OTDR 800

User Guide

Optical Time Domain Reflectometer

This guide is written for use with the OTDR 800 series.

Chapter 1: Introduction

Dear Valued Customer,

Thank you for choosing Ripley's ODM® brand for your fiber optic testing requirements. Our professional staff is available to answer any questions or provide assistance that you require. We at Ripley Tools 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, the most user friendly and affordable fiber optic solutions to meet individual needs.

Chapter 2: Using This Manual

This manual contains operation information for the Ripley Tools, ODM® brand OTDR 800 OTDR Optical Time Domain Reflectometer. The touchscreen is a resistive style screen and only proper stylus devices should be used while operating this product.

❗ 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.

Chapter 3: Safety

Prior to 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.

Information contained in this document must be followed by the user to ensure safe operation and to maintain the functionality of the product. Failure to follow these safety warnings and cautions may result in harm to the user and/or damage to the instrument.

⚠ WARNING

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

⚠ WARNING

Never look directly into the end of a connected fiber optic cable or the fiber optic interface of optical test equipment; to do so may expose the user to laser radiation and may 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 may cause unsafe conditions for the operator and/or equipment, and may void the warranty.

❗ CAUTION

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

❗ CAUTION

The OTDR is equipped with a protection circuit to avoid damage from live fiber connections. Therefore, the instrument will not operate properly with active fibers. Even with circuit 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. 3.1. Immediately remove the live fiber from the OTDR and press select to clear the message.

Fig 3.1

Chapter 4: Quickstart guide

Prior to using this quickstart guide or operating the equipment in any way, it is **highly suggested** that the user reads all safety information in chapter 3.

1. Press Power Button to turn on the OTDR.
2. Touch the Auto Test icon to enter the OTDR function.
3. Connect the fiber to the appropriate port (SM SC/APC OTDR Optical Port).
4. Touch the wavelength field on the display to open the wavelength list and choose the desired wavelength for the test.

   ✏ **NOTE**

   To test in Dual Mode, select both wavelengths. Wavelengths are selected if they are highlighted in dark gray.

If the launch and receive fiber lengths are unknown:

1. Leave the fiber launch and receives lengths set to 0. The OTDR will automatically detect any events it detects and display them when the results are shown. Any launch or receive events will be displayed as normal events.

If approximate Launch/Receive fiber length(s) is known:

1. Enter the desired fiber launch and receive lengths in meters or feet. Select the feet option on the input screen if desired.
2. Tap "Begin Test" and the OTDR will start a test using the selected wavelength(s), allowing the OTDR to determine the most appropriate range and pulse width. (Auto Test will set the averaging time to the best option dynamically, typically 60 sec.)
3. The schematic view will be shown once the test has completed. Review your results and/or save by clicking the save icon and naming your trace. (Refer Fig 8.5 for icon options)

   ✏ **NOTE**

   The Schematic view displays the trace with colored (Pass/Fail) events and allows the technician to quickly scroll through all events and fiber spans. The Trace View displays the trace with the parameters listed and loss and distance measurements displayed. The Event List displays the trace with numbered events and an interactive event table. Cycle through each of the screens by touching the icons below:

Chapter 5: Inspection and Identification

5.1   Inspection

Before shipment, quality inspection proved that the instrument was in perfect working order and free of defects. The shipping carton contains the following:

1. OTDR with Protective boot
2. USB 5 Volt Charger and Cable
3. User Manual
4. FC OTDR Adapter
5. Hard Carry Case for Instrument

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.

ODM
Optical Design Manufacturing Inc.
CE Made In The USA
603-524-8350

	Conforms to DHHS Standards for Laser Products PER 21 CFR 1040
Model	OTRM-00-0001
Wavelength	1310/1650nm
VFL Wavelength	650nm
Serial #	4030
MFG Date	12/9/2019

Fig 5.1

Chapter 6: OTR 800 Description

6.1 OTDR Physical Description

Instrument Enclosure

The ODM® Brand OTDR 800 is packaged in a rugged housing and further protected by a rubberized boot. Although the front panel is weather-resistant, care must be taken to prevent liquids and contaminants from damaging the fragile optical and electrical connectors, as well as the glass display. Use a mild cleaning agent and soft damp cloth to clean up the panels and the outside case. Clean the optical connector if needed using only industry accepted fiber cleaning methods. NEVER open the instrument for cleaning. Return the unit to the factory for servicing, if necessary.

Front Panel

Protective Rubber Boot

Color Touchscreen

Power Button

Stylus

Fig 6.1

Top Panel

Kickstand

VFL Port

Unit Serial Number

Velcro Hand Strap

USB Charging / Data Port

Battery Charge Indicator

OTDR Port
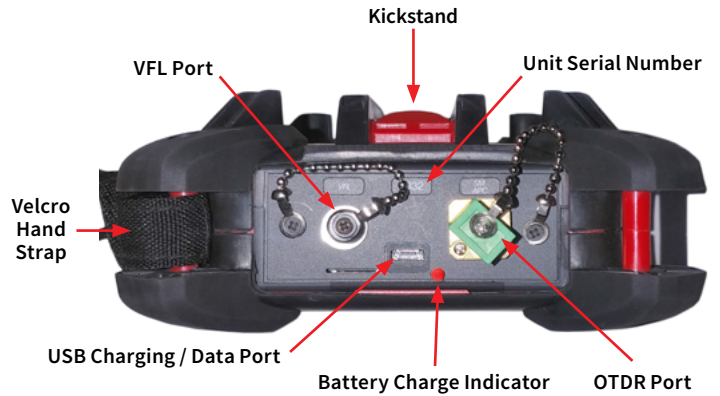
Fig 6.2

6.2 Home Screen Display

The unit is equipped with a 3.5″ color TFT-resistive touch display.

AUTO TEST MODE
Tap this feature to run a simple Optical Time Domain Reflectometer test that quickly finds events and faults.

SAVED TESTS
Tap this icon to load previously saved tests.

VIEW TRACE
Tap this icon to open the previously run trace results.

VFL (VISUAL FAULT LOCATOR)
Tap this icon to toggle between the VFL modes, ON (CW), or 2HZ Modulation.

VERSION & BATTERY INFORMATION
Shows version number for 5 seconds after start up and then battery gauge.

CUSTOM TEST MODE
Tap this feature to run a more complex OTDR test. Designed for OTDR experts who need to set custom lengths, pulse widths, and IOR.

OTDR SETTINGS
Tap this icon to change the OTDR time, date, and sleep timer settings.

Fig 6.3

6.3 Power Requirements

The OTDR 800 is equipped with a 3500mAh Li-ion battery. The OTDR is supplied with a 100-240V USB power adapter with 5 VDC, 2.1A output. A fully charged Li-ion battery will typically enable approximately 6 hours of use and require approximately 4 hours of recharging.

