FTE-7000A
Optical Time Domain Reflectometer
User's Guide

**This guide is written for use with the FTE-7000A series.
This includes the standard FTE-7000A OTDRs, FTE-7000A-EXT, FTE-7000A-PON and FTE-7000A-CWDM**

**Revision C
09/2015**

Chapter	PAGE

Chapter 1   Using This Manual

This manual contains operation information for the Terahertz Technologies Inc., FTE7000A Optical Time Domain Reflectometer. This OTDR may be operated by using the touch scree or the onboard key pad. The touch screen is a resistive style screen and only proper stylus devices should be used when using the touch screen capability.

This guide is written to instruct operation via the onboard keypad. There will be tips throughout the manual to assist with touch screen operation.

Precautions

Optical time domain reflectometers are optical instruments that emit laser radiation and though this level of radiation is not considered a danger, there are safety considerations and certain practices that should be followed.

Please read and follow all warning and caution information noted in this manual.

There are warnings, cautions and notes posted throughout this manual.

Warning
A warning alerts to situations that could cause personal injury.

Caution
A caution alerts to situations that may cause damage to the equipment or produce poor testing conditions resulting in inaccurate test results.

Note
A special annotation that will assist the user with operational features.

There are also a few touch screen tips scattered through this manual, these will assist the user with touch screen operation. They will be preceeded by the green text below:

Touch Screen Tip

Chapter 2   Safety

Chapter 3 of this manual is a quick start guide. Prior to using the quick start guide or operating the equipment in any way, it is highly suggested the user reads all safety information.

The information in this chapter pertains to safety consideration of OTDRs in general.

This product has been designed and tested in accordance with the manufacturer's safety standards, and has been supplied in a safe condition.

This document contains information that must be followed by the user to ensure safe operation and to maintain the product in a safe condition. Failure to follow these safety warnings and cautions can result in harm to the user or damage to the instrument.

Warning

Personnel should always be aware when working with fiber optic test equipment that active fibers may be present, therefore infrared optical energy may be present.

Warning

Never look directly into the end of a connected fiber optic cable or fiber optic interface of optical test equipment, to do so could expose the user to laser radiation and could result in personal injury.

Warning

To Prevent Fire or Shock Hazard:

➢Do not install battery types other than those supplied by the manufacturer

➢Do not use the charger without the proper batteries installed

➢Do not expose the battery charger to rain or excessive moisture

➢Do not use the AC adapter when there are signs of damage to the enclosure or cord

➢Ensure that you are using the correct charger for the local line voltage

➢Do not use any other charger than the one provided with this instrument.

➢Do not puncture batteries.

➢Do not incinerate batteries.

➢All batteries should be disposed of in a proper manner.

Failure to follow these caution statements could cause unsafe conditions for the operator and equipment and may void the warranty.

Chapter 2   Safety

Failure to follow these cautions statements may void the warranty of, or cause damage to this equipment.

Caution

Fiber-optic connectors are easily contaminated or damaged. The connection to the OTDR is physical contact type of connections and dirty or damaged connectors may impair the instruments capabilities at minimum and at worst result in the need to return the OTDR to the factory for expensive repairs. Prior to making any connection to the unit, ensure that all proper cleaning procedures have been followed. Use UPC Finish Connectors Only -- DO NOT insert APC connectors into the optical ports.

Caution

The OTDR is equipped with a protection circuit to avoid damage from live fiber connections, the instrument will not operate properly with active fibers. Even with this protection, high power output from EDFA's or other equipment can damage detectors and should never be connected to the OTDR.

If a live fiber is connected to the OTDR and a scan is attempted, a warning dialog will be displayed as in fig. 2.1. Immediately remove the live fiber from the OTDR and press select to clear the message.

>>> WARNING <<<
Live traffic detected.
Please disconnect the fiber.

Press SELECT to Continue.
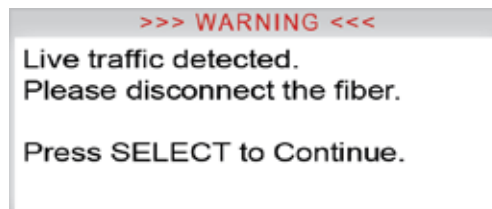
Fig 2.1

Chapter 3   Quick Start Guide

Prior to using this quick start guide or operating the equipment in any way, it is highly suggested the user reads all safety information in chapter 2.

Press ⏻ to turn on the OTDR.

Use the directional buttons to highlight the OTDR icon and press ⓢ to enter the OTDR function.

Connect the fiber to the appropriate port. (SM or MM OTDR Optical Port)

Press [Menu] to enter the Menu mode. The menu is displayed at the top of the screen. (To hide the menu, press the menu button a second time.)

Use the right button to highlight the λ (wavelength) icon and use ⓢ to cycle to the desired wavelength.

If approximate fiber length is unknown:

Press [AutoTest] to have the OTDR start a test using the selected wavelength, allowing the OTDR to determine the most appropriate range and pulse width. (Autotest will set the averaging time to 60sec.)

If approximate fiber length is known:

Set the Wavelength as above and further set the range, pulse width and averaging time.

Press [Menu] to open the icon menu, use the left or right arrow to highlight the ◀▶ (range) and use ⓢ to cycle through the available ranges of 250m, 1km, 4km, 16km, 64km, 128km or 256km.

Use the left or right buttons to highlight the �III (pulse width) icon and use ⓢ to cycle through the available pulse widths of 5ns, 10ns, 30ns, 100ns, 300ns, 1us, 3us, 10us or 20us. (Not all pulse widths will be available, only pulse widths appropriate for the selected range will be presented)

Chapter 3   Quick Start Guide

Press the left or right button to highlight the Σ (average) icon and use [select] to cycle to the averaging times of Real-Time, 15 seconds, 1, 4, 16 or 40 minutes.

Press [Menu] to exit the menu mode and hide the menu bar.

Press [Scan] (Scan) to start a trace. Pressing the [Scan] again will stop a trace.**T**o operate the cursors, use the left and right buttons. Press the A/B button to toggle between A and B as the active cursor.

To view the Fib-R-Map and event table, press [Menu] , use the left and right buttons to highlight the [icon] (schematic view) icon and press [select] .

Note
Alternately, the touch screen may be used to select the event table or the Schematic view by touching the tabs immediately below the grid scale. The OTDR tab displays the trace with the parameters listed and loss and distance measurements displayed. The Event tab displays the trace with numbered events and an interactive event table, while the Schematic tab displays the trace with numbered events and an interactive schematic view of the data.

To save a trace, touch the [Menu] button and use the left or right buttons to highlight the [icon] (file storage) icon and press [select]. Press [Menu] press [select] and with save highlight press [select] Use the touchscreen keyboard to enter the file name and touch save.

Note
The Quick Save icon may also be use to save the trace. Touching the Quick Save icon will store the trace to the active project folder and use the last base file name entered.

Chapter 4   Introduction

Dear Valued Customer,

Thank you for choosing Terahertz Technologies Inc. for your fiber optic testing requirements. Our professional staff is available to answer any questions or provide assistance that you require. We, at Terahertz Technologies, strive to provide premier customer care and technical support by providing timely responsiveness and training. We are proud of our quality and high standards and assure you, our customer, the most user friendly and affordable fiber optic solutions to meet individual needs.

Chapter 5   Inspection and Identification

5.1   Inspection
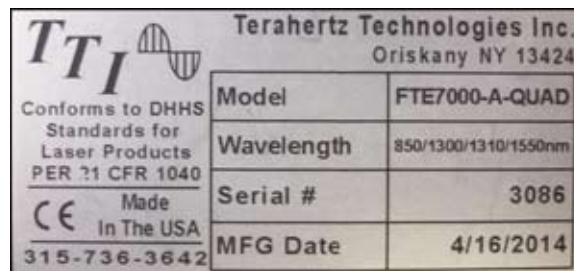
Before shipment, this instrument was inspected and found to be in perfect working order and free of defects.

The shipping carton contains the following:

1.   OTDR with Protective boot

2.   Universal AC/DC charger with interchangeable mains

3.   USB cable

4.   Manual and CertSoft software on CD.

5.   Set of interchangeable OTDR adapters, SC, ST and FC and Power Meter adapters for SC, ST, FC, 1.25 universal and 2.5 universal.

5.2   Identification and Configuration

The instrument's Model/Part Number, Serial Number and Date of Manufacture are indicated on a label located on the back of the unit. The instrument's history is filed at the factory by model/part number and serial number. The unit's serial number is also located on the top plate just above the USB Port.

Fig 5.1

Chapter 6   FTE-7000A Description

6.1   OTDR Physical Description

Instrument Enclosure

The TTI FTE-7000A is packaged in a rugged housing which is further protected with a rubberized boot. Although the front panel is weather resistant, care must be taken to avoid liquids and contaminants around the fragile optical and electrical connectors, and the glass display. Use a mild cleaning agent and soft damp cloth to clean up the panels and the outside case. See the maintenance section to clean the optical connector. NEVER open the instrument for cleaning. Return to the factory for servicing if necessary.

Front Panel

Protective Rubber Boot

Color Touch Screen

Key Pad

Power Button

Fig 6.1

Top panel

Video Probe Port

Unit Serial Number

Power Jack

Power Meter, Second Optical Port for Quad Wavelength OTDRs or Active Optical Port for PON OTDRs

Battery Charge Indicator

USB Port

OTDR Port

Fig 6.2

Chapter 6   FTE-7000A Description
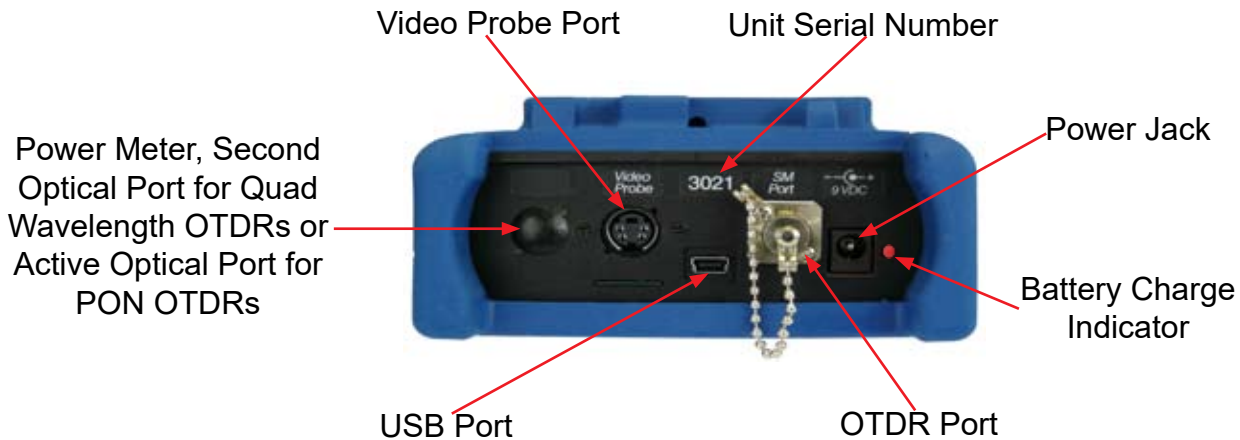
6.2 Home Screen Display

This unit is equipped with a 4" color TFT resistive touch display. All keyboard functions are also executable on the touch screen.

Fault Locator
Simple
Optical Time Domain Reflectomerter
Displays Event Table and
Schematic View

Optical Time Domain Icon
Select this icon to open the
OTDR function

Loss Test Set
Select for Loss Test Set operation or if no power is available, select this icon to access the CW mode of the light source.

Video Scope Icon
Select this icon to open the video scope function.

Firmware Version

Fig 6.3

Touch Screen Tip

The home page icons are highlighted by using the left and right buttons, pressing the select button will open the highlighted function. These icons are all active with the touch screen function.

