



DTX Series

CableAnalyzer™

Technical Reference Handbook

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Table of Contents

Chapter	Title	Page
1	Getting Acquainted	1-1
	Overview of Features.....	1-1
	Registration.....	1-2
	Contacting Fluke Networks.....	1-2
	Additional Resources for Cable Testing Information.....	1-3
	Unpacking	1-3
	DTX-1800	1-3
	DTX-1200	1-4
	DTX-LT	1-4
	DTX-MFM2 Multimode Fiber Modules (optional)	1-5
	DTX-GFM2 Multimode Fiber Modules (optional)	1-5
	DTX-SFM2 Singlemode Fiber Modules (optional).....	1-5
	Safety Information.....	1-6
	Basic Features.....	1-8
	Physical Features	1-8
	Changing the Language	1-14
	Powering the Tester.....	1-14

	About Link Interface Adapters and Modules	1-18
	Verifying Operation.....	1-21
	Checking the Hardware and Software Versions	1-22
	The Main Autotest Screen.....	1-22
	Setting User Preferences	1-24
	Changing the Date, Time, and Date/Time Formats.....	1-24
	Changing the Length Units.....	1-24
	Changing the Numeric Format	1-24
	Adjusting the Display Contrast	1-25
	Setting the Power Down Timer	1-25
	Setting the Backlight Timer	1-25
	Enabling or Disabling the Beeper.....	1-26
	Overview of Memory Features	1-26
	Inserting and Removing the Memory Card.....	1-26
	Formatting the Memory Card (DTX-1800 and DTX-1200) or Internal Memory... ..	1-26
	Creating Folders.....	1-27
	Setting the Storage Location (DTX-1800 and DTX-1200)	1-28
	Options for Entering Cable IDs	1-28
	Using the Talk Mode	1-30
	About LinkWare and LinkWare Stats Software	1-30
2	Tutorials on Setup and Test Procedures	2-1
	Preparing to Save Tests	2-1
	Step 1: Checking the Memory Space Available.....	2-1
	Step 2: Entering Job Information.....	2-2
	Step 3: Setting the Storage Location (DTX-1800 and DTX-1200)	2-4
	Step 4: Setting Up a Job Folder.....	2-4
	Step 5: Selecting a Cable ID Source.....	2-5

	Certifying Twisted Pair Cabling.....	2-5
	Required Equipment.....	2-6
	Step 1: Checking the Battery Status and Verifying Operation with Twisted Pair Adapters.....	2-7
	Step 2: Selecting a Test Limit, Cable Type, and Outlet Configuration	2-8
	Step 3: Running the Autotest.....	2-8
	Step 4: Viewing the Autotest Results.....	2-11
	Step 5: Saving the Results	2-12
	Certifying Fiber Cabling.....	2-12
	Required Equipment.....	2-12
	Step 1: Installing the Fiber Modules.....	2-14
	Step 2: Checking the Battery Status and Verifying Operation with Fiber Modules.....	2-14
	Step 3: Selecting a Fiber Type and Test Limit	2-15
	Step 4: Configuring the Fiber Test	2-16
	Step 5: Setting the Reference	2-16
	Step 6: Running the Test.....	2-18
	Step 7: Viewing the Results	2-19
	Step 8: Saving the Results	2-19
	Using the Auto Increment and Sequential Cable ID Features	2-20
	Using the Auto Increment Feature.....	2-20
	Creating a List of Sequential IDs	2-21
	About ANSI/TIA/EIA-606-A Cable IDs.....	2-24
3	Certifying Twisted Pair Cabling	3-1
	Setting the Reference	3-1
	Testing Twisted Pair Patch Cords	3-2
	Twisted Pair Test Settings.....	3-3

	Autotest on Twisted Pair Cabling	3-6
	Twisted Pair Autotest Results	3-9
	Automatic Diagnostics.....	3-11
	PASS*/FAIL* Results	3-12
	Wire Map	3-13
	Resistance.....	3-15
	Characteristic Impedance	3-15
	Length	3-16
	Propagation Delay and Delay Skew.....	3-17
	Insertion Loss	3-18
	NEXT (Near-End Crosstalk)	3-20
	ACR (Attenuation to Crosstalk Ratio)	3-22
	Return Loss.....	3-24
	PSNEXT (Power Sum Near End Crosstalk) Test	3-26
	PSACR (Power Sum Attenuation to Crosstalk Ratio) Test.....	3-26
	ELFEXT (Equal Level Far-End Crosstalk) Test	3-26
	PSELFEXT Test	3-29
	Running Single Tests	3-29
	Monitoring Impulse Noise.....	3-31
	Using the Tone Generator	3-34
4	Certifying Coaxial Cabling	4-1
	Setting the Reference.....	4-1
	Coaxial Test Settings.....	4-3
	Autotest on Coaxial Cabling	4-5
	Coaxial Autotest Results.....	4-9
	HDTDR Analyzer	4-10
	Resistance.....	4-10

	Impedance	4-10
	Length.....	4-11
	Propagation Delay	4-11
	Insertion Loss.....	4-11
	Running Single Tests.....	4-11
5	Diagnosing Copper Cabling Faults	5-1
	Using the Automatic Diagnostics.....	5-1
	Avoiding Tester-Induced Failures.....	5-1
	Common Causes of Copper Cabling Failures.....	5-2
	The HDTDX Analyzer	5-9
	Running the HDTDX Analyzer	5-9
	Recognizing Faults on HDTDX Plots.....	5-11
	The HDTDR Analyzer	5-12
	Running the HDTDR Analyzer	5-12
	Recognizing Faults on HDTDR Plots	5-12
6	Certifying Fiber Optic Cabling.....	6-1
	Overview of Features.....	6-1
	Safety Information.....	6-2
	Installing and Removing Fiber Modules	6-4
	Installing the Connector Adapter	6-6
	Verifying Operation.....	6-8
	Essentials for Reliable Fiber Test Results.....	6-8
	Cleaning Connectors and Adapters.....	6-8
	About Setting the Reference.....	6-10
	Selecting Reference Test Cords.....	6-11
	Testing Your Reference Test Cords	6-11

	Using Mandrels for Testing Multimode Fiber	6-12
	Fiber Test Settings	6-14
	About Method B Connections	6-18
	Autotest in Smart Remote Mode.....	6-19
	Setting the Reference for Smart Remote Mode	6-20
	Running the Autotest in Smart Remote Mode	6-22
	Smart Remote Mode Autotest Results.....	6-24
	Autotest in Loopback Mode	6-26
	Setting the Reference in Loopback Mode.....	6-28
	Running the Autotest in Loopback Mode.....	6-30
	Loopback Mode Autotest Results	6-32
	Autotest in Far End Source Mode.....	6-34
	Setting the Reference in Far End Source Mode	6-36
	Running the Autotest in Far End Source Mode	6-38
	Far End Source Mode Autotest Results.....	6-40
	Bi-Directional Testing.....	6-42
	Bi-Directional Results for Smart Remote Mode	6-42
	Bi-Directional Results for Loopback Mode	6-42
	Finding Connections with FindFiber.....	6-44
	Using FindFiber in Smart Remote Mode.....	6-44
	Using FindFiber in Loopback Mode	6-48
	Using the Power Meter	6-50
	Running Single Tests	6-54
	Using the Remote Tester with an OptiFiber™ Tester	6-54
7	Locating Fibers and Faults with the Visual Fault Locator	7-1
	Visual Fault Locator Applications	7-1
	Using the Visual Fault Locator	7-2

8	Diagnosing Fiber Cabling Faults	8-1
	Common Causes of Failures.....	8-1
	Diagnosing Failures.....	8-2
9	Verifying Network Service	9-1
	Overview of Features.....	9-1
	Software Requirements	9-1
	Installing and Removing the Network Module and Optional SFP Module	9-2
	Verifying Network Connectivity.....	9-4
	Network Connectivity Test Settings	9-4
	Entering Ping Addresses	9-5
	Running the Connectivity Test	9-6
	Saving Connectivity Results	9-6
	Pinging Network Devices.....	9-11
	Monitoring Network Traffic.....	9-12
	Blinking a Port Light	9-14
	Identifying Links (twisted pair only)	9-14
	Diagnosing Low-Level Network Problems	9-16
10	Custom Test Settings.....	10-1
	Creating a Custom Twisted Pair Cable Type.....	10-1
	Creating a Custom Fiber Type	10-3
	Creating a Custom Twisted Pair Test Limit	10-4
	Creating a Custom Fiber Limit.....	10-5
	Creating a Custom Outlet Configuration	10-6
	Editing Custom Settings	10-7
	Deleting Custom Settings	10-7

	Changing the NVP	10-8
	Setting the NVP to a Specified Value	10-8
	Determining a Cable's Actual NVP.....	10-9
	Resetting the NVP to the Default Value.....	10-10
	Transferring Custom Settings Between Testers	10-10
11	Memory Functions	11-1
	Storage Locations and Capacities	11-1
	Checking the Memory Status.....	11-2
	Setting the Storage Location (DTX-1800, DTX-1200).....	11-3
	Working with Folders.....	11-3
	Creating a New Folder.....	11-3
	Changing Folders.....	11-4
	Deleting Folders.....	11-4
	Viewing and Managing Saved Results	11-5
	Moving or Copying Results to a Memory Card (DTX-1800, DTX-1200).....	11-6
	Deleting Results	11-6
	Sorting Results	11-7
	Formatting a Memory Card (DTX-1800, DTX-1200) or Internal Memory	11-7
	Memory Card Care (DTX-1800, DTX-1200)	11-8
	Uploading Results to a PC.....	11-9
12	Maintenance and Specifications	12-1
	Maintenance.....	12-1
	Reference Procedure for Link Interface Adapters.....	12-1
	Factory Calibration	12-2
	Updating the Tester's Software	12-2
	Cleaning	12-6

Retraining the Battery Gauge	12-6
Replacing the Battery	12-7
Fiber Module Maintenance	12-7
Storage	12-8
If Something Seems Wrong.....	12-8
Options and Accessories	12-11
Specifications.....	12-15
Environmental and Regulatory Specifications.....	12-15
Service Calibration Period.....	12-16
Standard Link Interface Adapters	12-16
Cable Types Tested.....	12-16
Time for Autotest.....	12-17
Summary of Performance Specifications	12-17
Length.....	12-17
Propagation Delay	12-18
Delay Skew	12-18
DC Loop Resistance Test	12-18
Measurement Accuracy.....	12-22
HDTD TM X Analyzer Specifications for Cables <100 m (328 ft)	12-27
HDTDR TM Analyzer Specifications for Cables <100 m (328 ft).....	12-27
Characteristic Impedance.....	12-27
Impulse Noise	12-27
DTX-COAX Coaxial Adapter Specifications.....	12-28
DTX-NSM Module Specifications	12-30
DTX-MFM2/SFM2/GFM2 Fiber Module Specifications	12-31
Visual Fault Locator.....	12-35
Tone Generator.....	12-35
Power	12-36

Power	12-36
Electromagnetic Compatibility	12-36
Input Ratings.....	12-36
Certification and Compliance	12-36
CSA Standards.....	12-37
Safety.....	12-37
Laser Classification and Safety for DTX-MFM2, DTX-GFM2, and DTX-SFM2	
Fiber Modules	12-37
Memory for Test Results.....	12-37
Serial Interfaces	12-38
Dimensions (without adapter or module).....	12-38
Weight (without adapter or module).....	12-38
Display	12-38

Appendices

A	Fiber Test Method Reference Tables.....	A-1
B	Loss Test Methods for Fiber Cabling	B-1

Index

List of Tables

Table	Title	Page
1-1.	International Electrical Symbols	1-6
3-1.	Twisted Pair Test Settings	3-3
3-2.	Smart Remote Requirements for Twisted Pair Single Tests	3-30
4-1.	Coaxial Cable Test Settings	4-3
4-2.	Smart Remote Requirements for Coaxial Single Tests	4-12
5-1.	Diagnosing Twisted Pair Test Failures	5-2
6-1.	TIA/EIA-568-B.1 and ISO/IEC TR 14763-3 Mandrel Requirements	6-12
6-2.	Fiber Test Settings	6-14
8-1.	Causes of Failures in Fiber Links	8-1
8-2.	Diagnosing Fiber Test Failures	8-2
9-1.	Network Connectivity Test Settings	9-4
9-2.	Diagnosing Low-Level Network Problems	9-16
12-1.	Troubleshooting the Tester	12-9
12-2.	Options and Accessories	12-11
12-3.	Level IV Accuracy Performance Parameters per IEC Guidelines	12-19
12-4.	DTX RS-232 Cable Pin Connections	12-38
A-1.	Test Method Names	A-1
A-2.	Test Methods Required by Standards	A-2

List of Figures

Figure	Title	Page
1-1.	Tester Front Panel Features	1-8
1-2.	Tester Side and Top Panel Features	1-10
1-3.	Smart Remote Features.....	1-12
1-4.	Charging and Removing the Battery	1-15
1-5.	Checking the Battery Status	1-17
1-6.	Attaching and Removing Adapters.....	1-18
1-7.	Handling Guidelines for Permanent Link Adapters	1-19
1-8.	Changing the Personality Module.....	1-20
1-9.	Self Test Connections	1-21
1-10.	The Main Autotest Screen (for Twisted Pair Media)	1-23
1-11.	Inserting and Removing the Memory Card	1-27
2-1.	Using the Text Editing Screen	2-3
2-2.	Equipment for Certifying Twisted Pair Cabling.....	2-6
2-3.	Battery Status and Self Test Connections for Twisted Pair Adapters	2-7
2-4.	Permanent Link Test Connections	2-9
2-5.	Channel Test Connections	2-10
2-6.	Autotest Summary and Diagnostic Screens	2-11

2-7. Equipment for Testing in Smart Remote Mode (Method B)	2-13
2-8. Installing Fiber Modules	2-14
2-9. Self Test Connections for Fiber Modules	2-15
2-10. Smart Remote Mode Reference Connections (Method B).....	2-17
2-11. Smart Remote Mode Test Connections (Method B)	2-18
2-12. Summary Results Screen for an Autotest on Fiber.....	2-19
3-1. Twisted Pair Reference Connections	3-2
3-2. Equipment for Certifying Twisted Pair Cabling	3-6
3-3. Permanent Link Test Connections	3-7
3-4. Channel Test Connections.....	3-8
3-5. Autotest Summary Screen for Twisted Pair Cabling	3-10
3-6. Examples of Automatic Diagnostic Screens.....	3-11
3-7. PASS* and FAIL* Results.....	3-12
3-8. Wire Map Examples.....	3-13
3-9. Resistance Results	3-15
3-10. Length Results.....	3-16
3-11. Propagation Delay and Delay Skew Results	3-17
3-12. Insertion Loss is a Decrease in Signal Strength	3-18
3-13. Insertion Loss Plot.....	3-19
3-14. Near-End Crosstalk (NEXT)	3-20
3-15. NEXT Plot	3-21
3-16. Attenuation to Crosstalk Ratio (ACR).....	3-22
3-17. ACR Plot	3-23
3-18. Sources of Return Loss.....	3-24
3-19. Return Loss Plot	3-25
3-20. Far-End Crosstalk (FEXT).....	3-27
3-21. ELFEXT Plot	3-28
3-22. Causes and Effects of Noise.....	3-31

3-23. Impulse Noise Test Results	3-33
3-24. Using the Tone Generator	3-35
4-1. Coaxial Reference Connections	4-2
4-2. Equipment for Certifying Coaxial Cabling.....	4-5
4-3. Coaxial Network Cabling Test Connections.....	4-7
4-4. Coaxial Video Cabling Test Connections.....	4-8
4-5. Autotest Results for Coaxial Cabling.....	4-9
5-1. HDTDX Plot (permanent link adapters used)	5-10
5-2. Interpreting HDTDX Plots	5-11
5-3. HDTDR Plot (permanent link adapters used).....	5-13
5-4. Interpreting HDTDR Plots	5-14
6-1. Installing and Removing Fiber Modules	6-4
6-2. Fiber Module Features	6-5
6-3. SC, ST, LC, and FC Connector Adapters	6-6
6-4. Installing the Connector Adapter	6-7
6-5. Self Test Connections for Fiber Modules	6-8
6-6. Wrapping a Reference Test Cord Around a Mandrel.....	6-13
6-7. Example of How to Determine the Number of Adapters	6-16
6-8. Equipment for Testing in Smart Remote Mode (Method B).....	6-19
6-9. Smart Remote Mode Reference Connections (Method B)	6-21
6-10. Smart Remote Mode Test Connections (Method B).....	6-23
6-11. Smart Remote Mode Summary and Loss Result Screens (unsaved, single-directional)	6-24
6-12. Equipment for Testing in Loopback Mode (Method B)	6-27
6-13. Loopback Mode Reference Connections (Method B).....	6-29
6-14. Loopback Mode Test Connections (Method B)	6-31
6-15. Loopback Mode Summary and Loss Results Screens (single-directional)	6-32
6-16. Equipment for Testing in Far End Source Mode (Method B).....	6-35
6-17. Far End Source Mode Reference Connections (Method B)	6-37

6-18. Far End Source Mode Test Connections (Method B)	6-39
6-19. Far End Source Mode Summary and Results Screens	6-40
6-20. Unsaved and Saved Bi-Directional Results for Smart Remote Mode	6-43
6-21. Equipment for Using FindFiber in Smart Remote Mode	6-45
6-22. Main Tester Results for FindFiber Test (Smart Remote Mode)	6-46
6-23. Using FindFiber in Smart Remote Mode	6-47
6-24. Equipment for Using FindFiber in Loopback Mode	6-48
6-25. Using FindFiber in Loopback Mode	6-49
6-26. Equipment for Using the Power Meter in MONITOR Mode	6-50
6-27. Connections for Monitoring Optical Power (MONITOR mode)	6-51
6-28. Power Meter Screens	6-53
7-1. Equipment for Using the Visual Fault Locator	7-2
7-2. Using the Visual Fault Locator	7-3
9-1. Network Module Features	9-2
9-2. Installing and Removing the Network and SFP Modules	9-3
9-3. Network Test Connections	9-7
9-4. Network Connectivity Results Screen (DHCP example)	9-8
9-5. Negotiation Details for Twisted Pair (twisted pair results shown)	9-10
9-6. Ping Results Screen	9-12
9-7. Traffic Monitor Screen	9-13
9-8. Identifying Links with Optional LinkRunner Cable ID Locators	9-15
11-1. Memory Status Screen Features	11-2
11-2. View Results Screen	11-5
12-1. Updating the Software with a PC	12-3
12-2. Updating the Software with an Updated Tester	12-4
12-3. Baseline Insertion Loss Measurement Accuracy	12-23
12-4. Baseline NEXT Loss Measurement Accuracy	12-24
12-5. Baseline Return Loss Measurement Accuracy	12-25

12-6. Baseline ELFEXT Measurement Accuracy	12-26
B-1. Method A/A.2 Reference and Test Connections (singlemode shown)	B-3
B-2. Method B/A.1 Reference and Test Connections (singlemode shown).....	B-5
B-3. Method C/A.3 Reference and Test Connections (singlemode shown).....	B-7
B-4. Modified Method B: Smart Remote Mode Reference Connections	B-9
B-5. Modified Method B: Smart Remote Mode Test Connections	B-10
B-6. Alternate Method Reference and Test Connections (singlemode shown)	B-12
B-7. Alternate Method Test Connections for a Link with MT-RJ Connectors (singlemode shown).....	B-13

Chapter 1

Getting Acquainted

Overview of Features

The DTX Series CableAnalyzers are rugged, hand-held instruments used to certify, troubleshoot, and document copper and fiber cabling installations. The testers feature the following:

- The DTX-1800 and DTX-1200 certify twisted pair and coaxial cabling to Class F limits (600 MHz) in less than 25 seconds and Category 6 cabling in less than 10 seconds. Meets Level III and proposed Level IV accuracy requirements.
- The DTX-LT certifies Category 6 cabling in less than 28 seconds. Both meet Level III and proposed Level IV accuracy requirements.
- Color display clearly indicates PASS/FAIL results.
- Automatic diagnostics report distance to and likely causes of common faults.
- Toner feature helps you locate jacks and automatically starts an Autotest upon tone detection.
- Optional fiber modules let you certify multimode and singlemode fiber optic cabling.
- Optional DTX-NSM module lets you verify network service.
- Stores up to 250 Cat 6 Autotest results, including graphical data, in internal memory.
- The DTX-1800 and DTX-1200 store up to 500 Cat 6 Autotest results, including graphical data, on a 16 MB removable memory card.

- Runs for at least 12 hours on the rechargeable lithium ion battery pack.
- Smart remote with optional fiber module can be used with Fluke Networks OF-500 OptiFiber™ Certifying OTDR for loss/length certification.
- LinkWare™ software lets you upload test results to a PC to 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.

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



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- Beijing: 86 (10) 6512-3435
- Brazil: 11 3044 1277
- Canada: 1-800-363-5853
- Europe: +44-(0)1923-281-300
- Hong Kong: 852 2721-3228
- Japan: 03-3434-0510
- 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.

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 **knowledge base** at the top of the page.

Unpacking

The DTX Series CableAnalyzers and optional fiber modules come with the accessories listed below. If something is damaged or missing, contact the place of purchase immediately.

DTX-1800

- DTX-1800 CableAnalyzer with lithium-ion battery pack
- DTX-1800 Smart Remote with lithium-ion battery pack
- Two Cat 6/Class E permanent link adapters with personality modules
- Two Cat 6/Class E channel adapters
- Two headsets
- Carrying case
- Carrying strap
- Memory card
- USB cable for PC communications
- DTX RS-232 serial cable for PC communications
- Two ac adapters
- DTX Series CableAnalyzer Users Manual
- DTX Series CableAnalyzer Product CD
- LinkWare Software CD

DTX-1200

- DTX-1200 CableAnalyzer with lithium-ion battery pack
- DTX-1200 Smart Remote with lithium-ion battery pack
- Two Cat 6/Class E permanent link adapters with personality modules
- Two Cat 6/Class E channel adapters
- Two headsets
- Carrying case
- Carrying strap
- USB cable for PC communications
- Two ac adapters
- DTX Series CableAnalyzer Users Manual
- DTX Series CableAnalyzer Product CD
- LinkWare Software CD

DTX-LT

- DTX-LT CableAnalyzer with lithium-ion battery pack
- DTX-LT SmartRemote with lithium-ion battery pack
- Two Cat 6/Class E permanent link adapters with personality modules
- One Cat 6/Class E channel adapter
- Carrying strap
- USB cable for PC communications
- Two ac adapters
- DTX Series CableAnalyzer Users Manual
- DTX Series CableAnalyzer Product CD
- LinkWare Software CD

DTX-MFM2 Multimode Fiber Modules (optional)

- Two DTX-MFM2 Fiber Modules for testing at 850 nm and 1300 nm
- Two 62.5/125 μm multimode reference test cords, 2 m, SC/SC
- Two gray mandrels for 62.5 /125 μm fiber with 3 mm jackets
- *DTX-MFM2/GFM2/SFM2 Fiber Modules Users Manual*
- DTX CableAnalyzer Product CD
- LinkWare Software CD

DTX-GFM2 Multimode Fiber Modules (optional)

- Two DTX-GFM2 Fiber Modules for testing at 850 nm and 1310 nm (for Gigabit Ethernet applications)
- Two 50/125 μm multimode reference test cords, 2 m, SC/SC
- *DTX-MFM2/GFM2/SFM2 Fiber Modules Users Manual*
- DTX CableAnalyzer Product CD
- LinkWare Software CD

DTX-SFM2 Singlemode Fiber Modules (optional)

- Two DTX-SFM2 Fiber Modules for testing at 1310 nm and 1550 nm.
- Two 9/125 μm singlemode reference test cords, 2 m, SC/SC
- *DTX-MFM2/GFM2/SFM2 Fiber Modules Users Manual*
- DTX CableAnalyzer Product CD
- LinkWare Software CD

Note

The reference test cords and connector adapter types provided are suitable for testing SC-terminated links. Other reference test cords and adapter types are required for other connector types or 50 /125 μm fiber. Many are available as accessories from Fluke Networks.

Safety Information

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

Table 1-1. 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.
	Do not connect this equipment to public communications networks, such as telephone systems.
	Warning: Class 1 laser (OUTPUT port). Risk of eye damage from hazardous radiation. Class 2 laser (VFL port). Do not stare into beam.
	Do not put products containing circuit boards into the garbage. Dispose of circuit boards in accordance with local regulations.

Warning

To avoid possible fire, electric shock, or personal injury:

- Do not open the case; no user-serviceable parts are inside.
- Do not modify the tester.
- Use only ac adapters approved by Fluke Networks for use with the DTX tester to charge the battery or power the tester.
- When servicing the tester, use only specified replacement parts.
- 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.
- Never connect the tester to any telephony inputs, systems, or equipment, including ISDN. Doing so is a misapplication of this product, which can result in damage to the tester and create a potential shock hazard to the user.

- Always turn on the tester before connecting it to a cable. Turning the tester on activates the tool's input protection circuitry.
- Do not use the tester if it operates abnormally. Protection may be impaired.

Caution

To avoid disrupting network operation, to avoid damaging the tester or cables under test, to avoid data loss, and to ensure maximum accuracy of test results:

- Never connect the tester to an active network. Doing so may disrupt network operation.
- Never attempt to insert any connector other than an 8-pin modular (RJ45) connector into an adapter's jack. Inserting other connectors, such as RJ11 (telephone) connectors, can permanently damage the jack.
- Never operate portable transmitting devices, such as walkie-talkies and cell phones, during a cable test. Doing so might cause erroneous test results.

- To ensure maximum accuracy of copper cable test results, perform the reference procedure every thirty days as described under "Setting the Reference" in Chapters 3 and 4.
- The permanent link interface adapters may not perform properly or may be damaged if they are handled improperly. See pages 1-18 and 1-19 for important handling information.
- Turn off the tester before attaching or removing modules.
- Leave the module bay covers in place when the fiber modules are not installed. See page 1-10.
- Never remove the memory card while the memory card's LED is on. Doing so can corrupt the data on the card.

Warning: Class 1 and Class 2 Laser Products

To avoid possible eye damage caused by hazardous radiation, when using the fiber modules follow the safety guidelines given in Chapter 6 of this manual.

Basic Features

The following sections introduce the tester's basic features.

Physical Features

Figures 1-1 and 1-2 describe the tester's features. Figure 1-3 describes the smart remote's features.

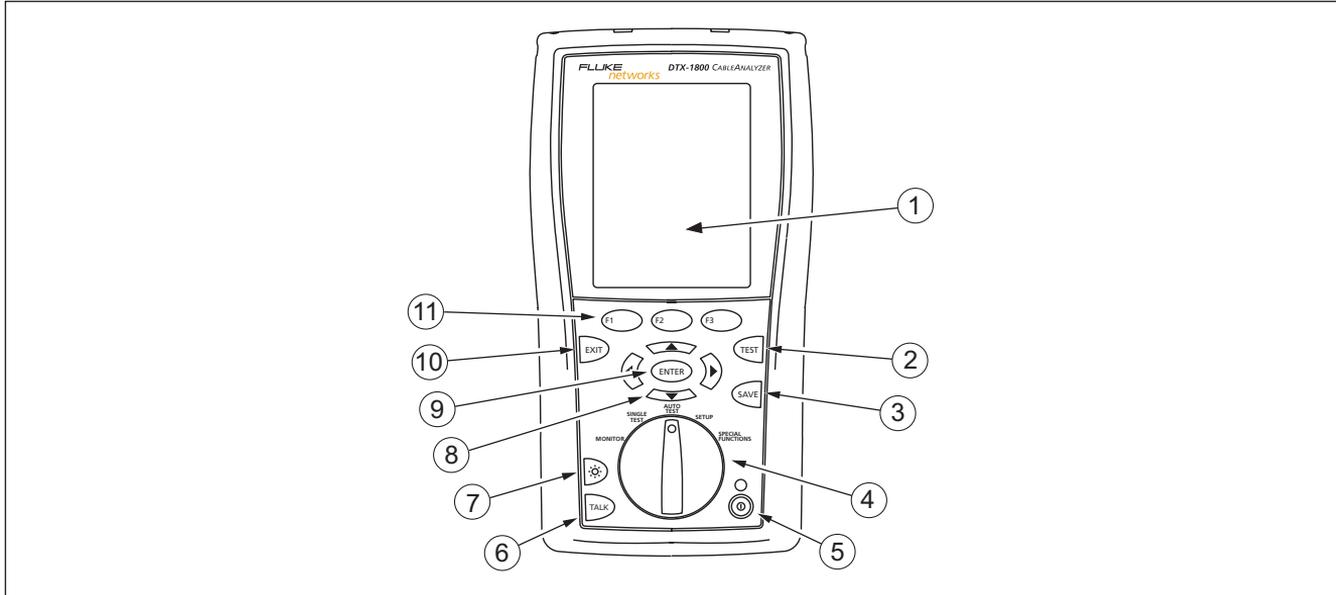


Figure 1-1. Tester Front Panel Features

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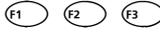
- | | |
|---|---|
| <p>① LCD display with backlight and adjustable brightness.</p> <p>② : Starts the currently selected test. Activates the tone generator for twisted pair cabling if no smart remote is detected. The test starts when both testers are connected.</p> <p>③ : Saves Autotest results in memory.</p> <p>④ Rotary switch selects the tester's modes.</p> <p>⑤ : On/off key.</p> <p>⑥ : Press to use the headset to talk to the person at the other end of the link.</p> | <p>⑦ : Press to switch the backlight between bright and dim settings. Hold for 1 second to adjust the display contrast.</p> <p>⑧ : Arrow keys for navigating through screens and incrementing or decrementing alphanumeric values.</p> <p>⑨ : Enter key selects the highlighted item from a menu.</p> <p>⑩ : Exits the current screen without saving changes.</p> <p>⑪ : The softkeys provide functions related to the current screen. The functions are shown on the screen above the keys.</p> |
|---|---|

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

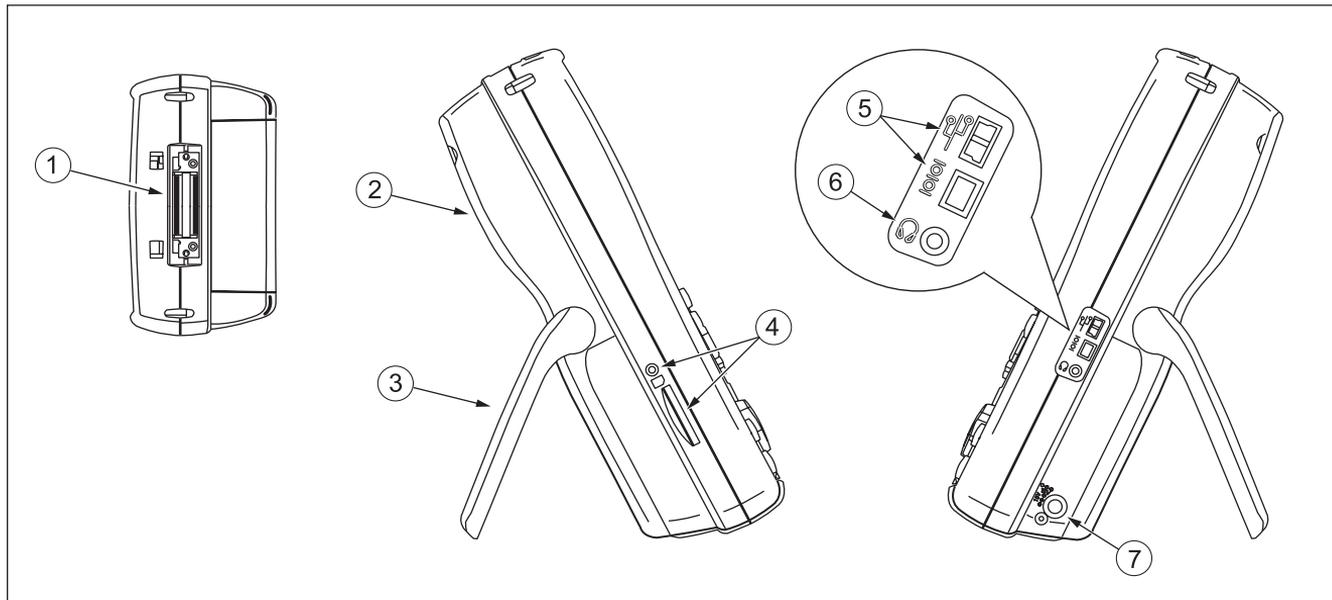


Figure 1-2. Tester Side and Top Panel Features

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- | | |
|---|---|
| <p>① Connector for twisted pair interface adapters.</p> <p>② Cover for the module bay. Slide off the cover to install optional modules, such as the fiber module.</p> <p>③ Bail.</p> <p>④ DTX-1800 and DTX-1200: Slot and activity LED for the removable memory card. To eject the card, push in then release the card.</p> <p>⑤ USB () and RS-232C (): DTX-1800, DTX-1200) ports for uploading test reports to a PC and updating the tester's software. The RS-232C port uses a custom DTX cable available from Fluke Networks. See Chapter 12 for more information.</p> | <p>⑥ Headset jack for talk mode.</p> <p>⑦ Connector for the ac adapter. The LED turns on when the tester is connected to ac power.</p> <ul style="list-style-type: none"> • Red: Battery is charging. • Green: Battery is charged. • Flashing red: Charge timeout. The battery failed to reach full charge within 6 hours. See "If Something Seems Wrong" in Chapter 12. |
|---|---|

Figure 1-2. Tester Side and Top Panel Features (cont.)

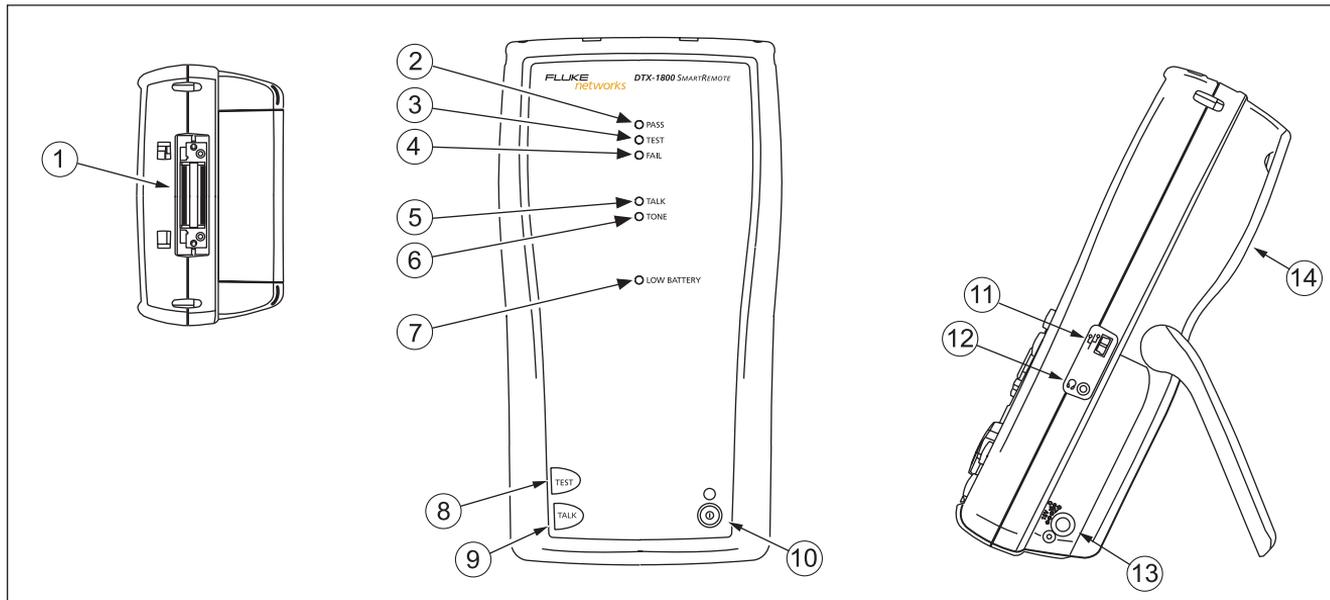


Figure 1-3. Smart Remote Features

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⚠ Caution

All the LEDs flash if the smart remote detects excessive voltage on the cable. Unplug the cable immediately if this occurs.

Note

The LEDs also act as a battery gauge. See Figure 1-5 on page 1-17.

- ① Connector for twisted pair interface adapters.
- ② Pass LED lights when a test passes.
- ③ Test LED lights during cable tests.
- ④ Fail LED lights when a test fails.
- ⑤ Talk LED lights when the smart remote is in talk mode. Press  to adjust the volume.
- ⑥ Tone LED lights and the tone generator turns on when you press , but the main tester is not connected.
- ⑦ Low battery LED lights when the battery is low.
- ⑧ : Starts the test currently selected on the main unit. Activates the tone generator for twisted pair cabling if no main tester is detected. The test starts when both testers are connected.
- ⑨ : Press to use the headset to talk to the person at the other end of the link. Press again to adjust the volume. Press and hold to exit talk mode.
- ⑩ : On/off key.
- ⑪ USB port for updating the tester's software with a PC.
- ⑫ Headset jack for talk mode.
- ⑬ Connector for the ac adapter, as described in Figure 1-2.
- ⑭ Cover for the module bay. Slide off the cover to install optional modules, such as the fiber module.

Figure 1-3. Smart Remote Features (cont.)

Changing the Language

To change the tester's language:

- 1 Turn the rotary switch to **SETUP**.
- 2 Use  to highlight **Instrument Settings** at the bottom of the list; then press .
- 3 Use  and  to find and highlight **Language** on tab **2** at the bottom of the list; then press .
- 4 Use  to highlight the desired language; then press .
- 5 Use the arrow keys and  to find and change other local settings on tabs **2**, **3**, and **4** under **Instrument Settings**.

Powering the Tester



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

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

If the tester does not turn on, refer to "If Something Seems Wrong" in Chapter 12.

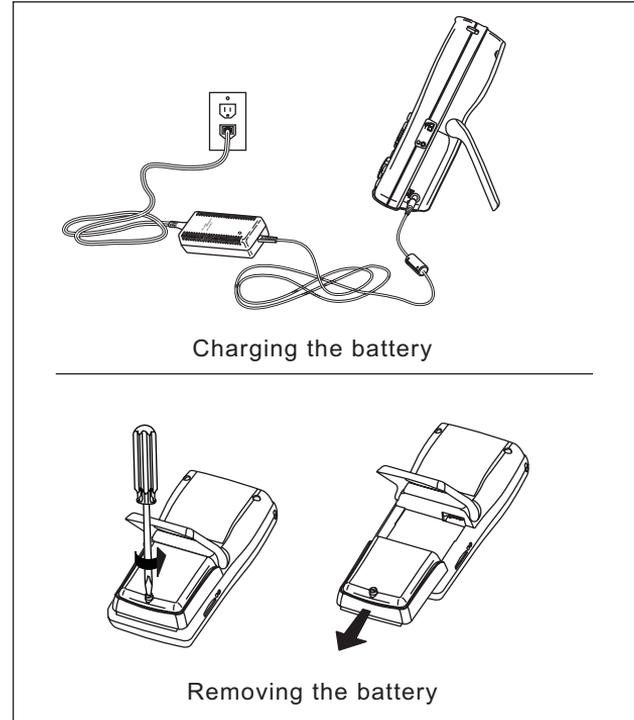
Charging the Battery

- To charge the battery, connect the ac adapter to the battery pack, as shown in Figure 1-4.
- You may charge the battery when it is attached or detached from the tester. Figure 1-4 shows how to remove the battery.
- The battery charges fully in about 4 hours with the tester off. A fully-charged battery lasts for at least 12 hours of typical use.

Note

The battery will not charge at temperatures outside of 0 °C to 45 °C (32 °F to 113 °F). The battery charges at a reduced rate between 40 °C and 45 °C (104 °F and 113 °F).

- If the battery does not reach full charge within 6 hours, the battery LED flashes red. Verify that the battery was within the temperature range given above during charging and that the correct ac adapter was used. Disconnect then reconnect ac power and try charging the battery again. If the battery does not charge the second time, retrain the battery gauge as described in Chapter 12.
- If the battery LED flashes red or the tester will not turn on, see “If Something Seems Wrong” in Chapter 12.



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Figure 1-4. Charging and Removing the Battery

Checking the Battery Status

The battery status icon () near the upper-right corner of the tester's main screens shows the battery's charge level. The smart remote's LEDs show the smart remote's battery status at the end of the power-up cycle, as shown in Figure 1-5.

To see more information about battery status:

- 1 On the main Autotest screen, verify that the media type is set to **Twisted Pair**. Press  **Change Media** to change it if necessary.
- 2 Connect the tester and smart remote as shown in Figure 1-5. You may also connect the testers through a link.

- 3 Turn the rotary switch to **SPECIAL FUNCTIONS**.

- 4 Use  to highlight **Battery Status**; then press .

The **Time Remaining** value tells you approximately how long the main tester's battery will last based on the last 3 minutes of use.

The accuracy of the battery gauge may drift over time. If the battery status information seems incorrect, retrain the battery gauge as described in Chapter 12.

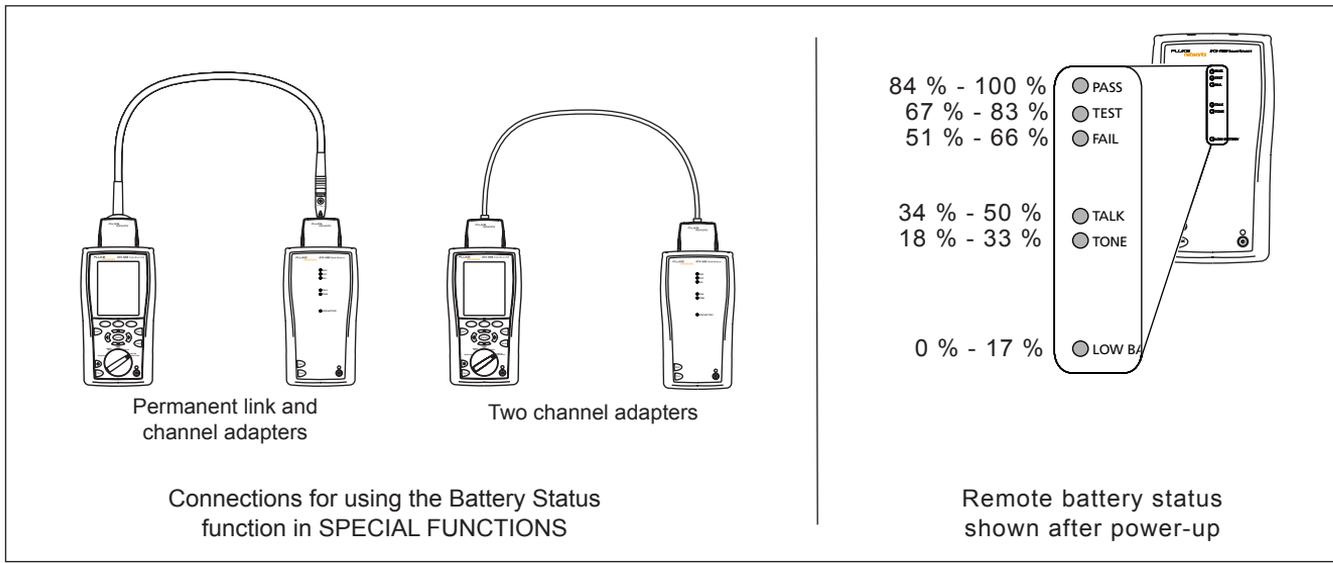


Figure 1-5. Checking the Battery Status

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About Link Interface Adapters and Modules

Link interface adapters provide the correct jacks and interface circuitry for testing different types of twisted pair LAN cabling.

The channel and permanent link interface adapters provided are suitable for testing cabling up to Cat 6.

Optional coaxial adapters let you test coaxial cabling.

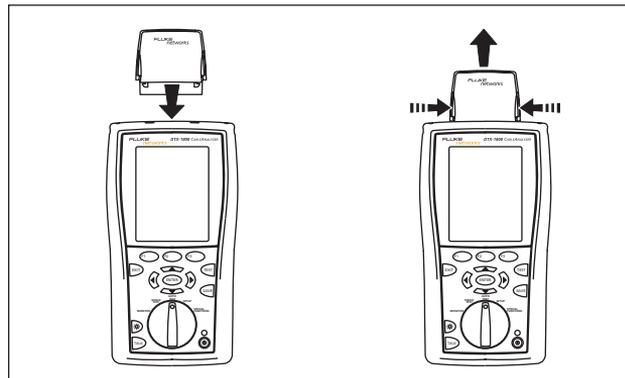
For information on other adapter types, contact Fluke Networks or visit the Fluke Networks website.

Figure 1-6 shows how to attach and remove adapters.

Caution

To avoid damaging the permanent link adapter and to ensure maximum accuracy of test results, never pinch, kink, or crush the adapter's cable. Follow the handling guidelines given in Figure 1-7.

Modules provide optional testing capabilities. For example, the DTX-MFM2, DTX-GFM2, and DTX-SFM2 modules let you certify fiber optic cabling. The DTX-NSM module lets you verify network service. See Chapters 6 and 9 for details on these modules.



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Figure 1-6. Attaching and Removing Adapters

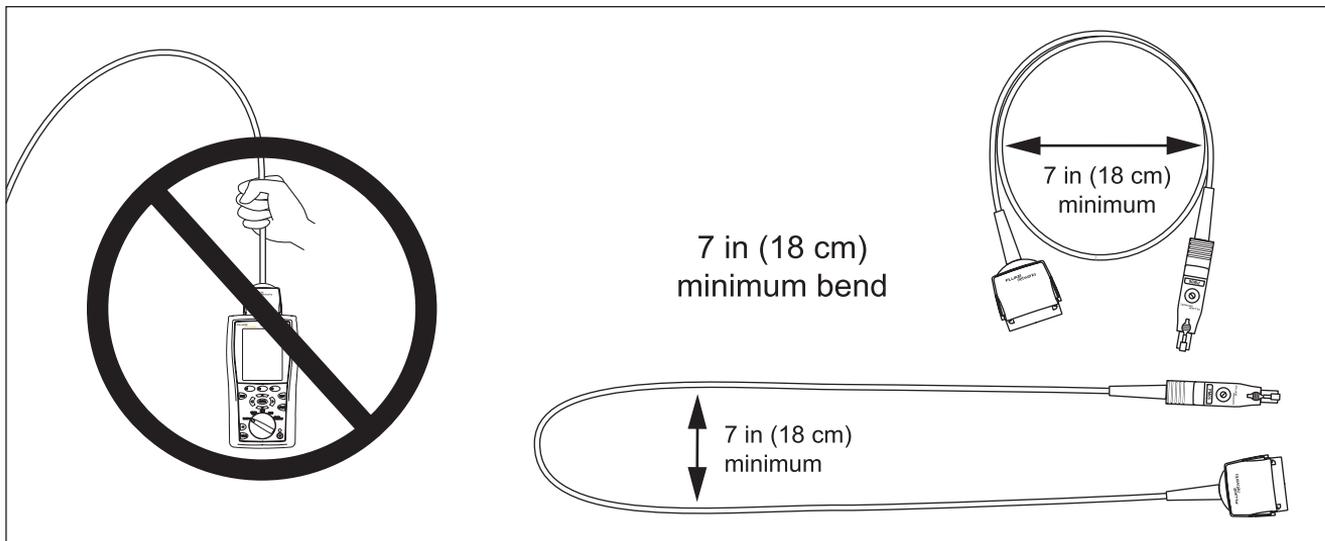


Figure 1-7. Handling Guidelines for Permanent Link Adapters

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The DTX-PLA001 universal permanent link adapter has a removable personality module. These may be changed to customize the adapter for different jack configurations.

To change the personality module (refer to Figure 1-8):

- 1 Ground yourself by touching a grounded, conductive surface.
- 2 Remove the link interface adapter from the tester.
- 3 Use your fingers to unscrew the screw on the personality module.
- 4 Store the module in its original, static protection bag.
- 5 Put the new module in place and tighten the screw with your fingers.

⚠ Caution

Tighten the screw snugly with your fingers only. Do not overtighten. Doing so can damage the module or the end of the cable.

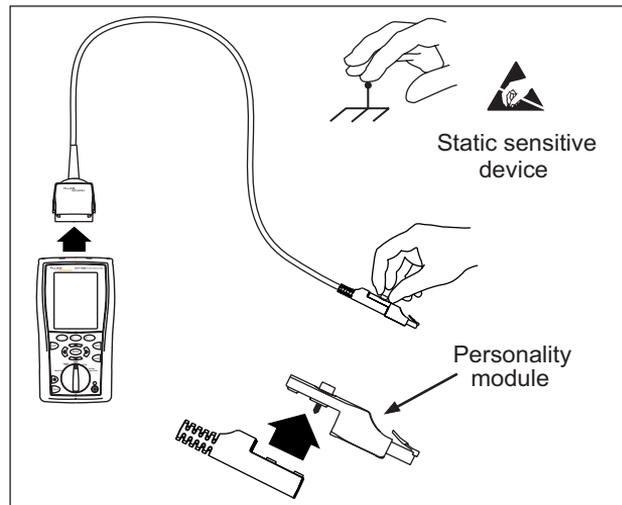


Figure 1-8. Changing the Personality Module

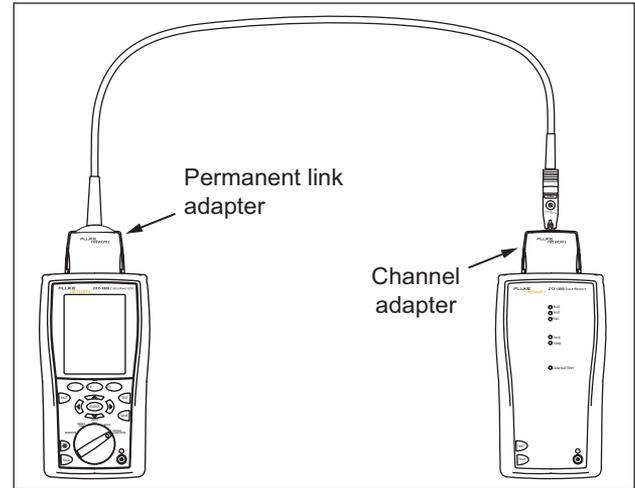
The optional DSP-PLCAL automated calibration kit lets you calibrate your permanent link adapters to compensate for physical changes that occur over time to the adapter's cable and other components. Contact Fluke Networks for more information.

Verifying Operation

The tester performs a basic self test when you turn it on. To run a more thorough self test for an acceptance test or as part of a routine equipment check:

- 1 Connect the main and remote testers as shown in Figure 1-9.
- 2 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 3 Use  to highlight **Self Test**; then press .
- 4 If a fiber module is installed, select **Mainframe**.
- 5 Press .

If the tester reports an error, refer to “If Something Seems Wrong” in Chapter 12.



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Figure 1-9. Self Test Connection

Checking the Hardware and Software Versions

To see information about the tester's hardware, software, and the test limits and cable types databases:

- 1 Connect the tester and smart remote through adapters, as in Figure 1-9.
- 2 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 3 Use  to highlight **Version Information**; then press .
- 4 Use the softkeys to switch between the tester and remote's information, and between information for the mainframe and any modules or adapters attached.

To determine if your tester needs a software update, visit the Fluke Networks website to see if an update is available. See Chapter 12 for details on updating the tester's software.

The Main Autotest Screen

The Autotest automatically runs all the tests necessary to certify that cabling meets the requirements of the selected test limit. You will probably use the Autotest more than any other of the tester's functions.

When you first turn the rotary switch to **AUTOTEST**, the main Autotest screen shows settings you should check before you start testing. Figure 1-10 describes this screen. You can change these settings in **SETUP**, as described in Chapters 2, 3, 4, and 6.

The screenshot shows the 'Twisted Pair' autotest screen. At the top, it displays the test title 'Twisted Pair', a battery status icon, and the date/time '03/13/2006 10:27:35 a.m.'. Below this, the test configuration is shown: 'TIA Cat 6 Perm. Link', 'Cat 6 UTP', and 'T568A'. The user information section includes 'Operator: Your Name', 'Site: Client Name', 'Folder: DEFAULT', and 'Store Plot Data: Yes'. At the bottom, there are three buttons: 'Change Media', 'View Results', and 'Memory'. A large blue button labeled 'Press TEST' is also visible.

Numbered callouts (1-11) point to the following elements:

- 1: Media type selected for testing (Cat 6 UTP).
- 2: Battery status icon.
- 3: Test Limit (TIA Cat 6 Perm. Link).
- 4: Cable Type (T568A).
- 5: Outlet Configuration (TIA Cat 6 Perm. Link).
- 6: Press F3 to check the memory status.
- 7: Press F2 to view the results of the previous test.
- 8: If a copper adapter and a fiber module are installed, press F1 to change the type of media you will test.
- 9: Store Plot Data (Yes).
- 10: Folder (DEFAULT).
- 11: Operator (Your Name) and Site (Client Name).

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① The media type selected for testing.

② Battery status icon.

③ **Test Limit:** The tester compares test results to the selected limit to determine the PASS/FAIL result.

④ **Cable Type:** The type of cable to be tested.

⑤ **Outlet Configuration:** The wire mapping used for testing twisted pair cabling.

⑥ Press **F3** to check the memory status.

⑦ Press **F2** to view the results of the previous test.

⑧ If a copper adapter and a fiber module are installed, press **F1** to change the type of media you will test.

⑨ **Store Plot Data**

No: Plot data is not saved, which lets you save more results. Saved results show worst margins and worst values for each pair.

Standard: The tester displays and saves plot data for frequency-based tests such as NEXT, return loss, and attenuation. The tester saves data for the frequency range required by the selected test limit.

Extended: The tester saves data beyond the frequency range required by the selected test limit.

⑩ **Folder:** The folder where results will be saved.

⑪ **Operator, Site:** The person using the tester. **Site:** The job site name. These are stored with saved results.

Figure 1-10. The Main Autotest Screen (for Twisted Pair Media)

Setting User Preferences

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

Changing the Date, Time, and Date/Time Formats

- 1 Turn the rotary switch to **SETUP**, use  to highlight **Instrument Settings**; then press .
- 2 Press  to go to the tab with the **Date** and **Time** selections.
- 3 Use  to highlight the setting you want to change; then press .
- 4 To change numbers in the date or time on the **Date** or **Time** screen, use   to highlight the number; then use   to change the number.

Press  when you are done.

- 5 To change the date or time format, press  **Change Format** on the **Date** or **Time** screen. Use  to highlight the format you want; then press .

Changing the Length Units

- 1 Turn the rotary switch to **SETUP**, use  to highlight **Instrument Settings**; then press .
- 2 Press  to go to the tab with the **Length Units** selection.
- 3 Use  to highlight **Length Units**; then press .
- 4 Use  to highlight the setting you want; then press .

Changing the Numeric Format

The tester can show decimal fractions with a decimal point (0.00) or a comma (0,00).

- 1 Turn the rotary switch to **SETUP**, use  to highlight **Instrument Settings**; then press .
- 2 Press  to go to the tab with the **Numeric Format** selection.
- 3 Use  to highlight **Numeric Format**; then press .
- 4 Use  to highlight the setting you want; then press .

Adjusting the Display Contrast

- 1 Press and hold .
- 2 Use   for coarse adjustments and  **Fine**  **Fine** for fine adjustments.
 **Default Setting** sets the contrast to the default level.
- 3 Press  when you are done.

The setting is retained when you turn the tester off.
The contrast setting does not affect the battery life.

Setting the Power Down Timer

The power down timer turns off the tester after a selected period of inactivity. The timer starts when the backlight timer times out. If the backlight timer is disabled, the power down timer starts whenever the tester is not being used.

The smart remote turns off after 30 minutes of inactivity. This setting is not adjustable.

Note

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

To set the power down timer:

- 1 Turn the rotary switch to **SETUP**, use  to highlight **Instrument Settings**; then press .
- 2 Press  to go to the tab with the **Power Down Time-Out** setting; then press .
- 3 Use  to highlight the setting you want; then press .

Setting the Backlight Timer

The backlight timer turns off the backlight after a selected period of inactivity. Using the timer to turn off the backlight helps conserve battery power.

To set the backlight timer;

- 1 Turn the rotary switch to **SETUP**, use  to highlight **Instrument Settings**; then press .
- 2 Press  to go to the tab with the **Backlight Time-Out** setting. Use  to highlight **Backlight Time-Out**; then press .
- 3 Use  to highlight the setting you want; then press .

Enabling or Disabling the Beeper

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

- 1 Turn the rotary switch to **SETUP**, use  to highlight **Instrument Settings**; then press .
- 2 Press  to go to the tab with the **Audible Tone** setting. Use  to highlight **Audible Tone**; then press .
- 3 Use  to highlight the setting you want; then press .

Overview of Memory Features

All DTX testers have internal memory that can store at least 250 Autotest results, including graphical data. The maximum capacity of internal memory depends on the space taken by the tester's software.

The DTX-1800 and DTX-1200 testers can also store up to 500 Cat 6 Autotest results, including graphical data, on a 16 MB card. The testers can also use cards with higher capacity and secure digital (SD) memory cards.