6.4   Battery Replacement

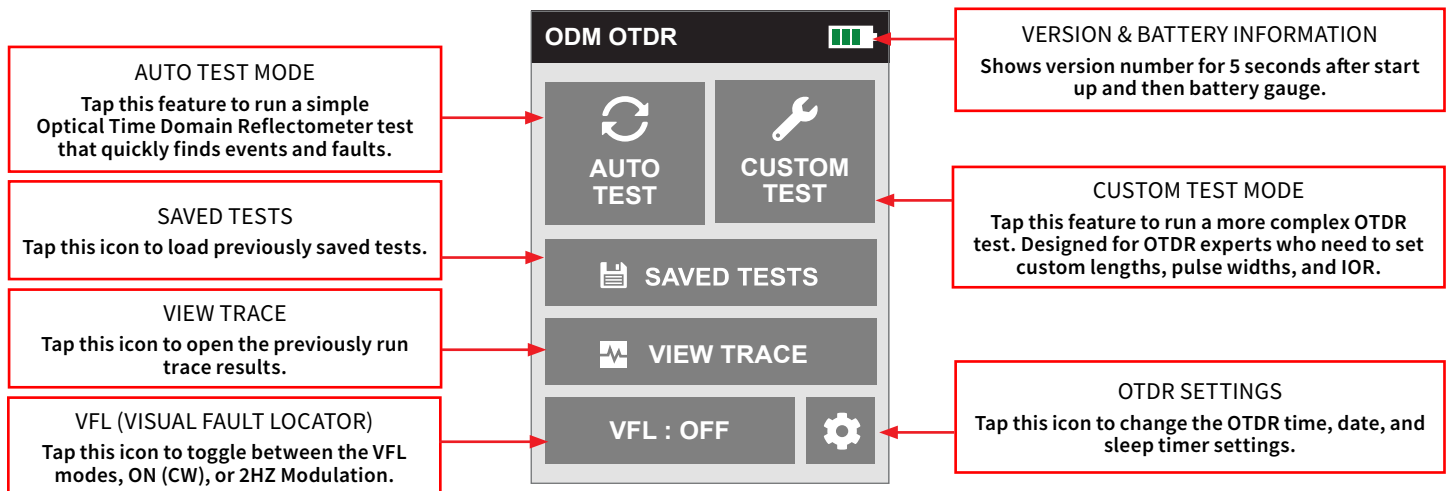The battery is not field-replaceable. Contact the factory to acquire an RMA and return the unit to the factory for battery replacement. The Li-ion battery pack should not be punctured, incinerated, or disposed of improperly.

⚠ 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 may cause unsafe conditions for the operator and/or equipment, and may void the warranty.

Chapter 7: Visual Fault Locator Operation

7.1   VFL Safety

❶ CAUTION

The Visual Fault Locator is classified as a Class II laser system and must be used with all safety precautions. Never view the light emanating from the fiber directly. Place a white piece of paper at the end of the fiber and look for the presence of a red spot on the paper.

7.2   VFL Description

The Visual Fault Locator emits visible red light at the 650 nm wavelength. Its intended function is to allow an operator to identify the exact location of a break, micro bend, or other discontinuity in a fiber optic cable. As the radiation is visible, light emanating from a break or micro bend enables the user to locate the exact position of a fault even at very short distances that would not be detectable by conventional means such as an Optical Time-Domain Reflectometer, (OTDR). It is also useful for identifying a particular fiber in a cable by illuminating the fiber with visible radiation.

7.3   VFL Operation

Access the VFL in the Home screen. The test fiber is connected to the VFL port of the OTDR by means of a standard 2.5 mm fiber optic connector. The source can be used in one of its two modes: modulated or continuous. In modulated mode, the laser is turned on and off at a rate of 2 Hz. The laser turns on for approximately one half of the cycle. This mode is helpful in permitting the user to identify the source radiation in the presence of high levels of ambient light. It also aids in conserving battery life.

The useable range for fault location depends on many factors including the type of fiber, cable, and the overall loss. To activate the VFL, tap the "VFL" button on the home screen to cycle through the available states of "Off", "Continuous" or "Modulated" modes.

Chapter 8: OTDR Operation

8.1   Entering OTDR Function

Press the Power button to turn on the OTDR 800. The unit has two OTDR options to choose for running a network test: Auto Test and Custom Test. Select either option to begin entering test parameters.

> ⚠ **WARNING**
>
> **Before connecting a fiber to the OTDR, ensure that the fiber has no active optical sources or instruments connected at the other end. Skin or eye damage may result from high power sources such as EDFAs, and/or instrument damage may occur, voiding the warranty.**

> ⚠ **WARNING**
>
> **Clean all connectors in use thoroughly prior to connecting them to the appropriate port of the OTDR. Failure to ensure the connectors used with the OTDR are properly cleaned may result in poor launch conditions at a minimum, or even damage to the optical interface that requires the unit be returned to the factory for repair.**

8.2   Auto Test

Auto Test is a useful feature when the approximate length of the tested fiber is unknown. To use Auto Test, only the Launch/Receive Fiber Length and Wavelength parameters need to be set by the user.

Set Launch/Receive Length

Tap the textbox containing the fiber length to change it. Enter the launch length in the left box and the receive length in the right box. Tap the "OK" button to set the length of the launch/receive fiber. If there is no launch or receive fiber used, or if the lengths are unknown, leave the values set to "0m" so that they will not be overlooked by the OTDR.

> ✎ **NOTE**
>
> **To switch between imperial and metric units, use the length editing menu.**

Set Wavelength

Tap the textbox on the display to open the wavelength list and choose the desired wavelength for the test. Select either a single wavelength, or two for dual mode operation. Wavelengths are selected when they are highlighted in dark gray. If the wavelength(s) are light gray, they are not selected for testing.

> ✎ **NOTE**
>
> **The wavelengths selections for the dual SM OTDR are 1310 nm, 1550 nm, and 1310/1550 nm. The 1310/1550nm settings are for Dual Mode operation where the OTDR will test both wavelengths in one operation. Dual Mode is covered in section 8.9 of this guide. At least one wavelength must be selected to start the test.**

Start AutoTest

Tap the "Begin Test" button to start the test. The OTDR will conduct a test at the selected wavelength(s) with a dynamic averaging time (typically around 60 seconds). The OTDR will automatically select the best average time, pulse width, and range parameters appropriate for the fiber being tested.

8.3   Custom Test

Custom Test is a powerful feature for OTDR-trained personnel who want to set up all of the test parameters. Technicians can enter and pre-configure all of the available test parameters before running the test. To use Custom Test effectively, technicians should know the overall length of the network they are looking to test to set a desirable pulse width and averaging time.

Using Custom Test allows the technician to chose between 3 different saved test configurations. The test configurations can be programmed into the OTDR in advance and saved to the OTDR for use in future tests. The test configurations contain all of the test parameters. Users can select one of the configurations by tapping on the name to highlight it (shown in dark gray) and then tapping the "NEXT >" button. Technicians will be shown a quick summary page with all the test parameters shown and a chance to edit before the test is run.
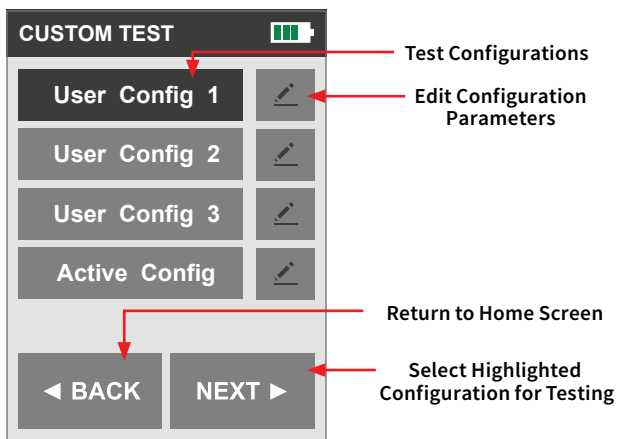
CUSTOM TEST

- User Config 1
- User Config 2
- User Config 3
- Active Config

◄ BACK   NEXT ►

Test Configurations
Edit Configuration Parameters
Return to Home Screen
Select Highlighted Configuration for Testing

Fig 8.1

The Active Configuration shows and uses the parameters used in the most recent test. The parameters may be identical to one of the other custom test configurations, or saved from running an Auto Test.

