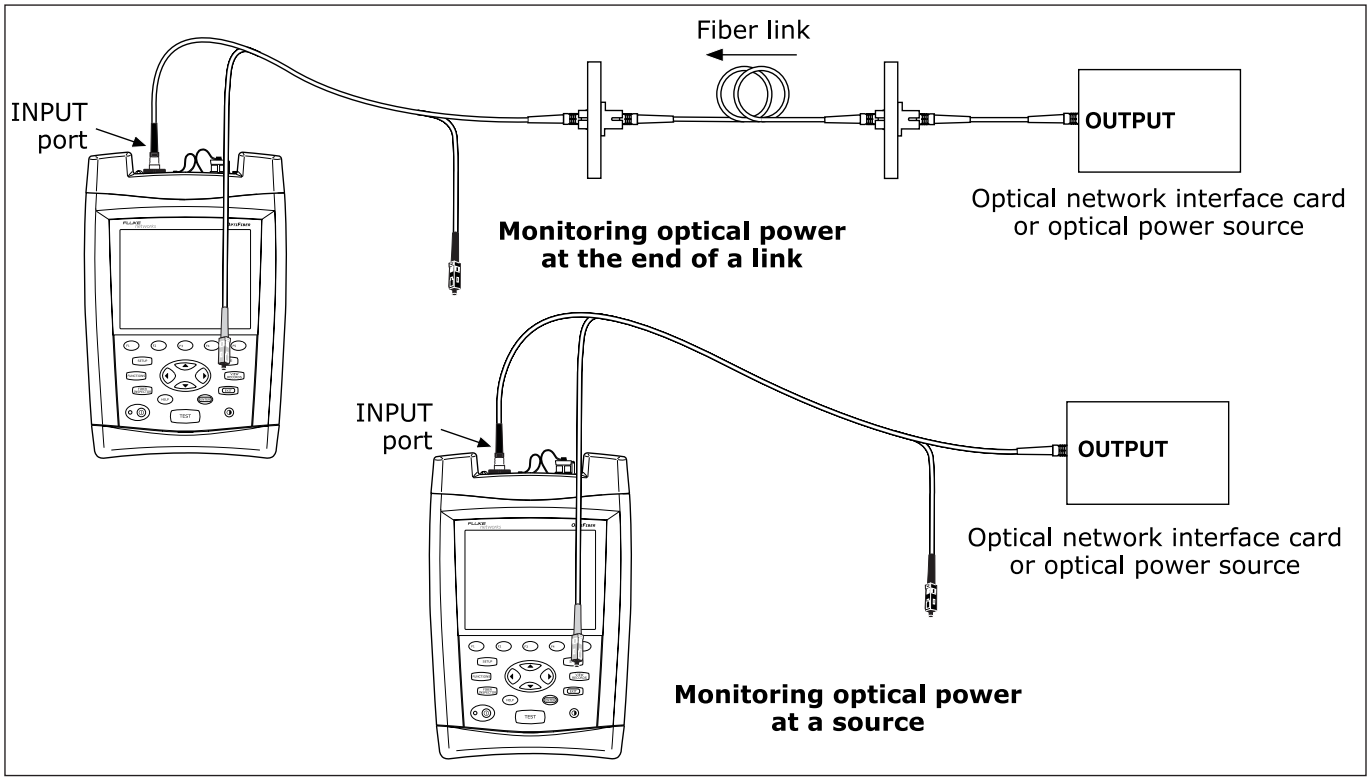


Figure 9-2. Connections for Monitoring Optical Power

Power Meter Results

① The current power meter reading and the minimum and maximum readings since the test began. The reading shows **Too Low** if the power is below or above the tester's measurement range. See page 9-6.

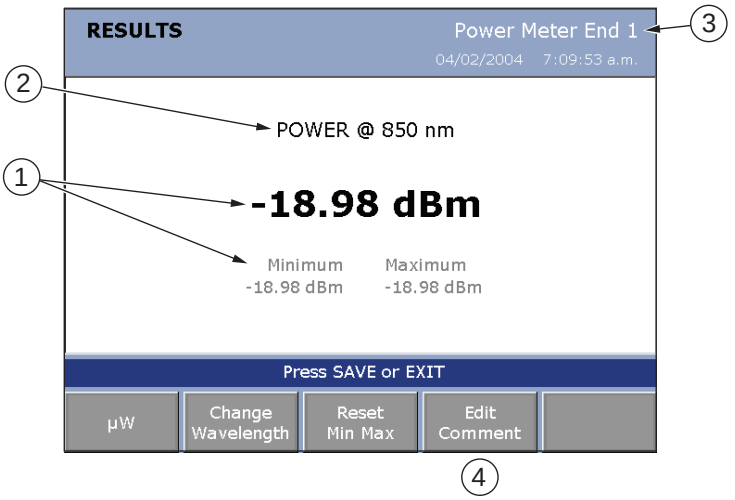
⚠ Caution

If the power reading is above the tester's range, 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 toggle between **dBm** (decibels relative to 1 mW) and **µW** (microwatts), press F1.

To restart the recording of minimum and maximum values, press F3 **Reset Min Max**.

② The wavelength being measured. To change the wavelength, press F2 **Change Wavelength**.



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③ The current **End** setting on the **Job** tab in **SETUP**.

④ To add comment to be saved with the power meter results, press F4 **Edit Comment**.

Figure 9-3. The Power Meter Screen

If the Power Reading is Low

- Verify that the reference test 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 10
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 SETUP 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.

If **SAVE WARNING** on the **System** tab is enabled, 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 and Card Sizes Supported

⚠ Caution

Memory cards may be lost, damaged, or accidentally formatted, resulting in data loss. Therefore, Fluke Networks recommends saving no more than one day's worth of test results on a memory card.

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.

