MULTITEST MODULE

FTB-3930

NETWORK TESTING

USER GUIDE

www.exfo.com

Telecommunications Test and Measurement

EXFO

EXPERTISE REACHING OUT

EXFO's Commerce And Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

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Trademarks

EXFO's trademarks have been identified as such. However, the presence or absence of such identification does not affect the legal status of any trademark.

Units of Measurement

Units of measurement in this publication conform to SI standards and practices.

Patents

FASTEST is protected by US patent(s) 5,305,078 and/or 5,455,672.
EXFO's Universal Interface is protected by US patent 6,612,750.

Version number: 3.1.2.7

Contents

Certification Information

F.C.C. Information

Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States. However, compliance verification tests are systematically performed on most EXFO equipment.

CE Information

Electronic test equipment is subject to the EMC Directive in the European Union. The EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has undergone extensive testing according to the European Union Directive and Standards.

DECLARATION OF CONFORMITY

Application of Council Directive(s):	73/23/EEC - The Low Voltage Directive 89/336/EEC - The EMC Directive
Manufacturer's Name:	EXFO ELECTRO-OPTICAL ENGINEERING INC.
Manufacturer's Address:	400 Godin Avenue Quebec, Quebec Canada G1M 2K2 (418) 683-0211
Equipment Type/Environment:	Industrial Scientific Equipment
Trade Name/Model No.:	FTB-3930 MultiTest Module

Standard(s) to which Conformity is Declared:

EN 60825-1: 1994/ A2: 2001	**Safety of Laser Products-Part 1: Equipment Classification, Requirement, and User's guide**
EN 61326: 1997/ A2: 2001	**Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements**
EN 55022: 1998/ A1: 2000	**Limits and methods of measurement of radio disturbance characteristics of information technology equipment**

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive and Standards.

Manufacturer

Signature: 

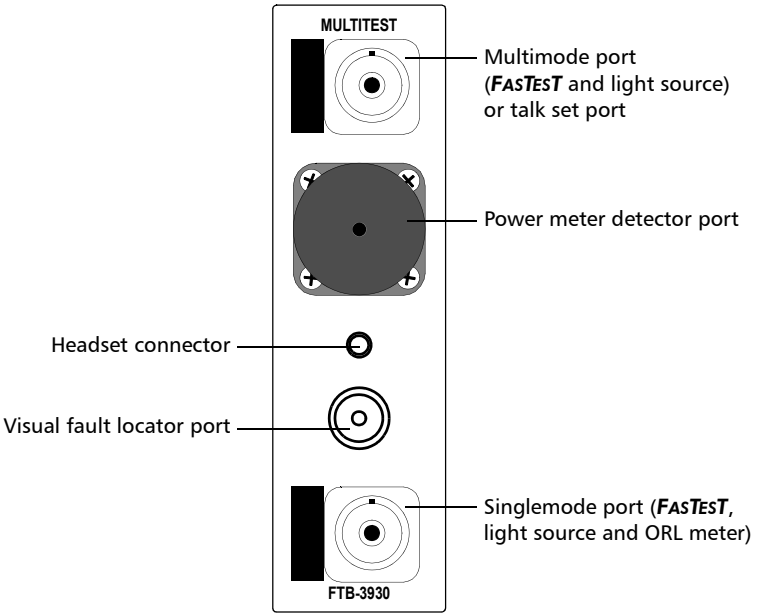
Full Name: Stephen Bull, E. Eng
Position: Vice-President Research and Development
Address: 400 Godin Avenue Quebec, Quebec, Canada
Date: July 20, 2004

1 Introducing the FTB-3930 MultiTest Module

The FTB-3930 MultiTest Module integrates a power meter and light sources with an optical return loss meter, optional talk set and visual fault locator.

Main Features

The unit features ***FASTEST***™, EXFO's one-touch automated measurement. In 10 seconds, you can simultaneously test IL and ORL at up to four wavelengths, in both directions. During the same test, the unit also determines fiber length.



Note: *Optical ports and connectors may differ from the illustration.*

The power meter has the following characteristics:

- Ge, GeX or InGaAs detector with 40 calibrated wavelengths to measure absolute power or link loss
- Editable list of favorite wavelengths for easy access
- Modulated signal detection
- No offset nulling required in normal operation

The light source has the following characteristics:

- Singlemode port (two or three wavelengths), also used for ***FASTEST*** and ORL.

  AND/OR

  Multimode port (two wavelengths), also used for ***FASTEST*** only.
- Modulated or high-power signal compatible with other EXFO units

Other test utilities:

- Text messaging
- Full-duplex digital talk set (optional)
- Visual fault locator to inspect or identify fibers (optional)

Result processing and analysis features (also available in the application):

- Analyze data acquired on the field using a tabular format
- Customizable test thresholds with visual pass/fail analysis
- Transfer data from the FOT-930 Multifunction Loss Tester (using the Handheld Data Transfer application) for easier management and greater storage capacity
- Save your OLTS data in popular text formats (XML, ASCII, etc.) or convert older result files to the new format for analysis
- Customize user settings and cable identification parameters
- Generate and print reports about OLTS data, including user and test location information and operator comments
- ***FASTEST*** results displayed according to FTTx usage and terminology

Typical Applications

You can use the MultiTest Module for several applications, such as:

- Fiber installation and maintenance applications
- FTTx: testing of passive optical networks (PONs)
- Absolute power or link loss measurements
- Bidirectional loss and ORL testing
- Length measurement
- All-in-one tool for contractors

Conventions

Before using the product described in this manual, you should understand the following conventions:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in *death or serious injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *minor or moderate injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *component damage*. Do not proceed unless you understand and meet the required conditions.

IMPORTANT

Refers to information about this product you should not overlook.

2 Safety Information

WARNING

Do not install or terminate fibers while a light source is active. Never look directly into a live fiber and ensure that your eyes are protected at all times.

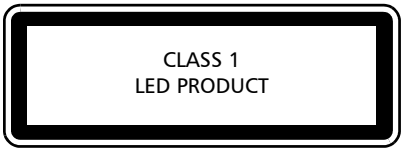
WARNING

Use of controls, adjustments and procedures for operation and maintenance other than those specified herein may result in hazardous radiation exposure.

Laser Safety Information (Units without VFL)

Your instrument is a Class 1 laser or LED product in compliance with standards IEC 60825-1 Amendment 2: 2001 and 21 CFR 1040.10. Laser radiation may be encountered at the output port.

The following labels indicate that a product contains a Class 1 source:

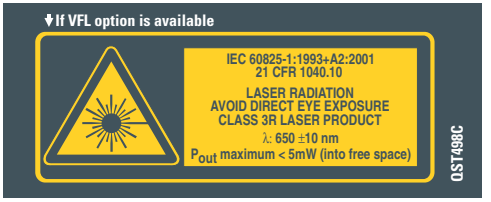


Note: *Labels shown for information purposes only. They are not affixed to your product.*

Laser Safety Information (Units with VFL)

Your instrument is a Class 3R laser product in compliance with standards IEC 60825-1 Amendment 2: 2001 and 21 CFR 1040.10. It is potentially harmful in direct intrabeam viewing.

The following label(s) indicate that the product contains a Class 3R source:



Affixed to side of module

Indicated on front panel

3 Getting Started with Your MultiTest Module

Inserting and Removing Test Modules

CAUTION

Never insert or remove a module while the FTB-400 Universal Test System is turned on. This will result in immediate and irreparable damage to both the module and unit.

WARNING

When the laser safety LED () is flashing on the FTB-400, at least one of your modules is emitting an optical signal. Please check all modules, as it might not be the one you are currently using.

To insert a module into the FTB-400 Universal Test System:

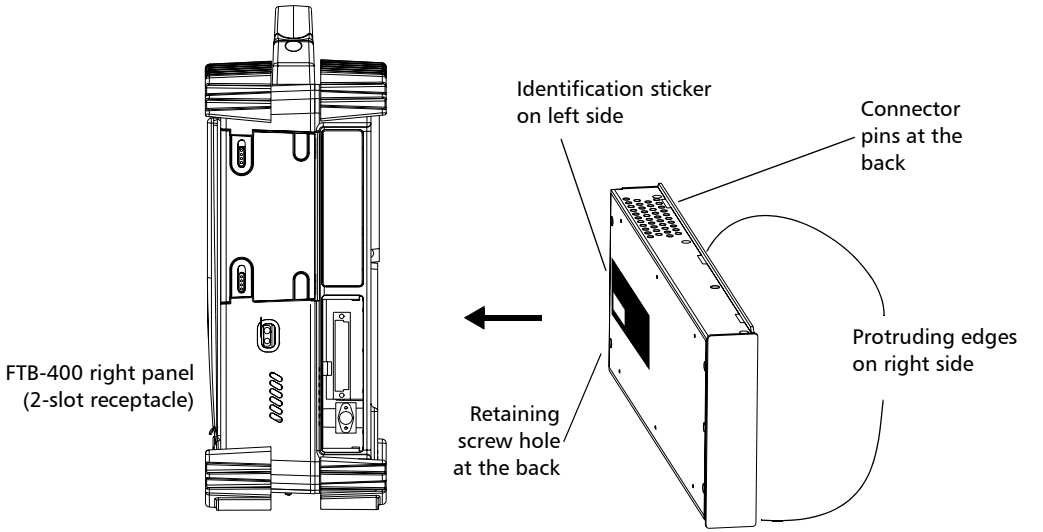
1. Exit ToolBox and turn off your unit.
2. Position the FTB-400 so that its right panel is facing you.

3. Take the module and place it so that the connector pins are at the back, as explained and shown below.

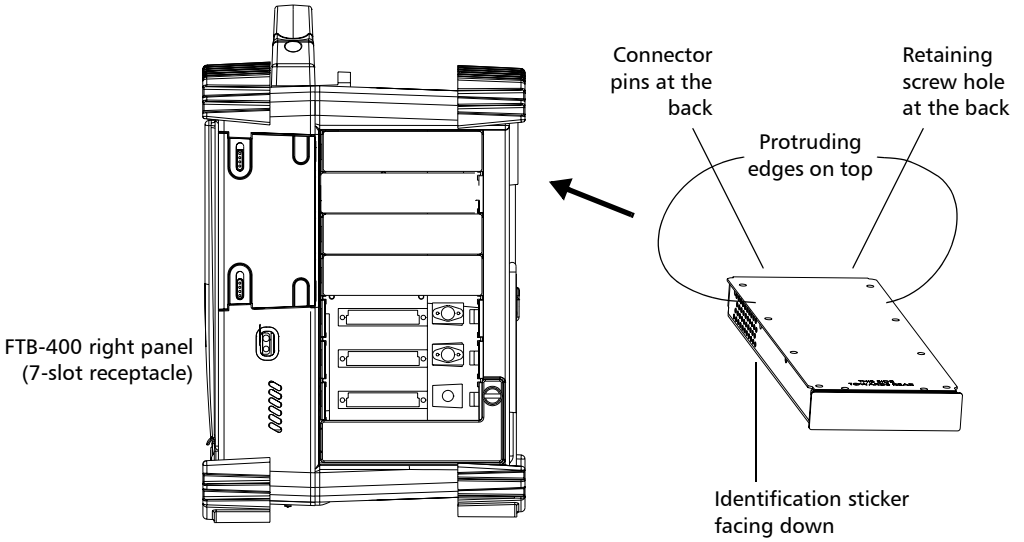
CAUTION

Inserting a module upside down could result in permanent damage to the module, as the connector pins might be bent.

➤ (2-slot or 4-slot receptacles) identification sticker must be on left side and retaining screw hole *under* connector pins.



➤ (7-slot or 8-slot receptacles) identification sticker must be facing down and connector pins at the left of the retaining screw hole.

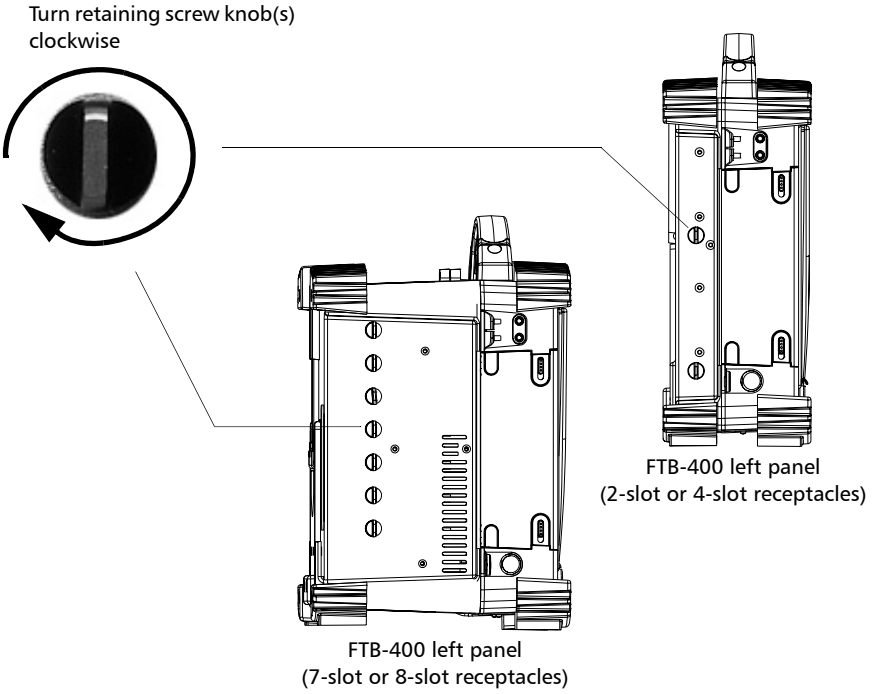


4. Insert the protruding edges of the module into the grooves of the receptacle's module slot.

5. Push the module all the way to the back of the slot, until the retaining screw makes contact with the receptacle casing.

6. Place the FTB-400 so that its left panel is facing you.

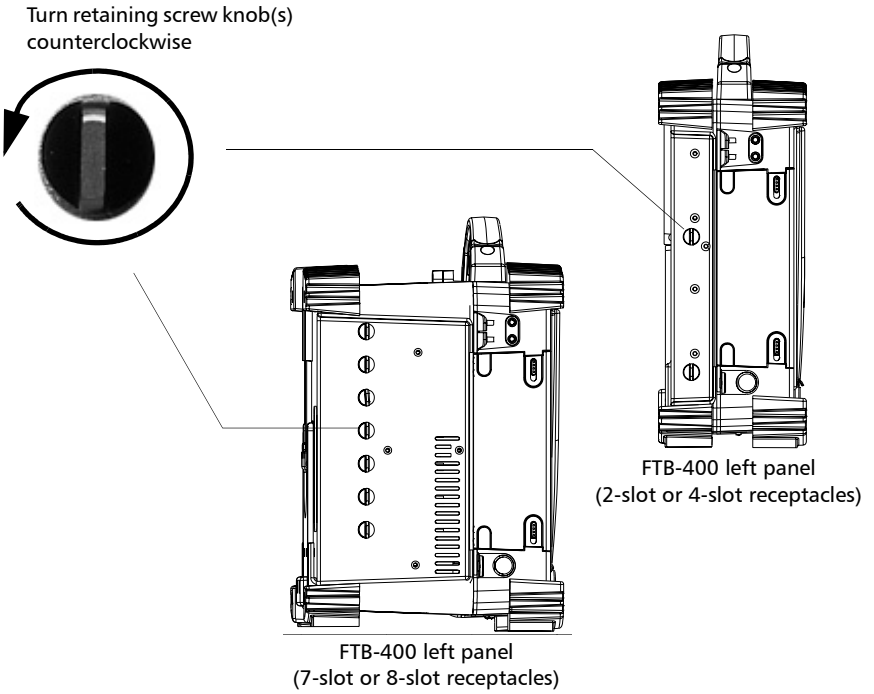
7. While applying slight pressure to the module, turn the retaining screw clockwise until it is tightened. This will secure the module into its "seated" position.