Select any of the pencil/pen icons to edit the configuration parameters. In the next set of menus, users can set their custom test parameters. The configurable trace parameters consist of launch/receive fiber lengths, wavelength(s) assigned for testing, network range, pulse width, pass/fail settings, IOR (index of refraction), averaging time, and event sensitivity. If desired, the user can also change the unit of measurement used from imperial to metric while editing the test parameters.
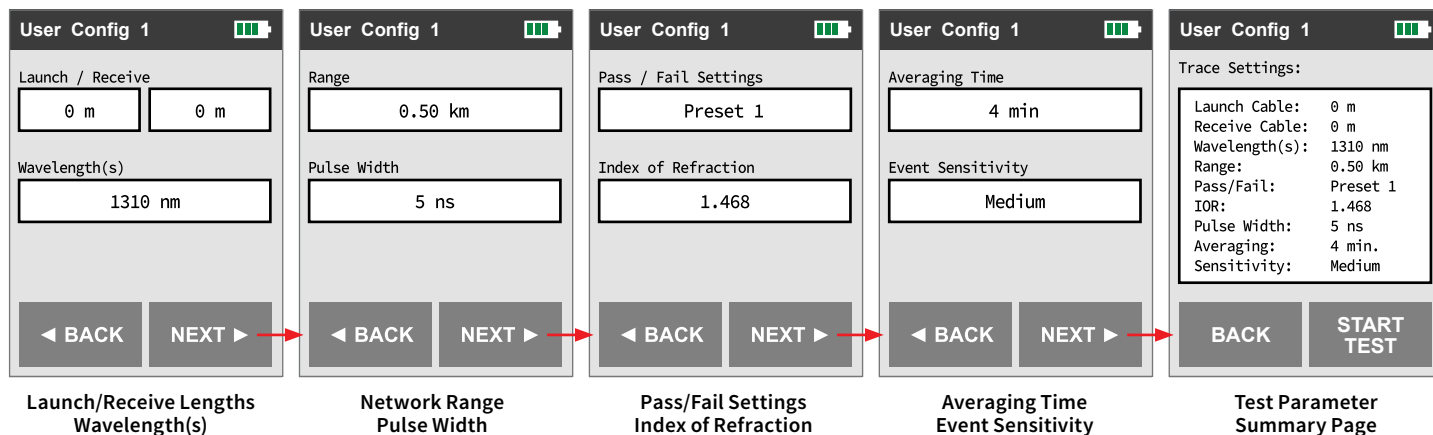

User Config 1	User Config 1	User Config 1	User Config 1	User Config 1
Launch / Receive 0 m 0 m Wavelength(s) 1310 nm	Range 0.50 km Pulse Width 5 ns	Pass / Fail Settings Preset 1 Index of Refraction 1.468	Averaging Time 4 min Event Sensitivity Medium	Trace Settings: Launch Cable: 0 m Receive Cable: 0 m Wavelength(s): 1310 nm Range: 0.50 km Pass/Fail: Preset 1 IOR: 1.468 Pulse Width: 5 ns Averaging: 4 min. Sensitivity: Medium
◄ BACK NEXT ►	◄ BACK NEXT ►	◄ BACK NEXT ►	◄ BACK NEXT ►	BACK START TEST
Launch/Receive Lengths Wavelength(s)	Network Range Pulse Width	Pass/Fail Settings Index of Refraction	Averaging Time Event Sensitivity	Test Parameter Summary Page

Fig 8.2

Confirm the parameters shown on the summary page and tap the "Start Test" button to begin the test using the parameters. The OTDR will show the progress via a percentage value. If running a dual trace, the value shown represents only the first wavelength. Once the first wavelength has finished, the second test using the other wavelength will begin again at 0%.

Set Launch/Receive Length

Tap the textbox containing the fiber length to change it. Enter the launch length in the left box and the receive length in the right box. Tap the "OK" button to set the length of the launch/receive fiber. If there is no launch or receive fiber used, or if the lengths are unknown, leave the values set to "0m" so that they will not be overlooked by the OTDR.

> ✎ **NOTE**
> To switch between imperial and metric units, use the lenght editing menu.

Set Wavelength

Tap the textbox on the display to open the wavelength list and choose the desired wavelength for the test. Select either a single wavelength, or two for dual mode operation. Wavelengths are selected when they are highlighted in dark gray. If the wavelength(s) are light gray, they are not selected for testing.

> ✎ **NOTE**
> The wavelengths selections for the dual SM OTDR are 1310 nm, 1550 nm, and 1310/1550 nm. The 1310/1550nm settings are for Dual Mode operation where the OTDR will test both wavelengths in one operation. Dual Mode is covered in section 8.9 of this guide. At least one wavelength must be selected to start the test.

Set Range

To set the Range, tap the textbox on the display to open the available range list and choose the desired range for the test. Only one range can be selected for testing.

> ✏️ **NOTE**
>
> **When setting the Range and Pulse Width, it is necessary to keep in mind that using certain pulse widths with some ranges is not beneficial. Pulse widths are not all available for use with all of the ranges. The chart below indicates the pulse widths that are available with each range.**

		Pulse Width							
		5 ns	**10 ns**	**30 ns**	**100 ns**	**300 ns**	**1 μ**	**3 μ**	**10 μ**	**20 μ**
Range	**250 m**	✓	✓	✓	✓	✓				
	500 m	✓	✓	✓	✓	✓				
	1 km	✓	✓	✓	✓	✓				
	2 km		✓	✓	✓	✓	✓			
	4 km		✓	✓	✓	✓	✓			
	8 km			✓	✓	✓	✓	✓		
	16 km			✓	✓	✓	✓	✓		
	32 km					✓	✓	✓	✓	✓
	64 km					✓	✓	✓	✓	✓
	128 km					✓	✓	✓	✓	✓

Fig. 8.3

Set Pulse Width

To set the Pulse Width, tap the Pulse Width indicator on the display to open the available pulse widths for the selected range and choose the desired setting for the test.

Pass/Fail Threshold Settings

There are five configurable pass/fail threshold settings for the event table and schematic views: ORL, Loss, Reflectance (Refl.), Link and End OF Fiber (EOF). Refer to chart below. The EOF is not a true Pass/Fail threshold, but it is used to set a loss value to determine the end of fiber. If the EOF threshold is set at 3 dB, then the first event that has a loss of 3 dB or greater will be designated as the EOF.

To set the thresholds, tap the textboxes for the range of the values and set them using the same steps as for the test parameters.

> ✏️ **NOTE**
>
> **There is an ORL and a Reflection Threshold setting. The ORL is the return loss for the entire link/system and the Reflection Threshold is the return loss value of an event. Thresholds are "pass thresholds" where a value entered as a threshold is a passing value.**

Setting Examples:

LOSS	If a 1.00dB splice/event loss is acceptable, set the threshold to 1.00. If an events loss of 1.00 is the fail point, set the threshold to 0.99.
ORL	If a system ORL of -35 dB reflectance is acceptable, set the threshold to 35. If -35 dB is the fail point, set the threshold to 35.1.
REFL	If a -45 dB, event reflection is acceptable, set the threshold to 45. If -45 dB link loss is the fail point, set the threshold to 45.1.
LINK	If a 20 dB, link loss is acceptable, set the threshold to 20. If 20 dB link loss is the fail point, set the threshold to 19.5.
EOF	If an event loss of 3 dB should trigger the end of fiber, set it to 3.0. If the end of fiber should be anything greater than 3 dB loss, set it to 3.1.

