FLUKE networks

DTX-MFM2/GFM2/SFM2

Fiber Modules

Users Manual

PN 2142235
April 2004, Rev. 4 4/10
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Selected Specifications*

Optical Specifications (23°C)	
Input (Meter) connectors	Removeable adapter on fiber optic power meter (input port). Removable SC adapter standard with product. Optional removable adapters: LC, ST and FC
Output (Source) connectors	Fixed SC adapter
Source type and nominal wavelength	DTX-MFM2: 850 nm LED and 1300 nm LED DTX-GFM2: 850 nm VCSEL and 1310 nm FP laser DTX-SFM2: 1310 nm FP laser and 1550 nm FP laser
Source power	DTX-MFM2: ≥ -20 dBm, DTX-SFM2: ≥ -7 dBm
Length measurement	DTX-MFM2: ≤ 5,000 m of 62.5 or 50 µm fiber DTX-GFM2: ≤ 5,000 m of 62.5 or 50 µm fiber DTX-SFM2: ≤ 10,000 m of 9 µm singlemode fiber
Power meter type	InGaAs detector
Power measurement range	0 to -60 dBm (1310 nm and 1550 nm) 0 to -52 dBm (850 nm)
VFL Specifications (23°C)	
Laser type and nominal wavelength	Class II CDRH, 650 nm
Output modes	Continuous wave and flashing mode
Connector adapter	2.5 mm universal
Environmental Specifications	
Operating temperature	0°C to 40°C
Storage temperature	-20°C to 60°C
Safety	CE, CSA, EN 61010-1
General Specifications	
Dimensions (L x W x D), nominal	4.2" x 3.0" x 1.1" (106 mm x 76 mm x 28 mm)
Weight, nominal	0.31 lb (0.14 kg)

* Visit flukenetworks.com/dtxfm for complete specifications.

Ordering Information

Models	Descriptions
DTX-MFM2	**Set of two DTX Multimode Fiber Modules, each incorporating:** • 850 nm and 1300 nm LED sources combined into a single output port • 850/1300/1310/1550 nm power meter • Integrated VFL
DTX-GFM2	**Set of two DTX Gigabit Multimode fiber modules, each incorporating:** • 850 nm VCSEL and 1310 nm laser sources combined into a single output port • 850/1300/1310/1550 nm power meter • Integrated VFL
DTX-SFM2	**Set of two DTX Singlemode Fiber Modules, each incorporating:** • 1310 nm and 1550 nm laser sources combined into a single output port • 850/1300/1310/1550 nm power meter • Integrated VFL
NFB1/2-LC&ST	**Adapter kit -** containing all Test Reference Cords to test 62.5 and 50 µm fiber installations using LC, ST
GLD-DTX-FIBERMOD	**DTX Fiber Module Gold Support** Gold SuperVision ensures peace-of-mind with free annual calibration, free loaner units, 24/7 TAC, and special discounts on training and promotions.

Certify multimode and singlemode fiber

Your network may contain both multimode or singlemode fiber types. Our LED modules and laser modules ensure standards-compliant certification. Our VCSEL/LD module qualifies the link for 1 or 10 Gigabit Ethernet use. Save, upload, manage and print comprehensive certification reports using Fluke Networks LinkWare™ PC software.

Find faults faster

Use the integrated on-module visual fault locator (VFL) to troubleshoot simple link problems. The bright laser-driven VFL helps you visually locate many near-end fiber faults, and is useful for continuity and polarity verification. Our exclusive integrated design ensures that the VFL is always on-hand when you need it.

Fluke Networks delivers Network SuperVision

Fluke Networks is committed to providing innovative Network SuperVision Solutions™ for testing and certifying copper and fiber cabling systems. Simply add these powerful modules to your DTX CableAnalyzer to certify, troubleshoot and document your fiber installations – today and tomorrow – with one compact field tester.

NETWORKSUPERVISION

Fluke Networks
P.O. Box 777, Everett, WA USA 98206-0777

Fluke Networks operates in more than 50 countries worldwide. To find your local office contact details, go to **www.flukenetworks.com/contact**.

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FLUKE networks

DTX Fiber Modules

With today's demands on high-speed data networks containing both fiber optic and twisted-pair cabling, it's more important than ever to certify and document multiple media types to ensure a properly executed installation.

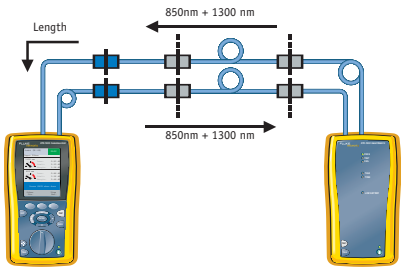
Now you can accurately certify copper and fiber with the new DTX CableAnalyzer™. Only the DTX Series offers optional on-board fiber modules. More convenient and powerful than other fiber optic test solutions, these modules enhance certification and troubleshooting with two-fiber, dual-wavelength testing and an integrated Visual Fault Locator (VFL). And no other solution lets you switch between copper and fiber with a touch of a button. Not only can you certify both media types, but you can do it faster and more efficiently than you ever imagined.

The DTX fiber advantage:

- Fiber on-board when you need it
- Five times faster than existing testers with 12-second Autotest
- Delivers Tier 1 LinkWare fiber certification reports
- Optimized for applications ranging from 10 Mb/s to 10 Gb/s
- Locates fibers, verifies continuity and polarity, and finds breaks with built-in VFL
- Speeds testing with TALK, FINDFIBER, MONITOR, bi-directional and single fiber test features
- Supports multiple SFF (small form factor) fiber connectors

Record-fast fiber certification

We engineered the DTX Fiber Modules to accelerate testing through exclusive technology and an easy-to-use interface. Press the Autotest button and automatically test two fibers, each at two wavelengths, measure length, and determine pass or fail status – all in about 12 seconds. Our fiber modules let you test more fibers in less time, minimizing testing costs and freeing



Unlike competitive fiber adapters which measure length and *two* loss measurements per Autotest, DTX is the only fiber test solution that measures length and *four* loss measurements per Autotest – all in about 12 seconds. With DTX Fiber Modules, you can speed through fiber testing five times faster than the competition.

you up for other tasks. Over time, the savings are substantial – easily more than 100 hours per year.

Test copper and fiber with a touch of a button

Only the DTX platform offers optional on-board fiber modules. Never lose time searching for your fiber adapter. Fiber certification is always resident and ready when you are.

Deliver complete Tier 1 certification

DTX fiber modules provide a complete Tier 1 certification solution – loss, length and polarity. Validate fiber link performance and installation quality. Measure optical loss at multiple wavelengths, measure fiber length and verify polarity. You can bi-directionally test two fibers at two wavelengths with incredible speed without swapping main and remote units, a capability only available from Fluke Networks.

Enhance your DTX Series CableAnalyzer™ with vision into fiber link performance.

Autotest in Smart Remote Mode: Set the Reference

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

2 Turn the rotary switch to **SETUP,** then select **Fiber Loss**. Set the following on the **Fiber Loss** tabs (press ▷ to see other tabs):

- **Test Limit**: Select the test limit required for the job. Press F1 **More** to see other lists of limits.
- **Fiber Type:** Select the fiber type to be tested.
- **Remote End Setup**: Set to **Smart Remote**.
- **Bi-directional**: Enable this if you are required to test the fiber in both directions.
- **Number of Adapters** and **Number of Splices**: Enter the number of adapters and splices that will be added to each direction of the fiber path after the reference is set.
- **Connector Type:** Select the connector type used in the cabling to be tested. Select **General** if the exact type is not listed.
- **Test Method**: Refers to the number of adapters represented in the loss results. Select **1 Jumper** if you use the reference and test connections shown in this manual.

3 Turn the rotary switch to **SPECIAL FUNCTIONS**, then select **Set Reference.** If both a fiber module and a twisted pair or coaxial adapter are attached, select **Fiber Module** next.

4 The **Set Reference** screen shows reference connections for the test method you selected. Figure 8 shows connections for the 1 Jumper method. Clean and inspect the connectors on the testers and test reference cords, connect the tester and smart remote; then press TEST.

See Table 2 on page 15 for details on settings.

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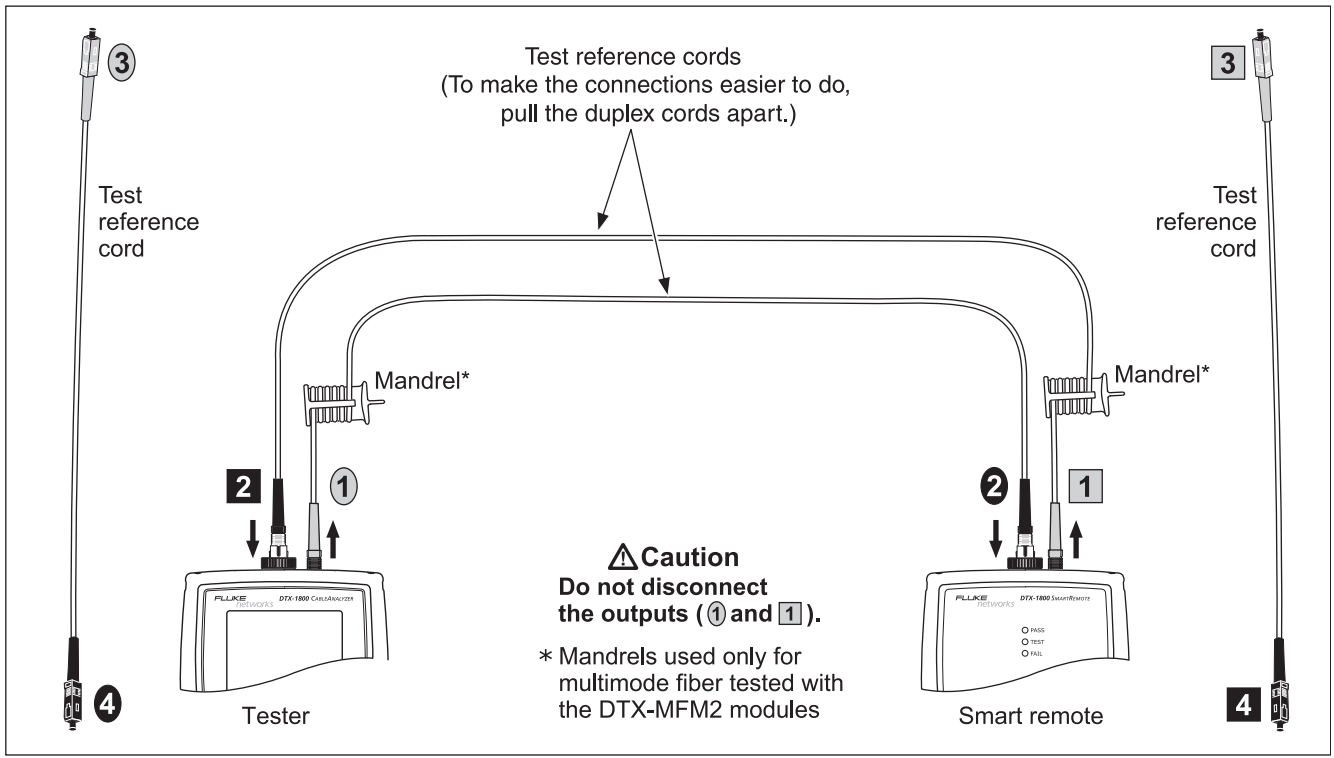


