FIS Atlas Mini Optical Time Domain Reflectometer (OTDR)

This manual contains the operation and maintenance information of the FIS Atlas Mini OTDR, as well as troubleshooting guide. Please read the manual carefully before operating the Atlas Mini OTDR and follow the instructions.

The contents contained in this manual are subject to modification without prior notice. If you have any questions, please call Fiber Instrument Sales Inc., phone: 1-800-500-0347 or 315-736-2206.

Fiber Instrument Sales Inc., 161 Clear Rd, Oriskany NY 13424.

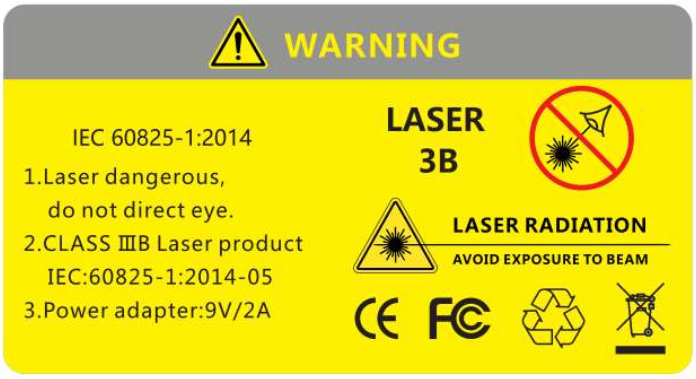
Security Warning

Power adapter
Input:AC 100V ～ 240V,50/60Hz@0.8A
Output:DC 9V,2A
Use the power adapter in strict accordance with the specifications, or it may cause damage to the device.

Battery:
Inside the instrument is dedicated lithium battery. To obtain full performance of the battery, when using the instrument for the first time use the internal battery for power supply, after the battery is exhausted then charge the battery. First charge time should not be less than 4 hours. The charging temperature range of the battery in the machine is -10℃(14 F)to 50℃(122 F). When the ambient temperature is too high, please terminate the charging for your safety. When the instrument is idle for more than 2 months, it should be charged every two weeks to maintain the battery power. Do not take out the battery without factory permission. Please do not put the battery near a fire source or strong heat. Do not open or damage the battery. The temperature range of battery for long-term storage should be -20℃(-4 F)to 45℃(113 F).

Laser safety instructions:
Laser safety level of this instrument is: CLASS Ⅲ B, the laser can be harmful to human body while in use, please pay attention and follow safety precautions.

When using this instrument avoid looking directly at the laser outlet or the end of the optical fiber. When the instrument is active please cover opposite end of connector/ferrule with a dust cap or insert dust cap on the laser light outlet. When the visual fault locator (VFL) of the instrument is on, do not look directly at the output port of the red light source or at the end of the optical fiber connected to the red light output end, it can cause damage to the human eyes.



Physical Features:

1） Wavelength: Single mode:1310/1550nm
2）Measuring range: Min 100m – Max 90km
3）Touch screen or Hard Key Functions
4）OTDR data format: SOR format
5）Onboard Features: Power meter, Light source, VFL, OTDR, Graphical Event Map Display, Fiber Inspection, and Network Cable Test.
6）Keyboard input, edit save file name and line number
7）Support user upgrade
8）The 4.3-inch TFT screen, 800 x 480 pixels, display screen is optimized for outdoor sunlight.
9）3.7v /5200mAh lithium batteries are used, which can be fully charged for more than 8 hours operation.
10) Size 6.9” x 4.1” x 1.8”, Weight: 1.25lbs (20 Oz.) (including battery)
11) Units of measurement: Kilometers, Kilofeet, Miles
12) Working temperature:-10 to+55°C (14 to 131F), storage temperature: -20~+80°C (-4 to 176F)