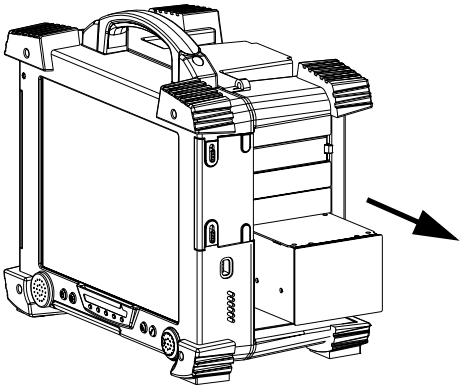
When you turn on the unit, the startup sequence will automatically detect the module.

To remove a module from the FTB-400 Universal Test System:

1. Exit ToolBox and turn off your unit.
2. Position the FTB-400 so that the left panel is facing you.
3. Turn the retaining screw counterclockwise until it stops. The module will be slowly released from the slot.



4. Place the FTB-400 so that the right panel is facing you.
5. Hold the module by its sides or by the handle (*NOT by the connector*) and pull it out.



CAUTION

Pulling out a module by a connector could seriously damage both the module and connector. Always pull out a module by its casing.

6. Cover empty slots with the supplied protective covers.

CAUTION

Failure to reinstall protective covers over empty slots will result in ventilation problems.

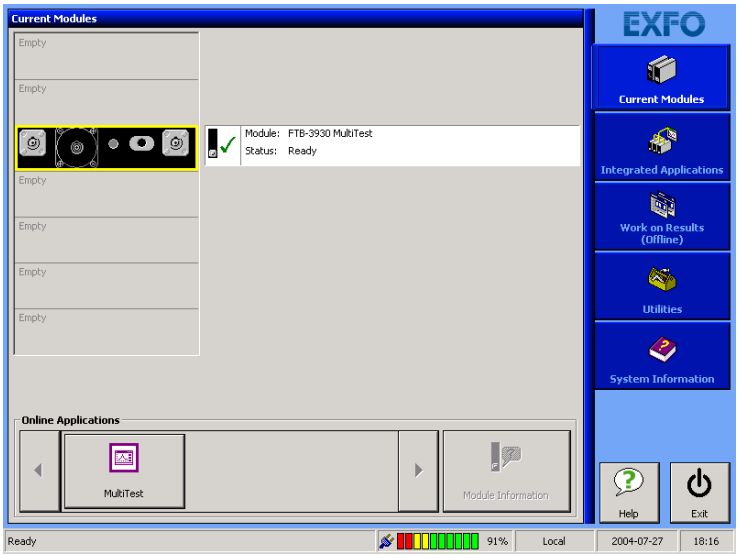
Starting the MultiTest Module Application

Your FTB-3930 MultiTest Module module may be fully configured and controlled from its dedicated ToolBox application.

Note: *For details about ToolBox, refer to the* FTB-400 Universal Test System *user guide.*

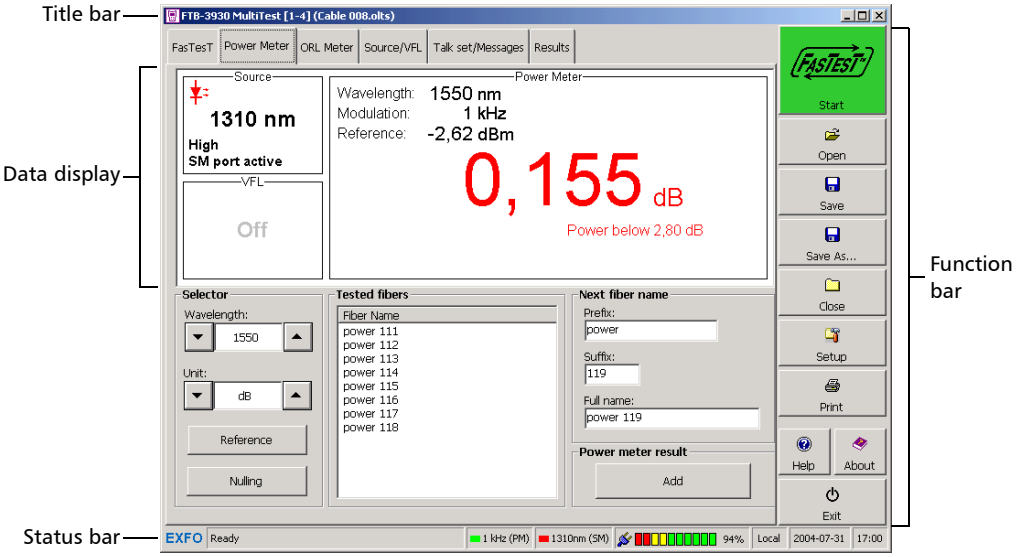
To start the MultiTest Module application:

1. From the **Current Modules** function tab, select the row corresponding to the module you wish to use. It will turn white to indicate that it is highlighted.



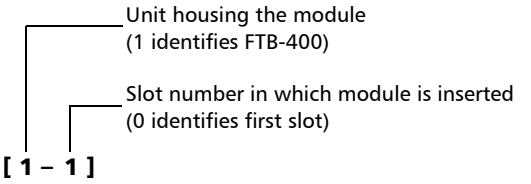
2. Press the corresponding button in the **Online Applications** box.

The main window (shown below) contains all the commands required to control the MultiTest Module:



Title Bar

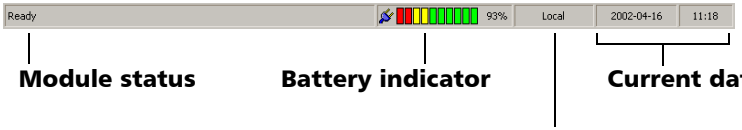
The title bar is located at the top of the main window. It displays the module name and its position in the FTB-400 Universal Test System. The module position is identified as follows:



Note: *On some 7-slot backplanes, slots are marked with a letter from A to G.*

Status Bar

The status bar, located at the bottom of the main window, identifies the current operational status of the FTB-3930 MultiTest Module.



Local: Module controlled locally only.

Exiting the Application

Closing any application that is not currently being used is a good way to free up system memory.

To close the application from the main window:

➤ Click on ☒ (in the top right corner of the main window).

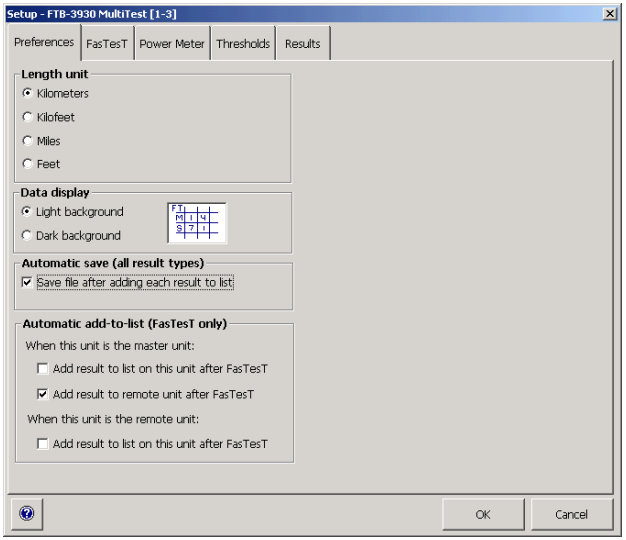
➤ Click on the **Exit** button located at the bottom of the function bar.

4 Customizing Your MultiTest Module

To set a length/distance unit and data display color:

1. From the main window, press **Setup**, then select the **Preferences** tab.
2. Select the desired unit and background color.

Note: *The length unit affects thresholds and fiber length only.*



To automate adding and saving results:

1. From the main window, press **Setup**, then select the **Preferences** tab.
2. Select one or more of the following options:

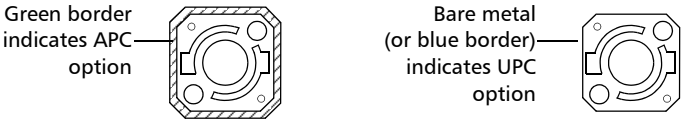
   - **Save file after adding each result to list**: if you select this option, you will not need to manually save your file (with **Save** or **Save As**) after adding your result to the **Tested fibers** list. The asterisk will never appear in the title bar.
   - **Add result to list on this unit after *FASTEST***: if you select this option, you will not need to press **Add** to add your result to the **Tested fibers** list. When your MultiTest Module is the remote unit, it consequently ignores automatic save settings from the master unit.
   - **Add result to remote unit after *FASTEST***: if you select this option and your MultiTest Module is the master unit, the result will automatically be sent and stored on the remote unit.

Note: *For details about naming settings, see* Setting Autonaming Scheme *on page 21.*

5 Setting Up Your MultiTest Module

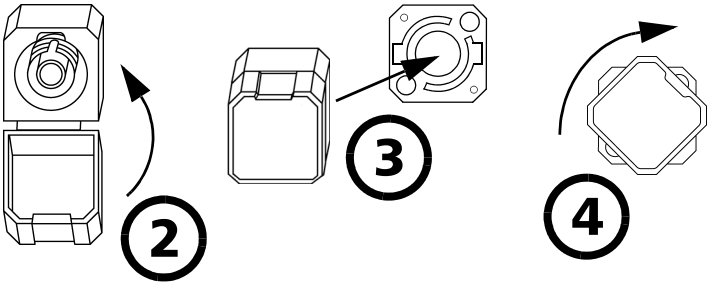
Installing the EXFO Universal Interface (EUI)

The EUI fixed baseplate is available for connectors with angled (APC) or non-angled (UPC) polishing. A green border around the baseplate indicates that it is for APC-type connectors, as shown below:



To install an EUI connector adapter onto the EUI baseplate:

1. Hold the EUI connector adapter so the dust cap opens downwards.



2. Close the dust cap in order to hold the connector adapter more firmly.
3. Insert the connector adapter into the baseplate.
4. While pushing firmly, turn the connector adapter clockwise on the baseplate to lock it in place.

Cleaning and Connecting Optical Fibers

IMPORTANT

To ensure maximum power and to avoid erroneous readings:

- **Always clean fiber ends as explained below before inserting them into the port. EXFO is not responsible for damage or errors caused by bad fiber cleaning or handling.**
- **Ensure that your patchcord has appropriate connectors. Joining mismatched connectors will damage the ferrules.**

To connect the fiber-optic cable to the port:

1. Clean the fiber ends as follows:

   1a. Gently wipe the fiber end with a lint-free swab dipped in isopropyl alcohol.

   1b. Use compressed air to dry completely.

   1c. Visually inspect the fiber end to ensure its cleanliness.

2. Carefully align the connector and port to prevent the fiber end from touching the outside of the port or rubbing against other surfaces. If your connector features a key, ensure that it is fully fitted into the port's corresponding notch.

3. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact.

   If your connector features a screwsleeve, tighten the connector enough to firmly maintain the fiber in place. Do not overtighten, as this will damage the fiber and the port.

Note: *If your fiber-optic cable is not properly aligned and/or connected, you will notice heavy loss and reflection.*

Setting Autonaming Scheme

When starting a new file, the unit suggests an initial fiber name. After adding a result to the **Tested fibers** list, the unit prepares the next fiber name by incrementing the suffix.

When you manually change the name for the first time (in **Power Meter**, **ORL Meter** or ***FASTEST***), the unit then ignores autonaming settings.

IMPORTANT

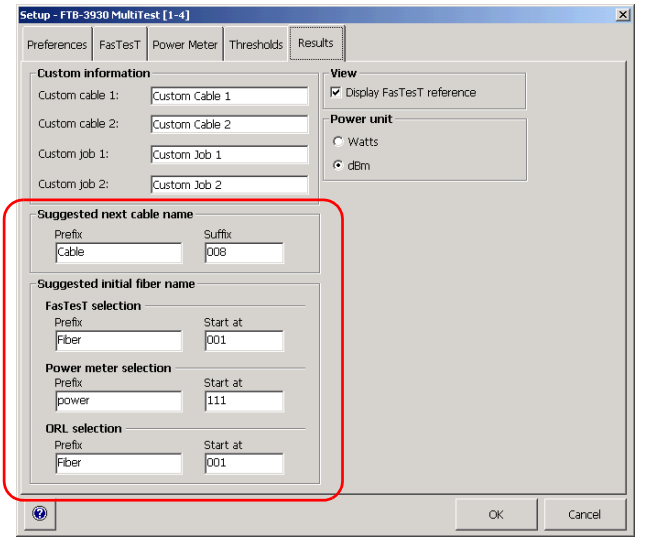
To start using new autonaming settings, you must close the current file.

- Cable names: maximum 60 characters for prefix, plus 3-digit suffix (or Microsoft Windows limitations when name is manually set)
- Fiber names: maximum 11 characters for prefix, plus 3-digit suffix (duplicate names allowed when name is manually set)

Note: *If you manually change a fiber name, then turn the unit off without saving at least one result, this name will be discarded.*

To set the autonaming scheme:

1. From the main window, press **Setup**, then select the **Results** tab.



2. Set the names/values, then press **OK**.

Note: *The cable name you set here will be the suggested file name when saving.*

Setting Pass/Fail Thresholds

You can define groups of thresholds to specify acceptable power (in W or dBm), power reference (in dB), ***FASTEST*** loss (in dB and dB per distance unit) and ORL values (in dB) for each wavelength.

Thresholds are supplied by system manufacturers and depend on the system deployed.

Measurements exceeding a threshold are shown with an exclamation mark. In the test tabs, these measurements also have a red background.

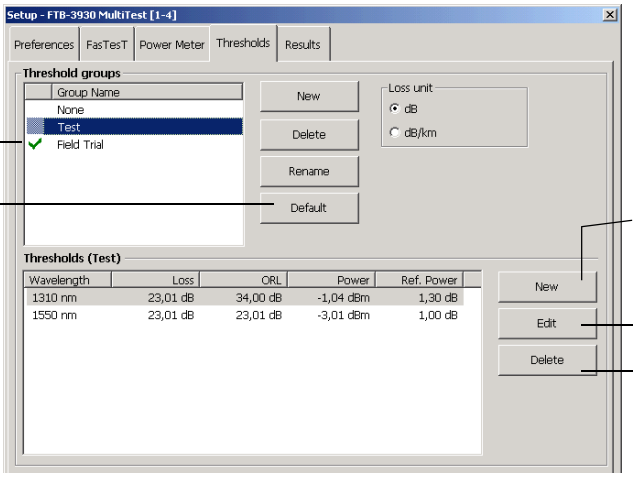
IMPORTANT

Thresholds are not saved with measurements. Results are compared to the threshold group currently *associated* to the file (for *FASTEST* results, not necessarily the master unit).

