Fluke Networks DSP-FTA410 Specs
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DSP-FTA410

Fiber Test Adapter

Users Manual

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Introduction

The DSP-FTA410 Fiber Test Adapter lets you use a DSP-4000 CableAnalyzer™ test tool to test and certify fiber optic cable installations. The fiber test adapter includes the following features:

- Autotest function measures optical power loss (at 850 nm and 1300 nm) and length on dual-fiber multimode links. Provides pass/fail results based on common fiber test standards.
- Includes built-in support for SFF (Small Form Factor) link testing.
- With a separate laser source (such as the Fluke LS-1310/1550 Laser Source), you can test singlemode fiber at 1310 nm and 1550 nm.
- Monitors power at 850 nm, 1300 nm, 1310 nm, and 1550 nm from optical sources, such as test equipment and optical interface cards.
- Transmits or receives 850 nm or 1300 nm light for performing quick continuity checks.
- Graphic **Help** screens show you how to make proper fiber connections.
- FindFiber™ feature helps you verify optical connectivity.
- Allows two-way voice communication over the fiber under test (using two DSP-FTA410 units and the headsets supplied with the DSP-4000 test tool).
- Saves fiber test results for printing or uploading to a PC.

Unpacking

The DSP-FTA410S Fiber Test Option Set includes the following items, which are shown in Figure 1:

- Two DSP-FTA410 Fiber Test Adapters
- Two ST/ST adapters
- Four SC/ST 62.5 µm multimode patch cords
- Two short ST/ST 62.5 µm multimode test jumpers
- *DSP-FTA410 Users Manual* (not shown)
- Warranty registration card (not shown)

If anything is damaged or missing, contact the place of purchase immediately.

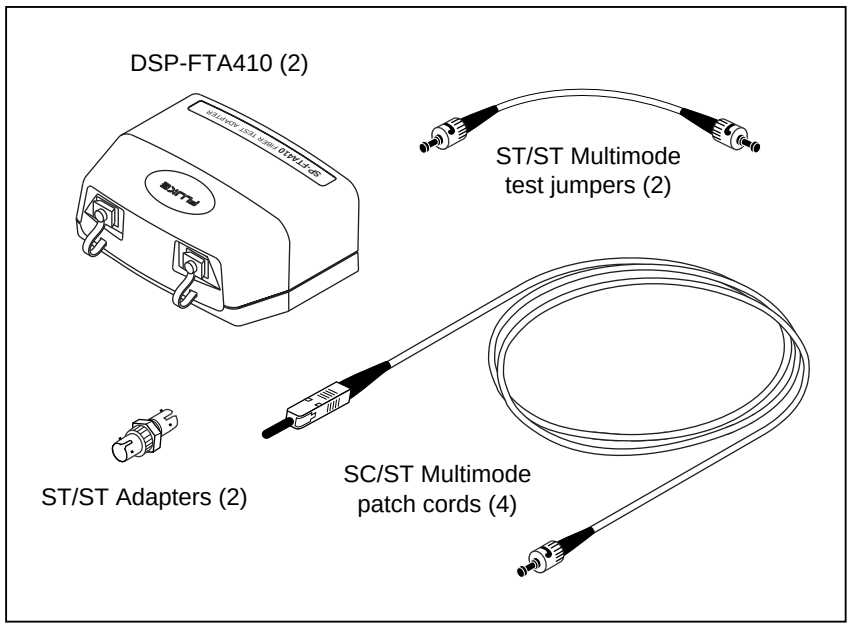


Figure 1. Standard Equipment

Safety Information

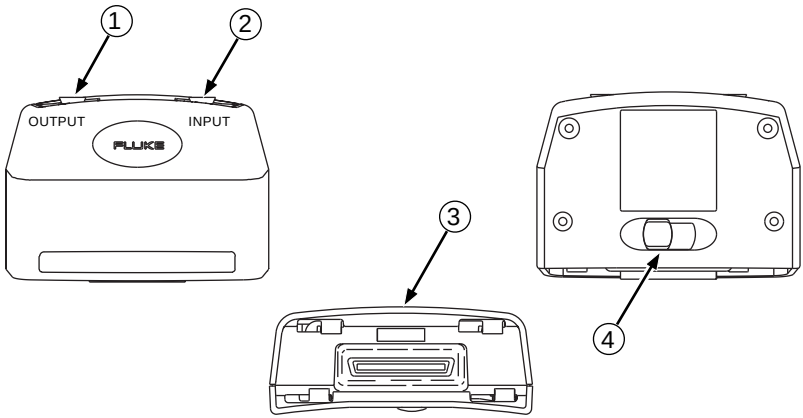
⚠Warning

To avoid possible eye damage caused by hazardous radiation:

- **Never look directly into optical output connectors (see Figure 2). Some sources produce invisible radiation that can permanently damage your eyes.**
- **Do not open the case; no user-serviceable parts are inside.**
- **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.**
- **Read the safety information given in Chapter 2 of the *DSP-4000 Users Manual*.**

Fiber Test Adapter Features

Figure 2 describes the features of the DSP-FTA410 Fiber Test Adapter.



①	SC output connector. Transmits multimode optical signals at 850 nm and 1300 nm.
②	SC input connector. Receives multimode optical signals at 850 nm and 1300 nm and singlemode optical signals at 1310 nm and 1550 nm.
③	DB60 connector and latches for attaching the DSP-FTA410 unit to a DSP-4000 test tool.
④	Slide mechanism for locking the DSP-FTA410 unit to a DSP-4000 test tool or remote unit.

Figure 2. Features of the DSP-FTA410 Fiber Test Adapter

Getting Started

This section describes how to connect the DSP-FTA410 units and verify their operation.

Attach a DSP-FTA410 unit to your DSP-4000 test tool, as shown in Figure 3. Attach the second DSP-FTA410 unit to the DSP-4000 remote unit. The DSP-FTA410 units are identical, so either one can be attached to the remote.

Notes

The DSP-FTA410 Fiber Test Adapters are compatible only with DSP-4000 test tools and remote units.

This manual assumes that you have used the DSP-4000 test tool to test copper cable. If you need more detailed instructions about using the DSP-4000 test tool, refer to the DSP-4000 Users Manual.

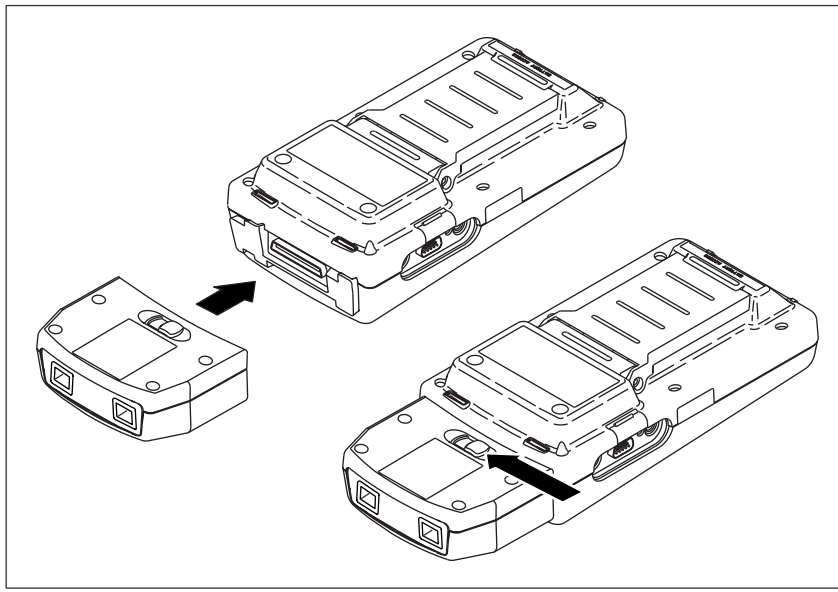


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Figure 3. Attaching a DSP-FTA410

Cleaning the Fiber Connections

Always clean the fiber endfaces before making connections. Use any of the following:

- Lint-free swabs or wipes moistened with isopropyl alcohol
- Pre-moistened swabs or wipes approved for use on fiber connectors
- Cassette-style cleaning devices designed for use on fiber connectors (follow the manufacturer's instructions for use)

Canned air approved for use on fiber connectors is also useful for dislodging contamination. Protect all connectors with dust caps when not in use.