OptiFiber software version 2.0 supports cards up to 4 gigabytes. Later versions may support larger cards. Check the Fluke Networks Knowledge Base for the latest information.

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

Table 10-1 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 10-1. Memory Status Screen Features

Feature	Description
Memory Card or Internal Memory	The memory status currently displayed. Press F1 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	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. All bar graphs on this screen change from green to yellow to red as the available memory decreases.

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 10-2 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 10-2. Record Viewing and Management Functions

Function	Method
See the records in the current folder	Press VIEW RECORDS. To change folders, press F1 **Change Folder**. 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.
Sort records on the **VIEW RECORDS** screen	Press F3 **Sort Field** on the **VIEW RECORDS** screen. Select a field name; then press F2 **Ascending** or F3 **Descending**. The sorting order applies to all folders. 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.
See the tests saved in a record	Use ▼ or ▲ to highlight the record on the **VIEW RECORDS** screen; then press ENTER.

* 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.)

-continued-

Table 10-2. 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 ENTER.
Delete records	On the **VIEW RECORDS** screen, press F2 **Delete**; then select the desired delete function.
Rename a record	Select the record on the **VIEW RECORDS** screen; then press F3 **Rename Record** on the **RECORD SUMMARY** screen.
Clear the internal memory, which moves records from internal memory to a memory card	**1** On the **Job** tab in Setup, set the **CURRENT FOLDER** to the desired location on the memory card. **2** Press FUNCTIONS; 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 VIEW RECORDS; then press F1 **Change Folder**.

  or

- Press SETUP; 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 F1 **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 F2 **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 11
Creating Custom Fiber Types and Test Limits

Notes

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

To copy custom settings between testers, see page 12-5.

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 11-1 describes the fiber property settings.

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

-continued-

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**.

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

Table 11-1. 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.
Backscatter Coefficient	The amount of light the fiber reflects back to the OTDR (using a 1 ns pulse). This value is used to calculate event reflectance for OTDR tests. Enter the backscatter coefficient of the fiber under test, if known. This value is specified by many fiber manufacturers.
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. For most applications you may enter N/A for this value.
Core Diameter	Enter the core diameter specified for the fiber.

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 11-2 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

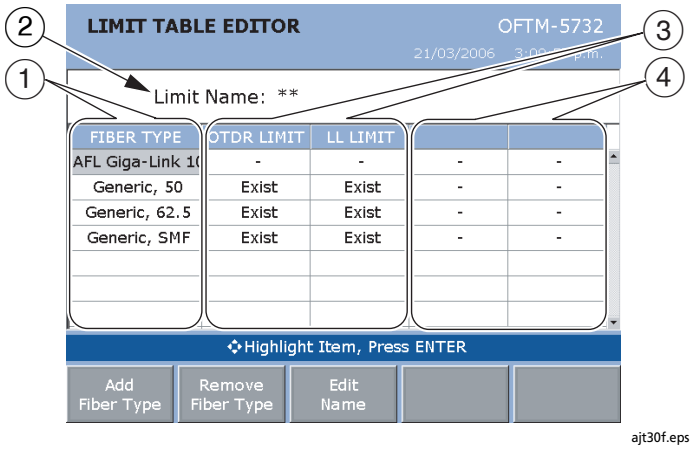
Selecting a factory-installed fiber type lets you see the fiber's properties, but you cannot edit them.

- 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 ENTER. Tables 11-2 and 11-3 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 SAVE.
- To edit the name, press F5 **Edit Name**. Press SAVE when you are finished entering a limit name; then press SAVE again to save the limit.



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 11-1. LIMIT TABLE EDITOR Screen

Table 11-2. 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. *Note* *The segment attenuation coefficient for shorter segments (50 m to 500 m, depending on wavelength and fiber characteristics) may not be measurable.*
Overall Attenuation Coeff	Enter a maximum value of attenuation per kilometer for the entire length of the cabling.
Event Reflectance	Enter a maximum reflection value for a single event.
* Minimum values are usually not used, but are available for special situations.	

Table 11-3. Custom Limit Settings for Loss/Length Tests

Setting	Description*
Length	Enter a maximum length for the cabling.
Overall Loss	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. 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**.
Loss per km **Loss per Connector** **Loss per Splice**	Enter a maximum value of attenuation per kilometer for the entire length of the cabling. Enter a maximum loss for one connector. Enter a maximum loss for one splice. 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. To avoid confusion, delete these values to change them to **N/A** if you do not enter all three.
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.	

Selecting a Custom Limit

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, then select **TEST LIMIT** on a test's tab.

3 Press F2 **More**, select **Custom**.; then select the limit from the list.

To delete a custom limit, do the following:

1 Press FUNCTIONS; then select **Edit Custom Test Limit**.

2 Highlight 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 12
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 F5 **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 F1 **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 PC's 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.

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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.

Copying Settings Between Testers

You can use LinkWare software to copy settings from one tester to another or to a memory card for installation on other testers. See the LinkWare online help for detailed information.

Copying Settings with LinkWare

1 In the latest version of LinkWare software, select **Utilities** > **OptiFiber** > **Read Setups** to save a tester's settings on the PC.

2 Select **Utilities** > **OptiFiber** > **Write Setups** to download the settings file (.oset extension) to another tester.

Copying Settings with a Memory Card

1 In the latest version of LinkWare software, select **Utilities** > **OptiFiber** > **Read Setups** to save a tester's settings on the PC.

2 Select **Utilities** > **OptiFiber** > **Create Setup Restore MMC** to copy the settings file (.oset extension) to a memory card.

