DINTEK
Lan Cabling Systems

OTDR

Optical Time Domain Reflectometer

USER'S GUIDE

Manual Index

PREFACE

Thank you for purchasing and using this series of hand-held optical time domain reflectometer. This manual contains information about the operation and maintenance of the instrument, as well as common troubleshooting guidelines. In order to facilitate your use, please read this manual carefully before operating this instrument and follow the instructions in the book.

This document is restricted to the use of this instrument. No unit or individual may, without the authorization of the DINTEK Electronic Limited, tamper with, copy and distribute the contents of this manual for commercial purposes.

The contents of this document are subject to change without notice. If you have any questions, please call the supplier, we will be happy to provide you with the best quality service.

Chapter 1 Summary

1.1   Instrument Unpacking Inspection

The packaging and transportation of this instrument is strictly in accordance with the general technical conditions of GB/T 9174-2008 "general cargo transport packaging". When you receive this instrument, please check the product according to the packing list and check the quality of the product. If you find the packaging damaged, please keep the original packaging materials and immediately notify the shipping company. Please also contact the supplier of this product.

Included in the packaging, the instrument should also be equipped with a power cord, adapter, analysis software and user manuals (via USB drive). After you receive the instrument, please check the integrity of the packaging of the equipment for the first time. If you find that the material in the packing box is not complete, please contact the supplier.

ITEM	NAME	QUANTITY
MASTER	OTDR	1
Accessory Options	Power Cord	1
	Power Adapter	1
	User's Guide	1
	U Disk（Including simulation analysis software）	1
	Touch Pen	1
	Soft Bag and Strap	1
	Certificate	1

Form 1-1 Basic Composition of OTDR

1.2   Summary

This series of optical time domain reflectometer (OTDR) is a new generation of intelligent optical fiber measuring instruments designed for the testing of optical fiber communication systems. This product is mainly used to measure various types of optical fiber; optical cable length, loss, and other parameters in the quality of the connection. The OTDR can be widely used in the construction, maintenance and emergency repair of optical fiber communication systems. This product can provide you with the highest performance solutions in the construction of fiber optic network installation, or follow-up rapid and efficient maintenance and troubleshooting tests. The DINTEK OTDR has the one of industry's most simple user interfaces with intuitive operation. Compared to similar products, the interface provides simple buttons with a touch screen dual mode of operation which greatly simplifies the user's experience. Test results are easily accessed, and the event is displayed in a tabular form on the main interface. The relevant information includes: event type,

event location, loss, reflection, attenuation, event between total loss.

The DINTEK OTDR adopts an intelligent power management mode, and comes complete with a large capacity lithium battery which allows the machine to work for more than 10 hours, making it very suitable for the long-term field environment.

In addition to the OTDR function, the instrument can also act as an Optical Power Meter, Light Source, and Visual Fault Locator (VFL) for use in fault location and end detection.
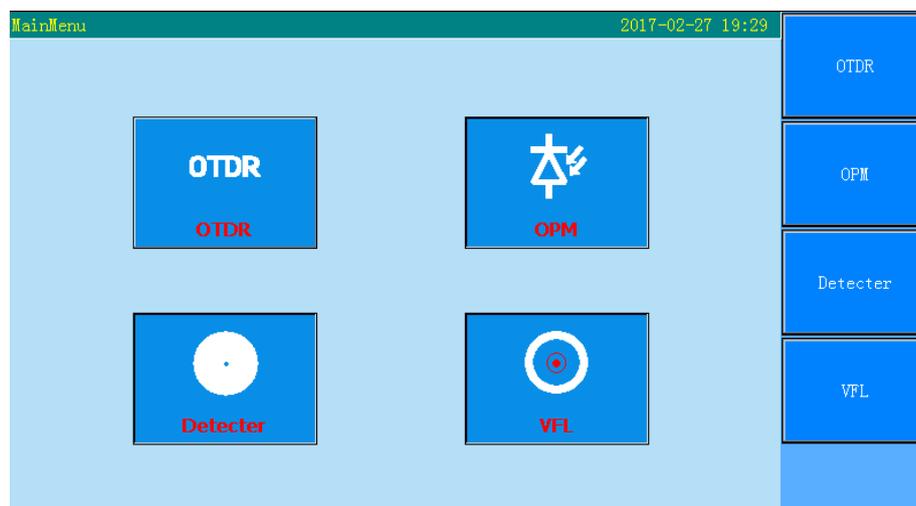
Figure 1-1 Main Menu

1.3 Maintenance & Safety Notices

1.3.1 External Power Supply

Power adapter input meets the following requirements: 100V～240V, 50/60Hz；@1.8A

Power adapter output meets the following requirements: 12V±1V, 2A, Polarity: Center is positive.

Please use the external power in strict accordance with the specification, otherwise it may cause damage to the equipment.

1.3.2 Internal Battery

- This instrument contains an internal lithium battery. In order to ensure full longevity of the battery, please charge the battery for no less than 12 hours before use. To avoid battery damage or overheating, the ambient environmental temperature when charging should be between 0℃～50℃.

  If the instrument is idle for two months or more, it is recommended to fully charge the battery before use.

  DO NOT allow the battery near fire or high heat

  DO NOT open or damage the battery

- For long-term storage of the equipment, the battery should be removed.

  When the battery is stored for a long time it is recommended to keep between -20℃～45℃。

1.3.3   Laser Safety

Please pay attention to protect the eyes when using the laser. When the instrument is not in use, please cover the light output with the dust cap.

When the instrument red light is on the laser is functioning. Do NOT look into the output port or, if the fiber is connected, avoid looking into the fiber at the remote end.

1.3.4   Instrument Maintenance

1. The DINTEK OTDR unit is guaranteed for 24 months, and the battery is guaranteed for 6 months.
2. Optical output connectors and other devices are vulnerable parts. Such devices are not within the scope of the warranty.
3. *External factors and the risk of physical instrument damage or performance degradation, will not be within the scope of the warranty.*
4. Improper operation of the instrument resulting in damage or performance degradation, will not be within the scope of the warranty.
5. **Without the permission of the company, it is strictly prohibited to disassemble the instrument, otherwise the warranty will be considered void.**

1.3.5   Instrument Return

If you need to return the product for product calibration or other reasons, please contact your supplier in advance, with brief description of the reasons for the return of the product, in order to provide you with more timely and effective service.

Please note the following for product returns:

- Use the polyethylene soft pad instrument package, giving protection to the instrument housing;
- Please use a hard-packing box to ensure that the instrument is filled with at least 3 cm thick protection;
- Fill in the product maintenance card correctly, including company name, address, contact person, telephone number, problem description etc.
- Deliver the goods to your supplier in a timely manner.

Chapter 2 OTDR Basics – An Introduction

2.1   OTDR Basic Knowledge Introduction

An Optical Time Domain Reflectometer (OTDR) is used in fiber optics to measure the time and intensity of the light reflected on an optical fiber. It is used as a troubleshooting device to find faults, splices, and bends in fiber optic cables, with an eye toward identifying light loss. Light loss is especially important in fiber optic cables because it can interfere with the transmission of data. An OTDR can detect such light loss and pinpoint trouble areas, making repairs easy.
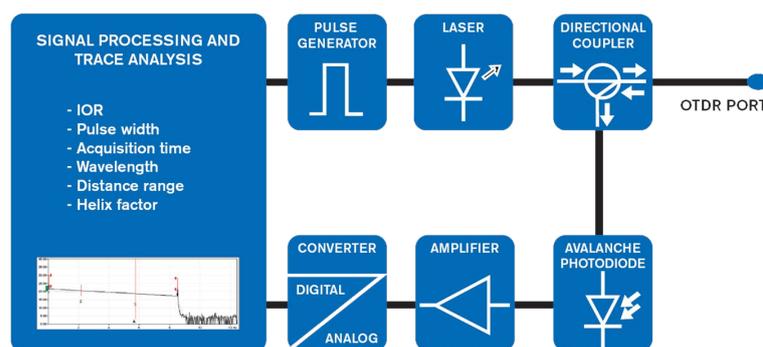
Internal OTDR Processes

In the fiber, light is scattered in all directions, including back toward the source. This is called Raleigh Scattering the OTDR uses this "backscattered light" to make its measurements. It sends out a very high power pulse from a laser transmitter and measures the light coming back in a very sensitive receiver. At any point in time, the light the OTDR sees is the light scattered from the pulse passing through a region of the fiber. Since it is possible to calibrate the speed of the pulse as it passes down the fiber, the OTDR can correlate what it sees in backscattered light with an actual location in the fiber. Thus, it can create a display of the amount of backscattered light at any point in the fiber.