6.3   Power Requirements

The FTE-7000A may be equipped with either 4-AA NiMH Batteries or with a 2600mAh Li-ion battery. The 4 NiMH batteries require a 100-240V-0.3A input and 9V, 0.67A center positive output universal AC/DC battery charger. The Li-ion batteries require a 100-240V-0.6A input and 15V, 1.2A center positive output universal AC/DC battery charger. The appropriate charger is supplied with each OTDR and it is clearly labeled above the charge port on the OTDR, which charger is required. These chargers are supplied with interchangeable mains for US, Great Britain, Europe and Australia. A fully charged NiMH batter pack will enable about 4 hrs. of use and require 6-8 hours to recharge. A fully charged Li-ion battery pack will typically enable approximately 9 hrs. of use and require approximately 2 hours of recharging.

6.4 Battery Replacement

4 AA NiMH
To replace the batteries, remove the OTDR from the protective boot by pulling the bottom of the boot down and back allowing the bottom of the unit to be lift out. The battery door is located on the back side of the unit. Replace the batteries with only high quality AA NiMH batteries. Spare battery packs are available with a charging unit for extended battery operation. If you install NiMH batteries that are dead or less than 1 volt each, charge these batteries for one (1) hour before using the OTDR. For proper maintenance, batteries require a monthly recharge.

Li-ion Pack
The batteries not field replaceable. An RMA should be acquired and the unit must be returned to the factory for battery replacement. This Li-ion battery pack should not be punctured, incinerated or disposed of improperly.

Warning

To Prevent Fire or Shock Hazard:

➢Do not install battery types other than those supplied by the manufacturer

➢Do not use the charger without the proper batteries installed

➢Do not expose the battery charger to rain or excessive moisture

➢Do not use the AC adapter when there are signs of damage to the enclosure or cord

➢Ensure that you are using the correct charger for the local line voltage

➢Do not use any other charger than the one provided with this instrument.

➢Do not puncture batteries.

➢Do not incinerate batteries.

➢All batteries should be disposed of in a proper manner.

Failure to follow these caution statements could cause unsafe conditions for the operator and equipment and may void the warranty.

Chapter 7   Fault Locator Operation

7.0 Fault Locator

The Fault Locator is a simple autotest feature which displays the test results in event table and in a schematic view modes. The fault locator will take a scan of the fiber in auto test mode. The user sets the wavelength to be tested and the OTDR will set the pulse width and range to best suite the fiber under test. at the selected wavelength, set the average to 15 seconds and set the pulse width and range to best suit the fiber under test.

7.1 Fault Locator Operation

To enter the Fault Locator mode, touch the FAULT icon on the home screen. The screen below will be displayed.
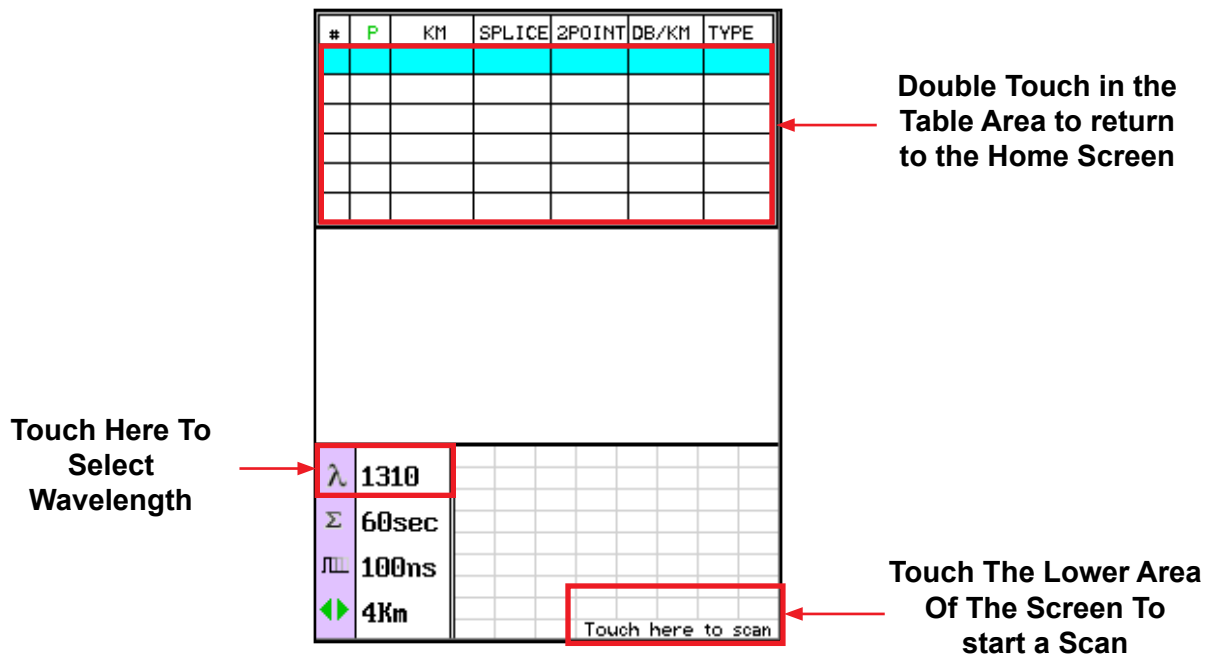
Fig 7.1

Set Wavelength
To select the wavelength to be tested, touch the wavelength indicator as shown in Fig. 7.1 above. Touching the area shown will cycle through the available wavelengths on the OTDR.

Start Scan
To start a scan, touch in the bottom right corner of the display. A "Please Wait, Scanning" message will be displayed. The scan will take about 15 seconds.

Exit Fault Locator Mode
To exit the fault locator mode double touch in the event table area or press the Menu button.

7.1 Fault Locator Operation Continued

When a scan it taken with the Fault Locate Mode, the trace information is temporarily stored in the OTDR. If the full trace needs to be viewed, double touch in the event table area or press the Menu button to return to the home screen. Touch the OTDR icon and the trace will be displayed with full OTDR operation.

7.2 Fault Locator Screen

The fault locator screen includes the event table, Fib-R-Map (Schematic View) and event map view of highlighted event.

Event Table

Fib-R-Map
Schematic View

Trace Parameters

Event Map

#	P	KM	SPLICE	2POINT	DB/KM	TYPE
1	P	0.3742	+0.115	0.309	+0.939	-55.8
2	P	0.7367	+1.655	0.419	+1.199	Splc
3	F	0.9190	+2.816	0.069	+0.411	>-26
4	F	0.9409	+9.913	1.005	-NA-	>-60
5	P	0.9736	+3.040	0.992	-NA-	Splc
E	F	0.9409	Link	3.683	+4.035	20.2

Fib-R-Map:
0.3742   1   0.419   0.7367   2   0.069   0.9190   3
ORL:-55   Splice   >-26
+0.115   +1.655   +2.816

Trace Parameters:
λ 1310
Σ 15sec
⊓ 30ns
◀▶ 4Km

Fig 7.2

Event Table

Fig 7.4

Note
Information in the red outlined area is for individual events. Information in the green outlined area is for the fiber link.

Fib-R-Map
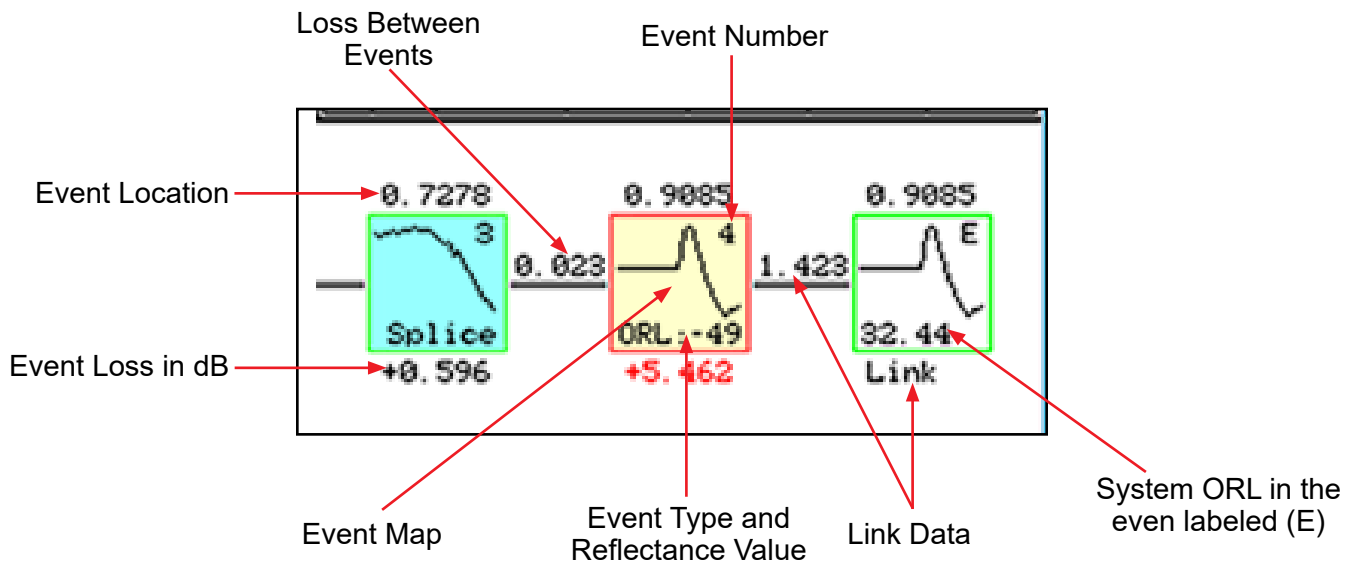
Fig 7.3

Note
The Link is the last item in the schematic view. It is labeled E in the event number position. The loss value just prior to this item is the Link Loss and the Event location above the item is the same as the location of the event deemed the EOF.

Chapter 7   Fault Locate Operation

Event Table Field Description

Event Number:
Indicates the event in sequence, where the higher the number the further distance from the OTDR the event occurs. "E" (End) which is always displayed in the bottom row is the event determined to be the End of Fiber (EOF).

P:
Pass/Fail, if any one of the thresholds are not met for and event, the P/F column will display a red F. The parameter that failed will also be displayed in red. If all the parameters are met, this column will display a green P. The Pass/Fail threshold for the last event labeled "E" is the loss displayed in the 2POINT column, the link loss threshold.

Km or KF or MI:
Event Location, Km for Kilometer or KF if unit of measure is Kilo-feet MI for mile. This is the distance/location that the event occurs along the fiber link.

Splice:
Event Loss, is the splice loss (event loss) of the numbered event. (A positive number is the amount of loss and a negative number indicates a gain normally due to mismatched index of refraction.) This is a settable threshold for the Pass/Fail feature. The "E" event will display LINK as this is not an event that would have meaning. The event that is deemed the EOF will normally display a large loss as this loss will be greater than the threshold set to determine the end of the fiber.

2POINT:
2 Point Loss is the loss measured from the end of the dead zone of the previous event to the beginning of current event. The value in the "E" line of the table for this column is the link loss. The loss from the beginning of the trace to the event determined to be the EOF. This is the value used to determine if the fiber link passes or fails it's loss threshold.

dB/Km:
dB per Kilometer if in KM and DB/KF if in Kilo-Feet and DB/MI if in mile unit of measure. This is the calculated loss per Km, Kf or Mi from the end of the dead zone of the previous event to the beginning of the current event. The value in the "E" line of the table for this column is the dB Per/KM, Kf or Mi for the total link.

TYPE:
Event Type is the type of event or the ORL measurement. If the event has no reflection, "splc" will be displayed and if the event is reflective, the reflectance value will be displayed. For the last event which is labeled "E" in the # column, the value displayed is the system ORL.

Chapter 8   OTDR Operation

8.1   Key Pad

Fig 8.1

Power button, turns the unit On and Off. (Hold for 1 second)

Scan button starts a scan or stops scan.

AutoTest button operates range finder trace mode. The Range Finder mode momentarily checks test conditions and starts a scan at the wavelength selected by the user but allows the OTDR to determine the pulse width and range parameters.