Figure 8. Setting the Reference in Smart Remote Mode (1 Jumper Method)

Autotest in Smart Remote Mode: Make Sure Your Test Reference Cords are Good

⚠Caution

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

5 Disconnect the test reference cords from the INPUT ports on the tester and smart remote.

6 Make the connections shown in Figure 9.

7 Turn the rotary switch to **AUTOTEST**, then press TEST.

8 Press ENTER to see the test results. The results for each fiber (**Input Fiber** and **Output Fiber**) must be no more than these limits:

⚠Caution

An overall result of PASS does not show that the test reference cords are good. You must compare the loss to the limits given here to make sure the cords are good.

Multimode test reference cord:

850 nm: 0.11 dB or less
1300 nm: 0.10 dB or less

(The limits are different because fiber has more loss at 850 nm than at 1300 nm.)

Singlemode test reference cord:

0.20 dB or less for 1310 nm and 1550 nm

9 If a result is more than the limit shown above, use the procedure given in Appendix A to test the cords in the path that failed (**Input Fiber** or **Output Fiber**). When you have good test reference cords, set the reference and do these steps (5 through 9) again before you test a fiber link.

10 Save the test results to show that you used good test reference cords to test the link.

Note

Fluke Networks recommends that you use this procedure to make sure your test reference cords are good before you test each fiber link.

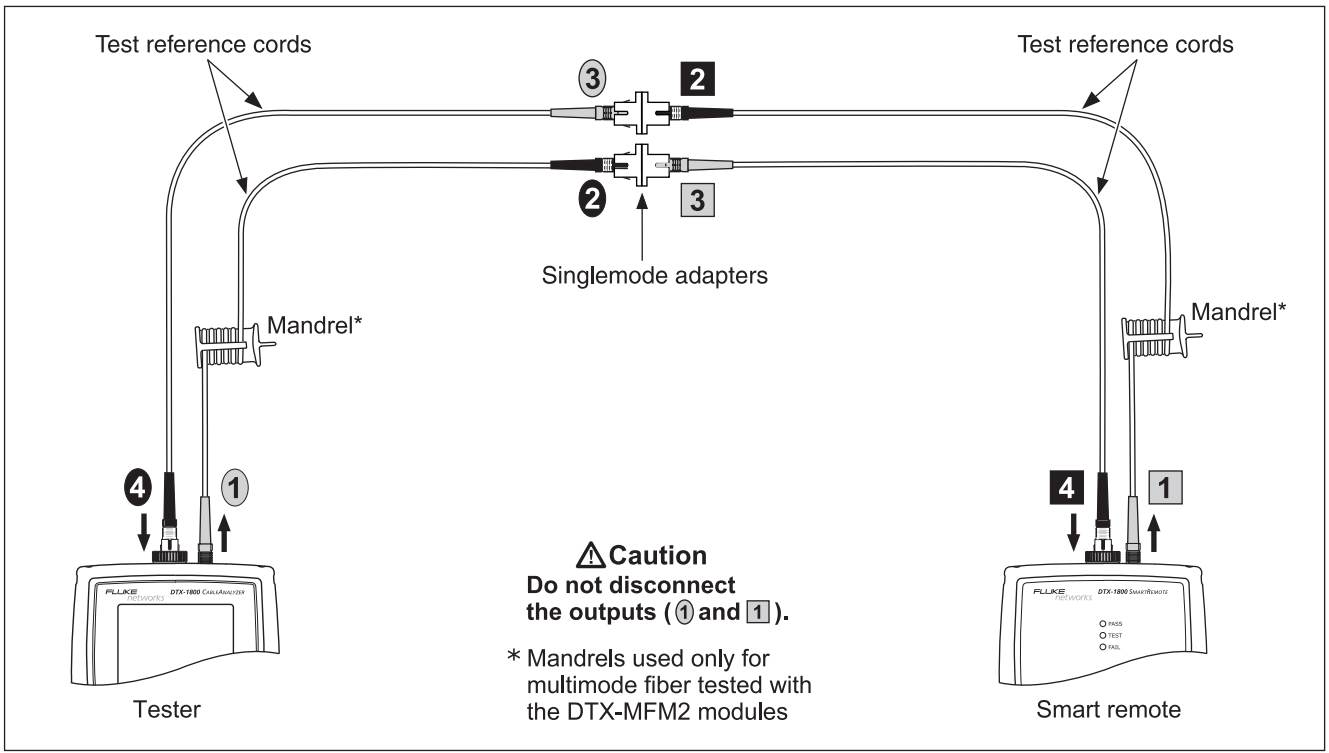


Figure 9. Testing the Test Reference Cords in Smart Remote Mode

Autotest in Smart Remote Mode: Test the Fiber Link

⚠Caution

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

11 Clean and inspect the connectors on the cabling to be tested; then connect to the link. The tester shows test connections for the test method you selected. Figure 10 shows connections for the 1 Jumper method.

12 Turn the rotary switch to **AUTOTEST**. Verify that the media type is set to **Fiber Loss**. Press F1 **Change Media** to change it if necessary.

13 Press TEST on the tester or smart remote.

14 If **Open** or **Unknown** appears, try the following:

- Verify that all connections are good.
- Verify that the tester at the other end is on. (The tester cannot activate a sleeping or powered-down tester at the far end through the fiber modules.)
- Try different connections at the patch panel.
- Try changing the polarity of the connections at one end.
- Use the visual fault locator to verify fiber continuity.

15 If bi-directional testing is enabled, the tester prompts you to switch the fibers halfway through the test. Switch the fibers at the patch panels or adapters (not at the tester's ports) at both ends of the cabling.

16 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.

In the results for Smart Remote mode, **Input Fiber** and **Output Fiber** refer to the fibers connected to the main tester's input and output ports. For a bi-directional test, these are the fibers connected to the main tester's input and output ports at the *end* of the test.

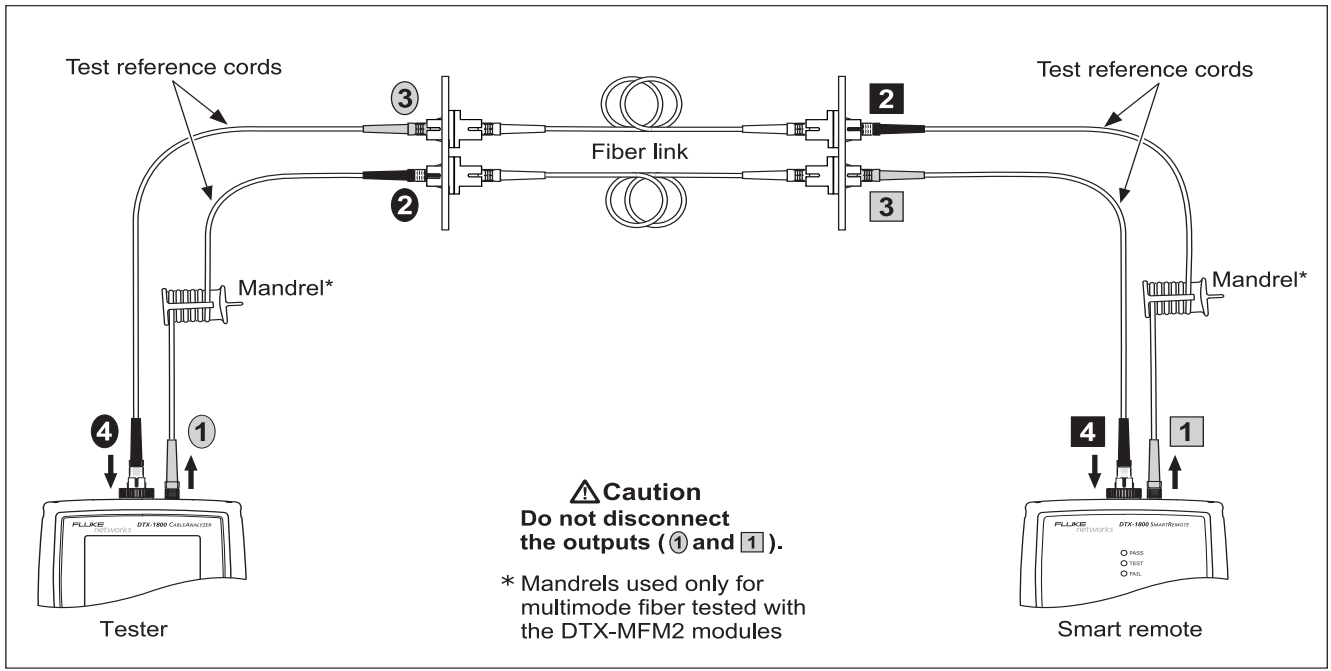


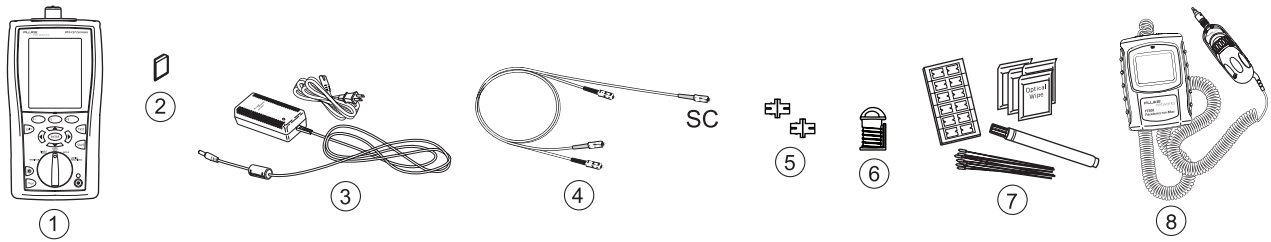
Figure 10. Testing a Fiber Link in Smart Remote Mode (1 Jumper Method)

Autotest in Loopback Mode

Use Loopback mode to test spools of cable and segments of uninstalled cable.