Inserting and Removing the Memory Card

Insert the memory card into the slot on the side of the tester. Figure 1-11 shows how to insert and remove the card.

Formatting the Memory Card (DTX-1800 and DTX-1200) or Internal Memory

Formatting erases all contents of the memory card or internal memory.

To format the memory card or internal memory:

- 1 Turn the rotary switch to **SPECIAL FUNCTIONS**, then select **Memory Status**.
- 2 For a DTX-1800 or DTX-1200 with a memory card installed, press  to select the memory card or internal memory.
- 3 Press  **Format**.

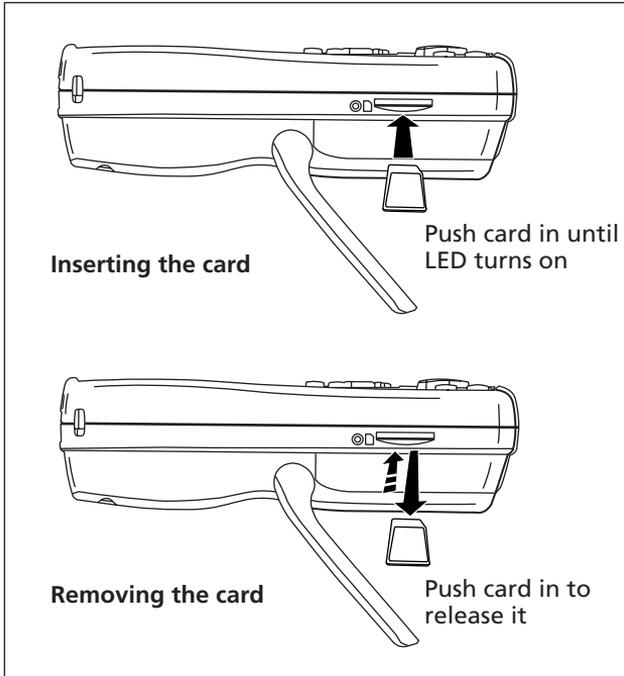


Figure 1-11. Inserting and Removing the Memory Card

Creating Folders

You can organize your test results by saving them in folders.

To create a folder:

- 1 DTX-1800, DTX-1200: Insert a memory card into the tester.
- 2 Turn the rotary switch to **SETUP**.
- 3 Use  to highlight **Instrument Settings**; then press .
- 4 Press  to highlight **Current Folder**; then press .
- 5 DTX-1800, DTX-1200: Press  if necessary if you want to create the folder on the memory card.
- 6 Press  **Create Folder**.
- 7 Use   ,    , and  to enter a folder name. Press  when you are done.
- 8 Use   to highlight the new folder in the list of folders; then press .

Setting the Storage Location (DTX-1800 and DTX-1200)

To set the destination for saved results on a DTX-1800 or DTX-1200 tester:

- 1 Turn the rotary switch to **SETUP**, use  to highlight **Instrument Settings**; then press .
- 2 Use  to highlight **Result Storage Location**; then press .
- 4 Use  to highlight **Internal Memory or Memory Card (if present)**; then press .

Note

*If you change storage location, and the selected **Current Folder** does not exist in the new location, the tester creates a new folder with the current folder's name in the new location.*

See Chapter 12 for more information on memory features.

Options for Entering Cable IDs

When you save a test, you enter a name for the test. At a job site, you usually name each test with the identification code assigned to the link tested. You can enter this ID character by character, or by selecting the ID from a pre-generated list.

To select a method for entering cable IDs:

- 1 Turn the rotary switch to **SETUP**.
- 2 Use  to highlight **Instrument Settings**, then press .
- 3 Press  to select **Cable ID Source**.
- 4 Use  to highlight an ID source, then press .

The tester offers the following methods for entering cable IDs:

- **Auto Increment:** You enter an ID for the first test you save. After that, the tester increments the last character of the ID each time you press . See Chapter 2 for details.
- **List:** Lets you select IDs from a list created with LinkWare software and downloaded to the tester. See the LinkWare online help for details. The ID list can be sequential or random.
- **Auto Sequence:** Lets you select IDs from a list of sequential IDs generated from a template in **SETUP**. The horizontal, backbone, and campus templates follow the ID formats specified in the ANSI/TIA/EIA-606-A standard. The **Free Form** template lets you create your own pattern. See Chapter 2 for details.
- **None:** Lets you create an ID each time you press .

After you press , you can also edit an existing ID before using it for saving results.

To create a list of sequential IDs:

- 1 On the **Auto Sequence** screen, select a template.
- 2 On the **Auto Sequence** screen, select **Start ID**. Use the softkeys, , , , and  to enter the first ID in the sequential list. Press  when you are finished.
- 3 Select **Stop ID**. Use the softkeys, , , , and  to enter the last ID in the sequential list. Press  when you are finished.
- 4 Press  **Sample List** to see what the list will look like.

When you use an ID from a list, the ID is marked with a "\$".

See Chapter 2 for more information on the **Auto Sequence** feature.

Using the Talk Mode

The talk mode lets you talk to the person at the other end of a twisted pair or fiber link. Two-way communication over twisted pair requires one good wire pair. Two-way communication over fiber requires fiber modules and two fibers.

Note

The talk mode is disabled during cable tests.

- 1 Connect the tester and smart remote to the cabling.
- 2 Plug headsets into the headset jacks on the testers.
- 3 Press  on either the tester or smart remote, then speak into the headset's microphone.

To adjust the volume at the main unit use



At the smart remote, use  to cycle through the volume settings.

- 4 To exit the talk mode at the main tester, press , turn the rotary switch to a new position, or start a test. At the smart remote, hold down  for two seconds.

About LinkWare and LinkWare Stats Software

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

- Upload DTX test results to PC. See Chapter 12.
- 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.
- Create and download data to the DTX, such as Setup data and cable ID lists.
- Calibrate the permanent link adapters (DSP-PLCAL kit required)
- Transfer custom limits between testers.

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

Tutorials on Setup and Test Procedures

The tutorials in this chapter guide you through setting up the tester, checking the tester's status, testing twisted pair and fiber cabling, and setting up cable ID lists.

Preparing to Save Tests

Step 1: Checking the Memory Space Available

- 1-1 DTX-1800, DTX-1200: Insert a memory card into the tester.
- 1-2 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 1-3 Use  to highlight **Memory Status**; then press .
- 1-4 DTX-1800, DTX-1200: Press  **Int. Memory** to switch between memory card and internal memory status.

Step 2: Entering Job Information

Job information includes the operator name, name of the job site, and the customer's company name. These settings are stored with results you save.

To enter job information:

2-1 Turn the rotary switch to **SETUP**.

2-2 Use  to highlight **Instrument Settings**; then press .

2-3 Press  to go to the tab with the **Operator Name** setting. Press  to select **Operator Name**.

2-4 Press  **Create**; then use   ,    , and  to enter your name in the box. Press  when you are done.

2-5 Figure 2-1 describes the text editing screen.

2-6 Use  to highlight **Site**; then press .

2-7 Press  **Create**; then use   ,    , and  to enter the job site name in the box. Press  when you are done.

2-8 Repeat steps 2-6 and 2-7 to enter the customer's **Company** name.

The screenshot shows a text editing interface. At the top is a blue header labeled 'Operator'. Below it is a text box containing 'YOUR TEXT'. A character selection menu is open, listing characters from A to Z, numbers 0-9, and various symbols. The letter 'D' is highlighted. Below the list is the instruction 'Highlight Character, Press ENTER'. At the bottom of the screen are three buttons: 'Move Cursor', 'Move', and 'Delete Character'. A 'Press SAVE when done' message is displayed above these buttons. Numbered callouts 1 through 5 are placed around the screen to identify key elements.

- 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** and **F2** to move the cursor.
- ④ The item you are editing.
- ⑤ Use **F1** **F2** **F3** to move the cursor and delete characters.

Figure 2-1. Using the Text Editing Screen

Step 3: Setting the Storage Location (DTX-1800 and DTX-1200)

To set the destination for saved results on a DTX-1800 or DTX-1200 tester:

- 3-1 Turn the rotary switch to **SETUP**, use  to highlight **Instrument Settings**; then press .
- 3-2 Use  to highlight **Result Storage Location**; then press .
- 3-3 Use  to highlight **Internal Memory** or **Memory Card (if present)**; then press .

Note

*If you change storage location, and the selected **Current Folder** does not exist in the new location, the tester creates a new folder with the current folder's name in the new location.*

Step 4: Setting Up a Job Folder

You can organize test results by saving them in a folder named for the job.

To set up a job folder:

- 4-1 DTX-1800, DTX-1200: Insert a memory card into the tester, if that is where you want to create a folder.
- 4-2 Turn the rotary switch to **SETUP**.
- 4-3 Use  to highlight **Instrument Settings**; then press .
- 4-4 Press  to highlight **Current Folder**; then press .
- 4-5 Press  **Create Folder**.
- 4-6 Use   ,    , and  to enter a folder name. Press  when you are done.
- 4-7 Use   to highlight the new folder in the list of folders; then press .

Step 5: Selecting a Cable ID Source

Cable IDs are names you enter for tests you save. You can select IDs from a pre-generated list, or enter them manually after each test. For this tutorial, you will enter IDs manually.

To select a cable ID source:

5-1 Turn the rotary switch to **SETUP**.

5-2 Use  to highlight **Instrument Settings**; then press .

5-3 Press  to select **Cable ID Source**.

5-4 Use  to highlight **None**; then press .

Certifying Twisted Pair Cabling

This tutorial familiarizes you with testing twisted pair cabling by guiding you through the following tasks:

- Attaching twisted pair adapters
- Checking the battery status and verifying operation with twisted pair adapters
- Running an Autotest
- Viewing the Autotest results
- Saving the results

Required Equipment

Figure 2-2 shows the equipment for testing twisted pair cabling.

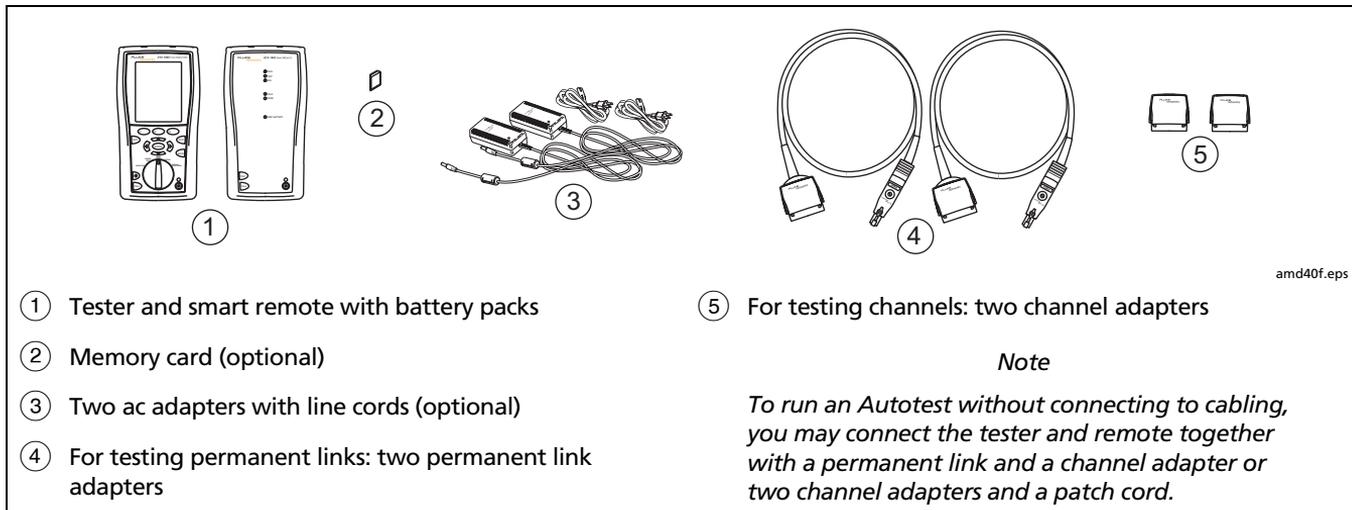


Figure 2-2. Equipment for Certifying Twisted Pair Cabling

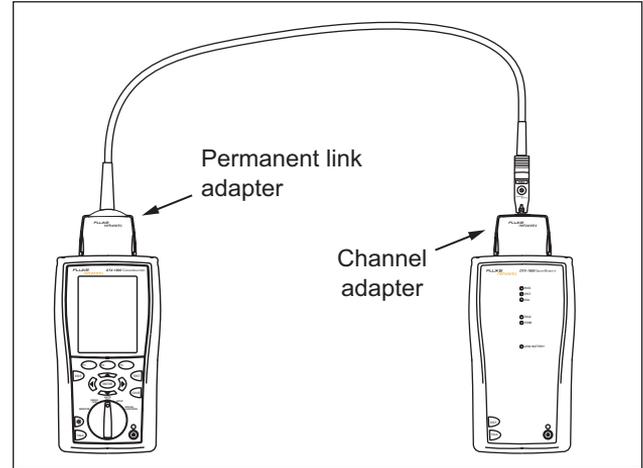
Step 1: Checking the Battery Status and Verifying Operation with Twisted Pair Adapters

You should check the tester and smart remote's battery status and verify all equipment is in good working order before going to the job site.

- 1-1 Connect the tester and smart remote together as shown in Figure 2-3.
- 1-2 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 1-3 Use  to highlight **Battery Status**; then press . Press  when you are done.
- 1-4 Use  to highlight **Self Test**; then press .
- 1-5 Press  to start the self test.

Note

You can also check the battery status by connecting channel adapters with a patch cord, or by connecting the tester and smart remote through a link.



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Figure 2-3. Battery Status and Self Test Connections for Twisted Pair Adapters

Step 2: Selecting a Test Limit, Cable Type, and Outlet Configuration

Select the test limit, cable type, and outlet configuration specified for the job. The outlet configuration determines which cable pairs are tested and which pair numbers are assigned to the pairs.

- 2-1 Turn the rotary switch to **SETUP**; then press  to select **Twisted Pair**.
- 2-2 On the **Twisted Pair** menu use  and  to select **Cable Type**. Cables are organized in groups:
 - UTP**: Unshielded twisted pair cable
 - FTP**: Foil screened twisted pair cable
 - SSTP**: Screened/shielded twisted pair cable
 - Custom**: Cable types entered by a DTX user.
 - Manufacturer**: Specific brands of twisted pair cable
- 2-3 Use  to highlight the group for the cable type you will test; then press .
- 2-4 Use  to highlight the cable type you will test; then press .
- 2-5 On the **Twisted Pair** menu, press  to select **Test Limit**.

2-6 The first **Test Limit** screen shows the most recently-used limits. To see the list of test limit groups, press  **More**.

2-7 Use  and  to select a different limit group, if necessary, and to select the test limit required for the job.

If you are connecting the permanent link and channel adapters together just to try an Autotest, select a Cat 6 Channel or equivalent limit.

2-8 If the currently-selected **Outlet Configuration** is not compatible with the selected **Test Limit**, the **Outlet Configuration** screen appears. Use   to highlight an appropriate configuration; then press .

Step 3: Running the Autotest

- 3-1 Attach the correct adapters to the tester and smart remote.
- 3-2 Turn on the tester and smart remote; then connect them to the cabling. Figures 2-4 and 2-5 show connections for permanent link and channel installations.

To run an Autotest without connecting to installed cabling, connect the tester and remote as shown in Figure 2-3 on page 2-7, or connect using two channel adapters and a patch cord.

3-3 Turn the rotary switch to **AUTOTEST**.

3-4 If a fiber module is installed, verify that the media type is set to **Twisted Pair**. Press **F1** **Change Media** to change it if necessary.

3-5 Press **TEST** on the tester or smart remote.

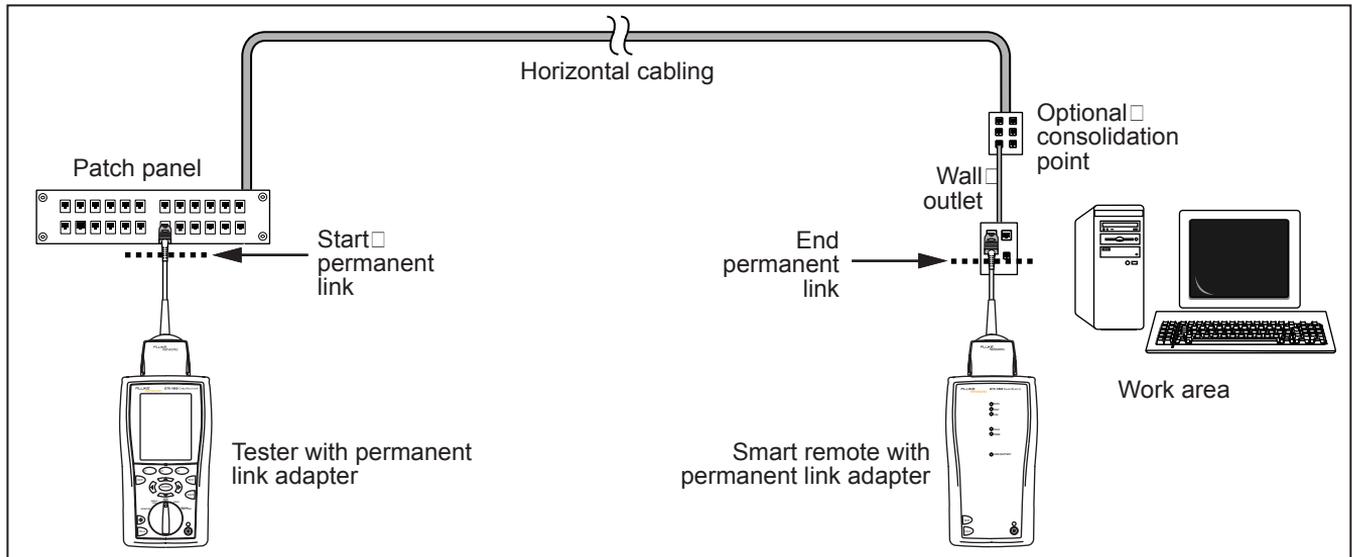


Figure 2-4. Permanent Link Test Connections

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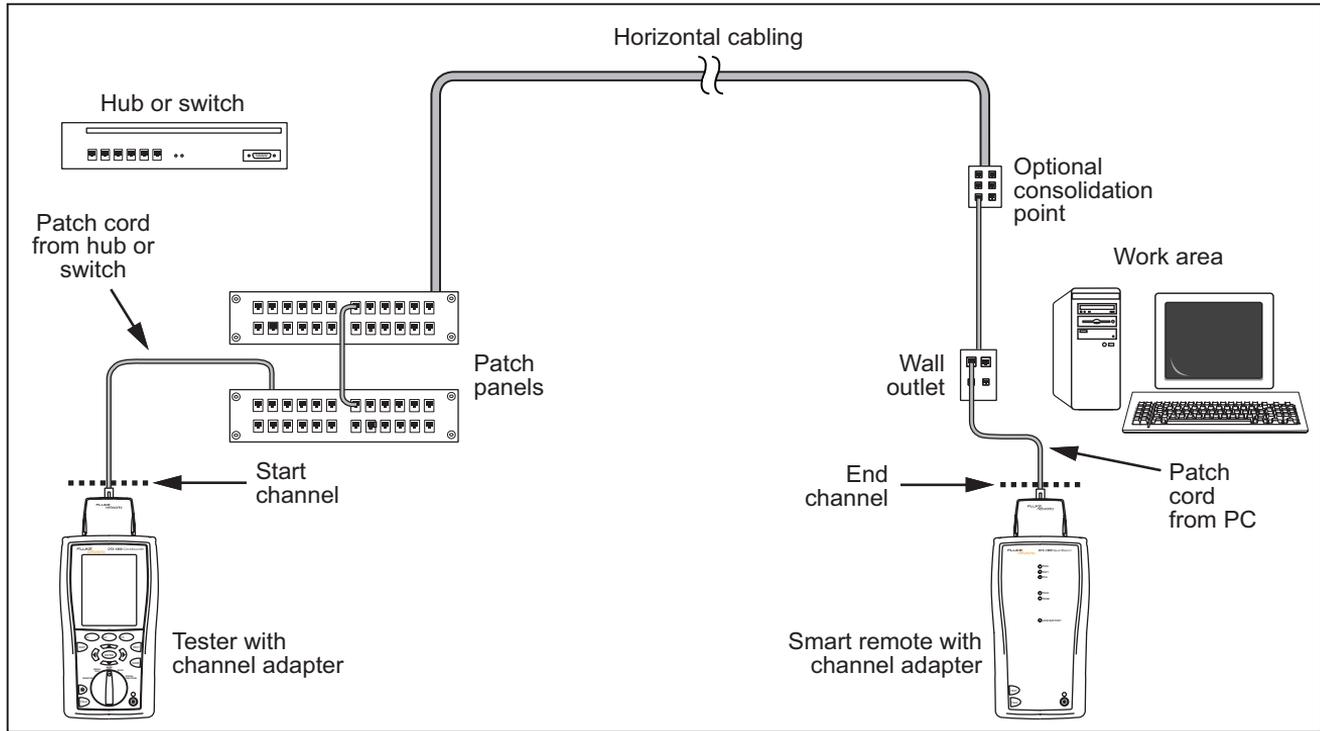


Figure 2-5. Channel Test Connections

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Step 4: Viewing the Autotest Results

The **Summary** screen, shown in Figure 2-6, tells you if the test results met the selected test limit. This screen also shows a status for each measurement:

✓: PASS

✗: FAIL

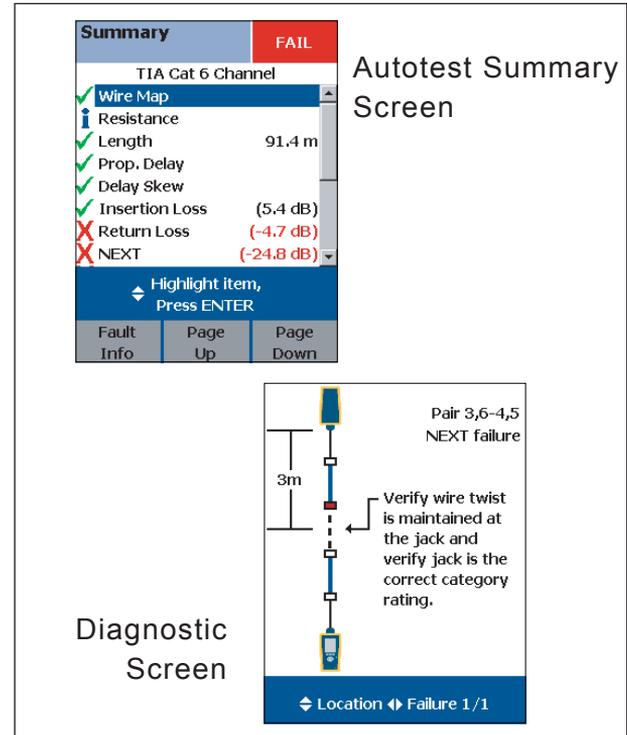
i: The results are for informational purposes only. The measurement is not required by the selected test limit.

*****: The measurement is within the tester's accuracy uncertainty range. See Chapter 3 for details.

To see the results for an individual measurement, use  to highlight the test; then press **ENTER**.

If the test failed, press **F1** **Fault Info.** for a diagnosis of the fault. Figure 2-6 shows a typical diagnostic screen. The **Next Fault** softkey is available if the tester detected more than one fault. See Chapter 5 for more information on diagnosing faults.

See Chapter 3 for details on twisted pair test results.



amd119f.eps
Figure 2-6. Autotest Summary and Diagnostic Screens

Step 5: Saving the Results

- 5-1** Press  .
- 5-2** Use the text editing screen to enter a name for the results. See Figure 2-1 on page 2-3 for details on editing text.
- 5-3** Press  when you are done.

This concludes the tutorial on testing twisted pair cabling. For more information on testing twisted pair cabling, see Chapter 3.

Certifying Fiber Cabling

This section familiarizes you with the optional DTX-MFM2, DTX-GFM2, and DTX-SFM2 fiber modules by guiding you through the following tasks:

- Installing fiber modules
- Checking the battery status and verifying operation with the fiber modules
- Setting a reference in Smart Remote mode
- Running an Autotest in Smart Remote mode
- Viewing the Autotest results
- Saving the results

Required Equipment

Figure 2-7 shows the equipment for testing fiber cabling in Smart Remote mode.

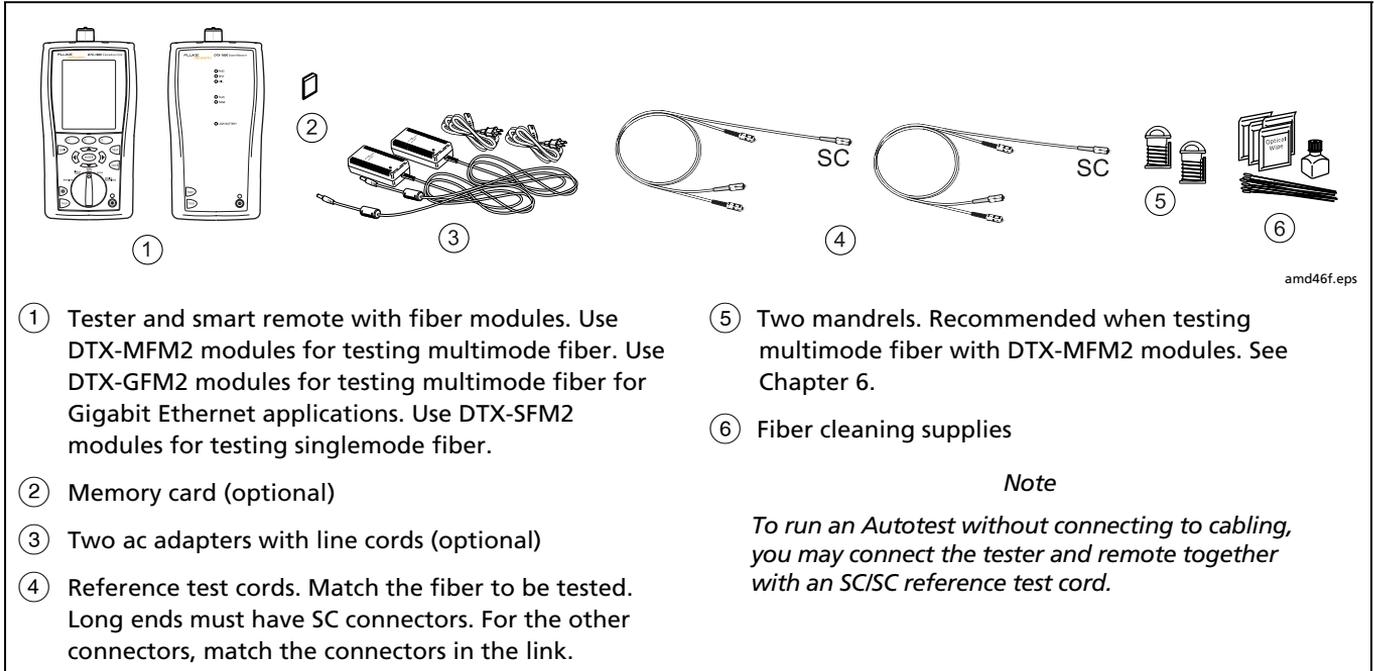


Figure 2-7. Equipment for Testing in Smart Remote Mode (Method B)

Step 1: Installing the Fiber Modules

- 1-1 Turn off the tester and smart remote.
- 1-2 Remove the cover from the back of each unit and install a DTX-MFM2, DTX-GFM2, or DTX-SFM2 module in each unit, as shown in Figure 2-8.

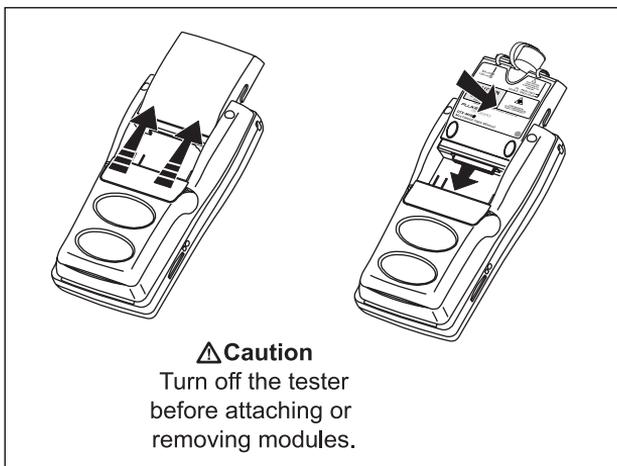


Figure 2-8. Installing Fiber Modules

⚠ Caution

Leave the module bay covers in place when the fiber modules are not installed.

Step 2: Checking the Battery Status and Verifying Operation with Fiber Modules

- 2-1 Clean the tester's connectors and the connectors on two SC/SC reference test cords. See Chapter 6 for details on cleaning.
- 2-2 Connect the tester and smart remote together, as shown in Figure 2-9.
- 2-3 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 2-4 Use  to highlight **Battery Status**; then press . Press  when you are done.
- 2-5 Use  to highlight **Self Test**; then press .
- 2-6 Press  to start the self test.

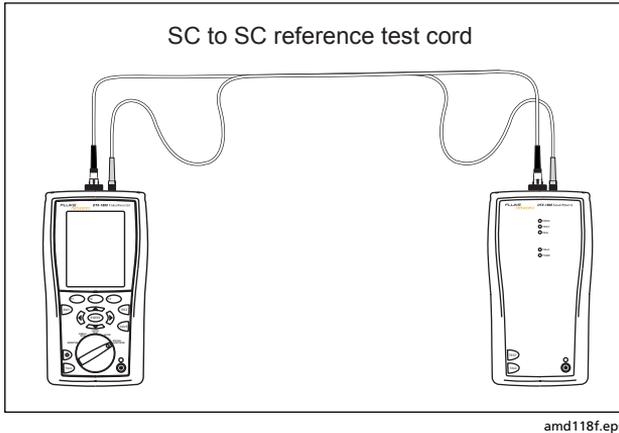


Figure 2-9. Self Test Connections for Fiber Modules

Step 3: Selecting a Fiber Type and Test Limit

Select the cable type and test limit specified for the job.

- 3-1** Turn the rotary switch to **SETUP**.
- 3-2** Use  to highlight **Fiber**; then press .
- 3-3** On the **Fiber** menu use  and  to select **Fiber Type**. Fiber types are organized in groups:
 - Generic:** Generic types of fiber
 - Custom:** Fiber types entered by a DTX user
 - Manufacturer:** Specific brands of fiber cable
- 3-4** Use  to highlight a group for the fiber type you will test; then press .
- 3-5** Use  to highlight the fiber type you will test; then press .
- 3-6** On the **Fiber** menu, use  to highlight **Test Limit** (if it is not highlighted); then press .
- 3-7** The first **Test Limit** screen shows the most recently-used limits. To see the list of test limit groups, press  **More**.
- 3-8** Use  and  to select a different limit group, if necessary, and to select the test limit required for the job.

Step 4: Configuring the Fiber Test

4-1 Turn the rotary switch to **SETUP**.

4-2 Use  to highlight **Fiber**; then press .

4-3 Use  to highlight **Remote End Setup**; then press .

4-4 Use   to highlight **Smart Remote**; then press .

4-5 Use  and  to enter the settings listed below. Use  to find settings on other tabs.

- **Bi-Directional: No**
- **Number of Adapters:** Enter the number of adapters used in the cabling you will test. For example, if the cabling has one connector at each end, enter 2.

- **Number of Splices:** Enter the number of splices in the cabling you will test.
- **Connector Type:** Select the type of connector used in the cabling you will test.
- **Test Method: Method B**

Step 5: Setting the Reference

5-1 Clean the connectors on the tester and the two reference test cords.

5-2 Turn the rotary switch to **SPECIAL FUNCTIONS**. Press  to select **Set Reference**. If both a fiber module and twisted pair adapter are attached, select **Fiber Module** next.

5-3 Connect the tester and smart remote as shown in Figure 2-10; then press .

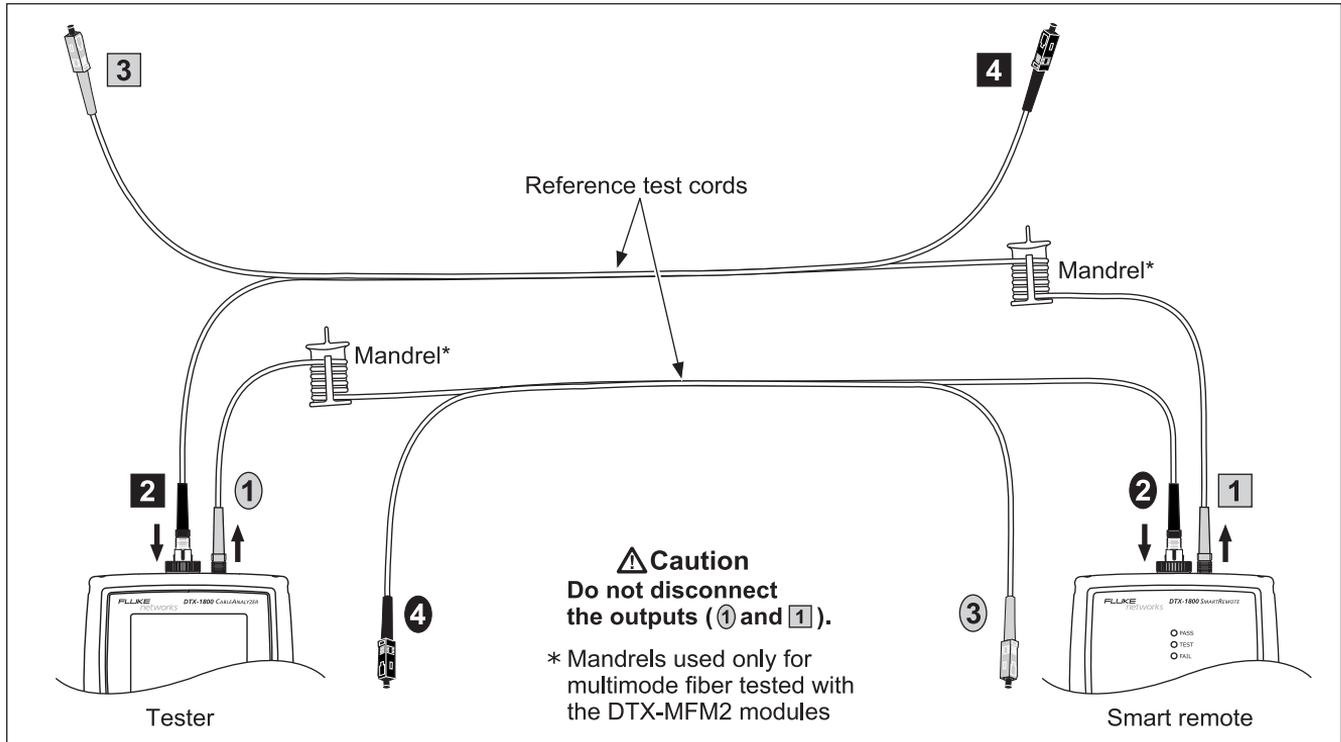


Figure 2-10. Smart Remote Mode Reference Connections (Method B)

Step 6: Running the Test

6-1 Clean the connectors on the cabling to be tested.

6-2 Make the connections as shown in Figure 2-11.

6-3 Turn the rotary switch to **AUTOTEST**. If a copper adapter is attached, verify that the media type is set to **Fiber**. Press **F1** **Change Media** to change it if necessary.

6-4 Press **TEST**.

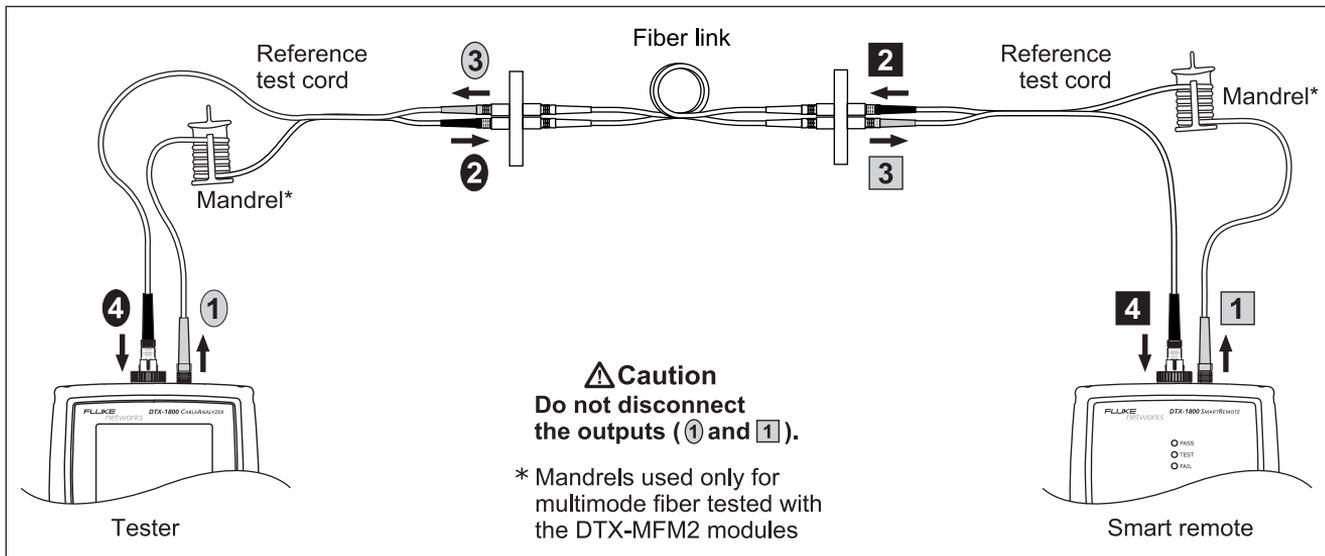


Figure 2-11. Smart Remote Mode Test Connections (Method B)

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Step 7: Viewing the Results

The **Summary** screen, shown in Figure 2-12, tells you if the test results met the selected test limit. This screen also shows a status for each measurement:

✓: PASS

✗: FAIL

i: The results are for informational purposes only. The measurement is not required by the selected test limit.

To see the results for an individual measurement, use  to highlight the test; then press .

See Chapter 6 for details on fiber test results.

Step 8: Saving the Results

8-1 Press .

8-2 Use the text editing screen to enter a name for the results. See Figure 2-1 on page 2-3 for details on editing text.

8-3 Press  when you are done.

This concludes the tutorial on testing fiber cabling. For more information on testing fiber cabling, see Chapter 6.

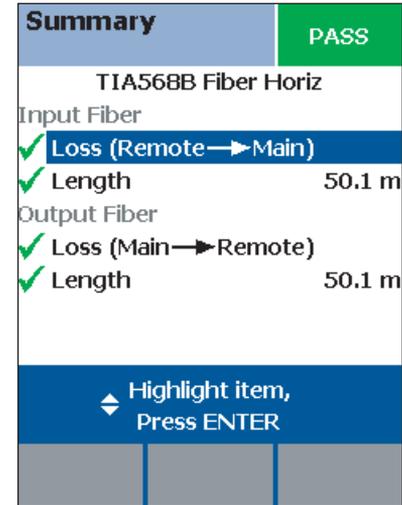


Figure 2-12. Summary Results Screen for an Autotest on Fiber amd121f.eps

Using the Auto Increment and Sequential Cable ID Features

The auto increment and sequential ID features generate cable IDs automatically. This frees you from having to enter IDs manually after each test.

These features are useful when you test installations with sequentially-numbered links.

When you use an ID from a list, the ID is marked with a "\$".

Note

The List feature lets you select IDs from a list created with LinkWare software and downloaded to the tester. See the LinkWare documentation for details.

Using the Auto Increment Feature

The auto increment feature increments the last character in the fiber ID you enter.

For example, if you save a test with the ID "A0", the tester increments the ID as follows:

A0, A1, A2...A9, A10, A11...A99, A100, A101...

Consecutive digits increment from right to left, but other characters do not.

Letters increment through the alphabet shown on the text editing screen:

1A, 1B, 1C...1Y, 1Z, 1Ç...1Û, 1Ü, 1A

To use the auto increment ID feature:

- 1 Turn the rotary switch to **SETUP**.
- 2 Use  to highlight **Instrument Settings**; then press .
- 3 Press  to select **Cable ID Source**.
- 4  to highlight **Auto Increment**; then press .
- 5 Run a test; then press .
- 6 Enter an ID in the **ID:** box.
- 7 Press  again.

The next time you run a test and press , the incremented cable ID appears in the ID box. Press  again to use the ID.

Creating a List of Sequential IDs

The tester includes templates for creating a list of sequential 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. The following characters are not incremented:

- Special characters: / # * - . , : [] space
- Characters that match between the start and stop IDs. For example if the start and stop IDs were ROOM1 and ROOM25, the characters "ROOM" would 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

The steps below guide you through creating a sequential ID list for the following scenario:

- You will test 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 IDs will follow the ANSI/TIA/EIA-606-A standard for horizontal links. See "About ANSI/TIA/EIA-606-A Cable IDs" on page 2-24 for details.

- 1 Turn the rotary switch to **SETUP**.
- 2 Use  to highlight **Instrument Settings**, then press .
- 3 Press  to select **Cable ID Source**.
- 4 Use  to highlight **Auto Sequence**, then press .
- 5 Use  to highlight **Template**, then press .
- 6 Use   to highlight **Horizontal**, then press .

- 7 On the **Auto Sequence** screen, press  **Default** to transfer the default pattern into the **START ID** and **STOP ID**.

- 8 Use  to highlight **Start ID**; then press .

- 9 Use   ,  ,  , and  to change the default ID to **03A-A01**.

Press  when you are done.

- 10 Use  to highlight **Stop ID**; then press .

- 11 Use   ,  ,  , and  to change the default ID to **03A-B06**.

Press  when you are done.

- 12 Press  **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, check your **Start** and **Stop** IDs for the problems listed below.

- 13 Press  to leave the sample list.

If the tester shows an error message, check your **Start** and **Stop** IDs for the problems listed below.

- 14 Press  when you are done setting up the list. The list is saved in the tester's internal memory.

If the ID sequence is invalid, check the following:

- 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 **Stop ID** is not allowed.
- Verify that you are not using the characters / # * - . , : [] space or accented characters as incrementing characters. You may use these 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 **Stop ID** is not sequentially greater than the **Start ID**. For example, using 25 as the **Start ID** and 10 as the **Stop ID** is not allowed.
- Verify that the **Start** and **Stop** IDs do not generate a sequence with more than 3000 IDs.

To use an ID from the auto sequence list:

- 1 Verify that the **Cable ID Source** in **SETUP** is set to **Auto Sequence**.
- 2 Run a test; then press .
- 3 To scroll through the ID list, use  . To scroll one page at a time, use  .
- 4 Select an ID from the ID list; then press  again.

About ANSI/TIA/EIA-606-A Cable 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 cable 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 cable or 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 cable or fiber tested is number 16 in backbone cable 5.

Chapter 3

Certifying Twisted Pair Cabling

Setting the Reference

The reference procedure sets a baseline for insertion loss, ELFEXT, and dc resistance measurements.

Run the tester's reference procedure at the following times:

- When you want to use the tester with a different smart remote. You can reference the tester to two different smart remotes.
- Every 30 days. Doing so ensures maximum accuracy of test results.

You do not need to set the reference after changing link interface adapters.

Note

Turn on the tester and smart remote and let them sit for 1 minute before setting the reference. Set the reference only after the testers have reached an ambient temperature between 10 °C and 40 °C (50 °F and 104 °F).

To set the reference:

- 1 Attach permanent link and channel adapters and make the connections shown in Figure 3-1.
- 2 Turn the rotary switch to **SPECIAL FUNCTIONS** and turn on the smart remote.
- 3 Highlight **Set Reference**; then press **ENTER**. If both a fiber module and copper adapter are attached, select **Link Interface Adapter** next.
- 4 Press **TEST**.

Testing Twisted Pair Patch Cords

Because up to 70 % of Cat 5e and Cat 6 patch cords fail to meet TIA requirements, Fluke Networks recommends testing patch cords before using them with your tester or in a network.

Patch cord testing requires the optional DTX-PCU65 Patch Cord Adapter Set. Contact Fluke Networks or visit the Fluke Networks website for more information.

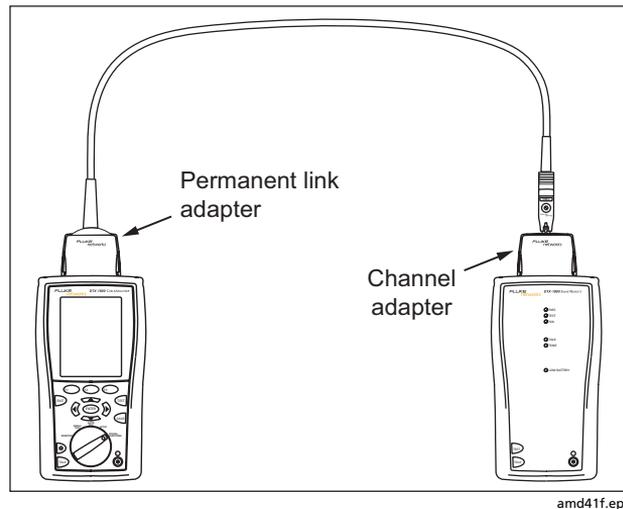


Figure 3-1. Twisted Pair Reference Connections

Twisted Pair Test Settings

Table 3-1 describes the settings that apply to twisted pair cabling tests.

To access the settings, turn the rotary switch to **SETUP**, use  to highlight **Twisted Pair**; then press .

Table 3-1. Twisted Pair Test Settings

Setting	Description
SETUP > Twisted Pair > Cable Type	Select a cable type appropriate for the type you will test. The cable types are organized by type and manufacturer. Selecting Custom lets you create a cable type. See Chapter 10 for details.
SETUP > Twisted Pair > Test Limit	Select the appropriate test limit for the job. Selecting Custom lets you create a test limit. See Chapter 10 for details.
SETUP > Twisted Pair > NVP	Nominal velocity of propagation, which is used with the measured propagation delay to determine cable length. The default value defined by the selected cable type represents the typical NVP for that cable type. You may enter a different value if necessary. To determine the actual value, change the NVP until the measured length matches the known length of a cable. Use a cable at least 30 m (100 ft) long. See Chapter 10. Increasing the NVP increases measured length.

-continued-

Table 3-1. Twisted Pair Test Settings (cont.)

Setting	Description			
SETUP > Twisted Pair > Outlet Configuration	The Outlet Configuration setting determines which cable pairs are tested and which pair numbers are assigned to the pairs. To see the wire map for a configuration, press F1 Sample from the Outlet Configuration screen. Selecting Custom lets you create a configuration. See Chapter 10 for details.			
<p style="text-align: center;">T568A</p> <pre> 3 { 1 white/green 2 green } 2 { 3 white/orange 1 { 4 blue 5 white/blue } 6 orange } 4 { 7 white/brown 8 brown } </pre>	<p style="text-align: center;">T568B</p> <pre> 2 { 1 white/orange 2 orange } 3 { 3 white/green 1 { 4 blue 5 white/blue } 6 green } 4 { 7 white/brown 8 brown } </pre>	<p style="text-align: center;">USOC (1 or 2 Pair)</p> <pre> 2 { 3 white/orange 1 { 4 blue 5 white/blue } 6 orange } </pre> <p style="text-align: center;">Token Ring</p> <pre> 3 { 3 white/green 1 { 4 blue 5 white/blue } 6 green } </pre>	<p style="text-align: center;">ATM/TP-PMD Straight</p> <pre> 1 { 1 white/green 2 green } 2 { 7 white/brown 8 brown } </pre> <p style="text-align: center;">ATM/TP-PMD Crossed</p> <pre> 1 { 1 white/green ----- 7 2 green ----- 8 } 2 { 7 white/brown ----- 1 8 brown ----- 2 } </pre>	<p style="text-align: center;">Ethernet</p> <pre> 2 { 1 white/orange 2 orange } 3 { 3 white/green 6 green } </pre> <p style="text-align: center;">Ethernet Crossed</p> <pre> 2 { 1 white/orange ----- 3 2 orange ----- 6 } 3 { 3 white/green ----- 1 6 green ----- 2 } </pre>

-continued-

Table 3-1. Twisted Pair Test Settings (cont.)

Setting	Description
SETUP > Instrument Settings > Store Plot Data	<p>Standard: The tester displays and saves plot data for frequency-based tests such as NEXT, return loss, and attenuation. The tester saves data for the frequency range required by the selected test limit.</p> <p>Extended: The tester saves data beyond the frequency range required by the selected test limit.</p> <p>No: Plot data is not saved, which lets you save more results. Saved results show worst margins and worst values for each pair.</p>
SPECIAL FUNCTIONS > Set Reference	<p>The tester must be referenced to the smart remote the first time the two units are used together. You should also set the reference every 30 days. See “Setting the Reference” on page 3-1.</p>
SETUP > Instrument Settings Settings for saving tests	<p>Cable ID Source, Current Folder, Result Storage Location (DTX-1800, DTX-1200), Operator, Site, and Company. See “Preparing to Save Tests” in Chapter 2.</p>

Autotest on Twisted Pair Cabling

Figure 3-2 shows the equipment needed for certifying twisted pair cabling.

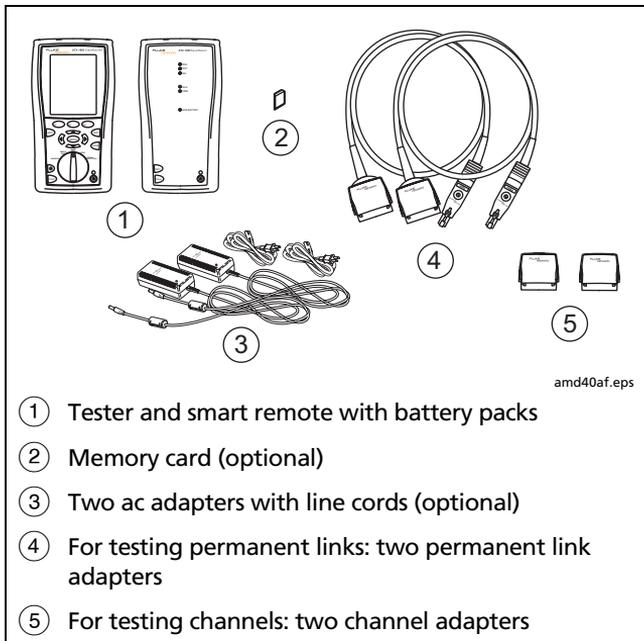


Figure 3-2. Equipment for Certifying Twisted Pair Cabling

To run the Autotest on twisted pair cabling:

- 1 Verify that the settings listed in Table 3-1 are appropriate.
 - 2 Attach adapters appropriate for the job to the tester and the smart remote.
 - 3 Turn the rotary switch to **AUTOTEST** and turn on the smart remote. Connect to the cabling, as shown in Figure 3-3 for a permanent link or Figure 3-4 for a channel.
 - 4 If a fiber module is installed, you may need to press **F1 Change Media** to select **Twisted Pair** as the media type.
 - 5 Press **TEST** on the tester or smart remote. To stop the test at any time, press **EXIT**.
 - 6 The tester shows the Autotest **Summary** screen when the test is complete (see page 3-10). To view results for a specific parameter, use **▲** **▼** to highlight the parameter; then press **ENTER**.
- If the Autotest failed, press **F1 Fault Info** for possible causes of the failure.
- 7 To save the results, press **SAVE**. Select or create a cable ID; then press **SAVE** again.

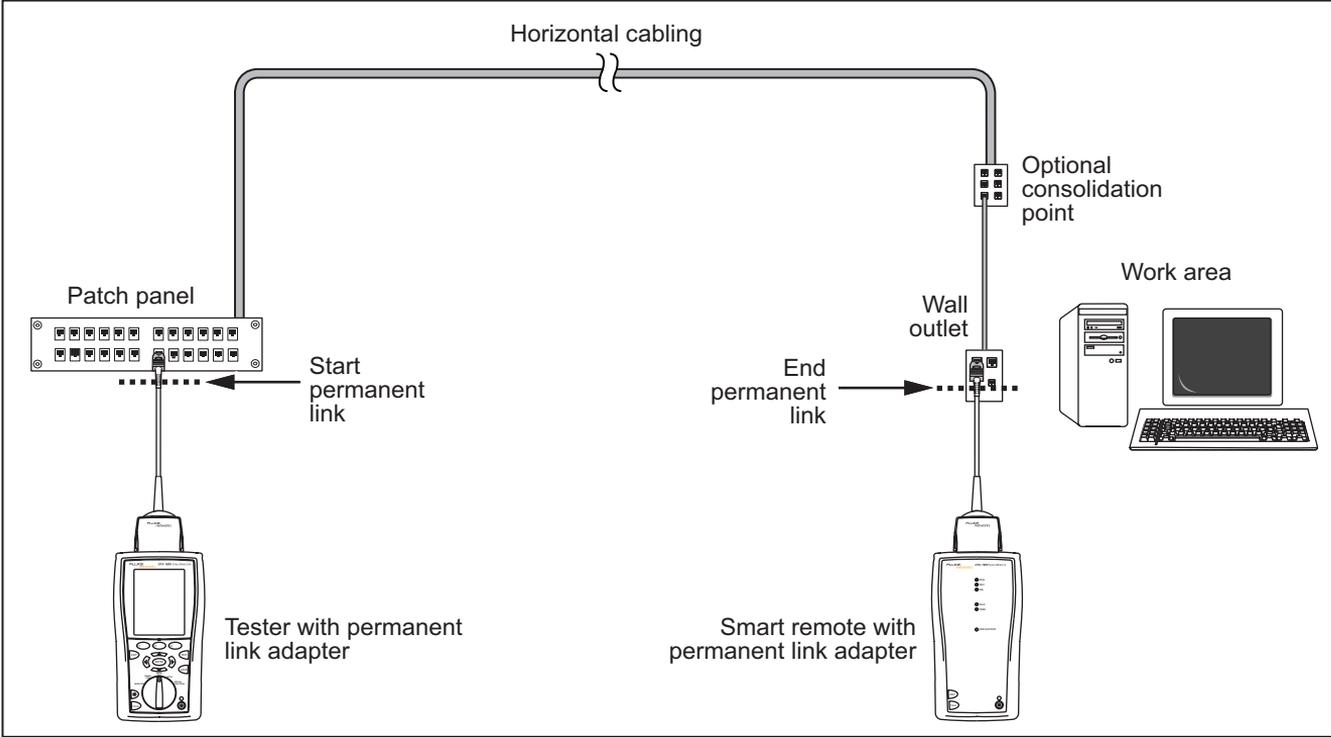


Figure 3-3. Permanent Link Test Connections

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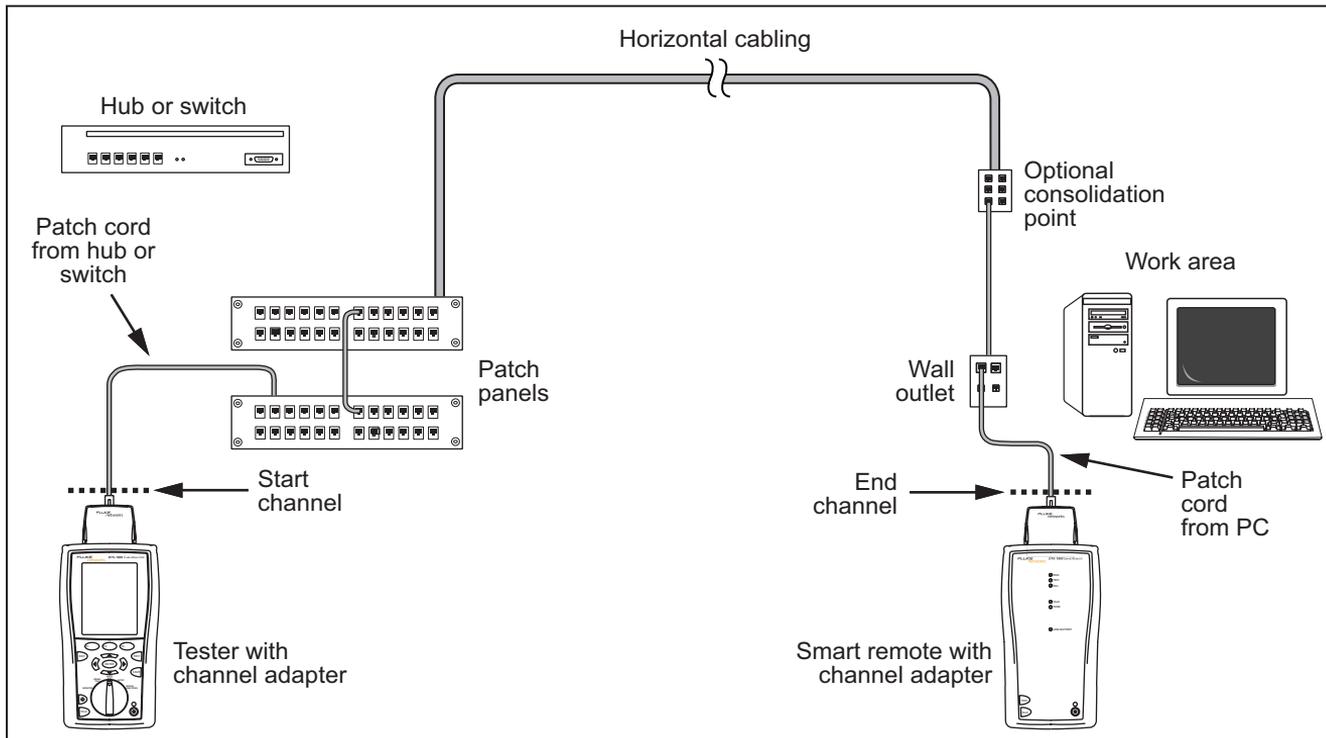


Figure 3-4. Channel Test Connections

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Twisted Pair Autotest Results

The tests listed below apply to twisted pair cabling.