The Menu button displays and hides the icon menu at the top of the display. It will also back out of most menu selected screens. In the project folder and file manager it opens the file/edit menu bar. When the menu is displayed at the top of the screen, the focus of the LRUD buttons and the select buttons are on the icon menu and no longer on the trace cursors.

Toggles between A and B as the active cursors.

Selects the Zoom level, each press increments through the levels of 1x, 2x, 4x, 8x, 16x and 32x.

In the menu mode, the select button actuates highlighted item.

While in the trace mode the directional buttons are used to move the cursors. In the Menu mode, the Left and right buttons move between the icons. The up button hides the menu bar or moves cursor up in drop-down menus and the down button opens drop-down menus or move cursor down while in a drop-down menu.

8.2 Entering OTDR Function

Press the power button the to turn on the OTDR.

Use the LRUD button buttons to highlight the OTDR icon and press the select button to enter the OTDR function, or touch the OTDR icon.

8.3 Icon Definitions

	Home	Brings the user back to the home page
	Quick Save	Saves the current trace to the current folder, incremented using last named file
	Quick Load	Recalls the next file, in reverse order, chronologically in the current folder.
	Project Folder	Opens project management
	File Manager	Opens file management
	Schematic View/Event Analysis	Opens the Fib-R-Map and event analysis view
	Settings	Opens the parameters setting page.
	Splice Zone Setting	Turns on LSA/Splice markers
	Help	Opens the context sensitive help menu
	Lambda (Wavelength)	Cycles through available wavelengths
	Pulse Width	Cycles through available pulse widths
	Range	Cycles through available test ranges
	Averaging	Cycles through averaging times
	Index of Refraction	Opens the Index of Refraction entry screen

8.4 Main OTDR Screen

"A" Cursor with Position Data

"B" Cursor with Position Data

Main Trace Screen

Screen Tabs
Touching OTDR, Events and Schematic tabs change the bottom portion of the display to parameters and measurement data for the OTDR tab, the event table for the Events tab and the schematic (Fib-R-Map) view for the Schematic tab.

Distance Increment Indicators

"A-B" Cursor Status / Select
Displays the 2pt loss and distance between the "A" and "B" cursors. Touching anywhere in this area will toggle between active cursors.

Zoom Control
Displays the zoom level, and also the values of distance and dB in the vertical and horizontal grids. Touch anywhere in the area to cycle through the zoom levels.

Test Parameters
Displays test parameters of wavelength, averaging time, pulse width, range and ORL. Touch the symbol or value to cycle through the available settings and long touch in this area to open the Parameter Settings Page.

Loss Method
Displays splice loss, LSA splice loss, dB per Km and ORL. Touch anywhere in this area to cycle through the loss methods.

Scan Button
Displays scan state / status and the charge level of the batteries. Touch anywhere in the area to start or stop a scan.

Fig 8.2

Touch Screen Tip

Use the touch screen to snap cursors to a position by touching that point along the trace curve. The active cursor will move directly to that point. For finer movement, touch active cursor and drag it to the desired position. Finest movement can be accomplished with the LRUD buttons on the keypad.

Touch Screen Tip

All the test parameters may be change by touching the value on the touch screen. A long touch in the test parameter section of the screen will open the parameter settings page. A/B cursor, zoom, loss method and scan may all be operated with the touch screen.

Trace Screen W/
Measurement Data

Trace Screen W/
Event Table

Trace Screen W/
Schematic view
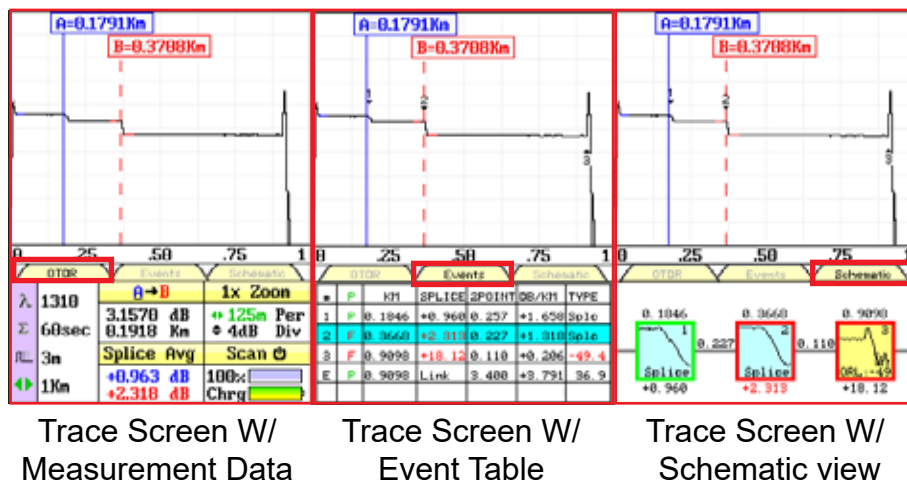
Fig 8.3

There are three tabs on the main OTDR screen. OTDR, Events and Schematic. Use the OTDR tab to view the trace with the loss and distance measurements. Use the Events tab to view an interactive event table with the trace and numbered events or the Schematic tab to view an interactive schematic view of the events with the trace and numbered events. In Events tab, the up and down buttons and in the Schematic tab, the left and right buttons may be used to snap the active cursor to previous or next event.

8.5 OTDR Parameter Settings Screen

To access the parameter settings screen press the menu button, use the LRUD buttons to highlight the setting icon and press the select button. An alternate manner to open this screen is to long touch the screen in the test parameter section of the main OTDR screen.

Touch Screen Tip

All operations on this page are accessible via the touch screen. To change parameters or event sensitivity, simply touch the desired value to select it. The block will change to green to indicate it is now the selected value. To set thresholds and the 24 hour clock, touch one of the arrows above or below a digit. Moving off the threshold category locks in the setting.

Trace Parameter Settings

Pass/Fail Thresholds Settings

Date and Time

Event Table/Fib-R-Map Sensitivity Settings

End of Fiber Pass/Fail Threshold Setting
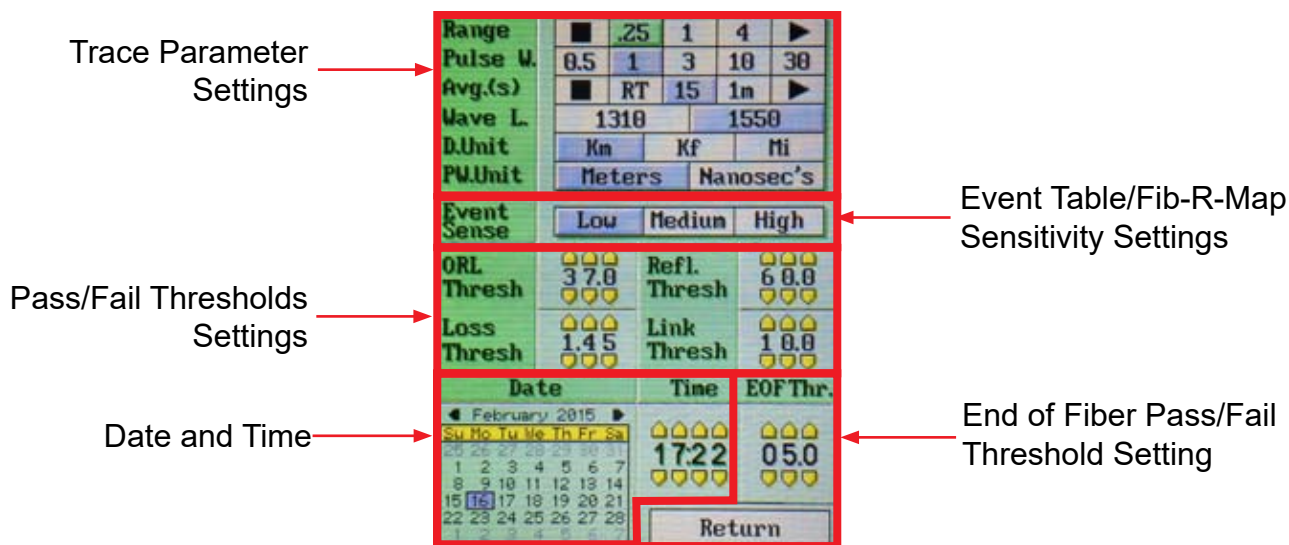
Fig 8.4

Chapter 8   OTDR Operation

Trace Parameter Settings

When using the keypad, the cursor is yellow. When the LRUD buttons are used, a yellow cursor will move through the available values. Use the Select button to select the yellow highlighted value. Once a value is selected, it will show green, until the yellow cursor is moved from that area and then it will show blue for a active value.

There are two additional setting in this area that are not available on the main OTDR screen, distance unit and pulse width unit.

Touch Screen Tip

When using the touch screen feature, simply touch the desired parameter to select it.

Note

An arrow at the beginning or end of a list indicates additional setting are available. A black square at either end indicated the end of the list.

Event Table/Fib-R-Map (Schematic) Sensitivity Settings

When using the keypad, the cursor is yellow. When the LRUD buttons are used, a yellow cursor will move through the available values. Use the Select button to select the yellow highlighted value. Once a value is selected, it will show green, until the yellow cursor is moved from that area and then it will show blue for a active value.

Pass/Fail Threshold Settings

There are five pass/fail thresholds that may be set. Use the LRUD buttons to move between threshold categories, once a categories is highlighted, press select to change the focus of the LRUD buttons and highlight the first digit in the setting. Use the up/down button to make changes to the highlighted digit and the left/right buttons to move to another digit. Once the desired value is entered, press selected again. Continue until all thresholds settings have been completed.

When using the touch screen, simply touch the up or down arrows of a digit to make changes.

Note

There is an ORL Threshold and a Reflection Threshold setting. The ORL is the return loss for the entire link/system and Reflection threshold is the return loss value of an event.

Date/Time Settings

Use the LRUD buttons to highlight the calendar month and press select. Use the left and right buttons to change the month and press select. Use the LRUD buttons, highlight the date and press select. With the touch screen, uses the arrows on either side of the month to set the month then touch the correct date.

Use the LRUD to buttons to highlight the clock and press select. Use the up/down buttons to make changes to the highlighted digit and the left/right buttons to move the another digit. Once the correct time is entered, press select. With the touch screen, uses the up and down arrows for each digit to set the time.

Exit Parameter Setting Screen

Press the menu button or touch Return to exit the parameter screen.

Warning
Before connecting a fiber to the OTDR, be certain the fiber has no active optical sources or instruments connected to the other end. Skin or eye damage could result from high power sources such as EDFAs, and instrument damage could occur voiding the warranty.

Warning
Clean all connectors in use thoroughly prior to connection to the appropriate port of the OTDR. Failure to ensure the connectors used with the OTDR are properly cleaned can result in poor launch conditions at the minimum or damage to the optical interface that requires the unit be returned to the factory for repair.

8.6   Auto Test

Auto Test is a useful feature when the approximate length of the fiber to be tested is unknown. To use the AutoTest, only the IOR and Wavelength need to be set by the user.

Note
To assist in obtaining reliable, consistent measurements, the user should be aware of the Index of Refraction of their fiber. The proper Index of Refraction (IOR) will maximize the distance measurement accuracy. The IOR is proportional to the speed of light in glass compared to the speed of light in a vacuum and can be calculated using the equation IOR = C (the speed of light in a vacuum) / V (the speed of light in fiber). The IOR number can be obtained from the fiber or cable manufacturer or can be calculated with a known length of cable. IOR numbers generally fall around 1.468 SM, 1.486 MM. These are the default values in the OTDR, but can be adjusted from 1.0 to 2. If this is unknown it is best to use the default setting on the OTDR.

Set IOR
It is necessary to have the Index of Refraction set as close as possible to the actual IOR of the fiber. If this is unknown it is best to use the default setting on the OTDR. To view the current IOR for a wavelength, open the menu use the left/right button to highlight the IOR Icon. Press select and the IOR for the wavelength that is the active will be displayed. To change the IOR, use the on screen QWERTY keyboard to enter the new value and touch save. Each wavelength stores an independent IOR.