This display is called a trace and the information is displayed on a graph made in accordance with the signal received, and a post-analysis event table that contains complete information on each network component is then generated. The signal sent is a short pulse that carries a certain amount of energy. A clock then precisely calculates the time of flight of the pulse, and time is converted into distance—knowing the properties of this fiber. As the pulse travels along the fiber, a small portion of the pulse's energy returns to the detector due to the reflection of the connections and the fiber itself. When the pulse has entirely returned to the detector, another pulse is sent—until the acquisition time is complete. Therefore, many acquisitions will be performed and averaged in a second to provide a clear picture of the link's components. After the acquisition has been completed, signal processing is performed to calculate the distance, loss and reflection of each event, in addition to calculating the total link length, total link loss, ORL and fiber attenuation.

2.2 OTDR Test Event Types

An OTDR test event is a measurable change in the pulse of light that causes a sudden change in loss or reflected power. It includes all kinds of connection points in the optical fiber link; melting contact and bending; crack or fracture etc. There are two main types of OTDR test events: Reflective Events and Non Reflective Events.

2.2.1 Reflective Events

Where backscattered (Rayleigh backscattering) light caused integration of light photons with impurities in the fiber another type of reflection used by an OTDR—Fresnel reflection—detects physical events along the link. When the light hits an abrupt change in index of refraction (e.g., from glass to air) a higher amount of light is reflected back, creating Fresnel reflection, which can be thousands of times bigger than the Rayleigh backscattering. Fresnel reflection is identifiable by the spikes in an OTDR trace.

Examples of such reflections are connectors, mechanical splices, bulkheads, fiber breaks or opened connectors. Figure 2-1 below

Fresnel reflections created by (1) mechanical splice, (2) bulkhead and (3) opened connection
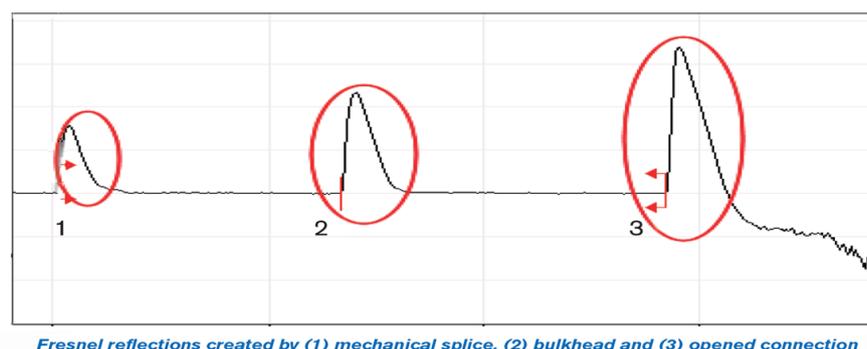
Figure 2-1 Reflective Events Diagram

2.2.2 Non-Reflective Events

Non-Reflective events are caused when there is a loss or perceived gain of power without the spike associated with Fresnel reflection. An example of this may be a fusion splice which although is a fused join in the glass without a break in the fiber still causes a slight loss of power. However, because there is no change in the refractive index of the glass joint, there is no Fresnel Reflection caused. Another cause of loss without Fresnel Reflection spikes may be an excessive bend in the fiber (called macro bends) or additionally, Micro Bends,

Figure 2-2   Non-Reflective Events Diagram

which are small imperfections in the structure of the fiber causing loss of power, but no increase backscatter through Fresnel reflection.   As shown in Figure 2-2.

2.3 OTDR Dynamic Range

Dynamic range, measured in dB, is an important parameter of the optical time domain reflectometer (OTDR). This parameter is expressed as the difference between the highest safe value of the input power and the minimum detectable power of the OTDR and, along with the pulse width and the fiber losses, determines the useful range of the equipment.

The maximum test distance of the OTDR is different in different applications, when the loss of the measured link is different. Connectors, Fusion Splices and Splitter are also factors that reduce the OTDR test length.

For example; If an OTDR was quoted as having a dynamic range of 36 dB, it could measure an 18km run of fiber with a loss of 2 dB/km, or alternatively a 72 km length of fiber having a loss of 0.5 dB/km, or any other combination that multiplies out to 36 dB.
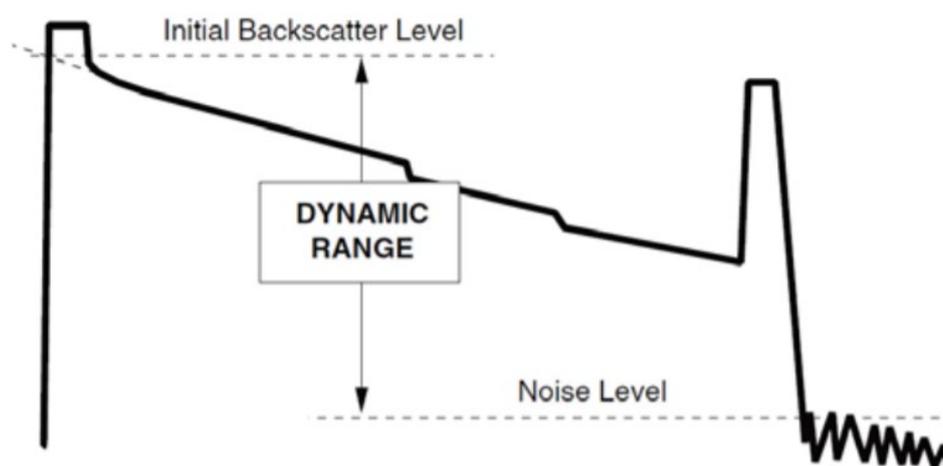
Figure 2-3 Dynamic Range Diagram

2.4 OTDR Dead Zone

Fresnel reflections lead to an important OTDR specification known as "dead zones". There exist two types of dead zones: Event and Attenuation. Both originate from Fresnel reflections and are expressed in distance (meters) that vary according to the power of those reflections. A dead zone is defined as the length of time during which the detector is temporary blinded by a high amount of reflected light, until it recovers and can read light again—think of when you drive a car at night and you cross another car in the opposite direction; your eyes are blinded for a short period of time. In the OTDR world, time is converted into distance; therefore, more reflection causes the detector to take more time to recover, resulting in a longer dead zone.