3 Put the memory card in a tester, press FUNCTIONS; then select **Install Software Update**. The **INSTALL UPDATE** screen shows the setup files on the card:

- **Custom Limit Setup**: Custom limits and fiber types
- **Mainframe Setup**: Settings from the Job and System tabs.
- **OFTM-xxxx Setup**: Settings from Cable, OTDR, and Loss/Length tabs

4 To exclude a settings file, highlight the file; then press F3 **Don't Install**.

5 Press F4 **Start**.

Optical Connector Care

- Periodically clean and inspect the tester's optical connectors as described on pages 3-2 and 7-4.
- Cover the connectors with the protective caps when no cable is connected.
- Periodically clean the protective caps with a lint-free swab or wipe and fiber optic solvent.

Replacing Reference Test Cords and Launch Fibers

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

- Core and cladding size: match the fiber to be tested
- Connector polish: UPC for reference test cords and launch fibers
- Reference test 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 reference test 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.

Note

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

An internal lithium battery maintains the tester's clock and other settings 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 11-10 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 F5 **Version Info** from the **HOME** display.

If Something Seems Wrong

If something seems wrong with the tester, refer to Table 12-1.

If the problem continues, refer to "Getting Help" below.

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

If Table 12-1 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 F5 **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.

Options and Accessories

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**.

To order options and accessories contact an authorized Fluke Networks distributor or contact Fluke Networks as described in Chapter 1.

Table 12-1. 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.

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Table 12-1. 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 "OTDR Connection Quality" in Chapter 3.) 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 test 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 8 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 HELP when the message appears.

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 1st Edition + Amendments 1, 2
Altitude	3000 m
EMC	EN 61326-1

* Using battery power. With ac power: 0 °C to 45 °C. 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 for OFTM-561xB Multimode Modules

Testing speed	< 10 s for two wavelengths at 2 km with 25 cm resolution < 30 s for two wavelengths at 400 m with 3 cm resolution[1]
Output/input connector	Removable/cleanable SC adapter, UPC polish
Emitter type	Fabry-Perot laser diode
Laser classification	Class I CDRH Complies to EN 60825-2
Output wavelengths	850 nm ± 20 nm 1300 nm ± 20 nm
Fiber types tested	50/125 µm or 62.5/125 µm multimode

1. For Auto OTDR mode. Manual OTDR mode: < 100 s.

OTDR Specifications for OFTM-561xB Multimode Modules (cont.)

Event deadzones[2]	850 nm: 0.5 m typical 1300 nm: 1.3 m typical
Attenuation deadzones[3]	850 nm: 4.5 m typical 1300 nm: 10.5 m typical
Maximum measurement range[4]	850 nm: 3 km 1300 nm: 7 km
Dynamic range[5]	850 nm: >15 dB typical 1300 nm: >14 dB typical
Output power	850 nm: > 110 mW-pk 1300 nm: > 22 mW-pk

2. Measured at 1.5 dB below reflection peak for typical connector with UPC polish (reflectance < -37 dB multimode) using narrowest pulse width (4 ns at 850 nm; 8 ns otherwise) at near end (100 m, which excludes dispersion). See Figure 12-1.
3. Measured at ± 0.5 dB beyond backscatter for typical connector with UPC polish (reflectance of < -37 dB multimode) using 40 ns pulse width (20 ns at 850 nm) at near end (100 m, which excludes dispersion). See Figure 12-1.
4. Distance ranges for typical fiber loss. For typical fiber with backscatter coefficients of -67 dB at 850 nm and -74 dB at 1300 nm. Manual mode provides a nominal 8 km range for multimode; however, the typical ranges for measuring loss are shown here.
5. SNR=1 method. Subtract 1.56 dB to compare to Telecordia 98 % method.

OTDR Specifications for OFTM-561xB Multimode Modules (cont.)

Loss threshold[6]	0.2 dB
Distance accuracy[7]	± 1 m ± 0.005 % of distance ± 50 % of resolution ± index of refraction error
Linearity[8]	± 0.07 dB/dB
Sampling resolution	3 cm to 50 cm
Reflectance accuracy[9,10]	± 4 dB
Optical return loss accuracy[9,10]	± 4 dB
Minimum pulse width	850 nm: 4 ns 1300 nm: 8 ns
Real time trace refresh rate	2 updates per second typical

6. 6 dB above the noise floor.
7. Does not apply to event table.
8. Not applicable to OTDR tests using the narrowest pulse width (4 ns at 850 nm; 8 ns otherwise).
9. Not applicable to OTDR tests using the narrowest pulse width (4 ns at 850 nm; 8 ns otherwise).
10. Not applicable to hidden events. Upper limit of -40 dB reflectance typical at the near end (100 m).

OTDR Specifications for OFTM-573x Singlemode Modules

Testing speed per wavelength	Auto OTDR mode: 15 seconds typical Manual OTDR mode: user-selectable from 15 seconds to 3 minutes. **Auto**, **Auto Test Time**, and **Auto Deadzone** settings: 5 seconds to 3 minutes
Output/input connector	Removable/cleanable SC adapter, UPC polish
Emitter type	Fabry-Perot laser diode
Laser classification	Class I CDRH Complies to EN 60825-2
Output wavelengths	1310 nm ± 25 nm 1550 nm ± 30 nm
Fiber types tested	9/125 µm singlemode

OTDR Specifications for OFTM-573x Singlemode Modules (cont.)

Event deadzones[1]	1310/1550 nm: 1 m typical
Attenuation deadzones[2]	1310/1550 nm: 8 m typical
Maximum measurement range[3, 4]	1310 nm: 60 km 1550 nm: 60 km

1. For singlemode: measured at 1.5 dB below the reflection peak for a typical singlemode UPC connector (< -50 dB reflection using 5 ns pulse width). Refer to Figure 12-1.
2. For singlemode: measured at ± 0.5 dB beyond the backscatter for a typical singlemode UPC connector (< -50 dB reflection using 20 ns pulse width). Figure 12-1.
3. For typical fiber with backscatter coefficients of -77 dB at 1310 nm and -82 dB at 1550 nm.
4. Distance ranges for loss in a typical fiber. Greater than 3 dB above the noise floor at 60 km.
5. EDZ: Event deadzone. ADZ: Attenuation deadzone. EDZ is valid only for Fresnel (non-saturating) reflections.