Note: *When transferring results from handheld unit to computer, thresholds are not transferred along with results.*

To set power, loss or ORL thresholds:

1. From the button bar, press **Setup**, then select the **Thresholds** tab.



Default threshold group (applies to **FasTesT**, **Power Meter** and **ORL Meter** tabs)

Add wavelength and its thresholds

Edit thresholds for selected wavelength

Delete thresholds for selected wavelength

2. In the **Threshold groups** list, select a group to modify.

OR

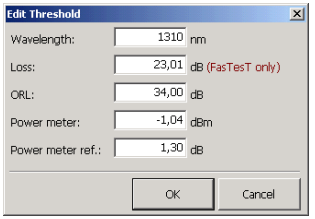
Create a new group by pressing **New**. Duplicate names are allowed, but you should always use distinct names to avoid confusion.

3. Select loss units (dB or dB/distance; distance units are selected in the **Preferences** tab).

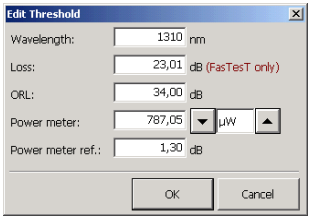
4. In the **Thresholds** list, select a wavelength for which you want to set thresholds, then press **Edit**.

OR

Add a new wavelength to the list by pressing **New**. Wavelengths that are not supported by ***FASTEST*** are simply ignored in ***FASTEST*** result tables.



dBm power units
selected in **Results** tab



Watt power units
selected in **Results** tab

5. In the text boxes, modify threshold values for the selected wavelength, then press **OK** to confirm the new thresholds (or **Cancel** to return to previous values).

➤ You select power units on the **Results** tab.

➤ You select ***FASTEST*** loss units (dB or dB/distance) on the **Thresholds** tab (and distance units on the **Preferences** tab).

6. Press **OK** to return to the main window.

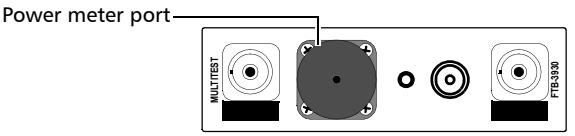
To rename a threshold group:

1. From the **Thresholds** tab, select a group in the **Threshold groups** list.

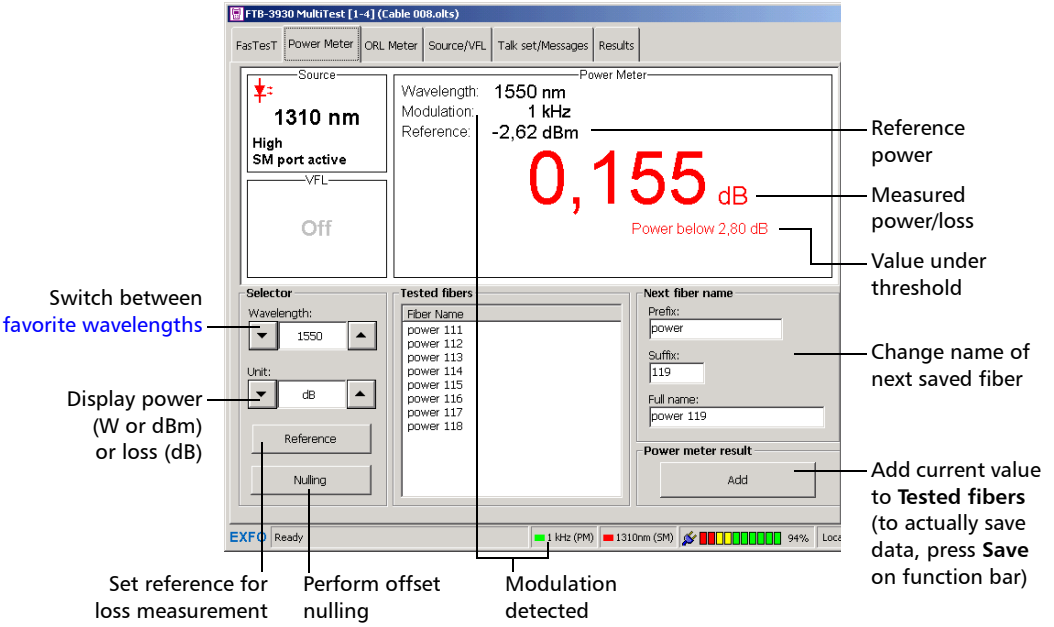
2. Press **Rename**, then set the new name (maximum 64 characters) and press **OK**.

6 Measuring Power or Loss

The FTB-3930 MultiTest Module is equipped with an optical power meter to measure absolute power (in dBm or W) or insertion loss (in dB). The power meter port is independent of the ***FASTEST*** port.



The following functions are available on your power meter:



Defining the List of Favorite Wavelengths

You must put the wavelengths you want to use on a list of favorite wavelengths. Only wavelengths selected from this list are available for measurements.

By default, the list contains 22 of the 40 calibrated wavelengths. It can contain a maximum of 30 wavelengths.

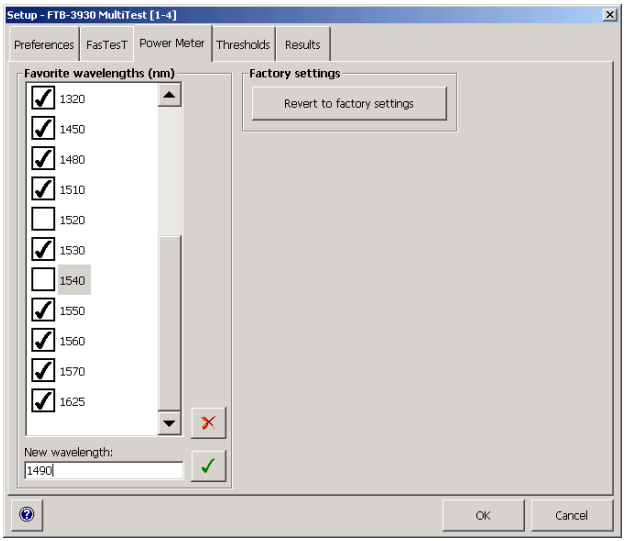
Specifications are guaranteed for calibrated wavelengths only. For other wavelengths, the unit will determine values based on the calibrated wavelengths (3-point interpolation).

Detector Type	Calibrated Wavelengths (nm)	Default Favorite Wavelengths (nm)
➤ InGaAs ➤ Ge	800, 820, 830, 840, 850, 860, 870, 880, 910, 980, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1390, 1450, 1460, 1470, 1480, 1490, 1500, 1510, 1520, 1530, 1540, 1550, 1560, 1570, 1580, 1590, 1600, 1610, 1620, 1630, 1640, 1650.	800, 840, 850, 860, 910, 980, 1280, 1300, 1310, 1320, 1450, 1470, 1480, 1490, 1510, 1520, 1530, 1540, 1550, 1560,1570, 1625.
➤ GeX	All the above, plus 1370 and 1060.	Same as above.

Note: *The list must always contain at least one selected wavelength.*

To customize the list of favorite and selected wavelengths:

1. From the button bar, press **Setup**, then select the **Power Meter** tab.



2. Scroll through the list.
3. Press on the highlighted wavelength to select/deselect it. An X appears beside selected wavelengths.
4. If a wavelength does not appear on the list, enter its value in the **New wavelength** box and press ✓. You can also remove a wavelength from the list by pressing ✗.
5. Repeat these steps for other wavelengths as necessary.
6. Press **OK** to return to the main window.

To revert to the factory-default list:

1. From the button bar, press **Setup**, then select the **Power Meter** tab.
2. Press **Revert to factory settings**.

Nulling Electrical Offsets

Temperature and humidity variations affect the performance of electronic circuits and optical detectors. Nulling the electrical offsets eliminate these effects.

Your unit has been designed not to require offset nulling under normal operation, but you should perform it whenever environmental conditions change significantly or when measuring very low power values.

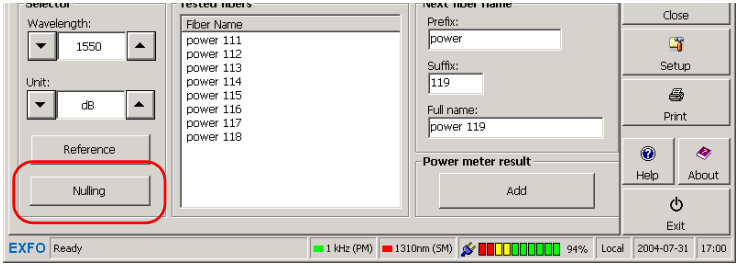
IMPORTANT

Light must not reach detectors when nulling offsets. Always use an EUI or protective screw cap. Do not use a soft rubber cover.

Note: *Starting a nulling automatically deactivates all light sources on the unit.*

To perform an offset nulling:

1. From the main window, select the **Power Meter** tab.



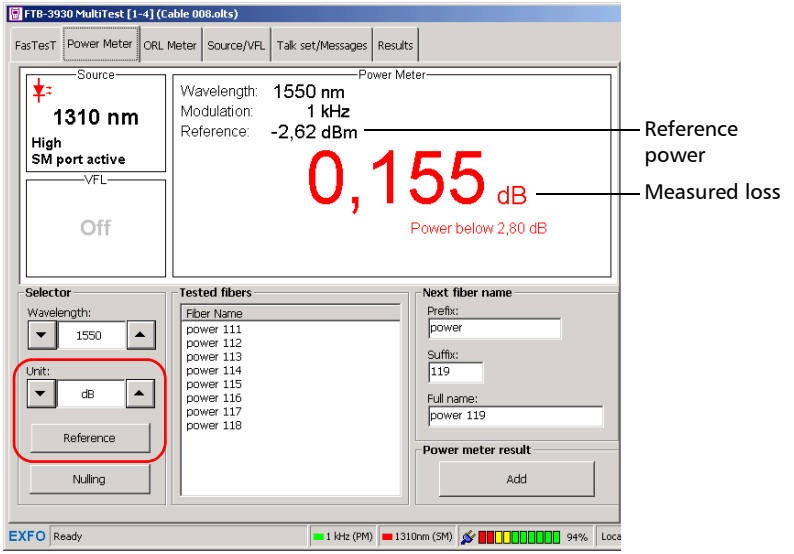
2. Press **Nulling**.

3. Tighten the protective caps on the power meter and ***FASTEST*** ports, then press **OK**.

   The nulling process takes approximately 10 seconds. Nulling status is indicated in the data display. If light is still detected, you will need to place the caps properly and restart.

Referencing Your Power Meter to a Source

In reference mode, your unit displays the loss created by the fiber under test only, since it subtracts a reference value from the measured power.



In the illustration, the reference value (-2.62 dBm) is subtracted from the actual power measured (-2.465 dBm).

Note: *The reference value you set for each wavelength remains in memory until a new one is set for the same wavelength, even when you turn the unit off.*

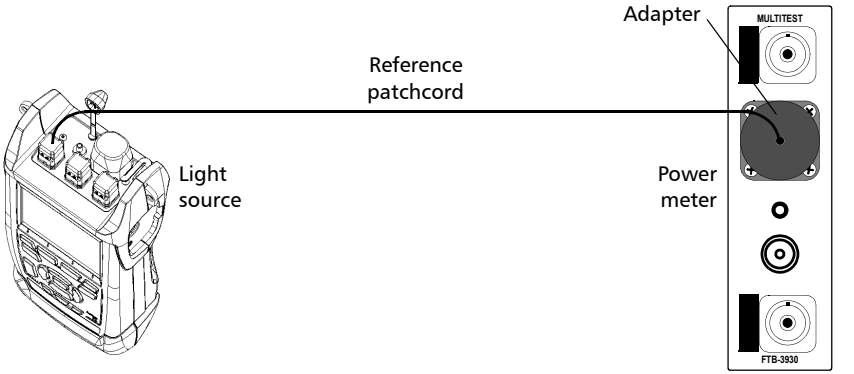
To reference the power meter to a source:

1. From the main window, select the **Power Meter** tab.

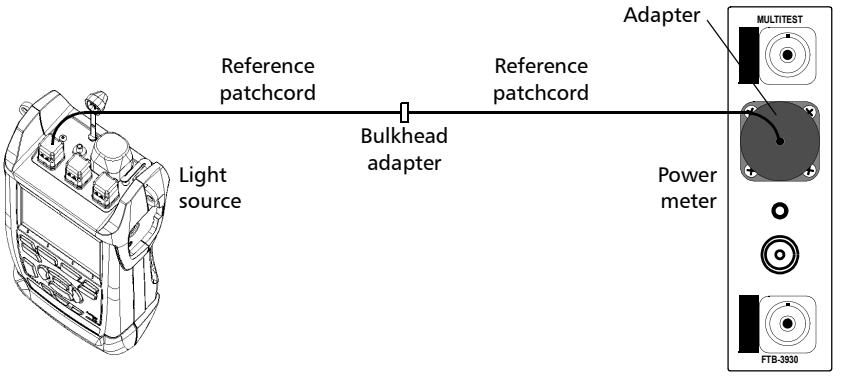
2. Check your fibers and clean them properly for optimum performance (see *Cleaning and Connecting Optical Fibers* on page 20).

3. Using one of the following methods, connect a light source to the power meter port of your unit.

➤ One single reference patchcord



➤ Two reference patchcords and a bulkhead adapter



4. Activate the source at the desired wavelength.

5. Match the power meter wavelength with the source wavelength as follows:

   Scroll through the **Wavelength** list to switch between favorite wavelengths of your power meter (see *Defining the List of Favorite Wavelengths* on page 28).

6. Scroll through the **Unit** list until you get **dB** units to retrieve the last saved reference.

   OR

   Press **Reference** to save the current power as the new reference.

   Reference power appears (in dBm) and current loss is automatically switched to dB.

7. Repeat the procedure for each wavelength you want to reference.

Measuring Power or Loss

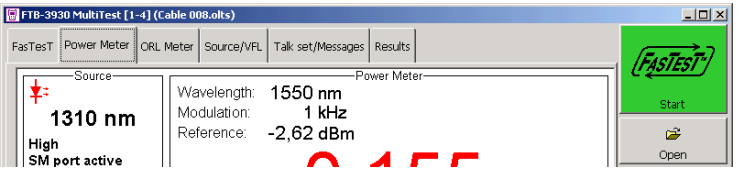
Measuring absolute power or link loss is done the same way, except for the referencing step. You can take power or loss measurements and save them for further analysis.

CAUTION

Connect high-power live fiber to the power meter port only.

To perform power or loss measurements:

1. If necessary, perform an offset nulling (see *Nulling Electrical Offsets* on page 30).
2. From the main window, select the **Power Meter** tab.