Event Dead Zone:

An event dead zone is the distance after a Fresnel reflection before another Fresnel reflection can be detected. It tells you how soon after a reflection (usually the reflection from the connector at the OTDR) you can detect a reflection from a break or from another splice. This is important if you are trying to isolate two different splices that are spaced at a close proximity to each other, such as in a restoration situation. A short event dead zone means you will be able to see a second splice after the first one.
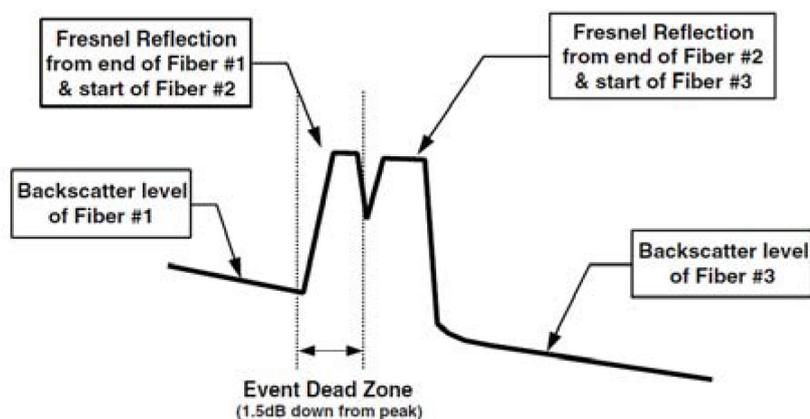
Figure 2.4.1 Event Dead Zone

Attenuation Dead Zone:

An attenuation dead zone is the distance after a Fresnel reflection until the backscatter level can be detected. This specification tells you how soon after a reflection you can measure a second event, such as a fusion splice or a defect in the fiber. To make any loss measurements in fiber you must be able to see backscatter on both sides of the splice. This means the trace has to have come all the way down from its peak at the reflection to the backscatter level. Attenuation dead zones are always longer than event dead zones, since the detector must make a full recovery down to the backscatter level.
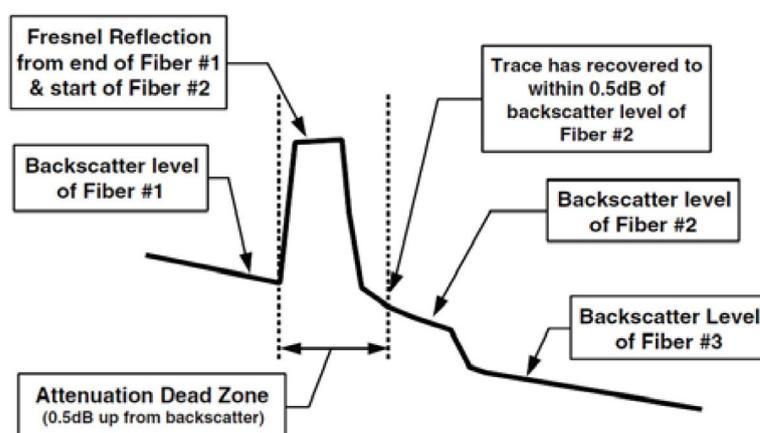
Figure 2.4.1 Event Dead Zone

Chapter 3 Basic operation and usage of this OTDR

The DINTEK OTDR has a simple and efficient operation, to make the user experience as easy as possible. The main operating interface contains only 5 menu options. The operation interface of the instrument is divided into the Operation Window area and the Menu Display area.

To start, turn on the OTDR and boot into the main interface area. The screen displays the main operating window, as shown in figure 3-1.

The main operating window contains all of the 5 OTDR main Operating Menu options, with each menu option containing a different sub window which contains the information to achieve the corresponding functions of that menu option. (detailed description is found in the use of methods)

3.1 This series of OTDR main operating window
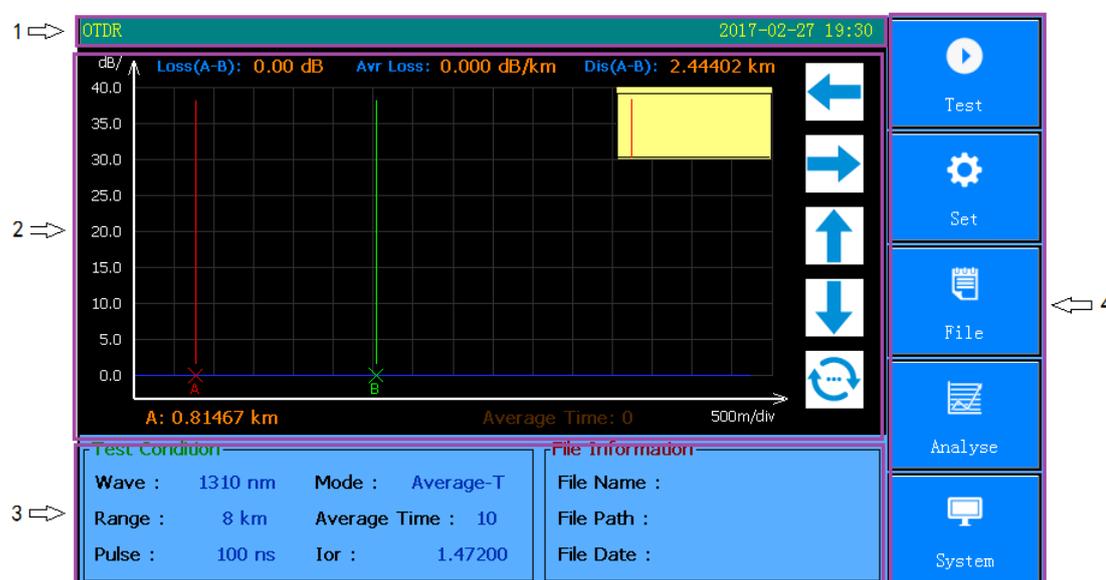
Figure 3-1 Main Operating Interface

Figure 3-1 Notes:

(1) For OTDR power indicator, system time, date & charging indicator display area.

(2) OTDR Trace Display area

(3) OTDR test conditions, file information, test results, event list display area.

(4) OTDR functions menu

3.2 OTDR Function Key Introduction

Figure 3-2 Function Key Introduction

3.3   F1 – F5 Function Keys

Operate corresponding on-screen menu options
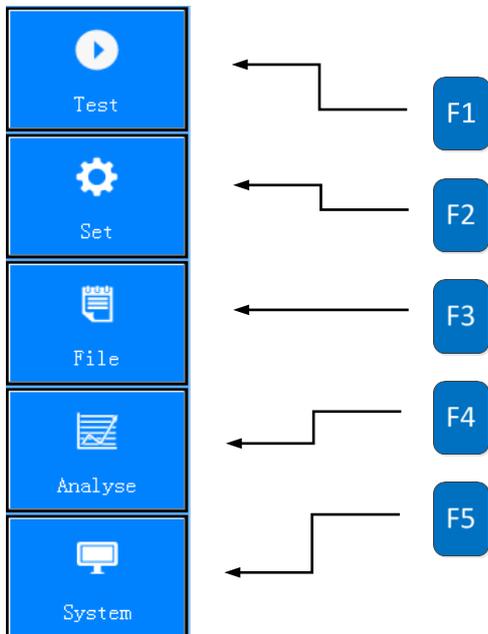
	Power Button: Press the button to start the OTDR, long press button to close the OTDR.
OTDR	**OTDR Test Button:** Press this button to Start or Stop the test of the optical fiber
A-B	**A\B Cursor toggle Button:** Press this button to switch between the A & B cursor
	Zoom\Move Select Button: Press this button to select the zoom function or cursor movement function
ENT	**Enter Button**: Press this button to confirm the prompt information.
ESC	**ESC Button:** Press this button to exit the test or current test function or return to the main function area.
	Navigation Button: Use this button after selecting the zoom function or cursor movement function

3.4 Setting the OTDR Parameters

It is necessary to set the parameters of the OTDR accurately before carrying out any testing. The test parameters of OTDR include the test wavelength, the range, the pulse width, the refractive index, the optical fiber correction coefficient and the event threshold.