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 in the OTDR. The default IOR for the wavelength chosen is shown in the text field. If an adjustment needs to be made to the IOR, tap the textbox and enter an appropriate value for the IOR for the fiber and wavelength used. Tap the "OK" button to set the IOR.

To obtain reliable, consistent measurements, the user should be aware of the Index of Refraction of the 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 2.0. If this is unknown, it is best to use the default setting in the OTDR.

Set Averaging Time

Tap the Averaging Time textbox on the display to open the list of averaging setting options and choose the desired time for the test.

The longer the averaging time, the "cleaner" the results will be. This is due to the extra data points included in the average that helps to filter out any extra noise that might be present on shorter average time tests. If testing dual wavelengths, this is the averaging time for just one of those wavelengths. For example, if testing dual wavelengths and the averaging time is set to 1 minute, the first wavelength will run for a minute and then after it completes, the second wavelength will run for another minute.

Sensitivity Settings

There are three levels of sensitivity for the event table and schematic views: low, medium, and high. To set the event sensitivity, tap the textbox for the sensitivity setting, select the desired setting, and then tap "OK".

The lowest setting possible should be used to help filter out any false events that may be caused by short pulse widths or "noisy" traces, but are not true perturbations in the optical signal. High sensitivity settings present events with loss down to approximately 0.05 dB, medium presents loss down to approximately 0.2 dB, and low presents loss down to about 0.5 dB. Longer pulse widths and averaging help to lower the number of false events. The highest sensitivity settings should only be used for "clean" traces with high signal level, low noise, long pulse widths, long ranges, and long averaging time.

Start Custom Configuration Test

Once confirming the parameters shown on the summary page, tap the "Start Test" button to begin the test using those parameters. The OTDR will show the progress with a percentage value. If running a dual trace, the value shown will represent only the first wavelength. Once the first wavelength has finished, the second test using the other wavelength will begin again at 0%.

8.4　OTDR Screens

There are three separate screens when viewing the OTDR trace results: Schematic, Trace, and Events List (or Grid) View. Use the View icon in the menu bar to cycle through the views. Use the Trace View to view the trace with the loss and distance measurements. Use the Events List View to view an interactive event table with the trace and numbered events. Use the Schematic View to view an interactive schematic view of the events with the pass/fail information, distance to event, and type.
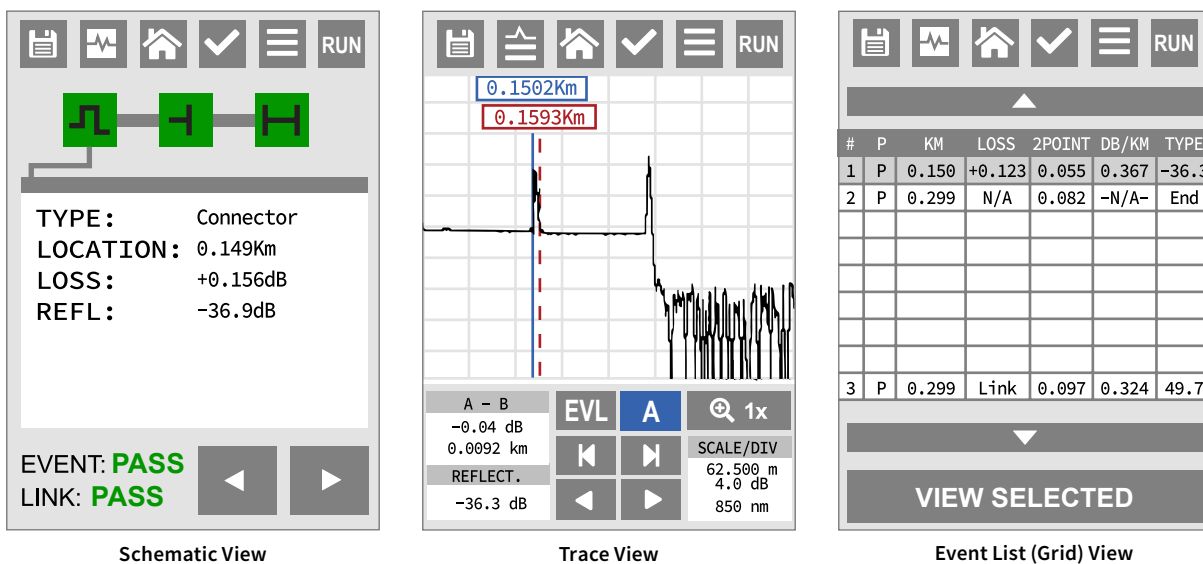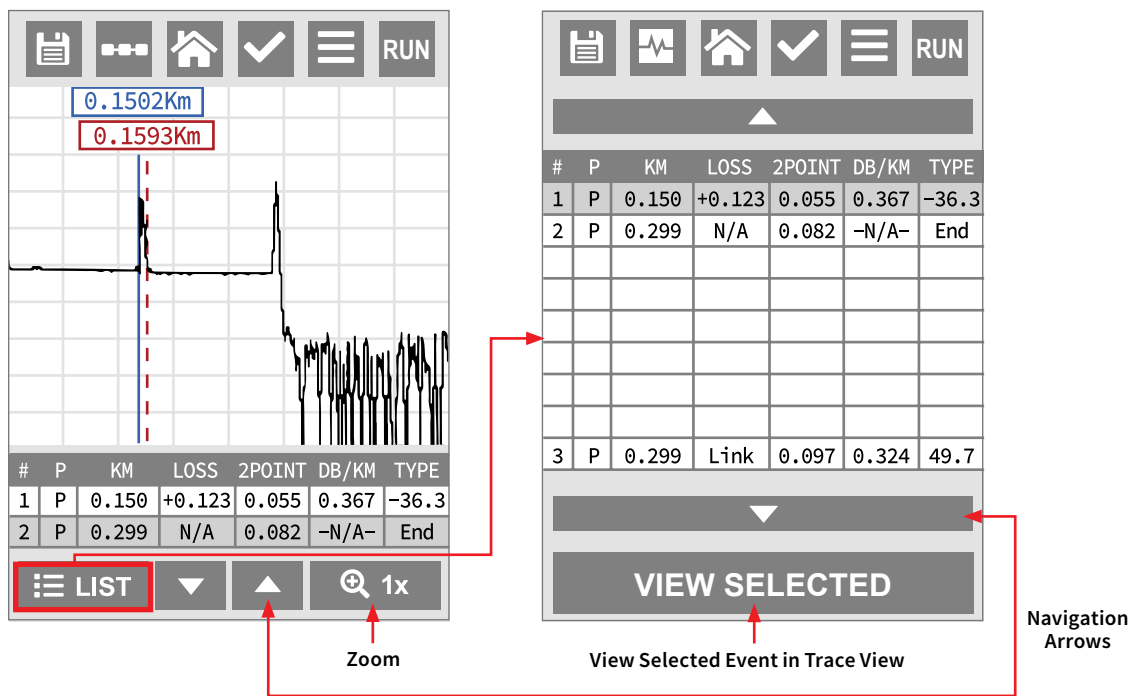

| Schematic View | Trace View | Event List (Grid) View |

Fig 8.4

8.5   Menu Icon Definitions

The menu bar is found at the top of every OTDR results screen. Below is the list of icon buttons and their meaning.