Note

The Autotest runs some or all of the tests listed below, depending on the selected test limit.

- Wire map
- Resistance
- Characteristic impedance
- Length
- Propagation delay
- Delay skew
- Insertion loss (attenuation)
- NEXT (near-end crosstalk) and NEXT at the smart remote
- Return loss
- ACR (attenuation to crosstalk ratio) and ACR at the smart remote
- PSACR (power-sum attenuation to crosstalk ratio) and PSACR at the smart remote
- ELFEXT (equal level far-end crosstalk)
- PSELFEXT (power-sum equal level far-end crosstalk)

Figure 3-5 describes the Autotest Summary screen.

amd77f.eps

① **PASS:** All parameters are within limits.
FAIL: One or more parameters exceeds the limit.
PASS*/FAIL*: One or more parameters are within the tester's accuracy uncertainty range, and the "*" notation is required by the selected test standard. See "PASS*/FAIL* Results" on page 3-12

② Press (F2) or (F3) to scroll the screen.

③ If the test failed, press (F1) for diagnostic information.

④ Action prompt for the screen. Use to highlight a parameter; then press (ENTER).

⑤ ✓: The measurement was within limits.
i: The parameter was measured, but has no PASS/FAIL limit in the selected test limit. The results are for informational purposes only.
X: The measurement exceeds the limit.
*****: See "PASS*/FAIL* Results" on page 3-12.

⑥ The worst margin found for the test.

Figure 3-5. Autotest Summary Screen for Twisted Pair Cabling

Automatic Diagnostics

If an Autotest fails, press **F1** **Fault Info** for diagnostic information about the failure. The diagnostic screens show likely causes of the failure and suggest actions you

can take to solve the problem. A failed test may produce more than one diagnostic screen. In this case, press  to see additional screens.

Figure 3-6 shows examples of diagnostic screens.

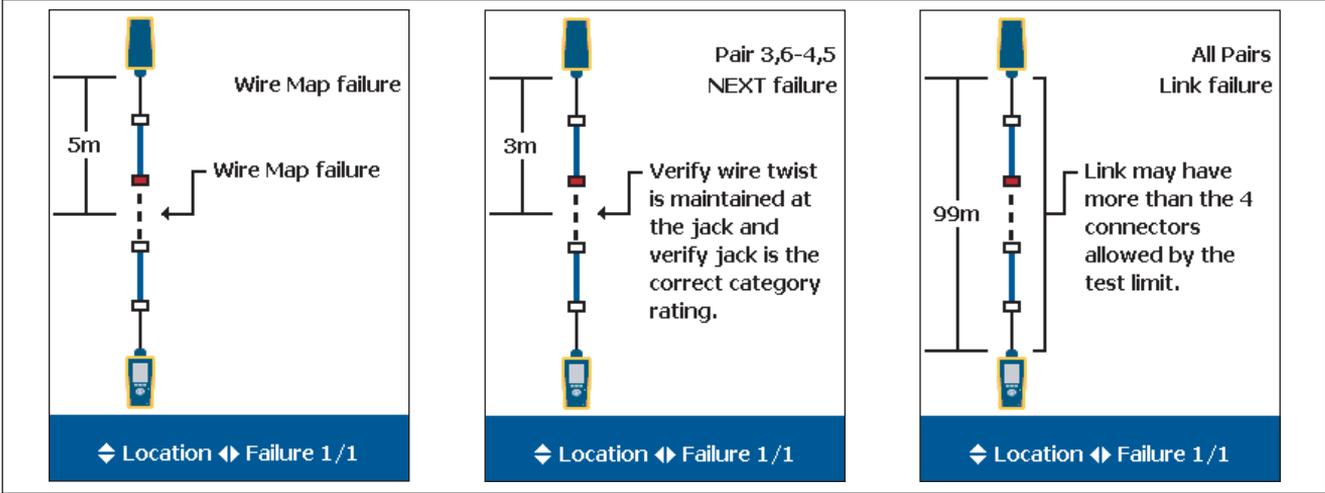


Figure 3-6. Examples of Automatic Diagnostic Screens

amd75f.eps

PASS*/FAIL* Results

A result marked with an asterisk means that measurements are in the tester's accuracy uncertainty range (Figure 3-7) and the "*" notation is required by the selected test standard. These results are considered marginal. Marginal passing and failing results are marked with blue and red asterisks, respectively.

A **PASS*** may be considered a passing result.

A **FAIL*** should be considered a failure.

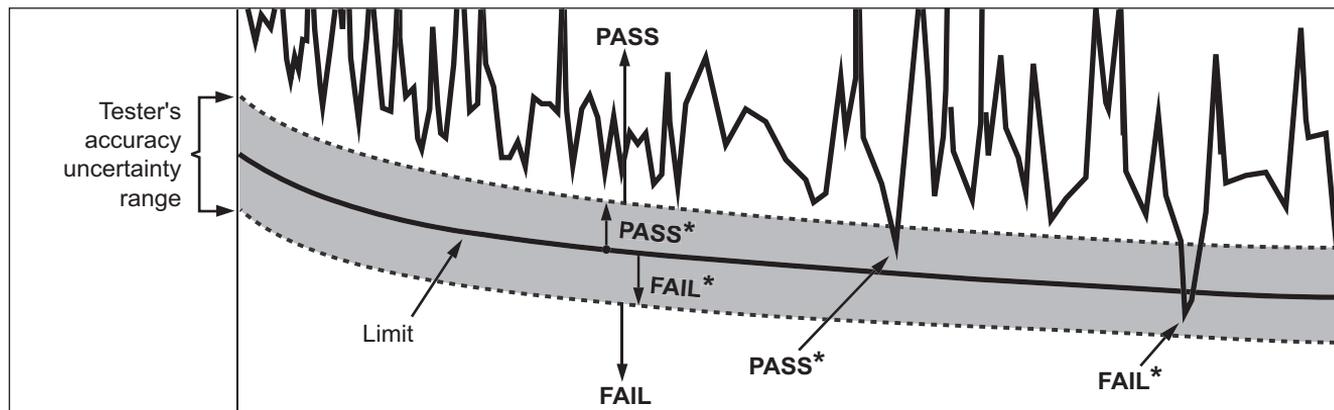


Figure 3-7. PASS* and FAIL* Results

amd42f.eps

Wire Map

Wire map results show the connections between the main and remote testers. The tester checks the cable pairs required by the selected test limit. If the wire map test fails, you can continue or stop the Autotest.

Tip: The wire map test in Single Test mode features a scanning function that runs the wire map test continuously. This function is helpful for locating intermittent wiring faults.

Figure 3-8 describes examples of wire map screens.

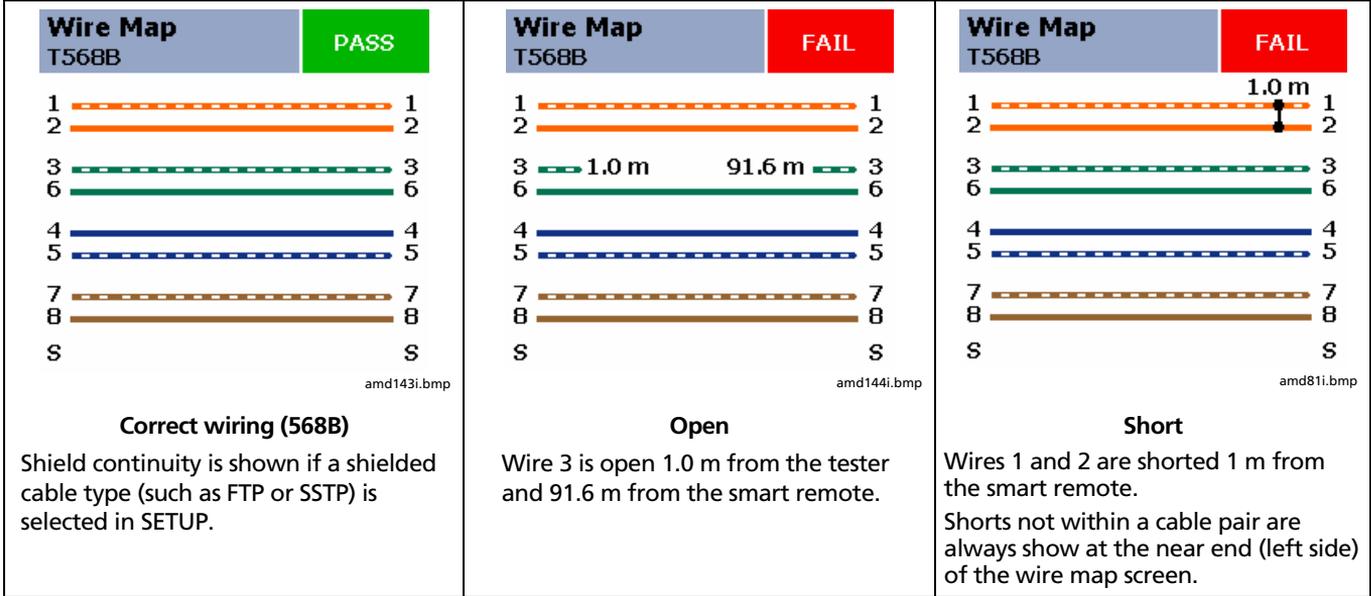


Figure 3-8. Wire Map Examples

-continued-

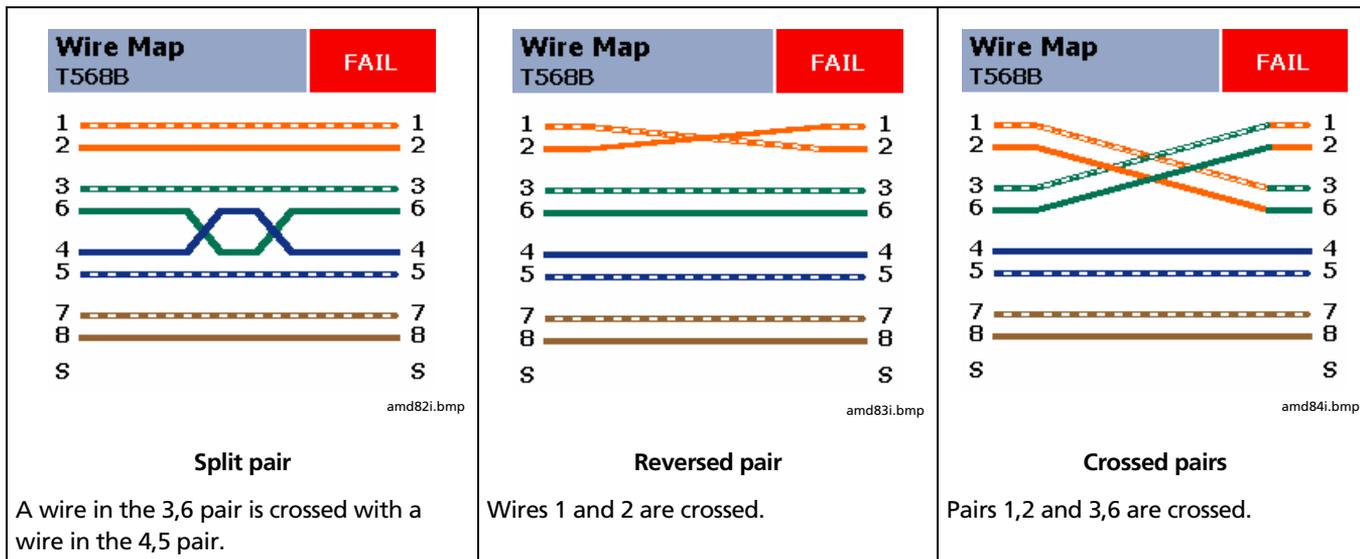


Figure 3-8. Wire Map Examples (cont.)

Resistance

Resistance results show the dc loop resistance for each cable pair. The smart remote shorts the end of each pair to create the loops. A pair's resistance depends on the integrity of the contacts in the connector, the length of the pair, and its wire gauge.

Resistance problems always affect other tests. For example:

- A link that is too long has higher-than-normal resistance and will fail the length test.
- High-resistance connections reflect signals that cause the return loss test to fail. The tester's HDTDR test tells you the distance to the bad connection.

Most standards do not have a limit for resistance. The tester shows an **i** when no limit is available. Figure 3-9 shows the resistance results screen.

Tip: The resistance test in Single Test mode features a scanning function that runs the resistance test continuously. This function is helpful for locating intermittent resistance faults.

Resistance	
Resistance	
i 1 2	9.8 Ω
i 3 6	10.0 Ω
i 4 5	12.5 Ω
i 7 8	9.8 Ω

Figure 3-9. Resistance Results

amd85f.eps

Characteristic Impedance

Note

Most test limits do not require the characteristic impedance measurement. Characteristic impedance is not displayed for these limits.

*Impedance measurements require a cable at least 13 ft (4 m) long. The tester shows **Unknown** for cables shorter than this.*

Characteristic impedance results show approximate characteristic impedance of each cable pair.

Characteristic impedance is the impedance a cable would have if the cable were infinitely long. Proper network operation depends on constant characteristic impedance throughout the system's cables and connectors. Abrupt changes in characteristic impedance, called anomalies, cause signal reflections that can cause network faults.

Length

Length results show the length of each cable pair. The **PASS/FAIL** result is assigned based on the shortest measured length. The lengths of the other pairs are shown for informational purposes. A 2 % to 5 % difference in measured length among cable pairs is normal because of the following:

- Signals travel at slightly different speeds in each cable pair, but the tester uses the same speed to calculate the length of each pair.
- The twist rate varies slightly among cable pairs. If you untwisted and straightened all the pairs, they would have slightly different lengths.

Figure 3-10 shows a length results screen.

Note

Differences between measured and actual length values can be caused by variations in the cable's NVP value. NVP values can vary among cable types, lots, and manufacturers. In most cases, these differences are minor and may be disregarded.

Length		PASS
	Length	Limit
i 1 2	90.4 m	90.0 m
i 3 6	91.8 m	90.0 m
i 4 5	91.6 m	90.0 m
✓ 7 8	89.6 m	90.0 m

Figure 3-10. Length Results

amd87f.eps

Propagation Delay and Delay Skew

Propagation delay is the time taken for a test pulse to travel the length of a cable pair. The delay is measured in nanoseconds. One nanosecond is one-billionth of a second, or 0.000000001 second. Propagation delays vary slightly among pairs because of small differences in electrical characteristics and length.

Delay skews are the differences in propagation delays between the shortest delay and the delays of the other cable pairs. The shortest delay is shown as “0 ns” in the delay skew results.

The propagation delay and delay skew results show a limit if the measurements required by the selected test limit. Otherwise, the results always show **PASS**. Figure 3-11 shows the propagation delay and delay skew results screens.

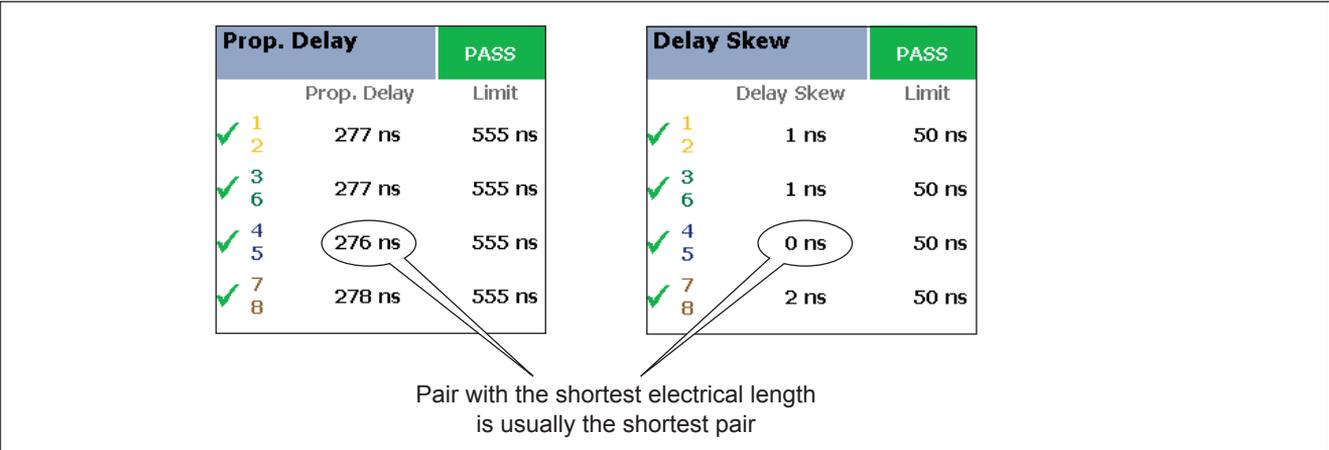


Figure 3-11. Propagation Delay and Delay Skew Results

amd88f.eps

Insertion Loss

Note

Insertion loss is also known as attenuation.

Insertion loss is the loss of signal strength over the cabling, as shown in Figure 3-12. Insertion loss is caused by the resistance of the copper wire and connecting

hardware and by leakage of electrical energy through the cable's insulation.

At higher frequencies, signals tend to travel only near the surface of a conductor. This "skin effect", along with the cabling's inductance and capacitance, cause insertion loss to increase with frequency.

Figure 3-13 describes the insertion loss plot.

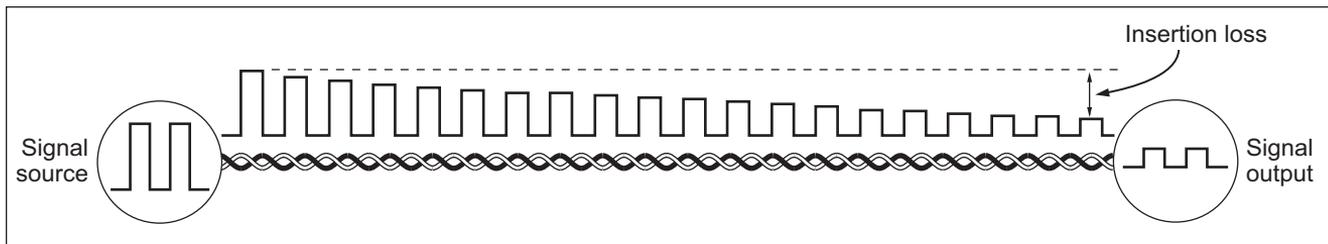
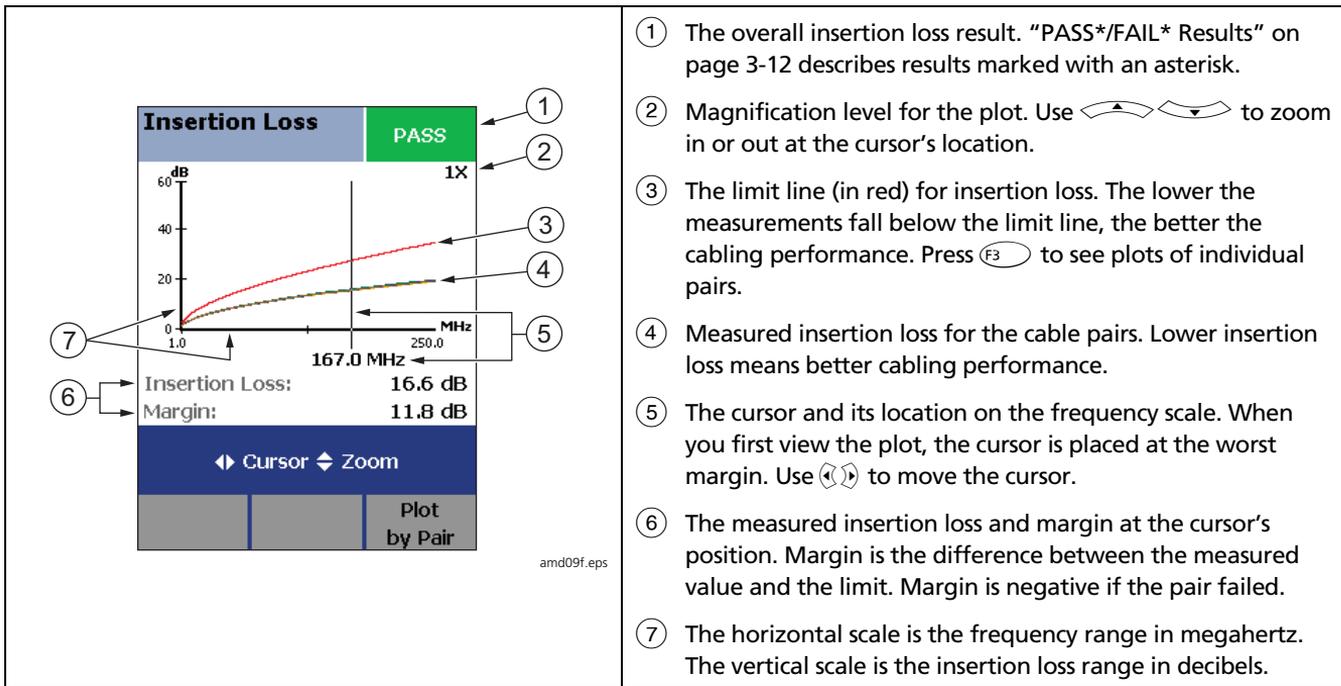


Figure 3-12. Insertion Loss is a Decrease in Signal Strength

amd90f.eps



- ① The overall insertion loss result. "PASS*/FAIL* Results" on page 3-12 describes results marked with an asterisk.
- ② Magnification level for the plot. Use to zoom in or out at the cursor's location.
- ③ The limit line (in red) for insertion loss. The lower the measurements fall below the limit line, the better the cabling performance. Press **F3** to see plots of individual pairs.
- ④ Measured insertion loss for the cable pairs. Lower insertion loss means better cabling performance.
- ⑤ The cursor and its location on the frequency scale. When you first view the plot, the cursor is placed at the worst margin. Use to move the cursor.
- ⑥ The measured insertion loss and margin at the cursor's position. Margin is the difference between the measured value and the limit. Margin is negative if the pair failed.
- ⑦ The horizontal scale is the frequency range in megahertz. The vertical scale is the insertion loss range in decibels.

Figure 3-13. Insertion Loss Plot

NEXT (Near-End Crosstalk)

NEXT results show the crosstalk attenuation between cable pairs. NEXT is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other cable pairs at the same end of the cabling. Higher NEXT values correspond to better cabling performance.

Because of insertion loss, crosstalk signals occurring farther from the signal source are weaker and cause less trouble than crosstalk nearer the source (Figure 3-14). For this reason, NEXT is measured from both ends of the cabling.

For NEXT failures, the tester's diagnostic screens (F1 **Fault Info**) may show more than one possible cause for the failure. In this case, you can use the HDTDX analyzer results to further diagnose the problem. See Chapter 5 for details. Figure 3-15 describes the NEXT plot.

Note

*For ISO/IEC 11801:2002 and EN50173:2002 standards, NEXT is not evaluated where insertion loss at the same frequency is less than 4 dB. If insertion loss never exceeds 4 dB, NEXT results are marked with an **i** on the tester and an **N/A** in LinkWare reports.*

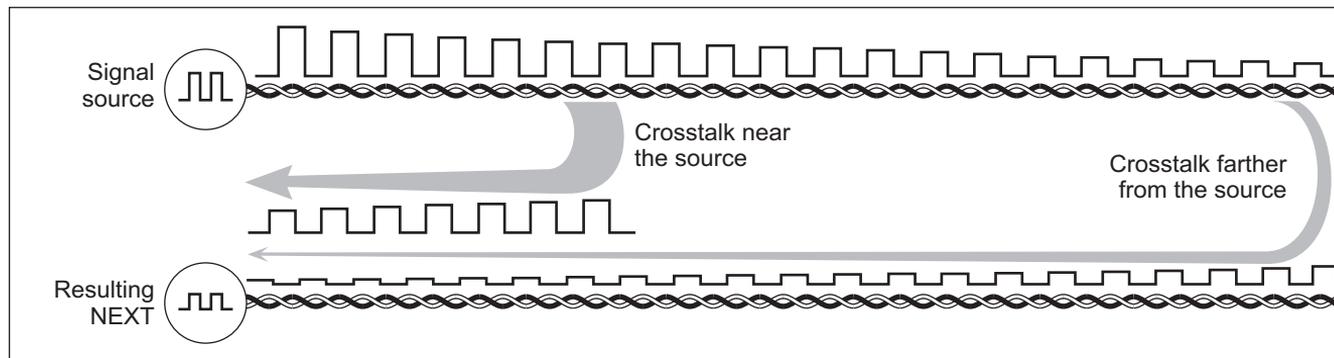


Figure 3-14. Near-End Crosstalk (NEXT)

amd89f.eps

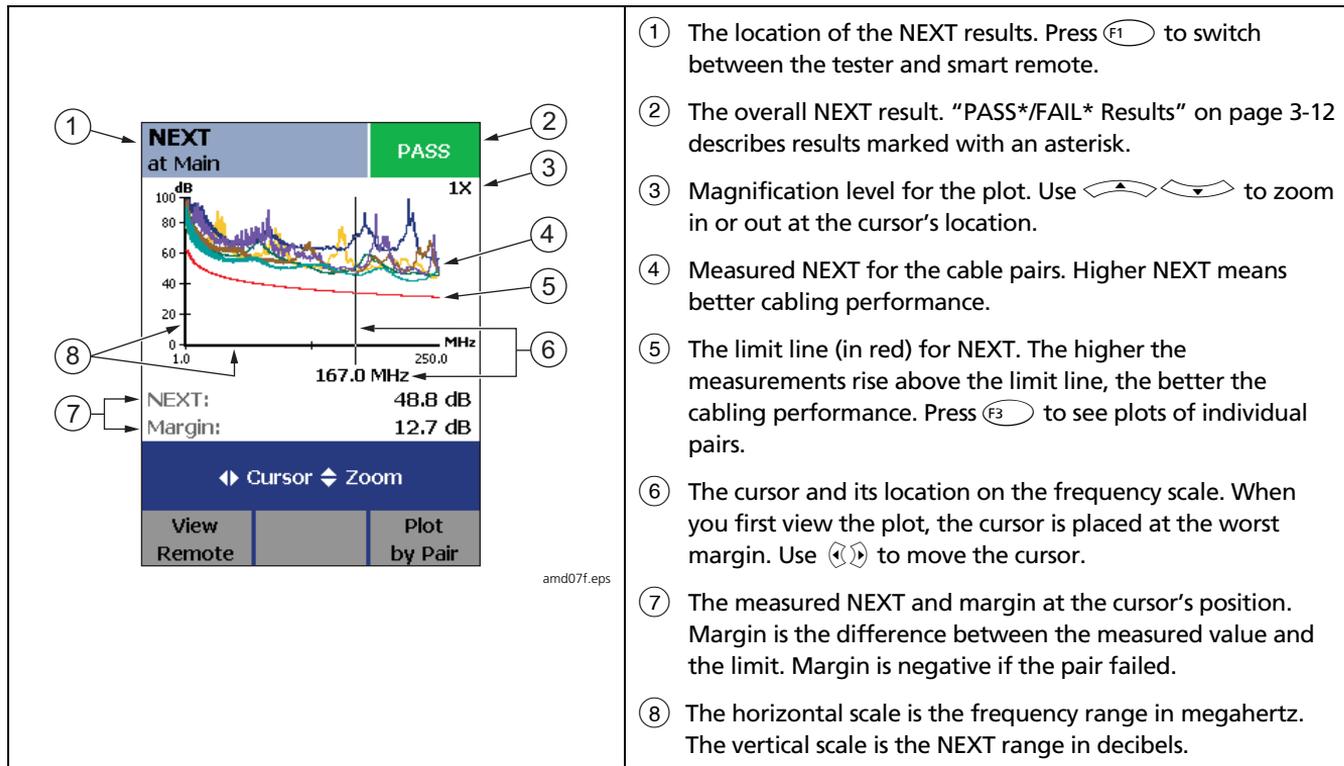


Figure 3-15. NEXT Plot

ACR (Attenuation to Crosstalk Ratio)

ACR is like a signal-to-noise ratio. ACR values indicate how the amplitude of signals received from a far-end transmitter compares to the amplitude of crosstalk produced by near-end transmissions, as shown in Figure 3-16. The tester calculates ACR as the difference (in dB)

between NEXT and attenuation (insertion loss). Higher ACR values mean received signals are much larger than crosstalk signals. Higher ACR values correspond to better cabling performance.

Figure 3-17 describes the ACR plot.

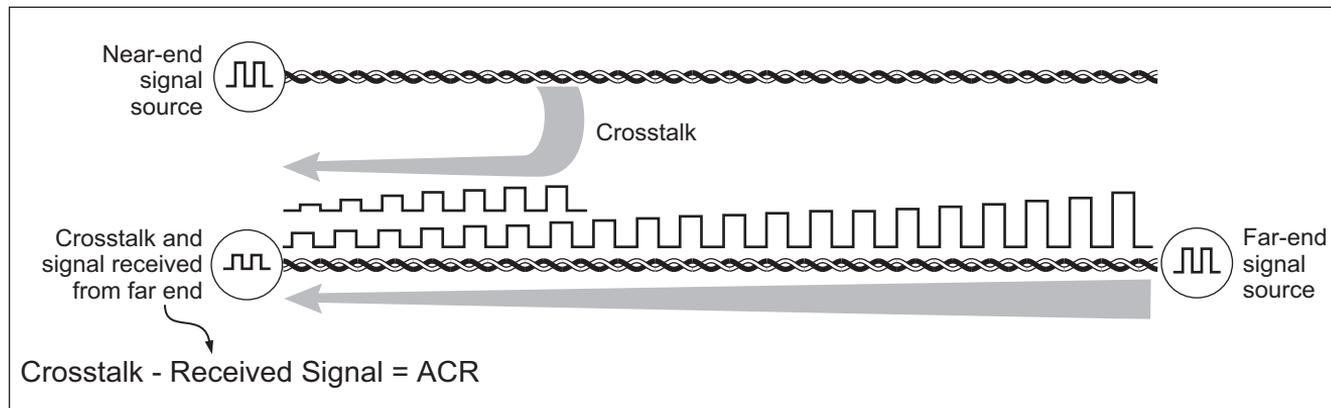
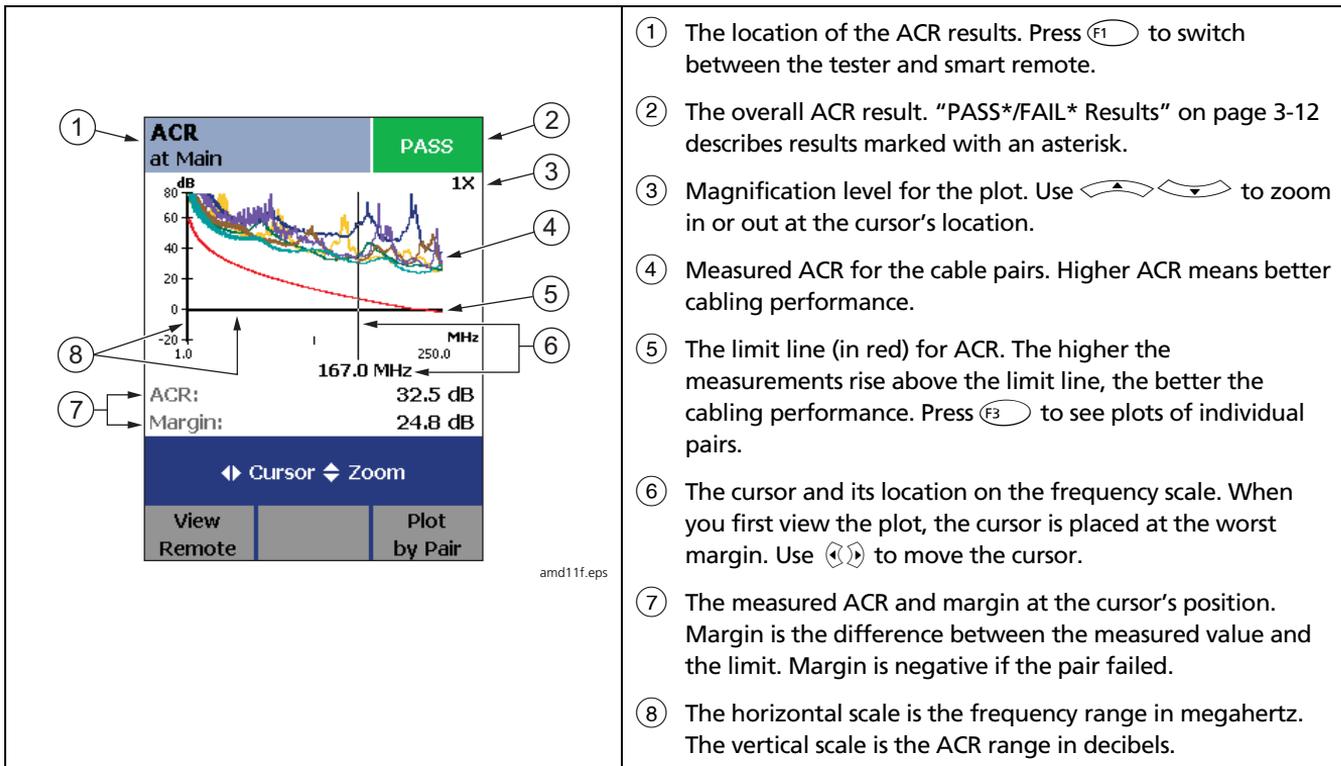


Figure 3-16. Attenuation to Crosstalk Ratio (ACR)

amd91f.eps



amd11f.eps

- ① The location of the ACR results. Press (F1) to switch between the tester and smart remote.
- ② The overall ACR result. "PASS*/FAIL* Results" on page 3-12 describes results marked with an asterisk.
- ③ Magnification level for the plot. Use  to zoom in or out at the cursor's location.
- ④ Measured ACR for the cable pairs. Higher ACR means better cabling performance.
- ⑤ The limit line (in red) for ACR. The higher the measurements rise above the limit line, the better the cabling performance. Press (F3) to see plots of individual pairs.
- ⑥ The cursor and its location on the frequency scale. When you first view the plot, the cursor is placed at the worst margin. Use  to move the cursor.
- ⑦ The measured ACR and margin at the cursor's position. Margin is the difference between the measured value and the limit. Margin is negative if the pair failed.
- ⑧ The horizontal scale is the frequency range in megahertz. The vertical scale is the ACR range in decibels.

Figure 3-17. ACR Plot

Return Loss

Return loss is the difference between the power of a transmitted signal and the power of the signals reflected back. The signal reflections are caused by variations in the cable's impedance. Figure 3-18 shows some common sources of reflections that create return loss.

High return loss means the cabling reflects very little of the transmitted signal back to the source. High return loss is especially important for high-speed systems, such as Gigabit Ethernet. The bi-directional (full-duplex) transceivers used in these systems use directional couplers to distinguish between incoming and outgoing signals. The couplers may interpret strong reflected signals as incoming data, resulting in data errors.

A return loss plot indicates how well a cable's impedance matches its rated impedance over a range of frequencies. Figure 3-19 describes the return loss plot.

For return loss failures, the testers diagnostic screens (F1) **Fault Info** may show more than one possible cause for the failure. In this case, you can use the HDTDR analyzer results to further diagnose the problem. See Chapter 5 for details.

Note

*For ANSI/TIA/EIA-568-B.2-3 and ISO/IEC 11801:2002 6.4.2 standards, return loss is not evaluated where insertion loss at the same frequency is less than 3 dB. If insertion loss never exceeds 3 dB, return loss results are marked with an **i** on the tester and an NIA in LinkWare reports.*

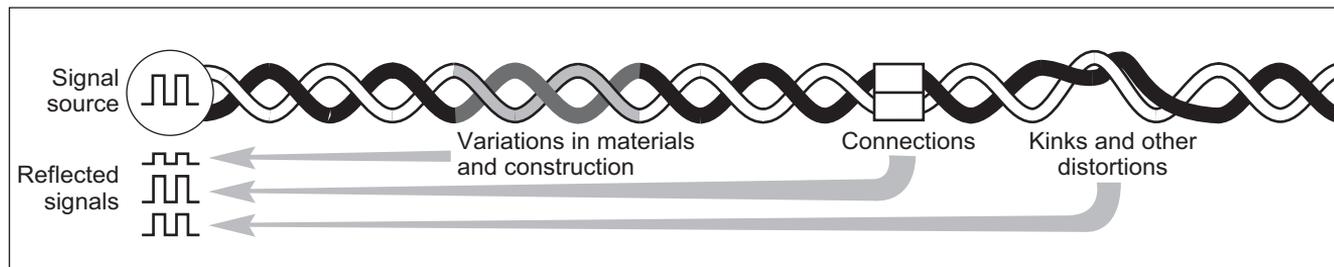


Figure 3-18. Sources of Return Loss

amd93f.eps

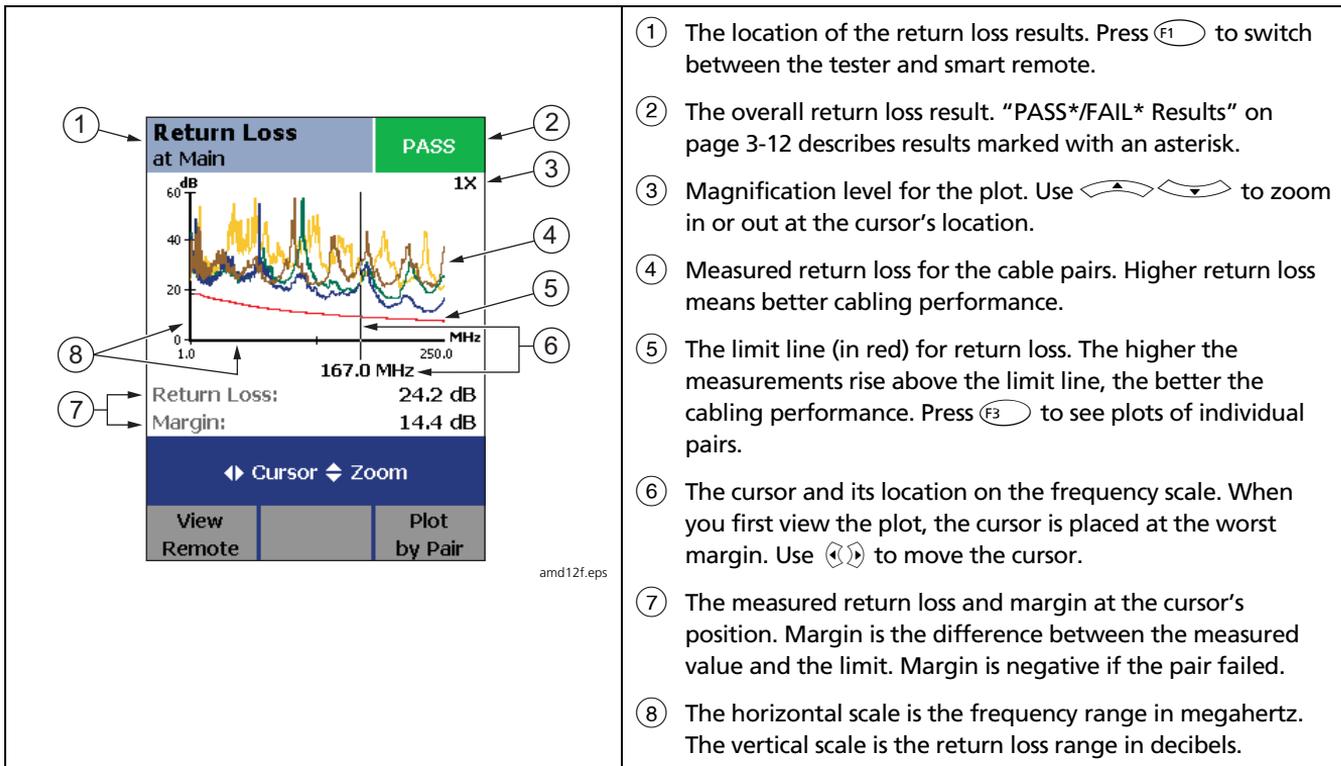


Figure 3-19. Return Loss Plot

PSNEXT (Power Sum Near End Crosstalk) Test

PSNEXT results show how much each cable pair is affected by the combined crosstalk from the other pairs. PSNEXT is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the same end of the cabling. The tester uses the NEXT values to calculate PSNEXT. Higher PSNEXT values correspond to better cabling performance.

PSNEXT results are typically a few dB lower (worse) than worst-case NEXT results.

PSACR (Power Sum Attenuation to Crosstalk Ratio) Test

PSACR values indicate how the amplitude of signals received from a far-end transmitter compares to the combined amplitudes of crosstalk produced by near-end transmissions on the other cable pairs. PSACR is the difference (in dB) between PSNEXT and attenuation (insertion loss). The tester uses the PSNEXT and attenuation results to calculate PSACR values. Higher PSACR values mean received signals are much larger than the crosstalk from all the other cable pairs. Higher PSACR values correspond to better cabling performance.

PSACR is the difference (in dB) between each wire pair's attenuation (insertion loss) and the combined crosstalk

received from the other pairs. The tester uses the PSNEXT and attenuation values to calculate PSACR values.

PSACR results are typically a few dB lower (worse) than worst-case ACN results.

ELFEXT (Equal Level Far-End Crosstalk) Test

While NEXT is measured at the same end as the signal source, FEXT (far-end crosstalk) is measured at the far end. Because all far-end crosstalk signals travel the same distance, they experience the same amount of attenuation, as shown in Figure 3-20. This means that all crosstalk signals contribute equally to noise at the far end. This is different from near-end crosstalk. At the near end, crosstalk occurring closer to the source contributes more to noise than crosstalk occurring farther from the source. (Figure 3-14).

Because of attenuation, FEXT on longer cables is less than FEXT on shorter cables of the same type. Subtracting the effects of attenuation normalizes the results for length and produces ELFEXT (equal level far end crosstalk) values. Since ELFEXT does not depend on length, it is used instead of FEXT to evaluate cable performance.

Because all far-end crosstalk signals travel the same distance, they tend to add up in phase. Therefore, high ELFEXT is critical when two or more wire-pairs carry signals in the same direction. 1000BASE-T carries bi-

directional signals on all four wire pairs, so ELFEXT is a critical parameter for 1000BASE-T certification.

Like ACR, ELFEXT represents a signal-to-noise ratio for the cabling. Higher ELFEXT values mean that data signals received at the far end of the cabling are much larger than crosstalk signals received at the far end. Higher ELFEXT values correspond to better cabling performance.

NEXT and ELFEXT performance tends to be similar in cable, but may differ greatly in connecting hardware.

Some connectors achieve good NEXT performance by balancing the inductive and capacitive currents that cause crosstalk. Since these currents are 180° out of phase at the near-end of the cabling, they cancel out, which eliminates crosstalk at the near end. However, currents that cancel at the near end add up at the far end, causing far-end crosstalk and poor ELFEXT performance.

Figure 3-21 describes the ELFEXT plot.

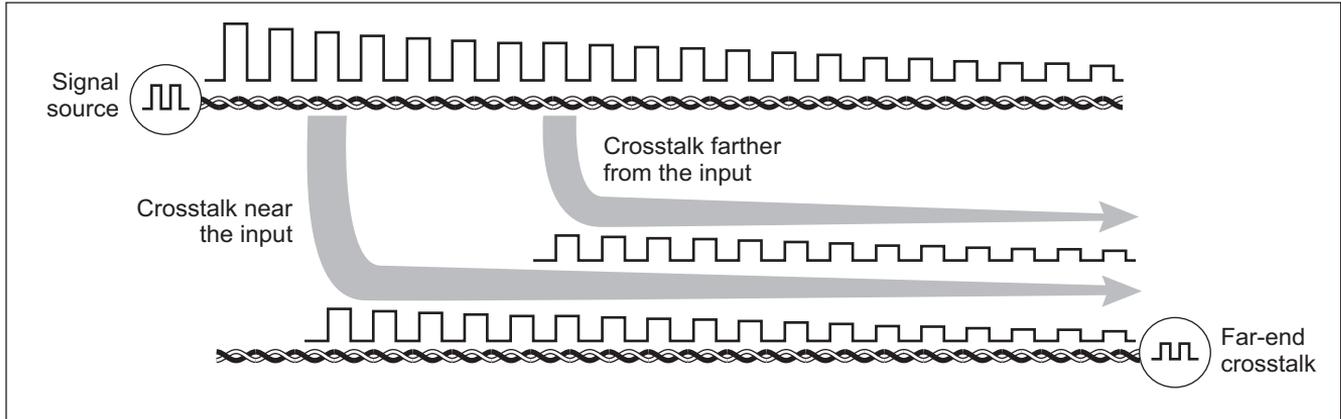


Figure 3-20. Far-End Crosstalk (FEXT)

amd94f.eps

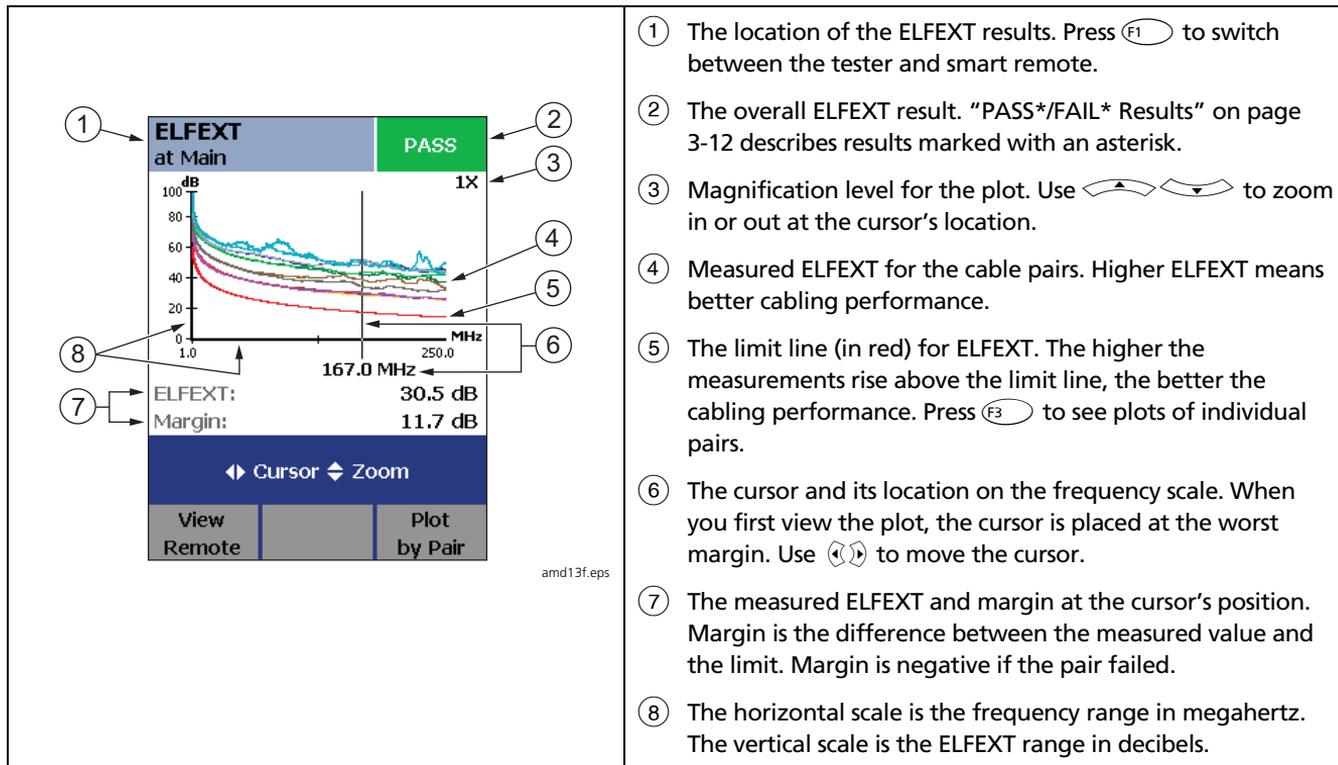


Figure 3-21. ELFEXT Plot

PSELFEXT Test

PSELFEXT results show how much the far end of each cable pair is affected by the combined far-end crosstalk from the other pairs. PSELFEXT is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the far end of the cabling. The tester uses the ELFEXT values to calculate PSELFEXT. Higher PSELFEXT values correspond to better cabling performance.

PSELFEXT results are typically a few dB lower than worst-case FEXT results.

Running Single Tests

The tester's single test mode (**SINGLE TEST** on the rotary switch) lets you run individual tests for isolating cabling failures and quickly testing repairs. You can run some single tests without a remote. Table 3-2 shows which tests require a smart remote.

Single tests use the selected test limit to produce a PASS/FAIL result for the test. Each single test also produces results for other measurements. For example, the wire map test also produces propagation delay and delay skew results. To see these results, press  when the single test is finished; then press  **View Results**.

To save a single test, press , select or create a cable ID; then press  again.

Table 3-2. Smart Remote Requirements for Twisted Pair Single Tests

Test	Smart Remote Requirements*
HDTDX analyzer	Recommended. Without a smart remote, results for short cables may be unreliable.
HDTDR analyzer	Optional. Without a smart remote, the plot shows large reflections at the end of the cabling.
Wire Map	Recommended. Without a remote some faults, such as split pairs and opens at the far-end connector, cannot be detected.
Resistance	Optional.
Impedance	Optional. Test is available only for limits that require the impedance measurement.
Length	Optional.
Propagation Delay	Optional.
Delay Skew	Optional.
Insertion Loss	Required.
NEXT/PSNEXT	Recommended. The NEXT test fails unless the end of the cabling is properly terminated with a remote or resistors.
ELFEXT/PSELFEXT	Required.
ACR/PSACR	Required.
Return Loss	Recommended. The return loss test fails unless the end of the cabling is properly terminated with a remote or resistors.
* Note: If a remote is not required for a test, the test runs without activating the toner when no remote is detected.	

Monitoring Impulse Noise

Impulse noise is electrical noise generated by fluorescent lights, electric motors, electric heaters and air conditioners, photocopiers, refrigerators, microwave ovens, and other electric devices. Active links in the same pathway can also cause noise.

Noise distorts the shape of digital signals, as shown in Figure 3-22. Too much noise can cause transmission errors, resulting in poor network performance.

The impulse noise test lets you monitor noise on inactive twisted pair cabling to determine if the noise may affect network operation.

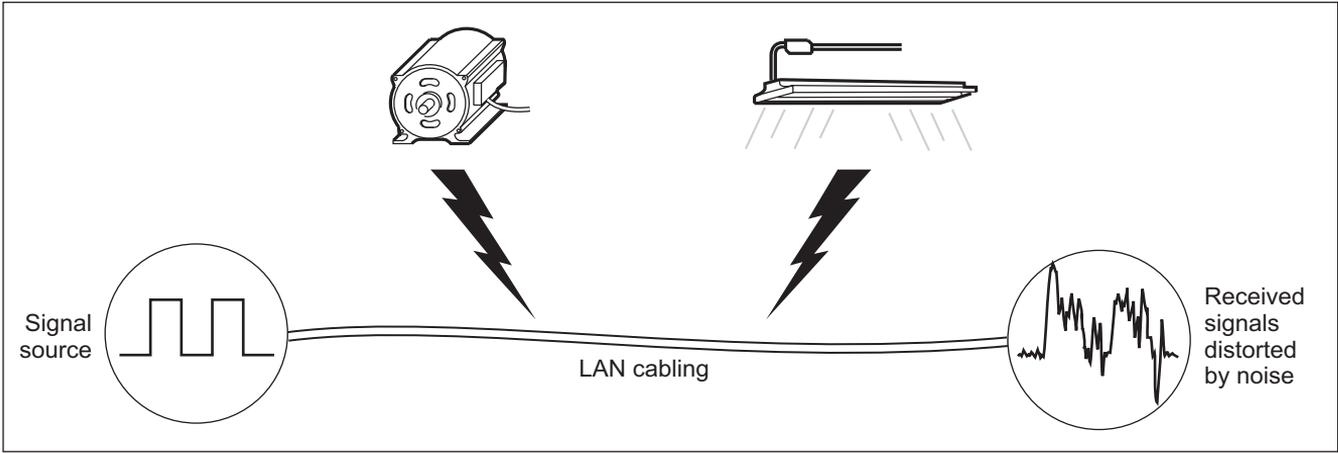


Figure 3-22. Causes and Effects of Noise

amd95f.eps

The test takes noise voltage samples every second on pair 3, 6. The test produces a PASS/FAIL result if the selected standard specifies a noise limit.

Note

Monitoring impulse noise without a smart remote may produce unreliable test results.

To monitor impulse noise:

- 1 Attach twisted pair link interface adapters to the tester and smart remote.
- 2 Turn the rotary switch to **MONITOR** and turn on the smart remote; then connect to the testers to the ends of the cabling.
- 3 Press .

To adjust the noise threshold, press  **Stop**; then use   to change the value. Press  to resume testing.

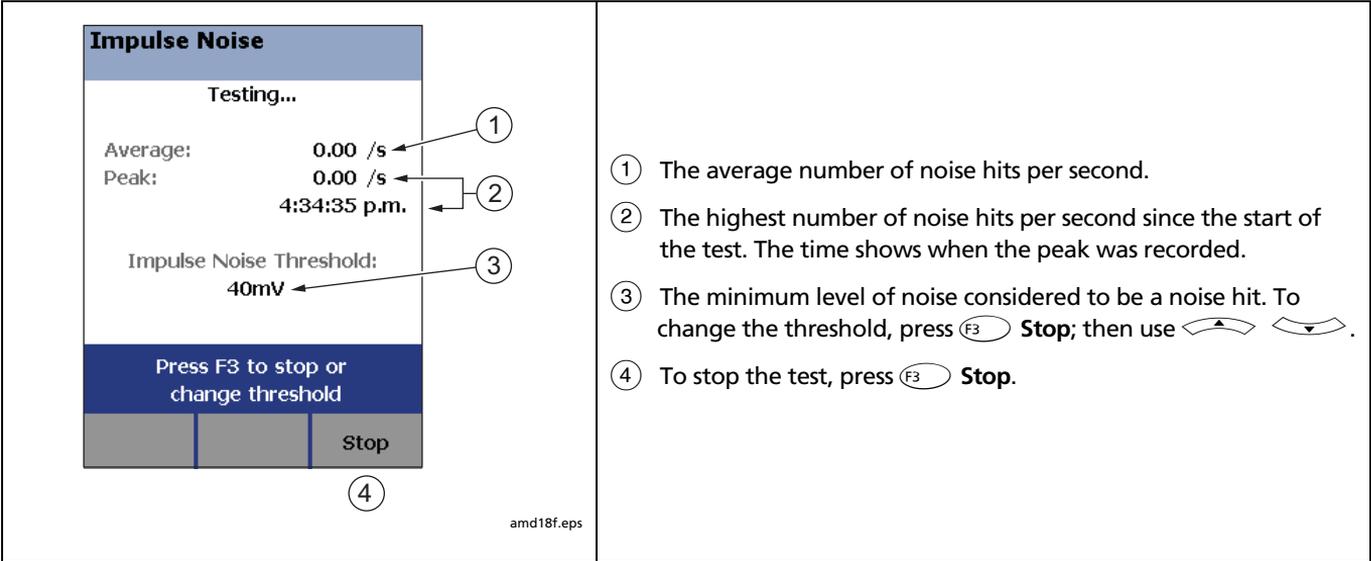
Tip: Fluke Networks recommends a noise threshold of 30 mV with an average pulse rate below 0.01/sec for testing 1000BASE-T (Gigabit Ethernet) cabling.

To stop the test at any time, press .

Note

If you disconnect the tester and smart remote during the impulse noise test, it takes several minutes for the remote to stop testing.

Figure 3-23 describes the impulse noise test results.



- ① The average number of noise hits per second.
- ② The highest number of noise hits per second since the start of the test. The time shows when the peak was recorded.
- ③ The minimum level of noise considered to be a noise hit. To change the threshold, press **F3 Stop**; then use  .
- ④ To stop the test, press **F3 Stop**.

Figure 3-23. Impulse Noise Test Results

Using the Tone Generator

The tone generator on the tester and smart remote produces a distinct signal for locating cables and jacks with a tone probe such as a Fluke Networks IntelliTone™ probe. The tone probe converts the toner's signal to audible tones that get louder as you get closer to the cable or jack transmitting the signal.