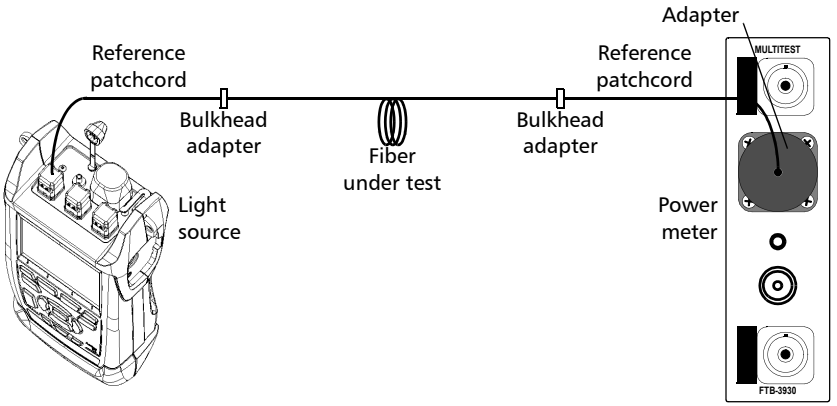


3. Check your fibers and clean them properly (see *Cleaning and Connecting Optical Fibers* on page 20).
4. For loss measurements, reference your power meter to a light source (see *Referencing Your Power Meter to a Source* on page 31), then deactivate the light source.
5. If you have used a single reference patchcord, disconnect it *from the power meter port only*, then attach a second reference patchcord to the power meter.

   OR

   If you have used two reference patchcords, disconnect both of them at the bulkhead.

6. Using bulkhead adapters or the system patch panels, connect a fiber under test to reference patchcords attached to the light source and power meter.

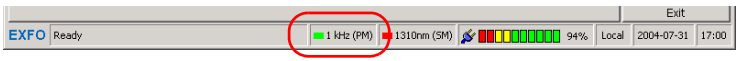


7. Activate the source at the desired wavelength.

8. Match the power meter wavelength with the source wavelength as follows:

   Scroll through the **Wavelength** list to switch between favorite wavelengths of your power meter (see *Defining the List of Favorite Wavelengths* on page 28).

   If the unit detects a modulated signal, it beeps and the signal frequency is indicated in the status bar.



9. Scroll through the **Unit** list to select the desired power (W or dBm) or loss (dB) unit.

10. Add the displayed values to the **Tested fibers** list if you want. If auto-save is activated (see *Customizing Your MultiTest Module* on page 17), results are automatically saved after adding them to the list.

10a. Change the displayed cable and fiber names as needed.

10b. Press **Add** to save the value along with wavelength, reference power, date and time. The fiber name will increment automatically, ready to save the next value.

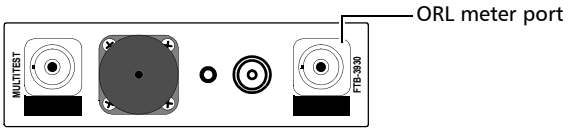
For details about viewing results, see *Managing Test Results* on page 55.

11. Repeat the procedure for other wavelengths.

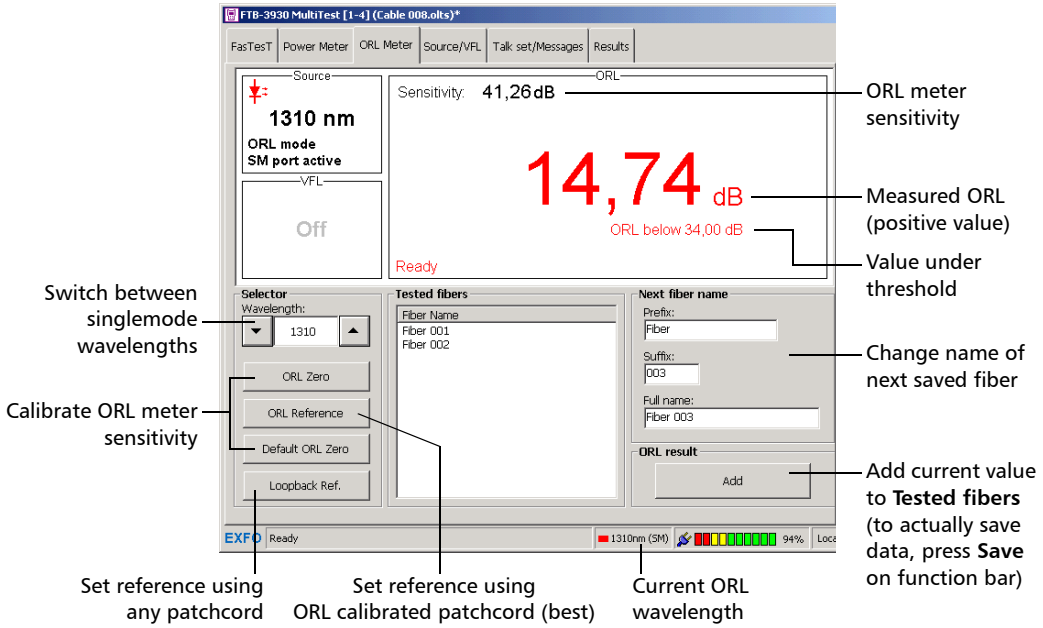
7 Measuring Optical Return Loss

Optical return loss (ORL) is the total effect of multiple reflections and scattering events within a fiber-optic system.

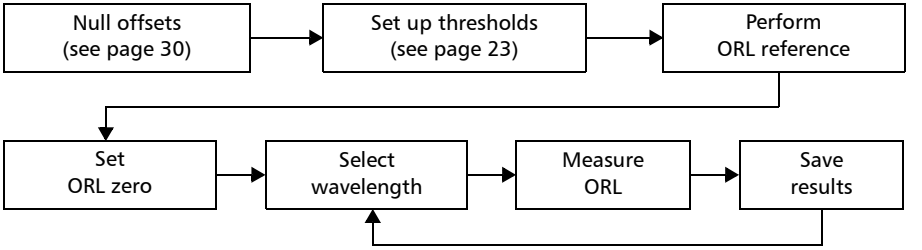
The FTB-3930 MultiTest Module is equipped with an ORL meter to measure ORL for singlemode fibers. The ORL meter uses the ***FASTEST*** SM (singlemode) port only.



The following functions are available on your ORL meter:



The ORL measurement procedure is outlined below:



Performing ORL Reference and Setting ORL Zero Value

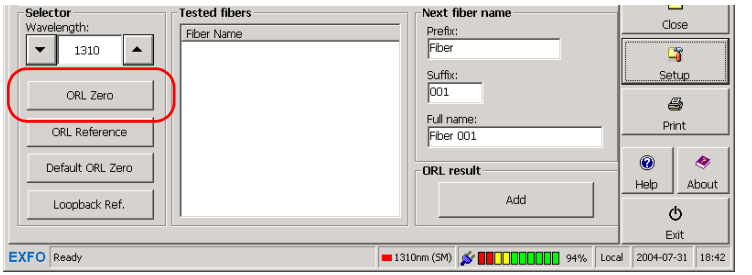
The ORL zero measurement eliminates the effects of backreflection on the link *before* the component under test, so your unit displays only the backreflection of this component.

You should set a new ORL zero:

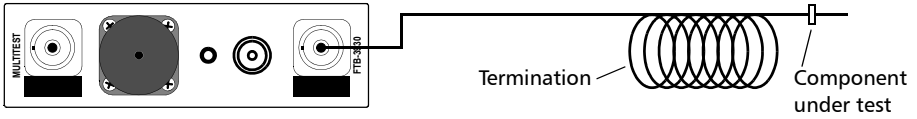
- when you change the measurement patchcord (the one connected to the DUT, not the reference patchcord)
- when you remove a connection between the unit and mandrel

To set the ORL zero value (all wavelengths at once):

1. From the main window, select the **ORL Meter** tab.
2. Press **ORL Zero**.

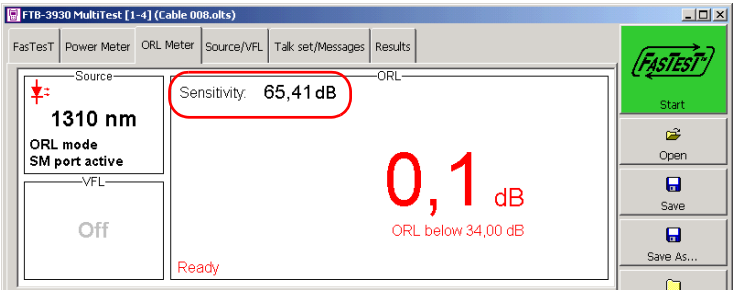


3. Connect a patchcord to the ***FASTEST*** SM port.



4. Terminate the fiber as close as possible *before* the component under test. Wrap it at least 10 turns around a mandrel or small diameter tool, adding turns until the reading stabilizes.

5. Press **OK** to save the ORL zero value, then remove the termination.



To revert to the factory-default ORL zero value:

1. From the main window, select the **ORL Meter** tab.

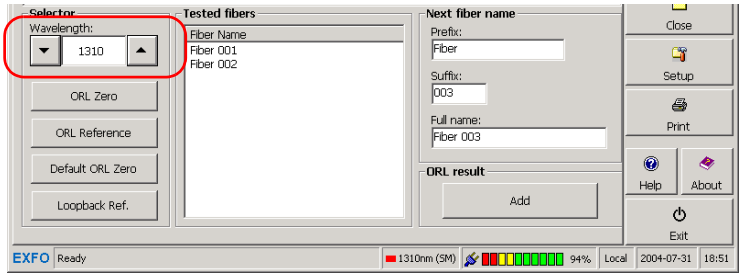
2. Press **Default ORL Zero**.

Performing and Saving ORL Measurements

You can define ORL thresholds (see *Setting Pass/Fail Thresholds* on page 23) before or after measuring ORL. ORL values below thresholds are displayed in red.

To measure ORL:

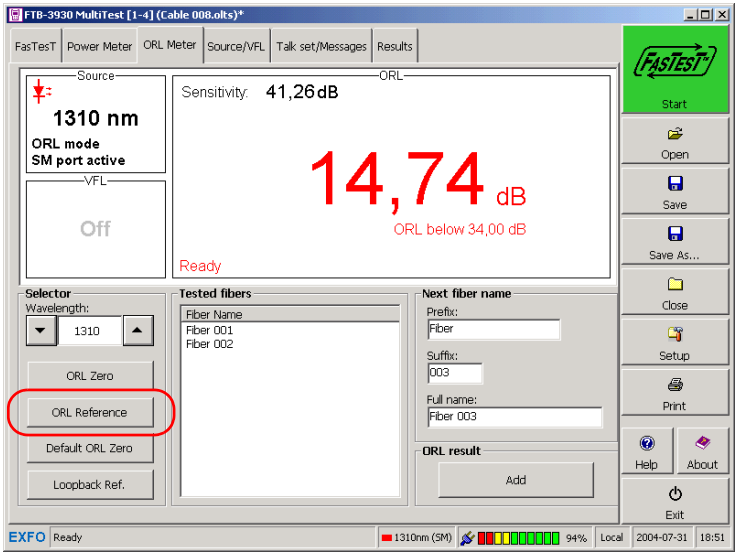
1. If necessary, perform an offset nulling (see *Nulling Electrical Offsets* on page 30).
2. From the main window, select the **ORL Meter** tab.



3. Scroll through the **Wavelength** list to select a singlemode wavelength.
4. Check your fibers and clean them properly (see *Cleaning and Connecting Optical Fibers* on page 20).
5. Connect a fiber to the ***FASTEST*** SM port of your unit.
6. Perform an ORL reference with one of the following:

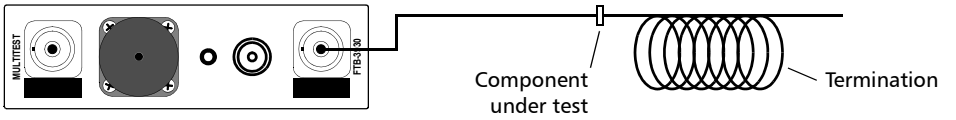
   ➤ If you are using the optional ORL calibrated patchcord (14.7 dB), equipped with an APC connector, press **ORL Reference**.

   ➤ If no such patchcord is available, press **Loopback Ref** and use a patchcord with a UPC connector, but do not connect it to the power meter port. During the reference, the patchcord end should remain in the air (reflections occurring at a fiber-to-air interface correspond to a constant of 14.7 dB).



7. Perform an ORL zero measurement (see *Performing ORL Reference and Setting ORL Zero Value* on page 38).

8. Terminate the fiber as close as possible *after* the component under test. Wrap it at least 10 turns around a mandrel or small diameter tool, adding turns until the reading stabilizes.



Note: *Avoid bending the fiber between the unit and the termination point.*

The displayed value represents the ORL of the component under test.

9. Add the displayed values to the **Tested fibers** list if you want. If auto-save is activated (see *Customizing Your MultiTest Module* on page 17), results are automatically saved (along with wavelength, date and time) after adding them to the list.

9a. Change the displayed cable and fiber names as needed.

9b. Press **Add**. The fiber name will increment automatically, ready to save the next value.

For details about viewing results, see *Managing Test Results* on page 55.

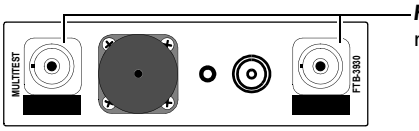
10. Repeat procedure for other wavelengths if necessary.

8 Performing Automated IL/ORL/Length Measurements (FASTEST)

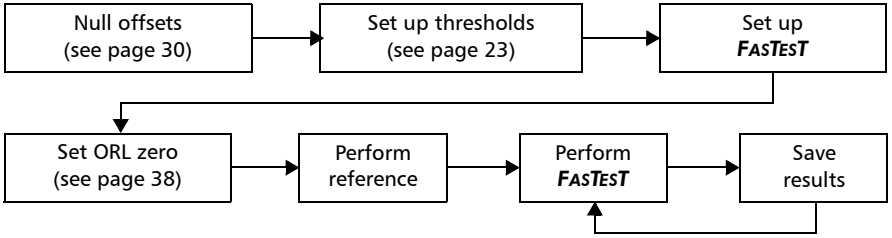
FASTEST allows you to perform 2- or 3-wavelength bidirectional loss and ORL tests for singlemode fibers, or 2-wavelength loss tests for multimode fibers, in 10 seconds (including fiber length measurement).

FASTEST is useful in high-fiber-count installations. Activated at the touch of a button, ***FASTEST*** cuts down on training time and provides error-free results.

To use ***FASTEST***, you need a compatible unit (such as FTB-3930, FOT-930, FOT-920 or FTB-3920, but not the FOT-910). The unit at the remote end is only used to establish references. It then waits for commands from the unit initiating ***FASTEST*** (master).



The ***FASTEST*** procedure is outlined below:



Setting Up the *FASTEST*

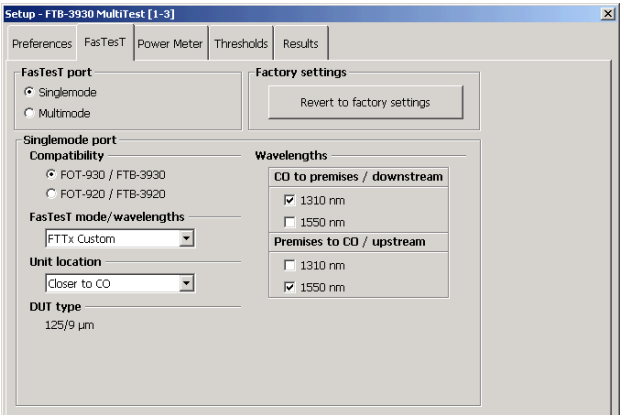
You can configure the ***FASTEST*** on the master unit only. The remote unit will automatically adapt to these parameters (***FASTEST*** parameters on remote unit are ignored).