	HOME	Brings the user back to the home screen.
	SAVE	Saves the Current Trace Data. The User can Name the File and Select the Project to Save to. If Saving in Dual Mode, the Wavelengths will be Appended to the File Name.
	PASS/FAIL PARAMETERS	Allows for the Viewing of Current Pass/Fail Settings and Editing of the Saved Pass/Fail Parameters
	TRACE SETTINGS	Shows Current Trace Parameters and Allows User to Edit Parameters for a New Test
	RUN	Runs a New Trace or Starts Live Mode (Trace View Only)
	TRACE VIEW	Opens Trace View (Schematic View Only)
	TRACE VIEW WITH LIST	Opens the Event List View overlaid with the trace (Trace View Only)
	SCHEMATIC VIEW	Opens the Schematic View (List View Only)

Fig 8.5

8.6   Schematic View

Fig 8.6

✏ **NOTE**

The Link Icon is the last item in the Schematic View. It contains Pass/Fail data for the entire link.

8.7 Event Table View

Zoom

View Selected Event in Trace View

Navigation Arrows

Event Table

Pass/Fail

Event Location

Event Loss in dB

Loss Between Previous and Current Events

dB per Km, Kf or Mi Between Events

Event Number

EOF Event Information

Link Information

System ORL

Link Loss

Link dB per Km, Kf or Mi

Fig 8.7

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. The last two events in the list are special. The first, which indicates a "type" of "End" is the determined end of the fiber under test. The last row is with the type "Link" includes data that is relevant to the entire system link (full fiber under test).

"P" or "F" (Pass or Fail):

If any threshold is not met for an event, the P/F column will display an "F" (Fail) and the parameter that failed will appear in red. If all parameters are met, the column will display a "P" (Pass). There is no Pass/Fail threshold in the event labeled "End". Pass/Fail in the "Link" row includes the 2-POINT column, representing the total link loss, and the TYPE column representing the system ORL.

Km or KF or MI:

Event Location (Distance from OTDR) is labeled "Km" for kilometer, "KF" for kilo-feet, and "MI" for mile. The measurement is the distance/location where the event occurs along the fiber link. This data should be the same for th End of FIber and Link.

LOSS:

Event Loss is the loss of the splice, mated pair, or other effect on the fiber considered to be an event. A positive number is the amount of loss and a negative number indicates a gain normally due to mismatched index of refraction. It is a configurable threshold for Pass/Fail purposes. The "End" event will always display "N/A".

2-POINT:

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 "Link" row of the table in 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 its loss threshold.

dB/Km:

The dB per (dB/...) measurement column is determined by the selected unit of measurement: "KM" for kilometer, "KF" for kilo-feet, and "MI" for mile. It represents 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 "Link" row of the table is the dB loss rate for the total link.

TYPE:

Event Type is the type of event, or the return loss of an event. If the event has no reflection, "splc" is displayed, and if the event is reflective, the reflectance value is displayed. For the last two events, the first of which is labeled "End", there is not a value displayed, it simply shows "End". The last row effectively named the "Link" row, the Optical Return Loss for the link is displayed (System ORL)

8.8   Event Analysis

✎ **NOTE:**

When using the Event Table or 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 by possibly causing erroneous readings or detection failure. User review of the Trace Display is recommended for final qualitative and quantitative analysis.
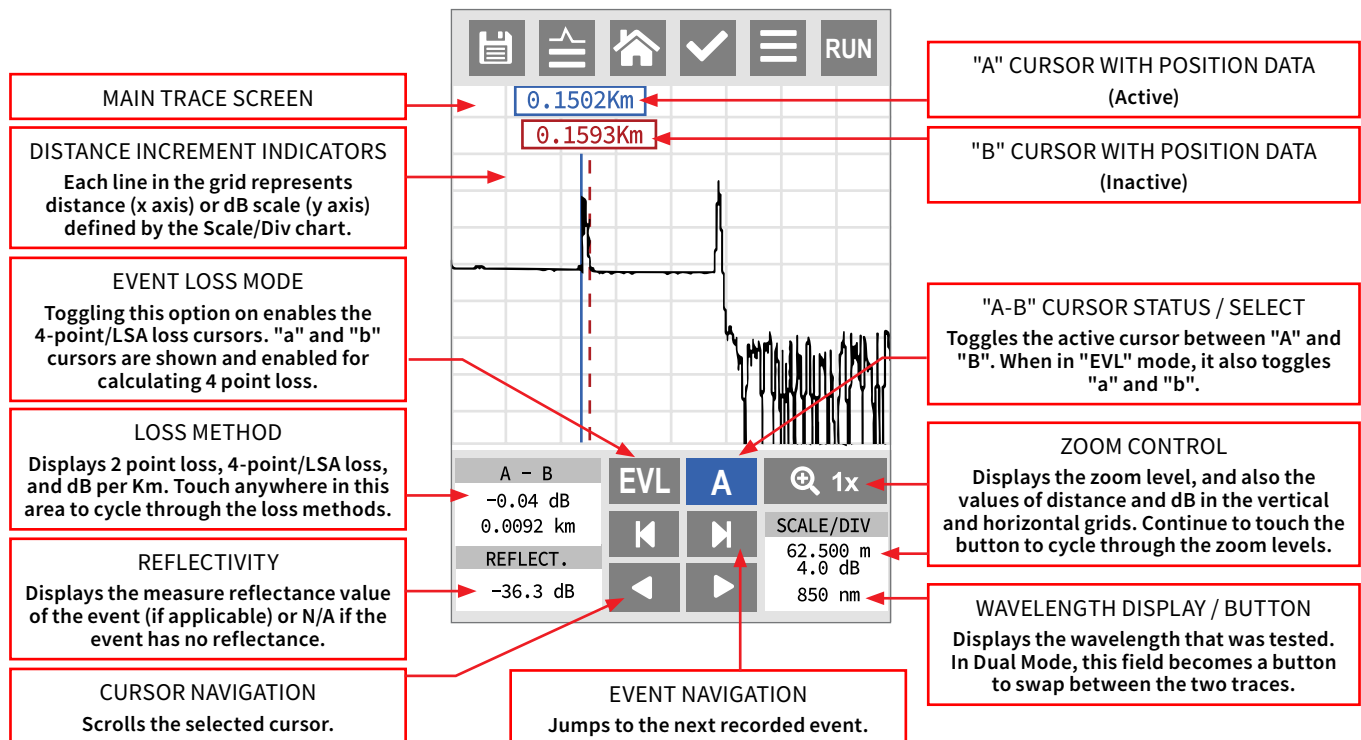
8.9   Trace View Screen

MAIN TRACE SCREEN

DISTANCE INCREMENT INDICATORS
Each line in the grid represents distance (x axis) or dB scale (y axis) defined by the Scale/Div chart.

EVENT LOSS MODE
Toggling this option on enables the 4-point/LSA loss cursors. "a" and "b" cursors are shown and enabled for calculating 4 point loss.