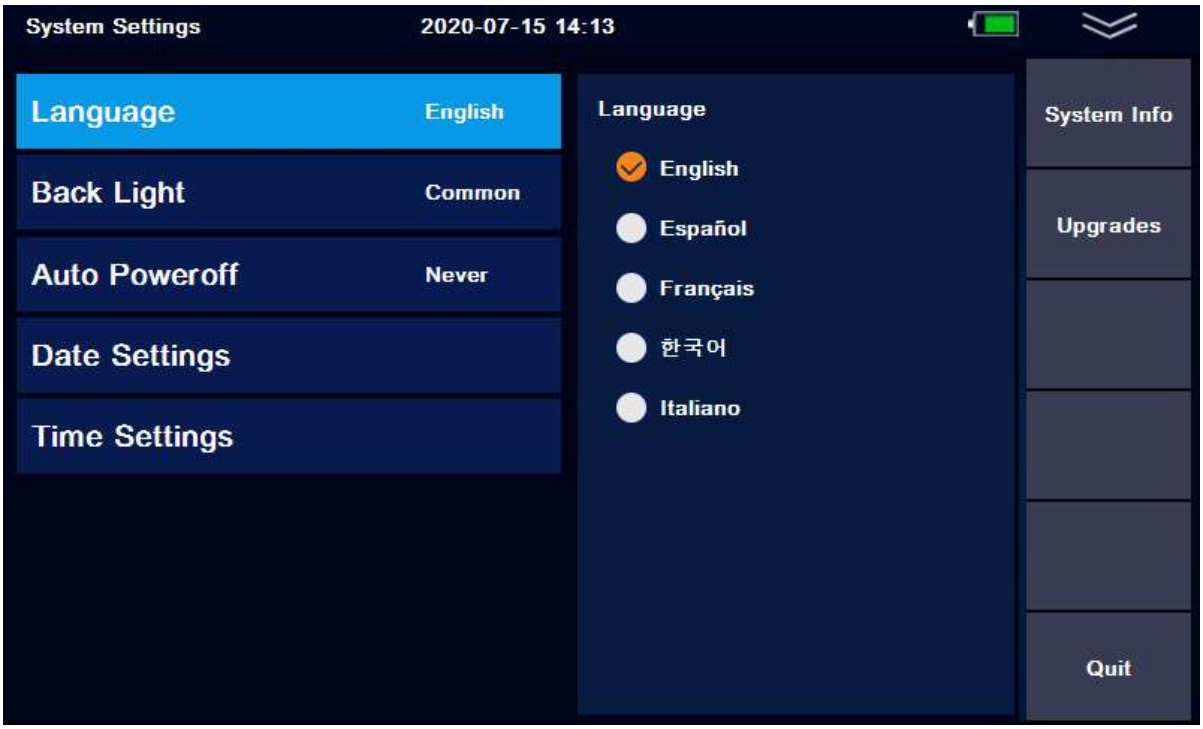
Technical Specifications:

Measuring range	100m, 500m, 2km, 5km, 10km, 20km, 40km, 60km, 100km
Sampling resolution	Minimum: 0.2m
The sampling point	64,000 point
linearity	≤0.05dB/dB
Loss threshold	0.01dB
Loss resolution	0.001dB
Range resolution	0.01m
Range accuracy	±(0.5m+Range×3×10^{-5}+Sampling resolution) （Excluding refractive index error）
Memory	>80,000
VFL	10mW,CW/2Hz
Data interface	2.0 USB（Type A×1,Micro usb×1), SD card
Screen	4.3-inch TFT-LCD (Standard distribution capacity touch screen)
Battery	3.7V/5200mAh
Temperature	Working temperature:-10C~+55℃ Storage temperature:-20℃~+80℃
Humidity	≤95%（No condensation）
Size/Weight	6.9” x 4.1” x 1.8” / 1.25 lbs. 20 Oz.（Contain the battery）
Attachment	Power adapter, lithium battery, FC adaptor, USB cable, quick guide, portable package
OPM	Type A:-10dBm~-70dBm;Type B:+26dBm~-50dBm
Laser source	The output power:-4~-10dBm±2dB,Modulation Frequency: CW/270Hz/1KHz/2KHz
Network Cable test	Support network wire sequence testing and wire alignment

User guide

No	Name	Describe
I	**Optical interface**	OTDR, Visual Fault Locator, Power meter, Light source
II	**Electrical interface**	Charging port, Micro USB, USB 2.0（Type A）,SD card, RJ45, LED
III	**Keys**	【M】:Manual testing 【A】:Auto testing ▲ ▼ ◀ ▶ OK(select): Directional navigation keys, Escape(ESC), SETUP: Enter the setting test parameters