In the parameter setting interface, click on the corresponding menu, then you can select the corresponding function; or in the main interface, click on the touch screen parameters in the display area. This will pop up the parameter setting interface (all test parameters can be viewed via the interface of the instrument), as shown in figure 3-3.

Fig 3-3 Parameter Setting Interface

3.5 Parameter Introduction and Setting Method

Wavelength（nm）:Setting the OTDR test wavelength.	
In the parameter settings interface, click [1310nm] or [1550nm] to choose the corresponding wavelength.	

| Test range（km）:Setting the scan range.	
The range is set according to the actual length of the fiber. To select the appropriate predefined range, it must be greater than the length of the measured fiber (usually set to two times the length of the measured fiber). *The setting method：* In the parameter settings interface, click the "Test Range" menu, giving options for 500m to 256km, then select the appropriate range.	

Pulse width（ns）：Setting the laser pulse width.

Setting the pulse width on the OTDR controls the precise timing of laser pulse injected into the fiber optic core.

The pulse width represents the conversion of the timed signal (nanoseconds) to distance or width (meters). The longer the timed pulse the more light energy that is injected into the fiber.

A Long pulse width is used for longer fiber distances and a short pulse width for shorter fiber distances. Always start with a shorter pulse width and gradually increase the pulse width to detect all possible fault traces.

The setting method：In the parameter settings interface, click on the "Pulse Width" menu, giving options for 5ns to 20000ns, then select the appropriate pulse width.

Pulse :	100 ns
	3 ns
Av. Times :	5 ns
	10 ns
Length Unit :	50 ns
	100 ns
	275 ns
☐ Lock A/	1000 ns
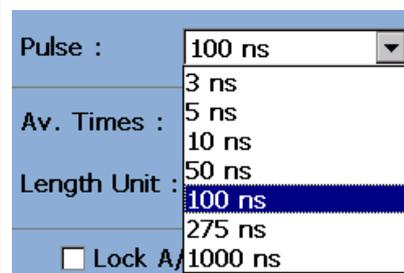
Test mode：Mode for selecting OTDR scan type.

Includes "real time testing", "average test" and "automatic test".

Real time testing: In order to scan the test link in real time and display the test results, it is convenient to monitor the link and the link dynamically.

Average test: The scanning results are accumulated and averaged to improve the quality and accuracy of the test curve.

Automatic test: Using and intelligent test method. Using an Auto-Test, the instrument will automatically enter the link according to the measured data, and Match the test conditions, without the user having to manually set parameters.

The setting method: Under the parameter setting interface, click on the "test mode", giving options for "automatic test", "real-time test", "average test" option, then select the appropriate test mode.

Test Mode :	Average-Test
	Auto-Test
Loss Item :	Real-Test
	Average-Test
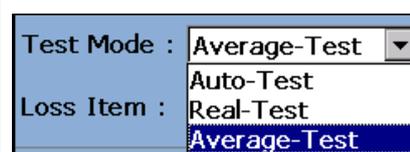
Average times：for the "average test", "automatic test" mode

Used to set the average number of times. This option is however not supported in the real time test mode.

The setting method: *In the parameter settings interface, click on the average number of times required, then click [OK] and exit window.*

-Please input average times-

10   The value in [1, 3000]

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| 8 | 9 | 0 | . | < | > |

Del BackSpace

OK   Cancel

Loss display: Used to select the OTDR test event Loss Type

Average Loss：Used to test the loss, spacing and average loss between two points in the link. By moving the cursor position, the loss of two points in the link can be measured.

Connection Loss: Used to test the loss characteristics of the connection point, melting point, or macro bend in the link.

Return Loss: Used for testing the loss of reflection events in a link.

The setting method: *Under the parameter setting interface, click on the "Loss Item" giving options for "Average Loss", "Connection Loss" and "Return Loss", then select the required loss.*

Loss Item : Connection Loss ▼

Average Loss
Connection Loss
Connection Loss

Group refractive index：

The refractive index of the fiber affects the transmission speed of the laser in the optical fiber, so the accuracy of the refractive index is directly affected by the accuracy of the measurement. The refractive index of optical fiber is provided by optical fiber manufacturer.

The setting method： *In the parameter settings interface, click on "Group Refractive Index", In the pop-up input interface, enter the refractive index of the optical fiber to be measured. Then click [OK] and exit window.*

-Please input value of Ior-

1.47200   The value in [1.00000, 2.00000]

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| 8 | 9 | 0 | . | < | > |

Del BackSpace

OK   Cancel

Cable correction：

The placement of the correction factor is the change of fiber length after the fiber optic cable length is taken into account. This parameter can be obtained from the cable manufacturer. The default is set to a factor of "1".

The setting method： *In the parameter settings interface, click the [Optical Cable Correction]. In the pop-up input interface, input the optical fiber correction factor, click OK then exit the window.*

Please Input the threshold value of splice loss

0.20   The value in [0.01, 30.00]

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 0 | . | < | > |

Del   BackSpace

OK   Cancel
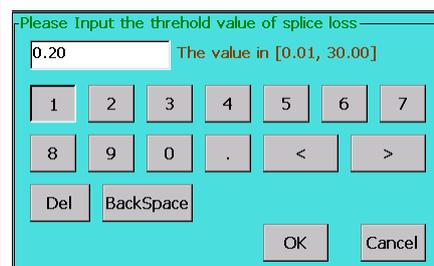
Event threshold：

The event threshold of curve analysis is divided into "splice loss threshold" and "return loss threshold" and "the end of the optical fiber threshold". Events greater than the event threshold will be listed in the event table and be ignored when less than the event threshold.

The setting method： *In the parameter settings interface, click on the corresponding threshold menu to pop up the threshold input interface, click on the input threshold "OK" to exit window.*

3.6 Introduction of Loss Test

3.6.1. This series of OTDR test items are available: average loss, connection loss, return loss.

3.6.2. Average Loss Test

In the average loss test mode, the OTDR will test the distance between the cursor A and B, the loss between the cursor A and B and the average loss between the cursor A and B.

Click the panel buttons $\boxed{A\text{-}B}$, switching between the A and B cursor by using t$\blacktriangleright$ or $\blacktriangleright$ buttons. The user can observe the loss of any distance between the optical fiber links. As shown in figure 3-4.

OTDR   2017-02-27 20:47

Loss(A-B): 6.20 dB   Avr Loss: 0.324 dB/km   Dis(A-B): 19.59877 km

A: 12.54322 km   4.0km/div

Test   Set   File   Analyse   System

	Wave: 1310 nm	Range: 64 km	Pulse: 275 ns		Ior : 1.46850	
No	Type	Distance(km)	Average-L(dB/km)	Splice-L(dB)	Return-L(dB)	Link-L(dB)
1	Reflect	10.2649	0.318	0.000	52.732	3.261
2	The End	35.5228	0.324	0.000	30.722	10.719

Fig.3-4 Average Loss Test

3.6.3. Connection Loss Test

The connection loss test is used to accurately measure the loss characteristics of any reflection and non-reflection events in the link.

In the reflection loss mode, the OTDR main interface will show A and B cursors. When the connection loss is to be measured, cursor A is placed before the reflection event to be measured, and close to the reflective spike, Cursor B is placed directly after the reflection event, but not on the event spike. The connection loss can be read by the "Loss(A-B)" displayed. As show in figure 3-5.

Fig.3-5   Connection Loss Test

3.6.4. Reflection Loss Test

The return loss mode is mainly used to accurately measure the reflection loss characteristics of any reflection event in the link.

In the reflection loss mode, the OTDR main interface will show A and B cursors. When the reflection event loss is to be measured, cursor A is placed before the reflection event to be measured, and close to the reflective spike, Cursor B is placed at the top of the reflection event spike.