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

Figure 11 shows the equipment required for testing fiber in Loopback mode.



1. Tester with fiber module and connector adapter installed (match connector adapter to the connectors in the link)
2. Memory card (optional)
3. AC adapter with line cord (optional)
4. Test reference cord. Match the fiber to be tested. Long end must have SC connector. For the other connectors, match the connectors in the link.
5. Two singlemode adapters of the appropriate type
6. Mandrel. Recommended when testing multimode fiber with a DTX-MFM2 module. See page 12.
7. Fiber cleaning supplies
8. A microscope for inspecting fiber connectors (the FT500 FiberInspector Mini Video Microscope is shown)

Figure 11. Equipment for Testing in Loopback Mode (1 Jumper Method)

Autotest in Loopback Mode: Set the Reference

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

2 Turn the rotary switch to **SETUP**, then select **Fiber Loss**. Set the following on the **Fiber Loss** tabs (press ▷ to see other tabs):

- **Test Limit**: Select the test limit required for the job. Press F1 **More** to see other lists of limits.
- **Fiber Type:** Select the fiber type to be tested.
- **Remote End Setup**: Set to **Loopback**.
- **Bi-directional**: Enable this if you are required to test the fiber in both directions.
- **Number of Adapters** and **Number of Splices**: Enter the number of adapters and splices that will be added to each direction of the fiber path after the reference is set.
- **Connector Type:** Select the connector type used in the cabling to be tested. Select **General** if the exact type is not listed.
- **Test Method**: Refers to the number of adapters represented in the loss results. Select **1 Jumper** if you use the reference and test connections shown in this manual.

3 Turn the rotary switch to **SPECIAL FUNCTIONS**, then select **Set Reference.** If both a fiber module and a twisted pair or coaxial adapter are attached, select **Fiber Module** next.

4 The **Set Reference** screen shows connections for the test method you selected. Figure 12 shows connections for the 1 Jumper method. Clean and inspect the connectors on the tester and test reference cord, connect the tester's INPUT and OUTPUT ports; then press TEST.

See Table 2 on page 15 for details on settings.

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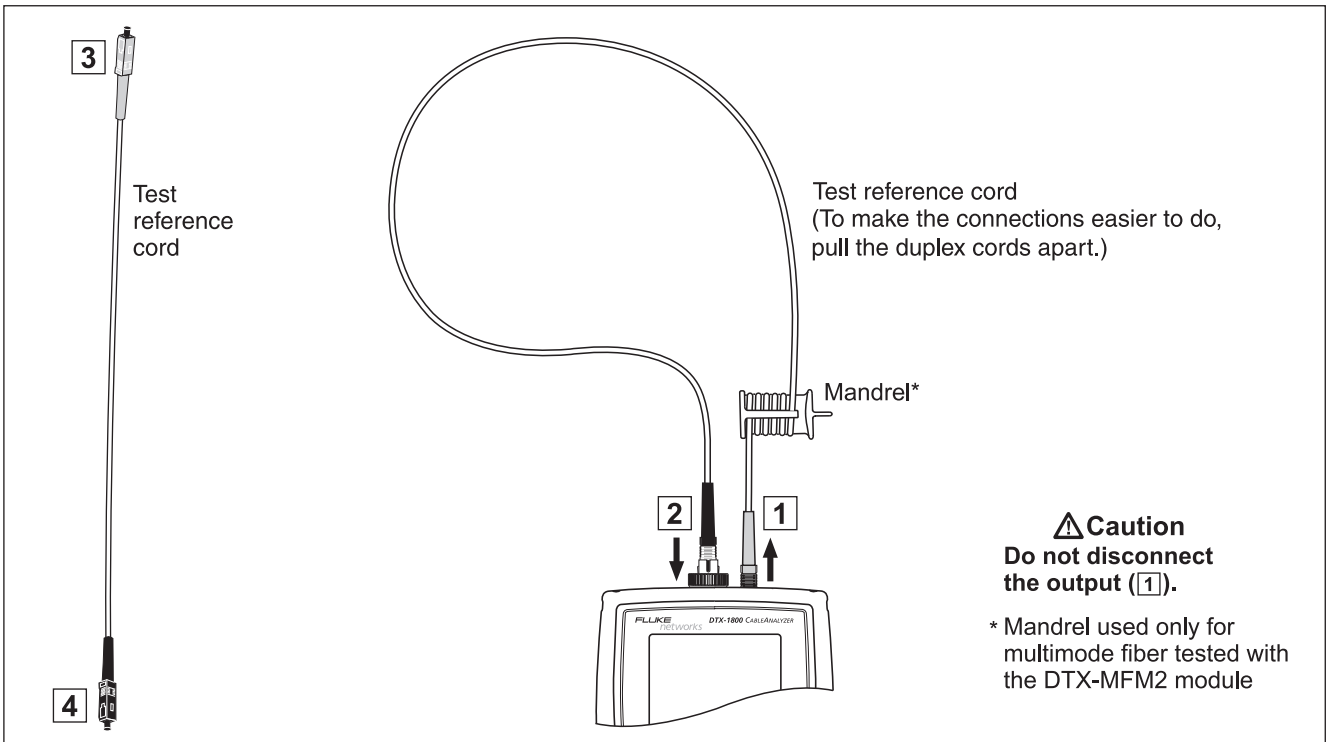

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Figure 12. Setting the Reference in Loopback Mode (1 Jumper Method)

Autotest in Loopback Mode: Make Sure Your Test Reference Cords are Good

⚠Caution

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

5 Disconnect the test reference cord from the INPUT port on the tester.

6 Make the connections shown in Figure 9.

7 Turn the rotary switch to **AUTOTEST**, then press TEST.

8 Press ENTER to see the test result. The result must be no more than these limits:

⚠Caution

An overall result of PASS does not show that the test reference cords are good. You must compare the loss to the limits given here to make sure the cords are good.

Multimode test reference cord:

850 nm: 0.11 dB or less
1300 nm: 0.10 dB or less

(The limits are different because fiber has more loss at 850 nm than at 1300 nm.)

Singlemode test reference cord:

0.20 dB or less for 1310 nm and 1550 nm

9 If a result is more than the limit shown above, use the procedure given in Appendix A to test the cords. When you have good test reference cords, set the reference and do these steps (5 through 9) again before you test a fiber link.

10 Save the test results to show that you used good test reference cords to test the link.

Note

Fluke Networks recommends that you use this procedure to make sure your test reference cords are good before you test each fiber link.

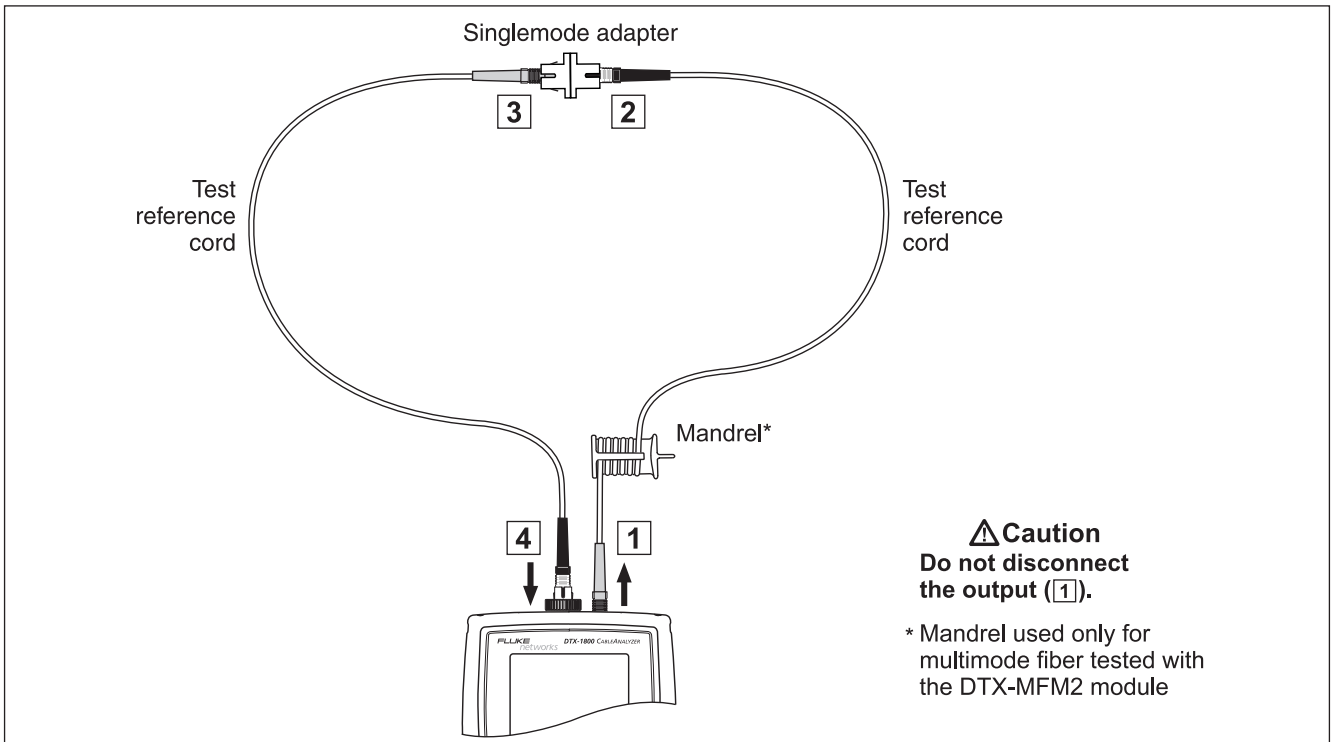


Figure 13. Testing the Test Reference Cords in Loopback Mode

Autotest in Loopback Mode: Test the Fiber

⚠Caution

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

11 Clean and inspect the connectors on the cabling to be tested; then connect to the cabling. The tester shows connections for the test method you selected. Figure 12 shows connections for the 1 Jumper method.