Setup includes the following elements:

- Port and DUT (fiber) type: multimode ***FASTEST*** will not include ORL.
- Compatibility: select **FOT-930** / **FTB-3930** for fast, two- or three-wavelength testing including ORL (it requires two FOT-930/FTB-3930). Use **FOT-920** / **FTB-3920** when other unit is an FOT-920 or FTB-3920.
- Mode/wavelengths: select one or more wavelengths for the ***FASTEST***. Depending on your choice, the ***FASTEST*** will include loss and/or ORL measurements. Selecting **FTTx Custom** or **FTTx All** allows you to define upstream and downstream wavelengths.
- Unit location: in FTTx mode, you specify if the master unit is closer to the CO (or to the premises) than the remote unit.

To set up the FASTEST:

1. From the button bar, press **Setup**, then select the ***FASTEST*** tab.



2. Select the ***FASTEST*** parameters.

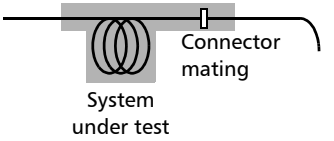
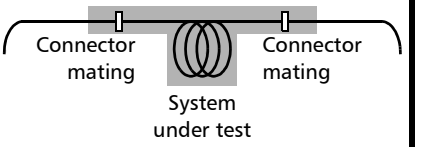
To revert to factory-default FASTEST settings:

1. From the button bar, press **Setup**, then select the ***FASTEST*** tab.
2. Press **Revert to factory settings**.

Referencing Units for *FASTEST*

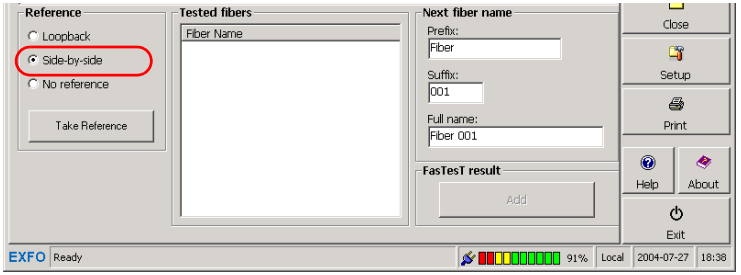
Referencing subtracts the loss caused by the test setup components from the overall loss measured during ***FASTEST***. The final result represents the loss inserted by the system under test alone.

Two referencing methods are available:

	Side-by-Side Method (Best)	Loopback Method
Description	Reference taken with both units together using their ***FASTEST*** ports. *Slightly more accurate* value than loopback method.	Reference taken separately on each unit (***FASTEST*** port connected to power meter port).
Location of units	Must be at same location.	Can be at different locations.
Loss included in ***FASTEST*** result	Loss due to system under test and one connector mating.  	Loss due to system under test and the two connector matings. 
Elements to consider	Includes neither an ORL reference nor an ORL zero measurement. To obtain them, use the **ORL Meter** pane (see Performing ORL Reference and Setting ORL Zero Value *on page 38*). With multiple referencing, you may coordinate an FTB-3930 with up to 10 FOT-930 units.	When measuring ORL (***FASTEST*** or ORL meter), accounts for connector loss and adjusts ORL calibration accordingly. Not recommended for short links.

To perform a side-by-side reference:

1. On the master unit (the one initiating the test), select the ***FASTEST*** tab.

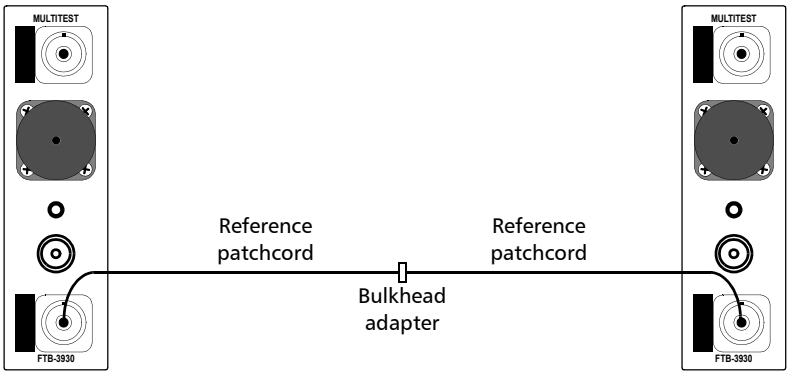


2. In the **Reference** pane, select the **Side-by-side** reference type. The data display shows previous reference values (if any) for the *currently connected remote unit*.

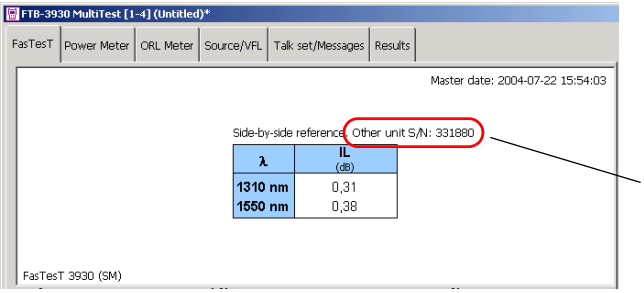
IMPORTANT

With its *multiple referencing* feature, your unit saves the last 10 side-by-side references for each DUT type and compatibility mode.

3. Connect both units through their ***FASTEST*** ports, using two reference patchcords and a bulkhead adapter.



4. Press **Take Reference**. After a few seconds, the unit displays new reference values for each wavelength on both units. If values are not acceptable, try to clean connectors and repeat this step.



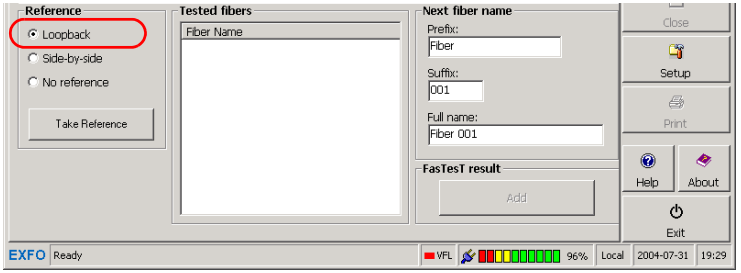
5. Disconnect the two patchcords *from the bulkhead only* and connect them to the fiber under test (using bulkhead adapters or the system patch panels).

IMPORTANT

- **You can turn off the unit without losing the reference.**
- **If you disconnect the patchcords from the *FASTEST* ports, you must take a new reference.**

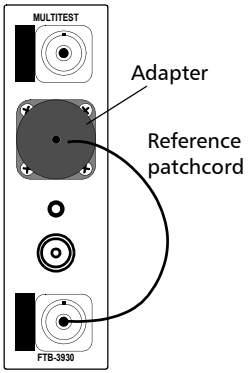
To perform a loopback reference:

1. On the master unit (the one initiating the test), select the ***FASTEST*** tab.

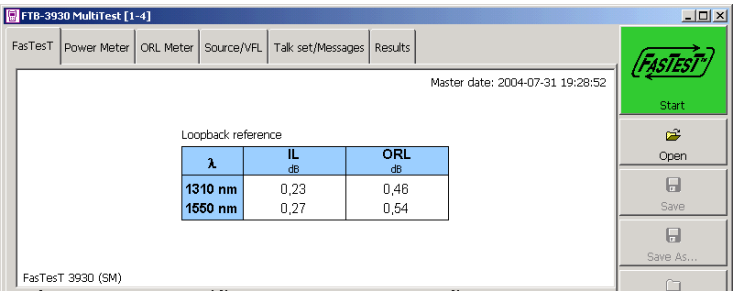


2. In the **Reference** pane, select the **Loopback** reference type. The data display shows previous reference values (if any).

3. Connect a reference patchcord from the ***FASTEST*** port to the power meter adapter.



4. Press **Take Reference**. After a few seconds, the unit displays new reference values for each wavelength. If values are not acceptable, try to clean connectors and repeat this step.



5. Disconnect the reference patchcord *from the power meter adapter only* and connect it to the fiber under test.

IMPORTANT

- **You can turn off the unit without losing the reference.**
- **If you disconnect the patchcord from the *FASTEST* port, you must take a new reference.**

6. Repeat the procedure with the second unit.

Performing the *FASTEST*

Although ***FASTEST*** requires two units (one at each end of the fiber under test), you initiate it from only one (the master). Both units use ***FASTEST*** settings from the master unit.

To perform a FASTEST:

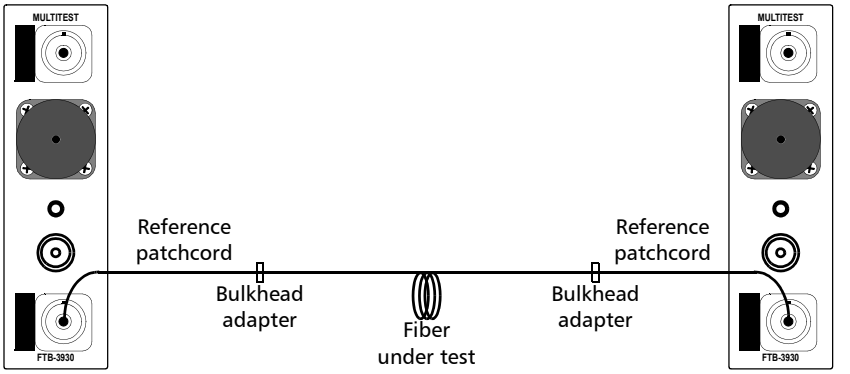
Unit A (Master)	Unit B
1. If necessary, null the offsets (see *Nulling Electrical Offsets* on page 30).	**1.** If necessary, null the offsets.
2. Clean your fibers properly (see *Cleaning and Connecting Optical Fibers* on page 20).	**2.** Clean your fibers properly.
3. Set up the ***FASTEST*** (see *Setting Up the FasTesT* on page 44).	
4. If you are testing ORL, perform an ORL zero measurement from the **ORL Meter** pane (see *Performing ORL Reference and Setting ORL Zero Value* on page 38).	**3.** If you are testing ORL, perform an ORL zero measurement from the **ORL Meter** pane.
5. Reference your unit (see *Referencing Units for FasTesT* on page 46).	**4.** Reference your unit.

Unit A (Master)

6. Connect reference patchcord to fiber under test (as shown):

Unit B

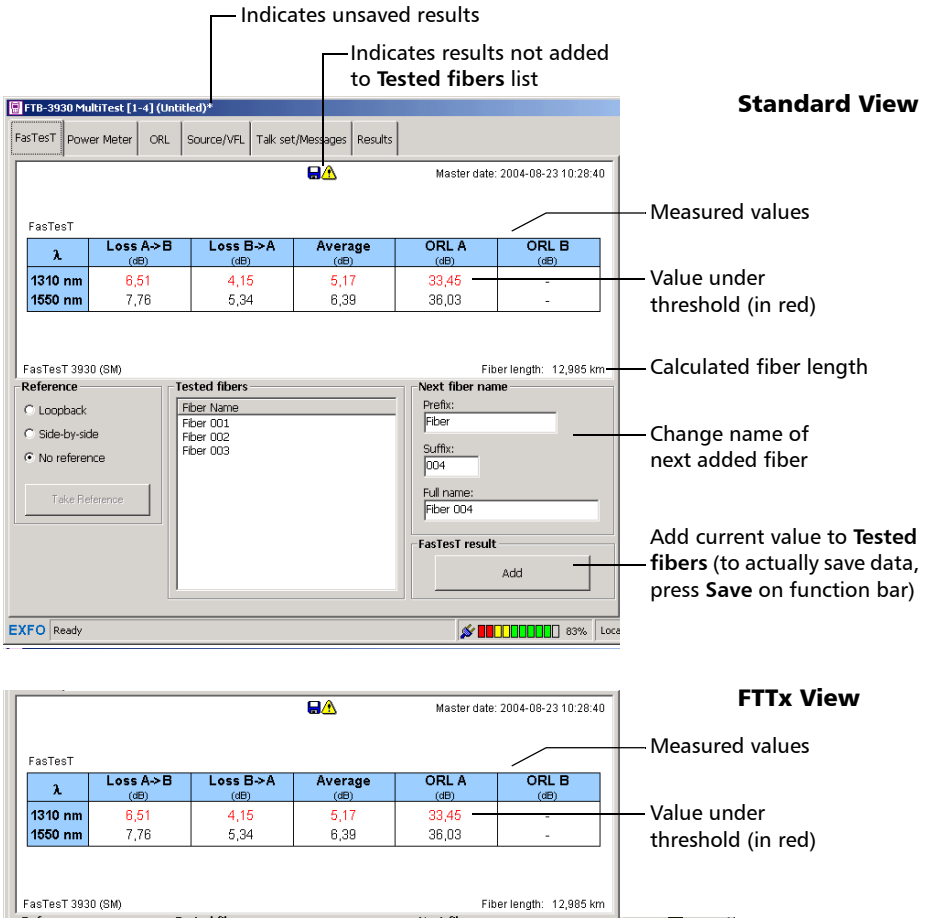
5. Connect reference patchcord to fiber under test (as shown):



7. From the button bar, press ***FASTEST*** (large green button).

Unit A (Master) **Unit B**

The units establish communication and automated tests begin. Measurements appear on both units as they are taken.



Unit A (Master)	Unit B

8. Add the displayed values to the **Tested fibers** list if you want. If automatic save was activated for one or both units (see *Customizing Your MultiTest Module* on page 17), results are already added to the list.

8a. Change the displayed cable and fiber names as needed.

8b. Press **Add**. The fiber name increments automatically, ready to save the next value.

If you are not satisfied with the results, press ***FASTEST*** and redo the test.

For details about viewing ***FASTEST*** results, see *Managing Test Results* on page 55.

9 Managing Test Results

Viewing and Deleting Results

You can save all your results (***FasTesT***, power/loss and ORL) on your FTB-400 Universal Test System, along with references and date/time of tests. You will save and recall this data according to cable names (or any Windows file name).