The return loss can be read by the return loss displayed. As show in figure 3-6.
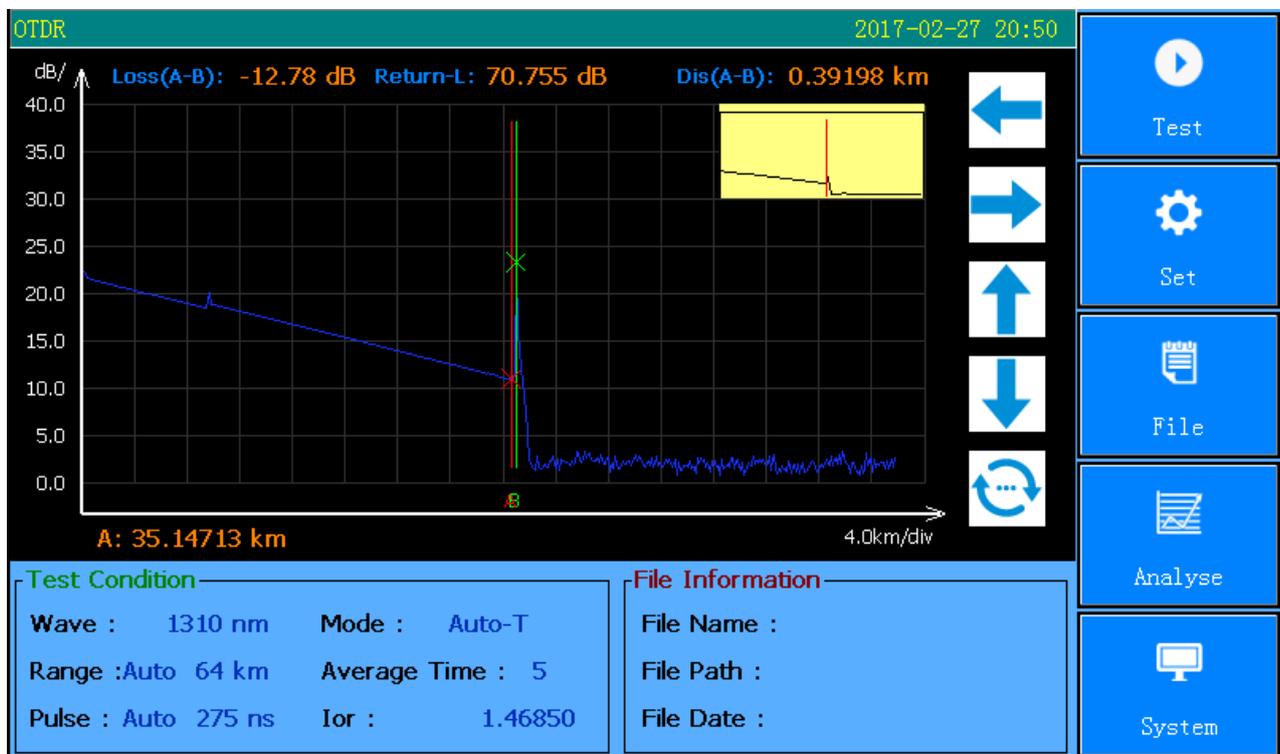
Fig.3-6 Reflection loss test

3.7 Trace Analysis and Event List

After the OTDR test ends and the screen displays the trace, click "analysis" menu or click F4 button, The OTDR will analyze the obtained trace. According to the threshold of the event, the event points are selected and located. The length, loss and average loss of optical fiber link are obtained. the event list information is displayed in the list of events in the main operating window.

Click "Event List", Press the navigation key ▲ or ▼ to view the information of all events in the event list one by one.

In the event list window：

| Event type:	Event type for current event point.
Drop event:	This event is a non-reflective event point in the fiber link, usually caused by melting contact, fiber bending or extrusion.
Rising events:	This event is a non-reflective event point in the fiber link, usually caused by testing of different types of optical fiber.
Reflection event:	This event is a reflection event. usually caused by a connector in an optical fiber link.
Fiber Splitter：	Usually caused by fiber splitter in an optical fiber link.
Fiber end:	Current event point is the end of the link.
Distance（km）:	Current event point position.
Average loss（dB/km）:	Current event point loss.
Splice loss:	Loss of fusion contacts in optical fiber links.
Return loss:	The return loss of current event point.
Link loss:	The total loss of the link from the start point to the current point in the link.
Reflection loss:	Reflection loss of reflection events caused by active connections in a link
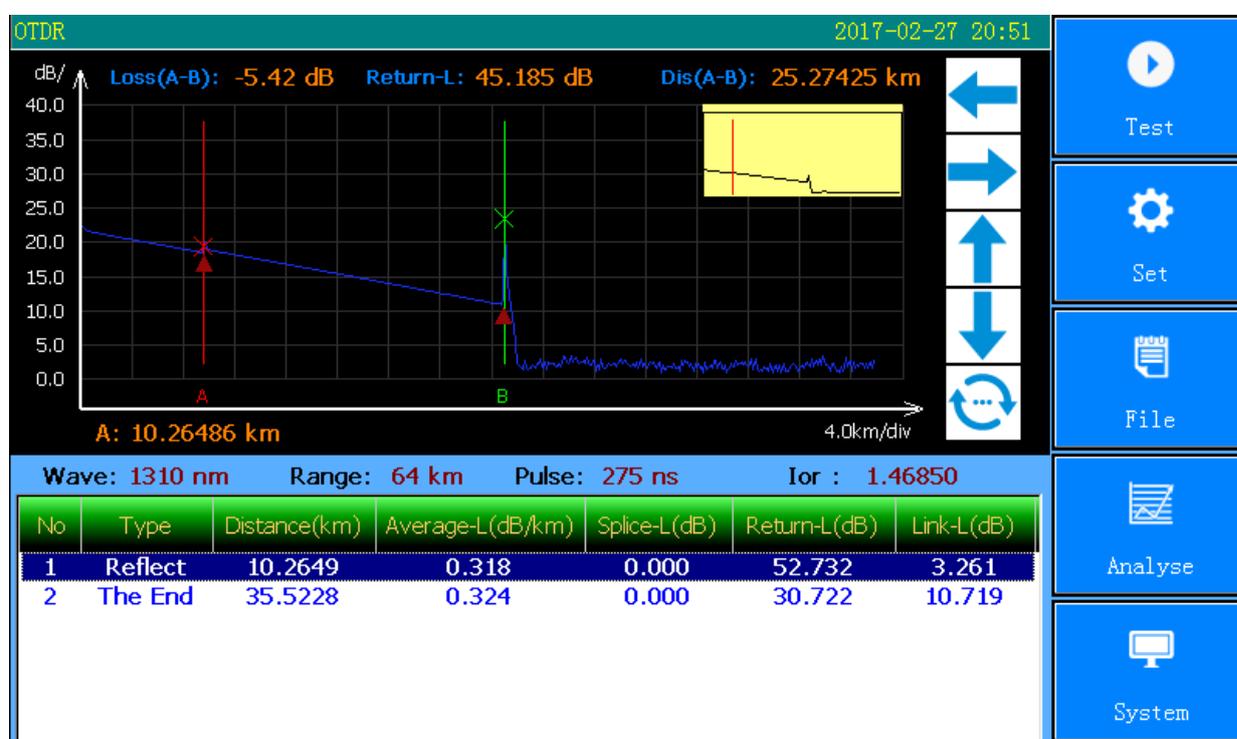
Fig.3-7 Analysis Result

3.8 Moving and Switching Cursor

- To move the active cursor A or B in either direction, press navigation k ▷ or ▷ which will move the cursor to the left or to the right.
- To change the location of a cursor, click on the touch screen to place the currently active cursor at the corresponding touch point.