LOSS METHOD
Displays 2 point loss, 4-point/LSA loss, and dB per Km. Touch anywhere in this area to cycle through the loss methods.

REFLECTIVITY
Displays the measure reflectance value of the event (if applicable) or N/A if the event has no reflectance.

CURSOR NAVIGATION
Scrolls the selected cursor.

EVENT NAVIGATION
Jumps to the next recorded event.

"A" CURSOR WITH POSITION DATA
(Active)

"B" CURSOR WITH POSITION DATA
(Inactive)

"A-B" CURSOR STATUS / SELECT
Toggles the active cursor between "A" and "B". When in "EVL" mode, it also toggles "a" and "b".

ZOOM CONTROL
Displays the zoom level, and also the values of distance and dB in the vertical and horizontal grids. Continue to touch the button to cycle through the zoom levels.

WAVELENGTH DISPLAY / BUTTON
Displays the wavelength that was tested. In Dual Mode, this field becomes a button to swap between the two traces.

Fig 8.8

Trace View Description

Unit of Measure

The Distance Unit of Measurement is available in Kilometer (Km), Kilo feet (Kf) or Miles (Mi). To set the Unit of Measurement, change the unit in the test parameters.

Zoom

There are six Zoom Levels: 1x, 2x, 4x, 8x, 16x and 32x. To change the Zoom Level, tap the Zoom button on the screen. It will cycle through the six levels. When viewing the Trace at a Zoom Level other than 1x, the active cursor is centers on the Trace Display. When the cursor moves, the Trace moves and the cursor will remain centered.

Cursor Movement

The Active Cursor displays as a solid line and the Inactive Cursor as a dashed line. Tap the A/B button on the screen to toggle between the two cursors to set the Active Cursor. The active cursor will snap to the position tapped on the screen, or use the right and left arrow indicators showing in Figure 8.8 to make fine adjustments.

Dual Trace Mode

Dual trace mode is used to view and compare two traces. Both traces must be of the same range setting. To utilize the dual trace feature, begin a new test (Auto or Custom) as normal and when selecting the desired wavelength, choose both of the available options. Proceed to enter the rest of the test parameters as desired and then begin the test. The two wavelength tests will run consecutively after one another. After the first completes, the second test will run.

Dual test results are only visible in the trace view screen. When viewing the trace, the first wavelength is overlaid on top of the second wavelength trace results (in light gray). Users can swap between the two wavelengths results by tapping the wavelength text in the bottom right corner.

Fig 8.9

Trace View Loss Measurements

2-Point Loss

2-Point Loss Measurements calculate the difference in vertical height between where the A and B cursors cross the fiber trace. The information is located on the Trace View Screen within the A-B section of the Trace Information as shown in Fig. 8.8. It is a quick method of checking the loss between any two points on the fiber optic link.

The 2-Point Loss Method is designed for use in noisy environments when it is difficult to attain an 4-point area that lays flat on the backscatter before and after the cursor. It takes an average of the selected points before and after the Active Cursor and uses the average to estimate the Event Loss. Although it is an estimation, the method may be more accurate than using the 4-Point / LSA Loss Method in noisy environments.

When using this 2-Point Loss Mode, it is necessary to set the cursors and loss areas in clear backscatter (areas that do not consist of other events). For accurate loss measurements, set a cursor at the beginning of an event and set the loss measurement areas. Loss Measurement Areas follow the undulations of the backscatter line unlike 4-Point areas.

4-Point Loss / Least Squares Approximation (LSA)

The 4-Point Loss Method provides the user with a visual aid when setting 4-Point Loss Areas. The method can be more accurate by allowing the ability to see the slope of the averaged Loss Areas and setting custom areas. However, it can also supply a reading with greater error if not used properly. The cursors and Loss Averaging Lines must be set to overlay the backscatter of a trace without overlapping any other events. Unlike Basic 2-Point Loss, 4-Point Measurement Areas are drawn as straight lines without regard to the undulations of the backscatter.

The OTDR must be in Event Loss (EVL) Mode to perform the 4-Point Loss Method Test. To adjust the loss areas around the cursors, the display must be in a zoom level greater than 1x. Tap the "EVL" button on the Trace View Screen. The button will turn dark gray once the mode is enabled. Four vertical dashed lines will appear on the display. Set point number one by tapping the cursor select (shown as an "A" or "B" letter in upper or lowercase; refer to figure 8.8) button to toggle between the cursors until lowercase "a" is selected. Move "a" to the desired position left of the "A" cursor using the navigational arrows and position the "A" cursor as desired right before the event.

Toggle to the "b" cursor by using the cursor select button again and move the "b" cursor to the desired position to the right of "B" cursor. Continue with all remaining adjustments, as needed. Refer to Fig. 8.14 for the proper positioning of cursors and green averaging lines. To leave EVL mode, tap the "EVL" button again to turn it off. EVL is disabled when the button is no longer highlighted (light gray).

> ✏️ **NOTE**
>
> **It is necessary to set the areas in clear backscatter to acquire the most accurate measurements. Therefore, they must not include other events.**

ATTENUATION

The Attenuation (dB/kft or dB/mi) Loss Method takes the 2-Point Loss in dB and divides it by the distance between the cursors in km (kilometers), kf (kilofoot) or mi (miles). For accurate dB/ Loss Measurements, the two cursors must be on level backscatter points at least 100 m apart. ("N/A" will show for distances that are not sufficient for measurement).

8.10   Loss Measurement Settings
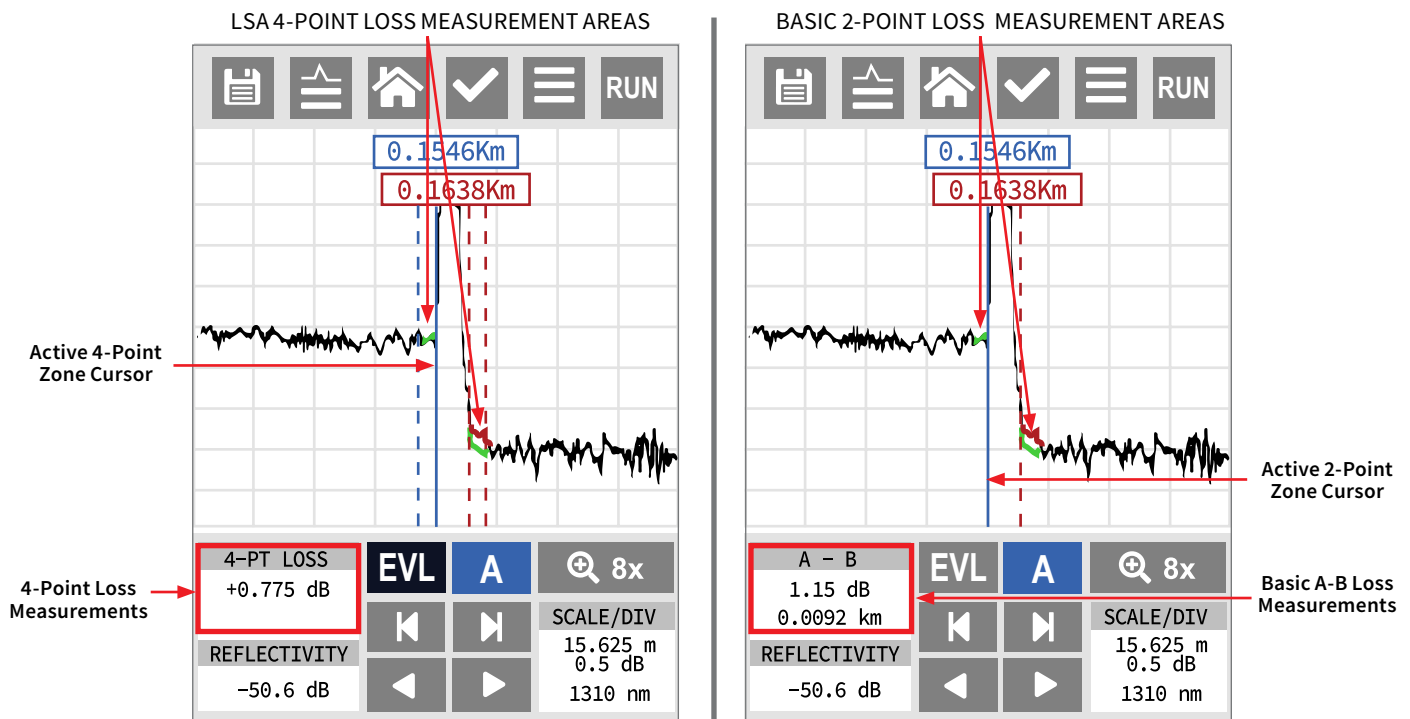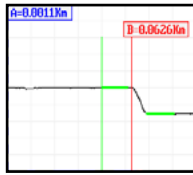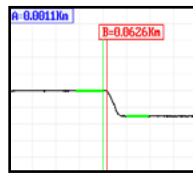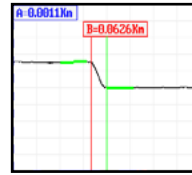
4-Point Measurement Areas