Set Wavelength
To select the wavelength, press the menu button to display the menu at the top of the display. Use the LRUD buttons to highlight the Lambda (Wavelength) icon, press select to cycle through the available wavelengths and press the menu button again to hide the menu. Use only the single wavelength settings for the Autotest feature. Dual wavelength indicators, such as 850/1300 or 1310/1550 are used for construction mode operation.

Note
The wavelength for dual MM OTDR are 850nm, 1300nm and 850/1300nm, for SM OTDR they are 1310nm, 1550nm and 1310/1550nm. For the Quad wavelength OTDR, they are 850, 1300, 850/1300, 1310, 1550 and 1310/1550nm. The 850/1300nm and 1310/1550nm settings are for Construction Mode operation where the OTDR will test both wavelengths in one operation. Construction mode is covered in section 8.8 of this guide.

Start Auto Test
Press the AutoTest button and the unit will set the average time to short, the appropriate pulse width and range parameters for the fiber under test.

Warning

Before connecting a fiber to the OTDR, be certain the fiber has no active optical sources or instruments connected to the other end. Skin or eye damage could result from high power sources such as EDFAs, and instrument damage could occur voiding the warranty.

Warning

Clean all connectors in use thoroughly prior to connection to the appropriate port of the OTDR. Failure to ensure the connectors used with the OTDR are properly cleaned can result in poor launch conditions at the minimum or damage to the optical interface that requires the unit be returned to the factory for repair.

8.7   Manual/Expert Mode

Note

To assist in obtaining reliable, consistent measurements, the user should be aware of the Index of Refraction of their fiber. The proper Index of Refraction (IOR) will maximize the distance measurement accuracy. The IOR is proportional to the speed of light in glass compared to the speed of light in a vacuum and can be calculated using the equation IOR = C (the speed of light in a vacuum) / V (the speed of light in fiber). The IOR number can be obtained from the fiber or cable manufacturer or can be calculated with a known length of cable. IOR numbers generally fall around 1.468 SM, 1.486 MM. These are the default values in the OTDR, but can be adjusted from 1.0 to 2. If this is unknown it is best to use the default setting on the OTDR.

Set IOR

It is necessary to have the Index of Refraction set as close as possible to the actual IOR of the fiber. If this is unknown it is best to use the default setting on the OTDR. To view the current IOR for a wavelength, open the menu use the left/right button to highlight the IOR Icon. Press select and the IOR for the wavelength that is the active will be displayed. To change the IOR, use the on screen QWERTY keyboard to enter the new value and touch save.   Each wavelength stores an independent IOR.

Touch Screen Tip

All the test parameters may be change by touching the value on the screen to the right of the icon. A long touch in the test parameter section of the screen will open the parameter settings page.

Set Wavelength

To select the wavelength, press the menu button to display the menu at the top of the display. Use the LRUD buttons to highlight the Lambda (Wavelength) icon, press select to cycle through the available wavelengths and press the menu button again to hide the menu. Wavelength may also be set by touching the wavelength indication on the display.

Note

When setting the range and pulse width, it is necessary to keep in mind that it may not be beneficial to use certain pulse widths with some ranges. For this reason not all pulse widths are available for use with all rangers. The chart below indicates the pulse widths that are available with each range.

Pulse Width

	5ns	10ns	30ns	100ns	300ns	1μ	3μ	10μ	20μ
250m	✓	✓	✓	✓	✓				
1km	✓	✓	✓	✓	✓				
4km		✓	✓	✓	✓	✓			
16km			✓	✓	✓	✓	✓		
64km					✓	✓	✓	✓	✓
128km					✓	✓	✓	✓	✓
256km					✓	✓	✓	✓	✓

(Range)

Set Range

To set the range, press the menu button and use the LRUD buttons to highlight the range icon. Use the select button to cycled to the desired range.

Set Pulse Width

To set the pulse width press the menu button and use the LRUD buttons to highlight the pulse width icon. Use the select button to cycled to the desired pulse width

Set Averaging Time

To set the averaging time press the menu button and use the LRUD buttons to highlight the averaging icon. Use the select button to cycle through the averaging times of RT (Real Time), 15, or 60 seconds, 2 or 4, 8 or 20 minutes.

Touch Screen Tip

The above setting may be made with the touch screen by simply touching the appropriate icon in the icon menu to cycle through the available settings or touching the value indicated in the parameter section of the OTDR screen. The parameter settings page may also be opened to adjust all these settings.

Scan

Once all the proper settings have been entered, press the Scan button to take the trace. To stop the trace press the scan button again.

8.8   Construction Mode

Construction Mode is useful when a large number of fibers need to be tested with the same settings at multiple wavelengths. This mode tests a fiber at two wavelengths, saves the traces and displays them in dual trace mode.

Create or Open a Project

Press the menu button, use the right or left buttons to highlight the Project Management folder icon and press select. Use the up and down buttons to highlight the desire project and press Select, or create a new one (Once you have established all the desired parameters for testing) by pressing the Menu button and with File tab highlighted press the down button. Press select with New highlighted. Use the onboard QWERTY keyboard to enter the project name and touch save.

Note

Refer to Chapter 9 of this manual for detailed project management operating procedures.

To enter project details, touch the Details section at the bottom of the projects screen. A dialog will be displayed that allows the user to set the Customer, Date, Operator along with 'to and from' locations if desired. Simply touch Close at the bottom of the dialog to go back to the projects screen

With the project enter and highlighted, press the Select button. This will bring the user directly to the file management screen.

Set Base File Name

Once the file management folder has been created and or opened, the files folder for that project will be displayed. A base file name for the test should be established. Press the menu button to open the file management menu, with the file tab highlighted, press the select button or the down button to open the drop-down menu. With save highlighted press the Select button. Use the QWERTY to enter a base file name.

When testing in construction mode, files will be save in numeric order with the first two digits of the wavelength added to the end of the file name. For example, if the base file name of SAMPLE is entered, the first test in construction mode (If the test were at 1310/1550nm) would be a test at 1310nm with a name of SAMPLE.1.13 and the second test would be the same fiber at 1550nm with a name of SAMPLE.1.15. The next tests would be SAMPLE.2.13 and SAMPLE.2.15,........

Once the base file name is set, exit the file manager by pressing the menu button, pressing select on the file tab, using the down button to highlight exit and pressing select.

Set the Wavelengths

On the main trace screen in the OTDR tab the wavelength settings are accessible. There are wavelength settings available here that are not in the parameters setting screen.   Dual wavelength OTDRs will have one extra setting of a combination of the two wavelengths. For example, if the OTDR is a 1310/1550nm dual wavelength unit, there will be three available selection here. 1310, 1550, and 13/15. The 13/15 is used for constructions mode. This needs to be selected anytime construction mode is to be used. Quad wavelength units will have 850, 1300, 1310, 1550, 85/13 and 13/15, where either 85/13 or 13/15 may be use for construction mode testing. Use the touch screen to cycle through these wavelength settings.

Chapter 8   OTDR Operation

Start A Test
To start the test connect the fiber to be tested to the proper OTDR port and press the scan button.

The OTDR will test the fiber at the shorter wavelength, display the trace and save the file. It will then test the fiber the longer wavelength, The longer wavelength will become the primary trace and the two test will be displayed in dual trace mode.

When the test is complete for the first fiber, remove the connector from the OTDR, connect the next fiber to be tested and press the scan button. Continue until all test are complete.

Note
Macrobend tests are automatically conduct with construction mode. Simply enter the Events tab on the OTDR screen or open the event analysis screen through the icon menu. For information about marobend analysis, please refer to section 8.11 of this guide.

Exiting Construction Mode
To exit construction mode, set the wavelength on the trace screen to a single wavelength and start a scan.

8.9 Trace Analysis

Unit of Measure
The distance unit of measure may be displayed in Kilometer (Km), Kilo feet (Kf) or Miles (Mi). To set the unit of measure, press the menu button, use the LRUD buttons to highlight the settings icon and press select to open the parameter screen. Use the down button to move the cursor to the D.Unit line in the parameter menu, and use the left or right button to highlight the desired unit of measure and press select. Press the menu button or touch Return to exit the parameter settings page.

Note
When in the Kilo feet (Kf) mode, the distance measurements are displayed in feet for the 820 foot and the 3.2 Kf ranges. All longer ranges have the distance measurements displayed in Kf.

Zoom
There are six zoom levels, 1x, 2x, 4x, 8x,16x and 32X. To change the zoom level, press the zoom button on the keypad. This will cycle through the six levels. When viewing the trace at a zoom level other than 1x, the active cursor is centered on the trace display and when the cursors are moved, the trace moves and the cursor will remain centered.

Cursor Movement
The active cursor is displayed as a solid line and the non-active cursor as a dashed line.   Pressing the A/B button on the keypad toggles between the two cursors as the active cursor. The cursors are moved using the left and right buttons.

Touch Screen Tip
Use the touch screen to snap cursors to a position by touching that point along the trace curve. The active cursor will move directly to that point. For finer movement, touch active cursor and drag it to the desired position.   The finest movement can be accomplished with the left and right buttons.

8.10   Loss Measurements

2 Point loss
2 Point loss measurements take into account the difference in vertical height between where the A and B cursors cross the fiber trace. This information is located on the main OTDR screen in the A-B section of the trace information as shown in Fig. 8.2. This is a quick method of checking the loss between any two points on a fiber optic link.

dB/km
The dB/Km (dB/Kft or dB/Mi) loss method takes the 2 Point loss in dB and divides by the distance between the cursors in Km (Kilometers), Kf (Kilofeet) or Mi (Miles). For accurate dB/.... loss measurements, the two cursors must be on level backscatter points at least 100m apart. (NA will show for distances that are not sufficient for measurement).

Chapter 8   OTDR Operation

Optical Return Loss

This Optical Return Loss (ORL) is separate from the event ORL (Reflectance) that is displayed in the event analysis under the TYPE header for an individual event. The measurement displayed in the loss measurement area of the main OTDR screen and in the E (End of Fiber) row in the TYPE column is an optical return loss based on the entire link. It is the total accumulated light reflected back to the source along the fiber optic link.

Basic Splice Loss

Splice Loss method is meant to be used in noisy environments when it is difficult to attain an LSA area that lays flat on the back scatter before and after the cursor. This method takes an average of the selected points before and after the active cursor and uses this average to make a good estimation of the event loss. This is an estimation but this method may be more accurate than LSA Splice Loss method in noisy environments.

When using the splice loss It is necessary to set the splice loss areas in clear backscatter. (areas that do not consist of other events) For accurate splice loss measurements, set a cursor at the beginning of an event and set splice loss measurement areas as shown in Fig. 8.6. Splice loss measurement areas will follow the undulations of the back scatter line unlike LSA areas.

Least Squares Approximation (LSA)

Least Squares Approximation (LSA) Splice loss method gives the user a visual aid in setting splice loss areas. This method can be more accurate by affording the ability to see the slope of the splice loss areas, however: it can also supply a reading with greater error if not used properly. The splice loss lines must be set to overlay the backscatter of a trace without over lapping any other events. Unlike basic splice lose, LSA measurement areas are drawn as straight lines without regard to the undulations of the back scatter

8.11   Loss Measurement Settings

Touch Screen Tip

The loss measurement/LSA areas may only be set with the key pad. Use the touchscreen menu to enter the LSA settings function, but once there, use the key pay to adjust the areas as described. It is necessary to be zoomed in on an event to set the loss measurement areas.

Setting Splice Loss Measurement Areas

To set the basic splice loss measurement/ LSA ares, the OTDR must be in Splice AVG or Splice LSA mode. To adjust the splice loss areas around the cursors, press the menu button, highlight the LSA icon and press select. The splice lose position indicator will be displayed at splice loss position number 1 as indicated in Fig. 8.6. Use the left and right buttons to adjust the loss measurement area. Press the select button to move the splice lose position indicator to the position number 2, set the area and continue with positions 3 and 4 in the same manner. Press select when done with position number 4 to hide the splice lose position indicator and reset the focus of the keyboard back to the cursors.   Press the menu button at any time to escape the splice lose settings sequence.