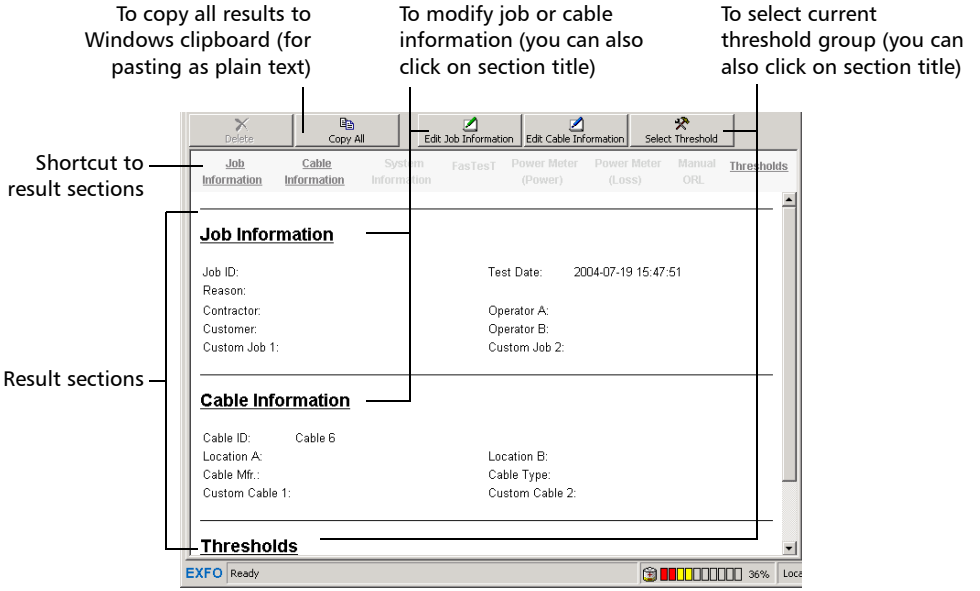
IMPORTANT

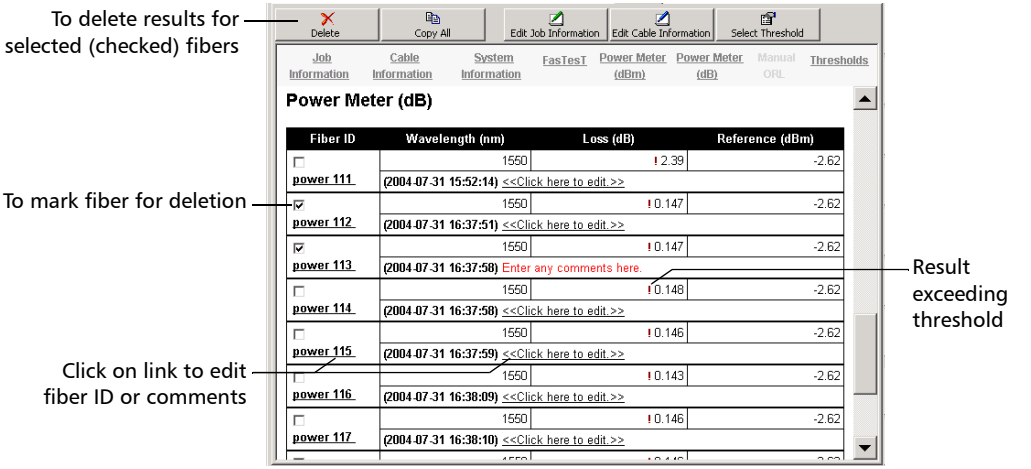
The date and time of *FasTesT* references are not saved. They are displayed with the results *immediately after the test* only.

Before or after saving the current file, you can view and edit results at any time (as long as a result was added to a **Tested fibers** list).

To view and process test results:

From the MultiTest Module application's main window, select the **Results** tab. The following functions are available when viewing results:





IMPORTANT

The threshold group you select will remain associated with the file, even if you change the default group. However, if you change values in the selected group, they will apply to your results.

Note: *For more accuracy, the loss average is always calculated from loss values in W and then converted to dB.*

Customizing Result Display

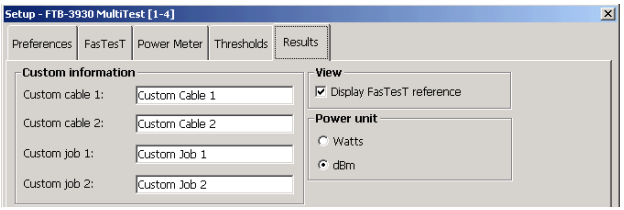
You can customize the following elements:

- Power unit: will affect the **Results** tab and the printed report, but not the different test tabs.
- Display ***FASTEST*** reference: when selected, the ***FASTEST*** references will be shown on the **Results** tab.
- Custom fields: sets the names of fields in the **Edit Job Information** and **Edit Cable Information** dialog boxes. *When you change the field name, data in this field is kept.*

You can also define default initial cable and fiber names. For details, see *Setting Autonaming Scheme* on page 21.

To customize the display of results:

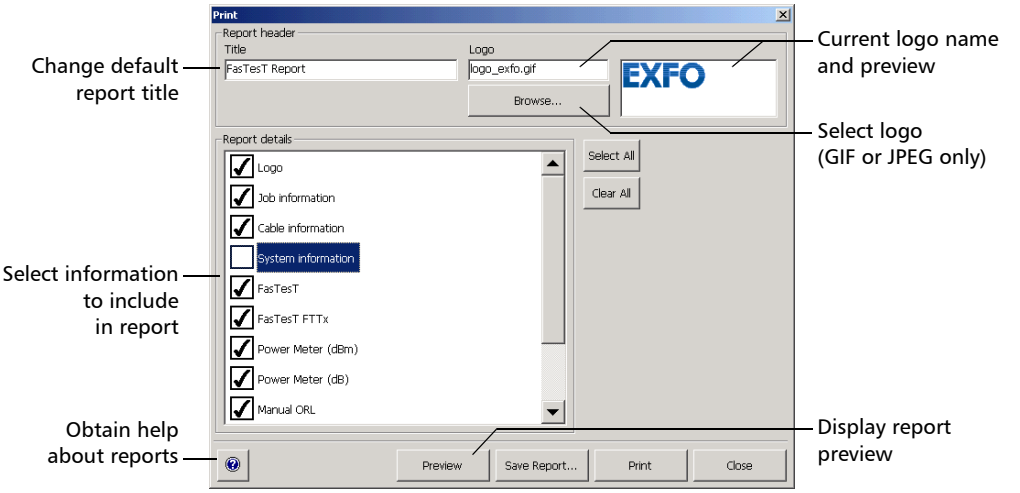
1. From the main window, press **Setup**, then select the **Results** tab.



2. Set parameters and press **OK**.

Customizing and Printing Reports

The FTB-3930 MultiTest Module application allows you to print detailed reports including your custom selection of OLTS data (***FasTesT***, ORL and power results with cable and job information).



You can also save the report as an HTML or XML file to view or print it later using any HTML or XML browser.

Note: *Saving a report including all items, a default title and no logo is equivalent to using the* ***Save As...*** *button to save as HTML in the main window.*

When you select information to include, consider the following:

- **System Information** and **Job Information** contain details from the **Job Information** section.
- **FasTesT** includes values from the Loss pane (except for references) and ORL pane (except for manual ORL values).
- Results exceeding thresholds are indicated with a “!”.

To print a report:

1. From the main window, press **Print**.
2. Enter a report title and press **Browse** to select a logo if desired.
3. Select items to include in the report, as follows:
   - ➤ To add or remove an item, check or clear the corresponding box.
   - ➤ To add all items, press **Select All**.
   - ➤ To remove all items, press **Clear All**.
4. If desired, press **Preview** to view the report before printing.
5. Press **Print**. For information about printer parameters, refer to your printer's user guide or to the Microsoft Windows documentation.

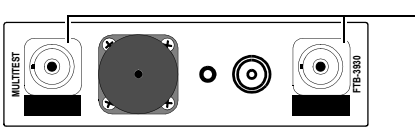
To save a report to a file:

1. Perform steps 1 to 4 in the above procedure.
2. Press **Save Report**, then select a name and file format (HTML or XML).

10 Using a Light Source

Your unit may contain two source ports: a 2- or 3-wavelength singlemode port and a 2-wavelength multimode port, depending on the configuration (see *Technical Specifications* on page 91).

The source signal can be continuous (CW or high-power) or modulated (270 Hz, 1 kHz or 2 kHz) and uses the ***FASTEST*** ports.



- CW signal (the default): constant power over the temperature range, but about 3 dB lower than maximum.
- High-power signal: reaches maximum power, but its power slightly varies over the temperature range.

WARNING

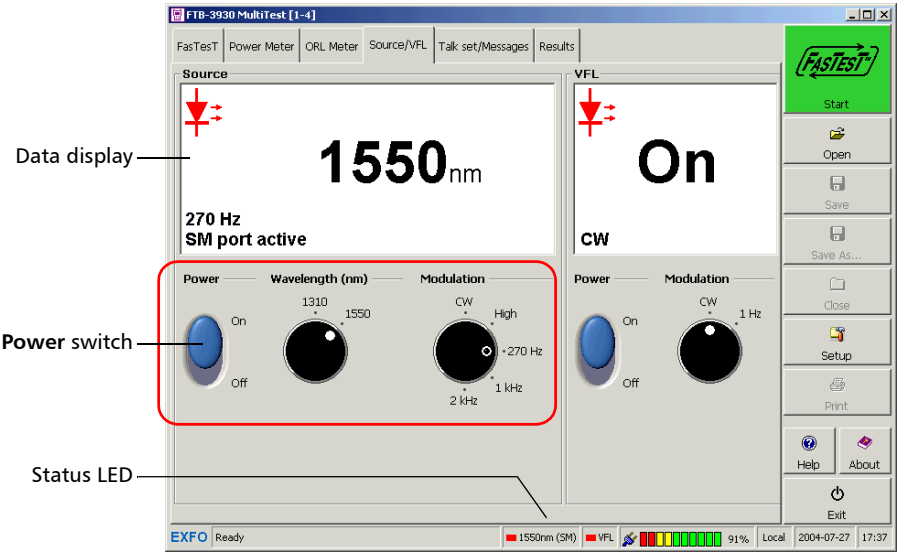
When a source is active, its port emits invisible laser radiation. Avoid exposure and do not stare directly into the beam. Ensure that any unused port is properly protected with a cap.

- If you switch to power meter or ORL meter, a **Source** status pane is always displayed.
- When you switch sources, the modulation remains the same. It is indicated in the data display.
- Only one source/wavelength may be active at a time. The active port (SM or MM) is indicated in the data display.
- The source status is indicated with a LED in the status bar and on the FTB-400 Universal Test System front panel.

Note: *The FTB-400 Universal Test System front panel always shows the source, VFL, ORL meter or talk set port status (even when you use other applications).*

To activate a light source:

1. Connect the fiber under test to the source port (see *Cleaning and Connecting Optical Fibers* on page 20).
2. From the main window, select the **Source/VFL** tab (units with a VFL) or the **Source** tab (units with no VFL).



3. In the **Source** pane, select a wavelength using the **Wavelength** dial.
4. Slide the **Power** switch to **On**.

To deactivate a light source:

Slide the **Power** switch to **Off**.

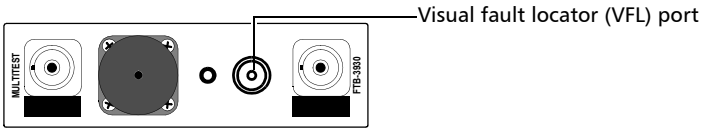
To change the signal modulation:

1. Activate the source if you want.
2. Select a modulation using the **Modulation** dial.

11 Identifying Fiber Faults Visually

The visual fault locator (VFL) helps you identify bends, faulty connectors, splices and other causes of signal loss.

From its dedicated port, the VFL emits a red signal which becomes visible at the location of a fault on the fiber. This signal can be continuous (CW, the default) or blinking (1 Hz).



WARNING

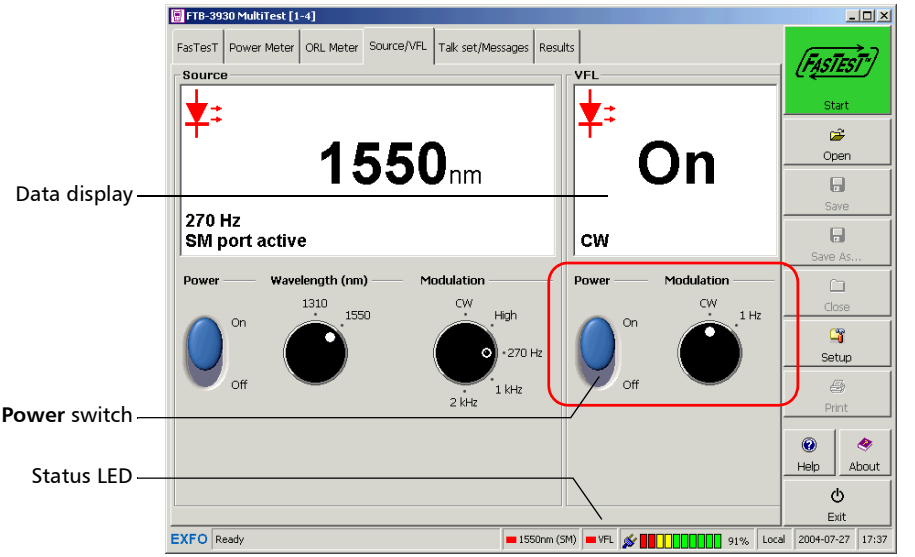
When the VFL is active, the VFL port emits visible laser radiation. Avoid exposure and do not stare directly into the beam. Ensure that any unused port is properly protected with a cap.

- If you switch to power meter or ORL meter, a **VFL** status pane is always displayed.
- The VFL status is indicated with a LED in the status bar and on the FTB-400 Universal Test System front panel.

Note: *The FTB-400 Universal Test System front panel always shows the source, VFL, ORL meter or talk set port status (even when you use other applications).*

To activate the VFL and inspect a fiber:

1. Connect the fiber under test to the VFL port (see *Cleaning and Connecting Optical Fibers* on page 20).
2. From the main window, select the **Source/VFL** tab.



3. In the **VFL** pane, slide the **Power** switch to **On**.
4. To switch between blinking (1 Hz) and continuous (CW) signals, use the **Modulation** dial.
5. Without looking directly into the beam, examine the fiber. If light is coming out of the rubber jacket or on the side of the ferrule, the fiber is defective.
6. Deactivate the VFL by sliding the **Power** switch to **Off**.

12 Communicating with Other Users

Your MultiTest Module offers two ways to communicate:

- text messages
- voice (via the optional talk set)

Sending and Receiving Text Messages

To facilitate communication between opposite ends of a fiber (especially on models with no talk set), you may send text messages to compatible units (such as FOT-930, FTB-3930, FOT-920 or FTB-3920) through their ***FASTEST*** ports.

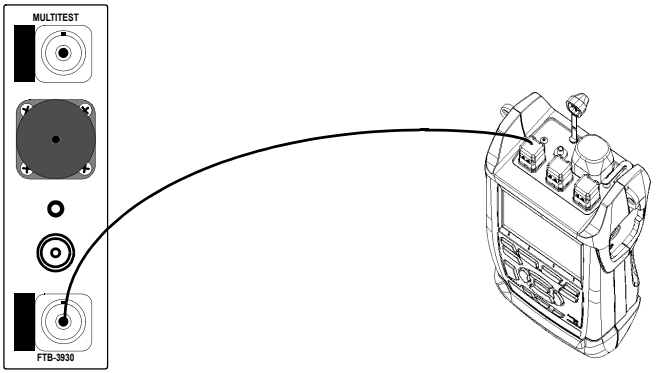
It is possible to send a predefined message or to write one of your own (maximum 30 characters). However, custom messages are not kept in memory.