- Press Navigation key A-B to achieve a switch between the cursor lines A & B.

3.9 Zooming In/Out or Moving the Trace

For trace movement after testing, press the function button in the trace menu, as shown in figure (1)	🔄		
Press Navigation key ▷ ▷ or ▲ ▲ to move the trace Horizontally or Vertically.	▷ ▷ ▲ ▼		
For trace zoom function, press the horizontal zoom function button in the curve menu as show in figure (2)	🔄		
Press Navigation keys ⊕ ⊖ or ⊕↕ ⊖↕ to zoom the trace Horizontally or Vertically.	⊕ ⊖ Horizontal Zoom ⊕↕ ⊖↕ Vertical Zoom	Figure 1	Figure 2
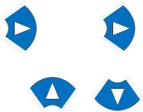
3.10 Measurement of average loss between two points in a fiber link

The setting method:

- In the OTDR test parameter setting window，Set test items to average loss test. The main operating window will appear 2 cursors, cursor A and cursor B.
- Place the cursor A and B at any two points on the linear region of the measured fiber segment.
- The average value of the average loss displayed on the operating window is the average loss of the fiber segment to be tested. As show in figure 3-8.

Fig.3-8 Average Loss Measurement

3.11   Measurement of the loss of connection points and fusion contacts in fiber links

To manually test the connection loss of a connection point:

- In the OTDR settings window, set the test item to the connection loss test. At this time the main operating window will appear in 4 cursors (followed by the cursor a, cursor A, cursor B, cursor B).

- Zoom waveform, Position the cursor A in front of the jump edge near the connection point event, near the location of the connection event.

- The small cursor before the cursor A is placed at the beginning of the linear segment of the fiber before the event of the connection.

- Position the cursor B near the jump edge of the connection point event, near the location of the connection event.

- The small cursor at the end of the cursor B is placed at the end of the segment of the optical fiber before the event of the connection.

- The connection loss of the measured connection point is displayed on the operation window. As shown in Fig. 3-9.

Fig.3-9 Connection Loss Measurement

3.12   Measure Echo Loss Manually

If you want to manually test the return loss of a connection point, the steps are as follows:

In the OTDR settings window, set the test item to **echo loss** test. At this time, there will be 2 cursors, cursor A and cursor B.

The test point is extended, and the mark point A is positioned at the rising edge of the measured reflection event.

Mark point B is located at the top of the measured reflection event.

At this time, the value of the return loss displayed on the operation window is the return loss of the measured connection point. As shown in Figure 3-10.
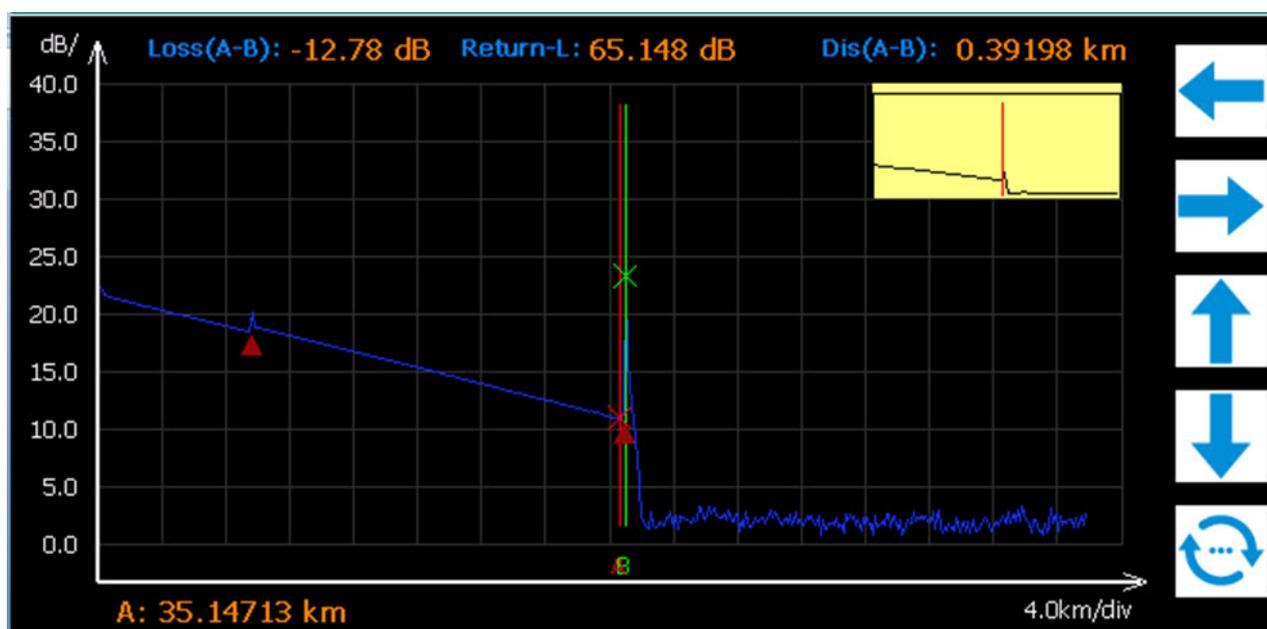


Fig.3-10   Return loss measurement

3.13 File Management Class

The following is the introduction of this series of OTDR's file management operations, including "file read", "save", "copy", "delete", etc. When testing with the OTDR, the resulting information can be saved. The contents of the preserved testing include: the trace and the relevant information of the trace.

### 3.13.1 File Read In the test of the main interface, click on the **[file]** - **[read]**, pop-up file read interface, click on the **[file path]**, the path of the file list, select the corresponding file, click **[read]**	
### 3.13.2 File Save In the test main interface, click **[file]** - **[save]**, pop-up file save interface, enter the file name, select the file to save the path and format, click **[OK]**	
### 3.13.3 File Copy In the test main interface, click **[file]** - **[save]**, pop-up file copy interface, you can choose to copy the file to the U disk memory.	
### 3.13.4 File Deletion In the test main interface, click **[file]** - **[delete]**, pop-up file delete interface, select the name of the file you want to delete, click Delete to delete the appropriate file.	
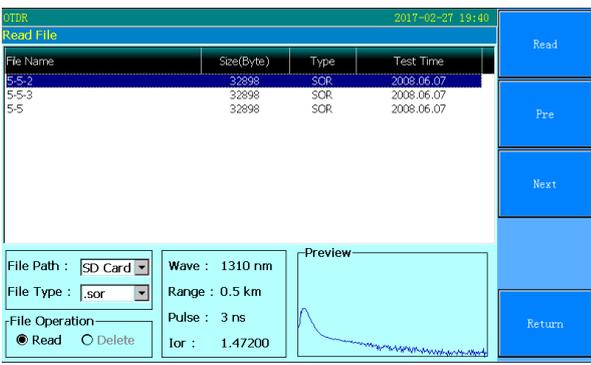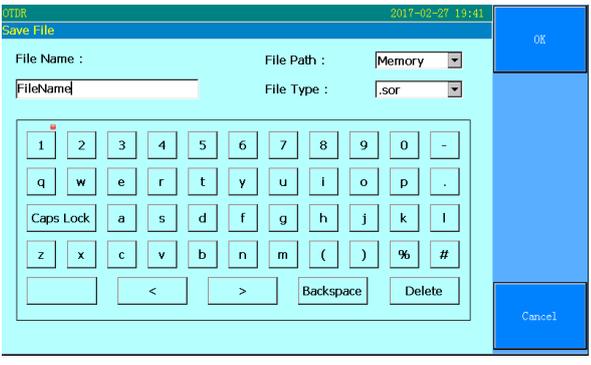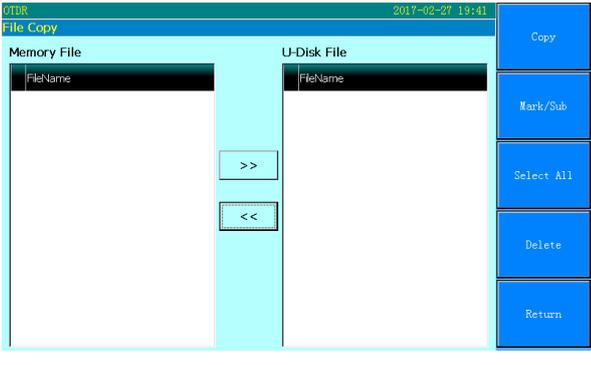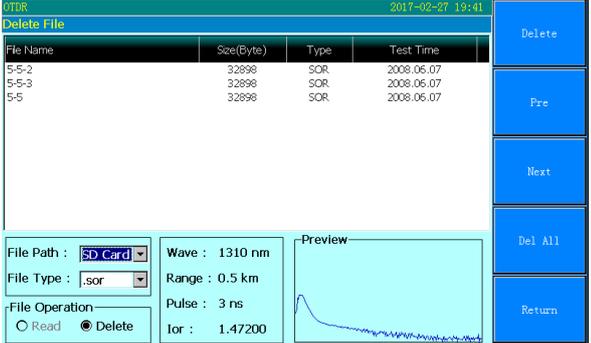
3.14.0 System Time, Language Settings, System Upgrades and View System Information