Verifying Operation

Use the DSP-4000 test tool's self-test feature to verify that the DSP-FTA410 units are working properly, as follows:

1. Clean all fiber connections.
2. Connect as shown in Figure 4.
3. Run the self test from the test tool's SPECIAL FUNCTIONS mode.
4. If the self test fails, verify that your patch cords are good, clean the fiber endfaces; then run the self test again. If it continues to fail, contact Fluke as described under "Contacting Fluke".

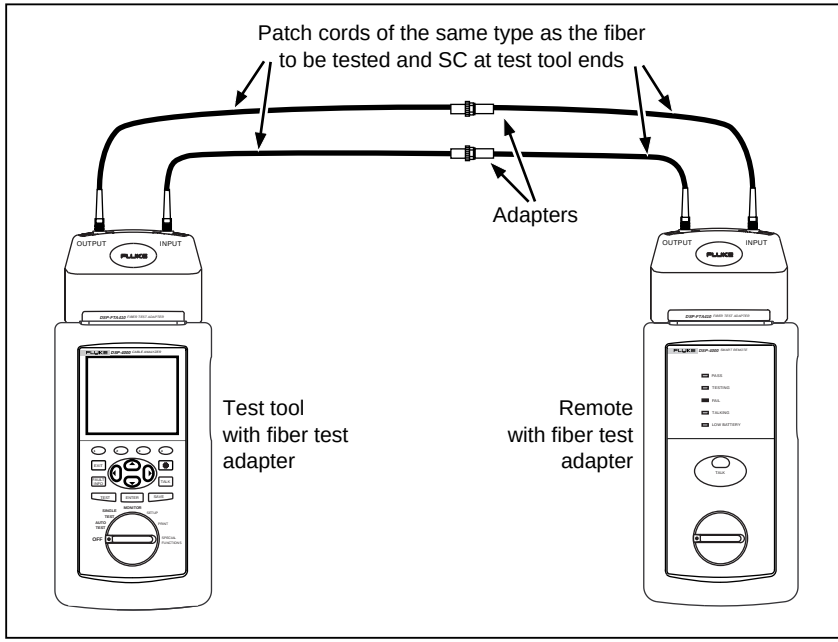

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Figure 4. Connections for a Self Test

Summary of Fiber Test Settings

Table 1 briefly describes the settings required for testing fiber links. See the descriptions under "Setting up for Fiber Tests" for more details on each setting.

Table 1. Settings for Testing Fiber

Setting	Description of Options
TEST STANDARD, CABLE TYPE	In SETUP, select the test standard and cable type (multimode or singlemode) that applies to the fiber under test.
REMOTE END CONFIGURATION	In SETUP, select Smart Remote, Loopback, or Far End Source Mode. Smart Remote Mode uses two DSP-FTA410 units. Loopback Mode uses one DSP-FTA410 unit. Far End Source Mode requires a separate optical source, such as the Fluke FOS-850/1300 multimode source or the Fluke LS-1310/1550 laser source. Figures 8, 9, and 10 show the three configurations.
NUMBER OF ADAPTERS NUMBER OF SPLICES	If required, in SETUP set the numbers of adapters and splices added to each fiber path since the reference was set.
ADAPTER TYPE	In SETUP, select the type of adapter. The graphic Help screens show how to connect the test unit with different adapter types.
SET FIBER REFERENCE	In SPECIAL FUNCTIONS, set the reference power level for the power loss test. Figures 5, 6, and 7 show the reference connections for the three remote end configurations.

Setting Up for Fiber Tests

This section tells you how to configure your test tool for testing fiber links.

Selecting a Test Standard and Fiber Type

Fiber test standards define limits for losses in adapters and splices, the length of fiber optic links, and other parameters. When you select a standard, the test tool also prompts you to select a cable type.

Note

For more details on fiber test standards, refer to the document on the DSP-LINK diskette included with your DSP-4000 test tool.

Select a fiber test standard and cable type as follows:

1. Attach a DSP-FTA410 unit to the DSP-4000 test tool. Turn the DSP-4000 test tool's rotary switch to SETUP; then press ENTER.
2. Use the arrow keys to highlight the desired test standard; then press ENTER.
3. Use the arrow keys to select the appropriate fiber type; then press ENTER.

Your DSP-4000 test tool is programmed with the standards available when the unit left the factory. When new standards emerge, they will be included with DSP-4000 software upgrades available from Fluke. Refer to the *DSP-4000 Users Manual* for information on upgrades. Or, contact Fluke on the World Wide Web at **www.fluke.com**.

Setting the Remote End Configuration

In the SETUP mode, select the remote end configuration that matches your test configuration (usually, you will use Smart Remote Mode):

- Smart Remote Mode uses two DSP-FTA410 units: one on the DSP-4000 main unit and one on the remote unit. (Refer to Figure 8.)
- Loopback Mode uses just one DSP-FTA410 unit on the DSP-4000 main unit. (Refer to Figure 9.) You can use this mode to test a single fiber or a spool of fiber. In this case, you would connect the fiber ends to the patch cords on DSP-FTA410 output and input ports.
- Far End Source Mode is used with a laser source, such as the Fluke LS-1310/1550 Laser Source, to test singlemode fiber. You can also use Far End Source Mode with a separate multimode source, such as the Fluke FOS-850/1300 Fiber Optic Source. (Refer to Figure 10.)

Selecting the Adapter Type

The test tool provides graphic help screens to show you how to make the proper fiber connections for testing. Since the connections are not the same for all types of adapters, you will want to select the adapter type to match the connectors on the fiber links you will be testing. Selecting the adapter type will be particularly helpful when you are testing Small Form Factor (SFF) fiber links.

In the SETUP mode, press the (4) Page Down softkey until you find the adapter type setting. To modify the setting, press ENTER. The default setting for the adapter type is General. Use this setting if you are not sure what type of adapter you are testing.

Setting the Number of Adapters and Splices

Some test standards use a calculated limit for the loss test. This limit includes the number of adapters and splices in the link. In the test tool's SETUP mode, enter the number of adapters and number of splices added in each direction of the fiber path since the reference was set. For example, the reference connections in Figure 5 show one adapter in each path. When power loss is measured as shown in Figure 8, there are three adapters in each path. You have added two adapters in each path, so you would enter "2" for the "Number of Adapters" count in SETUP.

The test tool uses the number of adapters and splices you enter and the measured length of the fiber to calculate the loss limit for the link. If the measured loss is greater than the calculated limit allows, the link fails.