IMPORTANT

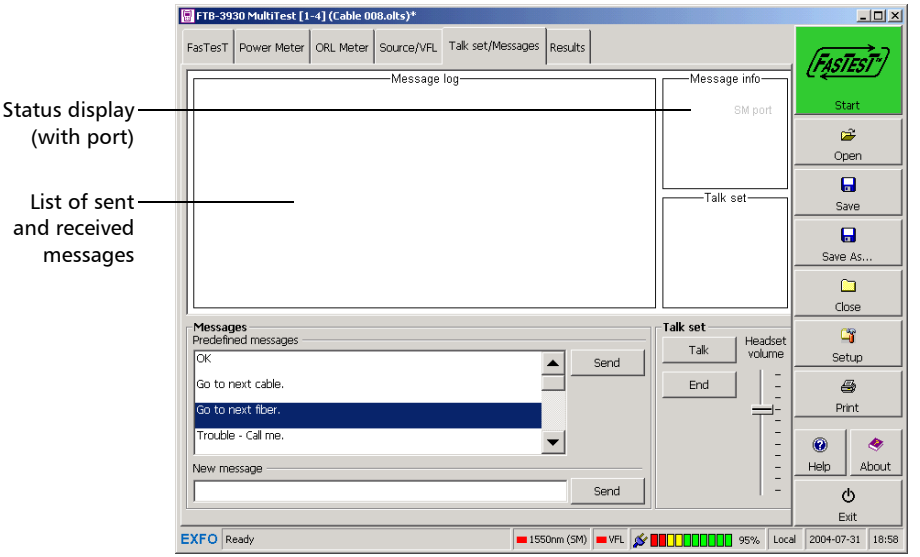
- **The messaging feature does not work with the talk set port.**
- **The messaging feature will not work if both units try to send a message at the same time.**
- **You cannot use other features while sending or receiving a message.**
- **You cannot cancel the operation.**

To send a text message:

1. Connect the units at each end of the same fiber via their ***FASTEST*** ports.



2. From the main window, select the **Talk set/Messages** tab (units with a talk set) or the **Messages** tab (units with no talk set).



3. Ensure that the port indicated (SM or MM) is the one you use. Otherwise, do as follows:

3a. In the function bar, press **Setup**, then select the ***FASTEST*** tab.

3b. Change the ***FASTEST*** port, then return to the **Messages** pane.

4. Scroll through the **Predefined messages** list and select a message.

OR

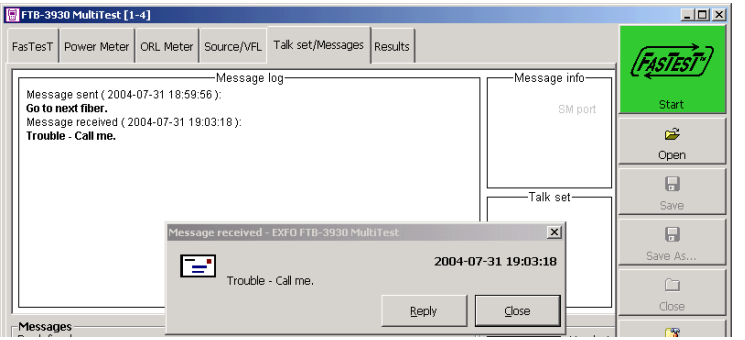
Enter a custom message in the **New message** text box.

5. Press the **Send** button next to your type of message (predefined or new).

After a few seconds, your message will automatically appear on the receiving unit (if its MultiTest Module application runs) and on the **Message log** pane. If an incompatible unit (or no unit) is detected at the other end, or if the ***FASTEST*** port of the receiving unit is in use, an error message will appear.

When you receive a message:

Your unit emits a short beep and displays the received message.



➤ Press Close to clear the display and return to your previous function.

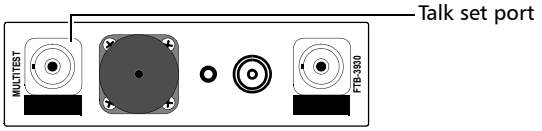
➤ Press **Reply** to access the **Messages** tab and reply to the message. You will then need to return to your previous function manually. *However, your last readings will be lost*.

Note: *If the message was written with a language not supported by your unit, you will see unreadable characters only.*

Communicating by Voice

With the optional talk set, you can establish full-duplex digital voice communication over a dedicated fiber, even while other functions are in use.

The talk set provides adjustable headset volume and uses a dedicated port. It is not compatible with the FOT-920 or FTB-3920 talk sets.



Note: *You may use any commercially available headset equipped with a microphone. It is also compatible with the GP-92B speakerphone.*

While communication is established, the actions and displays of each unit may differ as follows:

- You can send or receive a call at any time, except during a ***FASTEST***. To receive a call, you must be running the MultiTest Module application.
- Once communication is established, it will be maintained even if you use the unit's other test tools (including ***FASTEST***).
- If communication is lost, calling unit will automatically try to reestablish communication.

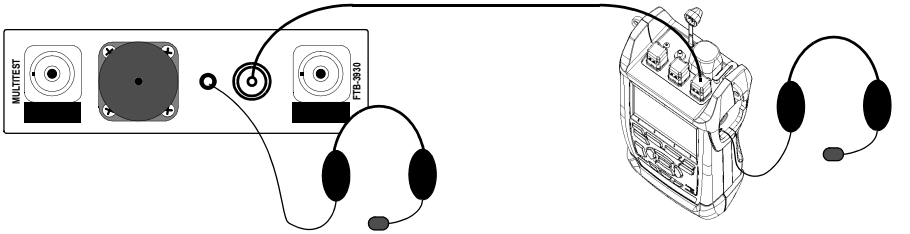
To communicate between units:

Calling Unit

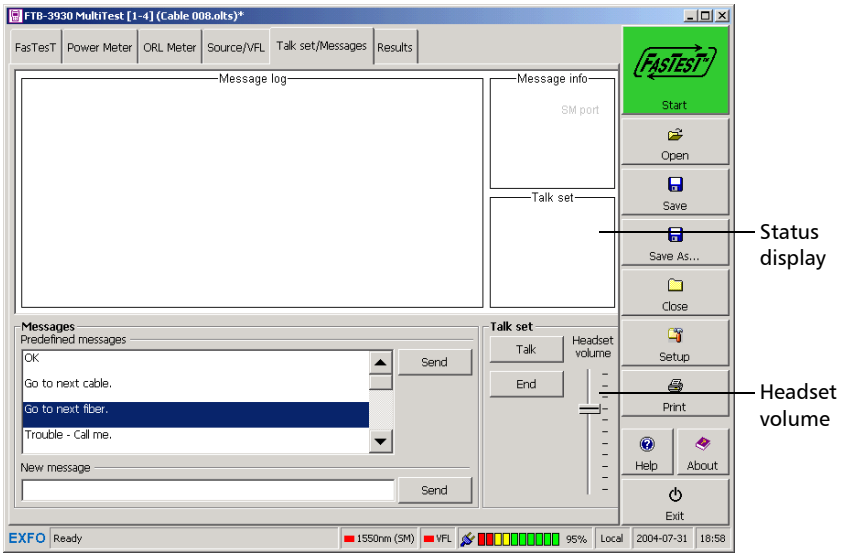
1. Connect the calling unit to one end of the fiber via its talk set port, and plug in your headset.

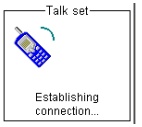
Receiving Unit

1. Connect the receiving unit to the other end of the fiber via its talk set port, and plug in your headset.



2. From the main window, select the **Talk set/Messages** tab.



Calling Unit	Receiving Unit
3. Press **Talk**. Your unit establishes communication with receiving unit.	When receiving the call, the unit beeps. A phone icon appears to indicate that communication is established.
	
If no compatible unit is detected at the other end, a message appears.	
4. Talk to the receiving unit.	***2.*** Simply answer (no need to press a key).
5. To end the communication, press **End** from the **Talk set** pane.	***3.*** To end the communication, press **End** from the **Talk set** pane.

To adjust the headset volume (calling or receiving unit):

From the **Talk set** pane, move the **Headset volume** slider to the top (volume increase) or to the bottom (volume decrease).

You cannot adjust or mute the ring sound.

13 Maintenance

To help ensure long, trouble-free operation:

- Always clean fiber-optic connectors before using them.
- Keep the unit free of dust.
- Clean the unit casing and front panel with a cloth slightly dampened with water.
- Store unit at room temperature in a clean and dry area. Keep the unit out of direct sunlight.
- Avoid high humidity or significant temperature fluctuations.
- Avoid unnecessary shocks and vibrations.
- If any liquids are spilled on or into the unit, turn off the power immediately and let the unit dry completely.

WARNING

Use of controls, adjustments and procedures for operation and maintenance other than those specified herein may result in hazardous radiation exposure.

Cleaning Fixed Connectors

Regular cleaning of connectors will help maintain optimum performance. *Do not try to disassemble the unit. Doing so would break the connector.*

To clean fixed connectors:

1. Fold a lint-free wiping cloth in four to form a square.
2. Moisten the center of the lint-free wiping cloth with *only one drop* of isopropyl alcohol.

IMPORTANT

Alcohol may leave traces if used abundantly. Avoid contact between the tip of the bottle and the wiping cloth, and do not use bottles that distribute too much alcohol at a time.

3. Gently wipe the connector threads three times with the folded and moistened section of the wiping cloth.

IMPORTANT

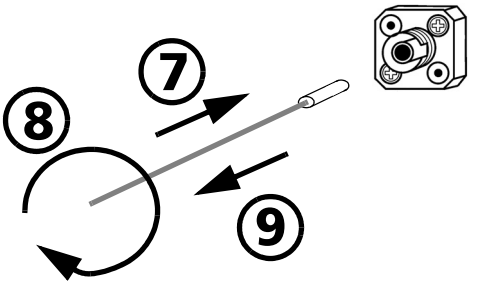
Isopropyl alcohol takes approximately ten seconds to evaporate. Since isopropyl alcohol is not absolutely pure, evaporation will leave microscopic residue. Make sure you dry the surfaces before evaporation occurs.

4. With a dry lint-free wiping cloth, gently wipe the same surfaces three times with a rotating movement.
5. Throw out the wiping cloths after one use.
6. Moisten a cleaning tip (2.5 mm tip) provided by EXFO with *only one drop* of isopropyl alcohol.

IMPORTANT

Alcohol may leave traces if used abundantly. Avoid contact between the tip of the bottle and the cleaning tip, and do not use bottles that distribute too much alcohol at a time.

7. Slowly insert the cleaning tip into the connector until it reaches the ferrule inside (a slow clockwise rotating movement may help).



8. Gently turn the cleaning tip one full turn.

9. Continue to turn as you withdraw the cleaning tip.

10. Repeat steps 7 to 9, but this time with a dry cleaning tip (2.5 mm tip provided by EXFO).

Note: *Make sure you don't touch the soft end of the cleaning tip and verify the cleanliness of the cotton tip.*

11. Throw out the cleaning tips after one use.

Cleaning EUI Connectors

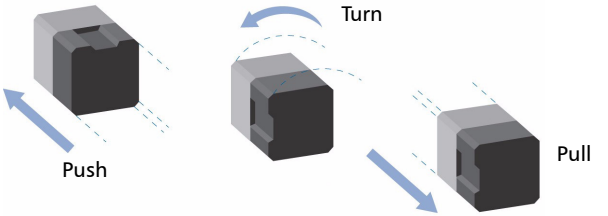
Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

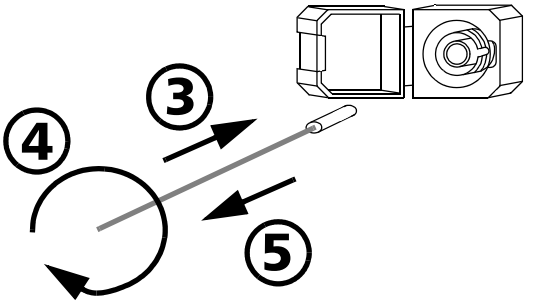
If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.

To clean EUI connectors:

1. Remove the EUI from the instrument to expose the connector baseplate and ferrule.



2. Moisten a 2.5 mm cleaning tip provided by EXFO with *one drop* of isopropyl alcohol (alcohol may leave traces if used abundantly).
3. Slowly insert the cleaning tip into the EUI adapter until it comes out on the other side (a slow clockwise rotating movement may help).



4. Gently turn the cleaning tip one full turn, then continue to turn as you withdraw it.

5. Repeat steps 3 to 4 with a dry cleaning tip.

Note: *Make sure you don't touch the soft end of the cleaning tip.*

6. Clean the ferrule in the connector port as follows:

   6a. Deposit *one drop* of isopropyl alcohol on a lint-free wiping cloth.

IMPORTANT

Isopropyl alcohol may leave residues if used abundantly or left to evaporate (about 10 seconds).

Avoid contact between the tip of the bottle and the wiping cloth, and dry the surface quickly.

   6b. Gently wipe the connector and ferrule.

   6c. With a dry lint-free wiping cloth, gently wipe the same surfaces to ensure that the connector and ferrule are perfectly dry.

   6d. Verify connector surface with a portable fiber-optic microscope (e.g., EXFO's FOMS) or fiber inspection probe (e.g., EXFO's FIP).

WARNING

Verifying the surface of the connector WHILE THE UNIT IS ACTIVE WILL result in permanent eye damage.

7. Put the EUI back onto the instrument (push and turn clockwise).

8. Throw out cleaning tips and wiping cloths after one use.

Cleaning Detector Ports

Regular cleaning of detectors will help maintain measurement accuracy.

IMPORTANT

Always cover detectors with protective caps when unit is not in use.

To clean detector ports:

1. Remove the protective cap and adapter (FOA) from the detector.
2. If the detector is dusty, blow dry with compressed air.
3. Being careful not to touch the soft end of the swab, moisten a supplied cleaning tip with *only one drop* of isopropyl alcohol.

IMPORTANT

Alcohol may leave traces if used abundantly. Do not use bottles that distribute too much alcohol at a time.

4. While applying light pressure (to avoid breaking the detector window), gently rotate the cleaning tip on the detector window.
5. Repeat step 4 with a dry cleaning tip or blow dry with compressed air.
6. Discard the cleaning tips after one use.

Recalibrating the Unit

Manufacturing and service center calibrations are based on the ISO/IEC 17025 Standard, which states that calibration documents must not contain a recommended calibration interval, unless this has been previously agreed upon with the customer.

Validity of specifications depends on operating conditions. For example, the calibration validity period can be longer or shorter depending on the intensity of use, environmental conditions and unit maintenance. You should determine the adequate calibration interval for your unit according to your accuracy requirements.

Under normal use, EXFO recommends calibrating your unit every three years.

Note: *The FlexCare warranty program includes Calibration/Verification packages (see* Service and Repairs *on page 89).*

Recycling and Disposal (Applies to European Union Only)

Recycle or dispose of your product (including electric and electronic accessories) properly, in accordance with local regulations. Do not dispose of it in ordinary garbage receptacles.

This equipment was sold after August 13, 2005 (as identified by the black rectangle).