Fig 8.10

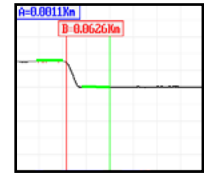**4-Point Loss Adjustment Positions**

| Loss Position 1 | Loss Position 2 | Loss Position 3 | Loss Position 4 |

Fig 8.11

✎ **NOTE**

A vertical green line is used to show which point of the LSA Measurement Areas is in focus when using the left and right buttons. To move to the next point, tap the cursor select button to move to the next area.
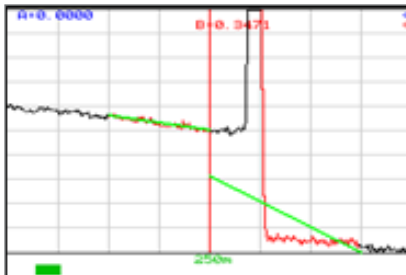
4-Point / LSA Examples

Fig 8.12
LSA SET TOO EARLY:

The LSA area and cursor are set too early. The right green LSA Indicator Line does not overlay the backscatter of the Trace properly.
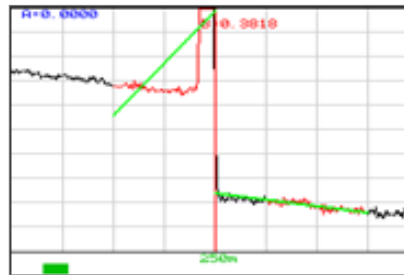
Fig 8.13
LSA SET TOO LATE:

The LSA Area and Cursor are set too late. The left green LSA Indicator Line does not overlay the backscatter of the Trace properly.
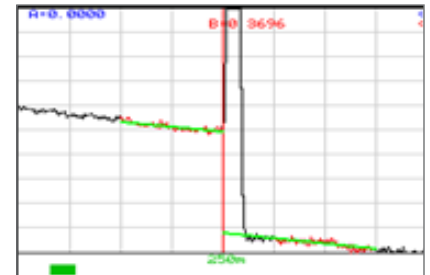
Fig 8.14
LSA SET PROPERLY:

The LSA Area and Cursor are set properly. The green LSA Indicator Line overlays the backscatter of the Trace properly.

Chapter 9: Project Management

9.1   Project Management Description

Project Management allows the user to save a set of parameters for future tests. 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 is not set, all traces will be saved to the [Default] folder.

✎ **NOTE**

It is necessary to create the project before saving a trace as the file will not be available to save after going through the project creation sequence.
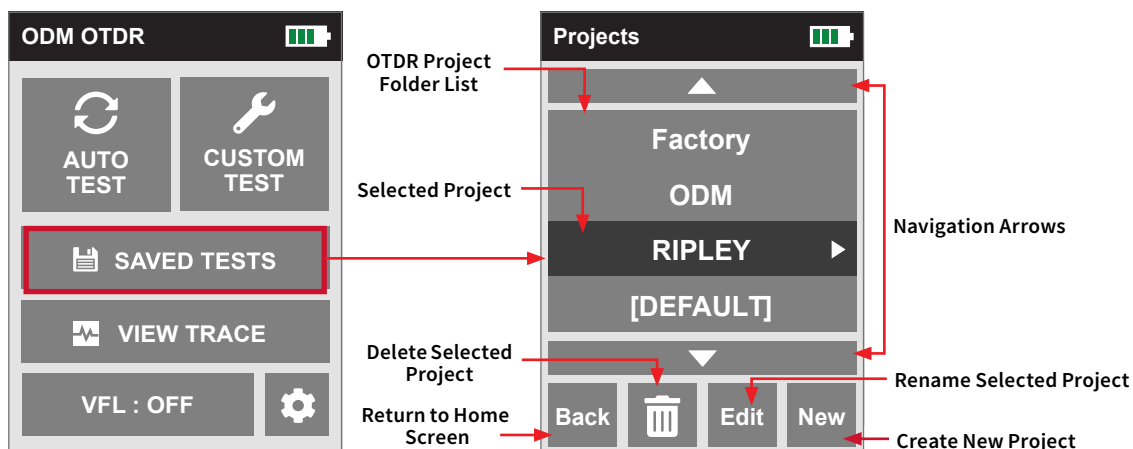
Project Management Screen

Fig 9.1

Project Management Menu

To open project management, tap "Saved Tests" from the home screen. The project management screen will open. There are four options available at the bottom of the screen: Back, Delete, Edit and New. Refer to Figure 9.1.

9.2   Project Management Operation

Create a New Project

In the project management screen, tap the "New" button at the bottom of the screen. Enter the new project name and then tap "OK". Folder names are limited to 16 characters. After tapping "OK", you will be returned to the project management screen. Your newly created project will be found in the project list. Tap the project name in the list to begin using it to save trace data.

Open an Existing Project

To open a Project, select the project name from the list by tapping the arrow buttons. Once the project is highlighted, tap the arrow to the right of the project name. The file management screen will appear. To return to the project management screen, tap the back button in the file management screen. Opening a project will also select it for testing. All new traces will save to that project folder by default.

Delete a Project

To delete a Project, highlight the project name using the navigation arrows and tap the "Delete" icon at the bottom of the screen. Refer to Figure 9.1. Ensure that the right Project is highlighted because once it is deleted, the project and all files associated with the project cannot be restored.

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

Rename a Project

To rename a Project, highlight it using the navigational arrows. Tap the "Edit" button at the bottom of the screen. Refer to Figure 9.1. Use the on-screen QWERTY keyboard to rename the project and then tap "OK".

Exit Project Management

To exit Project Management, tap the "Back" button from at the bottom of the screen. Refer to Figure 9.1.