The insertion loss allowed for each adapter or splice depends on the selected test standard. If necessary, you can change the insertion loss used for adapters or splices by creating a custom test as described on page 38.

Setting a Reference

The reference is used for power loss and delay measurements. Setting a reference lets your DSP-4000 test tool automatically subtract out the losses or delays due to patch cords or the DSP-FTA410 units. The loss and delay for a fiber under test is automatically calculated as the difference between the reference loss and delay and those values measured with the fiber inserted.

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

- Anytime you start using a different DSP-FTA410 unit or other optical source.
- Anytime you reconnect a patch cord or change the cord used on the DSP-FTA410 output port or other source.

Note

For the most accurate test results, set the reference at the beginning of each day using the test configuration (Figure 5, 6, or 7) you will be using that day.

The test tool stores separate reference values for each remote end configuration.

Setting a Reference for Smart Remote Mode

1. Turn on the test tool and the remote. Let the DSP-FTA410 units warm up for five minutes. Set the remote end configuration to Smart Remote Mode.
2. Choose four known-good SC/ST patch cords. Clean all fiber endfaces.

   Note

   If the fiber to be tested does not use ST adapters, select patch cords with SC adapters on one end and the appropriate adapters on the other end. Mate the cables with the appropriate adapters.
3. Make the connections shown in Figure 5.
4. Turn the rotary switch to SPECIAL FUNCTIONS. Select **Set Fiber Reference**; then press ENTER.

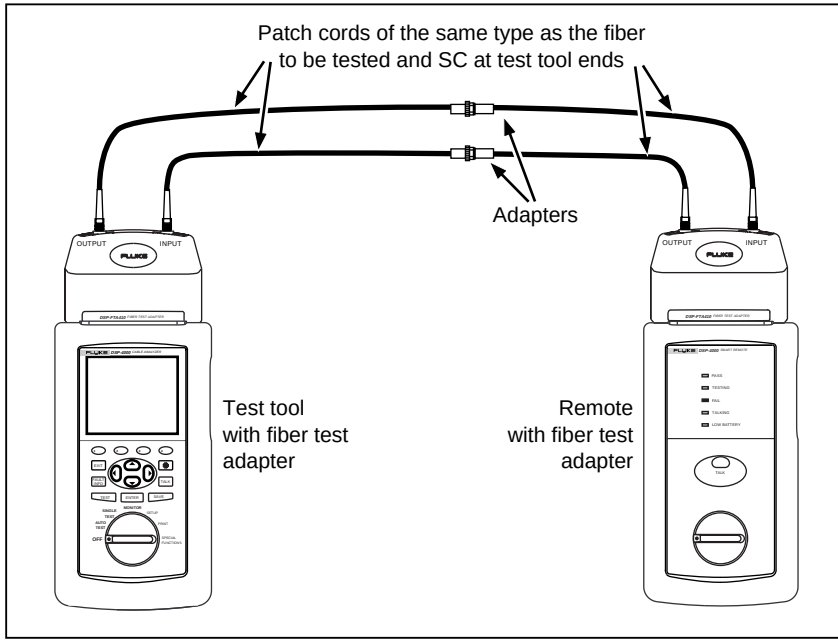

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Figure 5. Setting a Reference for Smart Remote Mode

Setting a Reference for Loopback Mode

1. Turn on the test tool. Let the DSP-FTA410 units warm up for five minutes. Set the remote end configuration to Loopback Mode.
2. Choose two known-good SC/ST patch cords. Clean all fiber endfaces.

   Note

   If the fiber to be tested does not use ST adapters, select patch cords with SC adapters on one end and the appropriate adapters on the other end. Mate the cables with the appropriate adapters.
3. Make the connections shown in Figure 6.
4. Turn the rotary switch to SPECIAL FUNCTIONS. Select `Set Fiber Reference`; then press ENTER.

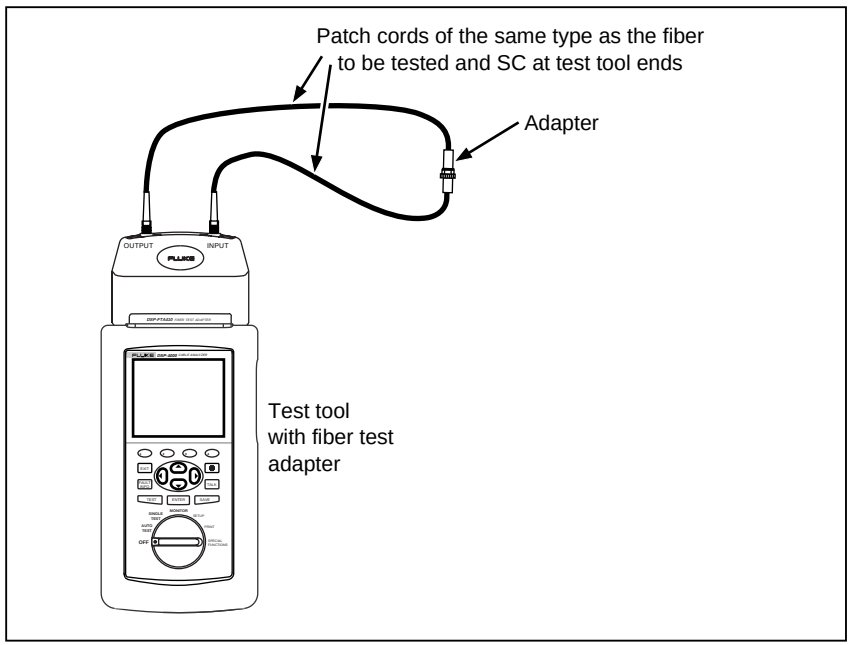

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Figure 6. Setting a Reference for Loopback Mode

Setting a Reference for Far End Source Mode

1. Turn on the test tool and the optional source. Set the remote end configuration to Far End Source Mode. Let the DSP-FTA410 units warm up for five minutes. Let the optional source warm up as required.
2. Choose two known-good patch cords with the appropriate connector types. Clean all fiber connectors.
3. Make the connections shown in Figure 7.
4. Turn the rotary switch to SPECIAL FUNCTIONS. Select **Set Fiber Reference**; then press ENTER.

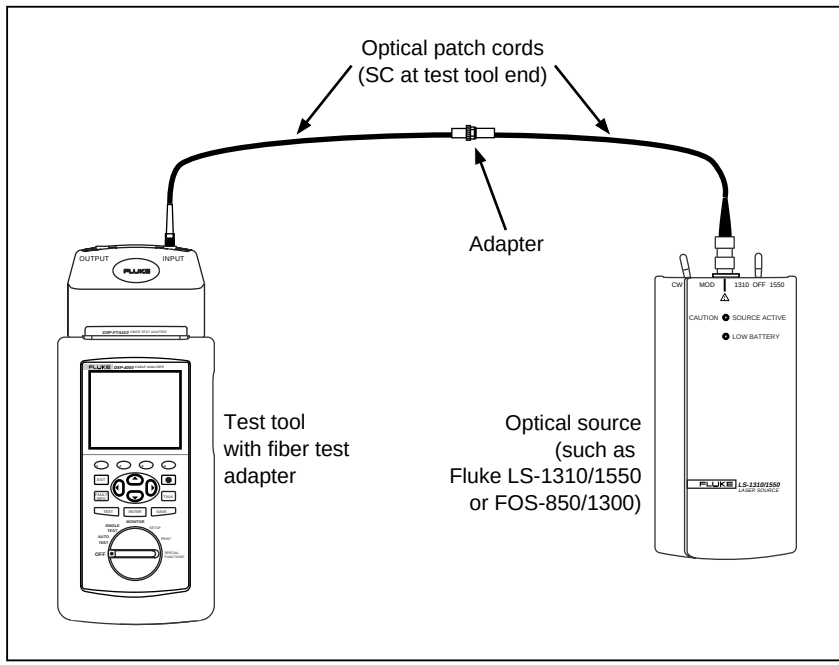

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Figure 7. Setting a Reference for Far End Source Mode

Changing the Index of Refraction

The index of refraction, n, is the ratio of the velocity of light in free space to the velocity of light in a fiber. This value is used with the measured propagation delay to determine fiber length.