In the OTDR test interface, click on the menu button [system], enter the system menu interface, click the system [settings/upgrade] to enter the system information settings window.

In the system [settings/upgrade] interface, the system time, the system language settings, the touch screen can be calibrated, the software can be upgraded. As shown in Figure 3-15.

    Note: the [system time], [language] and [Brightness]option in the page can be set up by the user, the rest is the inherent parameters of the system.
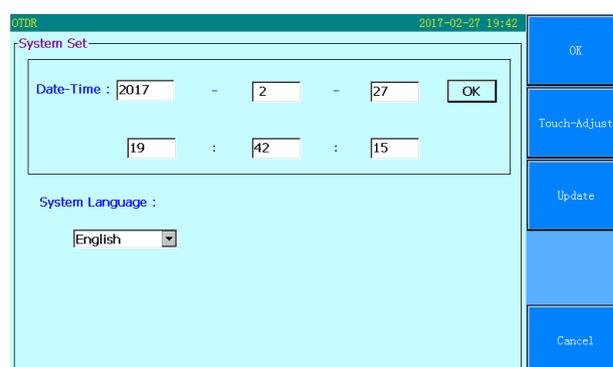
Fig.3-15 System Settings/Upgrade Interface
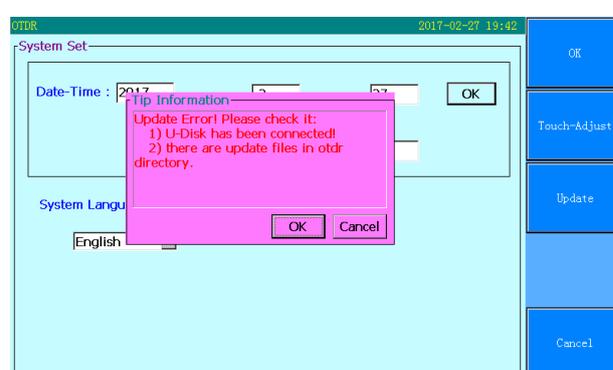
Fig.3-16 System Settings/Upgrade Interface

3.14.1 Help Information

In the OTDR test interface, the menu button, click on the [system], enter the system interface, click on [help] to access help file system interface, then you can view the instrument operating instructions, test notes and optical power function introduction, face detection function, OTDR file operation.
Use the left and right navigation keys to turn pages. Press the return key to exit the window. As shown in Figure 3-17.
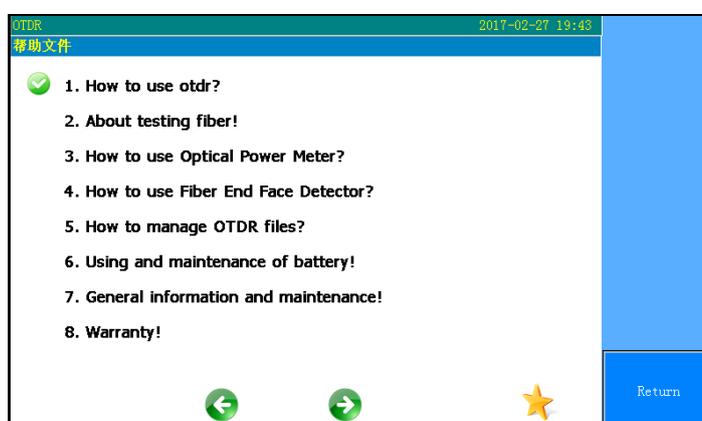
Fig.3-17 Help Information Interface

Chapter 4 Basic Operation and Use Method of Optical Power Meter

<table>
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If you buy the instrument equipped with the optical power meter function, click on the main menu then click the optical power meter button.

You will enter the optical power meter operating interface, as shown in Figure 4-1.

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Fig.4-1 Optical power meter test interface

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The menu button function and operating instructions are as follows:

[start]: start or stop power meter test. The following three methods can achieve this function.
Click the [Start] button to start the power meter module and carry out testing. Once pressed the button label then changes to [stop]. The button can then be used to stop the power meter test. Once stopped, the button label changes back to become [start].

[settings]: enter the settings interface, changing the wavelength, unit, the average number of times, the range of parameters. As shown in figure 4-2.

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Fig.4-2 Power meter setting interface

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[Wavelength]- Wavelength setting can be achieved by selecting wavelengths of either 850nm, 1300nm, 1310nm, 1550nm or 1625nm. This will change the power meter test wavelength.
[Unit] – Select units by choosing dB, dBm or mW.
[Average number of times] - Modify the average number of optical power meter readings. The greater the average number of times, the higher the accuracy of the measurement. Options from 16 to 1024.
[Range]: Click on the menu item button to pop up the range selection drop-down box. Click on the touch screen or ▲ ▼ key to select range. Select <automatic> and the instrument will automatically determine the test range. Select the appropriate range for testing. The measuring range will be locked when the instrument is tested
[zero]: the implementation of the adjustment of power meter zero point.
[reference] relative measurement of optical power mode, dB mode.
[return]: exit the Optical power interface, return to the main operating interface.

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</table>
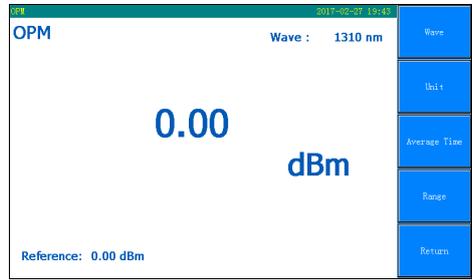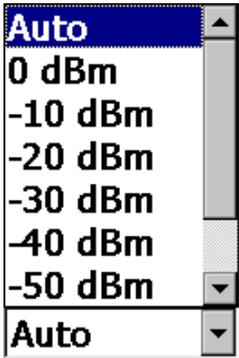
Chapter 5 The Function of End Face Detection

To use the End Face Detector. Plug detector into the USB port.

To access the equipment, boot into the test main interface, press the button, or click on `F3` the [end detection] module, into the end of the test interface.

Insert the optical fiber connector into the end of the detector to see whether the end surface is clean. As shown in figure 5-1.