The tone generator also activates a sleeping or powered-down tester or smart remote connected to the other end of the cabling.

Note

The tone generator does not generate the IntelliTone signal.

To use the tone generator:

- 1 Attach a twisted pair adapter to the tester or smart remote.
- 2 Connect the tester or smart remote to the cabling as shown in Figure 3-24.
- 3 To turn on the tester's toner, turn the rotary switch to **AUTOTEST** or **SINGLE TEST**; then press .

To turn on the smart remote's toner, press .

- 4 Use a tone probe to locate the cable or jack transmitting the tone.

Note

The toner's signal may not be detectable along shielded cable, but can be detected at a patch panel or outlet.

- 5 To start the test selected on the tester, connect the far-end unit to the cabling.

To turn off the tester's toner, press .

To turn off the smart remote's toner, press .

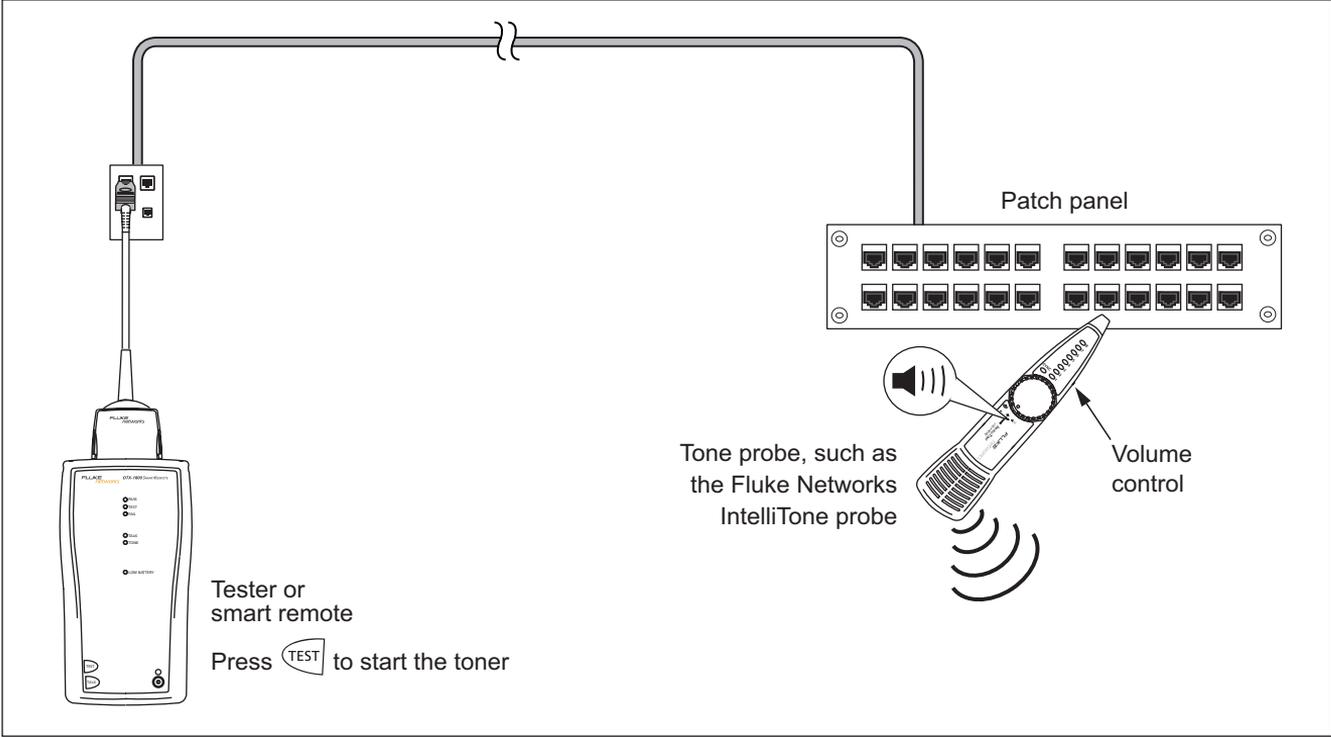


Figure 3-24. Using the Tone Generator

amd96f.eps

Chapter 4

Certifying Coaxial Cabling

Certifying coaxial cabling requires the optional DTX-COAX coaxial adapters.

Setting the Reference

The reference procedure sets a baseline for insertion loss and resistance measurements.

Run the tester's reference procedure at the following times:

- When you want to use the tester with a different smart remote. You can reference the tester to two different smart remotes.
- Every 30 days. Doing so ensures maximum accuracy of test results.

You do not need to set the reference after changing link interface adapters.

Note

Turn on the tester and let it sit for 1 minute before setting the reference. Set the reference only after the testers have reached an ambient temperature between 10 °C and 40 °C (50 °F and 104 °F).

To set the reference, do the following:

- 1 Attach coaxial adapters to the main and remote testers, screw in the F-connector to BNC adapters; then make the connections shown in Figure 4-1.
- 2 Turn the rotary switch to **SPECIAL FUNCTIONS** and turn on the smart remote.
- 3 Highlight **Set Reference**; then press **ENTER**. If both a fiber module and copper adapter are attached, select **Link Interface Adapter**.
- 4 Press **TEST**.

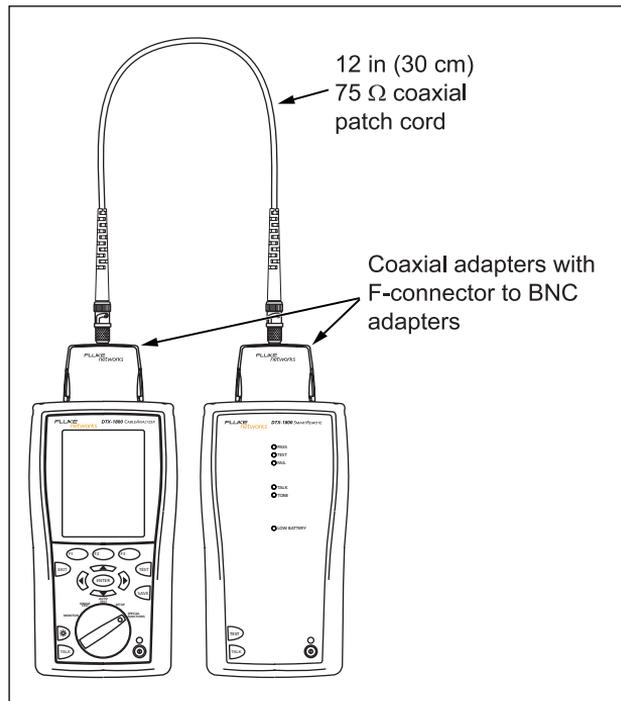


Figure 4-1. Coaxial Reference Connections

amd140.eps

Coaxial Test Settings

Table 4-1 describes the settings that apply to coaxial cabling tests.

To access the settings, turn the rotary switch to **SETUP**, use  to highlight **Coax**; then press .

Table 4-1. Coaxial Cable Test Settings

Setting	Description
SETUP > Coaxial > Cable Type	Select a cable type appropriate for the type you will test. The cable types are organized by type and manufacturer. Selecting Custom lets you create a cable type. See Chapter 10 for details.
SETUP > Coaxial > Test Limit	Select the appropriate test limit for the job. Selecting Custom lets you create a test limit. See Chapter 10 for details.
SETUP > Coaxial > NVP	Nominal velocity of propagation, which is used with the measured propagation delay to determine cable length. The default value defined by the selected cable type represents the typical NVP for that cable type. You may enter a different value if necessary. To determine the actual value, change the NVP until the measured length matches the known length of a cable. Use a cable at least 30 m (100 ft) long. See Chapter 10. Increasing the NVP increases measured length.

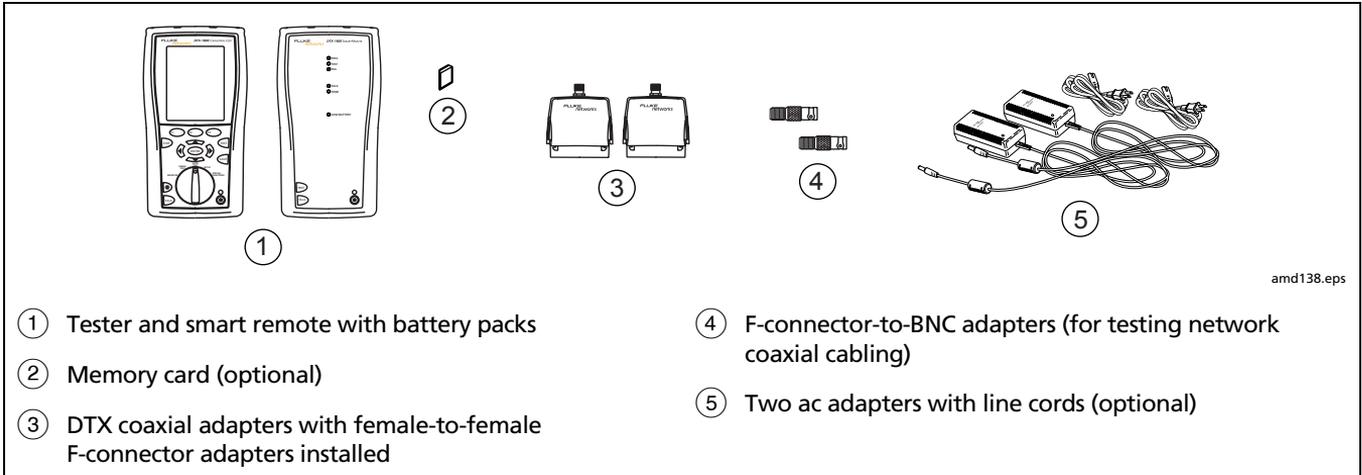
-continued-

Table 4-1. Coaxial Cable Test Settings (cont.)

Setting	Description
SETUP > Instrument Settings > Store Plot Data	<p>Standard: The tester displays and saves plot data for insertion loss. The tester saves data for the frequency range required by the selected test limit.</p> <p>Extended: The tester saves data beyond the frequency range required by the selected test limit.</p> <p>No: Plot data is not saved, which lets you save more results. Saved results show only worst margins and worst values for each pair.</p>
SPECIAL FUNCTIONS > Set Reference	The tester must be referenced to the smart remote the first time the two units are used together. You should also set the reference every 30 days. See "Setting the Reference" on page 4-1.
Settings for saving tests	Cable ID Source, Current Folder, Result Storage Location (DTX-1800, DTX-1200), Operator, Site, and Company. See "Preparing to Save Tests" in Chapter 2.

Autotest on Coaxial Cabling

Figure 4-2 shows the equipment needed for certifying coaxial cabling.



- ① Tester and smart remote with battery packs
- ② Memory card (optional)
- ③ DTX coaxial adapters with female-to-female F-connector adapters installed

- ④ F-connector-to-BNC adapters (for testing network coaxial cabling)
- ⑤ Two ac adapters with line cords (optional)

Figure 4-2. Equipment for Certifying Coaxial Cabling

To run the Autotest on coaxial cabling:

- 1 Verify that the settings listed in Table 4-1 are appropriate.
- 2 Attach coaxial adapters appropriate to the tester and the smart remote.
- 3 Turn the rotary switch to **AUTOTEST** and turn on the smart remote. Connect to the cabling, as shown in Figure 4-3 for network cabling or Figure 4-4 for video cabling.
- 4 If a fiber module is installed, you may need to press  **Change Media** to select **Coax** as the media type.
- 5 Press  on the tester or smart remote. To stop the test at any time, press .
- 6 The tester shows the Autotest **Summary** screen when the test is complete (see page 4-9). To view results for a specific parameter, use   to highlight the parameter; then press .
- 7 To save the results, press . Select or create a cable ID; then press  again.

Note

If you turn off the main or remote unit while the two units are connected through coaxial adapters, the unit will turn on again.

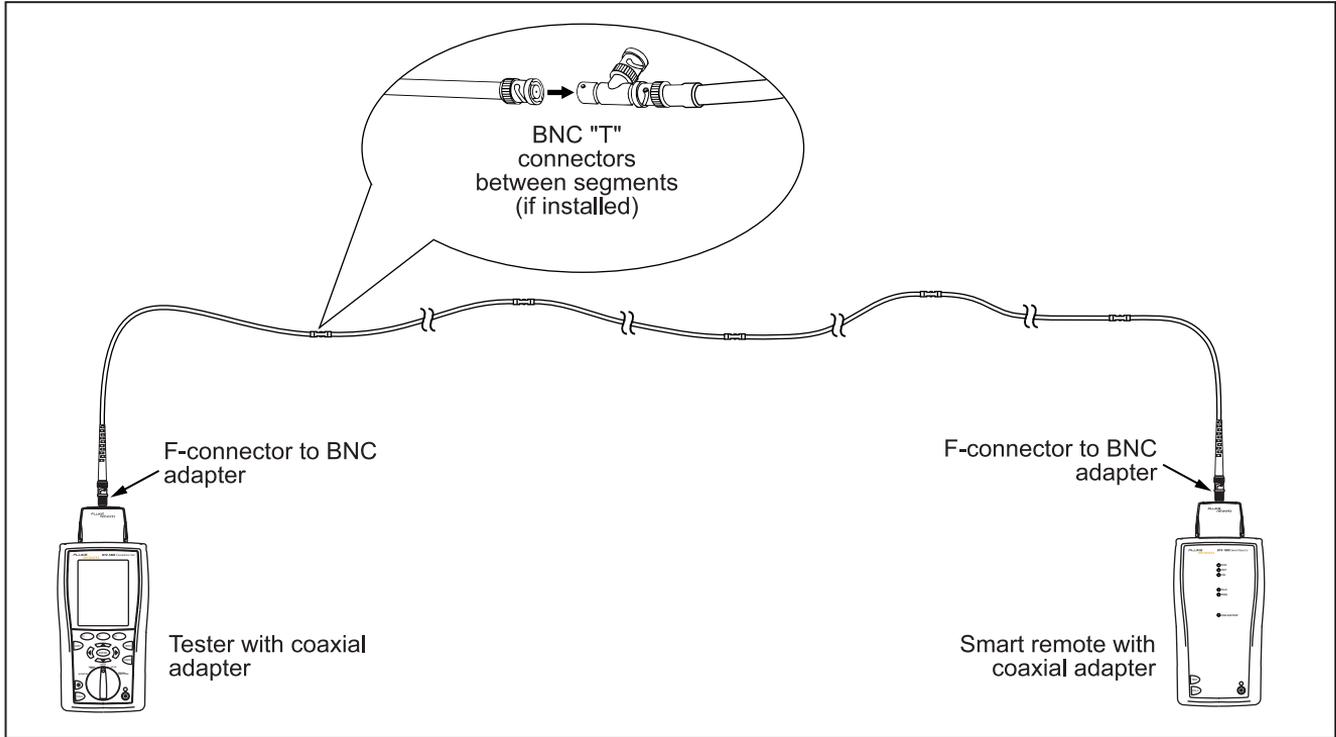


Figure 4-3. Coaxial Network Cabling Test Connections

amd139.eps

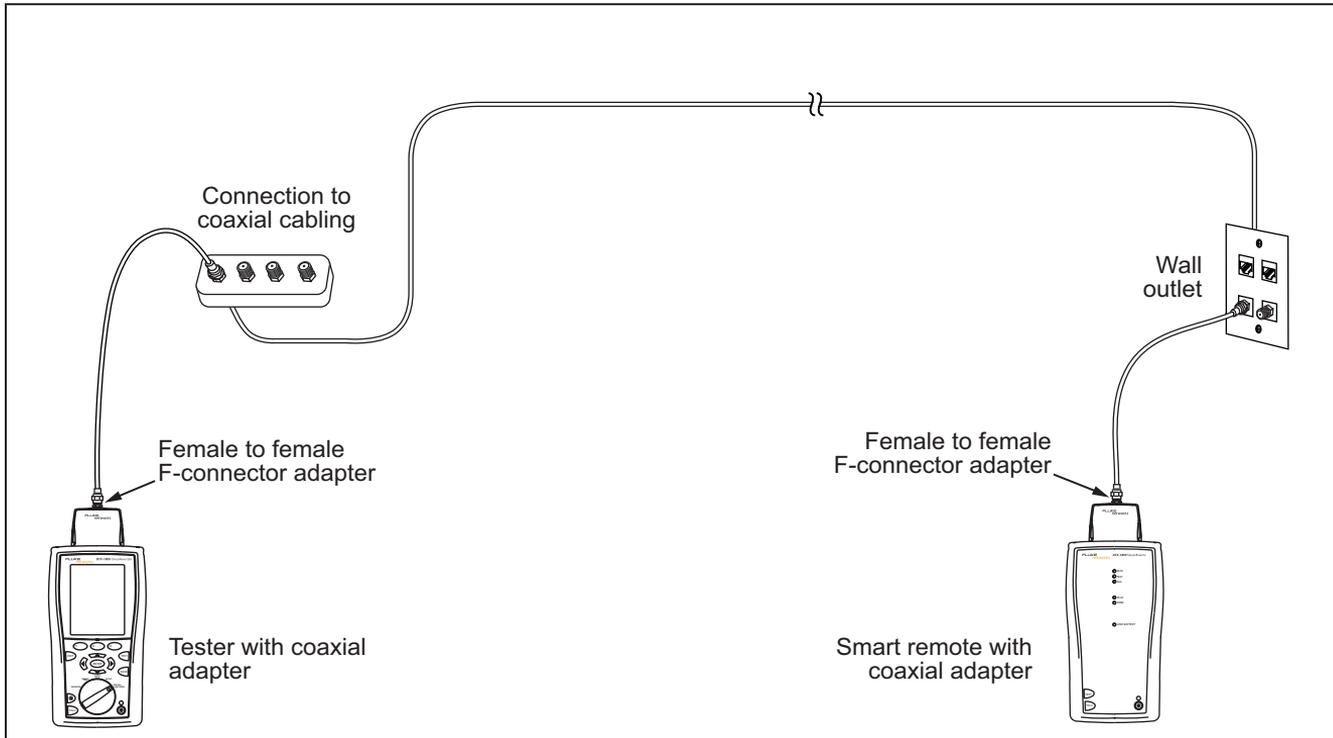


Figure 4-4. Coaxial Video Cabling Test Connections

amd142.eps

Coaxial Autotest Results

Figure 4-5 describes the Autotest **Summary** screen, which lists the tests that apply to coaxial cabling.

Note

The Autotest runs some or all of the tests shown in Figure 4-5, depending on the selected test limit.

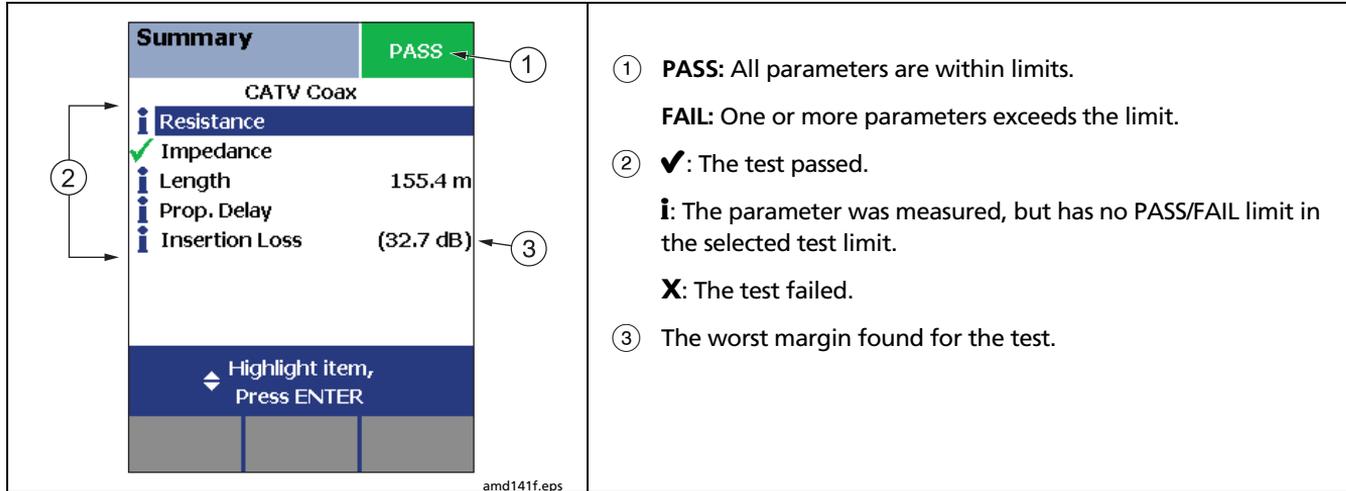


Figure 4-5. Autotest Results for Coaxial Cabling

HDTDR Analyzer

The HDTDR™ (High-Definition Time Domain Reflectometry) analyzer plots the locations and magnitudes of reflections caused by impedance anomalies. See Chapter 5.

Resistance

Resistance results show the dc loop resistance for the center conductor and shield. The smart remote shorts the conductor and shield to create the loop.

Most standards do not have a limit for resistance. The tester shows an **∞** when no limit is available.

Tip: The resistance test in Single Test mode features a scanning function that runs the resistance test continuously. This function is helpful for locating intermittent faults.

Impedance

Note

*Impedance measurements require a cable at least 13 ft (4 m) long. The tester shows **Unknown** for cables shorter than this.*

Impedance results show the approximate characteristic impedance of the cable at a point approximately 13 ft (4 m) from the tester.

Characteristic impedance is the impedance a cable would have if the cable were infinitely long. Good cabling has relatively constant characteristic impedance throughout the cable and connectors.

Changes in impedance cause signal reflections in cabling. In computer networks, signal reflections can cause network faults. In video systems, reflections can cause poor reception.

Length

Length results show the length of the cabling.

Note

Differences between measured and actual length values can be caused by variations in the cable's NVP value. NVP values can vary among cable types, lots, and manufacturers. In most cases, these differences are minor and may be disregarded.

Propagation Delay

Propagation delay is the time taken for a test pulse to travel the length of the cabling. The delay is measured in nanoseconds. One nanosecond is one-billionth of a second, or 0.000000001 second.

Insertion Loss

Insertion loss is the loss of signal strength over the cabling. Insertion loss is caused by the resistance of the copper wire and connecting hardware and by leakage of electrical energy through the cable's insulation.

At higher frequencies, signals tend to travel only near the surface of a conductor. This "skin effect", along with the cabling's inductance and capacitance, cause insertion loss to increase with frequency.

Running Single Tests

The tester's single test mode (**SINGLE TEST** on the rotary switch) lets you run individual tests for isolating cabling failures and quickly testing repairs. You can run some single tests without a remote. Table 4-2 shows which tests require a smart remote.

Single tests use the selected test limit to produce a PASS/FAIL result for the test.

To save a single test, press , select or create a cable ID; then press  again.

Table 4-2. Smart Remote Requirements for Coaxial Single Tests

Test	Smart Remote Requirements*
HDTDR analyzer	Optional. Without a smart remote, the plot shows large reflections at the end of the cabling.
Resistance	Smart remote or terminator required for loop resistance measurement.
Length	Not required. Because a coaxial cable terminator eliminates signal reflections, the tester cannot measure the length of terminated cabling. The tester shows End Not Found in this case.
Impedance	Optional. Without a smart remote or terminator, the tester cannot measure the impedance of cables longer than 984 ft (300 m). The tester shows Unknown in this case.
Propagation delay	Not required. Because a coaxial cable terminator eliminates signal reflections, the tester cannot measure the propagation delay of terminated cabling. In this case, the tester shows End Not Found .
Insertion Loss	Required.
* Note: If a remote is not required for a test, the test runs without activating the toner when no remote is detected.	

Chapter 5

Diagnosing Copper Cabling Faults

Using the Automatic Diagnostics

The DTX Series testers help you isolate cabling faults by automatically diagnosing Autotest failures. For twisted pair tests, press **F1** **Fault Info** after a failed Autotest to see information about the location and likely cause of the fault.

Avoiding Tester-Induced Failures

Some test failures can be avoided if the tester is properly maintained and configured. To keep your tester in top condition, follow these guidelines:

- Run the self test before going to the job site. See Chapter 1 for details.
 - Be sure to select the correct test standard and cable type for the job.
 - Send the testers to a Fluke Networks service center every 12 months for factory calibration.
- Keep the tester's software current. The latest software is available on the Fluke Networks website. See Chapter 12 for details on installing updates.
 - Set the reference for the twisted pair adapters every 30 days. See Chapter 3 for details.

Common Causes of Copper Cabling Failures

Table 5-1 describes common causes of test failures on twisted pair and coaxial cabling.

Table 5-1. Diagnosing Twisted Pair Test Failures

Wire Map: open	
<ul style="list-style-type: none">• Wires connected to wrong pins at connector or punchdown blocks• Faulty connections• Damaged connector• Damaged cable• Wrong Outlet Configuration selected in setup• Wrong application for cable	<p>Tip: The wire map test in Single Test mode features a scanning function that runs the wire map test continuously. This function is helpful for locating intermittent wiring faults.</p>
Wire Map: split pair or reversed pair	
Wires connected to wrong pins at connector or punchdown block.	

-continued-

Table 5-1. Diagnosing Twisted Pair Test Failures (cont.)

Wire Map: crossed wires
<ul style="list-style-type: none"> • Wires connected to wrong pins at connector or punchdown block. • Mix of 568A and 568B wiring standards (12 and 36 crossed). • Crossover cables used where not needed (12 and 36 crossed).
Wire Map: short
<ul style="list-style-type: none"> • Damaged connector • Damaged cable • Conductive material stuck between pins at connector. • Improper connector termination • Wrong application for cable
“Bad patch cord” message appears (indicates excessive crosstalk over the first 2 m of the cabling)
<ul style="list-style-type: none"> • Poor quality patch cord used for channel • Cable on permanent link interface adapter is badly distorted or damaged • Wrong test standard selected

-continued-

Table 5-1. Diagnosing Twisted Pair Test Failures (cont.)

NEXT, PSNEXT, ELFEXT, PSELFEXT gives FAIL, FAIL*, or PASS* result

- Excessive untwisting of pairs at connector
- Poor quality patch cords
- Poor quality connectors
- Poor quality cable
- Poorly matched plug and jack (Cat 6/Class E applications)
- Incorrect link interface adapter
- Cable compression (tight cable ties, pinches, kinks, etc.)
- Inappropriate use of couplers
- Excessive noise source near cabling under test. Use the impulse noise test to check for noise.
- Wrong test standard selected

Note

Fixing NEXT problems usually corrects ELFEXT problems.

Tip: The HDTDx test in Single Test mode features a scanning function that runs the HDTDx test continuously. This function can be helpful for locating crosstalk faults caused by cable compression and noise sources. See page 5-9.

-continued-

Table 5-1. Diagnosing Twisted Pair Test Failures (cont.)

NEXT passes, but the plot shows that measurements exceed the limit	
For ISO/IEC standards, NEXT is not evaluated where insertion loss is less than 4 dB (the 4 dB rule).	
Return passes, but the plot shows that measurements exceed the limit	
Return loss is not evaluated where insertion loss is less than 3 dB (the 3 dB rule).	
Return loss gives FAIL, FAIL*, or PASS* result	
<ul style="list-style-type: none"> • Patch cord or cable impedance not 100 Ω • Patch cord handling causing changes in impedance • Excessive amount of cable jammed into outlet box • Tight service loops in telecommunications closet • Excessive untwisting of pairs at connector • Poor quality connectors • Cable impedance not uniform (poor quality cable) 	<p>Tip: The HDTDR test in Single Test mode features a scanning function that runs the HDTDR test continuously. This function can be helpful for locating return loss faults caused by tight loops and cable compression. See page 5-12.</p>

-continued-

Table 5-1. Diagnosing Twisted Pair Test Failures (cont.)

Return loss gives FAIL, FAIL*, or PASS* result (cont.)
<ul style="list-style-type: none">• Mismatches in cable construction (such as cable from different manufacturers)• Water in cable jacket• Cable compression (tight cable ties, pinches, kinks, etc.)• Poorly matched plug and jack (Cat 6/Class E applications)• Wrong test standard selected• Defective link interface adapter
Insertion loss gives FAIL, FAIL*, or PASS* result
<ul style="list-style-type: none">• Cabling is too long• Poor quality patch cord• Bad connection• Wrong cable type in installation• Wrong test standard selected

-continued-

Table 5-1. Diagnosing Twisted Pair Test Failures (cont.)

Characteristic impedance exceeds the limit or an anomaly is detected	
<ul style="list-style-type: none"> • Bad connection • Cable compression (tight cable ties, pinches, kinks, etc.) • Mismatch of cable types • Water in cable jacket • Excessive loading at coaxial cable tap • Incorrect terminator value (coaxial cable) 	
Resistance gives FAIL, FAIL*, or PASS* result	
<ul style="list-style-type: none"> • Cabling is too long • Bad connection due to oxidized or loose contacts • Wire gauge is too thin • Wrong patch cord type used 	<p>Tip: The resistance test in Single Test mode features a scanning function that runs the resistance test continuously. This function is helpful for locating intermittent resistance faults. Note that the resistance test is available in Single Test mode only if the selected standard has a limit for resistance.</p>
Length gives FAIL result	
<ul style="list-style-type: none"> • Cable is too long (may need to remove coiled service loops) • NVP is set incorrectly 	

-continued-

Table 5-1. Diagnosing Twisted Pair Test Failures (cont.)

Propagation delay or delay skew gives FAIL result
<ul style="list-style-type: none">• Cable is too long (may need to remove coiled service loops)• Cable uses different insulation materials on different pairs
Impulse noise is detected
<ul style="list-style-type: none">• Electrical devices near the cabling are generating noise pulses.• There is an active link in the same bundle as the cabling under test.• Verify that the tester and smart remote are operating correctly. Connect the units together and run an Autotest.

The HDTDx Analyzer

The HDTDx™ (High-Definition Time Domain Crosstalk) analyzer plots the locations and magnitudes of crosstalk on the cabling under test. The analyzer, along with the tester's automatic diagnostics, helps you isolate the causes of NEXT and ELFEXT failures.

Running the HDTDx Analyzer

After an Autotest, you can view HDTDx results only if the Autotest test failed.

To see HDTDx results for a failed Autotest, select **HDTDx Analyzer** on the Autotest **Summary** screen.

To run the HDTDx analyzer as a single test:

Note

You can run the HDTDx analyzer with or without a smart remote. Without a remote, results on short cables may be unreliable.

- 1 Turn the rotary switch to **SINGLE TEST** and verify that the test limit and cable type are correct. Change them in **SETUP** if necessary.
- 2 Attach the appropriate interface adapters to the tester and smart remote.
- 3 Turn on the smart remote; then connect the tester and remote to the cabling.
- 4 Turn the rotary switch to **SINGLE TEST**, select **HDTDx Analyzer**; then press **TEST**.
- 5 To run the HDTDx analyzer continuously, press **F3** **Plot by Pair** to select a pair; then press **ENTER** to start the scanning function.
- 6 To save the results, press **SAVE**. Select or create a cable ID; then press **SAVE** again.

Note

*If **Store Plot Data** is set to **No**, the HDTDx plot will not be included in saved results.*

Figure and 5-1 describe the HDTDx plot.

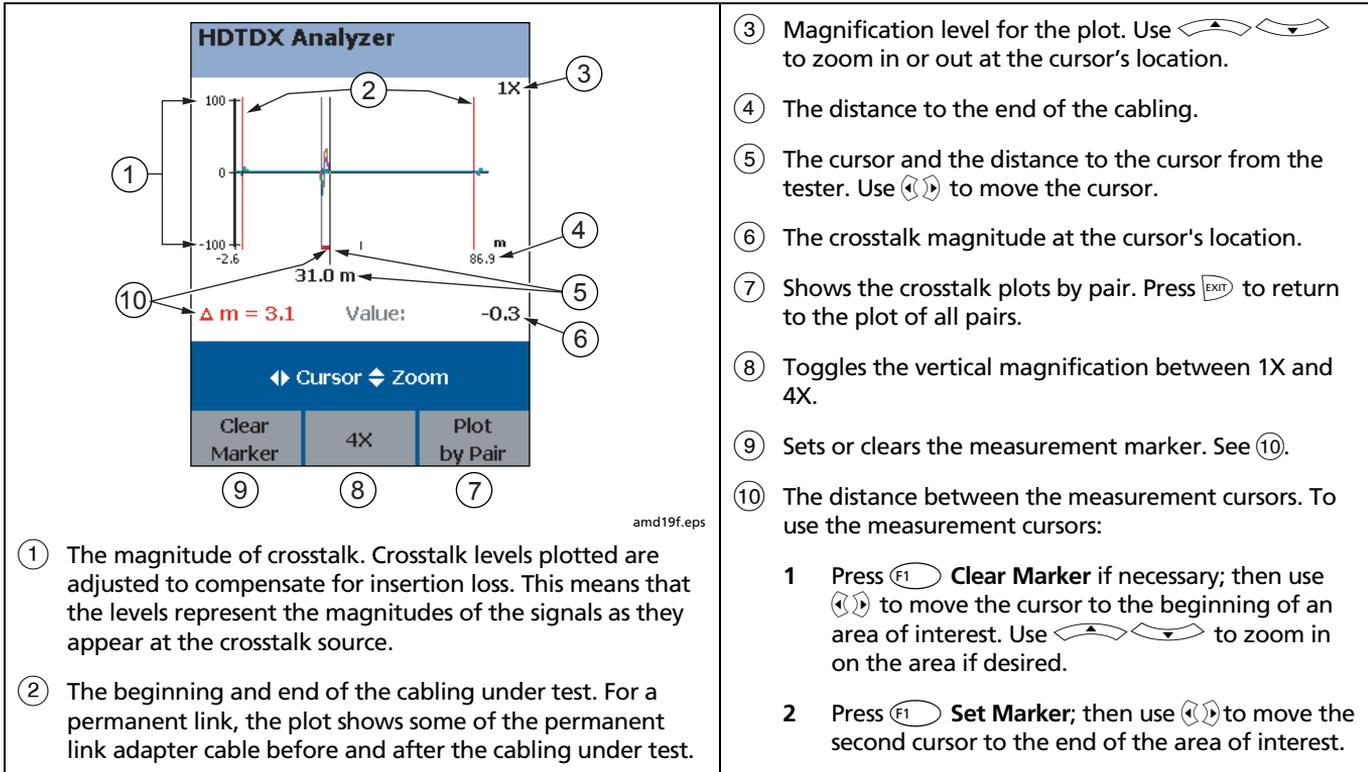


Figure 5-1. HDTDX Plot (permanent link adapters used)

Recognizing Faults on HDTDx Plots

Figure 5-2 shows how some common faults appear on HDTDx plots.

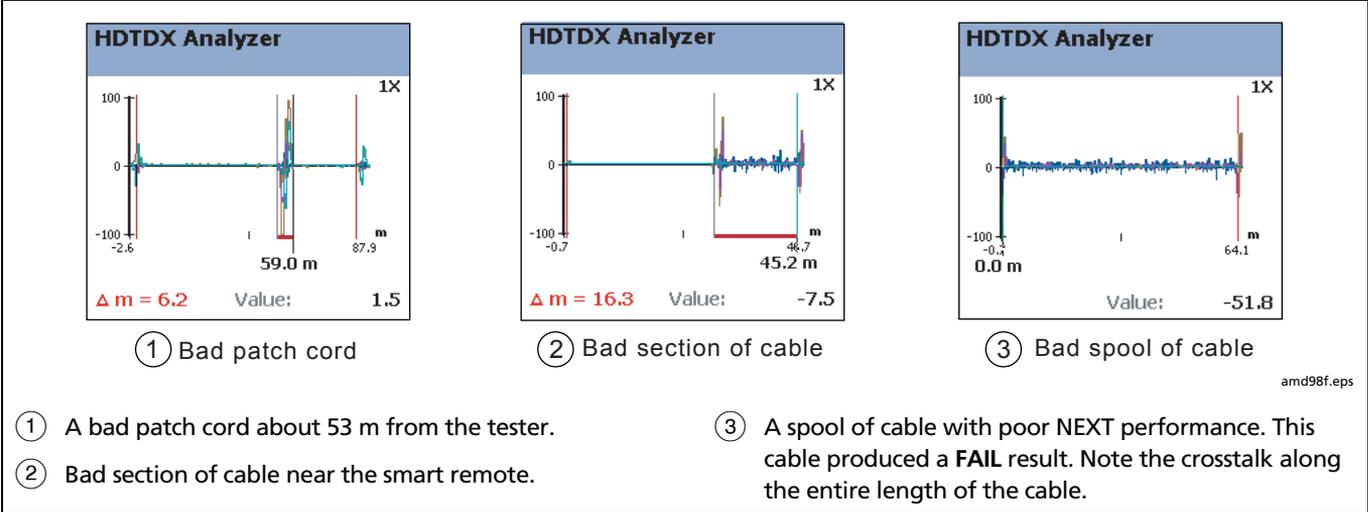


Figure 5-2. Interpreting HDTDx Plots

The HDTDR Analyzer

The HDTDR™ (High-Definition Time Domain Reflectometry) analyzer plots the locations and magnitudes of reflections caused by impedance anomalies. The analyzer, along with the tester's automatic diagnostics, helps you isolate the causes of return loss failures.

Running the HDTDR Analyzer

After an Autotest, you can view HDTDR results only if the Autotest failed.

To see HDTDR results for failed Autotest, select **HDTDR** on the Autotest **Summary** screen.

To run the HDTDR test as a single test:

Note

Though you can run the HDTDR analyzer without a smart remote, the following steps assume you are using a remote.

- 1 Turn the rotary switch to **SINGLE TEST** and verify that the test limit and cable type are correct. Change them in **SETUP** if necessary.

- 2 Attach the appropriate interface adapters to the tester and smart remote.
- 3 Turn on the smart remote; then connect the tester and remote to the cabling.
- 4 Turn the rotary switch to **SINGLE TEST**, select **HDTDR Analyzer**; then press .
- 5 To run the HDTDR analyzer continuously, press  **Plot by Pair** to select a pair; then press  to start the scanning function.
- 6 To save the results, press . Select or create a cable ID; then press  again.

Note

*If **Store Plot Data** is set to **No**, the HDTDR plot will not be included in saved results.*

Figure 5-3 describes the HDTDR analyzer.

Recognizing Faults on HDTDR Plots

Figure 5-4 shows how some common faults appear on HDTDR plots.

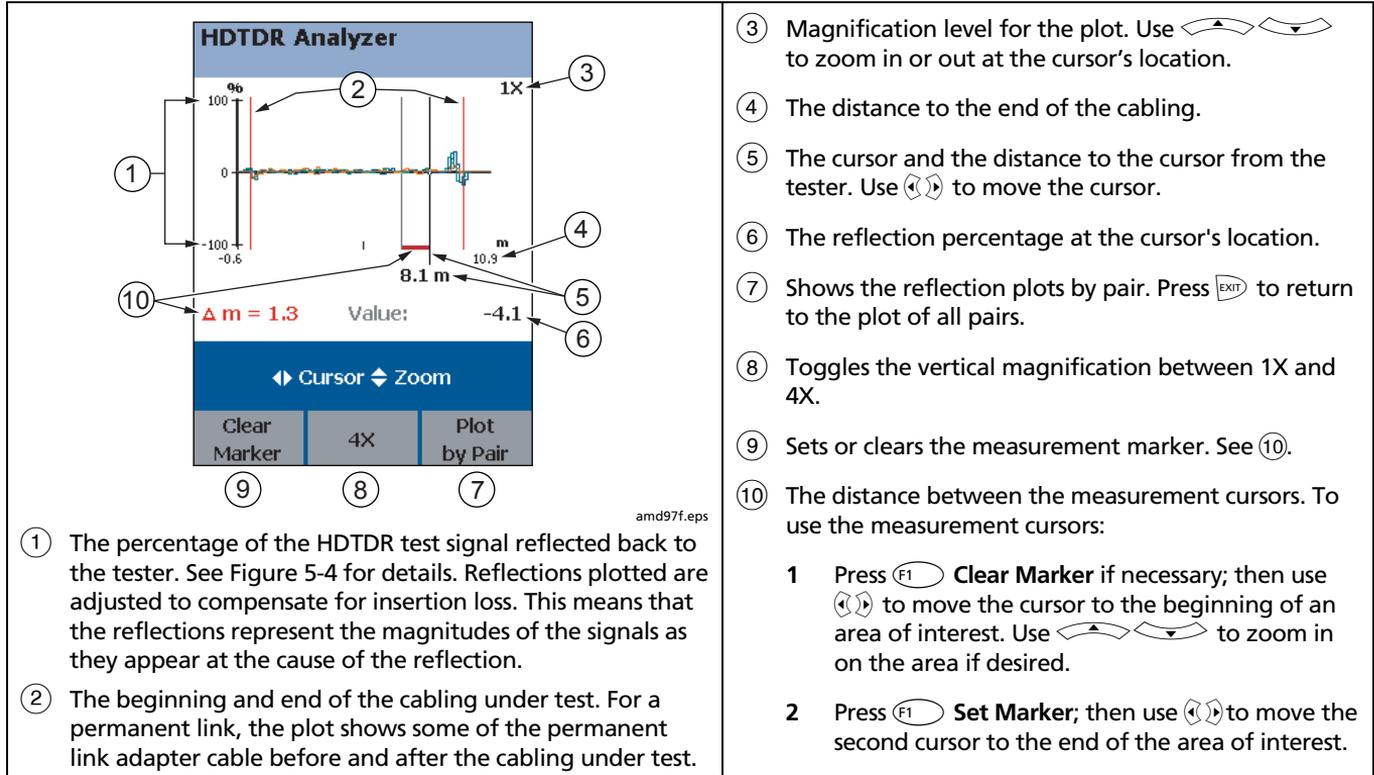
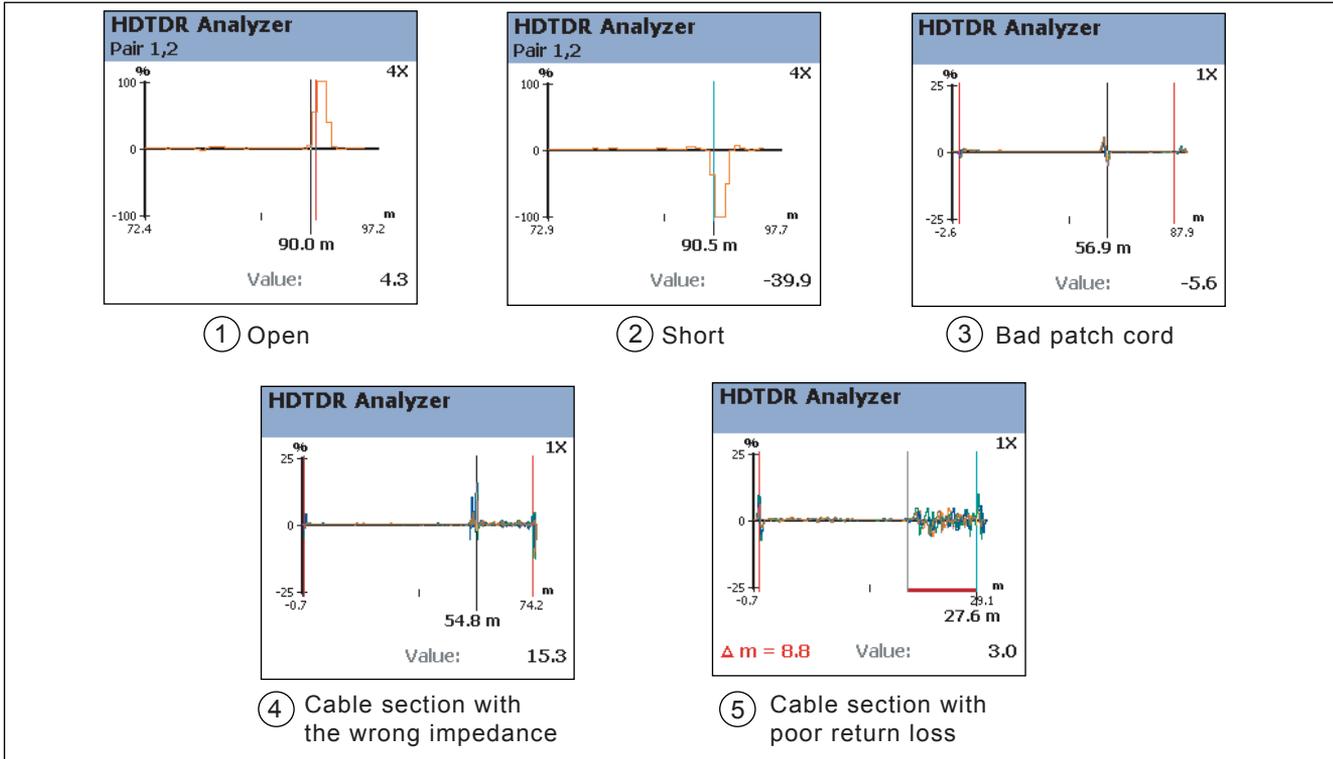


Figure 5-3. HDTDR Plot (permanent link adapters used)



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Figure 5-4. Interpreting HDTDR Plots

- ① Open on pair 1,2 near the smart remote. A positive reflection indicates an increase in impedance. Opens are large increases in impedance and create large positive reflections
- ② Short on pair 1,2 near the smart remote. A negative reflection indicates a decrease in impedance. Shorts are large decreases in impedance and create large negative reflections.
- ③ Bad patch cord just past the middle of the link.
- ④ A link with a section of cable that has higher impedance (120Ω) than the rest of the cable. The bad section starts at about 54 m. Note the positive pulse where the impedance increases at the beginning of the bad section, and the negative pulse where impedance decreases at the end of the section.
- ⑤ A link with a section of cable that has poor return loss. The section produces reflections along its entire length.

Figure 5-4. Interpreting HDTDR Plots (cont.)

Chapter 6

Certifying Fiber Optic Cabling

Overview of Features

The optional DTX-MFM2, DTX-GFM2, and DTX-SFM2 fiber modules are used with a DTX Series CableAnalyzer to test and certify fiber optic cabling installations. The fiber modules offer the following functions and features:

- Measures optical power loss and length on dual-fiber cabling. The DTX-MFM2 tests multimode cabling at 850 nm and 1300 nm. The DTX-SFM2 tests singlemode cabling at 1310 nm and 1550 nm. The DTX-GFM2 features a VCSEL for testing multimode cabling at 850 nm and 1310 nm for Gigabit Ethernet applications.
- Each module transmits both wavelengths (850 nm and 1300 nm, 850 nm and 1310 nm, or 1310 nm and 1550 nm).
- Interchangeable connector adapters allow reference and test connections that meet ISO standards for most SFF (small form factor) fiber connectors.
- Provides pass/fail results based on industry-standard limits.
- Visual fault locator helps you locate breaks, bad splices, bends, and check fiber continuity and polarity.
- FindFiber™ function helps you identify and verify fiber connections.

Figure 6-2 describes the fiber module's features.

Safety Information

Warning: Class 1 and Class 2 Laser Products

To avoid possible eye damage caused by hazardous radiation:

- Never look directly into optical connectors. Some sources produce invisible radiation that can permanently damage your eyes.
- Keep the fiber module's OUTPUT port covered with a dust cap or keep a reference test cord attached. The OUTPUT port may be active even when a test is not in progress. Covering the port reduces the risk of accidental exposure to hazardous radiation.
- Never start a test or activate the OUTPUT port or VFL port without first connecting a fiber to the port you will use.
- Never look directly into the visual fault locator output. Momentary exposure to the locator's output will not damage your eyes; however, direct, long-term exposure is potentially hazardous.
- 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.

 **Caution**

To avoid damaging the tester or cables under test, to avoid data loss, and to ensure maximum accuracy of test results:

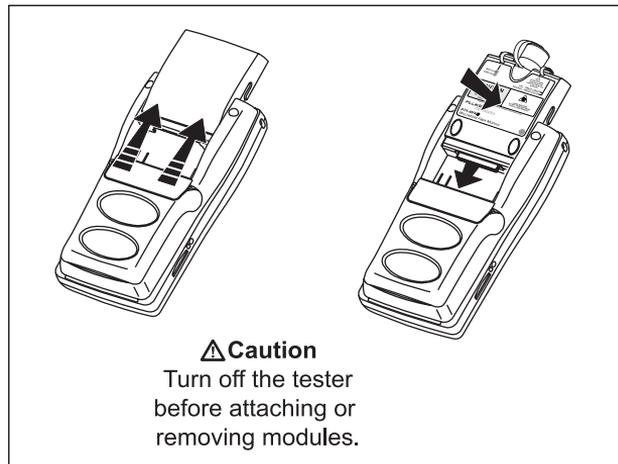
- Turn off the tester before attaching or removing modules.
- Leave the module bay covers in place when the fiber modules are not installed.
- When using the fiber modules, use proper cleaning procedures to clean all fiber connectors before every use. Neglecting this step or using improper procedures can cause unreliable test results and may permanently damage the connectors. See page 6-8.
- Cover all connectors with dust caps when not in use.
- Store the connector adapters for the fiber module in the canisters provided.
- Do not touch the photodiode lens (see Figure 6-4).
- Do not overtighten the adapter or use tools to tighten the adapter.
- Use a Fluke Networks FiberInspector Video Microscope to periodically inspect the fiber module's OUTPUT connector for scratches and other damage.

Installing and Removing Fiber Modules

Figure 6-1 shows how to install and remove the fiber modules.

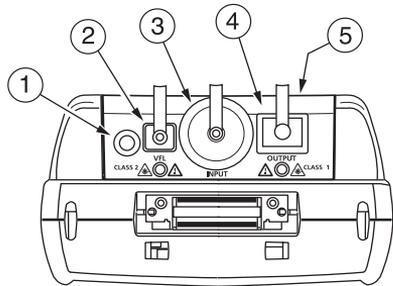
⚠ Caution

Leave the module bay covers in place when the modules are not installed.



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Figure 6-1. Installing and Removing Fiber Modules



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⚠ Warning

Never look directly into optical output connectors (2 and 4). Some sources produce invisible radiation that can permanently damage your eyes.

- ① Button for activating the visual fault locator (②) and output port (④). See “Using the Visual Fault Locator” in Chapter 7 and “Autotest in Far End Source Mode” on page 6-34.
- ② Universal fiber connector (with dust cap) for the visual fault locator output. The connector accepts 2.5 mm ferrules. The LED below the connector indicates the locator’s mode (continuous or blinking).
- ③ Input connector with dust cap. Receives optical signals for loss, length, and power measurements. You can change the connector adapter to match the connectors on the fiber under test. See Figure 6-3.
- ④ SC output connector with dust cap. Transmits optical signals for loss and length measurements.

The LED below the connector is red when the output is transmitting the module’s shorter wavelength, and green for the longer wavelength.

- ⑤ Laser safety label (shown at right).



COMPLIES WITH 21 CFR 1040.10, 1040.11 TO EN 60825-1:1994/A2:2001/A1:2002

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Figure 6-2. Fiber Module Features

Installing the Connector Adapter

You can change the fiber module's input connector adapter to connect to SC, ST, LC, and FC fiber connectors (Figure 6-3). Additional adapter styles may be available. Check the Fluke Networks web site for updates.

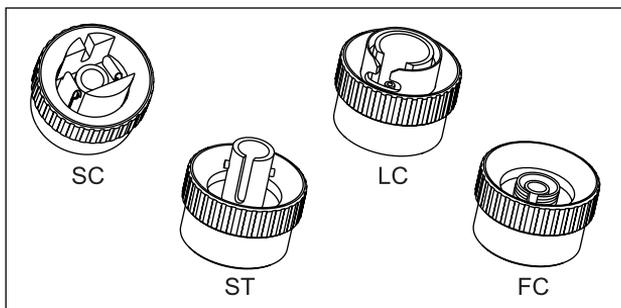


Figure 6-3. SC, ST, LC, and FC Connector Adapters

Caution

- Cover all connectors with dust caps when not in use.
- Store the connector adapters for the fiber module in the canisters provided.
- Do not touch the photodiode lens (see Figure 6-4).
- Do not overtighten the adapter or use tools to tighten the adapter.

To install a connector adapter, refer to Figure 6-4 and do the following:

- 1 Locate the slot in the fiber 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.

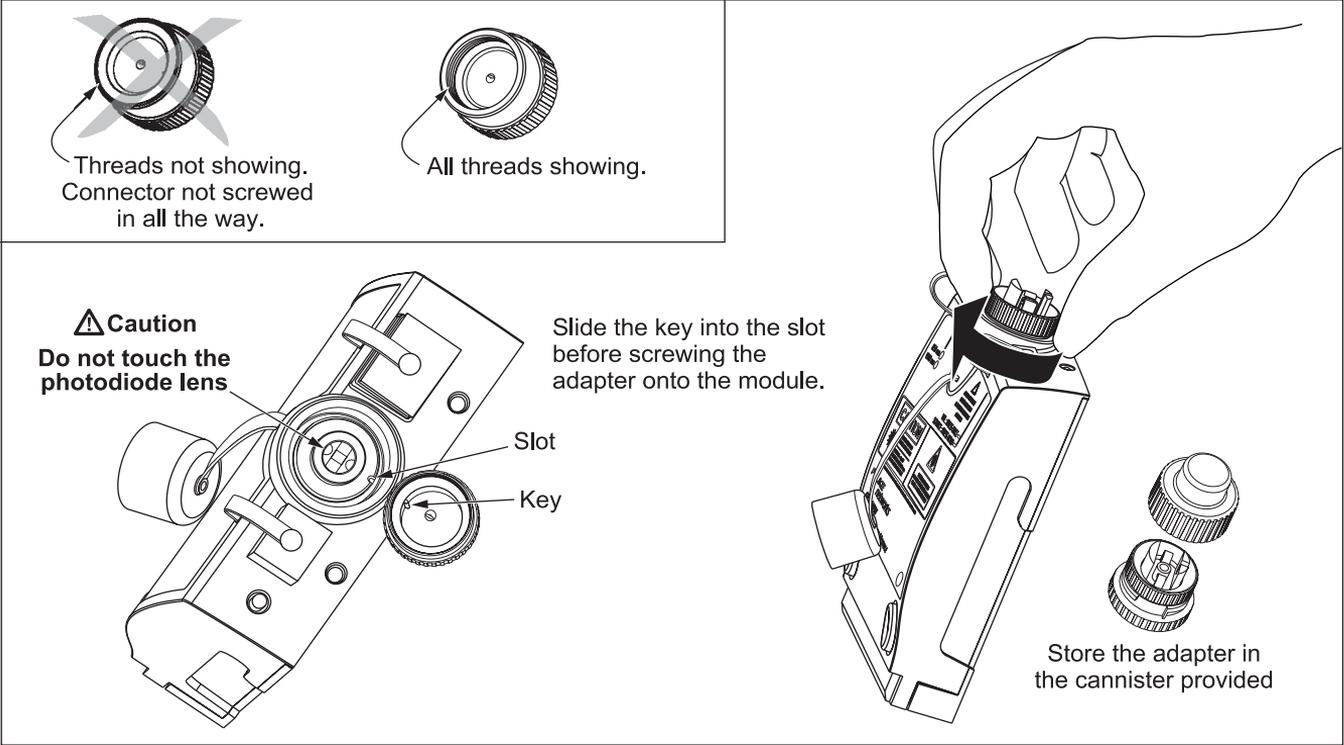
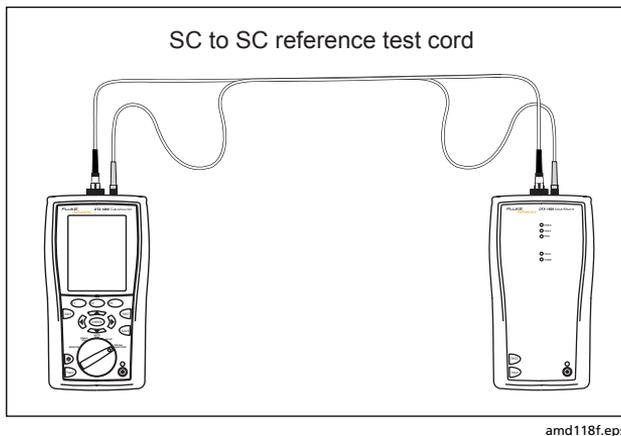


Figure 6-4. Installing the Connector Adapter

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Verifying Operation

- 1 Clean the tester's connectors and the connectors on two SC/SC reference test cords.
- 2 Connect the tester and smart remote together, as shown in Figure 6-1.
- 3 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 4 Use  to highlight **Self Test**; then press .
- 5 Press  to start the self test.



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Figure 6-5. Self Test Connections for Fiber Modules

Essentials for Reliable Fiber Test Results

To get reliable fiber test results, you must follow proper cleaning and referencing procedures and, in some cases, use mandrels during testing.

Cleaning Connectors and Adapters

Always clean and inspect fiber connectors before making connections. Use 99 %-pure isopropyl alcohol and optical-grade wipes or swabs to clean connectors as follows:

Bulkhead Connectors and the Fiber Module's Output Connector

Note

Use a 2.5 mm foam swab for cleaning the fiber module's output connector.