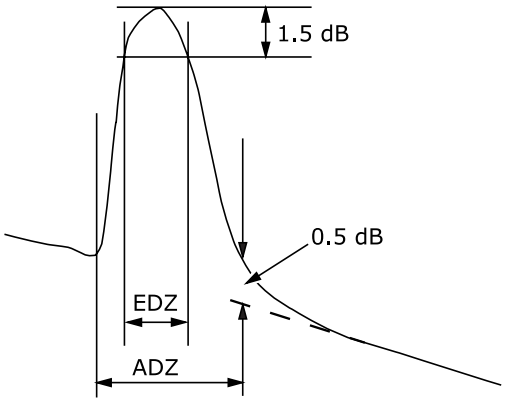

Figure 12-1. Event and Attenuation Deadzone Measurement Methods[5]

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OTDR Specifications for OFTM-573x Singlemode Modules (cont.)

Dynamic range[6, 7]	1310 nm: 26 dB typical with 10 µs pulse width 1550 nm: 24 dB typical with 10 µs pulse width
Output power	1310 nm: > 28 mW-pk 1550 nm: > 24 mW-pk
Loss threshold	0.01 dB to 1.50 dB inclusive, settable in 0.01 dB increments
Distance accuracy[8]	± 1 m ± 0.005 % of distance ± 50 % of resolution ± index of refraction error
Linearity	± 0.05 dB/dB
Sampling resolution	3 cm to 400 cm

6. For typical fiber, with backscatter coefficients of -77 dB at 1310 nm and -82 dB at 1550 nm.
7. SNR=1 method. Subtract 1.56 dB to compare to Telecordia 98 % method; 3 minutes of averaging.
8. Does not apply to the event table.

OTDR Specifications for OFTM-573x Singlemode Modules (cont.)

Reflectance accuracy[9]	± 4 dB
Optical return loss accuracy[10]	± 4 dB
Pulse widths (nominal)	1310 / 1550 nm: 5 ns, 20 ns, 40 ns, 100 ns, 300 ns, 1µs, 3 µs, 10 µs
Real time trace refresh rate	2 updates per second typical

9. Not applicable to hidden events or 5 ns pulse width; does not include error due to backscatter coefficient.
10. Not applicable to 5 ns pulse width; does not include error due to backscatter coefficient.

Power Meter Specifications

Testing speed, worst case	4.5 s (Far End Source mode)
Input connector	Interchangeable SC/ST/FC/LC (non contact)
Detector type	InGaAs
Calibrated wavelengths	850 nm, 1300/1310 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 display: 0.01 Linear display (µW): > 400: 1 > 40: 0.1 > 4: 0.01 > 0.4: 0.001 ≤ 0.4: 0.0001

Power Meter Specifications (cont.)

Power measurement uncertainty (accuracy)	± 0.25 dB[1]
Measurement linearity (18 °C to 28 °C constant temperature)	1300/1310 nm and 1550 nm: ± 0.1 dB[2] 850 nm: ± 0.15 dB[3]
Auto wavelength detect	On OFTM-573x modules when used with a SimpliFiber source
Re-calibration period	1 year
Display update rate	1 reading per second

1. Under the following conditions:
   - 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

2. Linearity for 1300 nm, 1310 nm, and 1550 nm:
   - Between 0 dBm and -55 dBm: ± 0.1 dB
   - < -55 dBm: ± 0.2 dB

3. Linearity for 850 dBm:
   - Between -15 dBm and -52 dBm: ± 0.15 dB typical performance
   - Between 0 dBm and -15 dBm: ± 0.5 dB typical performance

Loss/Length Specifications

Specification	OFTM-5x12B Multimode Modules	OFTM-5732B 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 connector	SC with PC polish	SC with PC polish
Input connector	Interchangeable SC/ST/FC/LC (non contact)	Interchangeable SC/ST/FC/LC (non contact)
Fiber types tested	9 /125 µm to 62.5 /125 µm multimode	9 /125 µm singlemode
Output wavelengths	Multimode LED source: 850 nm and 1300 nm	Laser source: 1310 nm and 1550 nm
Laser classification	NA	Class I CDRH Complies to EN 60825-2

Loss/Length Specifications (cont.)

Specification	OFTM-5612B Multimode Modules	OFTM-5732 Singlemode Modules
Maximum length measurement	5 km of 50 µm or 62.5 µm multimode fiber	20 km of 9 µm singlemode fiber
Measurement range[1]	2 km for Smart Remote and Loopback modes 20 km for Far End Source mode [2]	10 km for Smart Remote and Loopback modes 60 km for Far End Source mode [2]
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 minimum; -19.5 dB nominal	> -8 dBm minimum; -7 dBm nominal
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

1. Far End Source mode does not include length or propagation delay measurements.
2. 60 km at 1310/1550 nm on singlemode fiber, 20 km at 1300 nm on multimode fiber, 5 km at 850 nm on multimode fiber.

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Loss/Length Specifications (cont.)

Specification	OFTM-5612B Multimode Modules and OFTM-5732 Singlemode Modules
Calibrated wavelengths	850 nm, 1300/1310 nm, 1550 nm
Auto wavelength detect	On OFTM-573x modules when used with a SimpliFiber source
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 (µW): > 400: 1 > 40: 0.1 > 4: 0.01 > 0.4: 0.001 ≤ 0.4: 0.0001

Loss/Length Specifications (cont.)