12 Turn the rotary switch to **AUTOTEST**. Verify that the media type is set to **Fiber Loss**. Press F1 **Change Media** to change it if necessary.

13 Press TEST.

14 If bi-directional testing is enabled, the tester prompts you to switch the fibers halfway through the test. Switch the fibers at the adapters (not at the tester's ports).

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

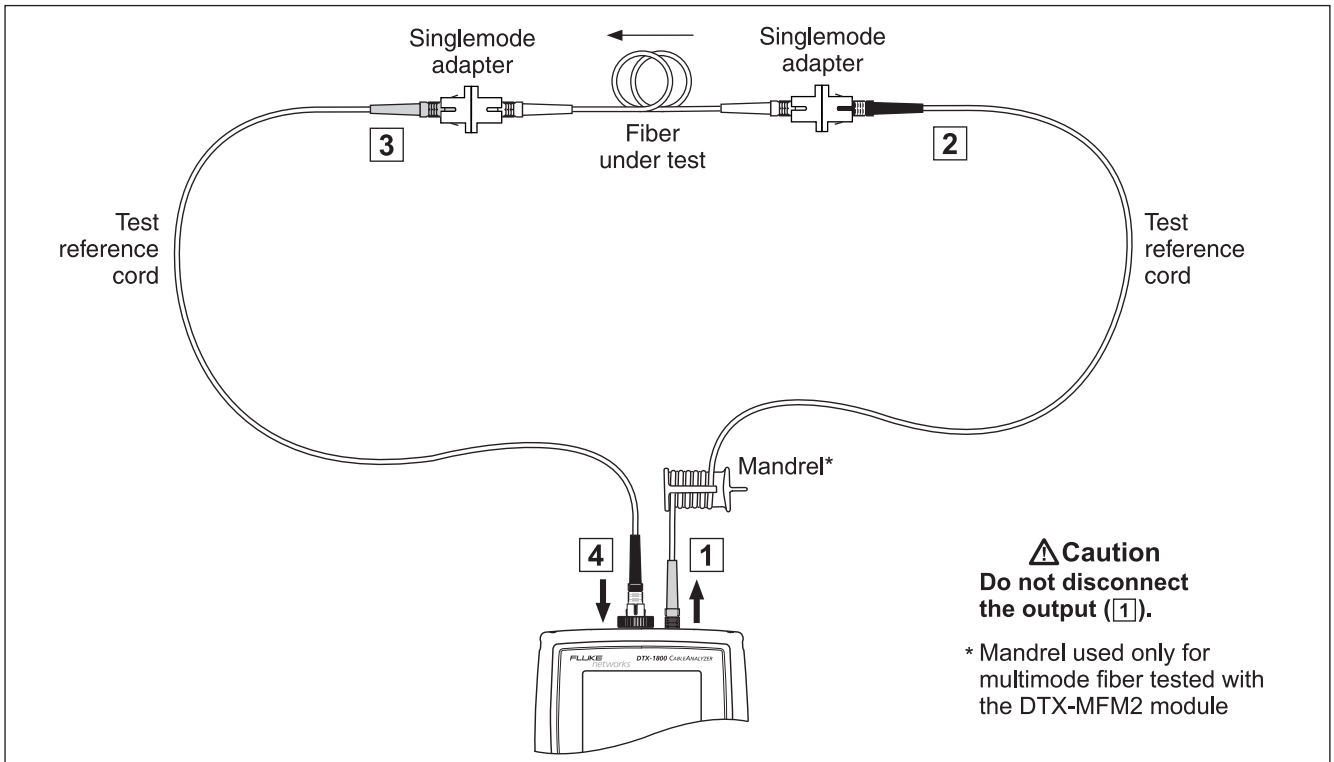
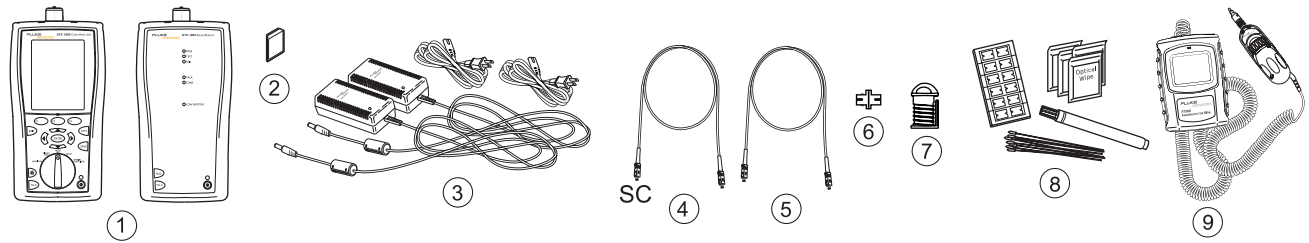


Figure 14. Testing a Fiber in Loopback Mode (1 Jumper Method)

Autotest in Far End Source Mode

Use Far End Source mode to measure loss at one wavelength on individual fibers.

Far End Source mode requires a stand-alone optical source. Figure 15 shows the equipment required for testing fiber in Far End Source mode.



1. Tester and smart remote with fiber modules and connector adapters installed (match connector adapters to the connectors in the link)
2. Memory card (optional)
3. Two AC adapters with line cords (optional)
4. Test reference cord. Match the fiber to be tested. SC connector at one end. Match the link connectors at the other end.
5. Test reference cord. Match the fiber and connectors in the link.
6. Singlemode adapter of the appropriate type.
7. Mandrel. Recommended when testing multimode fiber with a DTX-MFM2 module. See page 12.
8. Fiber cleaning supplies
9. A microscope for inspecting fiber connectors (the FT500 FiberInspector Mini Video Microscope is shown)

Figure 15. Equipment for Testing in Far End Source Mode (1 Jumper Method)

Autotest in Far End Source Mode: Set the Reference

1 Turn on the tester and smart remote and let them sit for 5 minutes. Allow additional time if the modules have been stored above or below ambient temperature. For other sources, warm up according to the manufacturer's recommendations.

2 Turn the rotary switch to **SETUP**, then select **Fiber Loss**. Set the following on the **Fiber Loss** tabs (press ▷ to see other tabs):

- **Test Limit**: Select the test limit required for the job. Press F1 **More** to see other lists of limits.
- **Fiber Type:** Select the fiber type to be tested.
- **Remote End Setup**: Set to **Far End Source**
- **Bi-directional**: Does not apply to Far End Source mode.
- **Number of Adapters** and **Number of Splices**: Does not apply to Far End Source mode.
- **Connector Type:** Select the connector type used in the cabling to be tested. Select **General** if the exact type is not listed.
- **Test Method**: Refers to the number of adapters represented in the loss results. Select **1 Jumper** if you use the reference and test connections shown in this manual.

See Table 2 on page 15 for details on settings.

-continued-

Autotest in Far End Source Mode: Set the Reference (cont.)

3 Hold down the button on the smart remote's fiber module for 3 seconds to turn on the output port at 850 nm (DTX-MFM2/GFM2) or 1310 nm (DTX-SFM2). Press again to switch to 1300 nm (DTX-MFM2), 1310 nm (DTX-GFM2), or 1550 nm (DTX-SFM2).

The LED is red for the shorter wavelength and green for the longer wavelength.

For other sources, verify the output is set to the correct wavelength and is in continuous-wave mode.

4 Turn the rotary switch to **SPECIAL FUNCTIONS**, then select **Set Reference.** If both a fiber module and a twisted pair or coaxial adapter are attached, select **Fiber Module** next.

5 The **Set Reference** screen shows connections for the test method you selected. Figure 16 shows connections for the 1 Jumper method. Clean and inspect the connectors on the tester, test reference cord, and source, connect the tester and source; then press TEST.

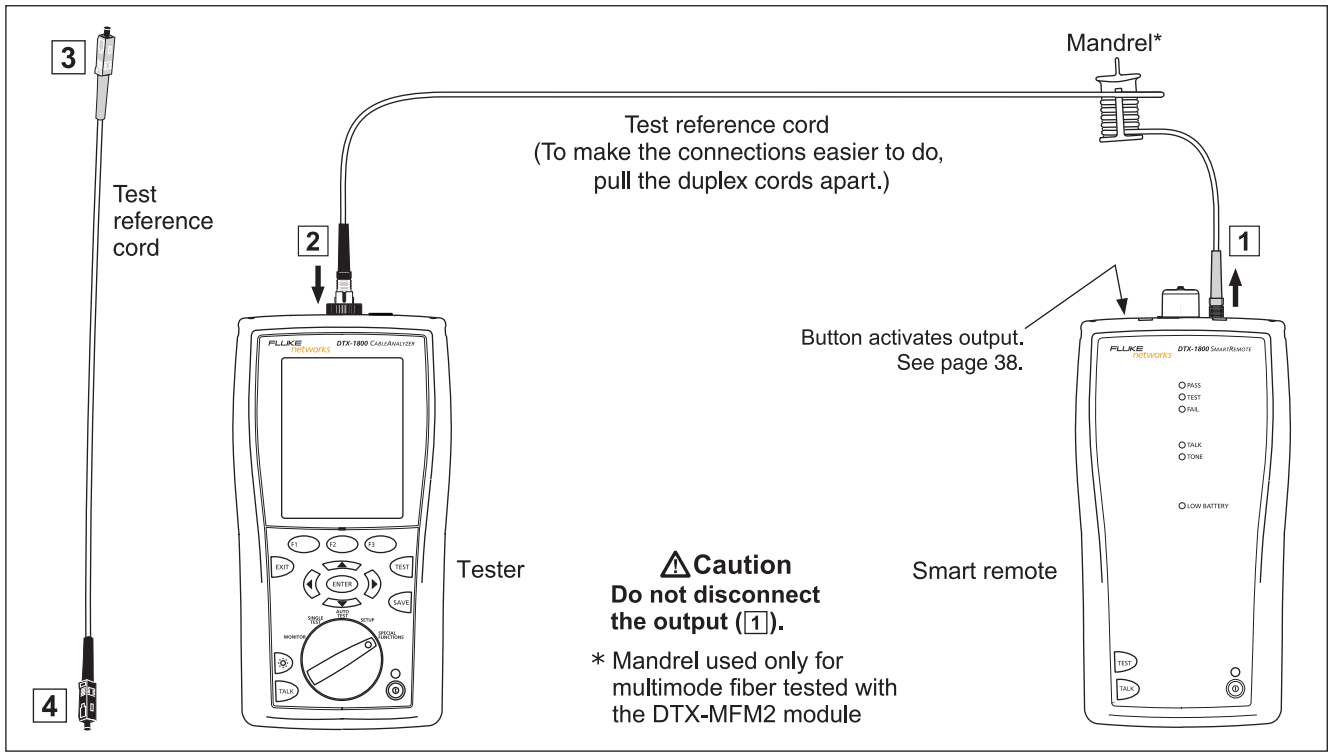


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Figure 16. Setting the Reference in Far End Source Mode (1 Jumper Method)

Autotest in Far End Source Mode: Make Sure Your Test Reference Cords are Good

⚠Caution

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

6 Disconnect the test reference cord from the INPUT port on the tester.

7 Make the connections shown in Figure 9.

8 Turn the rotary switch to **AUTOTEST**, then press TEST.

9 Press ENTER to see the test result. The result must be no more than these limits:

⚠Caution

An overall result of PASS does not show that the test reference cords are good. You must compare the loss to the limits given here to make sure the cords are good.