- 1 Dip the tip of a foam swab in alcohol; then touch the swab to a dry wipe.
- 2 Touch a new, dry swab to the alcohol spot on the wipe. Push the swab into the connector; twist it around 3 to 5 times against the endface, 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.

Fiber Module's Input Connector

Note

Typically, the input connector requires cleaning only if it has been touched.

- 1 Remove the connector adapter to expose the photodiode lens (see Figure 6-4).
- 2 Use the method described in steps 1 and 2 above to dampen a swab with alcohol.
- 3 Twist the damp swab around against the lens 3 to 5 times; then twist a dry swab around against the lens 3 to 5 times.

Connector Adapters and Fiber Adapters

Periodically clean connector adapters and fiber adapters with a swab and alcohol. Dry with a dry swab before use.

Connector Ends

Wipe the end of the ferrule with a swab or wipe lightly moistened with alcohol. Dry with a dry swab or wipe.

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

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 ambient temperature.

You should set the reference at these times:

- At the beginning of each day using the remote end setup (Figures 6-10 through 6-18) you will use that day.
- Anytime you reconnect a reference test cord to the module's output or other source.
- Anytime the tester warns you that the reference is out of date.

- Anytime you see a negative loss measurement. (See Chapter 8.)

You must set the reference at these times:

- Anytime you change the fiber module in the tester or smart remote.
- Anytime you start using a different smart remote.
- Anytime you change the **Test Method** in Setup.
- Twenty-four hours after the reference was previously set.

Caution

Do not disconnect the reference test cords from the testers' output ports after setting the reference. Doing so may alter the amount of optical power launched into the fiber and invalidate the reference.

Reference values should not change by more than a few tenths of a dB from day to day. Larger changes may indicate a problem with the reference test cords or connections.

See the sections on Smart Remote, Loopback, and Far End Source modes for details on setting the reference for each mode.

After you set the reference, you can enter the lengths of the reference test cords used for reference and test connections. The lengths are included with saved results to meet TSB-140 reporting requirements for fiber test results.

Selecting Reference Test Cords

The DTX Fiber Modules come with high-quality reference test cords.

To ensure that your measurements are accurate and repeatable, use reference test cords provided by Fluke Networks or cords of the same quality. See "Replacing Fiber Reference Test Cords" in Chapter 12.

Testing Your Reference Test Cords

You should test your reference test cords before each job. Use another set of known-good cords to set a reference and run an Autotest on other cords in Smart Remote or Loopback mode. See pages 6-19 and 6-26 for details on running these tests.

Using Mandrels for Testing Multimode Fiber

You should use mandrels when testing multimode fiber with the DTX-MFM2 fiber modules. 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.



Caution

Do not use mandrels when testing with the DTX-GFM2 fiber modules.

The gray mandrels included with the DTX-MFM2 are compliant with TIA/EIA-568-B 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 6-1 shows a partial list of mandrel requirements for TIA and ISO standards.

Figure 6-6 shows how to wrap the fiber around a mandrel. Place mandrels on the tester's output fibers, as shown in Figures 6-9 through 6-18.

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

Table 6-1. TIA/EIA-568-B.1 and ISO/IEC TR 14763-3 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/EIA-568-B.1 7.1	5	25 mm (1.0 in)	22 mm (0.9 in)
	ISO/IEC TR 14763-3 6.22	5	15 mm (0.6 in)	15 mm (0.6 in)
62.5 μm	TIA/EIA-568-B.1 7.1	5	20 mm (0.8 in)	17 mm (0.7 in)
	ISO/IEC TR 14763-3 6.22	5	20 mm (0.8 in)	20 mm (0.8 in)

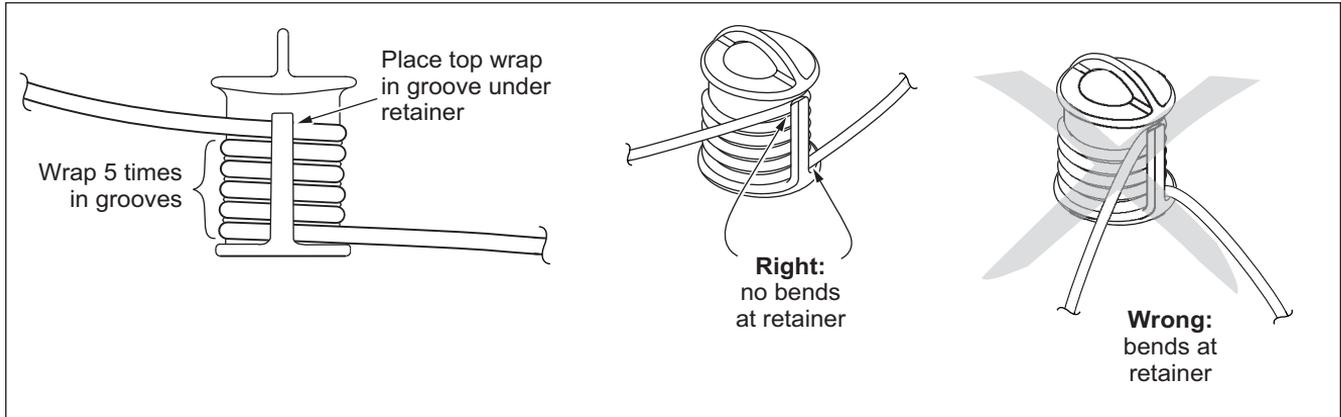


Figure 6-6. Wrapping a Reference Test Cord Around a Mandrel

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Fiber Test Settings

Table 6-2 describes the test settings that apply to fiber cabling.

To access the fiber test settings turn the rotary switch to **SETUP**; then select **Fiber**. Use   to see different tabs.

Table 6-2. Fiber Test Settings

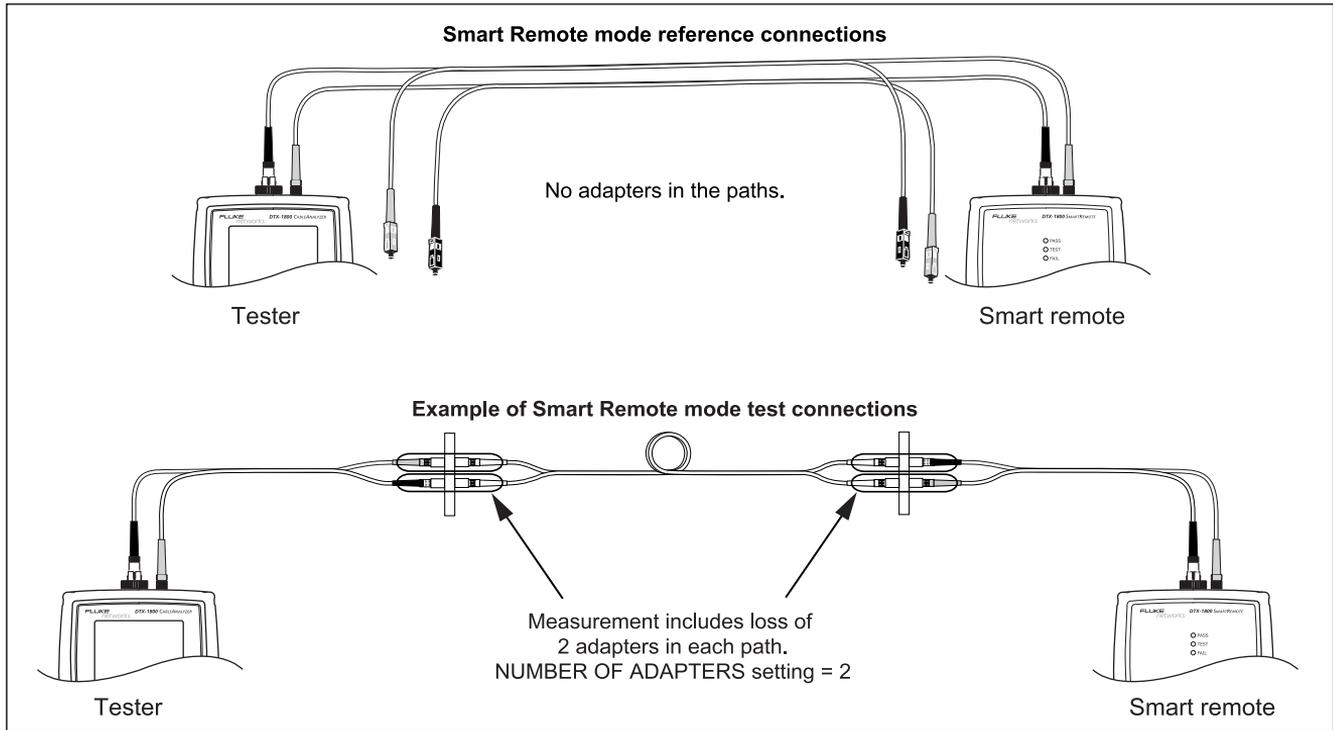
Setting	Description
SETUP > Fiber > Fiber Type	Select a fiber type that is appropriate for the type you will test. Selecting Custom lets you create a fiber type. See Chapter 10 for details.
SETUP > Fiber > Test Limit	Select the appropriate test limit for the job. The tester compares the fiber test results to the selected test limit to produce PASS or FAIL results. Selecting Custom lets you create a test limit. See Chapter 10 for details.
SETUP > Fiber > 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 optical source for testing individual fibers.
SETUP > Fiber > 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 make bi-directional measurements for each fiber at each wavelength (850 nm/1300 nm, 850 nm/1310 nm, or 1310 nm/1550 nm).

-continued-

Table 6-2. Fiber Test Settings (cont.)

Setting	Description
SETUP > Fiber > Number of Adapters SETUP > Fiber > Number of Splices	<p>If the selected limit uses a calculated loss limit, enter the number of adapters and splices that will be added to the fiber path after the reference is set. Figure 6-7 shows an example of how to determine the Number of Adapters setting.</p> <p>Only limits that use maximum values for loss per km, loss per connector, and loss per splice use a calculated limit for overall loss. For example, limits for fiber backbones use a calculated loss limit.</p>
SETUP > Fiber > Connector Type	Select the type of connector used in the cabling. This setting affects only the diagrams shown for reference connections. If the cabling's connector type is not listed, use General .
SETUP > Fiber > Test Method > Method A, B, C	<p>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:</p> <p>Method A: Loss results include one connection at one end of the link.</p> <p>Method B: Loss results include connections at both ends of the link. Select this method for connections shown in this manual. See "About Method B Connections" on page 6-18.</p> <p>Method C: Loss results exclude connections at the ends of the link. Only the fiber loss is measured.</p> <p>Different standards have different names for the three test methods. See Appendix A for details.</p> <p>The Test Method setting does affect the reference and test connection diagrams shown on the tester's display. The diagrams show connections for the method selected.</p>

-continued-



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Figure 6-7. Example of How to Determine the Number of Adapters Setting (singlemode example; mandrels not used)

Table 6-2. Fiber Test Settings (cont.)

Setting	Description
SETUP > Fiber > Index of Ref. Source (n) > User Defined or Default	<p>The tester uses the index of refraction (n) defined in the currently selected fiber type (Default) or a value you define (User Defined). The default value defined by the selected fiber type represents the typical value for that fiber type. You may enter a different value if necessary. To determine the actual value, change the index of refraction until the measured length matches the known length of a fiber.</p> <p>Increasing the index of refraction decreases the reported length.</p>
SPECIAL FUNCTIONS > Set Reference Patch Lengths (softkey on the View Connections screen)	<p>Setting a reference sets the baseline power level for loss measurements. See “About Setting the Reference” on page 6-10.</p> <p>After you set the reference, you can enter the lengths of the reference test cords used. The lengths you enter do not affect measurements. They are included with saved results to meet TSB-140 reporting requirements.</p>
SETUP > Instrument Settings Settings for saving tests	<p>Cable ID Source, Current Folder, Result Storage Location (DTX-1800, DTX-1200), Operator, Site, and Company. See “Preparing to Save Tests” in Chapter 2.</p>

About Method B Connections

The reference and test connections shown in this manual produce Method B results. Method B 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.

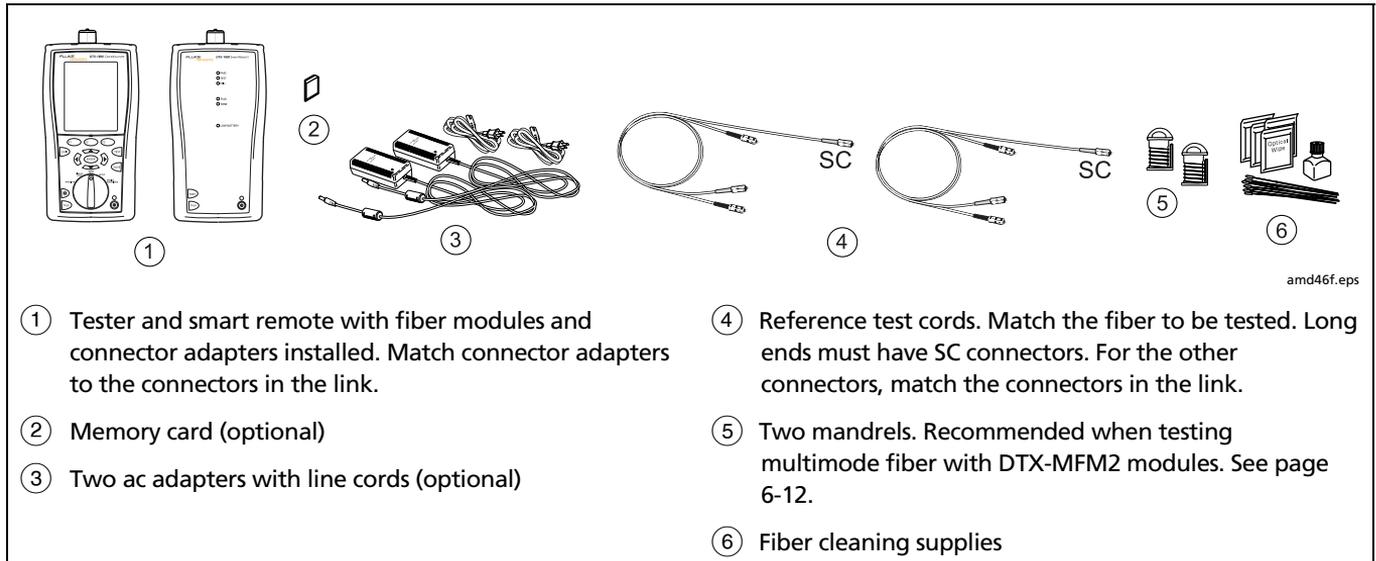
If you do not have the correct connector adapters, see Appendix B for modified Method B and alternative connections that produce Method B results.

Autotest in Smart Remote Mode

Use Smart Remote mode to test and certify dual-fiber cabling.

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

Figure 6-8 shows the equipment required for testing fiber in Smart Remote 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 Reference test cords. Match the fiber to be tested. Long ends must have SC connectors. For the other connectors, match the connectors in the link.
- ⑤ Two mandrels. Recommended when testing multimode fiber with DTX-MFM2 modules. See page 6-12.
- ⑥ Fiber cleaning supplies

Figure 6-8. Equipment for Testing in Smart Remote Mode (Method B)

Setting the Reference for Smart Remote Mode

- 1 Turn on both testers 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**.
- 3 Select **Remote End Setup**, then select **Smart Remote**.
- 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 Clean the connectors on the tester, smart remote, and reference test cords. Connect the tester and smart remote as shown on the tester.

Notes

The **Set Reference** screen shows reference connections for the selected test method. Figure 6-9 shows connections for Method B.

The reference test cords in the tester's diagrams are numbered. If you want to meet TSB-140 reporting requirements, you can enter lengths for each reference test cord number after setting the reference.

- 6 Press .

The **View Reference** screen shows the reference values and the date and time the reference was set.

- 7 Press  **OK**.

The **View Connections** screen shows the test connections for the selected test method.

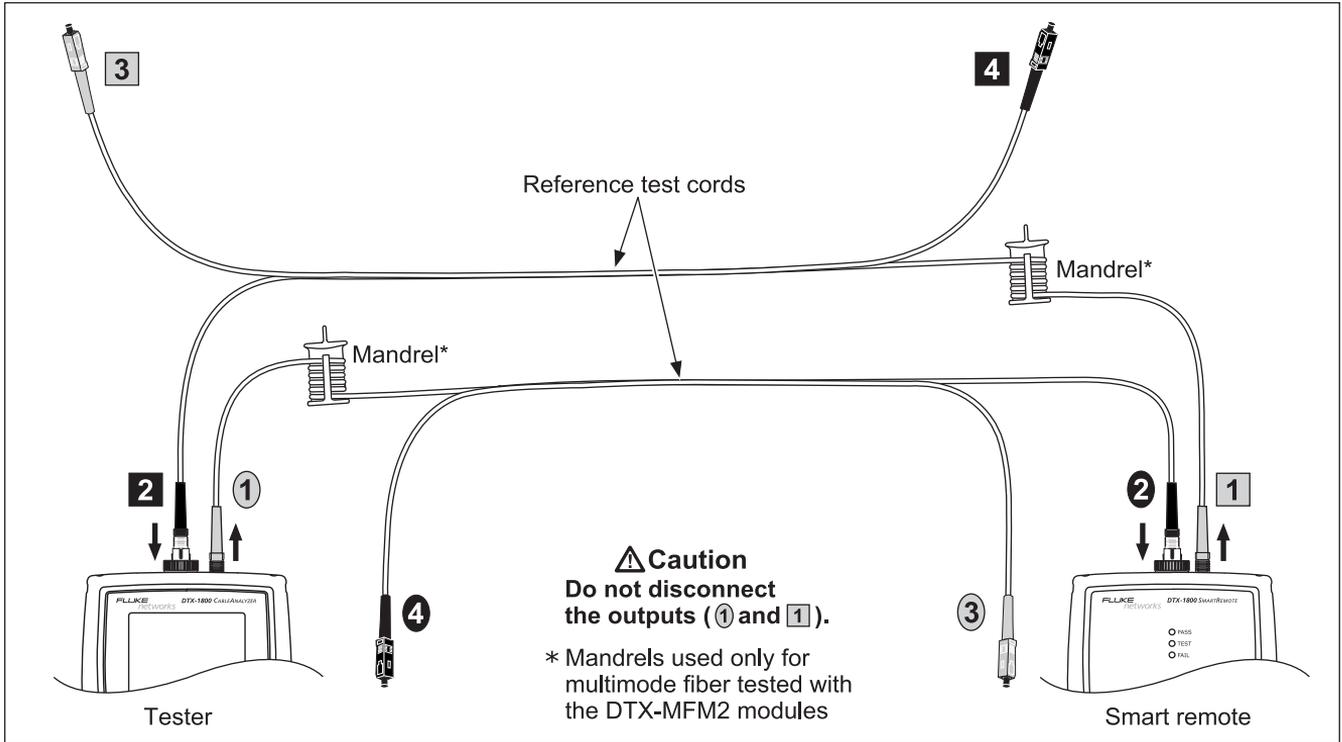
- 8 To enter reference test cord lengths to meet TSB-140 reporting requirements, press  **Patch Lengths**.

On the **Patch Lengths** screen, enter the lengths of the reference test cords.

Press  when you are done.

Caution

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



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Figure 6-9. Smart Remote Mode Reference Connections (Method B)

Running the Autotest in Smart Remote Mode

Caution

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

- 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 Verify that the settings described in Table 6-2 are appropriate.
- 3 Clean the connectors on the cabling to be tested.
- 4 Connect the tester to the cabling. Figure 6-10 shows test connections for Method B.
- 5 Turn the rotary switch to **AUTOTEST**. Verify that the media type is set to **Fiber**. Press  **Change Media** to change it if necessary.

- 6 Press .
- 7 If **Open** or **Unknown** appears as the status, try the following:
 - Verify that all connections are good.
 - Verify that the remote tester is on.
 - Try different connections to the cabling until the test continues. See "Using FindFiber in Smart Remote Mode" on page 6-44 for details on FindFiber messages.
 - Use a the visual fault locator to verify fiber continuity.
- 8 To save the results, press , select or create a fiber ID for one fiber; then press .

Select or create a fiber ID for the other fiber; then press  again.

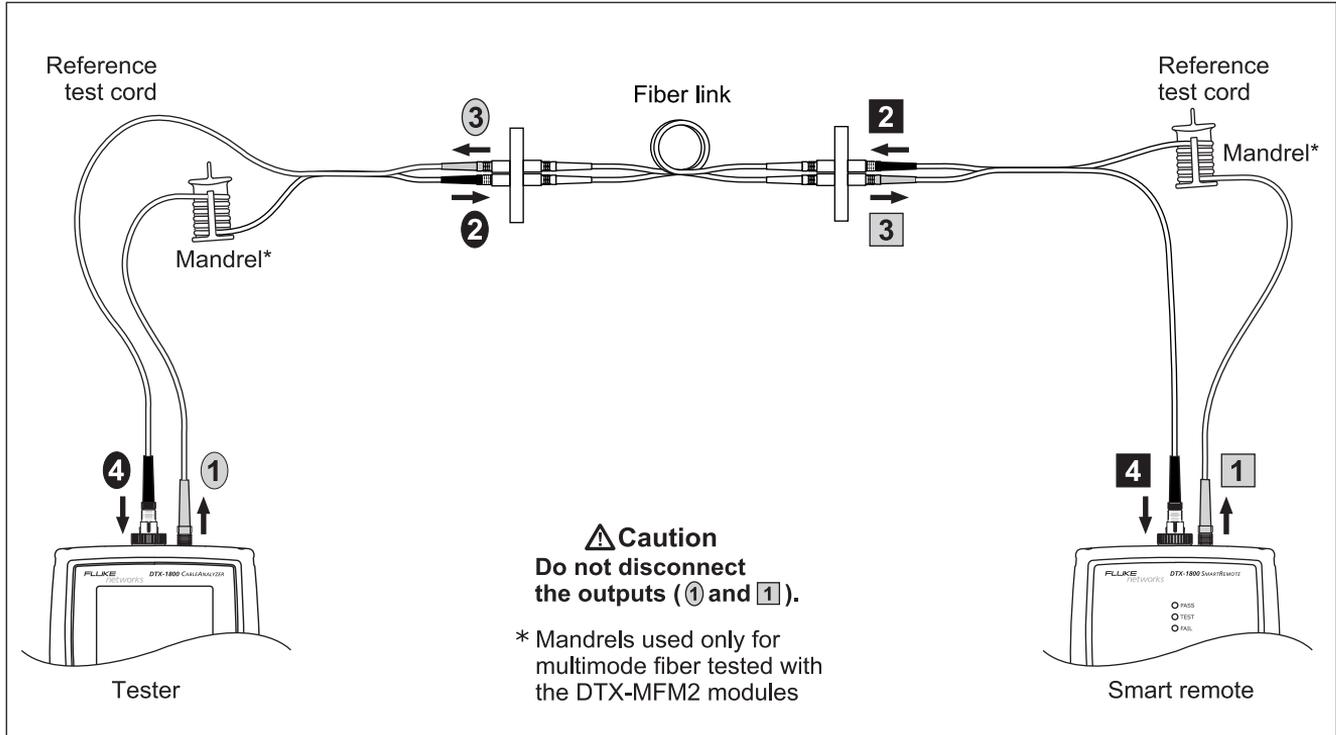


Figure 6-10. Smart Remote Mode Test Connections (Method B)

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Smart Remote Mode Autotest Results

The **Summary** screen appears when the test is finished. To see more detailed results, use  to highlight a measurement; then press .

Figure 6-11 describes the **Summary** screen and loss results screen for an unsaved, single-directional Autotest in Smart Remote mode.

For bi-directional results in Smart Remote mode, see “Bi-Directional Testing” on page 6-42.

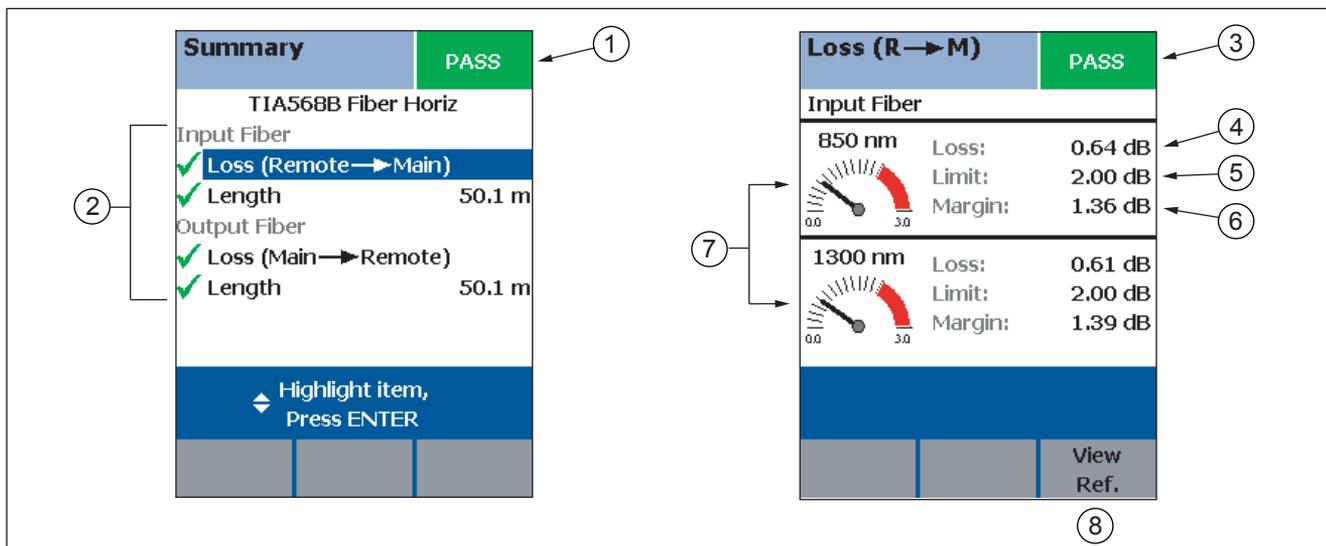


Figure 6-11. Smart Remote Mode Summary and Loss Result Screens (unsaved, single-directional)

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Note

The results described here are for an unsaved test. Unsaved tests for Smart Remote mode show results for both fibers. Saved tests are saved in two records. Each saved record shows results for one fiber.

- ① The overall result for the test.
- ② Overall results for the two fibers (✓ is PASS, ✗ is FAIL):

Input Fiber/Output Fiber: The fiber connected to the tester's input and output ports, respectively.

Loss (Remote -> Main): Loss on the fiber connected between the remote's output and the main tester's input.

Loss (Main ->Remote): Loss on the fiber connected between the main tester's output and the remote's input.

Length: Half of the length from the main tester to the remote and back again. This equals the length of one fiber if the two fibers are equal length.

To see the propagation delay, select the length result. Propagation delay is half the time taken for a signal to travel from the main tester to the remote and back again. Propagation delay is measured in nanoseconds (ns).

- ③ The overall result for the loss measurement.
- ④ The measured loss for the fiber.

Note

If loss is negative, set the reference again and retest the cabling. See Chapter 8 for more information on negative loss.

- ⑤ The maximum loss allowed by the selected test limit.
- ⑥ The difference between the limit and the measured loss. Margin is negative if the loss exceeded the limit.
- ⑦ Loss meters for the two wavelengths. Values in the red zone exceed the selected test limit.
- ⑧ Press **F3** **View Ref.** to view the reference information.

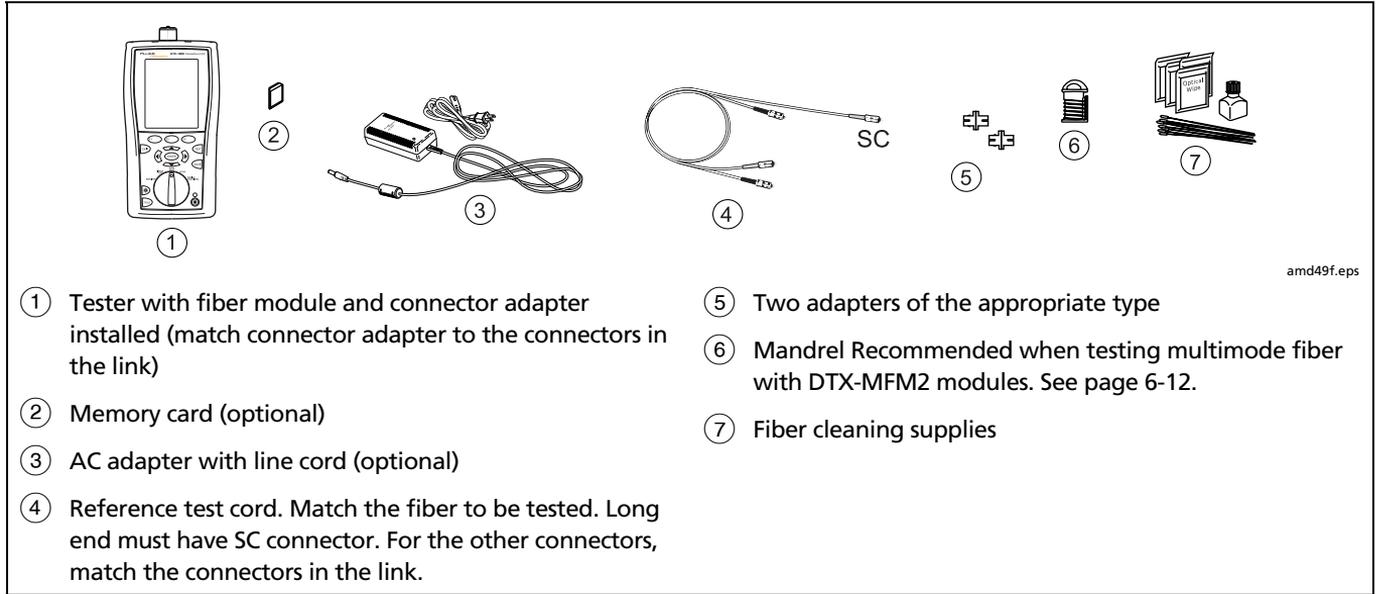
Figure 6-11. Smart Remote Mode Summary and Loss Result Screens (cont.)

Autotest in Loopback Mode

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

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

Figure 6-12 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 Reference test 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 adapters of the appropriate type
- ⑥ Mandrel Recommended when testing multimode fiber with DTX-MFM2 modules. See page 6-12.
- ⑦ Fiber cleaning supplies

Figure 6-12. Equipment for Testing in Loopback Mode (Method B)

Setting the Reference in Loopback Mode

- 1 Turn on the tester and let it 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**.
- 3 Select **Remote End Setup**; then select **Loopback**.
- 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 Clean the connectors on the tester and reference test cords. Connect the reference test cords as shown on the tester.

Notes

The **Set Reference** screen shows reference connections for the selected test method. Figure 6-13 shows connections for Method B.

The reference test cords in the tester's diagrams are numbered. If you want to meet TSB-140 reporting requirements, you can enter lengths for each reference test cord number after setting the reference.

- 6 Press  .
The **View Reference** screen shows the reference values and the date and time the reference was set.
- 7 Press  **OK**.
The **View Connections** screen shows the test connections for the selected test method.
- 8 To enter reference test cord lengths to meet TSB-140 reporting requirements, press  **Patch Lengths**.

On the **Patch Lengths** screen, enter the lengths of the reference test cords.

Press  when you are done.

Caution

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

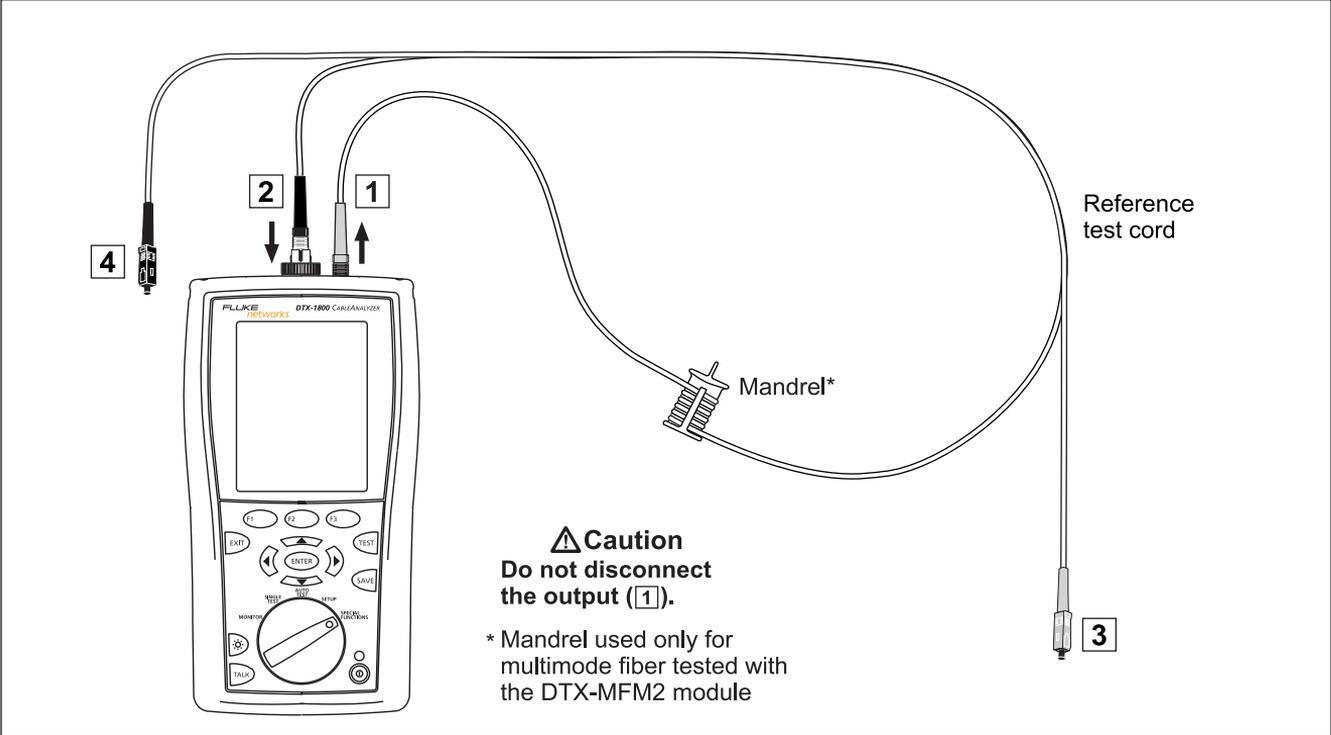


Figure 6-13. Loopback Mode Reference Connections (Method B)

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Running the Autotest in Loopback Mode

Caution

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

- 1 Turn on the tester and let it sit for 5 minutes. Allow additional time if the module has been stored above or below ambient temperature.
- 2 Verify that the settings described in Table 6-2 are appropriate.
- 3 Clean the connectors on the cabling to be tested.
- 4 Connect the tester to the cabling. Figure 6-14 shows connections for Method B.
- 5 Turn the rotary switch to **AUTOTEST**. Verify that the media type is set to **Fiber**. Press  **Change Media** to change it if necessary.
- 6 Press .
- 7 To save the results, press ; select or create a fiber ID; then press  again.

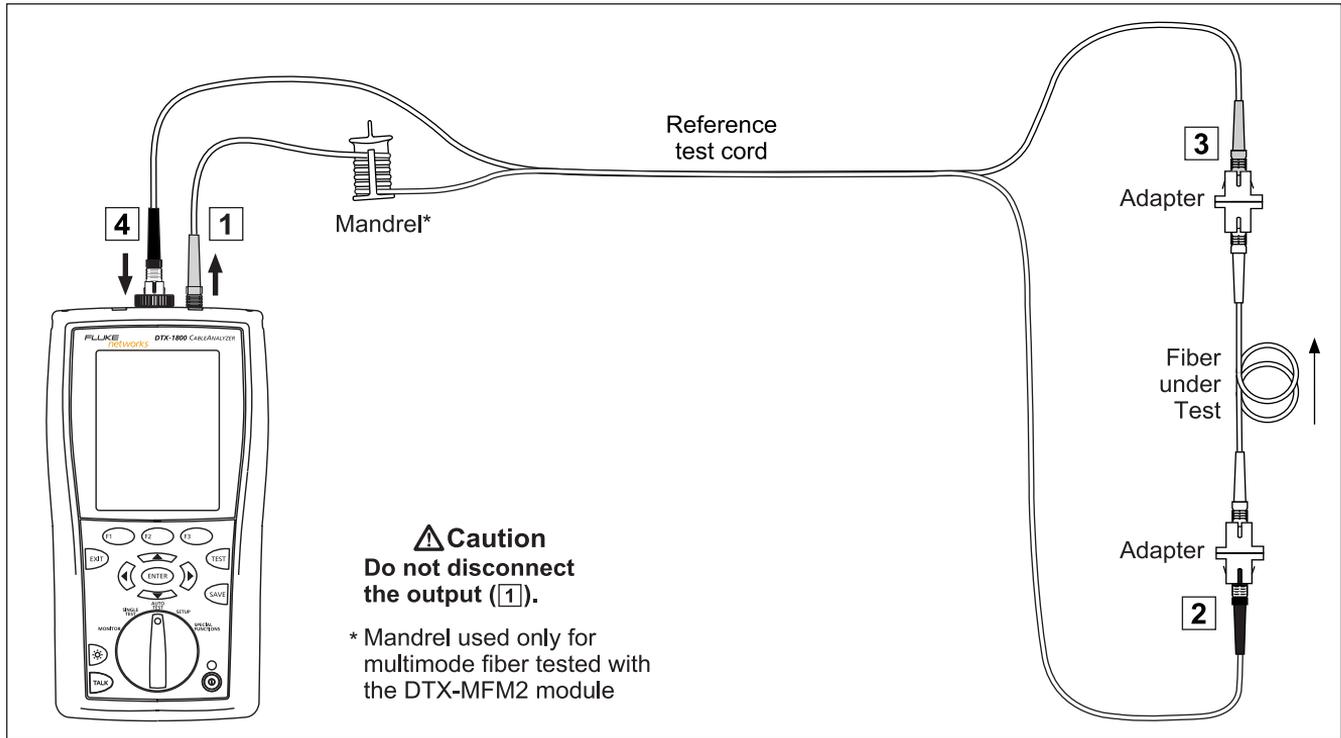


Figure 6-14. Loopback Mode Test Connections (Method B)

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Loopback Mode Autotest Results

The **Summary** screen appears when the test is finished.

To see more detailed results, use  to highlight a measurement; then press **ENTER**.

Figure 6-15 describes the **Summary** screen and loss results screen for a single-directional Autotest in Loopback mode.

For bi-directional results in Loopback mode, see “Bi-Directional Testing” on page 6-42.

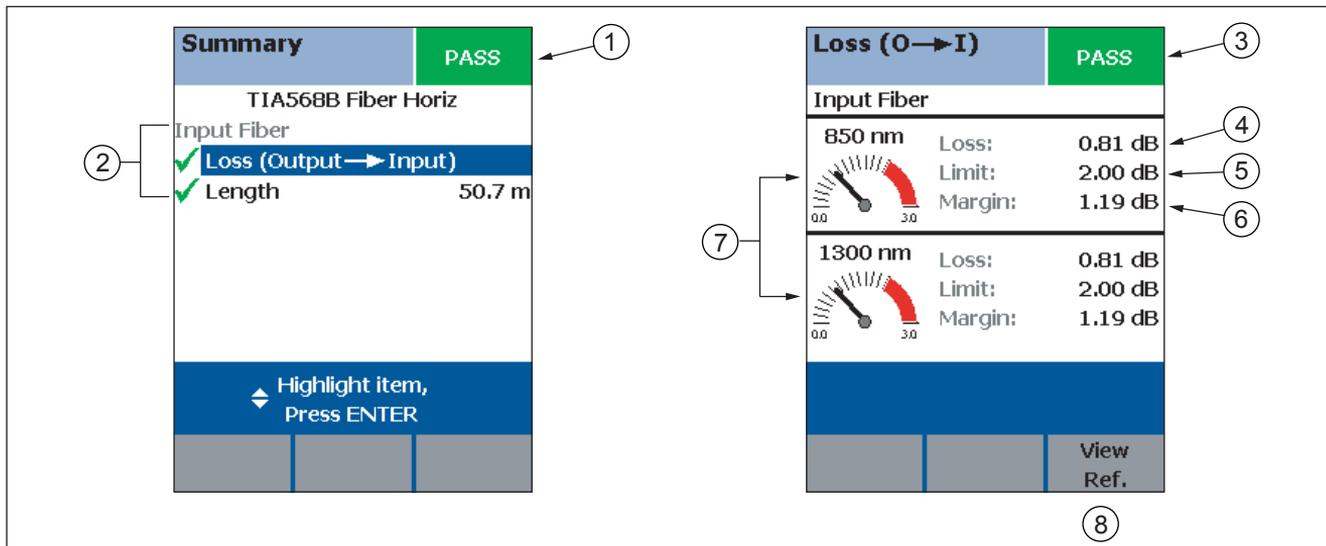


Figure 6-15. Loopback Mode Summary and Loss Result Screens (single-directional)

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<p>① The overall result for the test.</p> <p>② Overall results for the fiber (✓ is PASS, ✗ is FAIL):</p> <p>Loss (Output -> Input): Loss on the fiber connected between the tester's output and input ports.</p> <p>Length: The length of the fiber between the tester's output and input ports. To see the propagation delay, select the length result. Propagation delay is the time taken for a signal to travel between the tester's output and input ports. Propagation delay is measured in nanoseconds (ns).</p> <p>③ The overall result for the loss measurement.</p>	<p>④ The measured loss for the fiber.</p> <p style="text-align: right;"><i>Note</i></p> <p style="text-align: right;"><i>If loss is negative, set the reference again and retest the cabling. See Chapter 8 for more information on negative loss.</i></p> <p>⑤ The maximum loss allowed by the selected test limit.</p> <p>⑥ The difference between the limit and the measured loss. Margin is negative if the loss exceeded the limit.</p> <p>⑦ Loss meters for the two wavelengths. Values in the red zone exceed the selected test limit.</p> <p>⑧ Press F3 View Ref. to view the reference information.</p>
--	--

Figure 6-15. Loopback Mode Summary and Loss Result Screens (cont.)

Autotest in Far End Source Mode

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

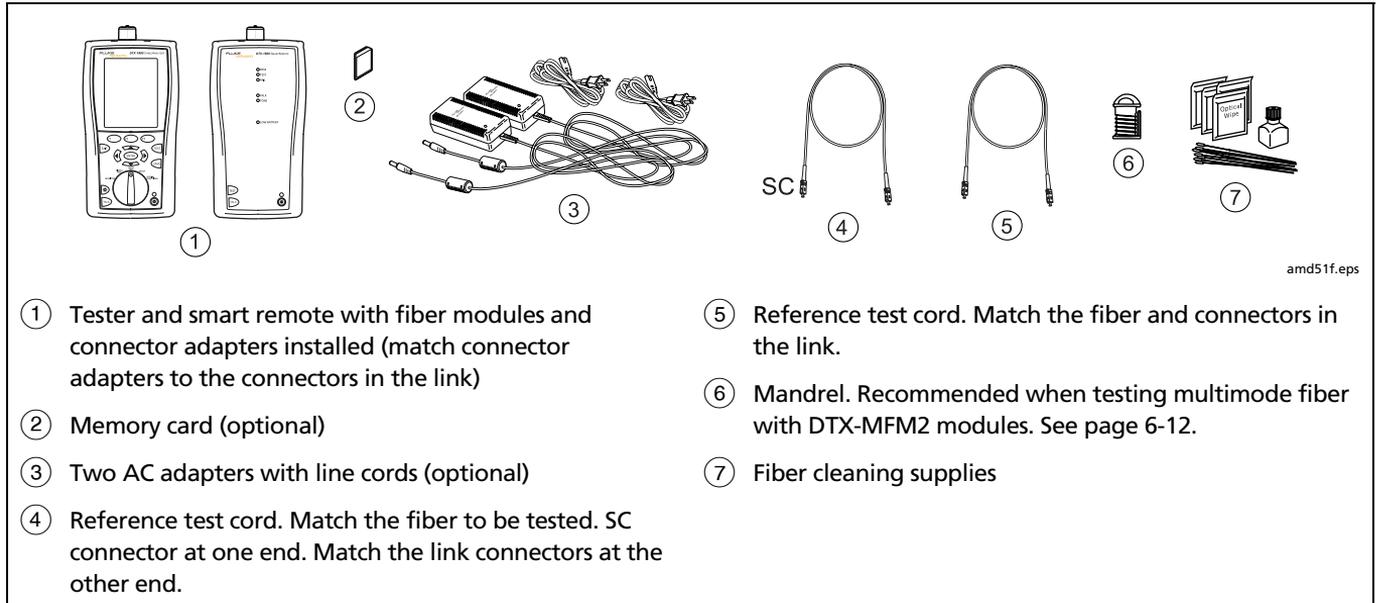
Far End Source mode requires a stand-alone optical source, such as a DTX smart remote with a fiber module.

You can also use other sources, such as a Fluke Networks SimpliFiber® source or LS-1310/1550 laser source.

Figure 6-16 shows the equipment required for measuring loss in Far End Source mode.

Note

The Autotest in Far End Source mode does not show a PASS/FAIL result, limit, or margin if the selected test limit calculates loss based on fiber length. An example of such a limit is the TIA-568B Fiber Backbone limit. The tester does not measure length 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 Reference test cord. Match the fiber to be tested. SC connector at one end. Match the link connectors at the other end.
- ⑤ Reference test cord. Match the fiber and connectors in the link.
- ⑥ Mandrel. Recommended when testing multimode fiber with DTX-MFM2 modules. See page 6-12.
- ⑦ Fiber cleaning supplies

Figure 6-16. Equipment for Testing in Far End Source Mode (Method B)

Setting the Reference in Far End Source Mode

- 1 Turn on the tester and smart remote and let them sit for 5 minutes. Allow additional time if the fiber 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**.
- 3 Select **Remote End Setup**; then select **Far End Source**.
- 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 Clean the connectors on the tester, source, and reference test cords. Connect the tester and source as shown on the tester.

Notes

The **Set Reference** screen shows reference connections for the selected test method. Figure 6-17 shows connections for Method B.

The reference test cords in the tester's diagrams are numbered. If you want to meet TSB-140 reporting requirements, you can enter lengths for each reference test cord number after setting the reference.

- 7 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.

- 9 Press , highlight the appropriate wavelength; then press  again.

The **View Reference** screen shows the reference values and the date and time the reference was set.

- 10 Press  **OK**.

The **View Connections** screen shows the test connections for the selected test method.

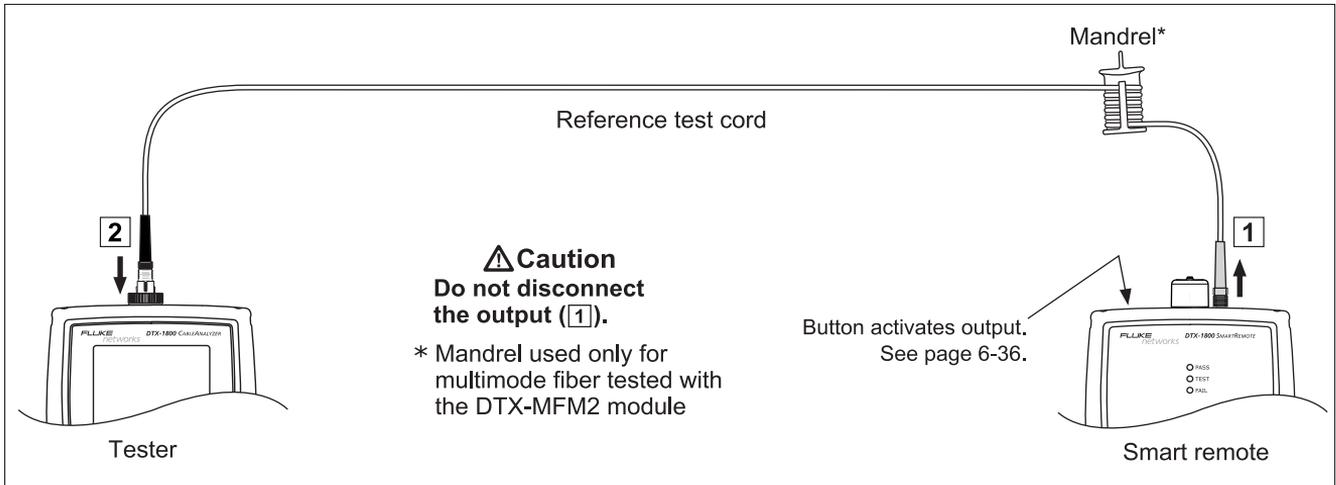
- 11 To enter reference test cord lengths to meet TSB-140 reporting requirements, press **F1** **Patch Lengths**.

On the **Patch Lengths** screen, enter the lengths of the reference test cords.

Press **SAVE** when you are done.

⚠ Caution

Do not disconnect the reference test cord from the smart remote's output after setting the reference. If you do, you must set the reference again to ensure valid measurements.



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Figure 6-17. Far End Source Mode Reference Connections (Method B)

Running the Autotest in Far End Source Mode

Caution

If the reference test cord has been disconnected from the smart remote's output since the reference was set, you must set the reference again to ensure valid measurements.

- 1 Turn on the tester and smart remote and let them sit for 5 minutes. Allow additional time if the fiber modules have been stored above or below ambient temperature. For other sources, warm up according to the manufacturer's recommendations.
- 2 Verify that the settings described in Table 6-2 are appropriate. Clean the connectors on the cabling to be tested.
- 3 Connect the tester to the cabling as shown in Figure 6-18.
- 4 Verify the source is set to the correct wavelength.

To set the wavelength on a DTX module used as a source, hold down the button on the smart remote's

fiber module for 3 seconds. This turns 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.

- 5 Turn the rotary switch to Autotest. Verify that the media type is set to **Fiber**. Press  **Change Media** to change it if necessary.
- 6 Press , highlight the appropriate wavelength; then press  again.
- 7 To save the results, press , select or create a fiber ID; then press  again.

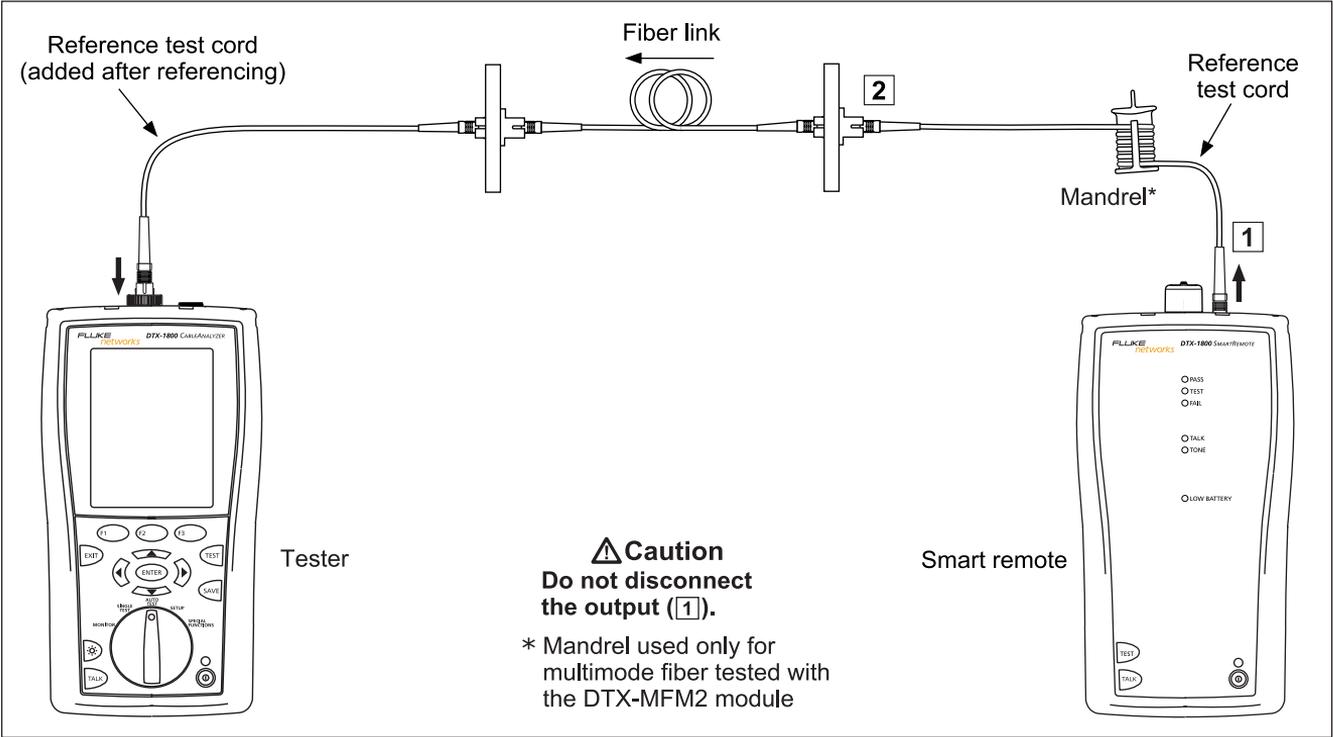


Figure 6-18. Far End Source Mode Test Connections (Method B)

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Far End Source Mode Autotest Results

The **Summary** screen appears when the test is finished.

To see more detailed results, use  to highlight a measurement; then press .

Figure 6-19 describes the **Summary** screen loss results screen for an Autotest in Far End Source mode.

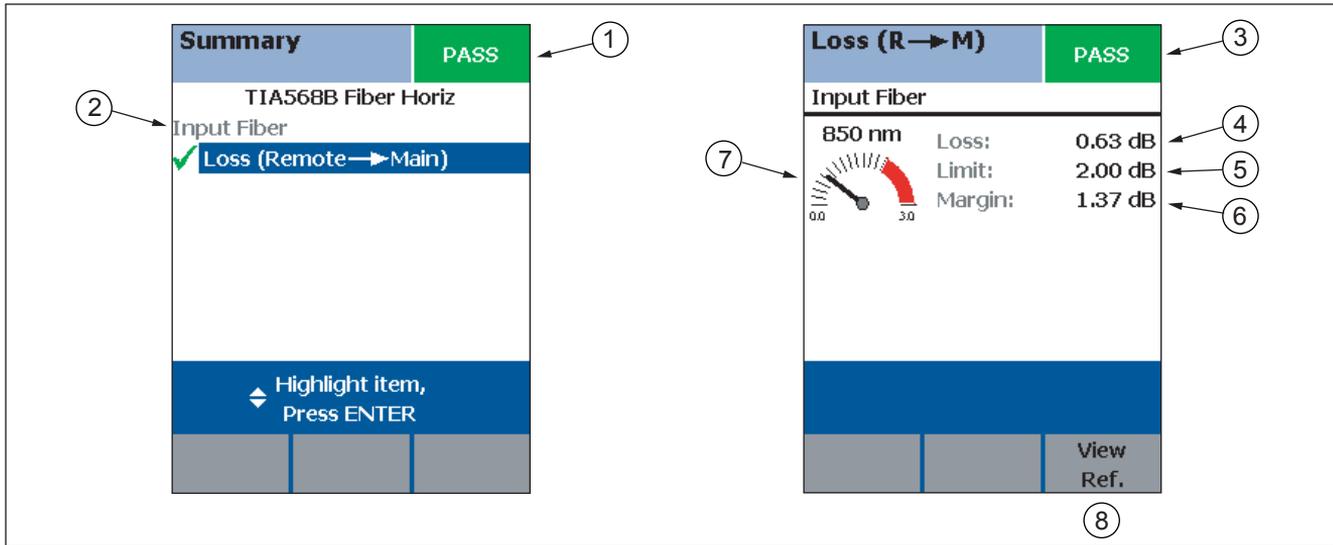


Figure 6-19. Far End Source Mode Summary and Results Screens

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- | | |
|--|--|
| <p>① Overall results for the fiber:</p> <p>② Loss (Remote -> Main): Overall loss on the fiber connected between the tester's output and input ports. ✓ is PASS, ✗ is FAIL.</p> <p>③ The overall result for the loss measurement.</p> <p>④ The measured loss for the fiber.</p> | <p>⑤ The maximum loss allowed by the selected test limit.</p> <p>⑥ The difference between the limit and the measured loss. Margin is negative if the loss exceeded the limit.</p> <p>⑦ Meter for the loss measurement. Values in the red zone exceed the selected test limit.</p> <p>⑧ Press F3 View Ref. to view the reference information.</p> |
|--|--|

Note

If loss is negative, set the reference again and retest the cabling. See Chapter 8 for more information on negative loss.

Note

In Far End Source mode, the results do not show a PASS/FAIL result, limit, or margin if the selected test limit calculates loss based on fiber length. An example of such a limit is the TIA-568B Fiber Backbone limit. The tester does not measure length in Far End Source mode.

Figure 6-19. Far End Source Summary and Loss Result Screens (cont.)

Bi-Directional Testing

The **Bi-Directional** setting lets you test cabling in both directions and save the bi-directional test results in Smart Remote and Loopback modes.