Specification	OFTM-5612B Multimode Modules	OFTM-5732 Singlemode Modules
Power measurement uncertainty[3] (accuracy)	± 0.25 dB	± 0.25 dB
Measurement linearity[4, 5] (18 °C to 28 °C constant temperature)	1300 nm: ± 0.1 dB 850 nm: ± 0.15 dB	± 0.1 dB
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

3. Under the following conditions:
   - 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

4. Linearity for 1300 nm, 1310 nm, and 1550 nm:
   - Between 0 dBm and -55 dBm: ± 0.1 dB
   - < -55 dBm: ± 0.2 dB

5. Linearity for 850 dBm:
   - Between -15 dBm and -52 dBm: ± 0.15 dB typical performance
   - Between 0 dBm and -15 dBm: ± 0.5 dB typical performance

Visual Fault Locator Specifications (OFTM-573x Modules)

On/off control	Controlled by the OptiFiber software (no hardware switch)
Output power (into SM fiber)	316 µw (-5 dBm) ≤ peak power ≤ 1.0 mw (0 dBm)
Operating wavelength	650 nm nominal
Spectral width (RMS)	± 3 nm
Output modes	Continuous wave and pulse mode (2 Hz-3 Hz blink frequency)
Connector adapter	2.5 mm universal
Laser safety	Class II CDRH Complies to EN 60825-2

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

CE Conformite Europeene. Conforms to the requirements of the European Union and the European Free Trade Association (EFTA).

C SP US 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 FUNCTIONS; 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 12-2 and 12-3 and show the pin connections for the cable and the 9-to-25-pin adapter available from Fluke Networks.

Table 12-2. 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 12-3. 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	Switchable between 250X and 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	1.8 in x 1.7 in x 5.5 in (45.7 mm x 43.2 mm x 140 mm) (length depends on adapter tip)
Weight	0.4 lb (180 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	CE (when used with the OF-500 OptiFiber tester)

Regulatory Information

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

Appendix A
Test Method Reference Table

Industry standards use different names for equivalent test methods. Table A-1 shows the names used in this manual and by four common industry standards for the three fiber test methods.

Table A-1. Test Method Names

Link End Connections Included in Loss Results	This Manual	TIA/EIA-526-14A (multimode)	TIA/EIA-526-7 (singlemode)	IEC 61280-4-1 (multimode)	IEC 61280-4-2 (singlemode)
1 connection	2 Jumper	Method A	Method A.2	Method 1	Method A2
2 connections	1 Jumper	Method B	Method A.1	Method 2	Method A1
None	3 Jumper	Method C	Method A.3	Method 3	Method A3

Appendix B
Loss Test Methods

Introduction

Notes

The following discussion uses the 1, 2, and 3 jumper terminology for the names of the three common test methods. See Appendix A for a cross-reference of the method names in various standards.

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. Both are 1 Jumper methods.

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, 1, 2, and 3 jumper.

To test links with different connectors at each end, visit the Fluke Networks Knowledge Base for suggestions.

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.

1 Jumper Method

Results from the 1 Jumper method account for the loss of two connections plus the fiber in the link. 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. Appendix A shows the names of the standards that define the 1 Jumper method.

Reference connections for the 1 Jumper method cancel out the effects of the reference test cords, as shown in Figure B-1.

Loss results for the 1 Jumper method therefore represent both connections plus the fiber in the link. Industry standards specify the 1 Jumper method for testing multimode and singlemode premises fiber, where connector loss is a significant portion of the total loss.

Note

Other methods are available for getting 1 Jumper results when you do not have the correct connector adapters for the tester. See "Modified 1 Jumper Method" on page B-8. For additional methods, see the Fluke Networks Knowledge Base.