The test tool can store n values for 50 µm multimode and 62.5 µm multimode cable types. One set is for the standard tests and four sets are used for custom tests.

If you need to change the factory setting for n to match the fiber you are testing, proceed as follows:

1. Turn the rotary switch to SETUP. Use 4 Page Down and ENTER to find and highlight the index of refraction setting.
2. Use ▼▲ and ◀▶ to adjust the setting to the desired value; then press ENTER.

If you change n for a custom test setup, this n value will be used only for that custom test. If you are not setting up a custom test, the new n value will be used for all tests except custom tests.

Running an Autotest

The Autotest certifies dual-fiber links based on the fiber standard you select. You can also use the Autotest in Far End Source Mode to measure loss on a single fiber. (Using Autotest rather than a Single Test gives you the option of saving the test results.)

You use an Autotest on multimode fiber links to check optical power loss (at 850 nm and 1300 nm), fiber length, and propagation delay. If you use an optional multimode source, such as the Fluke FOS-850/1300 source, Autotest measures optical power loss only.

Singlemode fiber links are tested for loss at 1310 nm and 1550 nm (a separate laser source is required).

Run an Autotest as follows:

1. Turn the test tool's rotary switch to AUTOTEST and turn on the remote (if used). Let the DSP-FTA410 units warm up for five minutes.
2. Verify that the Autotest display shows the correct test standard, cable type, and remote end configuration. You can change these selections in the SETUP mode.
3. Select patch cords of the same type as the fiber to be tested. Refer to Figures 8, 9, and 10 for the number of patch cords required for your remote end configuration. Clean all fiber endfaces.
4. If you wish, you can press 2 **Help** to show how to make the fiber connections. You can select the type of adapter in the SETUP mode. This will be particularly helpful when testing Small Form Factor (SFF) links.
5. Set the reference level if it has not already been set. (See "Setting a Reference" on page 101.)
6. Connect the test tool to the fiber cable as appropriate. Refer to Figures 8, 9, and 10.
7. To start the Autotest, press ENTER.

   If you are using Far End Source Mode, select the wavelength that matches the source; then press ENTER. For other modes, the DSP-4000 test tool automatically switches between 850 nm and 1300 nm during the Autotest.
8. If bi-directional testing is enabled, the test tool stops halfway through the bi-directional Autotest and prompts you to swap the fiber connections. Swap the connections at the patch panel or link connector, not at the DSP-FTA410 ports.

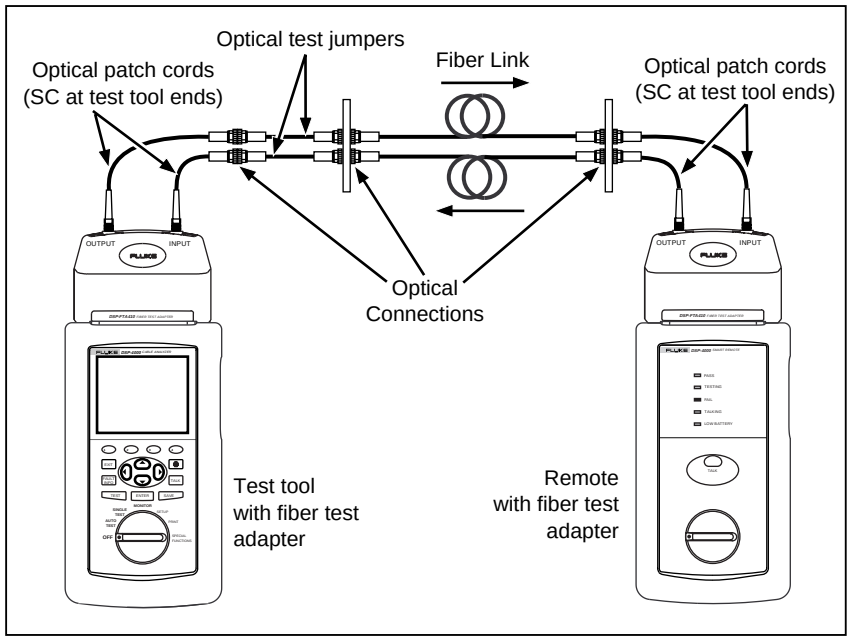

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Figure 8. Test Connections for Smart Remote Mode

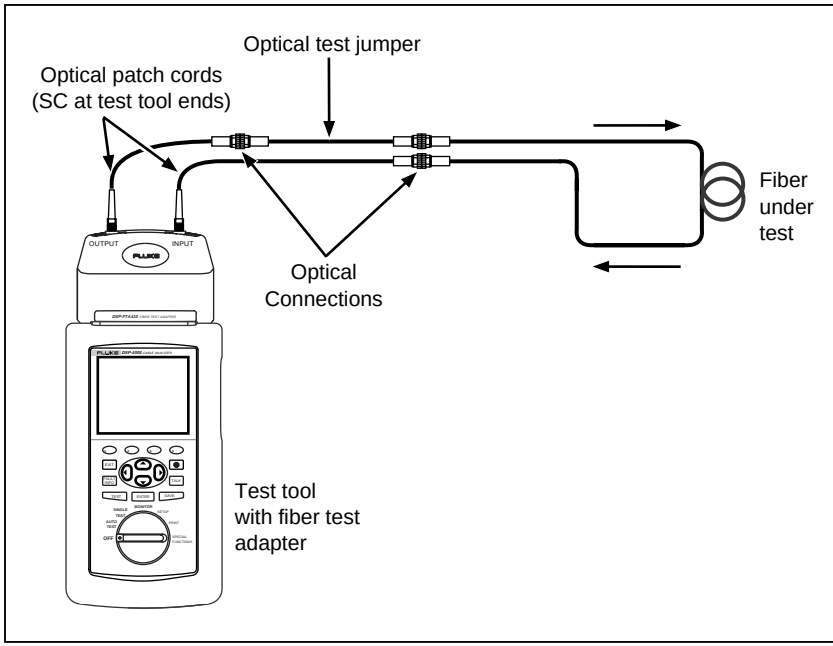

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Figure 9. Test Connections for Loopback Mode