To run a bi-directional test:

- 1 Turn the rotary switch to **SETUP**; then select **Fiber**.
- 2 Select **Bi-Directional**; then select **Yes**.
- 3 Run an Autotest test on the cabling, as described in the previous sections for Smart Remote mode and Loopback mode.
- 4 Halfway through the test, the tester prompts you to swap the fibers at each end of the cabling.

Caution

Swap the connections at the patch panel, not at the tester's ports. Disconnecting the reference test cord from the tester's output port invalidates the reference.

- 5 When the test is complete, press  to save the results. Select or create a fiber ID for the fiber; then press  again.

In Smart Remote mode, you save two results, one for each fiber. See the next section.

Bi-Directional Results for Smart Remote Mode

Unsaved tests show the results for both fibers, as shown at the left of Figure 6-20. **Input Fiber** and **Output Fiber** refer to the fibers connected to the main tester's input and output ports at the *end* of the test.

On the results screen for loss and length measurements for each fiber, press  **Other Dir.** to see results for the other direction.

Saved tests for Smart Remote mode are stored in two records, one for each fiber, as shown at the right of Figure 6-20. Each record contains bi-directional results for one fiber.

Bi-Directional Results for Loopback Mode

In the results for Loopback mode, **Output to Input** refers to the direction from the tester's output port to its input port. **Input to Output** refers to the direction from the tester's input port to its output port. Both results are stored in one record.

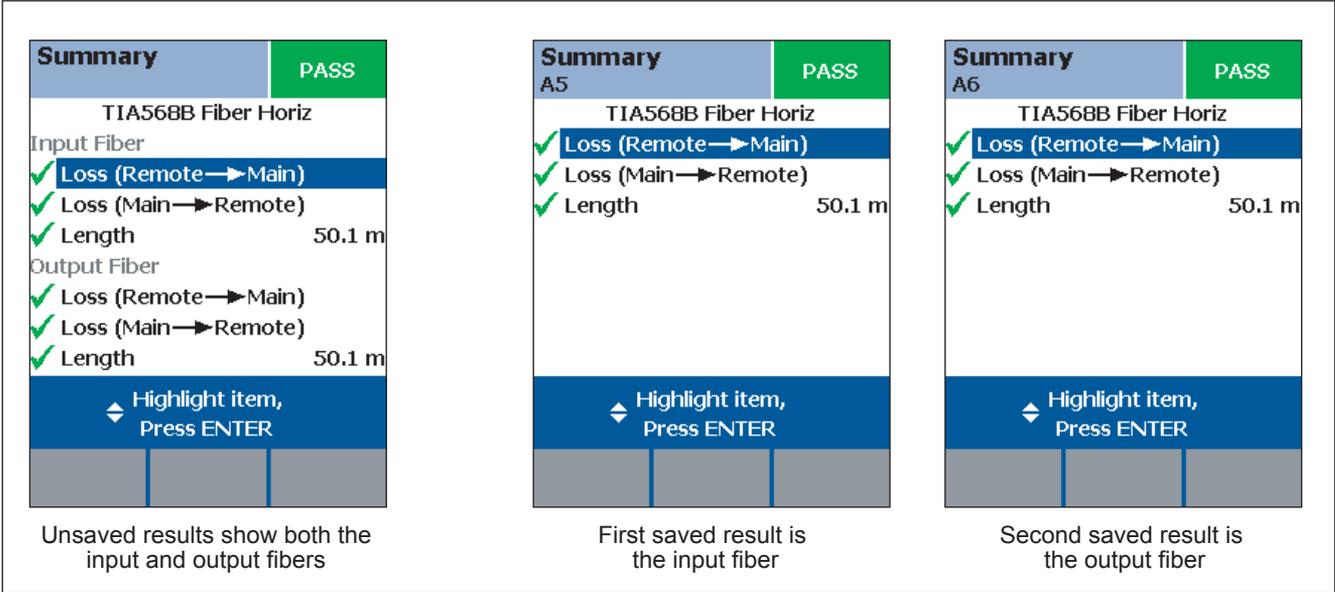


Figure 6-20. Unsaved and Saved Bi-Directional Results for Smart Remote Mode

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Finding Connections with FindFiber

The FindFiber™ function helps you trace connections at patch panels and quickly check fiber continuity.

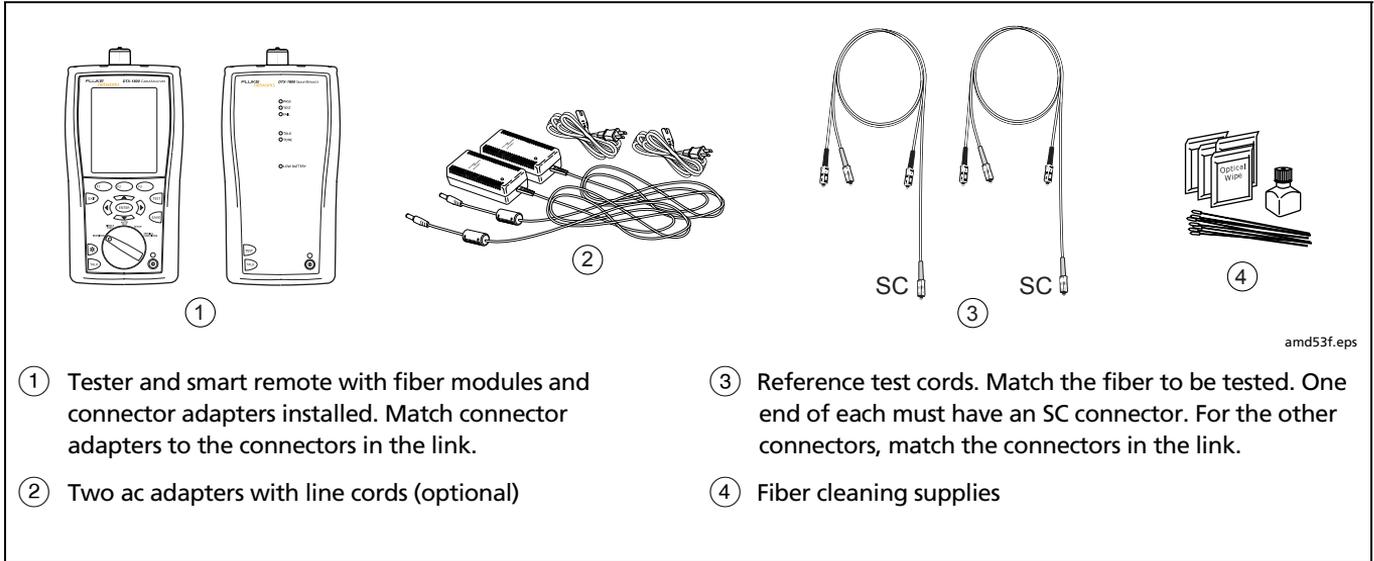
Note

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

Using FindFiber in Smart Remote Mode

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

Figure 6-21 shows the equipment needed for using FindFiber in Smart Remote mode.



- ① Tester and smart remote with fiber modules and connector adapters installed. Match connector adapters to the connectors in the link.
- ② Two ac adapters with line cords (optional)
- ③ Reference test cords. Match the fiber to be tested. One end of each must have an SC connector. For the other connectors, match the connectors in the link.
- ④ Fiber cleaning supplies

Figure 6-21. Equipment for Using FindFiber in Smart Remote Mode

To use the FindFiber function in Smart Remote mode:

- 1 Turn the rotary switch to **SETUP**; then select **Fiber**.
- 2 Select **Remote End Setup**; then select **Smart Remote**.
- 3 Clean all connectors; then make the connections shown in Figure 6-23.
- 4 Turn the rotary switch to **MONITOR**; then select **FindFiber**.

- 5 Try various connections to the patch panel with the main tester's **INPUT** fiber until the input fiber's status shows **Connected**.
- 6 Then try various connections with the main tester's **OUTPUT** fiber until the output fiber's status shows **Connected**.

Figure 6-22 shows the main tester results for Smart Remote mode.

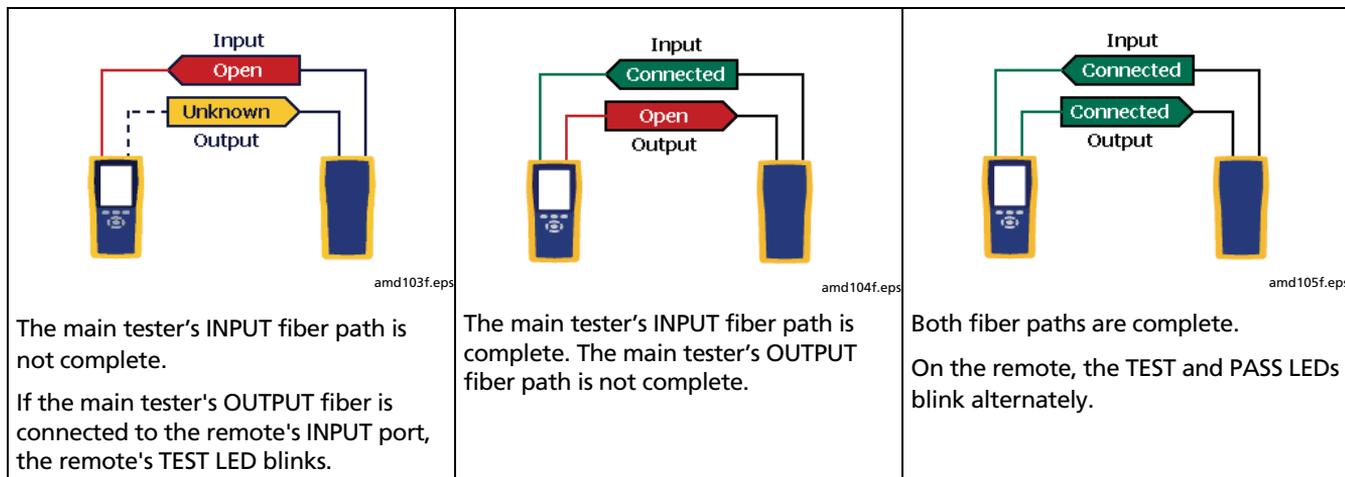


Figure 6-22. Main Tester Results for FindFiber Test (Smart Remote Mode)

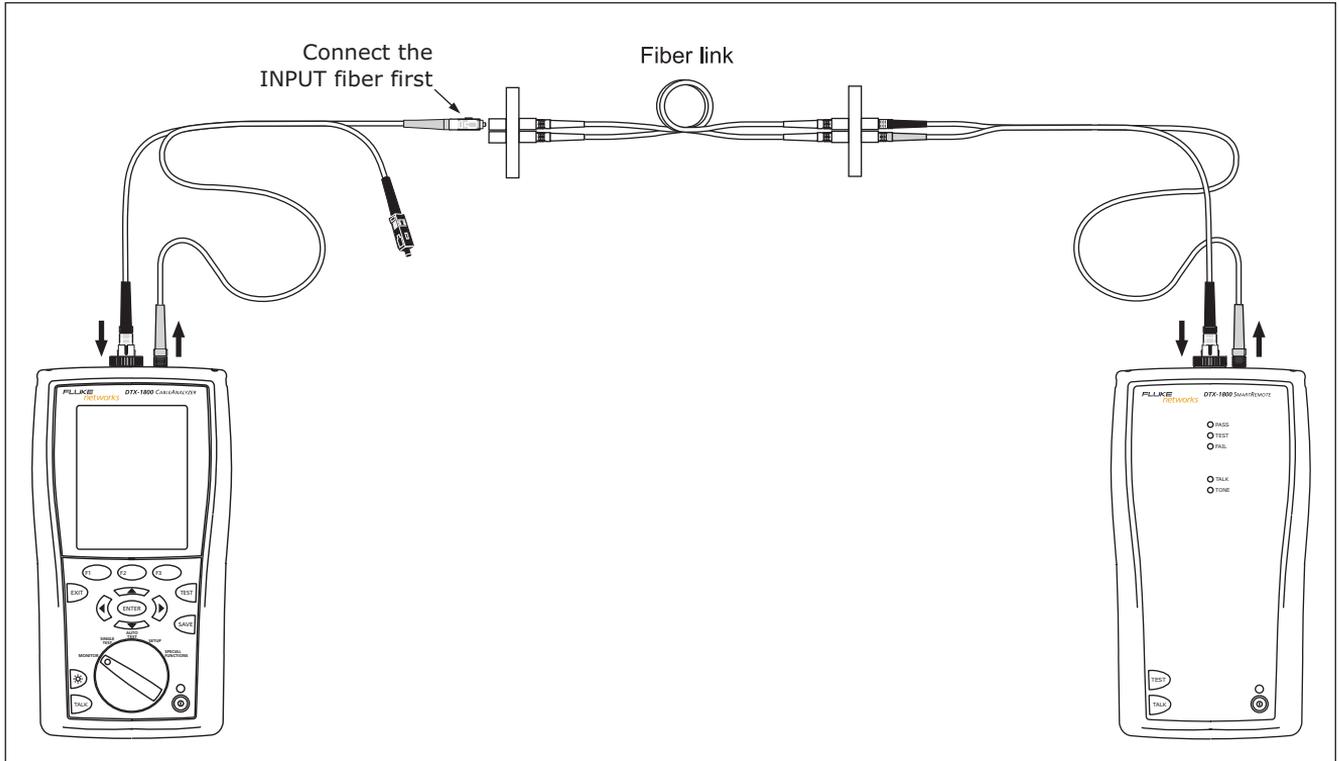


Figure 6-23. Using FindFiber in Smart Remote Mode

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Using FindFiber in Loopback Mode

Use FindFiber in Loopback mode to quickly check the continuity of patch cords and fiber spools. Figure 6-24 shows the equipment needed for using FindFiber in Loopback mode.

- 1 Turn the rotary switch to **SETUP**; then select **Fiber**.
- 2 Select **Remote End Setup**; then select **Loopback**.

- 3 Clean all connectors; then connect the tester's **OUTPUT** fiber to one end of the fiber path, as shown in Figure 6-25.
- 4 Turn the rotary switch to **MONITOR**; then select **FindFiber**.
- 5 Try various connections with the **INPUT** fiber. The status shows **Loopback** for both fibers when the path is complete.

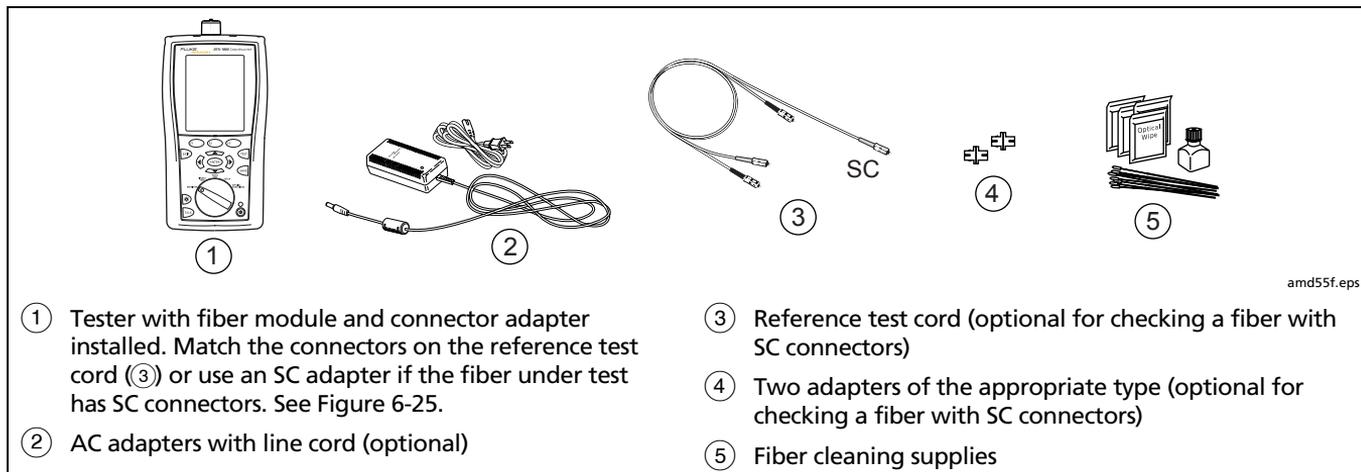


Figure 6-24. Equipment for Using FindFiber in Loopback Mode

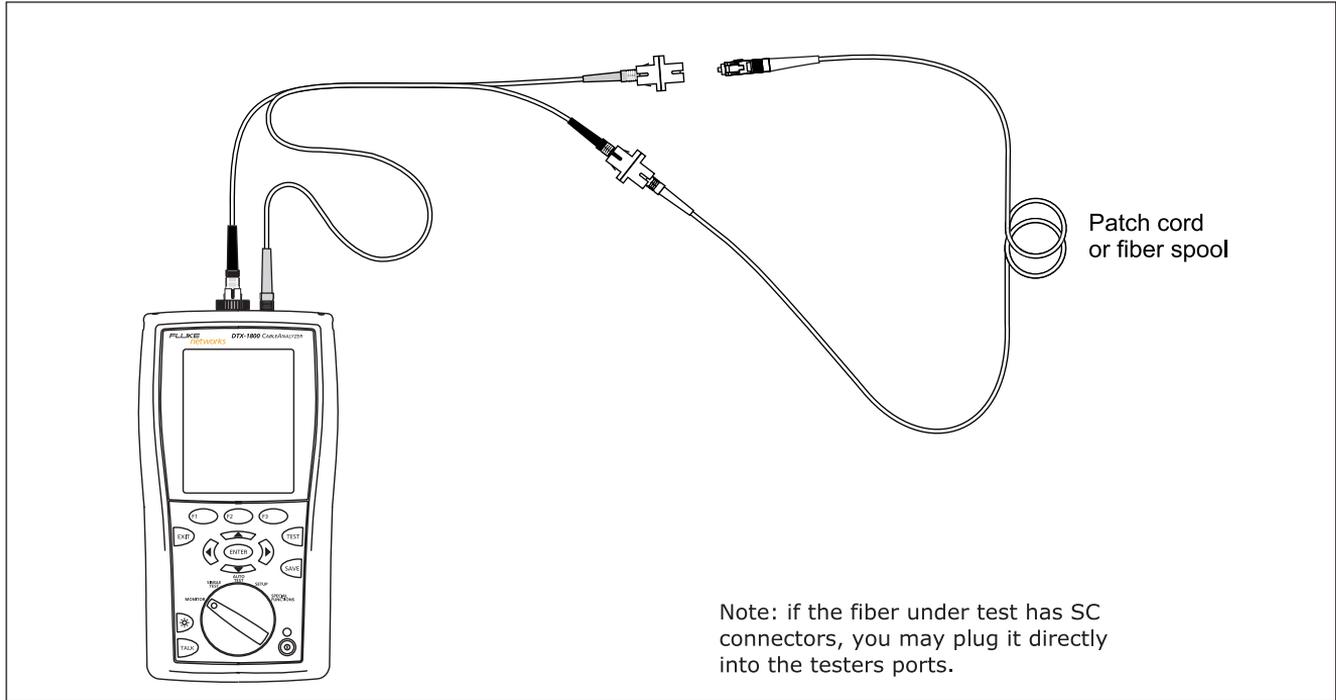


Figure 6-25. Using FindFiber in Loopback Mode

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Using the Power Meter

The power meter lets you measure 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: Measures power in the current remote end configuration (Smart Remote, Loopback, or Far End Source 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.

The power meter functions do not compare the power measurement to a limit and do not produce **PASS/FAIL** results.

Figure 6-26 shows the equipment required for using the power meter in **MONITOR** mode.

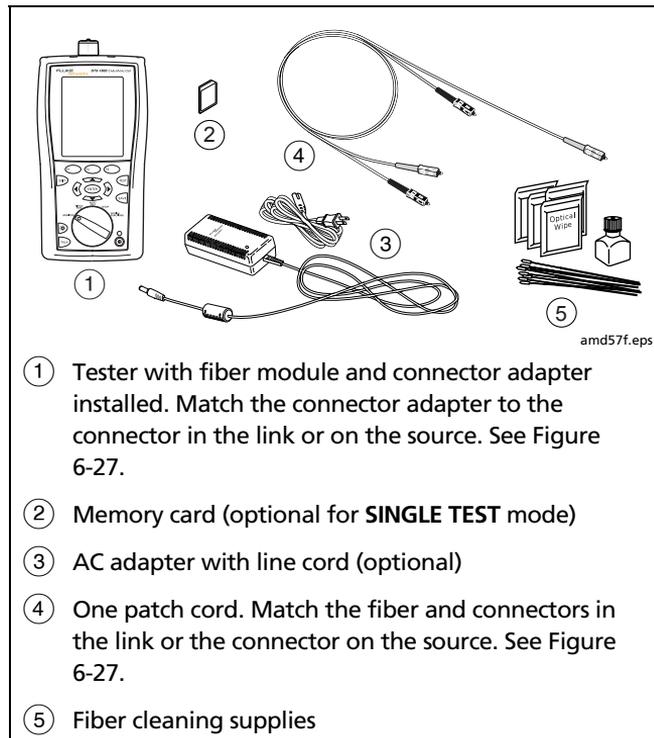


Figure 6-26. Equipment for Using the Power Meter in MONITOR Mode

To use the power meter in **MONITOR** mode:

Note

*If you need to save the power reading, use the power meter function in the **SINGLE TEST** mode.*

- 1 Clean the tester's input port, the reference test cord connectors, and the source connector.
- 2 Use the reference test cord to connect the source to the tester's input port, as shown in Figure 6-27.

- 3 Turn on the source.
- 4 Turn the rotary switch to **MONITOR**; then select **Power Meter**.
- 5 Press .
- 6 Select the appropriate wavelength; then press . The power meter in **MONITOR** mode runs continuously until you press .

Figure 6-28 describes the power meter screens for **SINGLE TEST** and **MONITOR** modes.

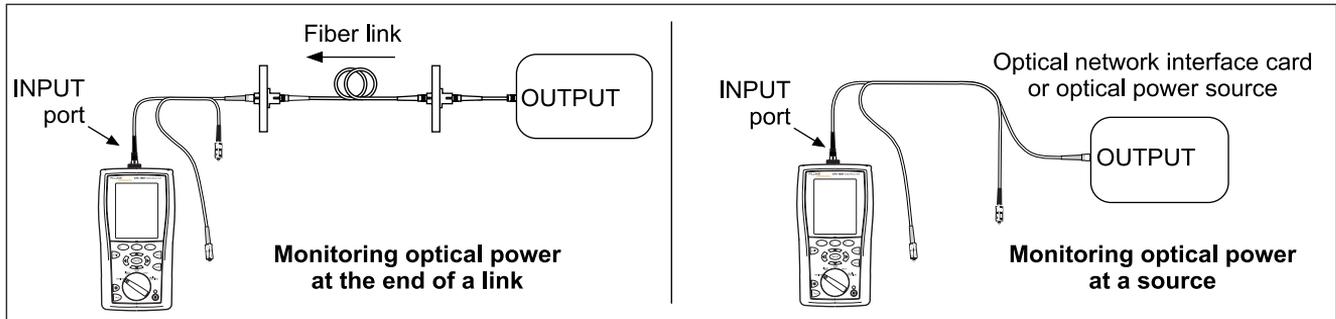


Figure 6-27. Connections for Monitoring Optical Power (MONITOR mode)

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To use the power meter in **SINGLE TEST** mode:

Note

Refer to previous sections on the Autotest in Smart Remote, Loopback, or Far End Source modes for details on selecting these modes and making test connections.

- 1 In **SETUP**, set the tester to Smart Remote, Loopback, or Far End Source mode.
- 2 Connect the tester to the cabling for Smart Remote, Loopback, or Far End Source mode.
- 3 Clean the tester's input port, the reference test cord connectors, and the source connector(s).
- 4 Use the reference test cord(s) to connect to the cabling.

- 5 Turn on the source.
- 6 Turn the rotary switch to **SINGLE TEST**, select **Power**; then press .
- 7 To save the results, press , select or create a fiber ID; then press  again.

In Smart Remote mode you will save two power meter results, one for each fiber. In the saved results, **Input Fiber** and **Output Fiber** refer to the fibers connected to the main tester's input and output ports at the *end* of the test.

Figure 6-28 describes the power meter screens for **SINGLE TEST** and **MONITOR** modes.

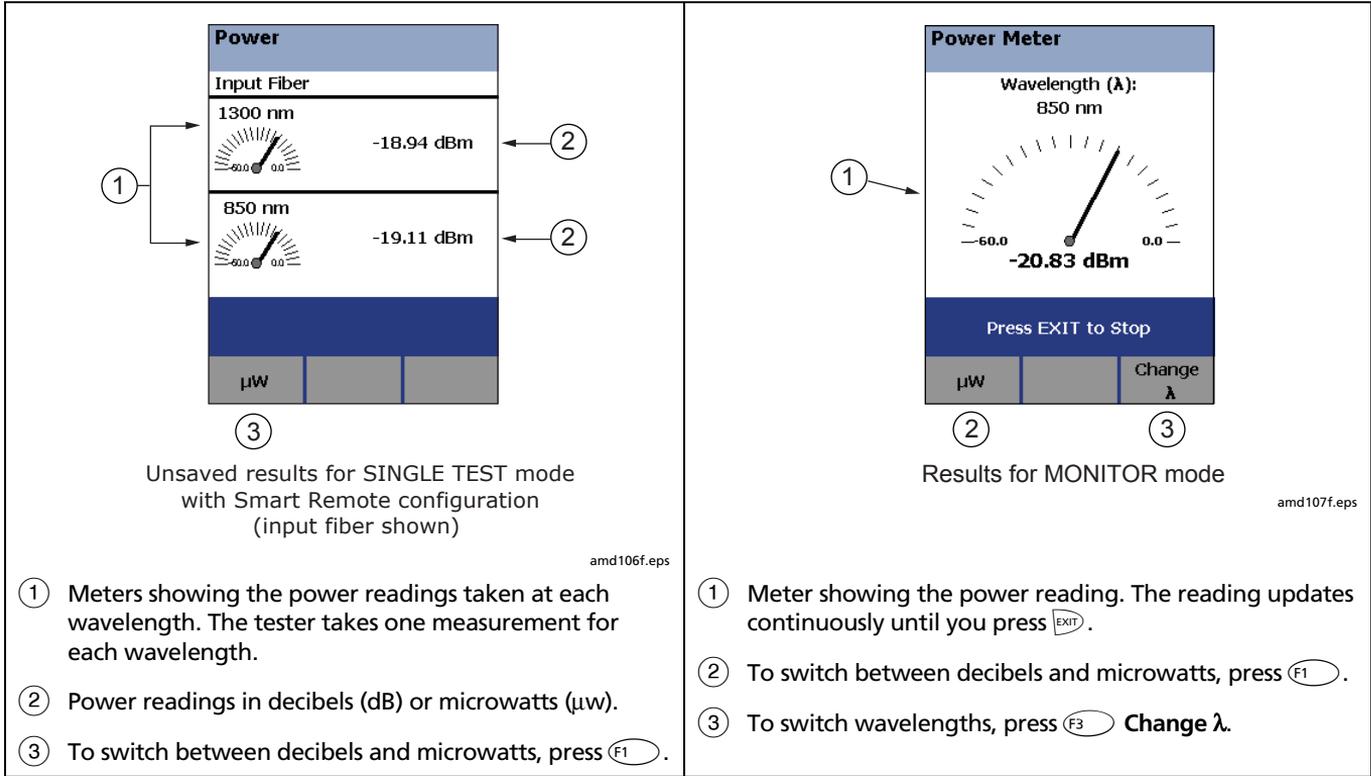


Figure 6-28. Power Meter Screens

Running Single Tests

The tester's **SINGLE TEST** mode lets you run individual tests for isolating cabling failures and quickly testing repairs.

In the **SINGLE TEST** mode, you can run and save the following tests individually:

- Loss
- Length (includes propagation delay)
- Power meter measurement

Using the Remote Tester with an OptiFiber™ Tester

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.

Locating Fibers and Faults with the Visual Fault Locator

Visual Fault Locator Applications

The fiber test module includes a visual fault locator that 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.)

Figure 7-1 shows the equipment needed for using the visual fault locator.

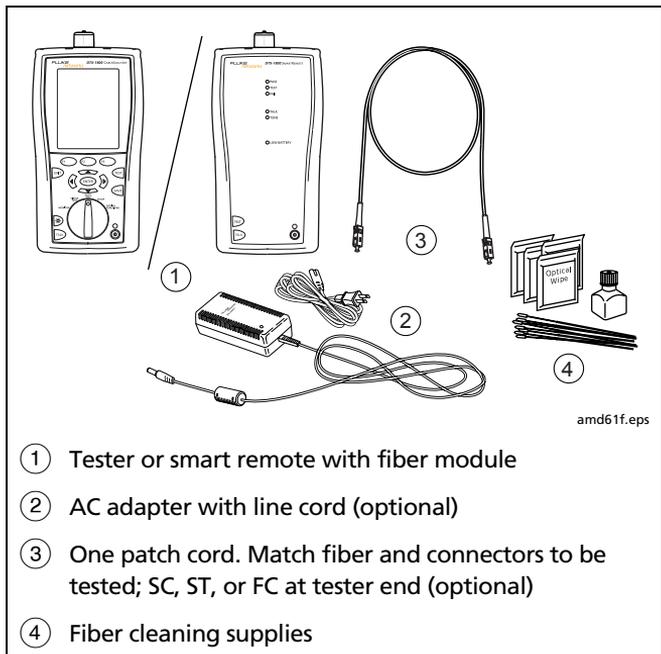


Figure 7-1. Equipment for Using the Visual Fault Locator

Using the Visual Fault Locator

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.

To use 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 visual fault locator by pressing the button near the VFL connector, as shown in Figure 7-2. 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, as shown in Figure 7-2.

View the VFL's 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.

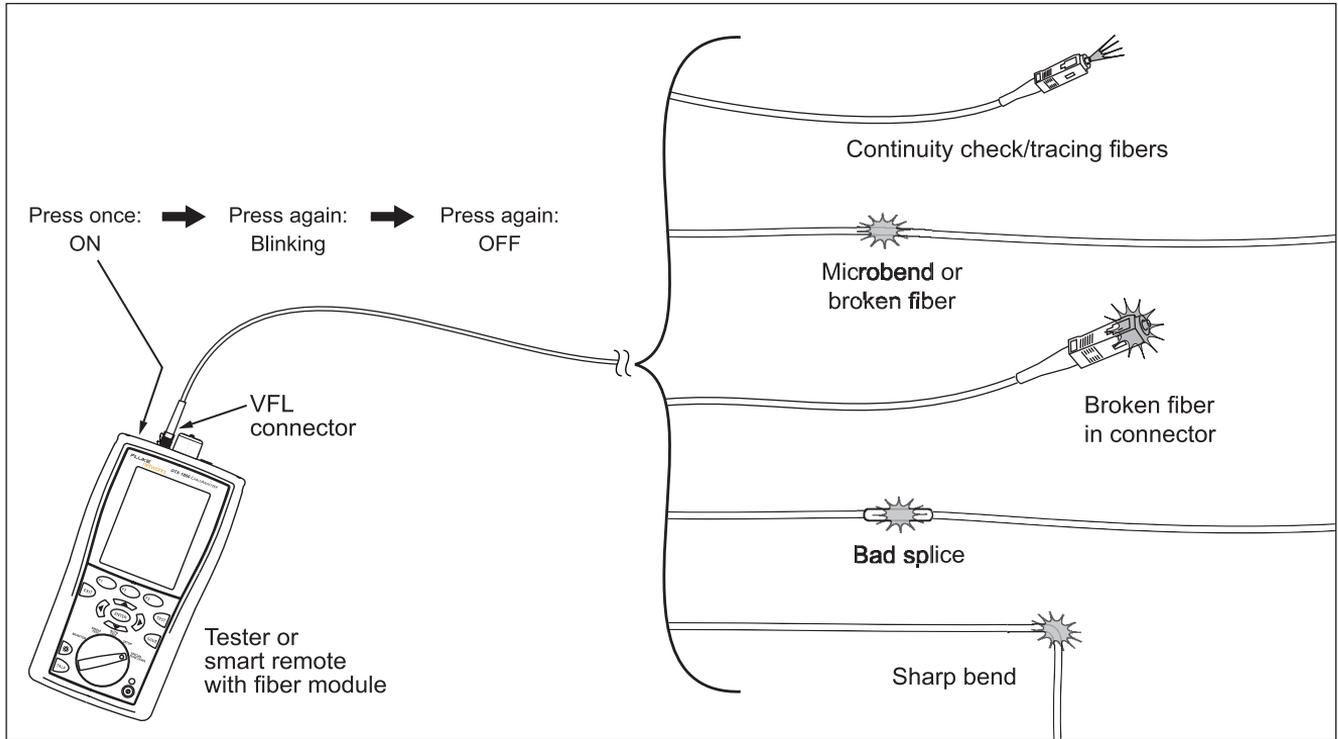


Figure 7-2. Using the Visual Fault Locator

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Chapter 8

Diagnosing Fiber Cabling Faults

Common Causes of Failures

Most problems in fiber links are caused by dirty, scratched, or damaged connectors, as shown in Table 8-1.

The table shows results of a survey of 89 contractors and private network owners. The results show what percentage of each group commonly found the faults listed.

Table 8-1. Causes of Failures in Fiber Links

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 %

Diagnosing Failures

Table 8-2 describes some typical causes of fiber test failures.

Table 8-2. Diagnosing Fiber Test Failures

Loss measurement gives FAIL result
<ul style="list-style-type: none">• There is one or more dirty, damaged, misaligned, or unseated connections in the cabling. Check all connections and clean all fiber endfaces, then retest. The tester's VFL can reveal damaged connectors and other faults. See Chapter 7 for details. An OTDR, such as the Fluke Networks OF-500 OptiFiber™ Certifying OTDR, can help you locate faults not revealed with the VFL.• There is a kink or sharp bend in a reference test cord or the fiber under test. Use the VFL to reveal these faults.• A reference test cord is broken.• The number of adapters or splices on the Fiber Setup menu is too low (for standards that use a calculated loss value).• The wrong fiber type is selected on the Fiber Setup menu.• The reference is incorrect. Set the reference again using the same reference test cords to be used for testing.• For multimode fiber, the wrong mandrel size was used for testing. Smaller mandrels create tighter bends in the fiber, resulting in more loss.• A reference test cord or fiber segment has the wrong core size. An OTDR is useful for locating mismatched fibers.• The cabling has a bad fusion or mechanical splice or a sharp bend. Use the visual fault locator to reveal these faults.• The fibers are connected to the wrong ports on the tester, or are swapped at one end of the cabling.

-continued-

Table 8-2. Diagnosing Fiber Test Failures (cont.)

<p>Loss is negative.</p> <ul style="list-style-type: none"> • The fiber ends were dirty during referencing. • The connections to the tester were disturbed after referencing. • There was a kink in a reference reference test cord during referencing. • The connectors were not properly aligned during referencing. • The testers were much colder during referencing than during testing. • Some other problem caused a bad reference value. <p>If loss is negative, set the reference again and retest the cabling. See Chapter 6.</p>
<p>A known length of cable measures too long or too short.</p> <ul style="list-style-type: none"> • The wrong fiber type is selected on the Fiber Setup menu • The index of refraction needs adjustment. Change n on the Fiber Setup menu

-continued-

Table 8-2. Diagnosing Fiber Test Failures (cont.)

Power meter measurement is too low
<ul style="list-style-type: none">• Fiber endface is dirty or damaged.• Reference test cord not connected to tester's INPUT port, or a connection is loose.• Wavelength selected on tester doesn't match source wavelength.• Source set to modulated output.• Reference test cord or adapter is the wrong type (SM or MM) or reference test cord has the wrong core size.• Cabling is cracked or broken.
Power meter measurement is too high
Tester is connected to an active CATV fiber.

Chapter 9

Verifying Network Service

Overview of Features

The optional DTX-NSM Network Service Module lets you do the following on twisted pair or fiber links:

- Verify connection to the network, including connection speed, duplex configuration, link wiring, and PoE service (wiring and PoE functions for twisted pair only)
- Ping IP addresses
- Monitor network traffic for utilization, collisions, errors, and broadcast packets
- Blink a port's activity LED
- Use Fluke Networks LinkRunner™ Cable ID locators (optional) to identify link connections at a patch panel (twisted pair only)

Notes

Running network tests on a fiber link requires an optional SFP module.

The DTX-NSM module does not support the Talk function.

Figure 9-1 describes the network module's features.

Software Requirements

The following software supports the DTX-NSM module. Software upgrades are available on the Fluke Networks website.

- DTX software: version 1.3 or later
- LinkWare software: version 2.5 or later

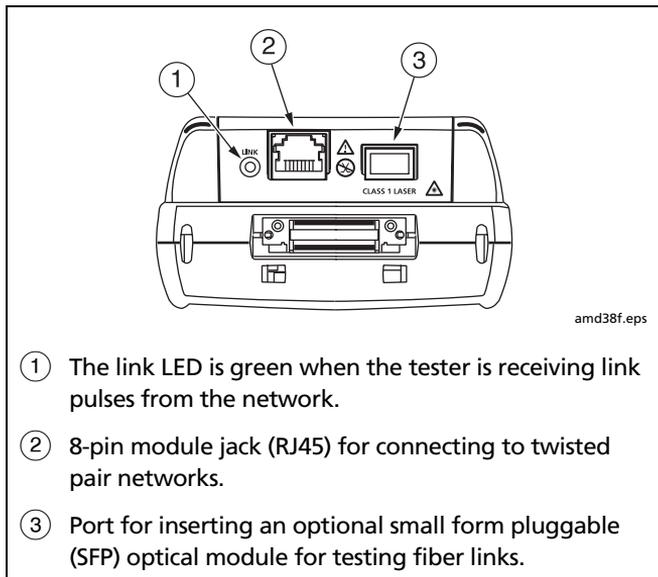


Figure 9-1. Network Module Features

Installing and Removing the Network Module and Optional SFP Module

See Figure 9-2.

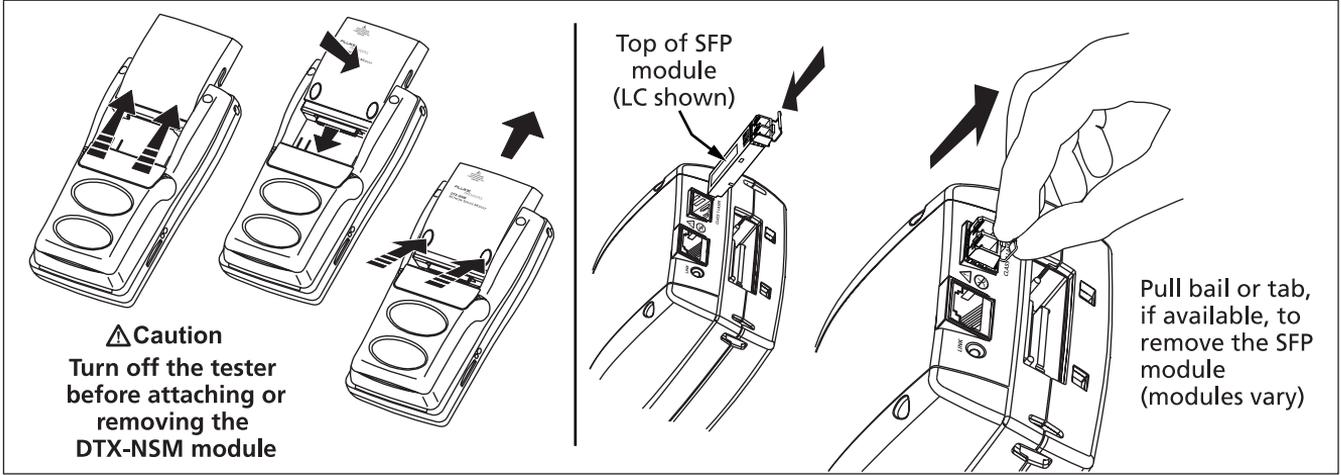
Install the network module only in the main tester.

Install an optional SFP (small form pluggable) module to test fiber links.

Caution

Leave the module bay cover in place when a module is not installed.

Put the dust cap on the SFP port when an optical module is not installed. Put the dust cap on the optical module when not connected to a fiber.



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Figure 9-2. Installing and Removing the Network and SFP Modules

Verifying Network Connectivity

The network connectivity test lets you verify that a twisted pair or fiber link is connected to a network. The test provides details about the link's configuration and includes a ping function for verifying connectivity to stations on the network.

Network Connectivity Test Settings

The tester needs various addresses to test a network connection, as described in Table 9-1. To access these settings, turn the rotary switch to **SETUP**; then select **Network Settings**.

Table 9-1. Network Connectivity Test Settings

Setting	Description
SETUP > Network Settings > IP Address Assignment	<p>Select DHCP (Dynamic Host Configuration Protocol) to have the network's server assign the tester's address, gateway address, and DHCP and DNS (Domain Name System) server addresses. Most networks support DHCP.</p> <p>Select Static to enter the tester's address, subnet mask, gateway address, and DNS server address manually. Enter the addresses on the second tab that appears after you select Static. These addresses are typically available from a network installer, administrator, technician, or from network documentation.</p> <p style="text-align: center;"> Caution</p> <p style="text-align: center;">In Static mode, verify that the DTX Address is not used by another network device. Using a duplicate address can cause the other device to malfunction.</p>
SETUP > Network Settings > Target Addresses	Optional. Enter one or more addresses for ping tests. You may enter addresses manually, or download them from LinkWare software. See "Entering Ping Addresses" on page 9-5 for details.

Entering Ping Addresses

You can use LinkWare software to create and download ping addresses to the tester, or you can enter and edit addresses directly on the tester.

To use LinkWare to enter ping addresses:

- 1 Install the latest version of LinkWare software on your PC.
- 2 Select **Utilities > DTX Utilities > Ping Target List** on the LinkWare menu.
- 3 Create an address list; then download it to the tester. See the LinkWare online help for details.

To enter or edit ping addresses on the tester:

- 1 Turn the rotary switch to **SETUP**; then select **Network Settings**.
- 2 Select **Target Addresses**; then do one of the following:
 - To add an address, press **F1** **Create**. Enter a device **Name** and **IP Address**. Press **SAVE** when you are finished.
 - To edit an address, highlight the address name; then press **F3** **Edit**. Select **Name** or **IP Address** for editing. Press **SAVE** when you are finished.
 - To delete an address, highlight the address name, press **F2** **Delete**; then press **F3** **Yes**.

Running the Connectivity Test

To test for network connectivity:

Note

The network connectivity test will not run on links with ground loops, analog telephone voltages, ISDN voltages, or other voltages (except PoE voltage). The tester warns you if it detects these conditions.

- 1 Select **DHCP** or **Static** mode and enter ping addresses in Setup, as described on pages 9-4 and 9-5.
- 2 Connect to the network as shown in Figure 9-3.
- 3 Turn the rotary switch to **MONITOR**; then select **Network Connectivity**.
- 4 Press . Figure 9-4 describes the network connectivity results.

Saving Connectivity Results

You can save the network connectivity results in a separate record or with an existing cable test record.

To save the results in a separate record:

- 1 Run the network connectivity test, then press .
- 2 Select **Save Standalone Result**. Create an ID; then press  again.

To save the results with an existing cable test record:

Note

You can add network connectivity results only to results for cables of the same type.

- 1 Run the network connectivity test, then press .
- 2 Select **Add to Cable Test Result**.
- 3 Highlight the record you want to save the results with; then press  **Add**.

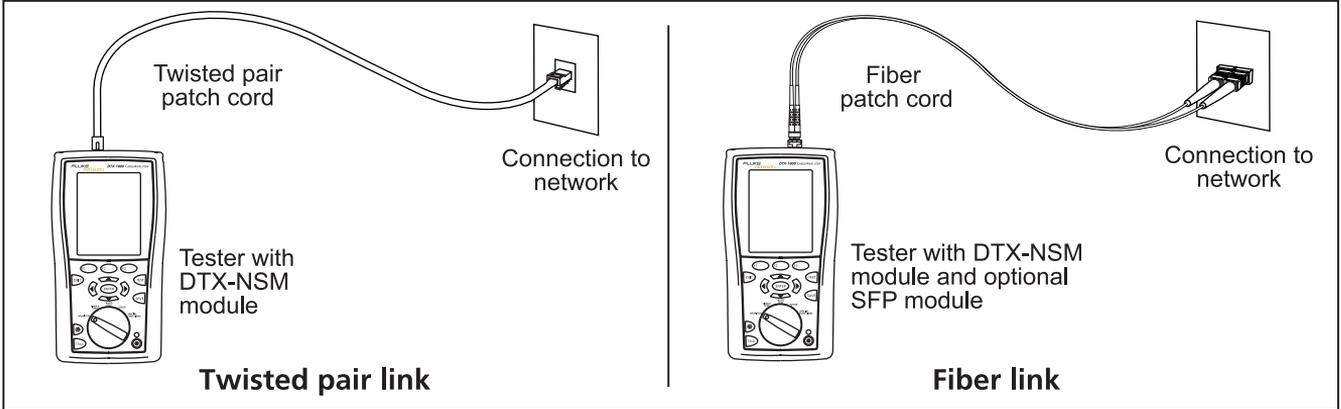
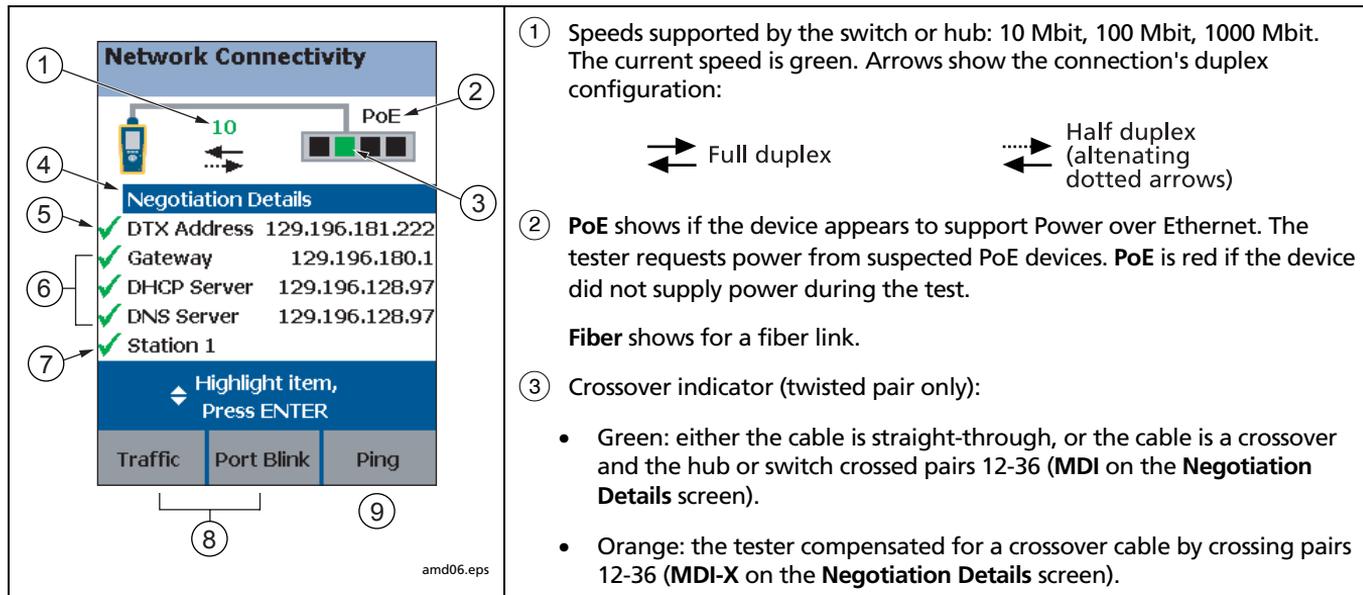


Figure 9-3. Network Test Connections

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-continued-

Figure 9-4. Network Connectivity Results Screen (DHCP example for twisted pair)

<p>④ Select Negotiation Details to see details. See Figure 9-5.</p> <p>On the Negotiation Details screen, Yes for Pin Reversal indicates a reversed pair on the link, (such as wires 1 and 2 crossed). Run a wire map test on the link to check the wiring.</p> <p>⑤ Select DTX Address to see details, including the subnet mask.</p> <p>⑥ Network addresses used during the test:</p> <ul style="list-style-type: none"> • Gateway: Address of the network device that joins networks using different protocols or passes data between networks. • DHCP Server: Dynamic Host Configuration Protocol server address. Shown only in DHCP mode. • DNS Server: Domain Name System server address. In DHCP mode, the addresses above show as 0.0.0.0 if the DHCP server does not provide them. <p>To see ping results for the above devices, highlight a device; then press (ENTER). See Figure 9-6.</p>	<p>The checkmarks and Xs indicate how many replies the tester received to its three pings:</p> <p> : Green: Ping replies received for all requests.</p> <p> : Orange: At least one ping reply received.</p> <p> : No ping replies received, indicating a problem with the connection.</p> <p>⑦ <Target Address name>: appears if you use (F3) Ping to ping a device. See "Pinging Network Devices" on page 9-11.</p> <p>⑧ See "Monitoring Network Traffic" on page 9-12 and "Blinking a Port Light" on page 9-14.</p> <p>⑨ Press (F3) Ping to ping devices. See "Entering Ping Addresses" on page 9-11 and "Pinging Network Devices" on page 9-11.</p>
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Figure 9-4. Network Connectivity Results Screen (DHCP example for twisted pair) (cont.)

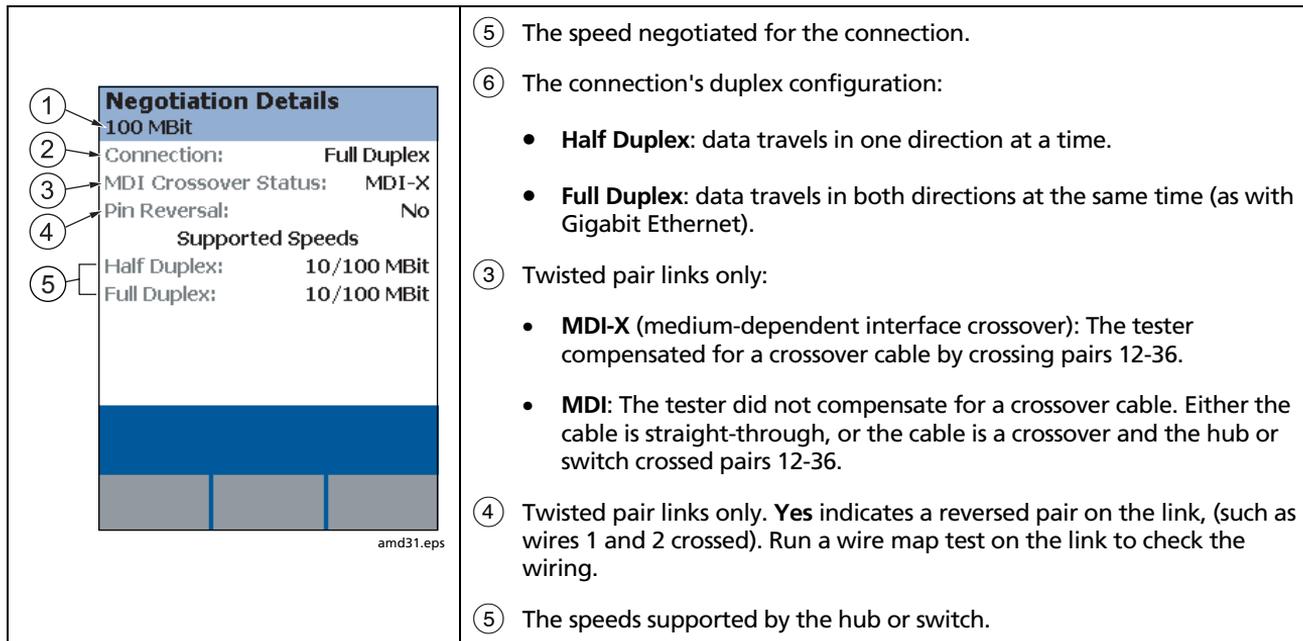


Figure 9-5. Negotiation Details (twisted pair results shown)

Pinging Network Devices

The ping test verifies connectivity to devices on the network.

To ping a network device:

- 1 Enter ping addresses in Setup. See page 9-5.
 - 2 Connect to the network as shown in Figure 9-3.
 - 3 Turn the rotary switch to **MONITOR**, select **Network Connectivity**; then press **TEST**.
 - 4 When the network connectivity test is complete, press **F3 Ping**.
 - 5 Do one of the following:
 - To ping one device, highlight the device; then press **TEST**.
 - To ping all devices in the list, press **F1 Ping All**.
- The overall ping result appears on the **Network Connectivity** screen. A scroll bar appears if you pinged multiple devices
- 6 To see ping details (Figure 9-6), highlight a device; then press **ENTER**.
 - 7 To save the ping results, press **SAVE**. Ping results are saved as part of the connectivity results. You can save the network connectivity results in a separate record or with an existing cable test record. See page 9-6.

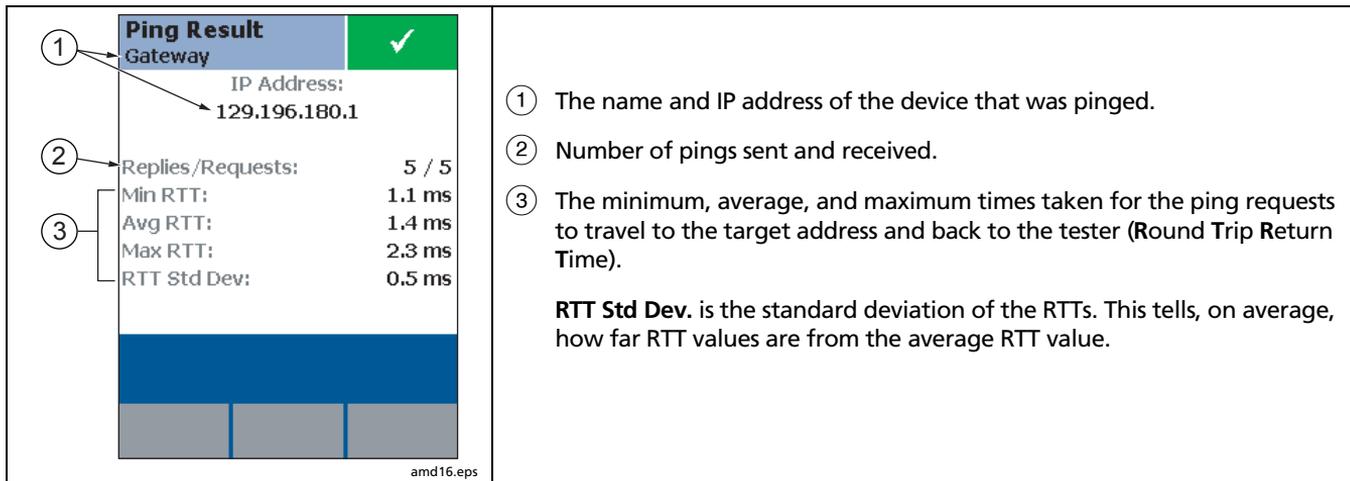


Figure 9-6. Ping Results Screen

Monitoring Network Traffic

The traffic monitor lets you identify active cables and check a network's basic health.

Note

Traffic monitor results cannot be saved.

To monitor network traffic:

- 1 Turn on the tester; then connect to the network as shown in Figure 9-3 on page 9-7.
- 2 Turn the rotary switch to **MONITOR**; then run the **Network Connectivity** test.
- 3 When the test is complete, press **F1** **Traffic**. Figure 9-7 describes the traffic monitor screen.

Traffic Monitor			
Running:	00:00:05		
Type	Last 1s	Avg	Peak
Utilization	1%	1%	1%
Collisions	0%	0%	0%
Errors	0%	0%	0%
Broadcasts	21%	15%	22%

Sound On Stop Reset

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① The time the test has been running.

② Traffic characteristics for the last 1 second, and the average and peak values since the test began:

- **Utilization:** Percentage of the network’s bandwidth used. This indicates the traffic density on the network. Utilization averaging over 40 % may indicate a problem.
- **Collisions:** The percentage of collision frames as compared to the total number of frames detected in the last 1 second. Collisions occur when two devices attempt to transmit at the same time. A collision rate averaging over 5 % may indicate a problem. A full-duplex link should show 0 % collisions.
- **Errors:** Includes short frames, bad FCS (frame check sequence), late collisions, and jabber. An error rate above 0 % indicates a problem.
- **Broadcasts:** Percentage of frames addressed to all devices. Acceptable broadcast rates vary among networks.

③ Toggles a sound that indicates the utilization level.

④ Stops the test.

⑤ Resets all statistics to zero.

Figure 9-7. Traffic Monitor Screen

Blinking a Port Light

The **Port Blink** function helps you quickly locate a link's port at a switch or hub. This function generates a link pulse on pairs 12 and 36 to blink the port's activity LED.