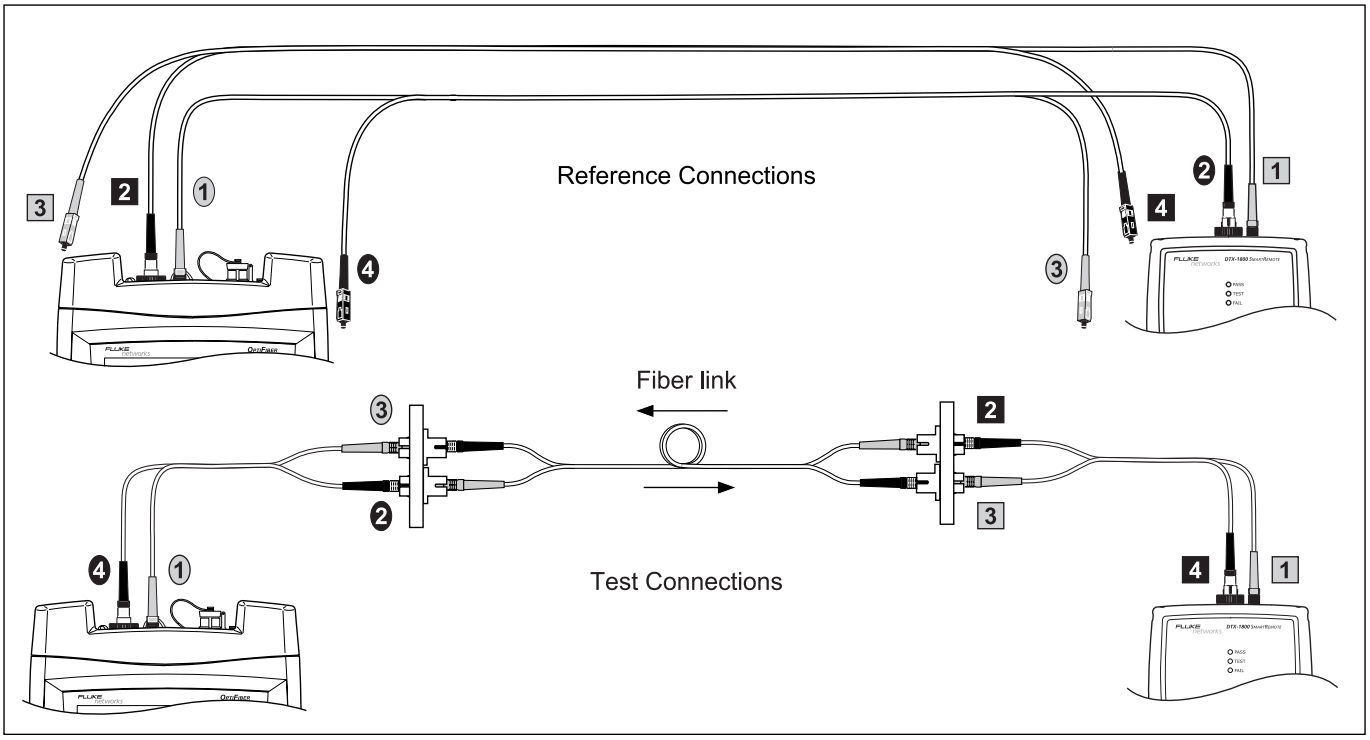

Figure B-1. 1 Jumper Reference and Test Connections (singlemode shown)

2 Jumper Method

Results from the 2 Jumper method account for the loss of one connection plus the fiber in the link. 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. Appendix A shows the names of the standards that define the 2 Jumper method.

Reference connections for the 2 Jumper method cancel out the effects of one connection and two reference test cords in each fiber path, as shown in Figure B-2.

The test connections add one connection and the fiber in the link to each path.

Loss results for the 2 Jumper method therefore represent only one connection plus the fiber in the link. Because the results omit one connection, industry standards do not recommend the 2 Jumper method 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.

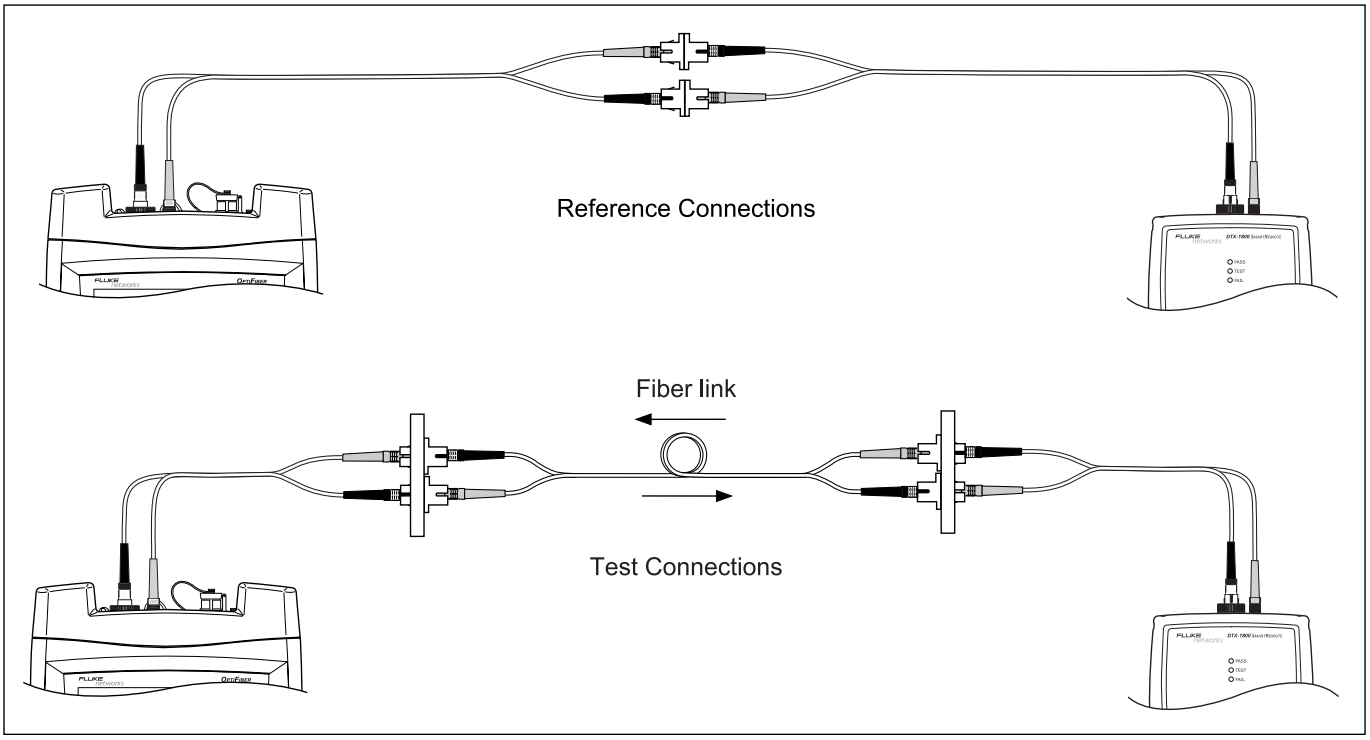

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Figure B-2. 2 Jumper Reference and Test Connections (singlemode shown)

3 Jumper Method

Results from the 3 Jumper method account for the loss of only the fiber in the link. 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. Appendix A shows the names of the standards that define the 3 Jumper method.

Reference connections for the 3 Jumper method cancel out the effects of two connections and three reference test cords in each fiber path, as shown in Figure B-3.

The test connections add the fiber in the link to each path. Loss results for the 3 Jumper method therefore represent only the fiber in the link.

Because the results omit both connections in the link, industry standards do not recommend the 3 Jumper method 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.