Note

It is necessary to set these areas in clear backscatter to acquire the most accurate measurements, they must not include other events.

Splice Loss Measurement Areas
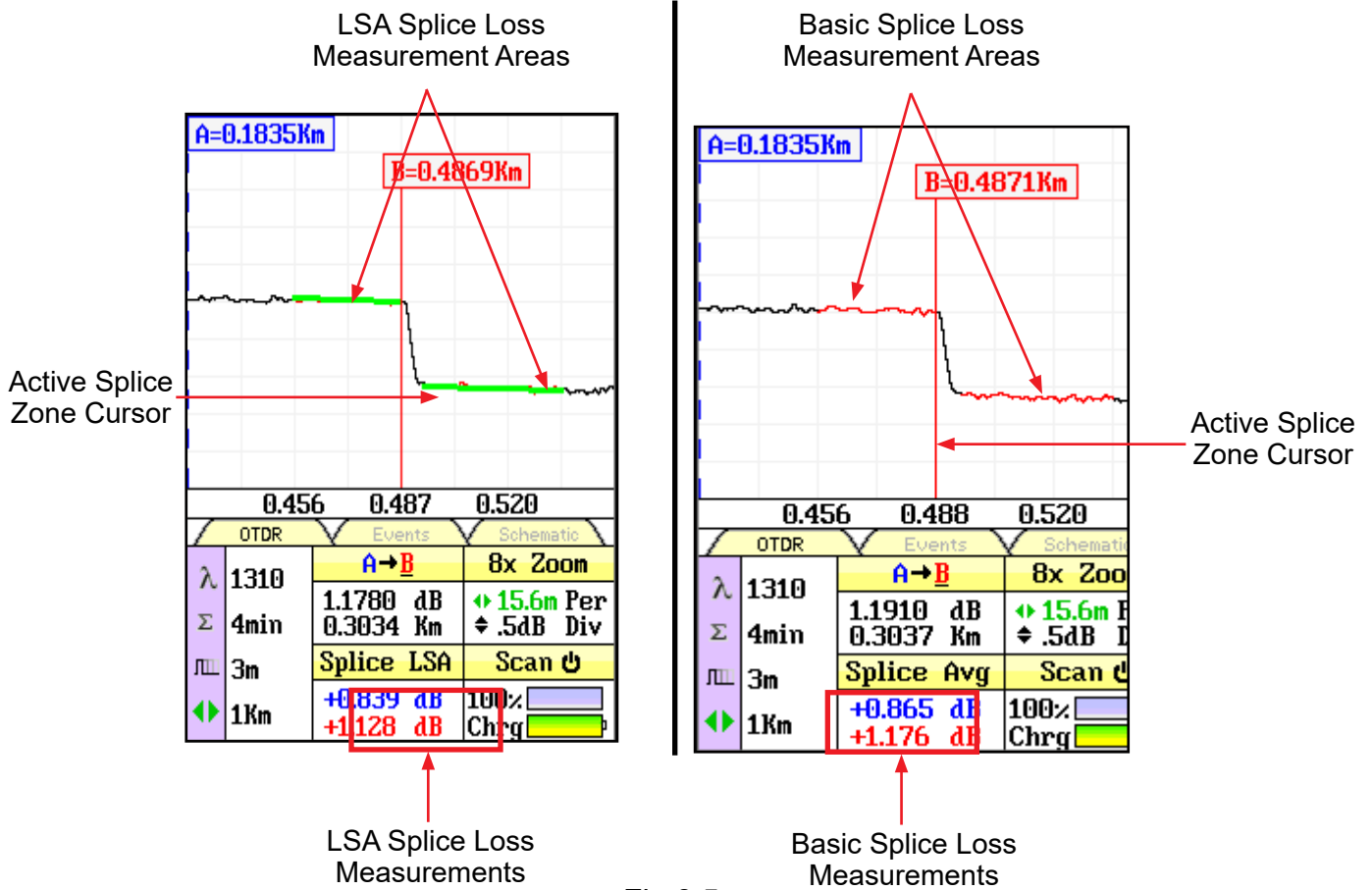
Fig 8.5

Splice Loss Adjustment Positions
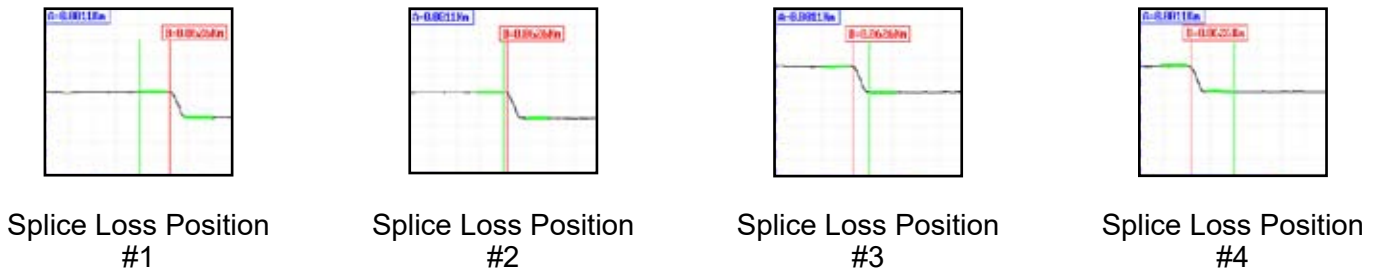
Fig 8.6

Note

The vertical green line is used to show which point of the LSA measurement areas is the focus of the left and right buttons. To move to the next point, press the Select button.

Chapter 8   OTDR Operation

LSA Examples

LSA Set Too Early:
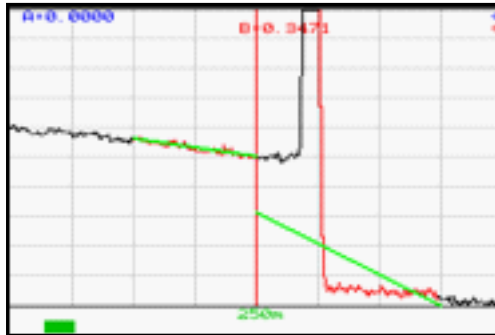
Fig 8.7

The LSA area and cursor are set too early. The right green LSA indicator line is not over laying the back scatter of the trace properly.

LSA Set Too Late:
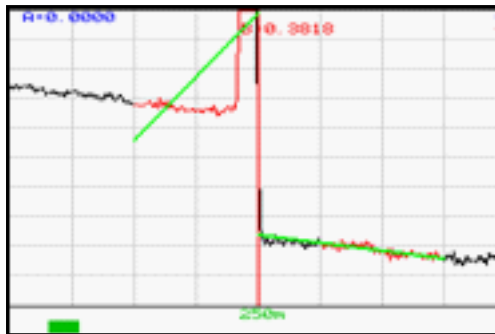
Fig 8.8

The LSA area and cursor are set too late. The left green LSA indicator line is not over laying the back scatter of the trace properly.

Proper LSA Setting:
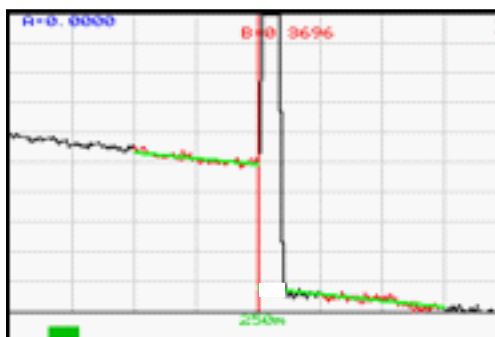
Fig 8.9

The LSA area and cursor are set properly. The green LSA indicator line is over laying the back scatter of the trace properly.

8.12   Event Analysis

NOTE:

When using the event table and the Fib-R-Map (Schematic view), it is necessary to keep in mind that event analysis provides approximate loss and distance measurements to quickly assist in network evaluation. Automatic detection results are not guaranteed and have their limits, possibly causing erroneous readings or detection failure. User interaction, by interfacing with the trace display is recommended for final qualitative and quantitative analysis.

Enter Event Analysis

To enter event analysis, press the menu button and use the left / right buttons to highlight the event analysis icon and press select.

Threshold Settings

There are five threshold settings, ORL, Loss, Reflectance (Refl.) Link and End OF FIber (EOF). (See Fig 8.4) The EOF is not a Pass/Fail threshold, it is used to set a loss value to determine the end of fiber. IF the EOF threshold is set for 3dB, then the first event that has a loss of 3dB or greater will be determined to be the EOF.

To change the threshold settings, press the Menu button, use the left/right buttons to highlight the settings icon and press select. Use the down button to move the cursor to the threshold setting to be set.

NOTE:
The cursor will be displayed as yellow when not on a selected value and green when on a value that is already a selected parameter..

When the threshold value is selected with the yellow background, press Select to highlight the first digit in the setting. Use the up or down buttons to make a change and the left or right buttons to move to the previous or next digit. When the value is set as desired, press the Select button and use the directional buttons to move to the next threshold to be set. To exit the parameter screen, press the menu button.

NOTE:
Thresholds are "pass thresholds", a value entered as a threshold is a passing value.

Touch Screen Tip
With the touchscreen, simple touch the arrows above or below any digit to make changes.

Examples of these settings are as follows:

Splice: If a 1.00dB splice loss is acceptable, set the threshold to 1.00. If a splice loss of 1.00 is the fail point, set the threshold to 0.99

ORL: If a -50dB reflectance is acceptable, set the threshold to 50. If -50dB is the fail point, set the threshold to 50.5.

Link: If a 20dB, link loss is acceptable, set the threshold to 20. If 20db link loss is the fail point, set the threshold to 19.5.

Sensitivity Settings

There are three levels of sensitivity for the event table and Fib-R-Map. (See Fig 8.4) To change the event sensitivity, press the Menu button, use the left/right buttons to highlight the settings icon and press select. The cursor is the yellow highlighted area. (If the yellow cursor is on a value that is the current selection, that block will be highlighted green.) The setting highlighted in blue is the current setting. Use the LRUD buttons to highlight the desired setting and press select. To exit the parameter screen, press the menu button.

The lowest setting possible should be used to help filter out any false events that may be caused by short pulse widths, but are not true perturbations in the optical signal. High sensitivity settings present events with loss down to approximately 0.1dB, Medium (Md) with events down to approximately 0.2dB and Low (Lo) for events down to about 0.5dB. Longer pulse widths, and averaging help to lower the number of false events. Highest sensitivity settings should only be used for traces with high signal level, low noise, long pulse width and long average.

Macrobend Analysis

Macrobend analysis is performed with the dual trace operation and displayed in the event table. The traces to be compared must have been performed at the same range and the primary trace must be of the longer wavelength.

To conduct a macrobend analysis, open the file manager as described in chapter 10. Highlight the first trace to be loaded (the trace of the longer wavelength) and select to open. Open the file manager again and highlight the trace to be compared (the trace of the short wavelength), open the drop-down menu under the file tab and touch dual or use the up or down buttons to highlight dual and press select.   Open the event analysis screen to check for macrobends. If and event on the longer wavelength trace has 0.25db or greater loss than the same event on the shorter wavelength trace, a macrobend event will be generated on the event table, identified by a Macro label in the Type column. This event will immediately follow the event it is related to. For example: If event number one was 5 dB at 1550nm and .5 db at 1310nm, the second event will be blank for location, +4.5dB for splice, blank for 2point and DB/KM. The type field will be listed as Macro.

To exit dual trace and macrobend analysis, simply start a new scan.

Event Analysis Screen

Event Table →

Fib-R-Map
(Schematic View) ←

Trace Parameters →

← Event Map

Fig 8.10

Fib-R-Map

Loss Between Events

Event Number

Event Location

Event Loss in dB

Event Map

Event Type and Reflectance Value

Link Data

System ORL

(On End Event Only)

Fig 8.11

Note

The Link is the last item in the schematic view. It is labeled E in the event number position. The loss value just prior to this item is the Link Loss and the Event location above the item is the same as the location of the event deemed the EOF.