Fig.5-1　End detection interface

Chapter 6　Visual Fault Location（VFL）

Click on the figure 6-1 **[VFL]**, will enter the visual fault locator operating interface, as shown in Figure 6-1.

VFL operating instructions are as follows:

- Click [VFL], visual fault location mode for 1Hz modulation light output;
- Click [VFL], visual fault location mode continuous light output;
- Click [VFL], visual fault location function off.

Fig.6-1 VFL Operation interface

Chapter 7 Instrument Maintenance and Troubleshooting

7.1 Daily Use and Maintenance of Instrument

7.1.1 Connector Cleaning

When testing, we recommend that connectors on both the reference and tested cables be cleaned before every test, as every time the connector is exposed to air, it can accumulate dust. Typical airborne dust is almost the size of the SM fiber core, so cleaning every time is even more important than MM. A secondary effect is that if the connectors are dirty, it can scratch the end finish (most dirt is silica (sand) based) and cause higher reflectance if not loss.

When the OTDR is unable to test and create an accurate trace, the connector should be considered first. When cleaning, make sure that the OTDR and the visual red fault location function are stopped. Unscrew the output interface, use a special paper towel or cotton swab moistened with alcohol to wipe the connecting end face. Or alternatively use Push-Cleaning-Pens from DINTEK.

At the same time, in the normal use of the instrument, after the completion of the dust cap on the cover, but also must keep the dust clean.

7.1.2 Internal Battery Maintenance

This OTDR machine contains a lithium battery. For first time use of the OTDR, please first use of battery as the source of power, allowing the battery to fully discharge completely. Once discharged. The battery should be charged for at least 8 hours before being used once again. This will correctly initialize the battery and optimize its storage capacity. For the sake of your safe use, the OTDR contains multiple protection measures for the battery voltage, charging current, charging temperature and so on. The charging temperature range of the internal battery is 0°C to about 50°C, and when the environment temperature is too high, the charging is automatically terminated. When the instrument is not used for a long time, please charge the battery on a regular basis, it is recommended that every 2 to 3 months for the battery charging operation to ensure the best performance of the battery.

7.1.3 Instrument Screen Cleaning and Calibration

This OTDR display for the model has touch 7 inch color LCD screen. The use of sharp objects MUST NOT be used to click on the LCD screen, otherwise it may lead to damage to the LCD screen.

When cleaning, use a soft cloth to clean the LCD screen. Do not use organic solvents to clean the LCD screen, otherwise it may cause damage to the LCD screen.

7.1.4 Instrument Calibration

In the normal use of the instrument, it is recommended that the optical time domain reflectometer is calibrated every two years. Please contact the instrument supplier for specific calibration.

7.2 Fault and Treatment Method

Form 7-1   Fault phenomena and treatment methods

Fault Description	Possible Failure Cause	Possible Remedy
OTDR can't start properly	Battery has no charge	Charge the battery, and observe the switch key light, if the red light, then continue to charge, otherwise, contact the supplier.
OTDR cannot charge	The environment is causing failure of the charging conditions	The instrument is placed in the environment of 0°C - 50°C.
	Poor battery contact	Open the battery compartment cover, check the battery contacts, and reinsert the battery
	Battery problems, or internal circuit problems	Contact supplier to replace battery
Unable to measure normal trace	Instrument parameter setting error	Resetting the correct test parameters
	The output end of the optical fiber is polluted	Clean light output face
	Optical output connector damage	Replace output connector
	Optical output connector mismatch	Replace with matching connector.
Test trace anomaly, Waveform is not smooth	Incorrect output interface connection	Reconnect the appropriate output interface
	Pulse setting too small	Increase test pulse width
	Incorrect channel settings	Modify test channel parameters
Saturation of the front end of the test trace	Pulse width setting	Reduce test pulse width parameters
	Incorrect channel settings	Modify test channel parameters
Test trace has excessive trailing noise after end point.	The end of the optical fiber is polluted	Clean light output face
	Optical output connector damage	Replace output connector
	Optical output connector mismatch	Replace with matching connector
Optical fiber end reflection peak	Range setting small	Increase test range
	Pulse setting small	Increase test pulse width parameters
False positives in curve analysis	Poor quality of test curve. Event threshold setting.	Increase test pulse width parameters. Add event threshold.
Measurement of fiber length is not accurate	Parameter settings incorrect	Resetting appropriate parameters
	The refractive index of optical fiber is not accurate	Fiber refractive index
	Optical cable correction factor is not accurate	Reset optical cable correction factor
The average value of optical fiber loss is not accurate	The front tail test curve is too long	Clean light output face
	Improper cursor location	Reset cursor position

- The above description is only for reference, please refer to the instructions for use. In the use of the OTDR, if in doubt, please contact with the instrument supplier.

- This OTDR may not be able to be repaired by the user without permission. The user must not arbitrarily disassemble, otherwise the warranty will become void.

Chapter 8 Technical Parameters and Ordering Information

8.1 Technical Parameters of the DINTEK OTDR

Form 8-1 DINTEK OTDR technical parameters

Model Item	OTDR			
	S1	S2	S3	M1
Fiber type	Single Mode			Multimode
Central wavelength	1310nm/1550nm ±20nm			850nm/1300nm ±20nm
Maximum dynamic range (dB)[1]	32/30	37/35	42/40	22/36
Event Dead Zone [2]	1.5m	1.5m	1.5m	3m
ATT dead zone	10m	10m	10m	10m
Panel type	800×480、7inch color LCD、Touch screen operation			
Optical interface	FC/UPC (SC or ST)			
Test range	500m, 1km, 2km, 4km, 8km, 16km, 32km, 64km, 128km			@850nm 2km, 4km, 8km, 16km, 32km @1300nm 2km, 4km, 8km, 16km, 32km, 64km, 128km, 256km
Pulse width	5ns, 10ns, 30ns, 50ns, 100ns, 275ns, 500ns, 1000ns, 5000ns, 10000ns			@850nm 5ns, 10ns, 30ns, 100ns, 275ns, 500ns, 1000ns @1300nm 10ns, 30ns, 50ns, 100ns, 275ns, 500ns, 1000ns, 5000
Ranging accuracy	±(1m+ Sampling interval +0.005%×distance)			
Attenuation measurement accuracy	±0.05 dB/dB			
Reflection measurement accuracy	±4dB			
Data storage	≥1000 Test trace storage			
Communication interface	USB			

Visible red light source		
Output power	≥2mW	
Test distance	≥5 km	
Environmental adaptability		
Power supply mode	AC/DC Adapter：AC：100V～240V（1.5A），50/60Hz DC：12V～20V（2A） Battery：7.4V，10000mAh	
Battery working time ³	≥ 12 hours	
Working temperature	-5℃ ～ 50℃	
Preservation temperature	-20℃ ～ 70℃	
Relative humidity	0 ～ 95％　Non Condensing	
Weight	≤ 1kg	
Volume	260mm × 170mm × 70mm	

Note:

1. The ambient temperature of 23℃ ± 2℃, the maximum test pulse width, the average time is greater than 3 minutes

2. Blind test conditions (range 500m, pulse width 10ns, channel three), reflecting optical fiber loss is larger than 45dB, the

    typical value;

3. Low brightness, not test.

8.2 Order Information

Form 8-2　This series of OTDR standard list

Serial Number	Name	Number
1	Optical Time Domain Reflectometer	1
2	Power Cord	1
3	AC/DC Power Adapter	1
5	User's Manual	1
6	USB disk (including simulation analysis software)	1
7	Touch Pen	1
8	The special instruments (including backpack straps)	1

Note: the OTDR standard interface type FC/UPC, type FC/APC optional

Note: the above contents are subject to change without prior notice due to the need for design improvement.