Multimode test reference cord:

850 nm: 0.11 dB or less
1300 nm: 0.10 dB or less

(The limits are different because fiber has more loss at 850 nm than at 1300 nm.)

Singlemode test reference cord:

0.20 dB or less for 1310 nm and 1550 nm

10 If a result is more than the limit shown above, use the procedure given in Appendix A to test the cords. When you have good test reference cords, set the reference and do these steps (6 through 10) again before you test a fiber link.

11 Save the test results to show that you used good test reference cords to test the link.

Note

Fluke Networks recommends that you use this procedure to make sure your test reference cords are good before you test each fiber link.

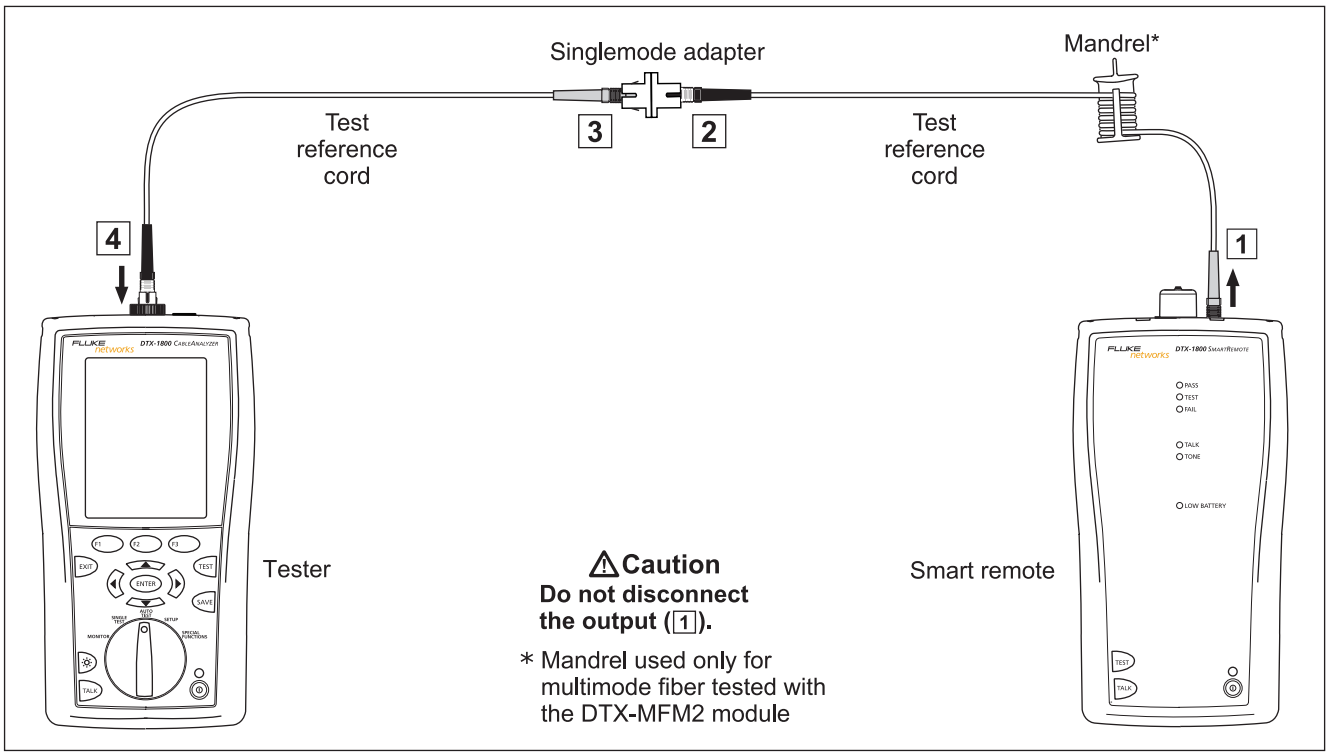

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Figure 17. Testing the Test Reference Cords in Far End Source Mode

Autotest in Far End Source Mode: Test the Fiber

⚠Caution

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

12 Clean and inspect the connectors on the cabling to be tested; then connect the tester and source to the cabling. The tester shows connections for the test method you selected. Figure 18 shows connections for the 1 Jumper method.

13 Turn the rotary switch to **AUTOTEST**, press TEST; then select the wavelength set on the smart remote.

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

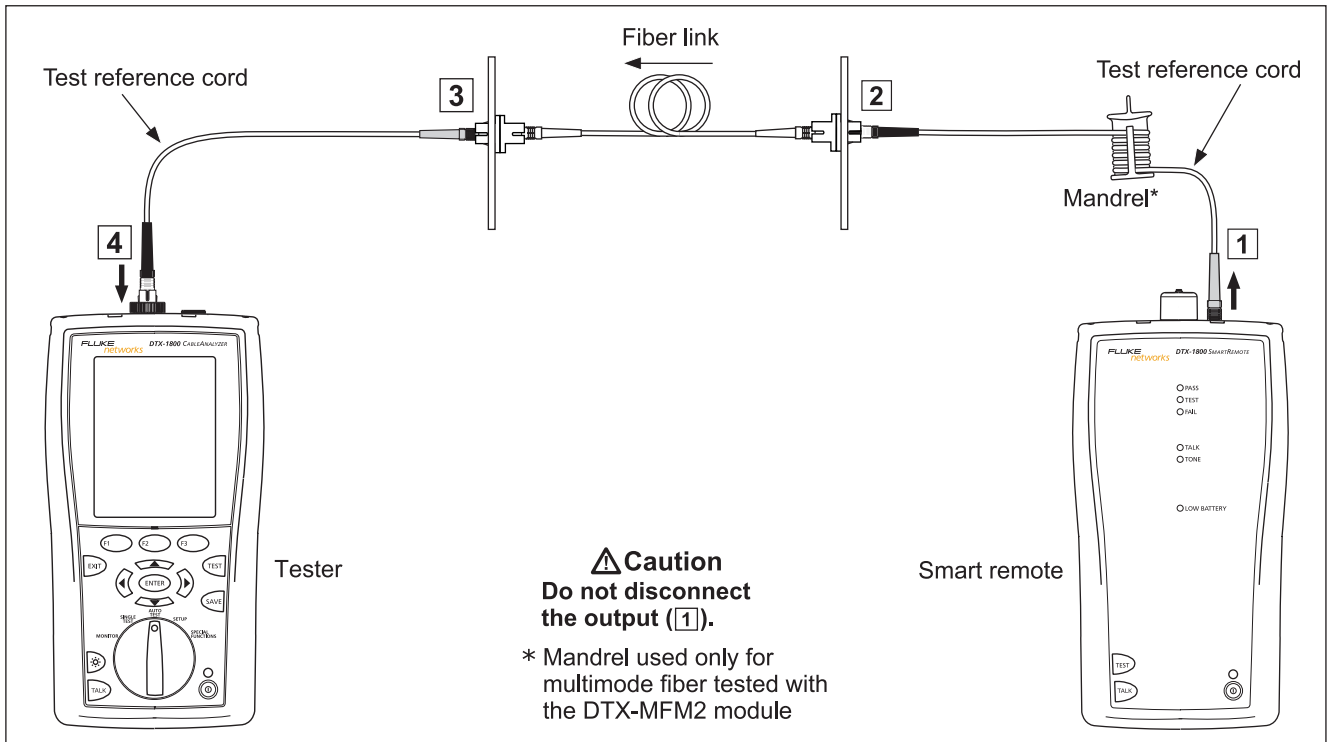


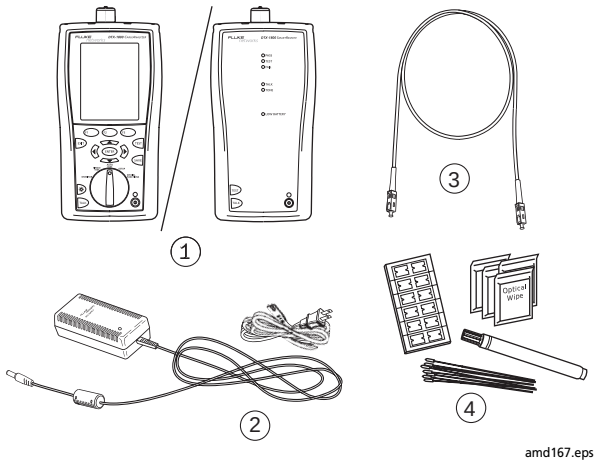
Figure 18. Testing a Fiber Link in Far End Source Mode (1 Jumper Method)

Using the Visual Fault Locator

The fiber module includes a visual fault locator that helps you quickly check fiber continuity, trace fibers, and locate faults along fibers and in connectors.

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

Figure 19 shows the equipment needed for using the visual fault locator.