Event Table

Event Location

Event Loss in dB

Loss Between Events

dB Per/Km Between Events

Pass/Fail

Event Number

EOF/Link Data

Event Type or Reflectance Value

System ORL

EOF Location

Link Loss

dB Per/Km Between Events

Fig 8.12

Note

Information in the red outlined area is for individual events. Information in the green outlined area is for the fiber link.

Chapter 8 OTDR Operation

Evemt Table Field Description

Event Number:
Indicates the event in sequence, where the higher the number, the further distance from the OTDR the event occurs. "E" (End) which is always displayed in the bottom row is the event determined to be the End of Fiber (EOF).

P:
Pass/Fail, if any one of the thresholds are not met for and event, the P/F column will display a red F. The parameter that failed will also be displayed in red. If all the parameters are met, this column will display a green P. The Pass/Fail threshold for the last event labeled "E" is the loss displayed in the 2POINT column, the link loss threshold.

Km or KF or MI:
Event Location, Km for Kilometer or KF if unit of measure is Kilo-feet MI for mile. This is the distance/location that the event occurs along the fiber link.

Splice:
Event Loss, is the splice loss (event loss) of the numbered event. (A positive number is the amount of loss and a negative number indicates a gain normally due to mismatched index of refraction.) This is a settable threshold for the Pass/Fail feature. The "E" event will display LINK as this is not an event that would have meaning. The event that is deemed the EOF will normally display a large loss as this loss will be greater than the threshold set to determine the end of the fiber.

2POINT:
2 Point Loss is the loss measured from the end of the dead zone of the previous event to the beginning of current event. The value in the "E" line of the table for this column is the link loss. The loss from the beginning of the trace to the event determined to be the EOF. This is the value used to determine if the fiber link passes or fails it's loss threshold.

dB/Km:
dB per Kilometer if in KM and DB/KF if in Kilo-Feet and DB/MI if in mile unit of measure. This is the calculated loss per Km, Kf or Mi from the end of the dead zone of the previous event to the beginning of the current event. The value in the "E" line of the table for this column is the dB Per/KM, Kf or Mi for the total link.

TYPE:
Event Type is the type of event or the ORL measurement. If the event has no reflection, "splc" will be displayed and if the event is reflective, the reflectance value will be displayed. For the last event which is labeled "E" in the # column, the value displayed is the system ORL.

9.1 Project Management Description

Project Management allows the user to save a set of parameters to be recalled for use at a later time. It also incorporates the file management system to save traces to the active project folder.   When the OTDR is turned on, the default project is [Default]. If an existing project is not open or a new one not set, all traces will be saved to the [Default] folder.

Note
It is necessary to create the project prior to taking a trace as the file will not be available to save after going through the project creation sequence.

Project Management Screen

Project Folder List →

Project Details/Properties →

Projects

Name

HP Schools 1
HP Schools 2
Rome City
[NONE]

Details

Customer: HP schools
Date: 1 2 2014
Operator: Don
Loc From: Middle School
Loc To: Central Office
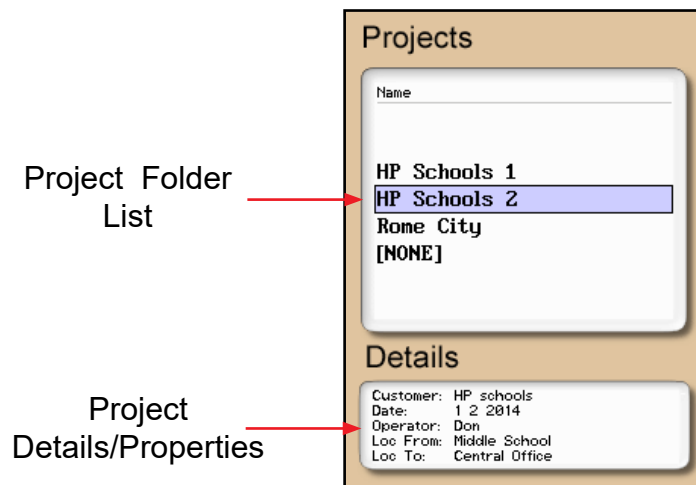
Fig 9.1

Project Management Menu The menu for project management may be operated with the touch screen, however, this manual describes the manner of operation with the keypad. To open the menu press the menu button. There are four tabs available, File, Edit, View and Help. Use the left or right buttons to move to a desired tab and use the select or the down button to open the drop-down menus. Pressing the menu button again or the up button will hide the operations menu.

File	Edit	View	Help

Fig 9.2

Touch Screen Tip
The menu may be pulled down with the stylus the same as the menu on the main trace screen. Once the file menu is open, it is fully operable with the touch screen function.

Chapter 9 Project Management

<u>Project Management File Tab</u> To open the drop down menu under file, with file tab highlighted, press Select or the down button. Use the down or up buttons to move through the drop down menu and press Select to choose an operation. Selecting new will open a new project folder using the current parameter settings. Open will open the highlighted project, dual is not operational in the project management and therefore greyed out, delete permanently removes the highlighted project. (The delete button must be held for at least one second to remove projects.) Once delete is selected, the project and all files associated with that project are deleted. Use exit to leave the project manager and return to the trace screen.
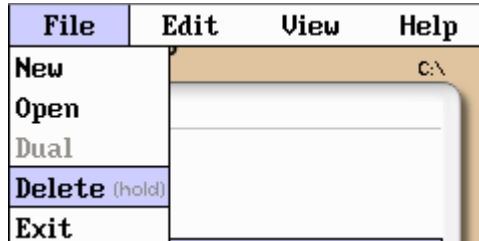
Fig 9.3

NOTE:

Once a project is established the settings cannot be permanently changed. They may be changed Temporarily, but the original setting will be defaulted every time the project is opened.

<u>Project Management Edit Tab</u>

To open the drop-down the menu under edit, with the edit tab highlighted, press select or the down button. Use the down or up buttons to move through the drop down menu and press select to choose an operation. Upload is used to transfer files to the CertSoft software. Rename allows the highlighted folder name to be modified while maintaining all settings and associated files. Properties allows the user to edit the details/properties displayed at the bottom of the project window.
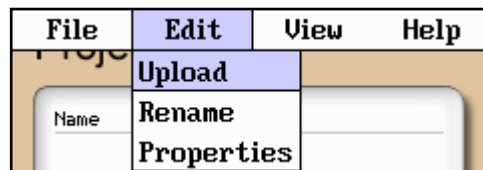
Fig 9.4

<u>Project Management View and Help Tabs</u>

View offers the user the opportunity to move to the file manager from the projects page. With view highlighted, press select or the down button to open the drop-down menu, with the files tab highlighted, press select to move to the file management page. For onboard help pages, highlight the help tab and press select.

Fig 9.5

Chapter 9   Project Management
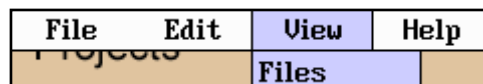
9.2 Project Management Operation

Create a New Project
The parameters that are stored for a project are; range, pulse width, average, wavelength, distance units, pulse width units, event sensitivity and the thresholds. To create a new project, press menu, select the settings icon, set the parameters as required, when all settings are established, use the arrow button to highlight the return button or touch return at any time while in the settings screen. Press the menu button, highlight the project folder icon and press select. With the file tab highlighted, press select or the down button to open the drop down menu. Use the down or up buttons to highlight new and press select again. Use the on-screen QWERTY keyboard to name the folder/project and touch save. The folder names are limited to 16 characters.

To enter details about the project, use the up and down buttons to highlight the project that was just created and press the menu button. Use the left or right button to highlight the edit tab, use the down button to highlight properties and press select. Use the up and down buttons to select the desired field to be entered or modified and press select. Use the QWERTY keyboard to enter the information and touch save when complete. Up to 24 characters may be entered for these fields. To exit the project screen, press menu, press select, use the down button to highlight exit and press select again.

Open an Existing Project
To open a project, press the menu button, highlight the project folder and press the Select button. Use the up or down buttons to highlight the desires project folder and press the Select button.   This will open the file management screen listing all the files previously stored in this project. All traces saved will now be stored to this project ,until another project is opened.

Delete a Project
To delete a project, with the project to be deleted highlighted, open the file drop down menu, highlight delete and press and hold the Select button. Ensure the proper project is selected as once deleted, the folder and files cannot be recalled.

NOTE:
Delete must be held for approximately 2 second to complete the delete function.

Upload a Project to CertSoft
To upload a folder and all it's associated files from the OTDR to the computer, open the CertSoft software and ensure the OTDR is connected to the computer with the USB cable.

NOTE:
The two plugs in the top right corner of the computer software screen should show as connected and green.

Highlight the project to be uploaded, press menu to open file manager menu, use the right button to highlight edit tab, press select or the down button to open the drop down menu and with upload highlighted, press select. The folder with all files will be uploaded to the target folder selected on the computer.

Rename a Project

To rename a project, have the project to be renamed highlighted, press menu, to open the project management menu. Use the left and right buttons to highlight edit tab and press select or the down button to open the drop-down menu. Use the down button to highlight rename and press select. The project name will be displayed with the on-screen QWERTY keyboard. Use the keyboard to rename the project and touch save.

Modify Properties

To modify the properties, have the project to modified highlighted. Press menu, highlight edit/properties and press select. The project properties will be displayed, use the up/down buttons to highlight the field to be changed, use the on-screen QWERTY keyboard to make the change and touch save. Continue with the changes needed, when compete highlight close and press select.

Temporary Modification of Parameters

Test parameters may be temporarily changed by selecting new settings, such as wavelength, average time, pulse width, and range directly on the main OTDR screen with the touch screen capabilities or open the parameter settings screen, set the new parameter and save. All subsequent test will use the new settings until the original settings are returned or the folder is reopened resetting the project parameters. To make temporary changes to event sensitivity or thresholds, open the parameters settings page.

Exit Project Management

To exit the project management, press menu, use the left or right buttons to highlight the file tab, press select or the down button to open the drop down menu. Use the down button to highlight Exit and press select.

Chapter 10 File Management

10.1 File management Description

File Management is use to save and recall traces, loss test and VIP images. It operates in conjunction with the projects manager in that if a project folder is open, the files saved to and listed in the file manager are associated with the open project. When the OTDR is turned on, the default folder is [Default], therefore, any files save without opening a project will be save to the [Default] folder. Any files saved with the LTS or scope functions will also be associated with the open folder.

File Management Screen
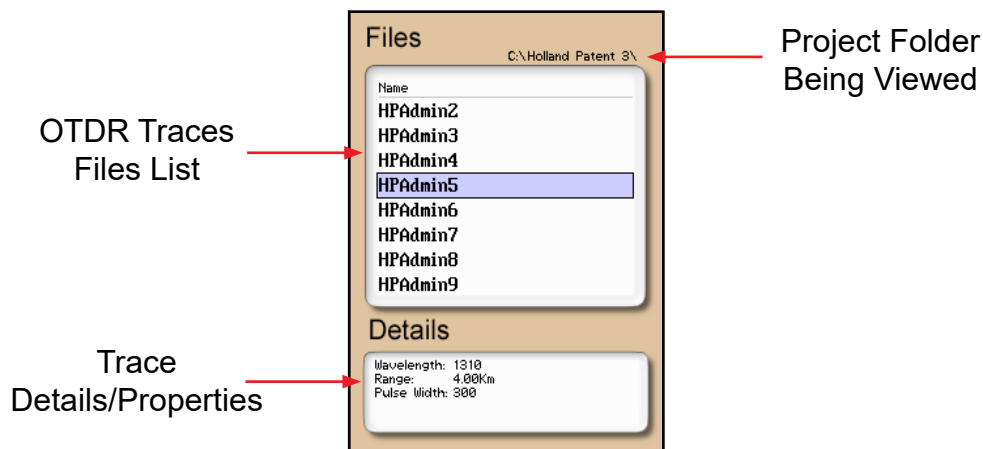
Fig 10.1

File Management File Menu

The menu for file management may be operated with the touch screen, however, this manual describes the manner of operation with the keypad. To open the file management menu press the menu button.
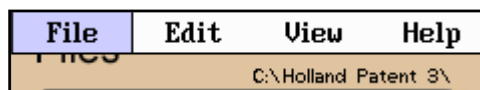

Fig 10.2

Touch Screen Tip

The file menu may be pulled down with the stylus the same as the menu on the main trace screen.