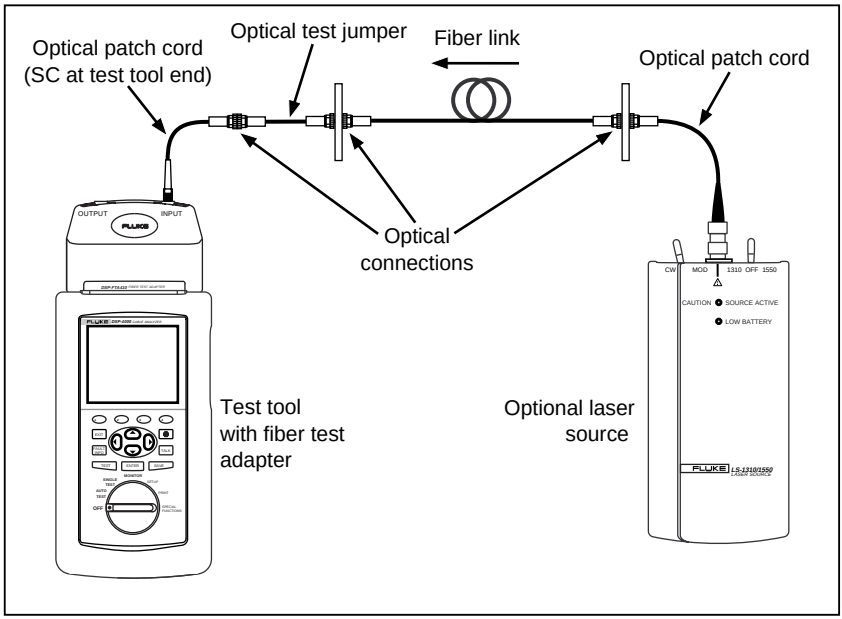

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Figure 10. Test Connections for Far End Source Mode

Saving Autotest Results

To save the results of the last Autotest, press SAVE. Use the test tool's alphanumeric display to enter one or two fiber names, depending on which remote end configuration was used:

- In Smart Remote Mode, the test tool saves two reports for each Autotest: one for the fiber connected to the output port and one for the fiber connected to the input port.

  Enter a name for the fiber connected to the DSP-FTA output port; then press SAVE. Next, enter a name for the fiber connected to the input port; then press SAVE again.

- In Loopback Mode and Far End Source Mode, the test tool saves one report for each Autotest. Enter a name for the fiber; then press SAVE.

You can edit the fiber identification assigned to a saved report as follows:

1. Turn the rotary switch to SPECIAL FUNCTIONS; select `View/Delete Test Reports,` then press ENTER.
2. Select the desired report, then press 1 `View Result` twice (for the Far End Source Mode you only need to press 1 `View Result` once).
3. Press `Rename Report`. Use the alphanumeric display to edit the fiber identification; then press SAVE.

You can edit a custom header, operator name, or site name in the PRINT mode under `Edit Report Identification`.

Autotest Results for Smart Remote Mode

This section describes the DSP-FTA410 fiber tests and the results produced when you run an Autotest using Smart Remote Mode. The descriptions of loss and length tests also apply to Single Tests using Smart Remote Mode.

To see the complete results for a test, press (1) View Result on the first Autotest display, use ▼ to highlight the desired test, then press ENTER.

Pass/Fail and Headroom Results for Smart Remote Mode

The pass/fail result shown on the first Autotest display tells you if the fiber link tested within the limits of the selected test standard.

Headroom is the smallest margin found between the measured power loss and the loss limit. Headroom indicates how much more loss you could have in the link without exceeding the limits of the selected test standard. If you tested two fibers, you can determine which fiber produced the smallest margin by viewing the loss results of the output and input fibers.

Loss for Smart Remote Mode

Loss is the optical power lost through the fiber, adapters, splices, and other components in a fiber link. The test tool determines power loss by calculating the difference between the received power and the reference power level. The loss is compared to the limit allowed by the selected test standard to produce a pass or fail result.

Table 2 describes the loss results for Smart Remote Mode.

Table 2. Loss Results for Smart Remote Mode

Result	Description
Fiber	The fiber (output or input) that corresponds to the test results. If bi-directional testing is enabled, the output fiber is the fiber you connected to the output port of the main unit after swapping the fibers.
Result	Pass means the power loss is less than allowed for the link. Fail means the loss exceeded the limit.
Direction (A-B or B-A):	Direction A-B runs from the main unit to the remote; B-A runs from the remote to the main unit.
Loss (dB)	The measured power loss. Loss is automatically measured at both 850 nm and 1300 nm.
Limit (dB)	The maximum loss allowed by the selected test standard. For some standards, the limit is calculated using the numbers of adapters and splices you entered and the losses allowed for these by the test standard.
Margin (dB)	The difference between the limit and the measured loss. This number is negative if the link failed.

Length Results for Smart Remote Mode

The test tool determines fiber length by measuring the propagation delay through the fiber, then using the index of refraction to calculate the length. Table 3 describes the length results for Smart Remote Mode.

Table 3. Length Results for Smart Remote Mode

Result	Description
Length	The length of each fiber.
Limit	The maximum length the test standard allows for one fiber.
Result	Pass means the measured length is less than the limit. Fail means the length exceeds the limit.
Note *When there is too much loss to determine length, the length is reported as a question mark.*	

Bi-Directional Testing

When you need to test fibers in both directions, the DSP-FTA410 units can perform bi-directional testing and save the bi-directional results for each fiber. You enable this feature in the SETUP mode under **BI-DIRECTIONAL TEST**.

Swapping Connections

To get bi-directional results for Smart Remote Mode, the test tool stops halfway through a bi-directional Autotest and prompts you to swap the fiber connections. Swap the connections on both the main and remote units.

Note

To avoid disturbing the connections to DSP-FTA410 output ports, always swap the connections at the patch panel or adapter, not at the DSP-FTA410 connectors.

The test tool does not support bi-directional testing in Loopback Mode.

In Far End Source Mode, the test tool does not prompt you to swap connections. If you need bi-directional results in this mode, swap the locations of the test tool and the source; change the direction of the test (select A-B or B-A under (2) **Options** on the Far End Source Autotest display); then run a second Autotest.

Bi-Directional Autotest Results

Bi-directional Autotest results list the test directions as A-B and B-A. In Smart Remote Mode, "A-B" runs from the main unit to the remote; "B-A" runs from the remote to the main unit. “Output Fiber” refers to the fiber that you connected to the main unit’s output port after you swapped the fibers.

Autotest Results for Loopback Mode

This section describes the Autotest results for Loopback Mode. The descriptions of loss, length, and propagation delay tests also apply to Single Tests using Loopback Mode.

To see the complete results for a test, press (1) View Result on the first Autotest display, use ▼ to highlight the desired test, then press ENTER.

Pass/Fail and Headroom Results for Loopback Mode

The pass/fail result shown on the first Autotest display tells you if the fiber link tested within the limits of the selected test standard. Headroom indicates how much more loss you could have in the link without exceeding the limits of the selected test standard.

Loss Results for Loopback Mode

Table 4 describes the loss results for Loopback Mode.

Table 4. Loss Results for Loopback Mode

Result	Description
Direction (A-B)	Direction A-B is from the output port to the input port using the connections made when you started the Autotest.
Loss (dB)	The combined loss of all fibers in the link under test. Loss is automatically measured at both 850 nm and 1300 nm.
Limit (dB)	The maximum loss allowed by the selected test standard. For some standards, the limit is calculated using the numbers of adapters and splices you entered and the losses allowed for these by the test standard.
Margin (dB)	The difference between the limit and the measured loss. This number is negative if the link failed

Length Results for Loopback Mode

Table 5 describes the length test results for Loopback Mode.