1. Tester or smart remote with fiber module
2. AC adapter with line cord (optional)
3. One test reference cord. Match fiber and connectors to be tested; SC, ST, or FC at tester end. (optional)
4. Fiber cleaning supplies

Figure 19. Equipment for Using the Visual Fault Locator

Using the Visual Fault Locator

1. Clean the connectors on the test reference cord, if used, and the fiber to be tested.
2. Connect the fiber directly to the tester's VFL port or connect using the test reference cord.
3. Turn on the visual fault locator by pressing the button near the VFL connector, as shown in Figure 20. Press again to switch to flashing mode. Press again to turn off the locator.
4. Look for the red light to locate fibers or faults (Figure 20):
   - To check continuity or trace fiber connections, look for the red light at the end of the fiber. View the VFL's light indirectly by holding a white card or paper in front of the fiber connector emitting the light.
   - To locate faults, move along the fiber from either end, looking for a red glow coming from the fiber jacket or a connector housing.

Note

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

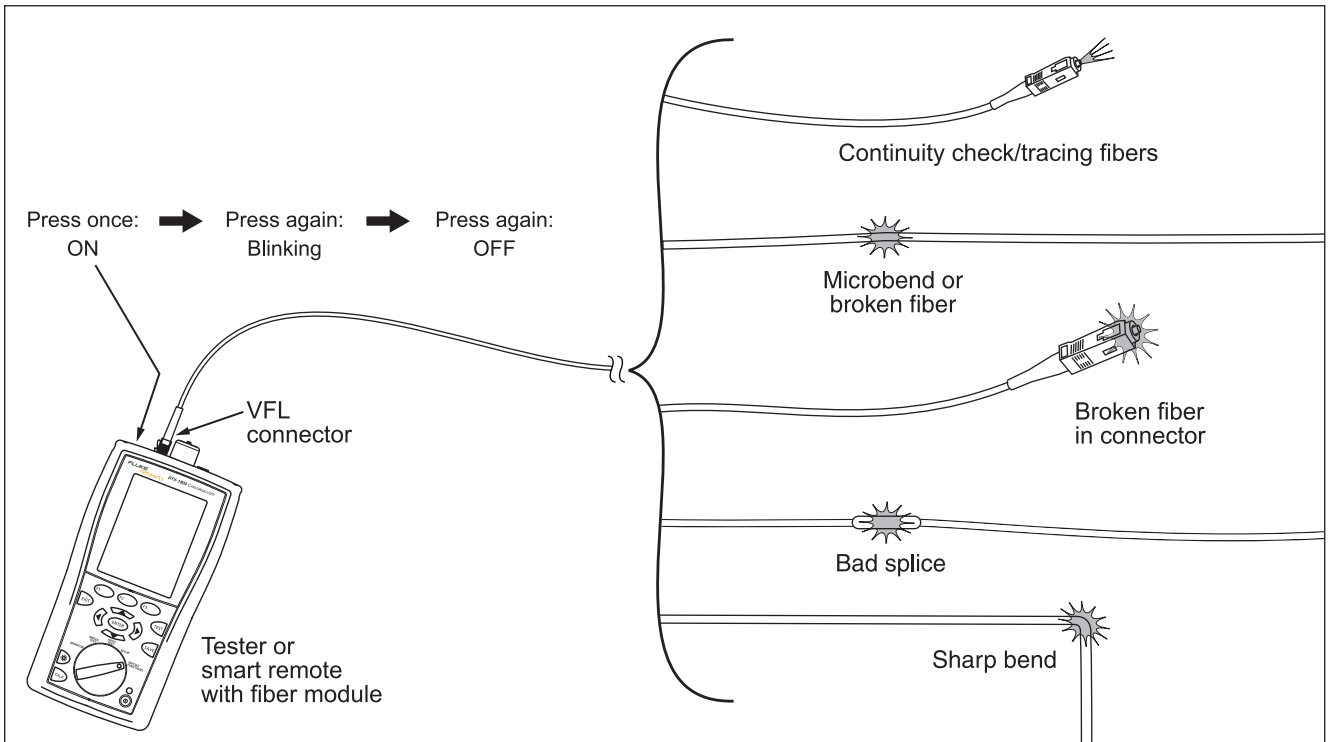


Figure 20. Using the Visual Fault Locator

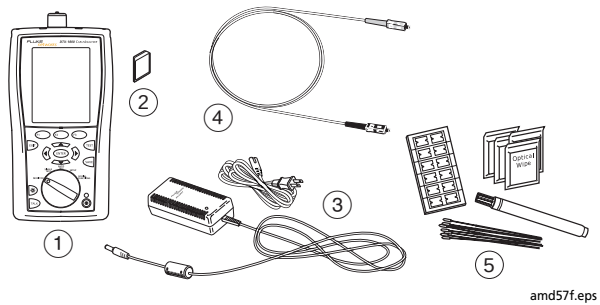
Monitoring Optical Power

The power meter lets you monitor the optical power produced by a source such as an optical network interface card or optical test equipment.

The tester offers two versions of the power meter function:

- **SINGLE TEST** mode: Takes one power measurement at 850 nm and 1300 nm (DTX-MFM2), 850 nm and 1310 nm (DTX-GFM2), or 1310 nm and 1550 nm (DTX-SFM2). You can save the power measurement in this mode.
- **MONITOR** mode: Monitors power continuously at the input port at 850 nm, 1300 nm, 1310 nm, or 1550 nm. This measurement cannot be saved.

Figure 21 shows the equipment required for monitoring power in the **MONITOR** mode.



1. Tester with fiber module
2. Memory card (optional for **SINGLE TEST** mode)
3. AC adapter with line cord (optional)
4. One test reference cord (match fiber used in installation, SC at tester end)
5. Fiber cleaning supplies

Figure 21. Equipment for Monitoring Optical Power

Monitoring Optical Power

1. Clean the tester's input port and the test reference cord and source connectors.
2. Use the test reference cord to connect the source to the tester's input port, as shown in Figure 22. Turn on the source.
3. Turn the rotary switch to **MONITOR**. If the media type is not set to **Fiber Loss**, press F1 **Change Media** to change it.
4. Select **Power Meter**. You do not need to select a fiber type or test limit.
5. Select the correct wavelength; then press TEST.

   To change the wavelength after starting the test, press F3 **Change** λ.

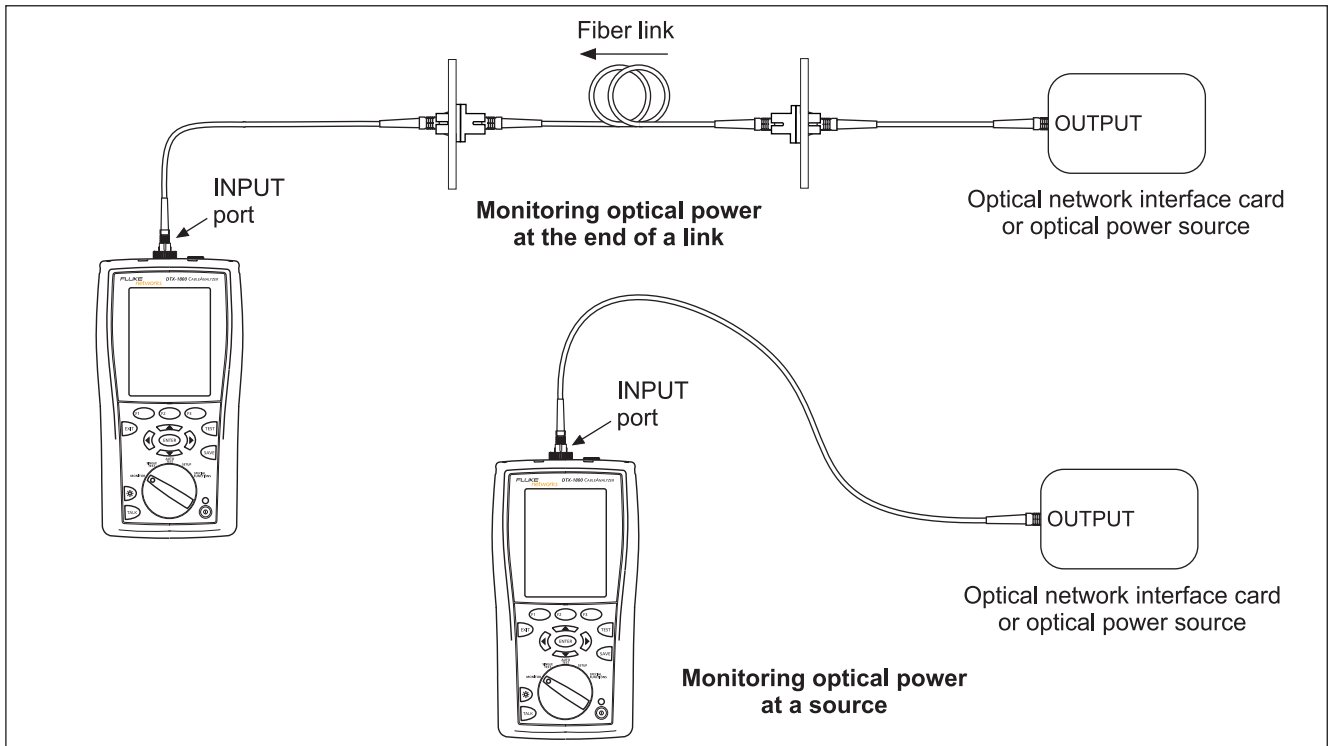


Figure 22. Connections for Monitoring Optical Power

Options and Accessories

For a complete list of options and accessories visit the Fluke Networks website at **www.flukenetworks.com**.

To order options or accessories, contact Fluke Networks as described on page 2.

Maintenance

Follow the maintenance procedures given in the *DTX Series CableAnalyzer Users Manual*.

Clean the optical connectors as described on page 10.

Replacing Fiber Test Reference Cords

Choose replacement fiber optic test reference cords that meet the following requirements:

- They meet the requirements of ISO/IEC 14763-3.
- Core and cladding size: match the fiber to be tested
- Connector polish: PC or UPC. Use APC only for tests on cabling with APC connectors.
- Test reference cord length: maximum 5 m

To ensure optimum performance from your tester, get replacement test reference cords from Fluke Networks.

Using the Smart Remote with an OptiFiber™ Certifying OTDR

You can use a DTX Series smart remote with a DTX-MFM2 or DTX-SFM2 fiber module as the remote for a Fluke Networks OptiFiber Certifying OTDR. The DTX remote takes the place of a second OptiFiber tester for measuring loss and length with the OptiFiber loss/length option in Smart Remote mode. You can buy a smart remote separately for this purpose. See the Fluke Networks website or contact Fluke Networks for details.