Once the file menu is open, it is fully operable with the touch screen function.

File Management File Tab

To open the drop down menu under file, with file highlighted, press select or press the down button. Use the down or up arrow to move through the drop down menu and press select to open the highlighted operation. The operations are Save, Open, Dual, Delete and Exit. Save stores the current trace, Open displays the trace that is currently highlighted, Dual opens a secondary trace, Delete permanently removes a file and Exit closes the file management screen.
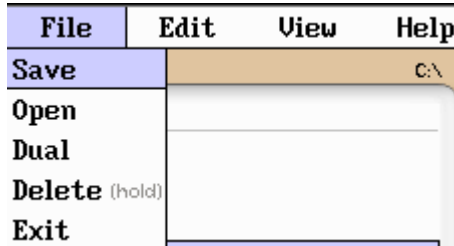
Fig 10.3

File Management Edit Tab

To open the drop down menu under edit, with edit highlighted, press select or press the down button. Use the down or up arrow to move through the drop down menu and press select to choose a highlighted operation. Upload is used to transfer the highlighted file to the CertSoft software. Rename allows the highlighted file name to be modified. Properties is grayed out and not accessible from this location.
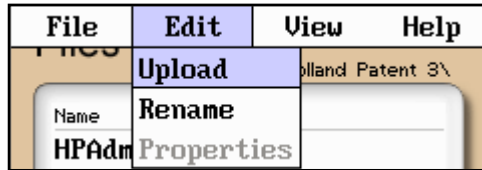
Fig 10.4

File Management View and Help Tabs

View offers the user the opportunity to move to the projects management page from the file management page. With view highlighted, press select or the down arrow to drop down the view tab and press select to move to the file management page. For onboard help pages, highlight the help tab and press select.
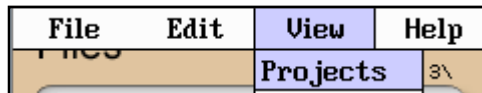
Fig 10.5

10.2 File management Operation

Save a Trace

To save a trace, press menu, highlight the file manager icon and press Select. Press the Select button or the down button to open the drop down menu and with save highlighted, press Select again. The file naming window will open and the onboard QWERTY key board will be available. Use the touch keyboard to name the file and touch save. The file names are limited to 16 characters. This method should be used to set the base file name for a group of traces. These file names are save exactly as entered. To save files with a chronologically numbered suffix, use the quick save. Quick Save uses the last enter base file name. If a Base file name of SAMPLE is saved, the first Quick Save file will be SAMPLE.1, next SAMPLE.2 etc.

Chapter 10 File Management

Open/View a Trace

To open a trace, press the menu button, highlight the file folder and press select. Use the up or down buttons to highlight the trace to be viewed and press select.

Dual Trace Mode

Dual trace mode may be used to view and compare two traces. Both traces must be of the same range setting. To utilize dual trace feature, first open the primary trace as you would a normally, by highlighting the trace in file management, pressing menu to open the file management menu, with file highlighted, open the drop-down menu use the down button to highlight dual and press select. The trace opened using the dual feature is the secondary trace and all information displayed is that of the primary trace. To exit the dual trace mode, start a scan with the scan button.

Delete a File

To delete a file, with the file to be deleted highlighted, press menu or the down button to open the file drop down menu, use the down or up buttons highlight delete and press select for at approximately 2 seconds. Ensure the proper file is selected as once deleted, the file cannot be recalled.

> ## NOTE:
> Delete must be held for approximately 2 seconds to complete the delete function.

Upload a Trace to CertSoft

To upload a trace from the OTDR to the computer, Open the CertSoft software and ensure the OTDR is connected to the computer with the USB cable.

> ## NOTE:
> The two plugs in the top right corner of the computer software screen should show as connected and green.

Highlight the file to be uploaded, press menu to open file manager menu, use the right button to highlight the edit tab, press select or the down button to open the drop down menu and with upload highlighted, press select. The file will be uploaded to the target folder on the computer .

Rename a Trace File

To rename a trace file, have the file to be renamed highlighted. Press menu, use the left or right button to highlight edit, press select, or the down button to open the drop-down menu, press the down button to highlight rename and press select. The file name will be displayed with the on-screen QWERTY keyboard. Use the keyboard to rename the project and touch save.

Exit File Management

To exit the file management, press menu, use the left or right buttons to highlight the file tab, press select or the down button to open the drop down menu. Use the down button to highlight Exit and press select.

11.1 Entering Video Scope Function

To operate the video scope, from the home screen, highlight the Scope icon and press the select button. If a probe is not connected already, connect the VIS300 video probe to the video probe port on the top of the OTDR.

11.2 Video Scope Display
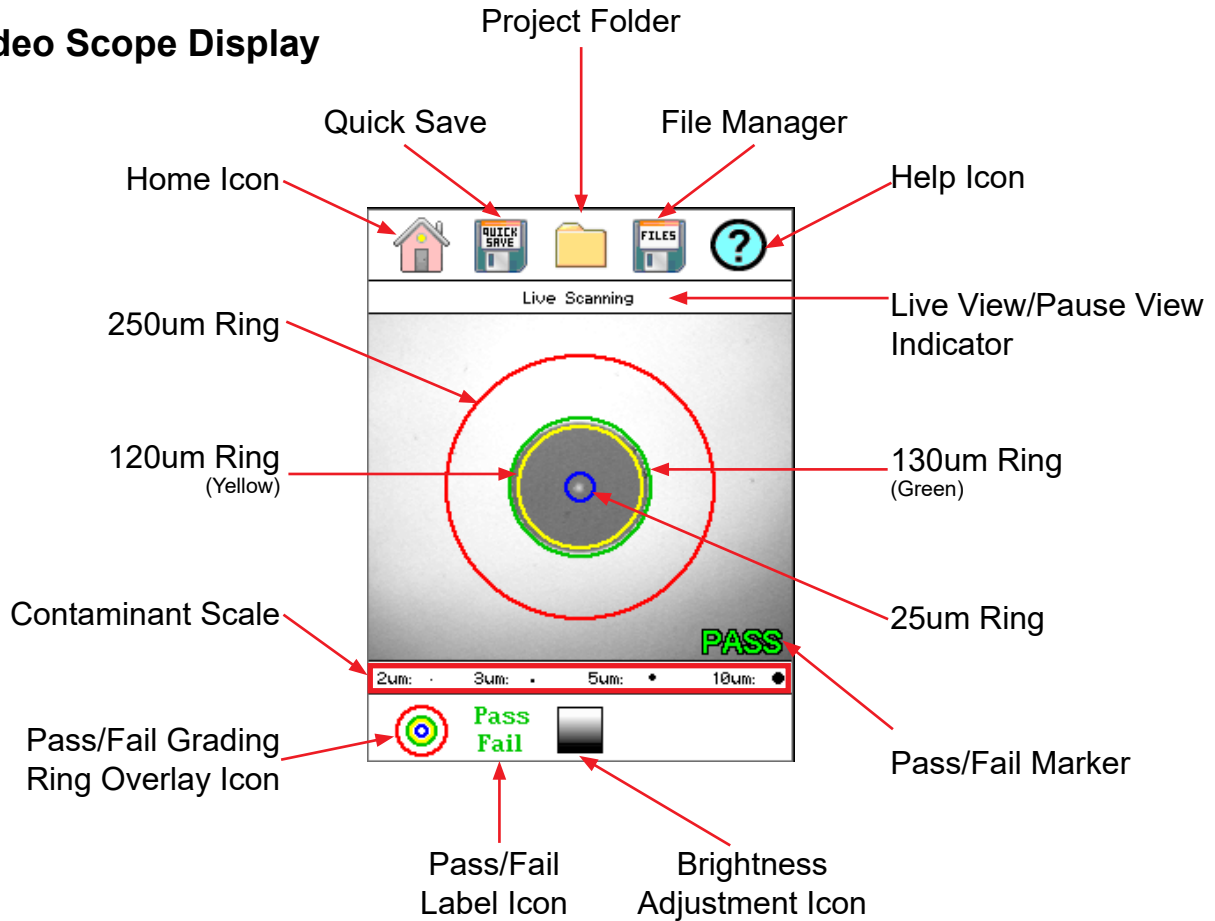
Fig 11.1

Touch Screen Tip

The icons on the video scope screen are operational with the touch screen feature, though this guide is written using the keyboard whenever it is available.

11.3 Video Scope File/help Icon Menu

The Icons at the top of the display are Home, file save, project management, file management and Help.

Home

Press the menu button, use the left and right buttons to highlight the home icon and press select to return to the home Screen.

Quick Save

Press the menu button, use the left or right buttons to highlight the quick save icon and press the select button to store a file image of the scope screen in the file folder within an active project. Scope files will be preceded by a target icon.

Project Management

To open project management, press the menu button, use the left or right buttons to highlight the project management folder icon and press select. Use the project management folder to open the project that the scope images are to be stored. When entering the video scope function, the active folder will be the one last used in the OTDR or LTS. For more information about the project management system, please refer to Chapter 9 of this guide.

File Management

To open file management, press the menu button, use the left or right buttons to highlight the file management icon and press select. Use File management to view a list of saved files or to open a stored image. File types are identified by the preceding icon. Trace files are indicated by a trace icon, LTS file by an LTS icon and scope files are preceded by scope (target) icon

Help

Press the menu button, use the left and right buttons to highlight the help icon and press select to view the help information.

11.4 Video Scope Operation Icon Menu

The following functions are only available for use when the the video scope is in live scan mode.

Grading Rings

Used to turn on and off the rings that indicate the IEC61300-3-35 grading zones.

by entering the menu mode with the menu button, use the LRUD buttons to highlight the pass/fail grading rings overlay icon and press the select button. Exit the menu mode and use the LRUD buttons to center the image in the rings. Use the Pass/Fail Criteria Tables from page 44 to grade the connector end face. 2, 3, 5 and 10 micron contaminant examples are displayed just below the connector image on the video scope display.

Pass/Fail Label

Used to turn cycle through pass, fail or no grading (off) indicators. To set the pass/fail indicator, press the menu button, use the left or right buttons to highlight the pass/fail icon and press select to cycle through the pass/fail states.

Brightness

Press the menu button, use the left and right buttons to highlight the brightness icon, use the up and down buttons to adjust the brightness level of the display or cycle through the brightness levels by pressing the select button.

11.5 Video Scope Operation

To operate the video scope, from the home screen, highlight the Scope icon and press the select button. If a probe is not connected already, connect the VIS300 Video Probe to the video probe port on the top of the OTDR.

Video Probe Tips

There are a number of video probe tips available. To remove a tip from the Probe, grasp the probe tip and unscrew the tip retention nut from the tip. Pull the tip straight up from the probe. To place a tip on the probe, ensure the lens is clean, slide the tip on to the end of the probe and tighten the tip retention nut. Do not overtighten the retention nut.

Adapter Tip

Tip Retention Nut   Focusing Ring

Fig 11.1

Viewing/Focusing a Connector

With the video scope turned on and the video probe plugged into the OTDR, insert a connector in to universal tip or insert the panel adapter tip into the appropriate port. The scope must be in the live scanning mode to make focus adjustments. Use the focus ring to get the connector image as sharp as possible.

NOTE:
To make position adjustments with the LRUD buttons, the unit must not be in menu mode. Menu mode is evident when there is a light blue box positioned around one of the icons. When the touch screen is used to roughly center the connector image, the menu mode is automatically turned off.

Chapter 11 Video Scope

Centering a Connector Image
Once the image is stable and focused, use the stylus to touch the approximate center of the connector to snap the image near the center of the display and the center of the grading rings. Use the LRUD buttons to fine tune the image to the center of the display.