Table 5. Length Results for Loopback Mode

Result	Description
Length	The measured length. The result shows the combined length of all fibers between the output port and the input port.
Limit	The maximum length the test standard allows for a fiber.
Result	Pass means the measured length is less than the limit. Fail means the length exceeds the limit.
Note *When there is too much loss to determine length, the length is reported as a question mark.*	

Autotest Results for Far End Source Mode

An Autotest using Far End Source Mode measures loss for singlemode or multimode fibers.

The Autotest runs continuously until the EXIT key is pressed. Table 6 describes the results.

The results display also features softkeys that are available only for Far End Source Mode:

- **Options**: Lets you set the direction of the test (A-B or B-A).
- **Power**: Lets you measure optical power at the selected wavelength.

Table 6. Loss Results for Far End Source Mode

Result	Description
PASS/FAIL	Pass means the power loss is less than allowed by the limit. Fail means the loss exceeded the limit.
Loss (dB)	The measured optical power loss.
Limit (dB)	The maximum loss you set with the (2) Options softkey.
Singlemode 1310 nm or 1550 nm	The singlemode wavelength you selected before you ran the Autotest.
Multimode 850 nm or 1300 nm	The multimode wavelength you selected before you ran the Autotest.
A-B or B-A	The direction of the test. To set the direction, press (2) Options; then select the desired direction.
Reference	The current reference value. See the earlier section "Setting a Reference for Far End Source Mode" for information.
Date and time	The date and time the reference was set.

Single Tests

The SINGLE TEST mode on the DSP-4000 rotary switch lets you run individual fiber tests. Single Tests are useful for quick checks of continuity, length, or loss, and for isolating faults and testing repairs. Single Tests run continuously, so you can make adjustments to a link and watch the results as they happen.

Single Tests for Smart Remote Mode

If an Autotest fails, you can use these tests to isolate problems on one of the fibers in a link. To connect for a Single Test in Smart Remote Mode, refer to Figure 8.

- **Loss** (**Output Fiber** or **Input Fiber**): Measures optical power loss on the fiber connected to the main unit's output or input port.
- **Length**: Measures fiber length, as done during an Autotest.
- **Propagation Delay**: Determines the propagation delay of each fiber.
- **Near End Power** or **Far End Power**: Measures the optical power received by the main unit (near end) or the remote unit (far end).
- **Send** (**850 nm** or **1300 nm**): The main unit continuously transmits 850 nm or 1300 nm light from its output port.

Single Tests for Loopback Mode

Use these tests to troubleshoot fiber links, test patch cords, and check spools of fiber before installation.

- **Total Loss**: Measures the optical power loss between the output and input ports of the DSP-FTA410 unit. If two fibers are connected end-to-end with a loopback cable, the total loss of both fibers is displayed.
- **Total Length**: Measures the total length of the fiber between the output and input ports of the DSP-FTA410 unit. If two fibers are connected end-to-end with a loopback cable, the total length of all fibers is displayed.
- **Propagation Delay**: Measures the total propagation delay of the of the fiber between the output and input ports of the DSP-FTA410 unit.
- **Power**: Measures the optical power received at the input port on the main unit. Power is measured at 850 nm and 1300 nm.
- **Send** (**850 nm** or **1300 nm**): Continuously transmits a 850 nm or 1300 nm optical signal at the output port.

Single Test for Far End Source Mode

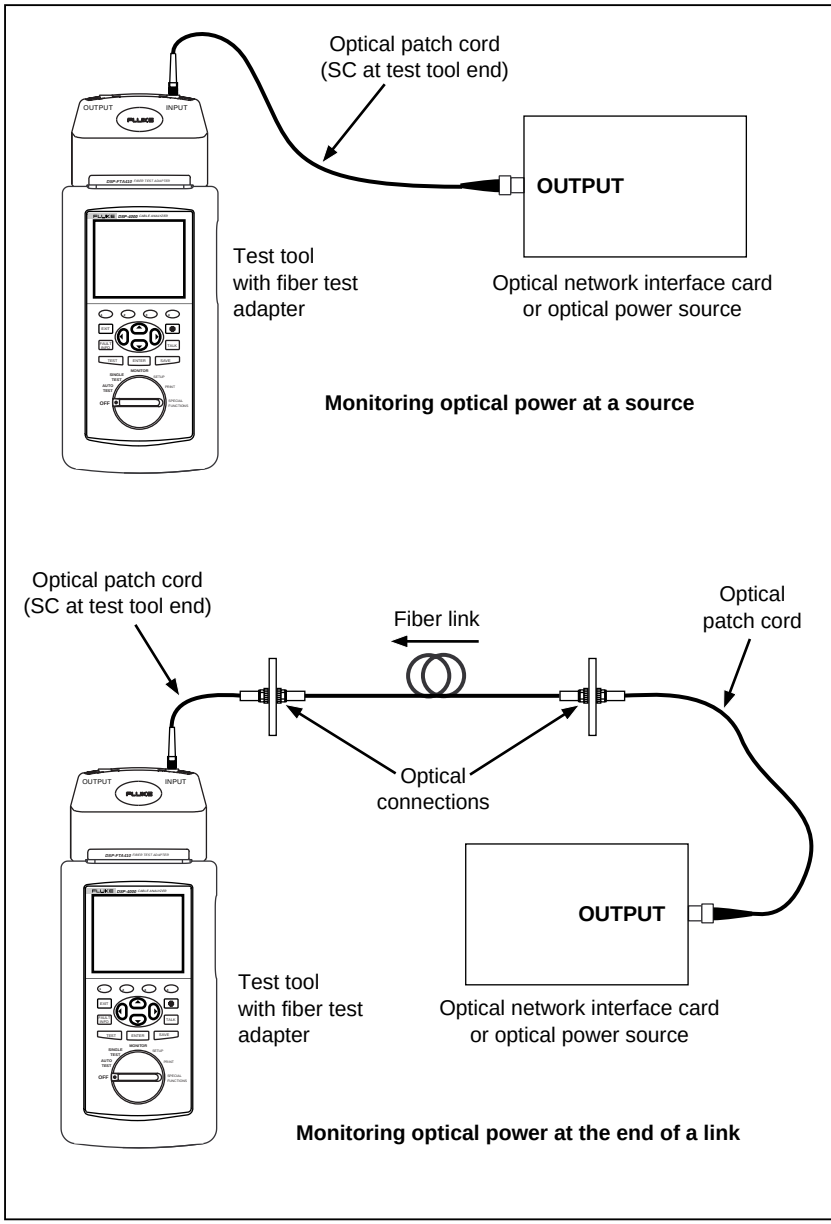
The **Receive** test, which requires a separate multimode or singlemode source at the far end, continuously measures optical power at the main unit. With a multimode source, you can measure power at 850 nm or 1300 nm. With a singlemode source, you can measure power at 1310 nm or 1550 nm.

Monitoring Optical Power

You can use the MONITOR position of the DSP-4000 rotary switch to monitor the output power produced by a source such as an optical network interface card or optical test equipment. You can also monitor the power received at the end of a fiber link.

To monitor optical power, proceed as follows:

1. Select a known-good patch cord. Clean all fiber connectors.
2. Connect the test tool to the optical source as shown in Figure 11.
3. Turn the rotary switch to MONITOR.
4. Select **Optical Power**; then press ENTER.
5. Select the appropriate multimode or singlemode wavelength to monitor; then press ENTER.
6. To switch between measurements in dBm and µW (microwatts), press 1.



tt09f.eps

Figure 11. Monitoring Optical Power

Using the Talk Mode

With two DSP- FTA410 Fiber Test Adapters, you can use the DSP-4000 headsets for two-way voice communication over the two fibers under test.