Certification, Compliance, and Regulatory Information

Conforms to relevant Australian standards

Conforms to relevant European Union directives.

Listed by the Canadian Standards Association.

Laser safety

OUTPUT port: Class 1
VFL port: Class 2
Complies with EN60825-1 and EN61010-1 (CE) and CFR21

Appendix A: How to Test Your Test Reference Cords

Why You Must Do this Test

To get accurate measurements of loss, you must use high-quality test reference cords that are in good condition and comply with ISO/IEC 14763-3. Measurements of optical power loss are very much affected by the condition of the endfaces on the fiber connectors. Dirty endfaces and endfaces with damage are the most common causes of problems in fiber links.

When You Must Do this Test

Test your test reference cords at these times:

- At the start of each day
- When you move your equipment to a different area
- When you change your equipment to test links that have a different type of connector

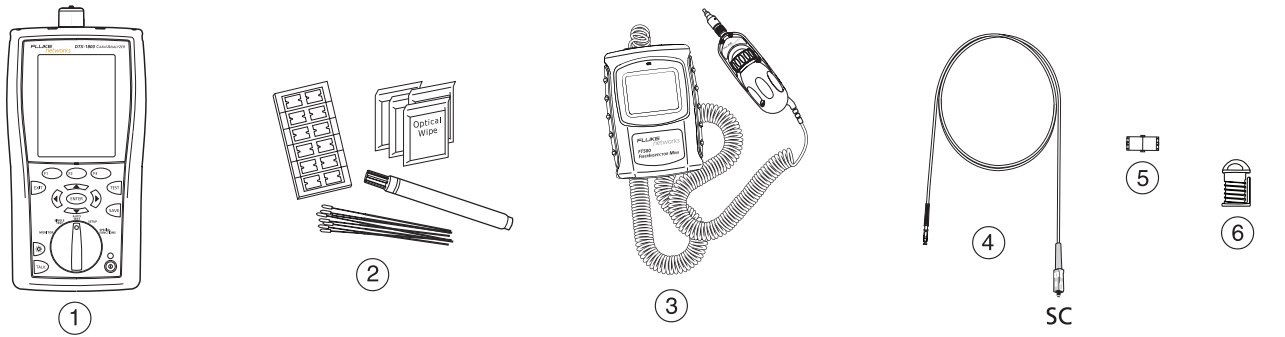
After you do the test given in this Appendix, use the procedure given with the procedures for certifying cabling to monitor the condition of the cords.

Equipment You Must Have

Figure A-1 shows the equipment you must have to test your test reference cords.

⚠ Caution

To do this procedure, you must have a fiber microscope. You cannot be sure that your cords are good unless you can examine the endfaces on the connectors. An endface that is dirty or has damage can give a good loss measurement, but can cause problems later. See Figure A-2.



1. Tester with a fiber module and a connector adapter installed. Use the connector adapter that connects to the cords you will test.
2. Fiber cleaning supplies
3. A microscope for inspecting fiber connectors (the FT500 FiberInspector Mini Video Microscope is shown)
4. A test reference cord that you are sure is good. One connector is SC. The other connector is the same as on the cords you will test.
5. Singlemode adapter for the connectors on the cords you will test
6. You must use a mandrel when you test multimode fiber. Select the correct size for the fiber you will test.

Figure A-1. Equipment for Testing the Test Reference Cords

1. Set Up the Tester

1-1 Turn on the tester. Wait for a minimum of 5 minutes for the tester to become stable. Wait for a longer time if the tester is much colder or hotter than the work area.

1-2 Turn the rotary switch to **SETUP**, then make these settings:

- **Test Limit**: Select the applicable limit:

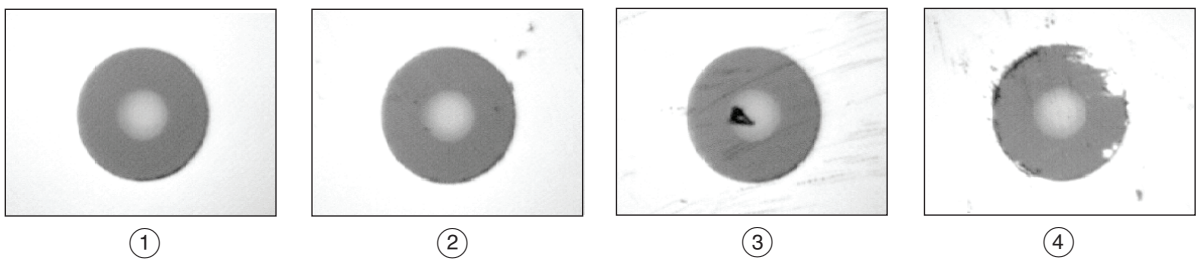
Standard	Test Limit for Multimode	Test Limit for Singlemode
ANSI/TIA-568-C	TIA-568-C Multimode	TIA-568-C Singlemode ISP
ISO/IEC 14763-3	ISO/IEC 14763-3	ISO/IEC 14763-3

- **Fiber Type**: Select the type of cable you will test. This sets the index of refraction (n). The test limits shown above use n to calculate the length of the fiber, then they use the length to calculate the limit for loss. Thus, you must use the correct value of n to get an accurate measurement of loss. If you cannot find the correct fiber type, you can enter the value of n for your fiber on tab 3 of the setup menus. Get the value of n from the cable vendor.
- **Remote End Setup**: **Loopback**
- **Bi-Directional: Yes**
- **Number of Adapters**: **1**
- **Connector Type**: Select the type of connector that is on the cords you will test
- **Test Method**: **1 Jumper**

2. Clean and Inspect the Connectors

2-1 Test reference cords must have endfaces that are clean and have no damage. Always use correct procedures to clean endfaces. See page 10 or use the procedures given with your cleaning supplies.

2-2 After you clean an endface, use a fiber microscope to examine the endface. Figure A-2 shows examples of what you can see with a fiber microscope.



1. A clean endface that has no damage. This is the only condition that you can accept for a test reference cord.
2. Dirt that is not on the core does not change the loss measurement, but the dirt can move when you connect the fiber.
3. Dirt is on the core. Also, there are scratches that were caused by incorrect procedures for cleaning.
4. The cladding has damage. This does not change the loss measurement, but can cause damage to other endfaces.

Figure A-2. Examples of Fiber Endfaces

3. Set the Reference

3-1 Make the connections shown in Figure A-3.

3-2 Turn the rotary switch to **SPECIAL FUNCTIONS**, then select **Set Reference.** If both a fiber module and a twisted pair or coaxial adapter are attached, select **Fiber Module** next.

3-3 Make sure that the reference value is good:

- For 50/125 µm fiber, the reference value must be better than -24.50 dBm (for example, -23.50 dBm is a better value)
- For 62.5/125 µm fiber, the reference value must be better than -20.00 dBm (for example, -19.50 dBm is a better value)
- For 9/125 µm fiber, the reference value must be better than -8.00 dBm (for example, -7.50 dBm is a better value)

If the value is not good, do the reference procedure again with a different test reference cord.

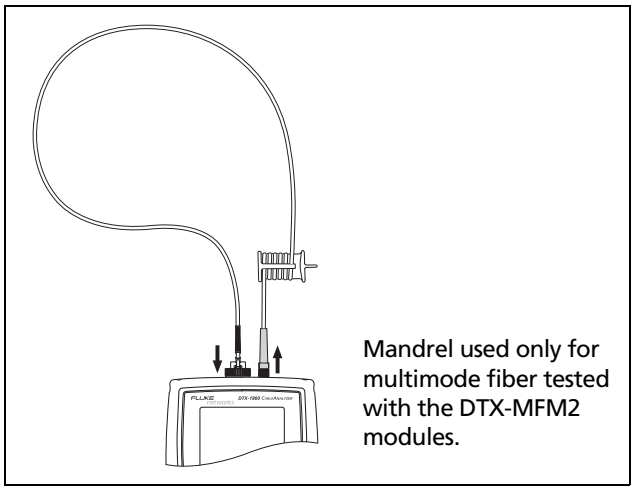


Figure A-3. Reference Connections

4. Test the Cord in Both Directions

4-1 Disconnect the test reference cord from the INPUT port of the tester (Figure A-4, ①).

4-2 Connect the cord you want test (Figure A-4, ②).

4-3 Turn the rotary switch to **AUTOTEST**, then press TEST. This test measures the loss of connector A shown in Figure A-4.

4-4 When the first part of the test is completed, connect the cord in the opposite direction (Figure A-4, ③).

4-5 Press F2 **OK**. This test measures the loss of connector B shown in Figure A-4.

5. Read the Loss Measurements

Compare the loss measurement for each direction to these limits:

- Multimode test reference cord: 0.10 dB or less
- Singlemode test reference cord: 0.20 dB or less

If the connectors show no contamination or damage, but the loss is higher than these limits, the cord does not comply with ISO/IEC 14763-3. Do not use the cord as a test reference cord.