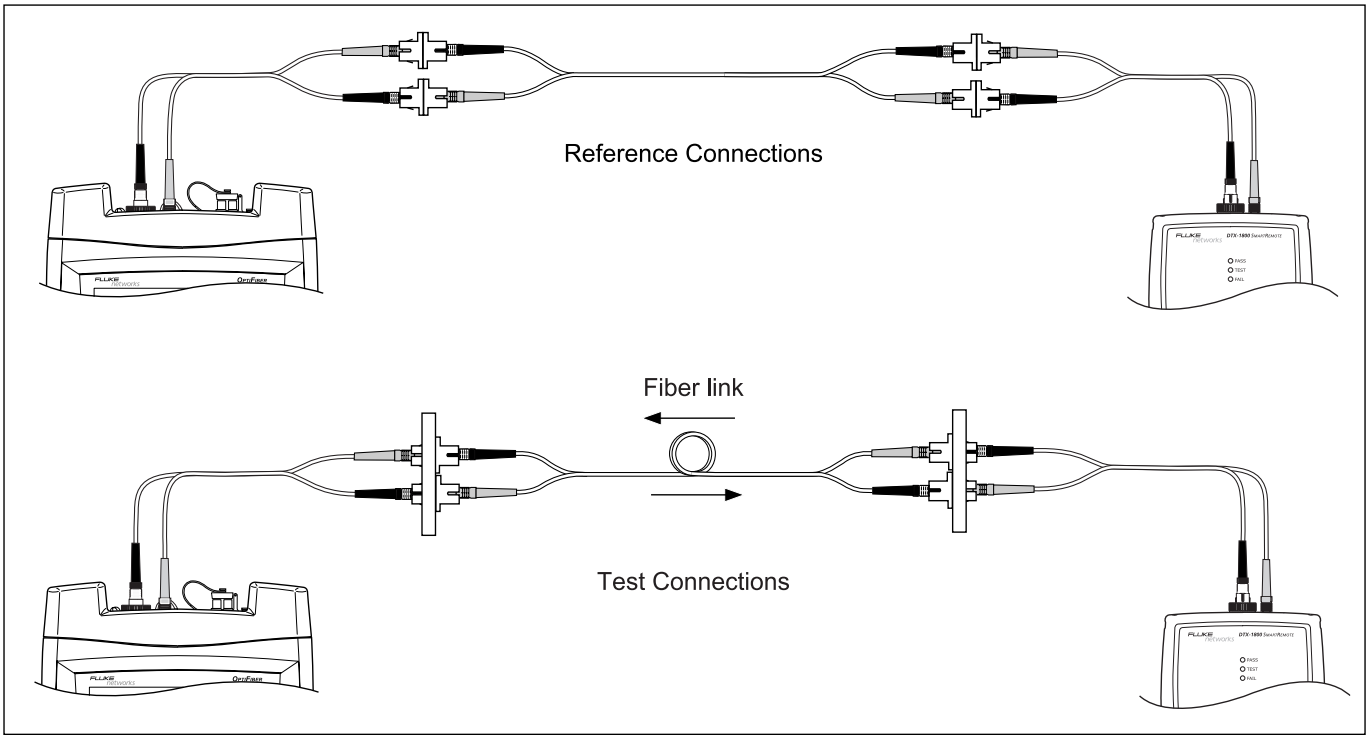

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Figure B-3. 3 Jumper Method Reference and Test Connections (singlemode shown)

Modified 1 Jumper Method

This section shows modified reference and test connections that produce 1 Jumper results. Use these connections if you need 1 Jumper results but cannot change the tester's or source's input adapter to match the connectors on the fiber under test. This method lets you connect to the fiber without disturbing the tester and source output connections after setting the reference.

Figures B-4 and B-5 show reference and test connections for a fiber with MT-RJ connectors.

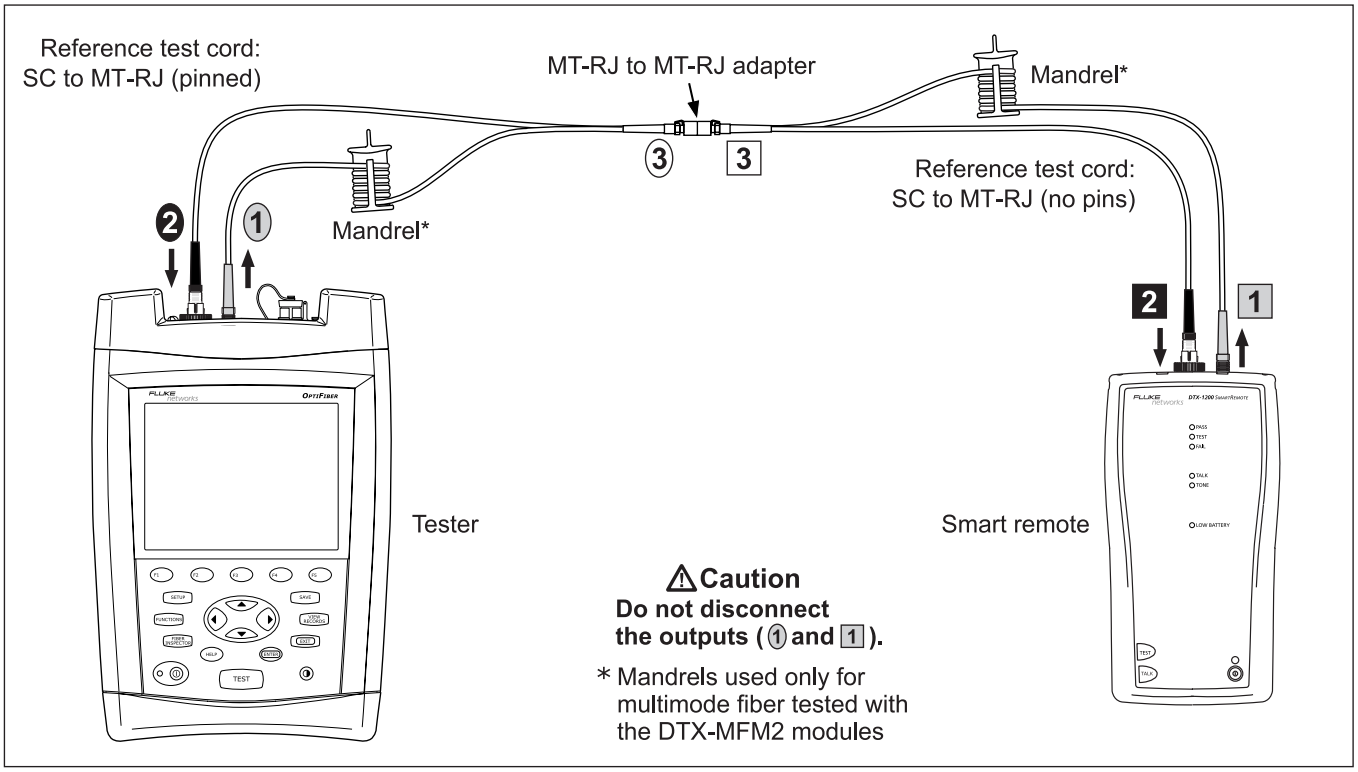
The reference connections (Figure B-4) cancel out the effects of one connection and two reference patch cords in each fiber path.