To use the Talk mode, connect the main and remote units for Smart Remote Mode, then press TALK on either unit. (Refer to Figure 8 for connections.)

To adjust the volume at the main unit, use the ▲ ▼ keys. On the remote unit, press TALK to cycle through the volume settings.

To exit Talk mode, press EXIT on the main unit.

The Talk mode turns off automatically when you start a fiber test or turn the rotary switch to a new position.

Using the FindFiber™ Feature

The FindFiber feature lets you quickly check fiber connectivity and can help you determine which fibers go to which connectors at a patch panel.

Note

The FindFiber feature is not available in Far End Source Mode.

Use the FindFiber feature as follows:

1. For Smart Remote Mode, make the connections shown in Figure 12. For Loopback Mode, make the connections shown in Figure 13.
2. Turn the rotary switch to SPECIAL FUNCTIONS; then press ENTER. Turn on the remote unit if you using Smart Remote Mode.
3. Press ENTER to start the FindFiber test.
4. For Smart Remote mode, try various connections to the patch panel with the main unit's INPUT fiber until the **Receiving Near End** result shows **PASS**. Then, try various connections with the main unit's OUTPUT fiber until the **Receiving Far End** result shows **PASS**. Tables 7 and 8 show the main unit results and remote unit LED results for Smart Remote Mode.

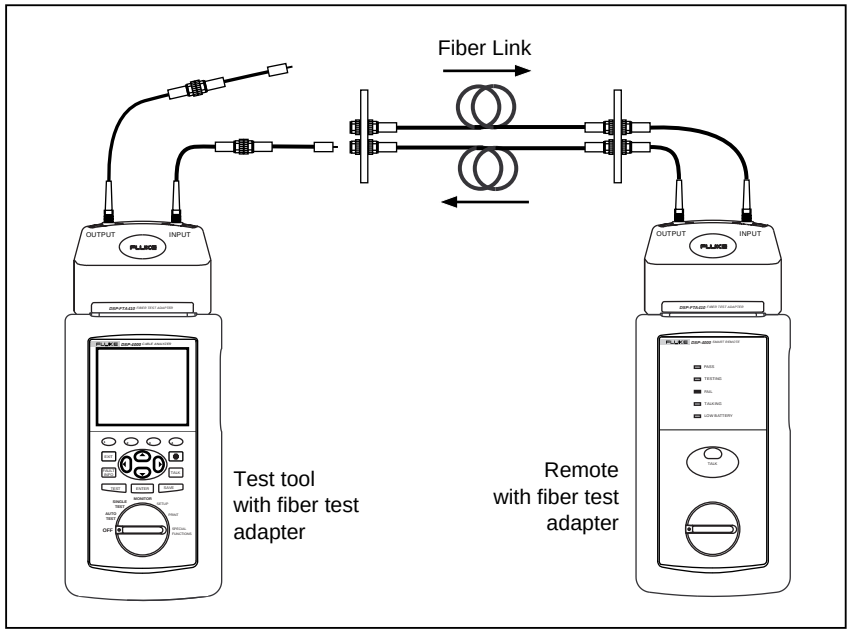
   For Loopback Mode, try various connections with the main unit's INPUT fiber until the **Receiving Near End** result shows **PASS**.

Table 7. Main Unit Results for the FindFiber Test (Smart Remote Mode)

Results	Description
Receiving Near End: FAIL Receiving Far End: ?	The main unit's INPUT fiber path is not complete. The main unit cannot determine the state of the OUTPUT fiber path.
Receiving Near End: PASS Receiving Far End: FAIL	The main unit's INPUT fiber path is complete. The main unit's OUTPUT fiber path is not complete.
Receiving Near End: PASS Receiving Far End: PASS	Both fiber paths are complete.

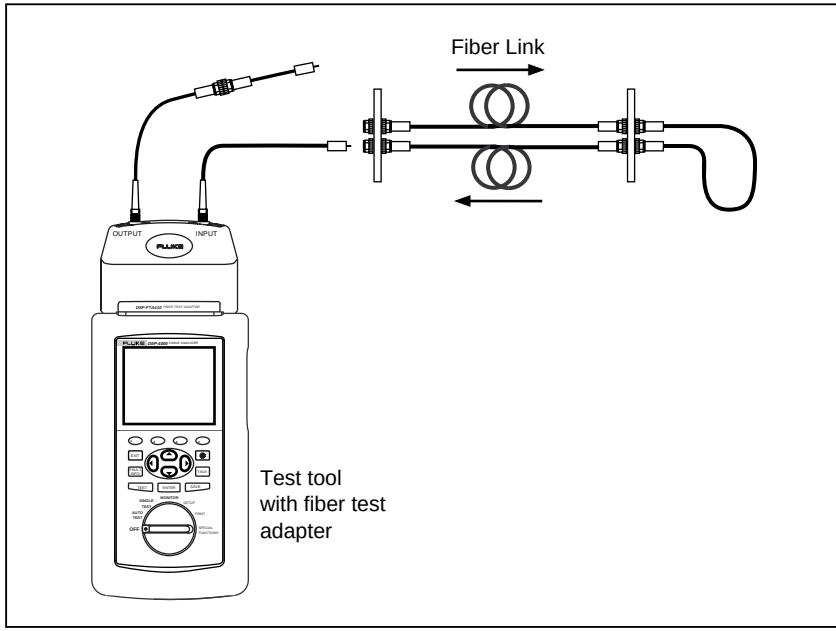
Table 8. Smart Remote LED Results for the FindFiber Test

Results	Description
No LEDs flash	The remote unit's INPUT fiber path is not complete.
Only the TEST LED flashes	The remote unit's INPUT fiber path is complete.
TEST and PASS LEDs flash	Both fiber paths are complete.



tt12f.eps

Figure 12. Using FindFiber with a Smart Remote



tt13f.eps

Figure 13. Using FindFiber with a Loopback Cable

Configuring a Custom Fiber Test

In some cases, you might want to create your own custom test, rather than use the standard tests stored in your test tool. The test tool's Configure Custom Test function lets you define up to four custom fiber standards.

You can set the following parameters for fiber tests:

- Custom test name
- Test standard for default test values (To save time when creating a custom test, you can base your custom test on a test standard or another custom test.)
- Multimode (50 µm or 62.5 µm) or singlemode cable type
- Maximum length of the fiber
- Maximum loss at 850 nm and 1300 nm
- Maximum loss per adapter
- Maximum loss per splice
- Index of refraction (n)

Use **Abort** or EXIT to exit the custom fiber test screens.

Use **Set to Default** to reset a value to the standard value.

Configure a custom test as follows:

1. On the last page of the SETUP mode, select a custom test name; then press ENTER.
2. If you want to edit the name of the custom test, press ENTER; then use the alphanumeric display to enter a new name.
3. To select a test standard, which determines the default values for your custom standard, select the current standard under USE DEFAULT VALUES FROM on page 1 of the custom test displays.
4. To see and change other parameters, return to page 1 of the CONFIGURE CUSTOM TEST displays; then press 4 Page Down.

Fiber Test Reports

Fiber test reports can be saved, viewed, printed, and uploaded to a PC in the same way as other DSP-4000 test reports. See Chapter 5 in the *DSP-4000 Users Manual* for more information.