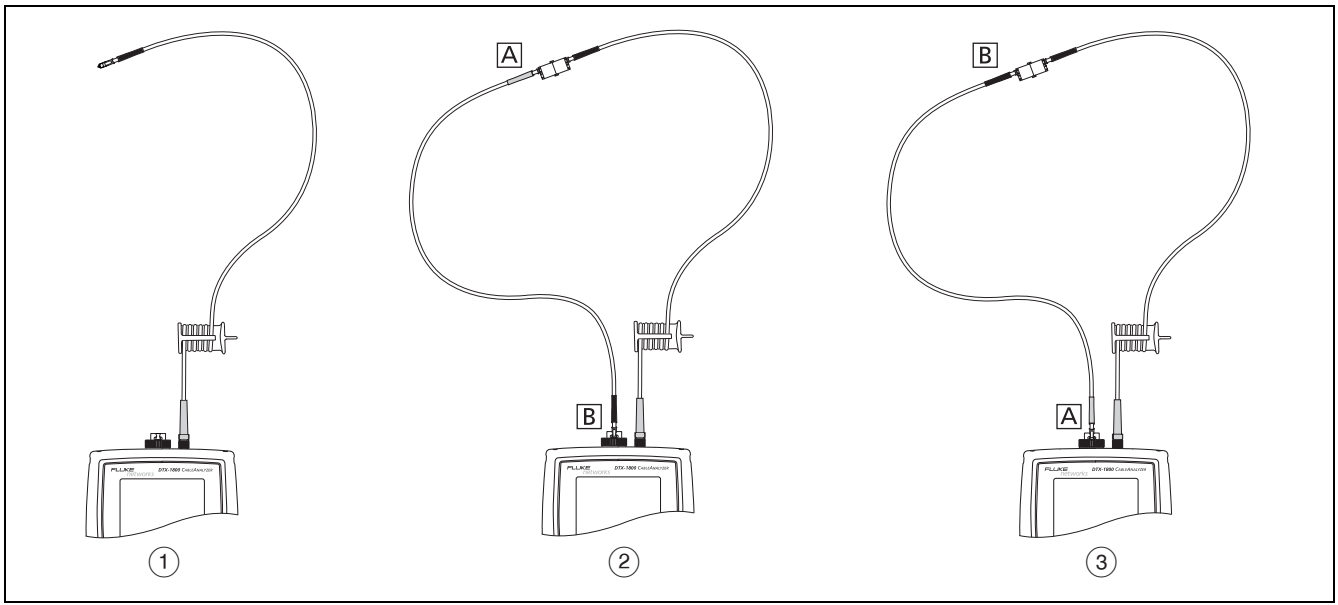


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Figure A-4. Connections for Testing a Test Reference Cord

Appendix B: Test Method Names

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

Table B-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 C: Modified 1 Jumper Method

This Appendix shows modified reference and test connections that produce 1 Jumper results. Use these connections if you need 1 Jumper results but do not have connector adapters that match the connectors in the fiber under test. This method lets you connect to the fiber without disturbing the fiber modules' output connections after setting the reference.

Figures C-1and C-2 show reference and test connections for a fiber with MT-RJ connectors.

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

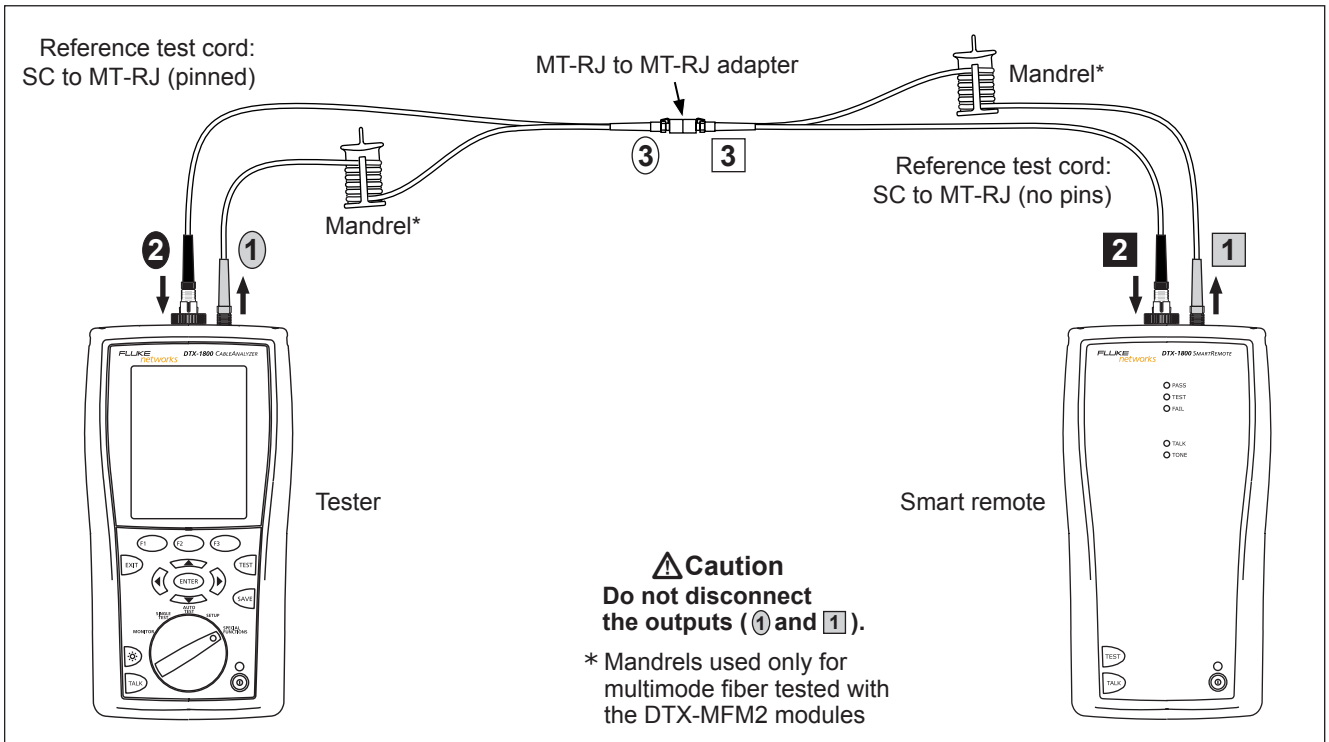

Figure C-1. Modified 1 Jumper Method: Smart Remote Mode Reference Connections

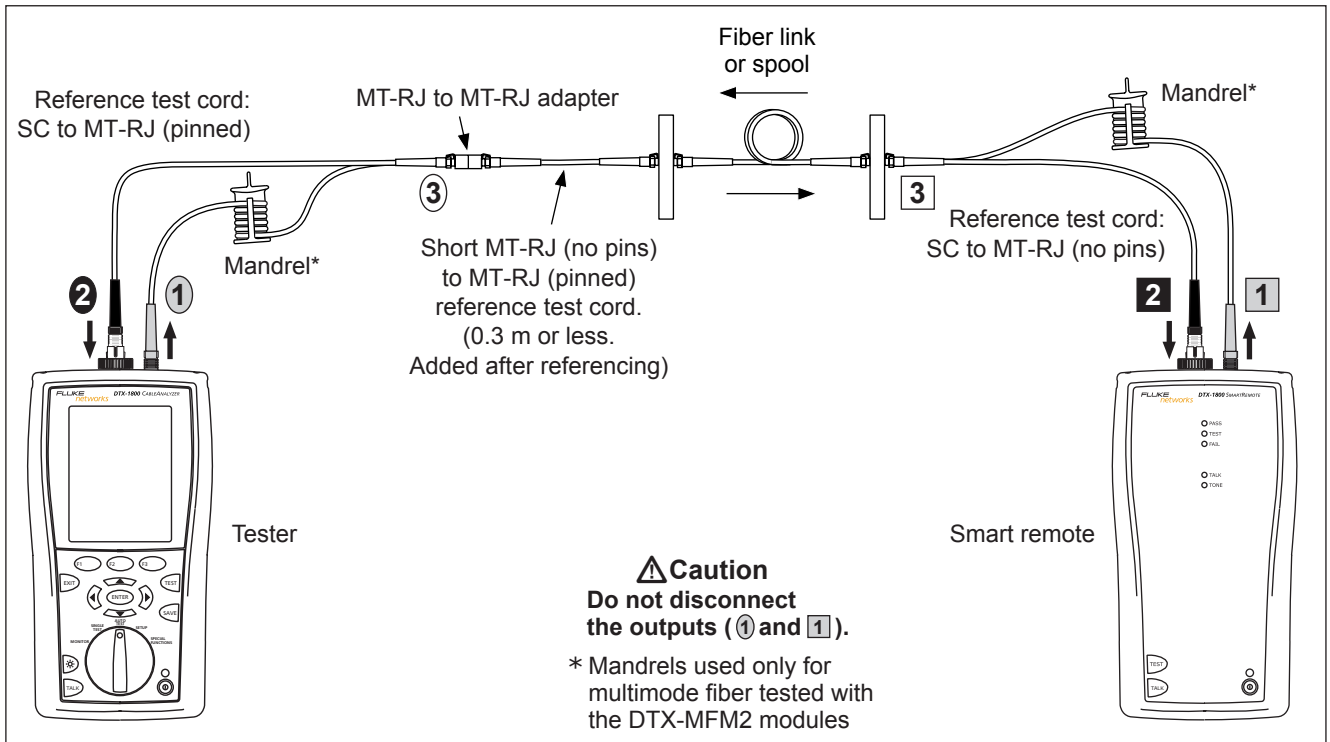

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Figure C-2. Modified 1 Jumper Method: Smart Remote Mode Test Connections

Index

Numerics

1 Jumper method
  modified, 63
  standard, 20
1, 2, 3 Jumper, 18

—A—

accessories, 3
Autotest
  Far End Source mode, 36
  Loopback mode, 28
  Smart Remote mode, 20

—B—

Bi-Directional, 16

—C—

cautions, 4
cleaning
  connectors and adapters, 10
connections
  alternate, 18
  See also Smart Remote, Loopback, or Far End Source mode
connector adapter
  cleaning, 10
  illustration of SC, ST, LC, and FC, 8
  installation, 8
Connector Type, 16
Custom Fiber Type and Test Limit, 15
customer support, 2

—F—

Far End Source mode, 37
FC connector adapter, 8
Fiber Type, 15
Fluke Networks
  contacting, 2
  Knowledge Base, 2

—I—

index of refraction, 19
installation and removal, 6

—K—

Knowledge Base, 2

—L—

LC connector adapter, 8
Loopback mode, 30
loss is negative, 11

—M—

mandrels, 12
Method 1 Jumper, 2 Jumper, 3
  Jumper, 18
MT-RJ, 20

—N—

n, 19
negative loss, 11
Number of Adapters, 16
Number of Splices, 16

—O—

Open (Smart Remote mode), 26

—P—

patch cord See test reference cord
Patch Lengths, 19
power meter, 47

—R—

reference
  alternate connections, 18
  Far End Source mode, 38
  Loopback mode, 30
  Smart Remote mode, 22
  when to set, 11
registration, 1
Remote End Setup, 15

—S—

safety, 4
SC connector adapter, 8
settings, 15
SFF connectors, 18
small form-factor connectors, 18
Smart Remote mode, 22
ST connector adapter, 8

—T—

Test Limit, 15
Test Method, 18, 61
test reference cord
  cleaning, 11
  replacement, 50
  testing, 12, 53

—U—

Unknown (Smart Remote mode), 26

—V—

visual fault locator, 44

—W—

warnings, 4