To blink a port light:

- 1 Connect to the network as shown in Figure 9-3 on page 9-7.
- 2 Turn the rotary switch to **MONITOR**, select **Network Connectivity**; then press .
- 3 When the test is complete, press  **Port Blink**. A square on the hub/switch icon on the **Network Connectivity** screen blinks when the port blink function is active.
- 4 Look for a blinking activity LED on the hub or switch.

Identifying Links (twisted pair only)

The **ID Locator** function helps you quickly identify link connections at a patch panel. This function requires one or more optional Fluke Networks LinkRunner™ Cable ID locators.

Note

ID locator results cannot be saved.

To identify a link:

- 1 Connect the tester and ID locator(s) as shown in Figure 9-8.
- 2 Turn the rotary switch to **MONITOR**, select **ID Locator**; then press .
- 3 Connect the tester to different jacks, pressing  to rescan each time, until **Found Cable ID** and the identifier's number appears.

Note

Wiring faults may cause the tester to misidentify the ID locator's number, or prevent the tester from detecting the locator.

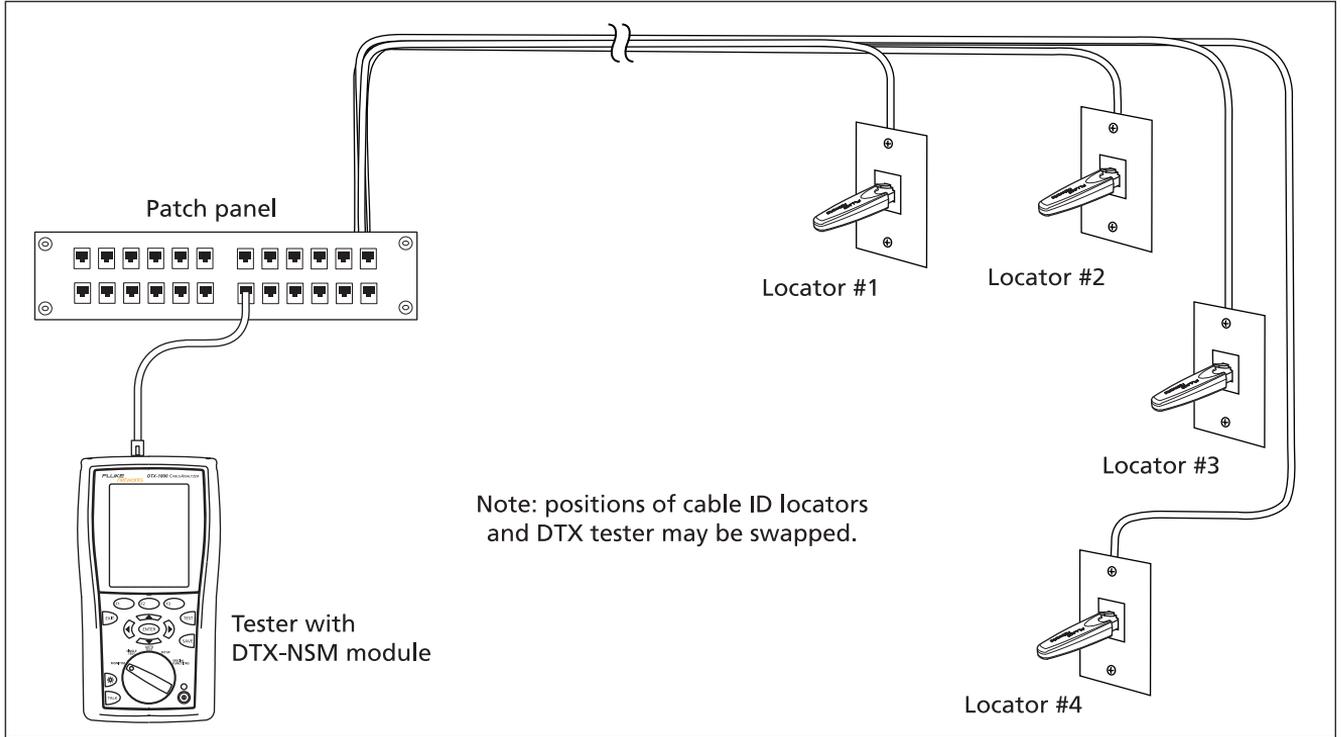


Figure 9-8. Identifying Links with Optional LinkRunner Cable ID Locators

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Diagnosing Low-Level Network Problems

The DTX-NSM module helps you troubleshoot links and diagnose network problems up through layer 3 of the OSI (Open Systems Interconnect) 7-layer model. It can

also indicate problems at higher levels. Higher-level problems are usually addressed by a network technician or administrator using a network tester or analyzer.

Table 9-2 lists common causes of symptoms you can detect with the DTX-NSM module.

Table 9-2. Diagnosing Low-Level Network Problems

No ping response, limited responses, or ping times seem high
<p style="text-align: center;"><i>Note</i></p> <p><i>To evaluate ping times, you should compare current results with results taken when the network was operating normally.</i></p> <ul style="list-style-type: none">• Wiring fault on the link.• Device is turned off.• For static IP address assignment, incorrect address or subnet mask in Setup.• A network fault, condition (such as network congestion), or security setting is preventing the device from answering.• Since ping requests are low-priority traffic, devices may not respond to all requests.

-continued-

Table 9-2. Diagnosing Low-Level Network Problems (cont.)

Wire pairs 12 and 36 are reversed
<ul style="list-style-type: none"> • Mix of 568A and 568B wiring standards. • Crossover cables used where not needed. They are typically used only between two switches or hubs. • Tester is connected to a NIC (network interface card) with a straight-through cable. The reversed result is normal in this situation., since a NIC transmits on pair 12 while a switch or hub transmits on 36.
<p><i>Note</i></p> <p><i>The utilization, collision, and error percentages given below are only guidelines. Acceptable percentages can vary among networks.</i></p>
Utilization averaging above 40 %
Too many stations on the network.
Utilization spikes above 40 %
Broadcast storms.

-continued-

Table 9-2. Diagnosing Low-Level Network Problems (cont.)

Collision rate averaging above 5 %
<ul style="list-style-type: none">• Duplex mismatch on the network.• Too many stations within the collision domain.• Faulty hub, switch, NIC, or other device.• Cabling is too long.
Errors detected (any rate above 0 %)
<ul style="list-style-type: none">• Cabling is too long.• Faulty cabling (such as intermittent wiring faults, cabling of the wrong category, or poor quality cabling)• Faulty or marginal network interface card (NIC).• Faulty or misconfigured hardware or software.• Electrical noise source near cabling. Use the impulse noise test to check for noise. See Chapter 3.• Duplex mismatch on the network.• Bad grounding for network components.
Broadcast rate too high (acceptable rates vary among networks)
Faulty or misconfigured hardware or software.

Chapter 10

Custom Test Settings

You can customize the following test settings:

- Twisted pair cable types
- Fiber optic cable types
- Twisted pair test limits
- Fiber optic test limits
- Outlet configurations for twisted pair cable
- NVP for twisted pair or coaxial cable

Creating a Custom Twisted Pair Cable Type

You can create up to nine custom twisted pair cable types. A custom twisted pair cable type includes the following settings:

- Custom cable name
- Baseline cable type for default values
- Nominal velocity of propagation (NVP)

To create a custom twisted pair cable type:

- 1 Turn the rotary switch to **SETUP**; then select **Twisted Pair**.
- 2 Select **Cable Type**; then select **Custom**.
- 3 Press  **Create**.
- 4 On the **Custom** screen, select **Name**; then use the text editing screen to enter a name for your custom cable type. Press  when you are done.
- 5 On the **Custom** screen, select **Use Default Values From**, select a cable group; then select a cable type as a baseline for your custom cable type.
- 6 To change the NVP for your custom cable, select **NVP** on the **Custom** screen. You may set the NVP to a specified value, or determine the actual NVP of a sample of cable. See "Changing the NVP" on page 10-8.
- 7 From the **Custom** screen, press  when you are done creating the cable type.

The tester saves the custom cable type in the **Custom** list, with asterisks (*) before and after the name.

Creating a Custom Fiber Type

You can create up to nine custom fiber types. A custom fiber type includes the following settings:

- Custom fiber name
- Baseline limit for default settings
- Index of refraction (n)

To create a custom fiber type:

- 1 Turn the rotary switch to **SETUP**; then select **Fiber**.
- 2 Select **Fiber Type**; then select **Custom**.
- 3 Press  **Create**.

- 4 On the **Custom** screen, select **Name**; then use the text editing screen to enter a name for your custom fiber type. Press  when you are done.
- 5 On the **Custom** screen, select **Use Default Values From**, select a fiber group; then select a fiber type as a baseline for your custom fiber type.
- 6 To change the index of refraction (n) for your custom fiber, select n for a wavelength; then use the editing screen to enter a value for n. Press  when you are done.
- 7 From the **Custom** screen, press  when you are done creating the fiber type.

The tester saves the custom fiber type in the **Custom** list, with asterisks (*) before and after the name.

Creating a Custom Twisted Pair Test Limit

You can create up to nine custom twisted pair test limits. A custom twisted pair test limit includes the following settings:

- Custom limit name
- Baseline limit for default settings
- Maximum length
- Resistance test enabled or disabled
- Insertion loss test enabled or disabled
- NEXT test enabled or disabled
- PSNEXT test enabled or disabled
- ELFEXT test enabled or disabled
- PSELFEXT test enabled or disabled
- ACR test enabled or disabled
- PSACR test enabled or disabled
- Return loss test enabled or disabled

To create a custom twisted pair limit:

- 1 Turn the rotary switch to **SETUP**; then select **Twisted Pair**.
- 2 Select **Test Limit**, press  **More**; then select **Custom**.
- 3 Press  **Create**.
- 4 On the **Custom** screen, select **Name**; then use the text editing screen to enter a name for your custom limit. Press  when you are done.
- 5 On the **Custom** screen, select **Use Default Values From**, select a test limit group; then select a limit as a baseline for your custom limit.
- 6 The **Custom** screen shows other settings on multiple tabs for the twisted pair limit. Use  and  and  to select settings to change. Use  and  to move among the tabs.
See Chapter 3 for details on twisted pair test parameters.
- 7 From the **Custom** screen, press  when you are done creating the limit.

The tester saves the custom limit in the **Custom** list, with asterisks (*) before and after the name.

Creating a Custom Fiber Limit

You can create up to nine custom fiber limits. A custom fiber limit includes the following settings:

- Custom limit name
- Baseline limit for default values
- Maximum fiber length
- Maximum loss at the wavelengths required by the baseline limit.

To create a custom fiber limit:

- 1 Turn the rotary switch to **SETUP**; then select **Fiber**.
- 2 Select **Test Limit**, press **F1** **More**; then select **Custom**.
- 3 Press **F1** **Create**.

- 4 On the **Custom** screen, select **Name**; then use the text editing screen to enter a name for your custom fiber limit. Press **SAVE** when you are done.
- 5 On the **Custom** screen, select **Use Default Values From**, select a limit group; then select a fiber limit as a baseline for your custom limit.
- 6 The **Custom** screen shows other settings on multiple tabs for the fiber test limit. Use   and **ENTER** to select settings to change. Use   to move among the tabs.

See Chapter 6 for details on fiber test parameters.

- 7 From the **Custom** screen, press **SAVE** when you are done creating the fiber type.

The tester saves the custom limit in the **Custom** list, with asterisks (*) before and after the name.

Creating a Custom Outlet Configuration

You can create up to nine custom outlet configurations. A custom outlet configuration includes the following settings:

- Custom outlet name
- Baseline outlet configuration for default settings
- Enable/disable setting for each wire pair

To create a custom outlet configuration:

- 1 Turn the rotary switch to **SETUP**; then select **Twisted Pair**.
- 2 Select **Outlet Configuration**; then select **Custom**.
- 3 Press  **Create**.

- 4 On the **Custom** screen, select **Name**; then use the text editing screen to enter a name for your custom configuration. Press  when you are done.

- 5 On the **Custom** screen, select **Use Default Values From**; then select an outlet configuration as a baseline for your custom configuration.

- 6 On the **Custom** screen use   and  to select wire pairs to enable or disable.

If the baseline configuration has additional wire pairs, use   to move among the tabs.

- 7 From the **Custom** screen, press  when you are done creating the outlet configuration.

The tester saves the custom configuration in the **Custom** list, with asterisks (*) before and after the name.

Editing Custom Settings

The editing function lets you change values in existing custom settings.

To edit an existing custom cable, fiber type, test limit, or outlet configuration:

- 1 Turn the rotary switch to **SETUP**; then select **Twisted Pair** or **Fiber**.
- 2 On the **Twisted Pair** or **Fiber** menu, select the item that includes the custom settings you want to edit (**Cable Type** , **Fiber Type**, **Test Limit**, **Outlet Configuration**).
- 3 If you selected **Test Limit**, press  **More**.
- 4 Select **Custom**.
- 5 Use   to highlight a custom setting; then press  **Edit**.
- 6 Make your changes on the **Custom** screen; then press .

Deleting Custom Settings

To delete a custom cable, fiber type, test limit, or outlet configuration:

- 1 Turn the rotary switch to **SETUP**; then select **Twisted Pair** or **Fiber**.
- 2 On the **Twisted Pair** or **Fiber** menu, select the item that includes the custom settings you want to delete (**Cable Type** , **Fiber Type**, **Test Limit**, or **Outlet Configuration**).
- 3 If you selected **Test Limit**, press  **More**.
- 4 Select **Custom**.
- 5 Use   to highlight a custom setting.
- 6 Press  **Delete**; then press  **Yes**.

Changing the NVP

The tester uses an NVP value (nominal velocity of propagation) and the signal delay through cable to calculate the length of twisted pair and coaxial cabling.

The default value defined by the selected cable type represents the typical NVP for that cable type. These values are usually accurate enough for certifying cable; however, you can increase the accuracy of length measurements by adjusting the NVP to a specified or actual value.

Note

NVP values can vary among cable types, lots, and manufacturers. In most cases, these differences are minor and may be disregarded.

Setting the NVP to a Specified Value

This procedure lets you set the NVP to a specified value, such as the value specified by the manufacturer. The NVP value applies to the selected cable type.

To enter a specified NVP value:

- 1 If you are in the middle of creating a custom cable type, go to step 4.
- 2 Turn the rotary switch to **SETUP**.
- 3 Select **Twisted Pair** or **Coax**.
- 4 Do one of the following:
 - To change the NVP for the selected cable type, select **NVP** on the **Twisted Pair** or **Coax** menu.
 - To change the NVP for a custom twisted pair cable type, create a custom cable type or select one for editing; then select **NVP** on the **Custom** screen. See page 10-1 for details on creating custom cable types.
- 5 Use   to change the NVP value; then press .

Determining a Cable's Actual NVP

You can determine a cable's actual NVP by adjusting the measured length to match a known length of cable. The NVP value applies to the selected cable type.

To determine a cable's NVP:

- 1 If you are in the middle of creating a custom cable type, and a twisted pair or coaxial adapter is already attached to the tester, go to step 5.
- 2 Attach a twisted pair or coaxial adapter to the tester.
- 3 Turn the rotary switch to **SETUP**.
- 4 Select **Twisted Pair** or **Coax**.
- 5 Do one of the following:
 - To change the NVP for the selected cable type, select **NVP** on the **Twisted Pair** or **Coax** menu.
 - To change the NVP for a custom twisted pair cable type, create a custom cable type or select one for editing; then select **NVP** on the **Custom** screen. See page 10-1 for details on creating custom cable types.
- 6 Connect a known length of twisted pair or coaxial cable to the tester. The cable should be at least 30 m (100 ft) long.
- 7 Press .
- 8 Use   to change the NVP until the measured length matches the known length of the cable; then press .

Resetting the NVP to the Default Value

You can reset the NVP to the default value defined by the selected cable type by re-selecting the cable type in **SETUP**.

To reset the NVP to the default value:

- 1 Turn the rotary switch to **SETUP**; then select **Twisted Pair** or **Coax**.
- 2 On the **Twisted Pair** or **Coax** menu, select **Cable Type**.
- 3 If you selected **Twisted Pair**, select the cable group that contains the desired cable type.
- 4 Select a cable type on the **Cable Type** menu. The NVP value on the **Twisted Pair** or **Coax** screen returns to the value defined by the cable type.

Transferring Custom Settings Between Testers

To transfer custom limits, cable types, outlet configurations, and fiber types between testers, use the **Modify DTX Test Limits** utility in LinkWare software. This utility lets you upload custom settings from a tester to a PC, then download the settings to other testers. See the LinkWare online help for details.

Chapter 11

Memory Functions

Storage Locations and Capacities

All DTX Series testers can store up to 250 Cat 6 Autotest results, including graphical data, in internal memory.

The maximum capacity of internal memory depends on the space taken by the tester's software.

The DTX-1800 and DTX-1200 can store up to 500 Cat 6 Autotest results, including graphical data, on a 16 MB removable memory card.

The DTX-1800 and DTX-1200 testers can use MultiMediaCard (MMC) or Secure Digital memory cards (SD).

Checking the Memory Status

To check the memory status, the rotary switch to **SPECIAL FUNCTIONS**, use  to highlight **Memory Status**; then press .

Or, press  **Memory** from the main Autotest screen.

Figure 11-1 describes the memory status screen.

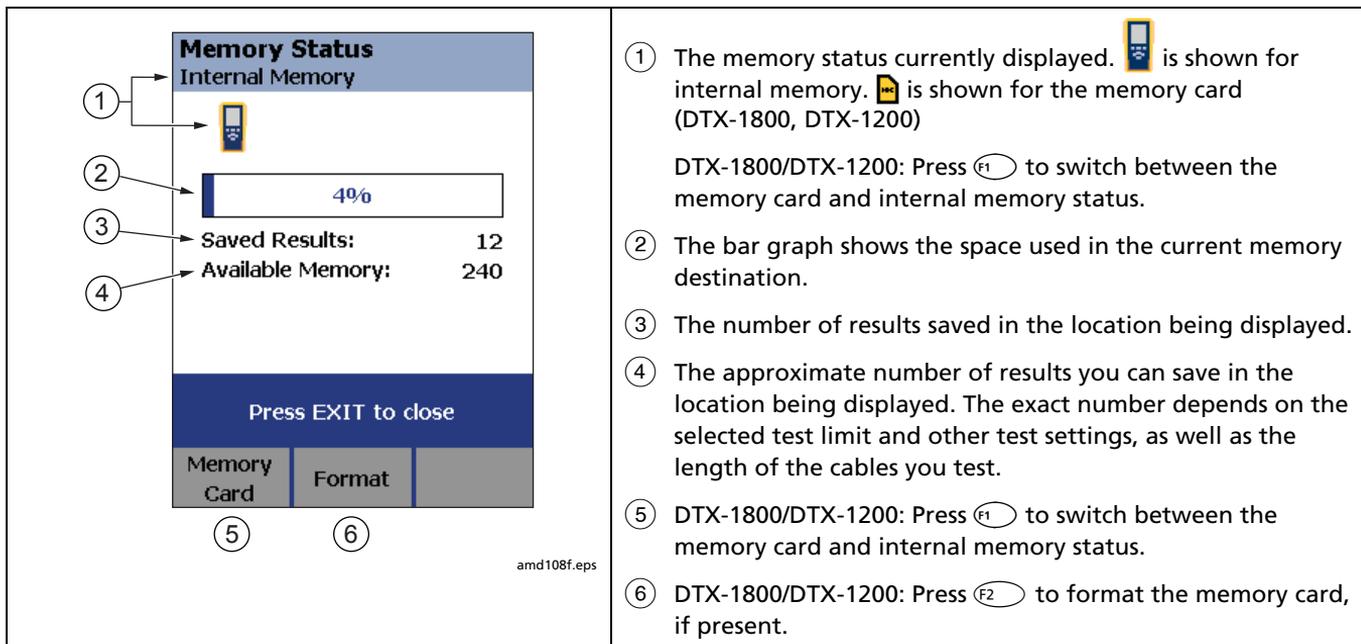


Figure 11-1. Memory Status Screen Features

Setting the Storage Location (DTX-1800, DTX-1200)

To set the destination for saved results on a DTX-1800 or DTX-1200 tester:

- 1 Turn the rotary switch to **SETUP**.
- 2 Use  to highlight **Instrument Settings**; then press .
- 3 Use  to highlight **Result Storage Location**; then press .
- 4 Use  to highlight **Internal Memory** or **Memory Card (if present)**; then press .

Note

*If you change the **Result Storage Location**, and the selected **Current Folder** does not exist in the new location, the tester creates a new folder with the current folder's name in the new location.*

Working with Folders

You can create folders for each job to organize your test results. The tester saves test results in the folder you select.

Creating a New Folder

To create a new folder:

- 1 Turn the rotary switch to **SETUP**.
- 2 Use  to highlight **Instrument Settings**; then press .
- 3 DTX-1800, DTX1200: Verify that the **Result Storage Location** shows the location where you want the new folder. Change the location if necessary.
- 4 On the **Instrument Settings** screen, use  to highlight **Current Folder**; then press .
- 5 Press  **Create Folder**.
- 6 Use the softkeys, , , , , and  to enter a folder name. Press  when you are finished.

Changing Folders

To change the current folder:

- 1 Turn the rotary switch to **SETUP**.
- 2 Use  to highlight **Instrument Settings**; then press .
- 3 DTX-1800, DTX1200: Verify that the **Result Storage Location** shows the correct location. Change the location if necessary.
- 4 On the **Instrument Settings** screen, use  to highlight **Current Folder**; then press .
- 5 Use   to highlight a folder name; then press .

Note

*Changing folders from the **View Results** screen in **SPECIAL FUNCTIONS** does not change the current folder in **SETUP**.*

Deleting Folders

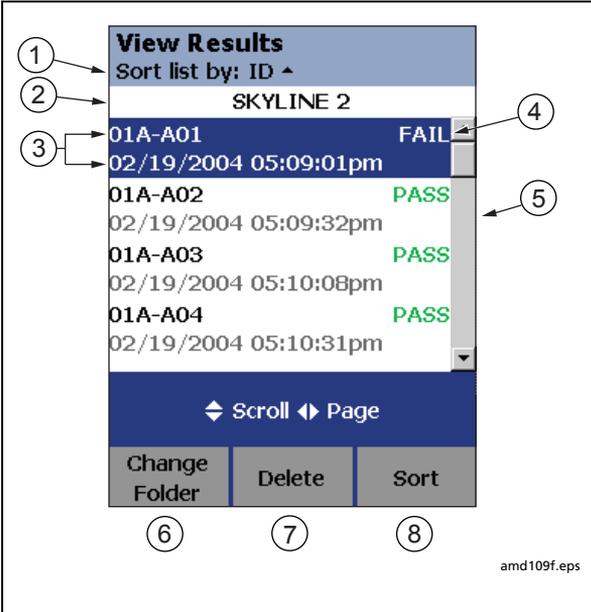
To delete a folder and all the results it contains:

- 1 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 2 Use  to highlight **View/Delete Results**; then press .
- 3 If necessary, press  **Change Folder** to find the folder you want to delete.
- 4 Press  **Delete**.
- 5 Use  to highlight **Current Folder**; then press  **Delete**.

Viewing and Managing Saved Results

To view and manage saved results, turn the rotary switch to **SPECIAL FUNCTIONS**, use  to highlight **View/Delete Results**; then press .

Figure 11-2 describes the **View Results** screen.



The screenshot shows the 'View Results' screen. At the top, it says 'Sort list by: ID ▲'. Below that is the folder name 'SKYLINE 2'. A list of results follows, with the first row highlighted in blue. The results are:

Cable ID	Date/Time	Result
01A-A01	02/19/2004 05:09:01pm	FAIL
01A-A02	02/19/2004 05:09:32pm	PASS
01A-A03	02/19/2004 05:10:08pm	PASS
01A-A04	02/19/2004 05:10:31pm	PASS

At the bottom of the screen are three buttons: 'Change Folder', 'Delete', and 'Sort'. A scroll bar is visible on the right side of the list.

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- Sorting order of the list of results. For example, **ID ▲** means the list is sorted by cable IDs in ascending order. Press .
- Name of the current folder. Press  **Change Folder** to select a different folder.
- The result's cable ID and the date and time the test was completed.
- The overall result for the test. See Chapter 3 for details on **PASS*** and **FAIL*** results.
- Scroll bar, which appears when there is more than one screen of results to view. Press   to scroll up and down. Press   to scroll up or down a screen at a time.
- Press  **Change Folder** to select a different folder.
- Press  **Delete** to delete results or folders.
- Press  **Sort** to sort the list of results.

Figure 11-2. View Results Screen

Moving or Copying Results to a Memory Card (DTX-1800, DTX-1200)

To move or copy all results from internal memory to the memory card:

- 1 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 2 Select **Move/Copy Internal Results**; then select an option:
 - **Move to Memory Card:** Moves all results and their folders to the memory card and deletes all results from internal memory.
 - **Copy to Memory Card:** Copies all results and their folders to the memory card.
 - **Delete from Internal Memory:** Deletes all results from internal memory.

The tester displays a message if it cannot move or copy a result. This occurs in the following cases:

- A result with the same ID and timestamp already exists on the memory card.
- The memory card is full.
- The memory card is not formatted or is damaged.

Deleting Results

To delete results:

- 1 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 2 Use  to highlight **View/Delete Results**; then press .
- 3 If necessary, press  **Change Folder** to find the result(s) you want to delete.
- 4 Press  **Delete**; then use  to highlight an option:
 - **Current Result:** Deletes the result highlighted on the previous screen.
 - **All Results in Folder:** Deletes all results in the current folder.
 - **All Results in Tester:** Deletes all results in internal memory.
 - **Current Folder:** Deletes the current folder and all its contents.
- 5 Press  **Delete**.

Sorting Results

You can sort the list of saved results in ascending or descending order by the following parameters:

- PASS/FAIL result
- Cable ID
- Date and time the test was completed

To sort results:

- 1 On the **View Results** screen, press **F3** **Sort**.
- 2 Use  to highlight the field you want to sort by.
- 3 Press **F1** **Ascending** or **F3** **Descending**.

The sorting order applies only to the current folder. The current sorting order is indicated at the top of the **View Results** screen, as shown in Figure 11-2 on page 11-5

The default order is descending by date. The sorting order reverts to the default when you turn off the tester.

Formatting a Memory Card (DTX-1800, DTX-1200) or Internal Memory

Formatting erases all contents of the memory card or internal memory.

To format a memory card or internal memory:

- 1 For a memory card, insert the card into the slot on the left side of the tester.
- 2 Turn the rotary switch to Autotest
- 3 Press **F3** **Memory**.
- 4 For a DTX-1800 or DTX-1200 with a memory card installed, press **F1** to select the memory card or internal memory.
- 5 Press **F2** **Format**; then press **F3** **Yes**.

You can also format a memory card or internal memory in **SPECIAL FUNCTIONS** mode:

- 1 Turn the rotary switch to **SPECIAL FUNCTIONS**.
- 2 Use  to highlight **Memory Status**; then press .
- 3 For a DTX-1800 or DTX-1200 with a memory card installed, press  to select the memory card or internal memory.
- 4 Press  **Format**; then press  **Yes**.

Memory Card Care (DTX-1800, DTX-1200)

- 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.

Uploading Results to a PC

To upload results to a PC:

- 1 Install the latest version of LinkWare software on your PC.
- 2 Turn on the tester.
- 3 Connect the tester to the PC with the USB cable included or the DTX serial cable available from Fluke Networks.

or

Insert the memory card containing results into the PC's memory card reader.

- 4 Start LinkWare software on the PC.
- 5 Click **Import**  on the LinkWare toolbar. Select the tester's model from the list.

or

Select **Memory card or folder on PC**.

- 6 Select the records you want to import; then click **OK**.

See the LinkWare online help for details on creating reports with LinkWare.

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 tester'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 tester's calibration and compromise its accuracy. If the calibration is void, cable manufacturers might not extend their warranty to the cabling you install.

Reference Procedure for Link Interface Adapters

The reference procedure sets a baseline for various measurements. You should perform the reference procedure every 30 days or whenever you start using the tester with a different remote.

See "Setting the Reference" in Chapters 3 and 4 for details.

Factory Calibration

The tester requires calibration at a service center 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 service calibration, turn the rotary switch to **SPECIAL FUNCTIONS**; then select **Version Information**. The tester's calibration date is also shown on reports uploaded to a PC.

Updating the Tester's Software

Keeping your tester's software current gives you access to new features and the latest test limits.

To get a software update, download the update from the Fluke Networks website or contact Fluke Networks to get the update by other means.

To see the software version installed in your main and remote testers, turn the rotary switch to **SPECIAL FUNCTIONS**; then select **Version Information**.

You can update your tester with a PC or with another tester that is already updated, as described in the following sections.

Caution

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

Note

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

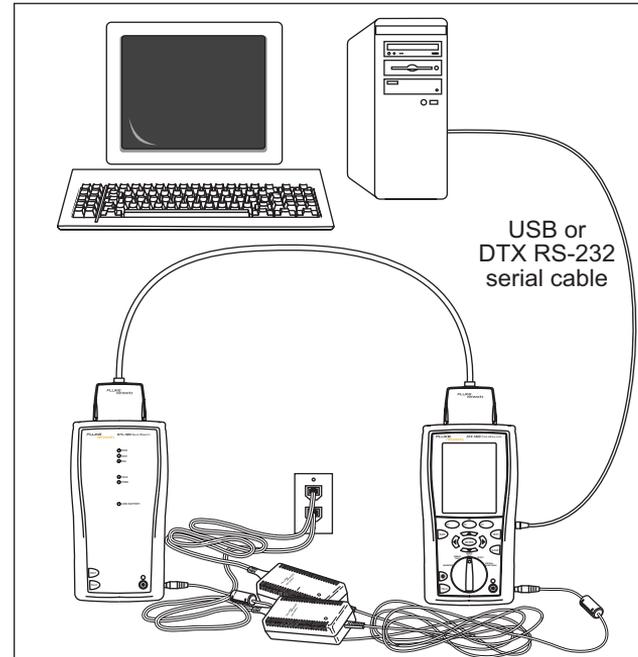
Updating with a PC

- 1 Install the latest version of LinkWare software on your PC.
- 2 Download the DTX CableAnalyzer update file 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 Make the connections shown in Figure 9-3 using the USB or DTX serial cable. (The USB connection, if available, is faster.) Turn on the tester and the smart remote.

Note

The DTX serial cable connects a PC's DB-9 RS-232 serial port to the miniature RS-232 serial port on the DTX-1800 and DTX-1200 testers. This cable is included with the DTX-1800 and is available from Fluke Networks. Table 12-4 shows the pin connections for this cable.

- 4 Select **Utilities > DTX Utilities > Software Update** from the LinkWare menu, locate and select the .dtx (DTX update) file; then click **Open**.
- 5 The tester reboots, then prompts you about updating the smart remote's software. Press **F2** **OK** to update the smart remote's software.
- 6 To verify the update, turn the rotary switch to **SPECIAL FUNCTIONS**; then select **Version Information**.



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Figure 12-1. Updating the Software with a PC

Updating with Another Tester

You can update a tester's software using another tester that is already updated.

- 1 Use link interface adapters to connect an updated tester or smart remote to a tester or smart remote that needs updating (Figure 9-4).

Note

One of the units must be a main tester.

- 2 Turn on both units; then press **TEST** on either.

The testers compare software versions. If one has more recent software, the main tester prompts you about updating the older software.

- 3 Press **F2** **OK** to start the update process.
- 4 To verify the update, turn the rotary switch to **SPECIAL FUNCTIONS**; then select **Version Information**.

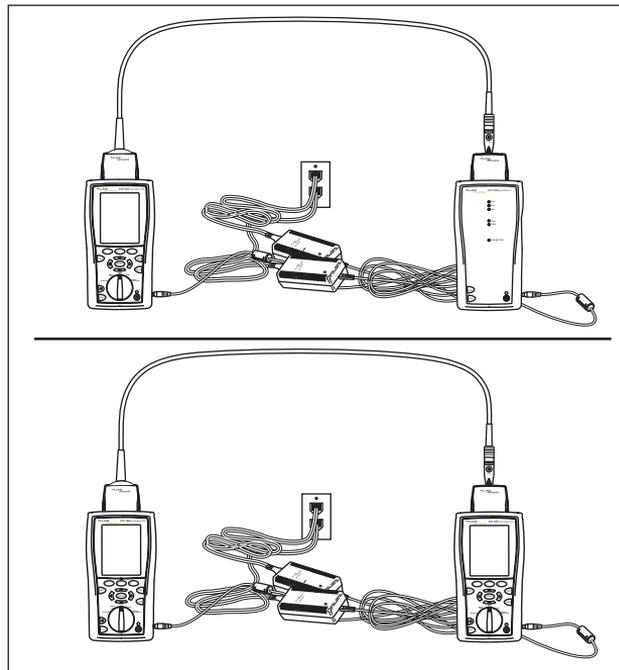


Figure 12-2. Updating the Software with an Updated Tester

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Updating with a Memory Card (DTX-1800, DTX-1200)

You can update the tester's software using a memory card that contains the software update file.

- 1 Download the DTX CableAnalyzer update file 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.
- 2 Copy the software update file to a memory card.
- 3 Connect the tester and smart remote together using a permanent link and a channel adapter or two channel adapters and a patch cord. Turn on the tester and the smart remote.
- 4 Put the memory card in the tester.
- 5 Turn the rotary switch to **SPECIAL FUNCTIONS**; then select **Update Software**.
- 6 Press **F3** **Yes** to start the update procedure.
- 7 When the tester is updated, it reboots, then prompts you about updating the smart remote's software. Press **F2** **OK** to update the smart remote's software.
- 8 To verify the update, turn the rotary switch to **SPECIAL FUNCTIONS**; then select **Version Information**.

Updating the Limits or Cable Types Database

Fluke Networks may release a test limits or cable types database that is not part of a software update. To install a new database in your tester, use the **Modify DTX Test Limits** utility in LinkWare software. See the LinkWare online help for details.

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.



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

Retraining the Battery Gauge

The accuracy of the battery gauge may drift over time if the battery is frequently recharged before being fully discharged. Retraining the battery gauge restores its accuracy.

Retraining can take 17 to 30 hours. The time is shorter if you start with the batteries discharged and modules (such as the fiber module) installed in the main and remote testers.

To retrain the battery gauge:

- 1 Connect the main and remote testers together using a permanent link adapter and a channel adapter, two channel adapters or two coaxial adapters and a patch cord, or two fiber modules and a reference test cord.
- 2 Connect the ac adapters to the main and remote testers. Turn on both testers.
- 3 Turn the rotary switch to **SPECIAL FUNCTIONS**; then select **Battery Status**. Verify that both the main and remote battery gauges are shown. If the remote gauge is missing, check the connections between the two units.
- 4 Press  **Train Battery**.

To abort the retraining, hold down the power key  on the main and remote testers until they turn off.
- 5 Retraining is complete when the testers have turned off and the LED by the ac adapter connection is green.

Replacing the Battery

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



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

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

Fiber Module Maintenance

The following sections apply to the optional DTX-MFM2, DTX-GFM2, and DTX-SFM2 fiber modules.

Optical Connector and Adapter Care

Periodically clean and inspect the module's optical connectors as described in Chapter 6.

Replacing Fiber Reference Test Cords

Choose replacement reference test cords that meet the following requirements:

- Core and cladding size: match the fiber to be tested
- Connector polish: PC or UPC
- Reference test cord length: minimum 2 m; maximum 5 m

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

Storage

- Before storing the tester or an extra battery for an extended period, charge the battery to between 70 % and 90 % of full charge. 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 internal lithium battery that maintains the clock.
- See “Environmental and Regulatory Specifications” on page 12-15 for storage temperatures.

If Something Seems Wrong

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

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. To see this information, turn the rotary switch to **SPECIAL FUNCTIONS**; then select **Version Information**.

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

Table 12-1. Troubleshooting the Tester

The keypad does not respond.
Press and hold  until the tester turns off. Then turn the tester on again. If the problem persists, update the tester's software if a newer version is available.
System error occurs.
Press  OK . 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.
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.
The battery LED is flashing red.
The battery did not reach full charge within 6 hours. Verify that the battery was charged within the temperature range of 32 °F to 113 °F (0 °C to 45 °C). Disconnect then reconnect ac power and try charging the battery again. If the battery does not charge the second time, retrain the battery gauge. See page 12-6.
The tester will not turn on even when 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.)

All the LEDs on the smart remote are flashing
The smart remote detects excessive voltage on the cable. Unplug the cable immediately.
Test results appear to be incorrect.
The tester may not be configured correctly. For example, the wrong test standard or cable type may be selected or the NVP may be incorrect. The tester may need referencing. See Chapter 3 or 4 for details.
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.
A fiber test produces a negative loss reading.
There is a problem with the reference. Set the reference and test the cabling again. See Chapters 6 and 8 for details.

Options and Accessories

To order options and accessories (Table 12-2), contact Fluke Networks as described in Chapter 1.

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

Table 12-2. Options and Accessories

Option or Accessory	Fluke Networks Model Number
Cat 6/Class E Channel Adapter	DTX-CHA001
Cat 6/Class E Channel Adapters, set of 2	DTX-CHA001S
Universal Permanent Link Adapter	DTX-PLA001
Universal Permanent Link Adapters, set of 2	DTX-PLA001S
Cat 6 Centered Personality Module	DSP-PM06
Personality modules for IDC and legacy cabling systems Many models are available. Contact Fluke Networks or visit the Fluke Networks website for details.	DSP-PMxx

-continued-

Table 12-2. Options and Accessories (cont.)

Option or Accessory	Fluke Networks Model Number
Siemon Tera Channel Adapter	DTX-CHA011
Siemon Tera Permanent Link Adapter	DTX-PLA011
Siemon Tera adapter kit	DTX-TERA
Nexans GG45 Channel Adapter	DTX-CHA012
Nexans GG45 Permanent Link Adapter	DTX-PLA012
Nexans GG45 adapter kit	DTX-GG45
Patch Cord Adapter Kit	DTX-PCU6S
DTX-COAX Coaxial Adapter Kit	DTX-COAX
DTX-NSM Network Service Module	DTX-NSM
DTX-MFM2 Multimode Fiber Module, 850 nm/1300 nm	DTX-MFM2
DTX-GFM2 Gigabit Fiber Module, 850 nm/1310 nm	DTX-GFM2
DTX-SFM2 Singlemode Fiber Module, 1310 nm/1550 nm	DTX-SFM2

-continued-

Table 12-2. Options and Accessories (cont.)

Option or Accessory	Fluke Networks Model Number
DTX-FTK Fiber Test Kit Fiber optic meter module and 850 nm/1300 nm SimpliFiber™ source. Measures power and loss at 850 nm/1300 nm (1310 nm/1550 nm with optional source).	DTX-FTK
DTX-FOM Fiber Optic Meter Module Measures power and loss at 850 nm/1300 nm and 1310 nm/1550 nm.	DTX-FOM
Permanent Link Calibration Kit	DSP-PLCAL
LinkRunner Cable ID Locator Kit (ID locators 1 through 8)	CABLE ID KIT
Lithium Ion Battery Pack	DTX-LION
DTX RS-232 Serial Cable (DB-9 to IEEE 1394)	DTX-SER
USB Interface Cable	DTX-USB
Carrying Strap	DTX-STRP
Carrying case	DTX-CASE
AC Charger, North America, 120VAC	DTX-ACNA
AC Charger, universal, 120-240VAC	DTX-ACUN
Headset for DSP and DTX CableAnalyzers	DTX-TSET

-continued-

Table 12-2. Options and Accessories (cont.)

Option or Accessory	Fluke Networks Model Number
32 MB SD Memory Card	DTX-SDC32
64 MB SD Memory Card	DTX-SDC64
128 MB SD Memory Card	DTX-SDC128
Memory Card Reader, USB	DSP-MCR-U
Memory Card Carry Case	MMC CASE
IntelliTone IT100 Probe	MT-8200-53A
LinkWare Cable Test Management Software (You may download this at no charge from the Fluke Networks website.)	LinkWare
LinkWare Stats Statistical Report Option	LinkWare-Stats
DTX-1800 main unit replacement with battery pack	DTX-1800/MU
DTX-1800 smart remote replacement with battery pack	DTX-1800/RU
DTX-1200 Main Replacement with Battery Pack	DTX-1200/MU
DTX-1200 Smart Remote Replacement with Battery Pack	DTX-1200/RU
DTX-LT Main Replacement with Battery Pack	DTX-LT/MU
DTX-LT Smart Remote Replacement with Battery Pack	DTX-LT/RU

Specifications

Environmental and Regulatory Specifications

Operating temperature	32 °F to 113 °F (0 °C to 45 °C)*
Storage temperature	-4 °F to +140 °F (-20 °C to +60 °C)
Operating relative humidity (% RH without condensation)	32 °F to 95 °F (0 °C to 35 °C): 0 % to 90 % 95 °F to 113 °F (35 °C to 45 °C): 0 % to 70 %
Vibration	Random, 2 g, 5 Hz-500 Hz
Shock	1 m drop test with and without module and adapter attached
Safety	CSA C22.2 No. 1010.1: 1992 EN 61010-1 1 st Edition + Amendments 1, 2
Pollution degree	2
Altitude	Operating: 4000 m; Storage: 12000 m
EMC	EN 61326-1
Laser safety (for fiber test module)	Class I CDRH. Complies to EN 60825-2
* DTX-MFM2/GFM2/SFM2 Fiber Modules: 32 °F to 104 °F (0 °C to 40 °C)	

Warning

Under no circumstances is this product intended for direct connection to telephony inputs, systems, or equipment, including ISDN inputs. Doing so is a misapplication of this product, which could result in damage to the tester and create a potential shock hazard to the user.

Service Calibration Period

One year.

Standard Link Interface Adapters

- Cat 6/Class E permanent link adapters

Plug type and life: shielded 8-pin modular (RJ45);
>5000 insertions

Tests supported: shielded and unshielded cable, TIA Cat 3, 4, 5, 5e, and 6 and ISO/IEC Class C and D, and E permanent link

- Cat 6/Class E channel adapters

Plug type and life: shielded 8-pin modular (RJ45);
>5000 insertions

Tests supported: shielded and unshielded cable, TIA Cat 3, 4, 5, 5e, and 6 and ISO/IEC Class C and D channels

Cable Types Tested

Shielded and unshielded twisted pair (STP, FTP, SSTP, and UTP) LAN cabling:

- TIA Category 3, 4, 5, 5e, and 6: 100 Ω
- ISO/IEC Class C and D: 100 Ω and 120 Ω

Note

For availability of additional adapters that allow testing to other performance standards, different cabling types, or fiber optic cabling, contact Fluke Networks.

Time for Autotest

Full 2-way Autotest of Category 6 UTP cable in 12 seconds or less.

Summary of Performance Specifications

Note

All specifications for tests on twisted pair cabling apply to 100 Ω cable. Contact Fluke Networks for information on measurement performance for cable with a different impedance.

For Category 6/Class E test modes or below, the DTX CableAnalyzer is compliant with Level III requirements of TIA/EIA-568-B.2-1 and IEC 61935-1.

For Class F test modes, the DTX-1800 is compliant with Level IV requirements as in the draft 2nd edition of IEC 61935-1.

Length

Note

Length specifications do not include the uncertainty of the cable's NVP value.

Parameter	Twisted Pair Cabling	
	Without Remote	With Remote
Range	800 m (2600 ft)	150 m (490 ft)
Resolution	0.1 m or 1 ft	0.1 m or 1 ft
Accuracy	$\pm (0.3 \text{ m} + 2 \%)$; 0 m to 150 m $\pm (0.3 \text{ m} + 4 \%)$; 150 m to 800 m	$\pm (0.3 \text{ m} + 2 \%)$

Propagation Delay

Parameter	Twisted pair cabling	
	Without Remote	With Remote
Range	4000 ns	750 ns
Resolution	1 ns	1 ns
Accuracy	$\pm (2 \text{ ns} + 2 \%)$; 0 ns to 750 ns $\pm (2 \text{ ns} + 4 \%)$; 750 ns to 4000 ns	$\pm (2 \text{ ns} + 2 \%)$

Delay Skew

Parameter	Twisted Pair Cabling
Range	0 ns to 100 ns
Resolution	1 ns
Accuracy	$\pm 10 \text{ ns}$

DC Loop Resistance Test

Parameter	Twisted pair cabling
Range	0 Ω to 530 Ω
Resolution	0.1 Ω
Accuracy	$\pm (1 \text{ } \Omega + 1 \%)$
Overload Recovery Time	Less than 10 minutes to rated accuracy following an overvoltage. Referencing is required after repeated or prolonged overvoltage.

Table 12-3. Level IV Accuracy Performance Parameters per IEC Guidelines*

Parameter	Baseline Field Tester	Field Tester with Level IV Permanent Link Adapter	Field Tester with Level IV Channel Adapter
Dynamic range	3 dB over test limit PPNEXT and FEXT 65 dB PSNEXT and FEXT 62 dB		
Amplitude resolution	0.1 dB		
Frequency range and resolution	1 MHz to 31.25 MHz: 125 kHz 31.25 MHz to 100 MHz: 250 kHz 100 MHz to 250 MHz: 500 kHz 250 MHz to 600 MHz: 1 MHz		
Dynamic Accuracy NEXT	± 0.75 dB		
Dynamic Accuracy ELFEXT	± 1.0 dB (FEXT dynamic accuracy is tested to ± 0.75 dB)		
* DTX-1800 up to 900 MHz. DTX-1200 and DTX-LT up to 350 MHz.			

-continued-

Table 12-3. Level IV Accuracy Performance Parameters per IEC Guidelines (cont.)*

Parameter	Baseline Field Tester	Field Tester with Level IV Permanent Link Adapter	Field Tester with Level IV Channel Adapter
Source/load return loss	1 MHz to 300 MHz: $20 - 12.5 \log(f/100)$, 20 dB maximum 300 MHz to 600 MHz: 14 dB	1- 300 MHz: $18 - 12.5 \log(f/100)$, 20 dB maximum 300 MHz to 600 MHz: 12 dB	
Random Noise Floor	100 - $15 \log(f/100)$, 90 dB maximum	95 - $15 \log(f/100)$, 85 dB maximum	
Residual NEXT	90 - $20 \log(f/100)$ (measured to 85 dB maximum)	85 - $20 \log(f/100)$ (measured to 85 dB maximum)	72.4 - $15 \log(f/100)$ (measured to 85 dB maximum)
Residual FEXT	80 - $20 \log(f/100)$ (measured to 85 dB maximum)	75 - $20 \log(f/100)$ (measured to 85 dB maximum)	60 - $15 \log(f/100)$ (measured to 85 dB maximum)
Output Signal Balance	40 - $20 \log(f/100)$ (measured to 60 dB maximum)	37 - $20 \log(f/100)$ (measured to 60 dB maximum)	
* DTX-1800 up to 900 MHz. DTX-1200 and DTX-LT up to 350 MHz.			

-continued-

Table 12-3. Level IV Accuracy Performance Parameters per IEC Guidelines (cont.)*

Parameter	Baseline Field Tester	Field Tester with Level IV Permanent Link Adapter	Field Tester with Level IV Channel Adapter
Common Mode Rejection	40 - 20 log(f/100) (measured to 60 dB maximum)	37 - 20 log(f/100) (measured to 60 dB maximum)	
Tracking	± 0.5 dB (applicable when IL > 3 dB)		
Directivity	(applicable when IL > 3 dB) 1 MHz to 300 MHz: 27 - 7log(f/100), 30 dB maximum 300 MHz to 600 MHz: 23.7 dB	1 MHz to 300 MHz: 25 - 7log(f/100), 25 dB maximum 300 MHz to 600 MHz: 21.7 dB (applicable when IL > 3 dB)	
Source Match	20 dB (applicable when IL > 3dB)		
Return loss of Termination	(applicable when IL > 3 dB) 1 MHz to 250 MHz: 20 - 15log(f/100), 25 dB maximum 250 MHz to 600 MHz: 14 dB	1 MHz to 250 MHz: 18 - 15log(f/100), 25 dB maximum 250 MHz to 600 MHz: 12 dB (applicable when IL > 3dB)	
* DTX-1800 up to 900 MHz. DTX-1200 and DTX-LT up to 350 MHz.			

Measurement Accuracy

The measurement accuracy of the DTX Series CableAnalyzer testers meets or exceeds accuracy Level IV. The DTX-1800 measures up to 900 MHz and is fully compliant with accuracy Level IV. The DTX-1200 and DTX-LT measure up to 350 MHz with accuracy Level IV performance.

Worst case accuracy performance parameters are used for asterisk (*) results reporting. These are based on computation of the overall measurement accuracy based

on the worst case of each parameter at each frequency data point. Observed differences between laboratory equipment and DTX CableAnalyzers using calibration verification artifacts were used as a confirmation.

Accuracies computed from the parameters in Table 12-3 are shown in Figures 12-3 through 9-6.

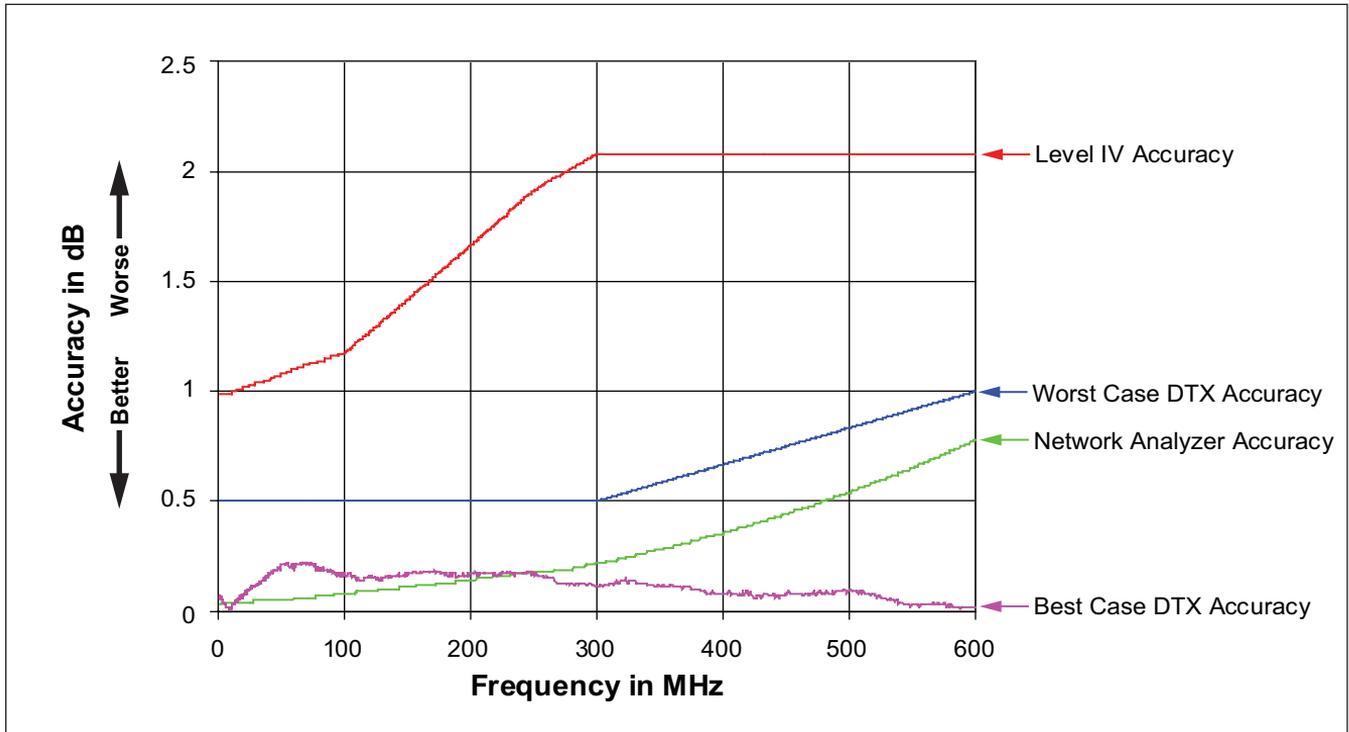


Figure 12-3. Baseline Insertion Loss Measurement Accuracy

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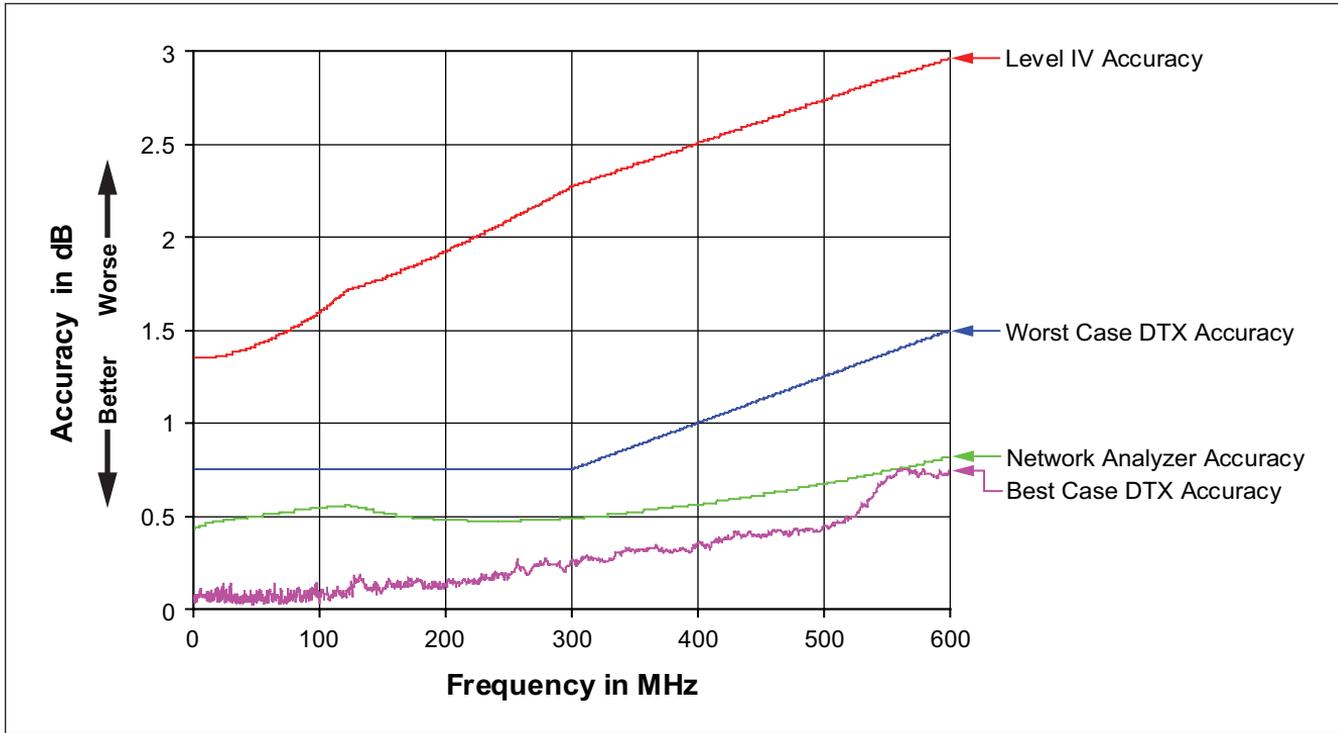


Figure 12-4. Baseline NEXT Loss Measurement Accuracy

amd111f.eps

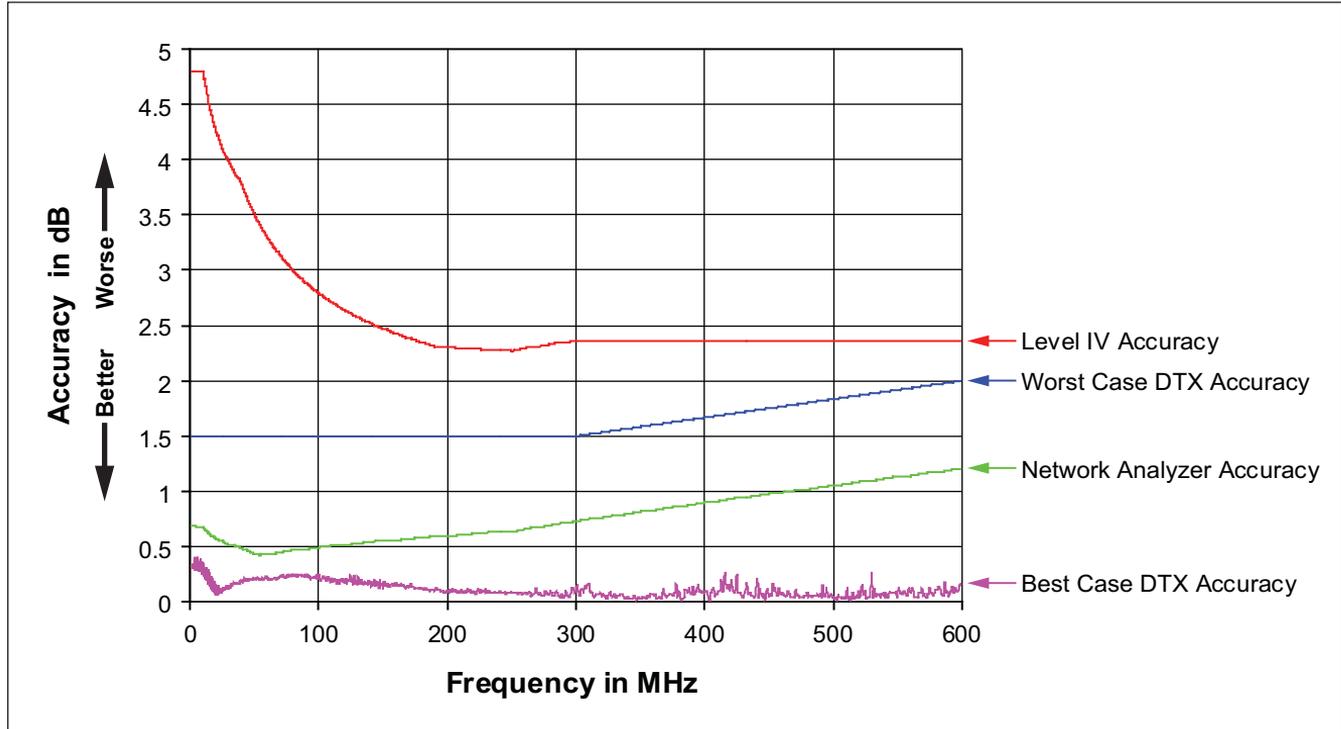


Figure 12-5. Baseline Return Loss Measurement Accuracy

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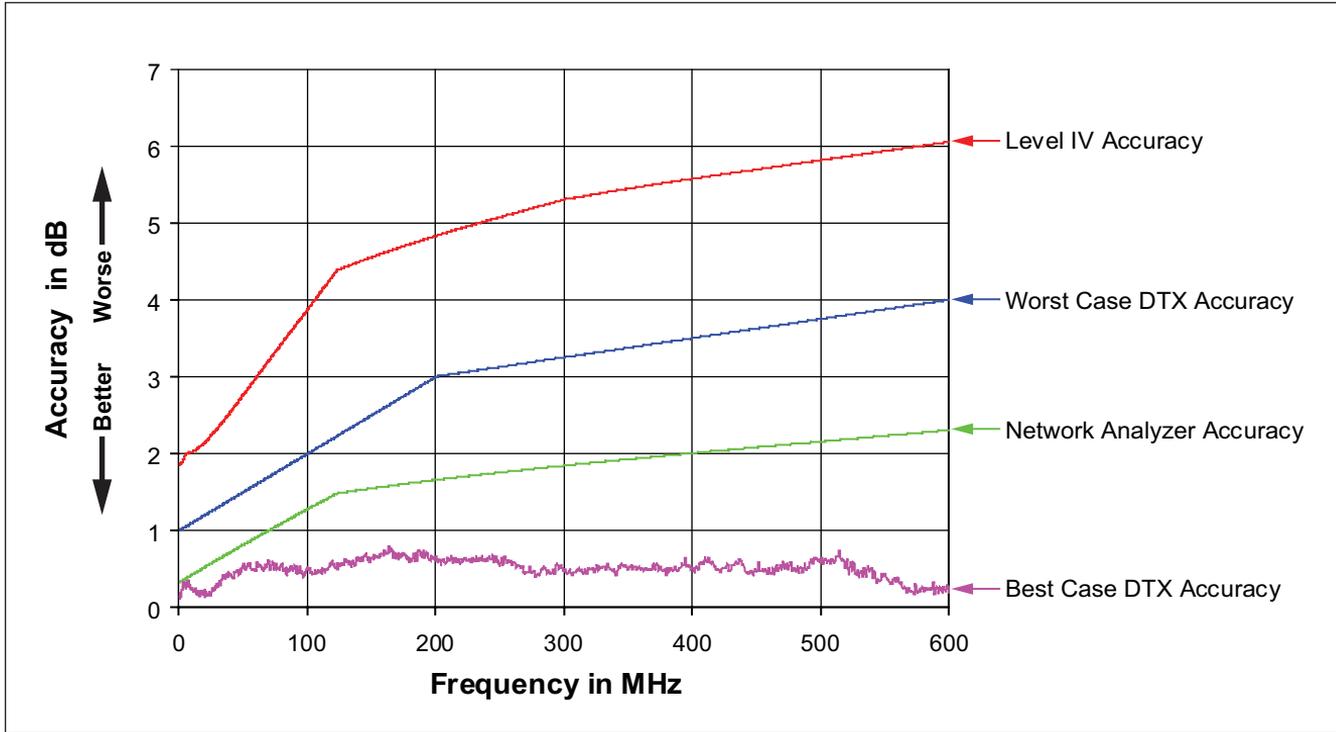


Figure 12-6. Baseline ELFEXT Measurement Accuracy

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HDTD[™]X Analyzer Specifications for Cables <100 m (328 ft)

The specifications below are typical for cables less than 100 m (328 ft).