Chapter 10: File Management

10.1   File Management Description

File Management is used to save and recall OTDR traces. It operates in conjunction with the Project Manager where if a project folder is selected as active, the files saved and listed in the file manager are associated with that project. When the OTDR is first turned on, the default folder is [Default], therefore, any files saved without creating a new project will be save to the [Default] folder. When the unit is turned off, the previously selected folder will remain as the active folder.
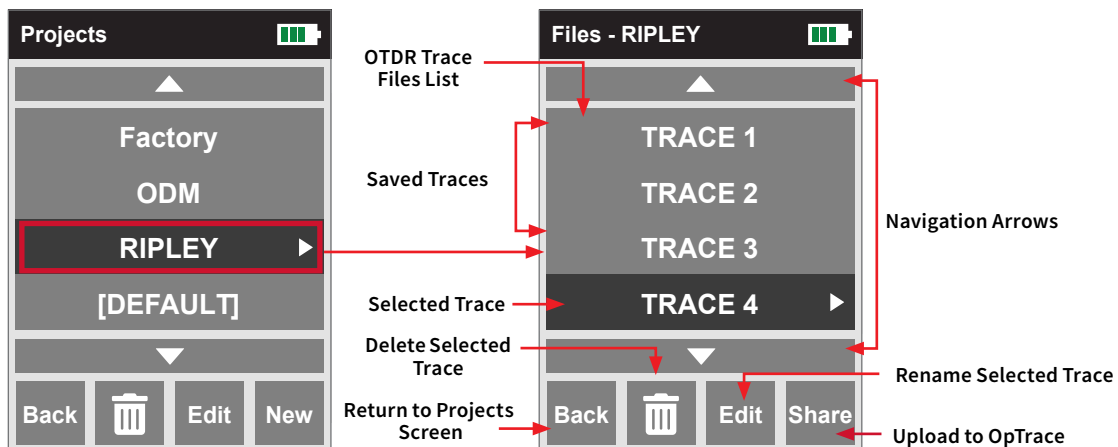
File Management Screen

Fig 10.1

File Management File Menu

Tap the arrow to the right of the highlighted project name. If the project is not highlighted, use the navigation arrows to select it. Alternatively, tap on the project name itself to select it.

10.2   File management Operation

Open/View a Trace

To open a trace, use the navigation arrows to highlight the appropriate trace and tap the arrow to the right of the file name. Alternatively you can tap the name of the file in the list to highlight it and then tap it again to open it. Once the file is opened, you the schematic view of the trace data will appear.

> ✏ **NOTE**
>
> **Opening a saved trace will unload any "active" trace data. Please ensure that all previous test data has been saved before loading a saved trace.**

Delete a File

To delete a file, with the file to be deleted highlighted, tap and hold "Delete" icon for at approximately 2 seconds. Ensure the proper file is selected as once deleted, the file cannot be recalled.

Upload a Trace to OpTrace2

To upload a trace from the OTDR to the computer, open the OpTrace2 software and ensure the OTDR is connected to the computer with the included 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 using the navigational arrows and then tap the "Share" button. The file will be uploaded to the target folder on the computer.

> ✏ **NOTE:**
>
> **When using OpTrace2, the file upload function is completed using the Software only once the OTDR is connected to the computer.**

Rename a Trace File

To rename a trace file, have the file to be renamed highlighted. Tap the "Edit" icon found near the bottom of the screen. The file name will be displayed with the on-screen keyboard. Use the keyboard to rename the project and then tap "OK".

Exit File Management

To exit the file management, tap the "Back" button at the bottom of the screen until you return to the home screen.

Chapter 11: Specifications

11.1   OTDR Specifications

WAVELENGTH	1310 / 1550 ± 20 nm
DYNAMIC RANGE	33/33 dB SM (1310 / 1550)
PULSE WIDTH	5 - 20,000 ns
UNITS OF MEASUREMENT	Kilometer, Foot, Kilofoot and Mile
EVENT DEAD ZONE	1 m
ATTENUATION DEAD ZONE	4 m
RESOLUTION	0.125 - 32 m
DISTANCE UNCERTAINTY	±(0.75 m + 0.005% x distance + sampling resolution)
FULL SCALE DISTANCE RANGE	0.25 - 260 km SM
TYPICAL REAL-TIME REFRESH RATE	2 Hz
GROUP INDEX OF REFRACTION (GIR)	1.024 - 2.048

LINEARITY	± .05 dB/dB
MEMORY CAPACITY	~ 40,000
MEMORY TYPE	Internal
POWER SUPPLY / CHARGER	Universal
BATTERY TYPE / LIFE	Li-ion / 6 Hours (Typical)
STORAGE TEMPERATURE	-20° to 60° C
OPERATING TEMPERATURE RANGE	-10° to 50° C
DIMENSIONS (WITHOUT RUBBER BOOT)	6.25" L x 4.125" W x 1.875" H (159 mm L x 105 mm W x 48 mm H)
WEIGHT	1.5 lb (0.7 kg)
COMMUNICATIONS PORTS	USB / Bluetooth®
CONNECTOR STYLES	Choice of FC or SC
ACCESSORIES INCLUDED	U.S. Choice of FC or SC Adapters; Android™ Application, Windows® Compatible Software, Rubber Boot, Hard Carry Case, Manual
LASER SAFETY **CLASS 1 SAFETY PER FDA/ CDRH AND IEC-825-1 REG.**	

Ripley Tools reserves the right to change specifications without notice.

11.2   VFL Specifications

EMITTER TYPE	Laser Photo Diode 1100 - 1700 nm InGaAs -70 to +9 dBm with Interchangeable FC Adapter
WAVELENGTH	650 nm ± 5 nm
CONNECTOR TYPE	2.5 mm Universal
OUTPUT POWER	1 mW Max.
LASER SAFETY **CLASS II FDA21 CFR1040.10 & 1040.11** **IEC 825-1: 1993**	

Ripley Tools reserves the right to change specifications without notice.

Chapter 12: Repair & Warranty

12.1   Repair Information

If repair is required, simply call the factory at 603-524-8350 for return instructions and a RMA number.

12.2   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 two years 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.

Certification Training

Ripley Tools offers a half-day certification training course to help familiarize test technicians with core concepts and test procedures for fiber optic installations. The course covers:

1. Fiber Optic Theory

Multi-mode and Single Mode Fiber; Construction of Fiber Optic Cables; Connectors and Ferrule Types

2. Connector Inspection - IEC 61300-3-35 Standard

Understanding the IEC Specification; Inspection Methods; Connector Cleaning Methods

3. Test Equipment and Methods

Inspection Scopes; Optical Power and Loss Measurement; Lasers and LED Light Sources; Fault Detection; Live Fiber Identification; Optical Time Domain Reflectometers (OTDRs)

4. Hands-On Training

Inspection Process; Connector Cleaning; dB Loss Testing

5. Classroom Exam

Certification is valid for two years after the training session. Ripley Tools maintains a database of certified technicians for the QA groups of major wireless carriers. Ripley Tools will only issue replacement certificates to the company or individual who initially paid for the training course.

Contact Ripley Tools to receive more information or to set up a certification course.

Contact Technical Support

Ripleys's experienced technical support team understands the unique needs of today's contractors in the wireless, telecom & broadband communities.

Call Us:
(603) 524-8350

Email Us:
tech.support@odm.ripley-tools.com

Download:
Find instruction manuals & user guides online at www.ripley-tools.com/odm

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