- Unless otherwise noted in a separate agreement between EXFO and a customer, distributor or commercial partner, EXFO will cover costs related to the collection, treatment, recovery and disposal of end-of-lifecycle waste generated by electronic equipment introduced after August 13, 2005 to an European Union member state with legislation regarding Directive 2002/96/EC.
- Except for reasons of safety or environmental benefit, equipment manufactured by EXFO, under its brand name, is generally designed to facilitate dismantling and reclamation.

For complete recycling/disposal procedures and contact information, visit the EXFO Web site at www.exfo.com/recycle.

14 Troubleshooting

Solving Common Problems

Problem	Possible Cause	Solution
During offset nulling, you get the following message: "Light detected during nulling."	Light reaches at least one detector (power meter or ***FASTEST***).	Ensure protective caps are tightly screwed on ***FASTEST*** and power meter ports and perform the nulling again. Do not use rubber cover.
When using the power meter, you get **Power Too Low** or **Power Too High**.	Power of the signal received at the power meter port is outside its measurement range.	Check the connections. Ensure you use the proper fiber and connector type and that you use your power meter within specifications.
When measuring ORL, you get **Too Much Power**.	Measured reflected power is higher than emitted power. The ORL reference is incorrect.	Always perform ORL reference before each ORL measurement.
When measuring ORL, you get **ORL exceeds**.	Reflection is below sensitivity of ORL meter.	Perform an ORL zero measurement to increase the sensitivity of the detector. Ensure mandrel is correct and that patchcord and connectors are in good condition.

Problem	Possible Cause	Solution
Unable to establish ***FASTEST*** communication.	➤ Remote unit's ***FASTEST*** port is in use.	➤ Wait until ***FASTEST*** completes, turn source and ORL meter off or exit Probe mode (FOT-930).
	➤ Remote unit is not compatible.	➤ Make sure remote unit is an FOT-930, FTB-3930, FOT-920 or FTB-3920.
	➤ Selected port on master unit differs from actual port to which fiber is connected.	➤ Set the port (SM or MM) correctly in **Setup** (***FASTEST*** tab) on master unit.
	➤ Compatibility set to **FOT-930** / **FTB-3930** but remote unit is not an FOT-930 or FTB-3930.	➤ Set the compatibility to **FOT-920** / **FTB-3920** in **Setup** (**FasTesT** tab) on master unit.
During ***FASTEST***, you get a message saying that loopback reference was not performed.	Loopback reference was selected, but not performed (or reference is outdated).	Perform a loopback reference before ***FASTEST*** measurement.
ORL values are inaccurate for short fibers at 1310 nm during a ***FASTEST***.	—	Measure ORL manually.
Unable to communicate with an FOT-920 using the talk set.	Talk sets of the FOT-920 and FOT-930/FTB-3930 are not compatible.	Use text messaging instead.
Unable to establish connection with compatible talk set.	Probe mode is activated on remote unit (FOT-930 only).	Deactivate Probe mode.

Problem	Possible Cause	Solution
Unable to send a text message.	➤ Selected port differs from actual port to which fiber is connected. ➤ Receiving unit's port is in use. ➤ Remote unit is not compatible.	➤ On the sending unit, set the correct port (SM or MM) in **Setup** (***FASTEST*** tab). ➤ Wait until ***FASTEST*** completes, turn source and ORL meter off or exit Probe mode (FOT-930). ➤ Make sure remote unit is an FOT-930, FTB-3930, FOT-920 or FTB-3920.
On **Results** tab, a box indicates "Invld" instead of a numerical value.	The application is unable to calculate the ***FASTEST*** ORL value (e.g., at 1310 nm for short fibers).	Perform the measurements again.
On **Results** tab, a box indicates "- - - -" instead of a numerical value.	The calculated value makes no sense (e.g., negative ORL value).	Perform the measurements again. Note that the calculated value is usually shown on the printed report.
When printing a report, rightmost columns are not printed.	The Fiber ID column is too wide. The width of this column is determined with the widest name.	Rename fiber IDs that have a long name.
When saving data in text formats, some ORL values are higher than the indicated sensitivity.	Saved text files containing symbols such as ">" may not open properly in some applications.	The actual measured value is used instead, even if it is not accurate.

Obtaining Online Help

Context-sensitive and interactive help is conveniently available at all times to guide you through the use of your application.

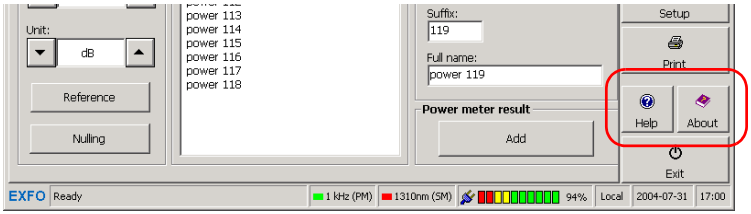
Note: *You will also find a printable PDF version of the FTB-3930 MultiTest Module user guide on your installation CD.*

To access online help:

Anywhere in the application, press the button (or F1 on a keyboard) to get help about the current function.

OR

Press **About** in the button bar, then press **User Guide**.



Finding Information on the EXFO Web Site

The EXFO Web site provides answers to frequently asked questions (FAQs) regarding the use of your FTB-3930 MultiTest Module.

To access FAQs:

1. Type http://www.exfo.com in your Internet browser.
2. Click on the **Support** tab.
3. Click on **FAQs** and follow the on-screen instructions. You will be given a list of questions pertaining to your subject.

The EXFO Web site also provides the product's most recent technical specifications.

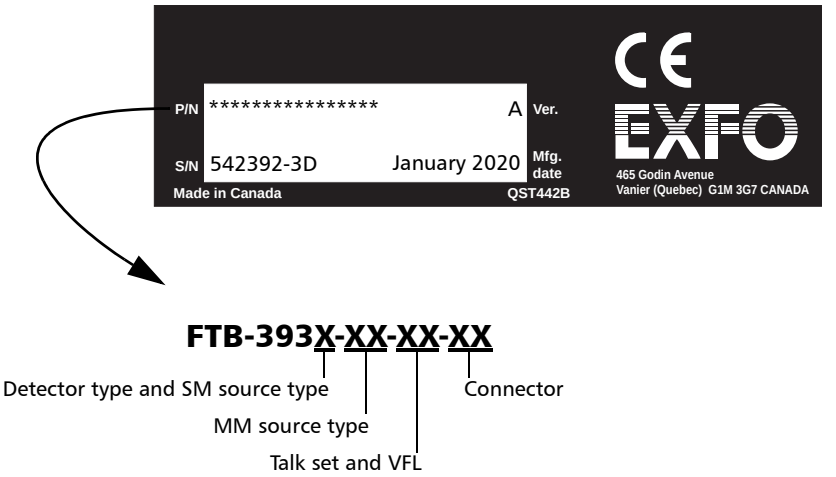
Contacting the Technical Support Group

To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 7:30 a.m. to 8:00 p.m. (Eastern Time in North America).

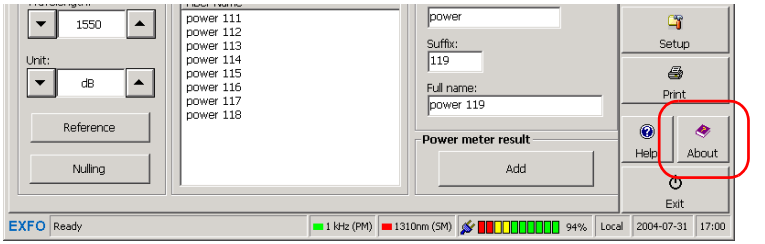
Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

To accelerate the process, please have information such as the name and the serial number (see the product identification label—an example is shown below), as well as a description of your problem, close at hand.



You may also be requested to provide software and module version numbers. This information, as well as technical support contact information, can be found by clicking on **About** in the button bar.



Transportation

Maintain a temperature range within specifications when transporting the unit. Transportation damage can occur from improper handling. The following steps are recommended to minimize the possibility of damage:

- Pack the unit in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the unit out of direct sunlight.
- Avoid unnecessary shock and vibration.

15 Warranty

General Information

EXFO Electro-Optical Engineering Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of three years from the date of original shipment. EXFO also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, EXFO will, at its discretion, repair, replace, or issue credit for any defective product should the equipment need to be repaired. If the equipment is sent back for verification of calibration during the warranty period and found to meet all published specifications, EXFO will charge standard calibration fees.

IMPORTANT

The warranty can become null and void if:

- **unit has been tampered with, repaired, or worked upon by unauthorized individuals or non-EXFO personnel.**
- **warranty sticker has been removed.**
- **case screws, other than those specified in this guide, have been removed.**
- **case has been opened, other than as explained in this guide.**
- **unit serial number has been altered, erased, or removed.**
- **unit has been misused, neglected, or damaged by accident.**

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL EXFO BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Liability

EXFO shall not be liable for damages resulting from the use of the product, nor shall be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

EXFO shall not be liable for damages resulting from improper usage or unauthorized modification of the product, its accompanying accessories and software.

Exclusions

EXFO reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units purchased. Accessories, including but not limited to fuses, pilot lamps, batteries and universal interfaces (EUI) used with EXFO products are not covered by this warranty.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond EXFO's control.

IMPORTANT

EXFO will charge a fee for replacing optical connectors that were damaged due to misuse or bad cleaning.

Certification

EXFO certifies that this equipment met its published specifications at the time of shipment from the factory.

Service and Repairs

EXFO commits to providing product service and repair for five years following the date of purchase.

To send any equipment for service or repair:

1. Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 90). Support personnel will determine if the equipment requires service, repair, or calibration.
2. If equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and provide an address for return.
3. If possible, back up your data before sending the unit for repair.
4. Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.
5. Return the equipment, prepaid, to the address given to you by support personnel. Be sure to write the RMA number on the shipping slip. *EXFO will refuse and return any package that does not bear an RMA number.*

Note: *A test setup fee will apply to any returned unit that, after test, is found to meet the applicable specifications.*

After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, you will be invoiced for the cost appearing on this report. EXFO will pay return-to-customer shipping costs for equipment under warranty. Shipping insurance is at your expense.

Routine recalibration is not included in any of the warranty plans. Since calibrations/verifications are not covered by the basic or extended warranties, you may elect to purchase FlexCare Calibration/Verification Packages for a definite period of time. Contact an authorized service center (see *EXFO Service Centers Worldwide* on page 90).

EXFO Service Centers Worldwide

If your product requires servicing, contact your nearest authorized service center.

EXFO Headquarters Service Center
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
quebec.service@exfo.com

EXFO Europe Service Center
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FRANCE

Tel.: +33.1.40.83.85.85
Fax: +33.1.40.83.04.42
europe.service@exfo.com

EXFO China Service Center/ Beijing OSIC
Beijing New Century Hotel
Office Tower, Room 1754-1755
No. 6 Southern Capital Gym Road
Beijing 100044
P. R. CHINA

Tel.: +86 (10) 6849 2738
Fax: +86 (10) 6849 2662
beijing.service@exfo.com

A Technical Specifications

IMPORTANT

The following technical specifications can change without notice. The information presented in this section is provided as a reference only. To obtain this product's most recent technical specifications, visit the EXFO Web site at *www.exfo.com*.

SPECIFICATIONS[1]

External Power Meter	FTB-3932	FTB-3932X	FTB-3933		
Detector type	Ge	GeX	InGaAs		
Measurement range (dBm)	10 to −70	26 to −55	6 to −73		
Uncertainty[2,3]	± 5 % ± 0.1 nW	± 5 % ± 3 nW	± 5 % ± 0.05 nW		
Wavelength range (nm)	800 to 1650	800 to 1650	800 to 1650		
Display resolution[2] (dB)	0.01	0.01	0.01		
Calibrated wavelengths	40	42	40		
Recommended recalibration period (years)	3	3	3		
Automatic offset nulling[4]	Yes	Yes	Yes		
Measurement-distance units	kilometers, meters, kilofeet, feet, miles				
Sources	**Standard**	**-4**	**-5**	**-12C (second port)**	**-12D (second port)**
Wavelengths[5] (nm)	1310 ± 20 1550 ± 20	1310 ± 20 1550 ± 20 1625 ± 10	1310 ± 20 1490 ± 10 1550 ± 20	850 ± 25 1300 +50/−10	850 ± 25 1300 +50/−10
Emitter type Laser	Laser	Laser	Laser	LED	LED
Minimum output power[5] (dBm)	−1/−1	−1/−4/−7	−1/−7/−4	−27/−27 (50/125 µm)[9]	−21/−21 (62.5/125 µm)[9]
Spectral width[6] (nm)	≤ 5/≤ 5	≤ 5/≤ 5/≤ 5	≤ 5/≤ 5/≤ 5	50/135	50/135
Stability[7] (8 hours) (dB)	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05
FasTesT	**Standard**	**-4**	**-5**	**-12C (second port)**	**-12D (second port)**
Wavelengths (nm)	1310 1550	1310 1550 1625	1310 1490 1550	850 1300	850 1300
Loss range[8] (dB)	60	56	56	40	46
Loss precision[9] (repeatability) (dB)					
Side-by-side	0.15	0.15	0.15	0.15	0.15
Loopback	0.25	0.25	0.25	0.25	0.25
Length measurement range (km)	200	200	200	5	5
Length measurement uncertainty[10]	± (10 m + 1 % x length)				

Dedicated ORL	All SM Wavelengths
ORL range (APC / UPC) (dB)	65/55
ORL uncertainty[2] (dB)	± 0.5
Resolution[2] (dB)	0.01

Talk Set	
Emitter type	Laser
Wavelength (nm)	1550 ± 20
Dynamic range at 1550 nm (dB)	45
Dynamic range MM[11] (dB)	40

VFL[3]	
Emitter type	Laser
Wavelength (nm)	650
Output power (dBm)	3

General Specifications

Size (H x W x D)	96 mm x 25 mm x 260 mm	(3 3/4 in x 1 in x 10 1/4 in)
Weight	0.5 kg	(1.1 lb)
Temperature		
operating	0 °C to 50 °C	(32 °F to 122 °F)
storage[12]	−40 °C to 70 °C	(−40 °F to 158 °F)
Relative humidity	0 % to 95 % non-condensing	
Warranty (years)	3	

Notes:

1. At 23 °C ± 1 °C and 1550 nm with FC connector and on batteries, unless otherwise specified.
2. Resolution, uncertainty and linearity are functions of input power; uncertainty is valid at calibration conditions.
3. Up to 20 dBm for GeX.
4. Power of > −45 dBm for Ge, > −30 dBm for GeX and > −47 dBm for InGaAs.
5. In High source mode.
6. As defined by Telcordia TR-TSY-000887, rms for lasers and at −3 dB for LEDs; typical values for LEDs.
7. After a warmup time of 6 minutes, in CW source mode.
8. Typical value, at 1550 nm for SM and 850 nm for MM.
9. Typical value.
10. For fiber length ≤ 120 km.
11. For graded-index MM fibers; typical.
12. Without batteries.

Index

Symbols

A

B

C

D

E

F

H

I

L

M

N

O

P

R

S

T

U

V

W

Z

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Printed in Canada (2006-07)

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