Maintenance

Clean the case with a soft cloth dampened with water or a mild detergent. Do not use abrasives or solvents.

Clean the optical connectors as described under "Cleaning the Fiber Connections". Always cover the connectors with a dust cap when not in use.

Do not open the DSP-FTA410 case. There are no user-serviceable parts inside.

Calibration

Have the DSP-FTA410 units calibrated at an authorized Fluke Service Center every 12 months.

Repair

If a DSP-FTA410 unit requires service, pack it in the original shipping container and send it, postage paid and insured, to the nearest Fluke Service Center. Include a written description of the problem. Fluke assumes no responsibility for shipping damage. Refer to the warranty for warranty repair terms. Contact the nearest service center for post-warranty repair terms and prices.

Contacting Fluke

To contact Fluke, call one of the following telephone numbers:

USA: 1-888-99-FLUKE (1-888-993-5853)
Canada: 1-800-36-FLUKE (1-800-363-5853)
Europe: +31 402-678-200
Japan: +81-3-3434-0181
Singapore: +65-738-5655
Anywhere in the world: +1-425-446-5500

Or, visit Fluke's Web site at **www.fluke.com**.

Replacement Parts and Accessories

Table 9 shows the replacement parts and accessories available for the DSP-FTA410S Fiber Test Option Set.

Table 9. Replacement Parts and Accessories

Description	Fluke Part Number or Model Number
SC/ST patch cord, multimode, 62.5 µm	FOC-ST/SC
ST/ST test jumper, multimode, 62.5 µm	NF230
ST/ST adapter	NF300SM
SC/SC adapter	NF310SM
Dust cap for the SC connector on the DSP-FTA410 Fiber Test Adapter	669991
LS-1310/1550 Laser Source	LS-1310/1550
FOS-850/1300 Fiber Optic Source (multimode)	FOS-850/1300
DSP-FTA410 Users Manual, English	691656
DSP-FTA410 Users Manual, French	691659
DSP-FTA410 Users Manual, Spanish	691698
DSP-FTA410 Users Manual, Italian	691667
DSP-FTA410 Users Manual, German	691664
DSP-FTA410 Users Manual, Portuguese	691706
DSP-FTA410 Users Manual, Simplified Chinese	691683
DSP-FTA410 Users Manual, Japanese	691691

Specifications

General Specifications

Power supply: ±6 V supplied by the DSP-4000 test tool.

Temperature range: Operating: 0 ºC to +40 ºC; Storage: -10 ºC to +60 ºC

Warm-up time: 5 minutes

Humidity range: Operating: 0 % to 75 % RH, non-condensing
Storage: 0 % to 95 % RH, non-condensing

Certifications: CE c SP us

Dimensions: 3.3” x 4.6” x 1.9” (8.3 cm x 11.6 cm x 4.7 cm)

Weight: 7.6 oz (215 g)

Optical Transmitter

Connector: SC, multimode

Emitter type: LED

Wavelengths: 850 nm and 1300 nm

Power output at 850 nm and 1300 nm: -20 dBm (10 µW), typical
(into 62.5/125 µm fiber)

Power output stability (8 hours) at 850 nm and 1300 nm: ±0.25 dB at 23 °C

Optical Receiver

Power measurement accuracy: ±0.25 dBm at 23 °C, 45 % RH to 75 % RH, -20 dBm for 850 nm and 1300 nm, -10 dBm for 1550 nm

Connector: SC, multimode or singlemode

Detector type: Germanium

Calibrated wavelengths: 850 nm, 1300 nm, 1310 nm, and 1550 nm

Measurement range: 0 dBm to -40 dBm

Power measurement linearity: ±0.25 dB at 23 °C

Length measurement accuracy: ±1.5 m plus 2 % of length

Appendix A
Fiber Troubleshooting Guide

Table 10 on the next page lists some common problems in fiber links and gives possible causes.

Table 10. Common Problems in Fiber Links

Problem	Possible Causes
No power is measured at a source	The optical source is defective. The patch cord is defective.
Power loss is much more than expected	The fibers are connected to the wrong ports on a DSP-FTA410 unit. The fibers are swapped at one end of the link. A patch cord is broken. Retest using a different set of patch cords.
Power loss is somewhat more than expected	There is one or more dirty connections in the link. Clean all fiber endfaces and retest. The number of adapters or splices set in SETUP is too low. The reference power level is incorrect. Set the reference again using the same patch cords to be used for testing. A patch cord or fiber segment has the wrong core size. For example, you are using 62.5 µm patch cords to connect to a 50 µm fiber. Or, you are using multimode patch cords or adapters to connect to singlemode fiber.
A known length of cable measures too long or too short.	The index of refraction is not set correctly for the fiber under test. Set the index of refraction to give the correct length for a known length of the fiber.

Appendix B
Glossary

Adapter

A device used to mate fiber connectors of the same or different styles.

Attenuation

A loss of optical power, mostly due to poor connections or to light diffusion caused by imperfections in the fiber material (scattering).

Bandwidth

The range of frequencies a fiber can transmit without significant power loss.

Buffer

A layer of protective material surrounding the cladding of a fiber. The buffer helps protect the fiber from physical damage.

Cladding

A glass coating surrounding a fiber core to reflect light back into the core.

Core

The light-conducting central portion of an optical fiber.

dBm

A unit of power (in decibels), assuming a reference of 1 mW (1/1000 of a watt).

The dBm unit expresses loss or gain as a ratio of output power to the reference power, as follows:

$$\text{dBm} = 10\left(\log\frac{\text{output power}}{1\ \text{mW}}\right)$$

Full-duplex

Simultaneous transmission of data in two directions.

Headroom

The smallest margin in a set of loss margins.

Index of refraction (n)

The ratio of the velocity of light in a vacuum to the velocity of light in a fiber. Light travels more slowly through a fiber than through a vacuum, so n values are always greater than or equal to one.

Insertion loss

Loss of optical power caused by adding a connector, adapter, splice, or other optical component to a fiber path.

Launch cable

A fiber patch cord used to couple an optical source to a fiber.

Macrobending losses

Light losses due to large-radius bends in a fiber, such as bends made during installation.

Margin

The difference between the measured power loss and the maximum loss allowed for the link.

Microbending losses

Light losses due to microscopic imperfections in a fiber.

Multimode fiber

Fiber with a relatively large core (50 µm or more) that offers many paths, or modes, for propagation of light.

n

See *index of refraction.*

Numerical aperture

A parameter that represents a fiber's ability to gather light. The numerical aperture is the sine of the maximum angle at which a fiber accepts light. A fiber with a higher numerical aperture gathers more light.

Optical power

Optical power measured at a source or the end of a fiber and expressed in microwatts (µW) or in decibels with reference to one milliwatt (dBm).

Propagation delay

The time taken for a light pulse to travel the length of a fiber. Propagation delay is a function of a the length of a fiber and its index of refraction.

Receive cable

A fiber patch cord used to couple a fiber to an optical receiver.

SC connector

Subscription Channel Connector. An optical connector that originated in Japan and provides push-pull connections, low loss, and low backreflection.

Singlemode fiber

Fiber with a small core (8 µm to 10 µm) that offers just one path, or mode, for propagation of light.

ST connector

Straight-Tip Connector. A popular fiber connector originally developed by AT&T.

SFF connector

Small Form Factor Connector. Several different types are available on the market, including the MT-RJ, VF-45, LC, and Fiber Jack.

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