Parameter	Twisted Pair Cable
Distance accuracy	$\pm (1 \text{ ft (0.3 m)} + 2 \% \text{ distance})$
Distance resolution	1 ft or 0.1 m

HDTDR[™] Analyzer Specifications for Cables <100 m (328 ft)

The specifications below are for HDTDR tests on cables less than 100 m (328 ft) long.

Parameter	Twisted Pair Cable
Distance accuracy	$\pm (1 \text{ ft (0.3 m)} + 2 \% \text{ distance})$
Distance resolution	1 ft or 0.1 m

Characteristic Impedance

The tester reports an estimate of the cable's impedance at 4 m from the beginning of the link. The accuracy of the measurement is relative to a 100 Ω terminating resistance.

Parameter	Twisted Pair Cable
Range	70 Ω - 180 Ω
Accuracy	$\pm (5 \Omega + 5 \% \text{ of } 100 \Omega - \text{Measured})$
Resolution	1 Ω

Impulse Noise

Adjustable from 10 mV to 500 mV in 10 mV steps.

Monitors either polarity of noise on pair 3, 6.

Minimum detectable impulse width: 10 ns

DTX-COAX Coaxial Adapter Specifications

Input connector	Male F-connector. BNC adapter allows connection to coaxial network cabling
Cable types tested	Coaxial video and network cabling
Length	Range: 800 m (2625 ft) with or without remote Resolution: 0.1 m or 1 ft Accuracy: 0 m to 150 m (0 ft to 492 ft): $\pm(0.3 \text{ m} + 2 \%)$ 150 m to 800 m (492 ft to 2625 ft) : $\pm(0.3 \text{ m} + 4 \%)$
Propagation delay	Range: 4000 ns with or without remote Resolution: 1 ns Accuracy: 0 ns to 750 ns: $\pm(2 \text{ ns} + 2\%)$; 750 ns to 4000 ns: $\pm(2 \text{ ns} + 4\%)$
Loop resistance	Range: 0 Ω to 530 Ω Resolution: 0.1 Ω Accuracy: $\pm(1 \Omega + 1 \%)$

-continued-

DTX-COAX Coaxial Adapter Specifications (cont.)

<p>Insertion loss</p>	<p>Frequency range and resolution: 1 MHz to 31.25 MHz: 125 kHz 31.5 MHz to 100 MHz: 250 kHz 100.5 MHz to 250 MHz: 500 kHz 251 MHz to 900 MHz: 1 MHz</p> <p>Source/load return loss (typical): 1 MHz to 300 MHz: 20 – 12.5 log(f/100), 20 dB maximum (75 Ω reference impedance) 300 MHz to 900 MHz: 14 dB</p> <p>Random noise floor (typical): 90 dB</p>
<p>Characteristic impedance</p>	<p>Range: 45 Ω to 110 Ω Resolution: 1 Ω Accuracy: $\pm (5 \Omega + 5 \% \text{ of } 75 \Omega - \text{Measured})$</p>
<p>HDTDR</p>	<p>Range: 350 m (1148 ft) with or without remote Resolution: 0.1 m or 1 ft Accuracy: 0 m to 150 m (0 ft to 492 ft): $\pm(0.3 \text{ m} + 2 \%)$ 150 m to 360 m (492 ft to 1148 ft) : $\pm(0.3 \text{ m} + 4 \%)$</p>

DTX-NSM Module Specifications

Input connectors	Twisted pair cable: 8-pin modular jack (RJ45) Fiber optic cable: SFP port (small form pluggable)
Indicator	Green LED indicates link activity
Functions	Verifies link connectivity and network service availability, checks link utilization and error conditions, verifies the presence of PoE (Power over Ethernet), blinks a hub/switch activity LED, detects LinkRunner™ cable ID locators
Protocol	Complies with IEEE 802.3 (Ethernet) specifications

DTX-MFM2/SFM2/GFM2 Fiber Module Specifications

Power Meter Specifications

Input connector	Interchangeable connector adapter (SC standard)
Detector type	InGaAs
Calibrated wavelengths	850 nm, 1310 nm, 1550 nm
Power measurement range	0 dBm to -60 dBm (1300/1310 nm and 1550 nm) 0 dBm to -52 dBm (850 nm)
Display resolution	dB, dBm: 0.01 Linear (μ W): >400, >40, >4, >0.4, \leq 0.4: 1, 0.1, 0.01, 0.001, 0.0001
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: ± 0.2 dB ³
Re-calibration period	1 year
Display update rate	1 reading per second
<p>1. Under the following conditions:</p> <ul style="list-style-type: none"> • Power level: -20 dBm, continuous wave • At 850 nm: 62.5/125 μm fiber with 0.275 NA • At 1310 nm and 1550 nm: 9/125 μm • Ambient temperature: 23 °C \pm5 °C <p>2. Linearity for 1310 nm and 1550 nm:</p> <ul style="list-style-type: none"> • Between 0 dBm and -55 dBm: ± 0.1 dB • < -55 dBm: ± 0.2 dB <p>3. Linearity for 850 dBm:</p> <ul style="list-style-type: none"> • Between 0 dBm and -45 dBm: ± 0.2 dB • < -45 dBm: ± 0.25 dB 	

Loss/Length Specifications

Specification	DTX-MFM2 Multimode Modules	DTX-GFM2 Gigabit Modules	DTX-SFM2 Singlemode Modules
Testing speeds (excluding referencing times)	Far End Source mode (1 wavelength): ≤ 4.5 s Loopback mode (2 wavelengths, one direction): ≤ 5 s Smart Remote mode (2 wavelengths, one direction): ≤ 15 s		
Output connector	SC		
Input connector	Interchangeable connector adapter (SC standard)		
Fiber types tested	50/125 μm to 62.5/125 μm multimode	50/125 μm to 62.5/125 μm multimode	9/125 μm singlemode
Source type and wavelengths	Multimode LED source 850 nm \pm 30 nm 1300 nm \pm 20 nm	VCSEL diode: 850 nm \pm 20 nm Fabry-Perot laser diode: 1310 nm \pm 20 nm	Fabry-Perot laser diode 1310 nm \pm 20 nm 1550 nm \pm 30 nm
Maximum length measurement	5 km of 50 μm or 62.5 μm multimode fiber	5 km of 50 μm or 62.5 μm multimode fiber	10 km of 9 μm singlemode fiber

-continued-

Loss/Length Specifications (cont.)

Specification	DTX-MFM2 Multimode Modules	DTX-GFM2 Gigabit Modules	DTX-SFM2 Singlemode Modules
Length measurement accuracy	± 1.5 m plus ± 2 % of length		
Propagation time accuracy	± 15 ns plus ± 2 % of propagation time		
Output power (nominal)	≥ -20 dBm	≥ -7 dBm	≥ -7 dBm
Output power stability over 8-hour period (after 5 minute warmup)	± 0.10 dB over 8 hours, 5 minute warm-up time	± 0.25 dB over 8 hours, 5 minute warm-up time	± 0.25 dB over 8 hours, 5 minute warm-up time
Detector type	InGaAs		
Calibrated wavelengths	850 nm, 1310 nm, 1550 nm		
Power measurement range	850 nm: 0 dBm to -52 dBm 1300/1310 nm, 1550 nm: 0 dBm to -60 dBm		
Display Resolution	dB, dBm: 0.01 Linear (µW): >400, >40, >4, >0.4, ≤0.4: 1, 0.1, 0.01, 0.001, 0.0001		

-continued-

Loss/Length Specifications (cont.)

Specification	DTX-MFM2 Multimode Modules	DTX-GFM2 Gigabit Modules	DTX-SFM2 Singlemode Modules
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: ±0.2 dB ³		
Dynamic Range for main-remote communication and nominal length measurement	≥ 12 dB	≥ 22 dB	≥ 22 dB
Re-calibration period	1 year		
Display update rate	1 reading per second		
<p>1. Under the following conditions:</p> <ul style="list-style-type: none"> • Power level: -20 dBm, continuous wave • At 850 nm: 62.5/125 μm fiber with 0.275 NA • At 1310 nm and 1550 nm: 9 /125 μm • Ambient temperature: 23 °C ±5 °C <p>2. Linearity for 1310 nm and 1550 nm:</p> <ul style="list-style-type: none"> • Between 0 dBm and -55 dBm: ± 0.1 dB • < -55 dBm: ± 0.2 dB <p>3. Linearity for 850 dBm:</p> <ul style="list-style-type: none"> • Between 0 dBm and -45 dBm: ± 0.2 dB • < -45 dBm: ± 0.25 dB 			

Visual Fault Locator

Output power*	316 μ w (-5 dBm) \leq peak power \geq 1.0 mw (0 dbm)
Operating wavelength	650 nm nominal
Spectral width (RMS)	\pm 3 nm
Output modes	Continuous wave and pulsed mode (2 Hz to 3 Hz blink frequency)
Connector adapter	2.5 mm universal
Laser safety	Class II CDRH
* Into SMF-28 singlemode fiber, continuous wave and pulse modes, SC/UPC connector.	

Tone Generator

Generates tones that can be detected by a tone probe, such as a Fluke Networks IntelliTone™ probe. The tones are generated on all pairs.

Frequency range of tones: 440 Hz to 831 Hz

Power

Notes

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

The battery will not charge at temperatures outside of 0 °C to 45 °C (32 °F to 113 °F). The battery charges at a reduced rate between 40 °C and 45 °C (104 °F and 113 °F).

- Main unit and remote: Lithium-ion battery pack, 7.4 V, 4000 mAh
- Typical battery life: 10 to 12 hours
- Charge time (with tester off): 4 hours (below 40 °C)
- AC adapter/charger, USA version: Linear power supply; 108 V ac to 132 V ac input; 15 V dc, 1.2 A output
- AC adapter/charger, international version: Switching power supply; 90 V ac to 264 V ac input; 15 V dc; 1.2 A output
- Memory backup power in main unit: Lithium battery
- Typical life of lithium battery: 5 years

Electromagnetic Compatibility

Emissions: EN 61326-1, Class A

Immunity: EN 61326-1

Input Ratings

A DTX Series tester and remote are designed to measure unpowered cables. The inputs are protected against continuous, current-limited telco voltages (<100 mA) and can withstand occasional overvoltages of less than 30 V rms (42 V peak, 60 V dc).

Certification and Compliance



N10140

Conforms to relevant Australian standards



Conforms to relevant European Union directives.



Listed by the Canadian Standards Association.

CSA Standards

CAN/CSA-C22.2 No. 1010.1-92 + Amendment 2: 1997 and CAN/CSA-C22.2 No. 1010.1 2000 (2nd edition) Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements.

Safety

CAN/CSA-C22.2 No. 1010.1-92 + Amendment 2: 1997; Overvoltage Category II, Pollution degree 2, 30 V.

EN61010, 2nd Edition, MEASUREMENT (Installation) CATEGORY I, Pollution Degree 2 per IEC1010-1 refers to the level of Impulse Withstand Voltage protection provided. Equipment of MEASUREMENT CATEGORY I is for measurements performed on circuits not directly connected to mains.

Laser Classification and Safety for DTX-MFM2, DTX-GFM2, and DTX-SFM2 Fiber Modules

OUTPUT port: Class 1

VFL port: Class 2

Complies with EN60825-1 and EN61010-1 (CE) and CFR21

Memory for Test Results

Internal memory stores up to 250 Cat 6 Autotest results, including graphical data.

The 16 MB memory card included stores up to 500 Cat 6 Autotest results, including graphical data.

1 MB Flash EPROM allows software and test limit updates.

LinkWare software lets you upload Autotest results to a PC from the tester or a memory card reader.

Serial Interfaces

The tester and smart remote have a USB client interface. The main DTX-1800 and DTX-1200 testers also have an RS-232 (EIA/TIA-232) interface.

The RS-232 (EIA/TIA-232) serial port connects to a PC with a DB-9 to IEEE 1394 (Firewire) cable available from Fluke Networks. Table 12-4 shows the pin connections for the DTX serial cable.

Table 12-4. DTX RS-232 Cable Pin Connections

Tester End (IEEE 1394)		Direction	PC End (female DB9)	
Signal Name	Pin		Pin	Signal Name
Data carrier detect	1	←	4	Data terminal ready
Transmit data	2	→	2	Receive data
Receive data	3	←	3	Transmit data
Signal ground	4	↔	5	Signal ground

Dimensions (without adapter or module)

8.5 in x 4.5 in x 2.3 in (21.6 cm x 11.4 cm x 5.8 cm), nominal

Weight (without adapter or module)

2.4 lb (1.1 kg), nominal

Display

3.7 in (9.4 cm) diagonal, 1/4 VGA, passive color, transmissive LCD with backlight.

Appendices

Appendix	Title	Page
A	Fiber Test Method Reference Tables.....	A-1
B	Loss Test Methods for Fiber Cabling	B-1

Appendix A

Fiber Test Method Reference Tables

Industry standards use different names for equivalent fiber 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	Method A	Method A	Method A.2	Method 1	Method A2
2 connections	Method B	Method B	Method A.1	Method 2	Method A1
None	Method C	Method C	Method A.3	Method 3	Method A3

Table A-2 shows the test methods required by standards.

Table A-2. Test Methods Required by Standards

Standard or Application	Test Method (as named in this manual)
TIA-568-B	B
ISO 11801	B
EN50173	B
10BASE-FB	A
10BASE-FP	A
10BASE-FL	A
10/100BASE-SX	B
100BASE-FX	B
1000BASE-LX	B
1000BASE-SX	B

Standard or Application	Test Method (as named in this manual)
10GBASE-S	B
10GBASE-L	B
10GBASE-LX	B
10GBASE-E	B
Fibre Channel	B
ATMI	B
FDDI	B
Token Ring	B
Fluke Networks General Fiber	B

Appendix B

Loss Test Methods for Fiber Cabling

Introduction

Note

The following discussion uses TIA/EIA-526 terminology for the names of the three common test methods. See Appendix A for a cross-reference of the method names in various standards.

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

This appendix also describes modified and alternate connections you can use for all types of connectors, including installations that have different connector styles at the patch panels and outlets.

Use the **Test Method** setting on the tester's **Fiber** menu in **SETUP** to record the method used. This setting does not affect loss results. It is only saved with the results to record which method you used.

Note

ANSI/TIA/EIA-526-14A and 526-7 specify Method B for measuring loss on multimode premises fiber and Method A.1 for singlemode premises fiber, respectively.

Method A/A.2

Method A/A.2 results 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. Method A is defined in the ANSI/TIA/EIA-526-14A multimode standard. Method A.2 is defined in the ANSI/TIA/EIA-526-7 singlemode standard.

Method A/A.2 reference connections cancel out the effects of the reference test cords and one connection in each fiber path, as shown in Figure B-1.

The test connections add one connection, plus the fiber in the link, to each path. Loss results for Method A/A.2 therefore represent only one connection plus the fiber in the link. Because the results omit one connection, ANSI/TIA/EIA-526-14A and 526-7 do not recommend Method A/A.2 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.

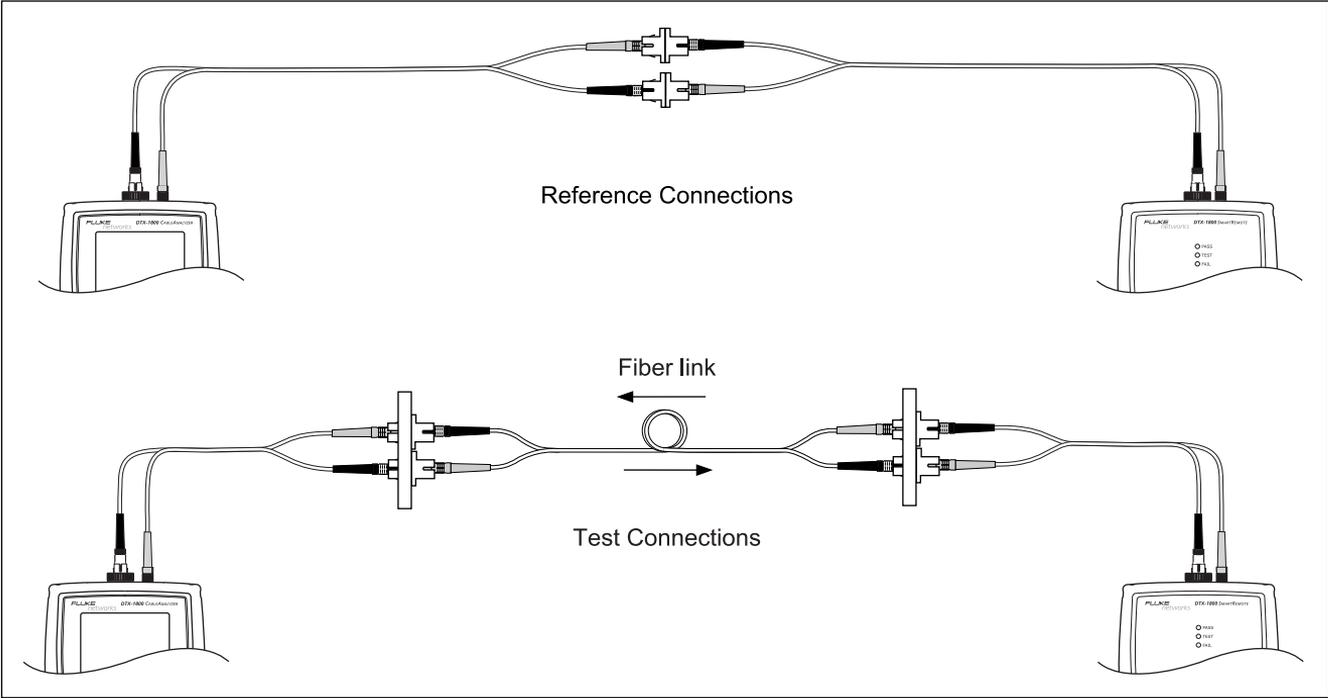


Figure B-1. Method A/A.2 Reference and Test Connections (singlemode shown)

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Method B/A.1

Method B/A.1 results 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. Method B is defined in the ANSI/TIA/EIA-526-14A multimode standard. Method A.1 is defined in the ANSI/TIA/EIA-526-7 singlemode standard.

Method B/A.1 reference connections cancel out the effects of the reference test cords, as shown in Figure B-2.

Loss results for Method B/A.1 therefore represent both connections plus the fiber in the link. ANSI/TIA/EIA-526-14A and 526-7 specify Methods B and A.1 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 Method B results on links that have different connector styles at each end or for when you do not have the correct connector adapters for the tester. See "Modified Method B" on page B- 8 and "The Alternate Method" on page B-11.

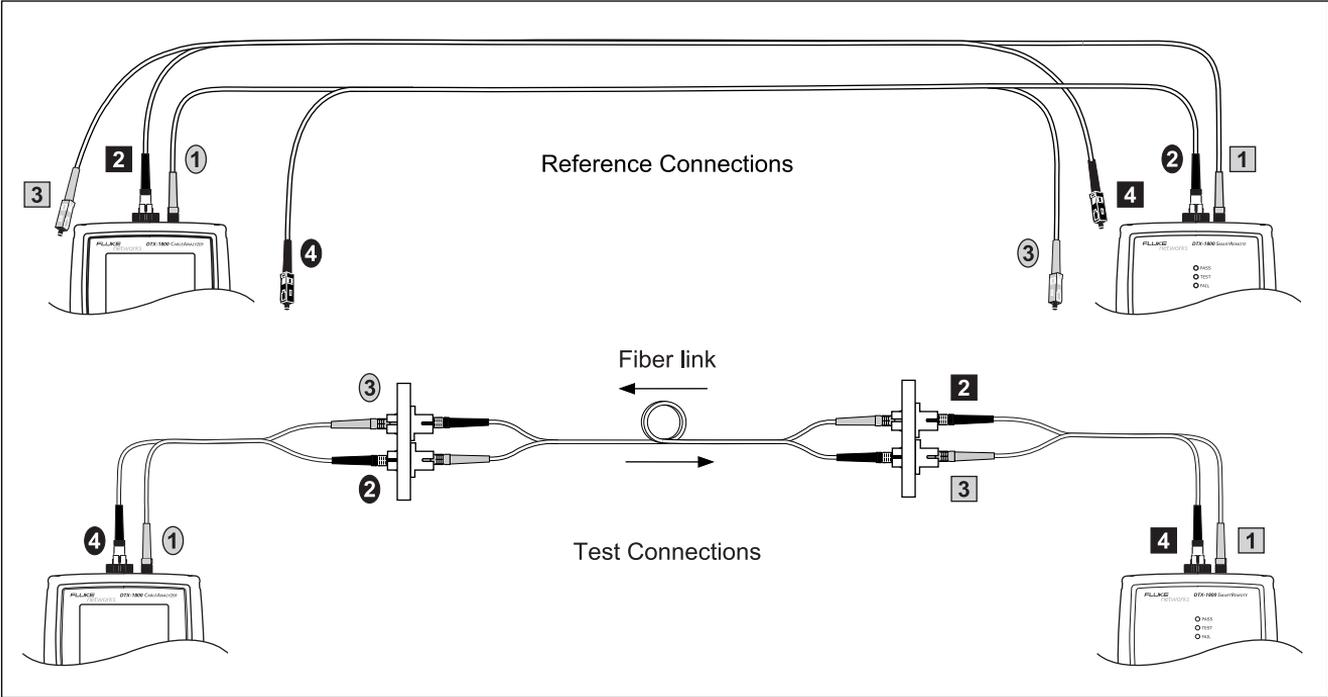


Figure B-2. Method B/A.1 Reference and Test Connections (singlemode shown)

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Method C/A.3

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

Method C/A.3 reference connections cancel out the effects of both reference test cords and two connectors in each fiber path, as shown in Figure B-3.

The test connections add only the fiber in link to each path. Loss results for Method C/A.3 therefore represent only the fiber in the link.

Because the results omit both connections in the link, ANSI/TIA/EIA-526-14A and 526-7 do not recommend Method C/A.3 for testing premises fiber, where patch cords are typically used at both ends of the link and connector loss is a large portion of the total loss.

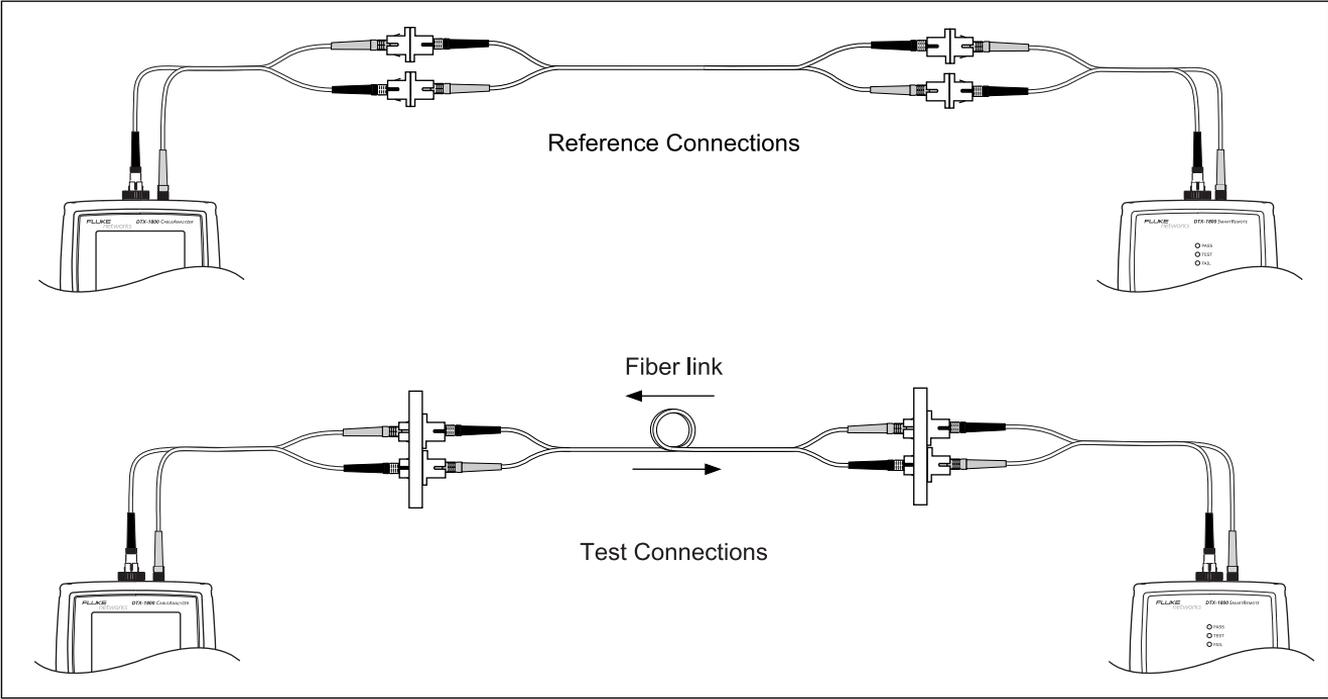


Figure B-3. Method C/A.3 Reference and Test Connections (singlemode shown)

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Modified Method B

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

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

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

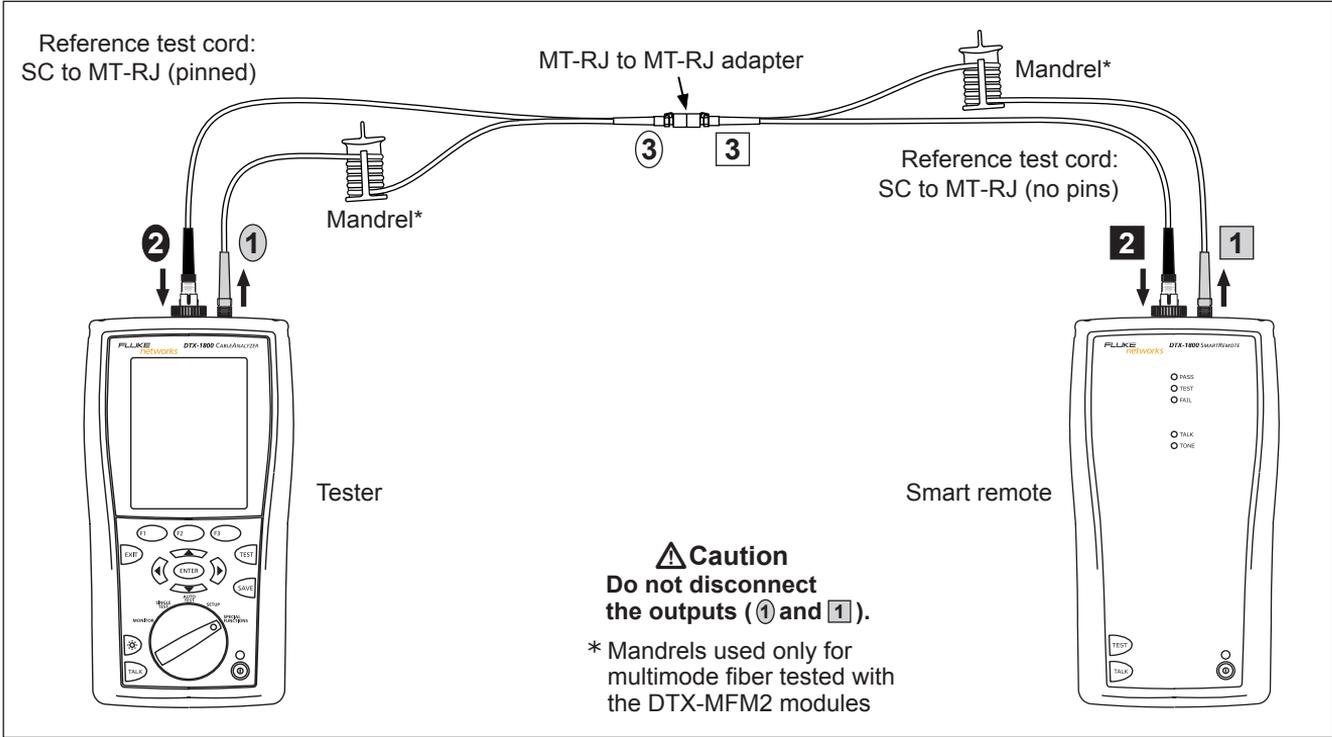


Figure B-4. Modified Method B: Smart Remote Mode Reference Connections

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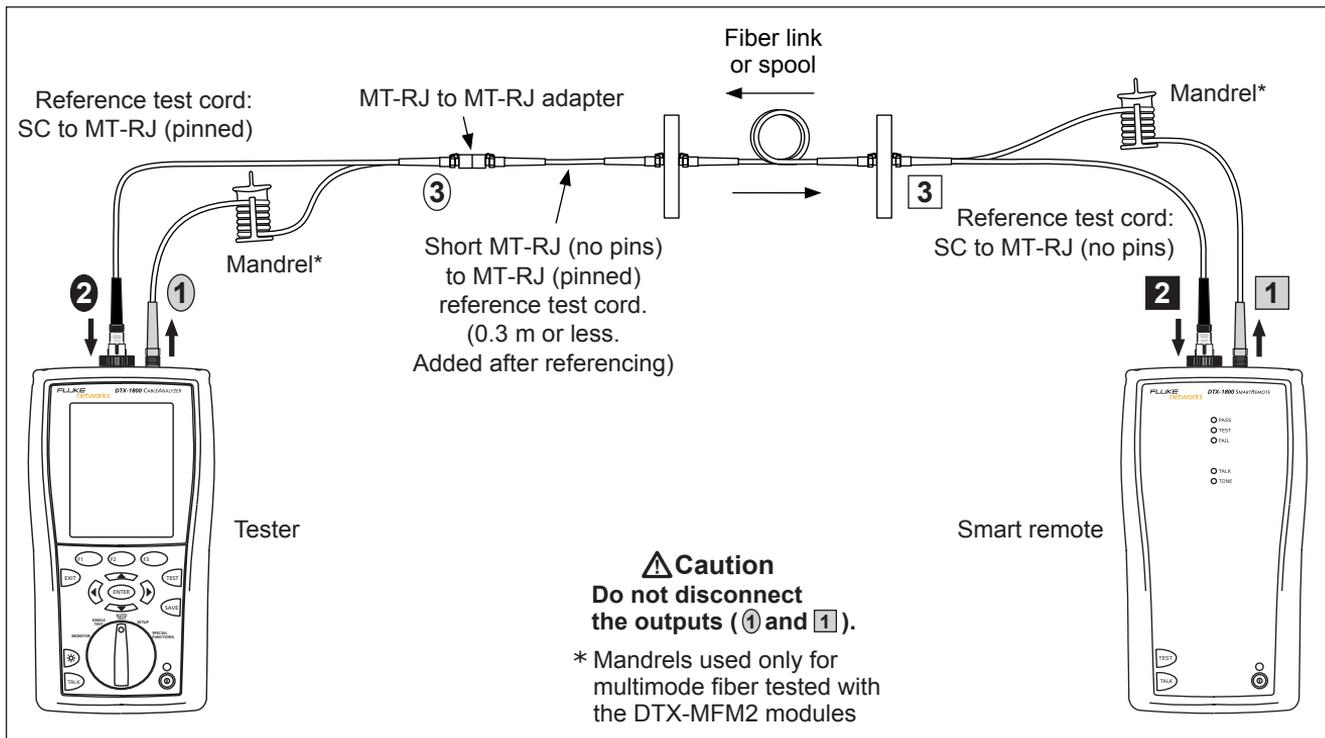


Figure B-5. Modified Method B: Smart Remote Mode Test Connections

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The Alternate Method

Like Method B/A.1, the alternate method produces results that account for the loss of two connections plus the fiber in the link.

An advantage of this method is that you can test links that have different connector styles at each end.

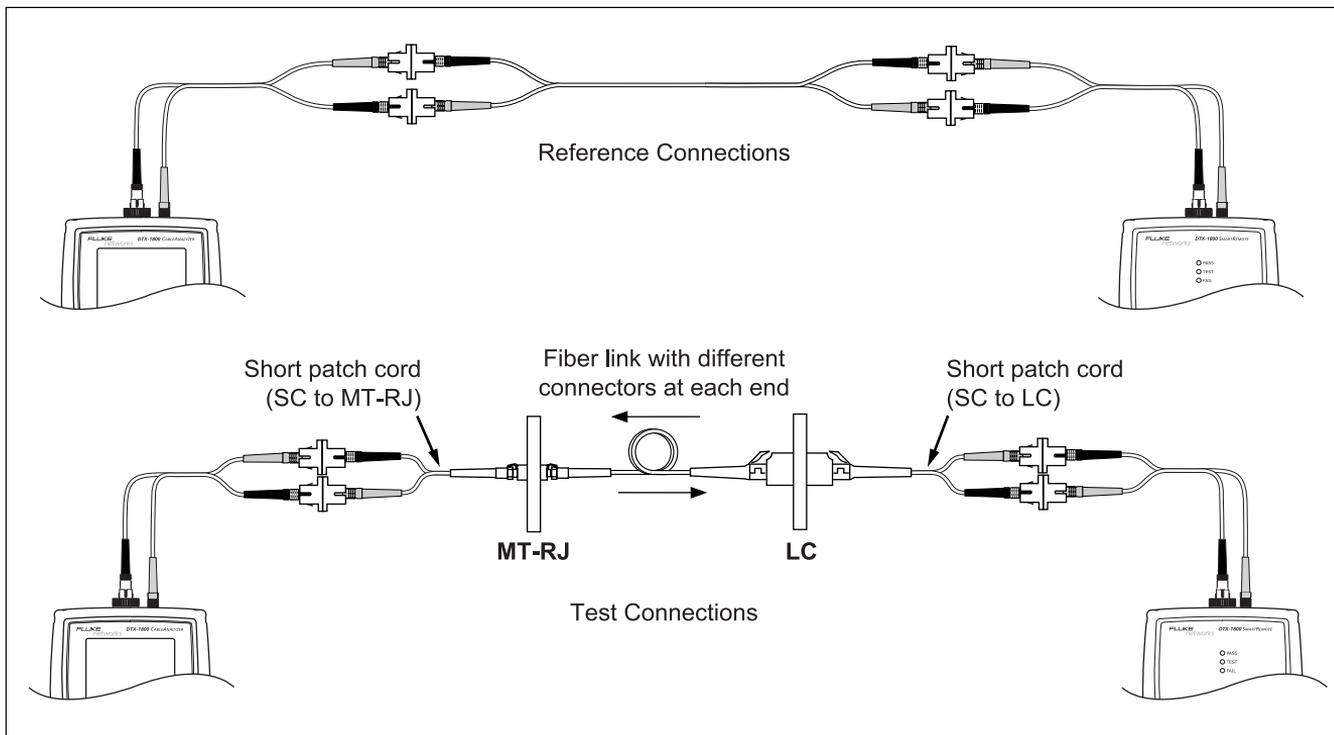
Figure B-6 shows reference and test connections for the alternate method. The link under test has MT-RJ connectors at one end, and LC connectors at the other end.

Using an SC to MT-RJ patch cord and an SC to LC patch cord for reference and test connections may seem like an easier way to connect to the link; however, that would require an MT-RJ to LC patch cord for reference connections. The reference and test connections would be the Method C/A.3 configuration, as shown in Figure B-3. The loss results would account for the loss of only the fiber in the link.

To account for the loss of both connections in the link, you must add connections to each end after referencing, as shown at the bottom of Figure B-6. Each fiber path then has four connections. Since two connections were canceled out during referencing, the test results include the loss of the two connections at the ends of the link.

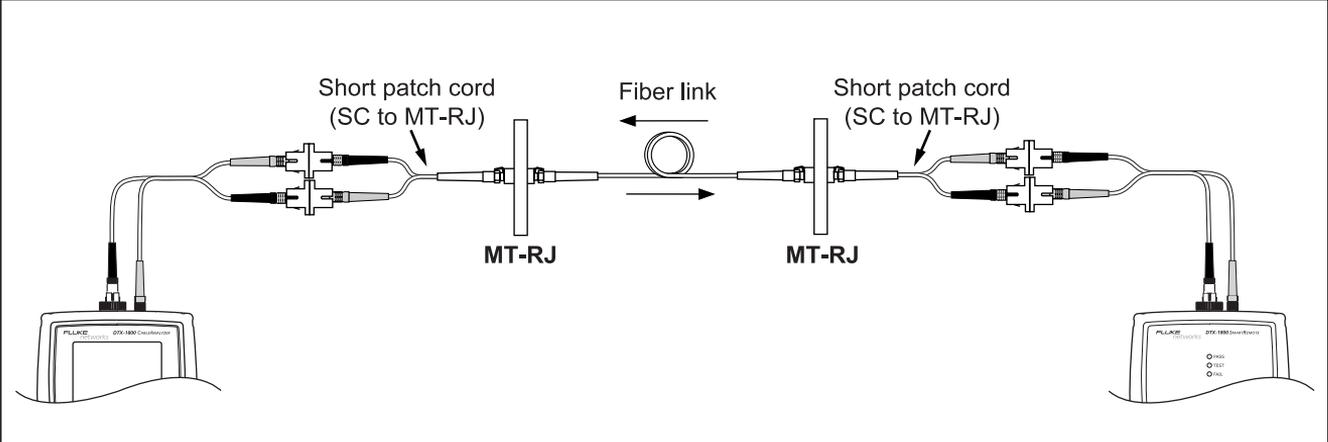
You may also use the alternate method to test links that have the same connector style at both ends. As with modified Method B, this method lets you test links when you do not have the correct connector adapters for the tester. For referencing, use the connections shown at the top of Figure B-6. For testing, add the appropriate short patch cords at each end. Figure B-7 shows an example of these test connections for a link with MT-RJ connectors at both ends.

On the tester select **Method B** as the **Test Method** when using these alternate connections.



amd114f.eps

Figure B-6. Alternate Method Reference and Test Connections for a Hybrid Link (singlemode shown)



amd115f.eps

Figure B-7. Alternate Method Test Connections for a Link with MT-RJ Connectors (singlemode shown)

Index

—\$—

\$
cable IDs, 1-29

—*—

* in results, 3-12
* in test settings, 10-2, 10-3, 10-4,
10-5, 10-6

—3—

3 dB rule, 3-24

—4—

4 dB rule, 3-20

—6—

606-A, 2-24

—A—

accessories
 optional, 12-11
 standard, 1-3
ACR test, 3-22
adapters, 1-18
asterisk in results, 3-12
attenuation. See insertion loss
Audible Tone, 1-26
Auto Increment
 overview, 1-29
 tutorial, 2-20
Auto Sequence

 overview, 1-29
 tutorial, 2-21
Autotest
 asterisk in results, 3-12
 automatic diagnostics, 3-11
 coaxial, 4-6
 coaxial results, 4-9
 copper cabling failures, 5-2
 Far End Source mode, 6-34
 fiber cabling failures, 8-2
 Loopback mode, 6-26
 main screen, 1-23
 results
 coaxial, 4-9
 Far End Source mode, 6-40
 Loopback mode, 6-32
 Smart Remote mode, 6-24
 twisted pair, 3-9
 Smart Remote mode, 6-19

twisted pair, 3-6

—B—

backbone template, 2-24

backlight

key, 1-9

timer, 1-25

Bad patch cord, 5-3

battery

charging, 1-14

clock battery, 12-7

replacement, 12-7

retraining the battery gauge, 12-6

status, 1-16

storage, 12-8

beeper, 1-26

Bi-Directional

setting, 6-14

testing, 6-42

Broadcasts, 9-13

buttons, 1-9

—C—

Cable ID Source, 1-28

cable IDs, 1-28

\$, 1-29

auto increment, 2-20

downloaded from a PC, 1-29

sequential, 2-21

templates, 2-24

troubleshooting, 2-23

Cable Type

coaxial, 4-3

custom, 10-1

fiber types tested, 12-32

new cable types database, 12-5

twisted pair, 3-3

twisted pair types tested, 12-16

calibration, 12-2

campus template, 2-25

cautions, 1-6, 6-3, 12-1

certifications, 12-36

channel test connections, 3-8

characteristic impedance

coaxial, 4-10

diagnosing failures, 5-7

specifications, 12-27

twisted pair, 3-15

checkmark

coaxial results, 4-9

fiber results, 6-25, 6-33, 6-41

twisted pair results, 3-10

cleaning

display and case, 12-6

fiber connectors, 12-7

cleaning connectors and adapters,
6-8

coaxial

Autotest, 4-6

reference, 4-1

results, 4-9

test settings, 4-3

Collisions, 9-13

Company, 2-2

compliance, 12-36

connections

channel, 3-8

fiber. See Smart Remote,

Loopback, or Far End Source
mode

for fiber test methods, B-1

permanent link, 3-7

connector adapter

cleaning, 6-9

installation, 6-6

Connector Type, 6-15

connectors

fiber module, 6-5

main tester, 1-11

optical connector maintenance,
12-7

RJ11 (telephone), 1-7

- smart remote, 1-13
- crossed pairs, 3-14
- crossed wires, 5-3
- custom test settings
 - deleting, 10-7
 - editing, copying, renaming, 10-7
 - fiber test limit, 10-5
 - fiber type, 10-3
 - NVP, 10-8
 - outlet configuration, 10-6
 - transferring between testers, 10-10
 - twisted pair cable, 10-1
 - twisted pair test limit, 10-4
- customer support
 - contacting Fluke Networks, 1-2
 - if something seems wrong, 12-8

—D—

- database for limits and cable types, 12-5
- Date, 1-24
- decimal separator, 1-24
- delay skew
 - diagnosing failures, 5-8
 - specifications, 12-18
 - test, 3-17
- deleting

- folders, 11-4
- results, 11-6
- DHCP, 9-4
- diagnosing test failures
 - copper cabling, 5-2
 - fiber cabling, 8-2
 - network service, 9-16
- diagnostics, 3-11
- display
 - backlight, 1-9
 - backlight timer, 1-25
 - cleaning, 12-6
 - contrast, 1-25
 - specifications, 12-38
- DTX-COAX module. See coaxial
- DTX-MFM2/GFM2/SFM2 modules. See fiber
- DTX-NSM module. See network service

—E—

- ELFEXT
 - diagnosing failures, 5-4
 - specifications, 12-19
 - test, 3-26
- EMC, 12-36
- End Not Found, 4-12

- equipment
 - Far End Source mode, 6-35
 - FindFiber in Loopback mode, 6-48
 - FindFiber in Smart Remote mode, 6-45
 - Loopback mode, 6-27
 - power meter (MONITOR mode), 6-50
 - Smart Remote mode, 6-19
 - twisted pair tests, 3-6
- error messages, 12-9
- Errors, 9-13

—F—

- FAIL
 - copper cabling, 5-2
 - fiber cabling, 8-2
- FAIL*, 3-12
- Far End Source mode
 - Autotest, 6-38
 - equipment, 6-35
 - referencing, 6-36
 - test connections, 6-39
- Fault Info, 3-11
- FEXT, 3-26
- fiber
 - bi-directional, 6-42

- Far End Source mode, 6-34
- FindFiber, 6-44
- Loopback mode, 6-26
 - module
 - features, 6-5
 - installation and removal, 6-4
 - negative loss, 8-3
 - power meter, 6-50
 - reference test cord replacement, 12-7
- referencing
 - Far End Source mode, 6-36
 - Loopback mode, 6-28
 - Smart Remote mode, 6-20
- Smart Remote mode, 6-19
- specifications, 12-28, 12-31
- test methods, B-1
- test settings, 6-14
- tutorial on testing, 2-12

Fiber Type

- custom, 10-3
- new fiber types database, 12-5
- setting, 6-14

FindFiber, 6-44

Fluke Networks

- contacting, 1-2
- Knowledge Base, 1-3

folders

- changing, 11-4
- deleting, 11-4
- duplicate, 11-3
- new, 11-3

formatting memory, 1-26, 11-7

front panel

- main tester, 1-9
- smart remote, 1-13

Full Duplex, 9-8, 9-10

—G—

gateway address, 9-4

—H—

Half Duplex, 9-8, 9-10

hardware version, 1-22

HDTDR analyzer

- specifications, 12-27
- using, 5-12

HDTDX analyzer

- specifications, 12-27
- using, 5-9

help (customer support), 12-8

horizontal link template, 2-24

—I—

i

- coaxial results, 4-9
- fiber results, 6-25, 6-33
- length results, 3-16
- NEXT results, 3-20
- resistance results, 3-15
- return loss results, 3-24
- twisted pair results, 3-10

ID Locator, 9-14

IDs. See cable IDs

impedance. See characteristic impedance

impulse noise, 3-31

- diagnosing failures, 5-8
- specifications, 12-27

index of refraction, 6-17

input ratings, 12-36

insertion loss

- coaxial, 4-11
- diagnosing failures, 5-6
- twisted pair, 3-18

internal memory capacity, 11-1

—K—

keys

- main tester, 1-9

smart remote, 1-13
Knowledge Base, 1-3

—L—

language, 1-14
length
 coaxial, 4-11
 diagnosing failures for fiber, 8-3
 diagnosing failures for twisted pair, 5-7
 Loopback mode, 6-33
 Smart Remote mode, 6-25
 specifications, 12-17
 twisted pair, 3-16
 units, 1-24
link interface adapters
 attaching/removing, 1-18
 specifications, 12-16
LinkWare
 description, 1-30
 uploading results, 11-9
LinkWare Stats, 1-30
List, 1-29
Loopback mode
 Autotest, 6-30
 equipment, 6-27
 referencing, 6-28

test connections, 6-31
loss
 diagnosing failures, 8-2
 Loopback mode, 6-33
 Smart Remote mode, 6-25
loss is negative, 6-10, 8-3
loss/length testing (fiber)
 Far End Source mode, 6-34
 Loopback mode, 6-26
 Smart Remote mode, 6-19

—M—

maintenance, 12-1
mandrels, 6-12
MDI/MDI-X, 9-8, 9-10
memory
 features and functions, 11-1
 specifications, 12-37
 status screen, 11-2
memory card
 capacity, 11-1
 care, 11-8
 folders, 11-3
 inserting and removing, 1-27
Method A, B, C, 6-15
Method A/A.2, B-2
Method B

modified, B-8
standard, 6-18
Method B/A.1, B-4
Method C/A.3, B-6
modified Method B, B-8
monitoring network traffic, 9-12
moving results, 11-6
MT-RJ, 6-18

—N—

n, 6-17
negative loss, 6-10, 8-3
network service
 blinking a port light, 9-14
 connectivity results, 9-8
 connectivity test, 9-4
 connectivity test connections, 9-7
 diagnosing network problems, 9-16
 ID locator, 9-14
 module
 features, 9-2
 installation and removal, 9-2
 software requirements, 9-1
 monitoring network traffic, 9-12
 negotiation details screen, 9-10
 ping addresses, 9-5

- ping test, 9-11
- saving results, 9-6
- specifications, 12-30
- test settings, 9-4

NEXT

- diagnosing failures, 5-4
- HDTDX analyzer, 5-9
- specifications, 12-19
- test, 3-20

- noise. See impulse noise
- None, 1-29

- Number of Adapters, 6-15

- Number of Splices, 6-15

- Numeric Format, 1-24

NVP

- changing, 10-8
- coaxial default, 4-3
- resetting to default, 10-10
- twisted pair default, 3-3

—O—

open

- fiber, 7-2
- Smart Remote mode, 6-22
- twisted pair, 3-13, 5-2

- Operator, 2-2

- OptiFiber, 6-54

- options, 12-11

Outlet Configuration

- custom, 10-6
- diagrams, 3-4

—P—

- PASS*, 3-12

- patch cord. See reference test cord
- testing twisted pair patch cords, 3-2

- Patch Lengths, 6-17

permanent link

- interface adapters, 1-18
- test connections, 3-7

- personality module, 1-20

- Pin Reversal, 9-10

ping test

- entering addresses, 9-5
- results, 9-12
- running the test, 9-11

- PoE, 9-8

- Port Blink, 9-14

power

- powering the tester, 1-14
- specifications, 12-36

- power down timer, 1-25

- power meter, 6-50

- measurement is too high or too low, 8-4

- MONITOR mode, 6-51

- SINGLE TEST mode, 6-52

problems

- copper cabling, 5-2
- fiber cabling, 8-1
- with the tester, 12-8

propagation delay

- coaxial, 4-11
- diagnosing failures, 5-8
- Loopback mode, 6-33
- Smart Remote mode, 6-25
- specifications, 12-18
- twisted pair, 3-17

- PSACR test, 3-26

PSELFEXT

- diagnosing failures, 5-4
- test, 3-29

PSNEXT

- diagnosing failures, 5-4
- test, 3-26

—R—

reference test cord

- replacement, 12-7
- testing, 6-8, 6-11

- referencing
 - coaxial, 4-1
 - fiber
 - Far End Source mode, 6-36
 - Loopback mode, 6-28
 - Smart Remote mode, 6-20
 - when to set, 6-10
 - twisted pair, 3-1
 - registration, 1-2
 - Remote End Setup, 6-14
 - resistance
 - coaxial, 4-10
 - diagnosing failures, 5-7
 - specifications, 12-18
 - twisted pair, 3-15
 - Result Storage Location, 1-28, 2-4, 11-3
 - return loss
 - diagnosing failures, 5-5
 - HDTDR analyzer, 5-12
 - specifications, 12-21
 - test, 3-24
 - RJ11 connector, 1-7
 - RTT, 9-12
- S—**
- safety
 - fiber module information, 6-2
 - information, 1-6
 - standards, 12-37
 - scanning
 - coaxial resistance, 4-10
 - HDTDR, 5-12
 - HDTDX, 5-9
 - twisted pair resistance, 3-15
 - wire map, 3-13
 - self test
 - fiber modules, 6-8
 - twisted pair adapters, 1-21
 - sequential cable IDs, 2-21
 - serial cable (RS-232), 12-3
 - serial port, 12-38
 - service, 12-8
 - Set Reference
 - fiber, 6-17
 - twisted pair, 3-5
 - setup
 - battery, 1-14
 - coaxial test settings, 4-3
 - fiber test settings, 6-14
 - language, 1-14
 - twisted pair test settings, 3-3
 - user preferences, 1-24
 - short, 3-14, 5-3
 - single tests
 - coaxial, 4-11
 - fiber, 6-54
 - twisted pair, 3-29
 - Site, 2-2
 - Smart Remote mode
 - Autotest, 6-22
 - equipment, 2-13, 6-19
 - referencing, 6-20
 - test connections, 6-23
 - software
 - updates, 12-2
 - limits or cable types database, 12-5
 - with a memory card, 12-5
 - with a PC, 12-2
 - with another tester, 12-4
 - version, 1-22
 - sorting results, 11-7
 - split pair, 5-2
 - Static, 9-4
 - storage, 12-8
 - Store Plot Data
 - coaxial, 4-4
 - twisted pair, 1-23, 3-5
 - subnet mask, 9-4

Summary screen

coaxial, 4-9

Far End Source mode, 6-40

Loopback mode, 6-33

Smart Remote mode, 6-25

twisted pair, 3-10

—T—

talk mode, 1-30

Target Addresses, 9-5

templates for cable IDs, 2-24

Test Limit

coaxial, 4-3

custom fiber limit, 10-5

custom twisted pair limit, 10-4

fiber, 6-14

new limit database, 12-5

twisted pair, 3-3

Test Method

alternate connections, B-11

explanation, B-1

modified Method B, B-8

names in standards, A-1

setting, 6-15

text editing screen, 2-3

Time, 1-24

tone generator

main tester, 1-9

smart remote, 1-13

using, 3-34

traffic monitor, 9-12

troubleshooting

copper cabling, 5-2

fibercabling, 8-2

tester, 12-8

tutorials

auto increment cable IDs, 2-20

auto sequence cable IDs, 2-21

testing fiber cabling, 2-12

testing twisted pair cabling, 2-5

twisted pair

adapters, 1-18

Autotest, 3-6

equipment for testing, 3-6

referencing, 3-1

test settings, 3-3

tutorial on testing, 2-5

—U—

Unknown

coaxial impedance test, 4-10, 4-12

Smart Remote mode, 6-22

twisted pair impedance test, 3-15

updating the software, 12-2

with a memory card, 12-5

with a PC, 12-2

with another tester, 12-4

uploading results, 11-9

USB port, 12-38

Utilization, 9-13

—V—

version, 1-22

visual fault locator (VFL), 7-1

—W—

warnings, 1-6, 6-2, 12-1

wire map

diagnosing failures, 5-2

diagrams, 3-4

test, 3-13

—X—

X

coaxial results, 4-9

fiber results, 6-25, 6-33, 6-41

twisted pair results, 3-10