The test connections (Figure B-5) 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 the modified 1 Jumper method therefore represent both connections plus the fiber in the cabling under test.

On the tester select **1 Jumper** as the **Test Method** when using modified 1 Jumper connections.

To enter the length of the third, short reference test cord used in the modified 1 Jumper connections, press F2 **Test Setup** from the **Loss/Length HOME** screen.



ajt74f.eps

Figure B-4. Modified 1 Jumper Method: Smart Remote Mode Reference Connections

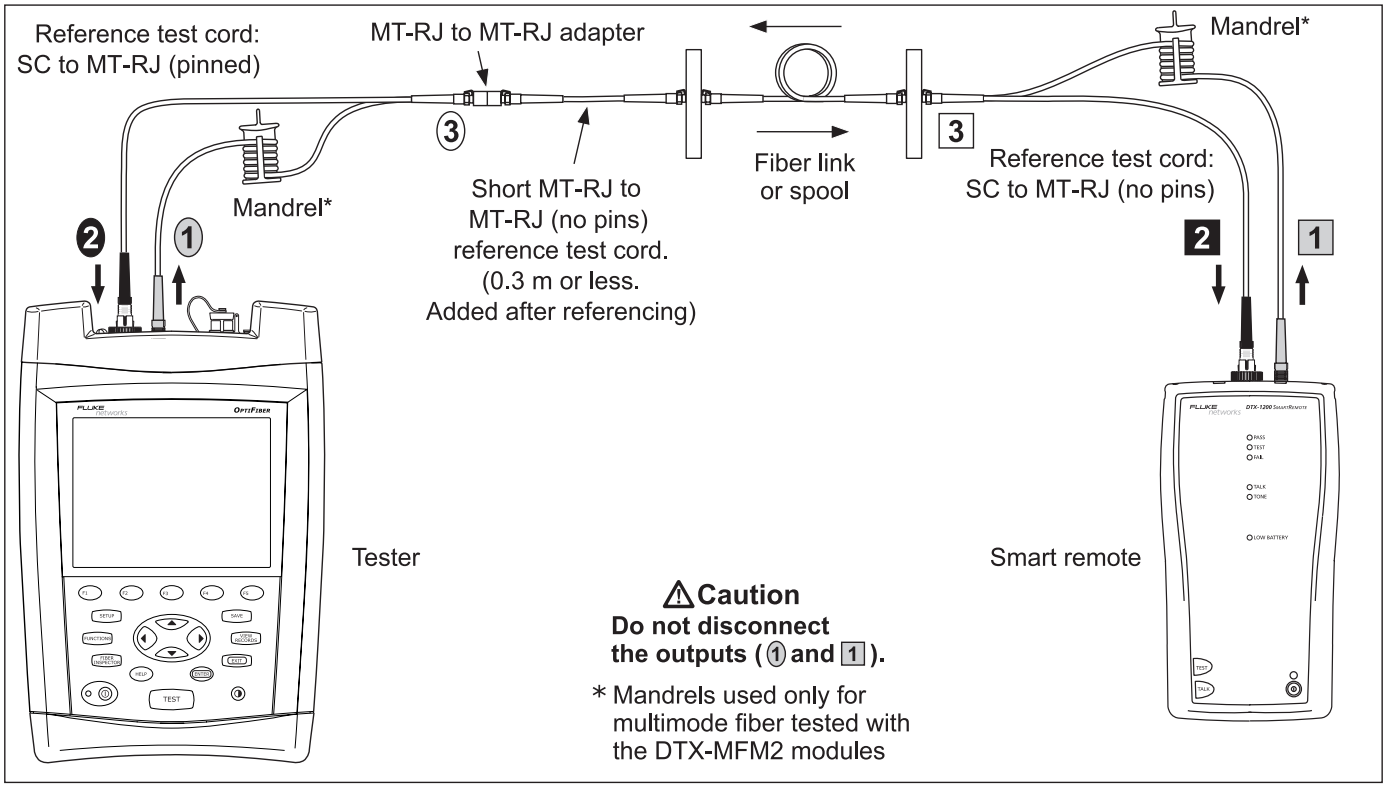


Figure B-5. Modified 1 Jumper Method: Smart Remote Mode Test Connections

Appendix C
Common Causes of Fiber Link Failures

Most problems in fiber links are caused by dirty, scratched, or damaged connectors, as shown in Table C-1. The table shows results of a survey of 89 contractors and private network owners. The results show what percentage of each group reported finding the faults listed.

Table C-1. Fiber Failure Survey Results

Fault	Network Owners	Contractors
Dirty end-faces	80 %	98 %
Poor polishing	72 %	88 %
Broken connectors	40 %	86 %
Mislabeling	8 %	86 %
Shattered end-faces	34 %	82 %
Bad splices	36 %	74 %
Excessive bends	6 %	66 %

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