Pausing Image Scan
To freeze an image in position and focus level for inspection, press the scan button. This will pause the image at the current position and focus level. Simply press the scan button again to set the operational mode back to live mode for focus and position adjustments

Grading Rings
Turn on or off the grading rings by pressing menu and using the left or right buttons to highlight the grading ring icon and press select. The unit must be in live scan mode to turn the rings off or on.

Pass/Fail
Use the pass/fail criteria tables on the next page to determine if the connector passes the IEC61300-3-35 standard. There is a guide to contamination size located at the bottom of the image. To mark a connector as Pass or Fail, enter the menu mode, highlight the Pass/Fail Label icon and press select to cycle through pass, fail, or no grading. This must be done in the Live Scan mode. Once the pass fail status has be marked, the scan may be paused with the scan button and the points of contamination that caused a failure may be marked on the image.

Marking Points of Contamination
To mark the points of contamination the unit must be in paused mode. Pick up the contamination marker by using the stylus and touching the contamination sample size that is required. Touch the image to place the marker. The marker may be fine tuned with the stylus to cover the contamination point on the image to be marked. Once the marker is positioned properly, touch the area just below the image that states, "Place marker, touch here to apply" to lock the marker in place. Repeat this as necessary to mark all the points that need to be indicated for the pass/fail status. At this point the image should be save with the Quick Save icon

> ## NOTE:
> Marking the points of contamination should be done last, just before saving the image. Once the unit is returned to live mode the markers are removed.

Exiting Video Scope Operation
Enter the menu mode, use the left or right buttons to highlight the Home icon and press select.

Touch Screen Tip
The majority of function and features in the Video Scope are operable with the touch screen. It is not necessary to enter the menu mode when using the touch screen. The menu mode needs to be entered when the focus of the LRUD buttons needs to be taken off the positioning feature and moved to the icon cursor.

Pass/Fail Criteria Tables

Fiber End Face Criteria Table for Angled PC Polished Connetors

Zone	Description	Diameter	Allowable Scratches (Width)	Allowable Defects (Diameter)
A	Critical Zone	0μm to 25μm	≤ 4μm	None
B	Cladding Zone	25μm to 120μm	No limit	No Limit < 2μm 5 from 2μm to 5μm None > 5μm
C	Adhesive Zone	120μm to 130μm	No limit	No limit
D	Contact Zone	130μm to 250μm	No limit	None ≥ 10 μm

Fiber End Face Criteria Table for Ultra PC Polished Connetors

Zone	Description	Diameter	Allowable Scratches (Width)	Allowable Defects (Diameter)
A	Critical Zone	0μm to 25μm	None	None
B	Cladding Zone	25μm to 120μm	No limit ≤ 3μm None > 3μm	No Limit < 2μm 5 from 2μm to 5μm None > 5μm
C	Adhesive Zone	120μm to 130μm	No limit	No limit
D	Contact Zone	130μm to 250μm	No limit	None ≥ 10 μm

Fiber End Face Criteria Table for SM PC Polished Conn. (Single Mode Fiber, RL≥ 26 dB)

Zone	Description	Diameter	Allowable Scratches (Width)	Allowable Defects (Diameter)
A	Critical Zone	0μm to 25μm	2 ≤ 3μm None > 3μm	2 ≤ 3μm None > 3μm
B	Cladding Zone	25μm to 120μm	No limit ≤ 3μm None > 3μm	No Limit < 2μm 5 from 2μm to 5μm None > 5μm
C	Adhesive Zone	120μm to 130μm	No limit	No limit
D	Contact Zone	130μm to 250μm	No limit	None ≥ 10 μm

Chapter 12 Loss Test Set

12.1 Entering Loss Test Set Function

The FTE-7000A may be equipped with a Loss Test Set which includes the power meter and CW source.   On the home screen, touch the LTS icon or use the left or right button to highlight the LTS Icon and press SELECT. All OTDRs will support the stable Light Source, thought not all OTDRs will support the Power Meter.

> ## NOTE:
> All OTDRs will support the stable Light Source, thought not all OTDRs will include the Power Meter.

> ## NOTE:
> The touchscreen operation will be used to guide the user through Loss Test Set operation.

12.2 LTS File/Help Icon Menu

Home
Touch the home icon to exit the LTS function and return to the home Screen.

Quick Save
Quick Save: Touching this icon will save the value on the display to the active project folder with an LTS label and files will be automatically incremented to the next numbered suffix.

Project Management
Project Folder: Opens the project management screen. For a full description of project management operation, please refer to "Chapter 9" of this user's guide.

File Management
File Manager: To open file manager touch the file manager icon. For a full description of project management operation, please refer to "Chapter 10" of this user's guide.

Help
Press the menu button, use the left and right buttons to highlight the help icon and press select to view the context sensitive help information.

12.3 Light Source Operation

Selecting Light Source Wavelength
The light source is located in the top left portion of the display. Touch the source indicated or the OFF indicator and a list of available sources will be displayed. Touch the desired wavelength to turn on that light source, or Disable to shut the light source off.

Selecting Light Source Modulation
Modulation is located in the top right portion of the display. Touch the modulation value indicated and the list of available modulation values will be displayed. Touch the desired value to modulate the source or touch CW for a continuous wave. The available modulation values are CW, 270Hz, 1000Hz and 2000Hz.

Chapter 12 Loss Test Set

12.4 Power Meter Operation

Set Power Meter Wavelength
The Power Meter wavelength being tested is indicated in the bottom left of the display. To change the wavelength, touch the indicated value below Power Meter and a list of calibrated wavelengths will be displayed. Touch the wavelength to be tested and begin the test. Available wavelengths are 850/1300/1310/1490/1550/1625nm for standard OTDRs and PON OTDRs. The CWDM OTDR has the standard wavelengths calibrated plus 1431-1611nm.

> ## NOTE:
> In the bottom right portion of the screen is reference indicator, this is where a reference may be set as well as setting the units of measure.

Set Reference
Connect the reference cable/s to the appropriate ports and touch reference in the bottom right of the display, touch the Set Reference tab and a non-volatile reference value will be displayed below the reference indicator in the bottom right of the display.

Set Measurements Units
The power meter displays measurements in dB (Relative) or dBm (Absolute) units of measure. dB measurements are used with a set reference as described above. dBm measurements do not take into account the reference and display the absolute power value received by the detector.

12.4 LTS Project Management

To save loss measurements to a project, touch the project management icon, highlight the project to be used and touch it again to open the projects folder.   A list of files associated to that folder will be displayed.   OTDR files are proceeded with trace icon, the LTS file will have an LTS icon and scope files will be proceeded by a target icon. To return to the LTS screen exit the file management screen by drawing down the file management menu, touching file to open the drop-down menu and touch the exit tab. For a full description of project management operation, please refer to "Chapter 9" of this user's guide.

12.5 LTS File Management

To open file manager touch the file manager icon. To save a file using the file manager, with the test data on the display, open the file management, open the drop-down menu under file by touching the file tab and touch save. Name the file as desired with the on-screen keyboard. Touch the file tab with Save highlighted press SELECT. Use the on-screen keyboard to enter a file name. For a full description of project management operation, please refer to "Chapter 10" of this user's guide.

> ## NOTE:
> File names will be saved exactly as entered using this method. To have the files saved with incrementally number suffixes, use the file manager to save the base file name with the suffix number as the first file to be save in a sequence and then use the Quick Save icon moving forward. Example: Use file manger to save the file test as test.001 and when you use quick save for the next test, the file name will be test.001.

12.6 Exiting Lost Test Set

Touch the Home icon to exit the loss test set function and return to the home screen

Chapter 13   Specifications

13.1 OTDR Specifications

	FTE-7000A	FTE-7000A-EXT	FTE-7000A-PON	FTE-7000A-CWDM
Wavelength	850, 1300 MM 1310, 1490, 1550, and 1625nm SM (±20nm)	1310/1550nm (±20nm)	1310, 1550, and 1625nm (±20nm)	1471, 1491, 1511, 1531nm or 1551, 1571, 1591.1611nm ±3nm
Dynamic Range	26/27dB MM 36/35/35/35dB SM	38/39dB	38/39/39 dB	36dB
Pulse Width	5 - 20,000 ns			
Units of Measurement	Kilometer, Kilo feet and Mile			
Event Dead zone	1m			
Attenuation Dead Zone	4m			
Resolution	.125 - 32m			
Distance Uncertainty	±(0.75m + 0.005% x distance + sampling resolution)			
Full Scale Distance Range	0.25-64km MM , 0.25-240km SM			
Typical Real-time Refresh Rate	2 Hz			
Group Index of Refraction (GIR)	1.024 - 2.048			
Linearity	± .05 dB/dB			
Memory Capacity	~1000			
Memory Type	Internal			
Power Supply / Charger	Universal 100-240V			
Battery Type / Life	Li-ion / 9hr typ.			
Storage Temperature	-20 to 60 C			
Operating Temperature Range	-10 to 50 C			
Dimensions (without rubber boot)	8.07" L x 3.89" W x 1.57" H (205mm L x 99mm W x 40mm H)			
Weight	1.6 lbs.			
Communications ports	USB			
Connector Styles	FC, ST or SC Interchangeable			

13.2 Power Meter Specifications

Detector Type	InGaAs
Connector Type	2.5mm Interchangeable
Dynamic Range	+5 to -77dB (CATV - +25 to -57dB)
Calibrated Wavelengths	850,1300,1310,1490,1550,1625nm (standard units) + 1431-1611nm (CWDM units)
Power Measurement Uncertainty	± 0.18 dB under reference conditions, ± 0.25 dB from 0 to -65 dBm, ± 0.35 dB from 0 to +5 dBm and from -65 to -77 dBm
Units of Measurement	dBm, dB
Resolution	.01 dB

13.3 Light Source Specifications

Fiber Type	Single mode, Multimode
Wavelengths	850, 1300, 1310, 1550, 1625 nm ±20nm *
Output Power	0 dBm (-3dBm @ 1625nm)
Laser Safety Classification	Class I Safety Per FDA/CDRH and IEC-825-1 Regulation
Modulation Modes	CW, 270 Hz, 1000 Hz, 2000 Hz

* Light source wavelengths present are determined by the OTDR configuration   TTI reserves the right to change specifications without notice.

Chapter 14   Repair/Warranty

14.1   Repair Information

If repair is required, simply call the factory at 315-736-3642 for return instructions and a RMA number.

14.2 Warranty Information

This product, including all mechanical, electrical, and optical parts and assemblies are unconditionally warranted to be free of defects in workmanship and material for a period of one (1) year from the date of delivery.

This warranty does not apply to expendable parts such as batteries or optical panel connectors, nor to any instrument or component which has been subjected to misuse, alteration, or fiber connector damage. It is the customer's responsibility to understand all the instructions and specifications prior to operating this instrument. This warranty does not extend to any loss or damage consequent to the failure of the warranted product.

Chapter 15   Version Control

15.0   Version Control

Through a Program of continuous improvement the upgrade of the features and performance of this instrument are an on going process. The instrument firmware version is accessible in the lower right corner of the home screen. The version changes and approximate release dates are as follows.

OTDR V1.0.0.0 - 02/2014 -   Original release

        V1.1.0.4 - 05/2014 -   Event table and schematic access from OTDR screen via tabs

                                 Event marker overlay on trace graph when in either event or schematic tab

                                 Redesigned the scope screen including new large icon menus and the defect size gauge overlays

                                 Support for virtual instrument control via both CertSoft and android app

                                 Independent IOR settings per wavelength

                                 Increased total maximum number of files as well as maximum number of files in each project

        V1.1.0.5 - 05/2014 -   Field upgradable help text via windows reporting software

        V1.2.0.0 - 08/29/14 -   Added system ORL threshold setting with P/F analysis in event table

        V1.3.0.1 - 04/03/15 -   "A1" - support for Li-ion batteries, increased max file per project to 4000

        V1.4.0.0 - 09/15/15 -   Added support for CWDM wavelengths