1. System settings:



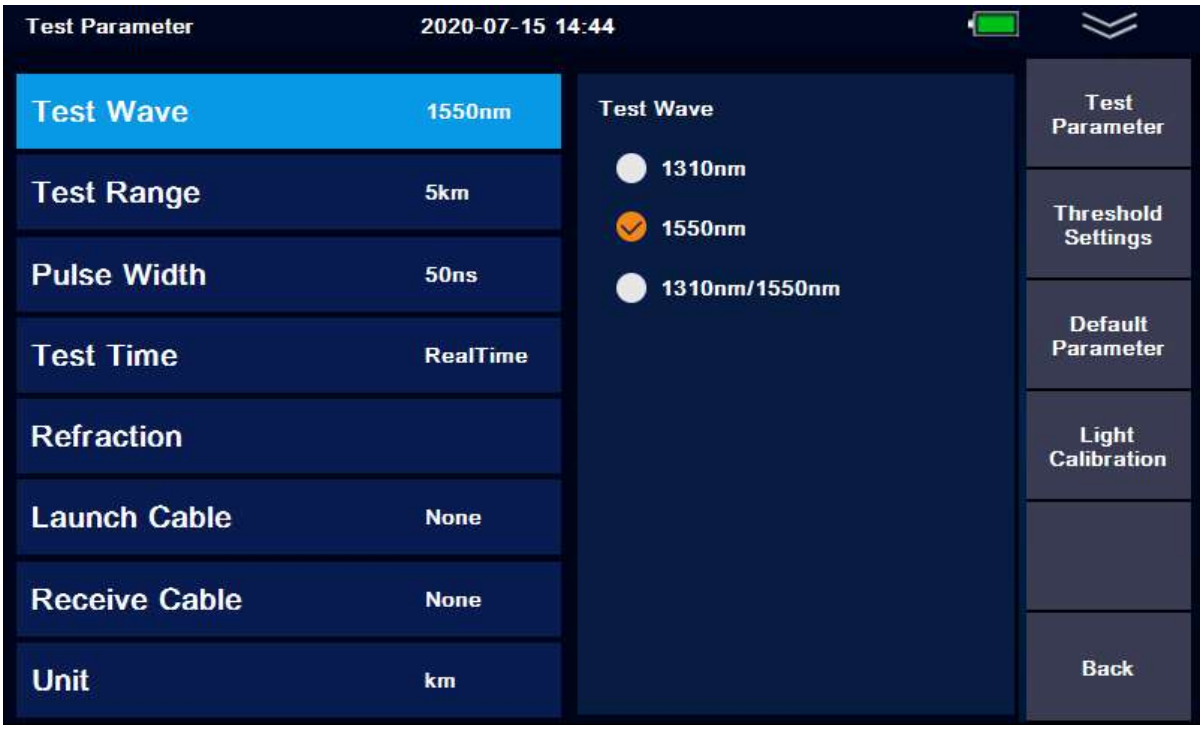
Press [Setting] icon in the interface of the main menu to enter the system settings menu, and the following settings can be edited:

- **Language selection**
- **Backlight adjustment**
- **Automatic shutdown**
- **Date Settings**
- **Time Setting**
- **Touch screen calibrate**
- **Upgrades**
- **System information（Series no, Instrument model, Hardware and software version number）**

2. OTDR Function Application

2.1 Setting

Under the main interface of the OTDR, press the [Parameter Settings] button to quickly enter the Test Parameter menu:



“Test parameter” Menu

2.1.1 Test Parameter

❖ **Wavelength:** 1310nm, 1550nm.

❖ **Measuring range:**

-AUTO mode: The device will automatically set the most appropriate parameters for the current measurement including the measurement range and pulse width. Auto selected values cannot be modified in this setting.

-Manual mode: The range and pulse width can both be set manually.

❖ **Pulse Width:** Pulse width refers to the time width of emitting laser signal during measurement. The wider the pulse width is, the stronger the optical power injected into the fiber, the stronger the backscattering signal of the fiber, and the farther the OTDR can effectively detect, but a wide pulse width will cause saturation of the initial reflection signal, resulting in larger deadzone. Therefore, the selection of pulse width is related to the measurement of fiber length. The longer the length is, the wider the pulse width. It can not be modified in the automatic measurement mode, which defaults to "automatic configuration".

- **Measuring time:** In the mean measurement mode, the longer the detection time is, the better the signal-to-noise ratio is improved, and technician receives more accurate the test results. The user should reasonably select the detection time, which is proportional to the dynamic measurement.

- **Resolution:** High resolution will have more sampling points and higher accuracy, but it will also increase time of test due to amount of data collected.

- **Refractive index:** Is the essential characteristics of optical fiber, different manufacturers of optical fiber have slightly different refractive index which is the key parameter to calculate the distance, this value cannot be arbitrarily set.

- **Unit**: Kilometer/Kilofeet/Miles.

OTDR will automatically select the most appropriate reference pulse width when manual measurement range is set in automatic mode.
The range and pulse width can be adjusted manually in manual mode. The following list is for reference only:

Range / Pulse Width	100m	500m	2km	5km	10km	20km	40km	60km	100km
5ns	√	√	√	△	△	△	△	△	△
10ns	√	√	√	√	△	△	△	△	△
20ns	√	√	√	√	√	△	△	△	△
50ns	√	√	√	√	√	√	△	△	△
100ns	△	√	√	√	√	√	△	△	△
200ns	△	△	√	√	√	√	√	△	△
500ns	△	△	△	√	√	√	√	√	√
1us	△	△	△	△	√	√	√	√	√
2us	△	△	△	△	△	√	√	√	√
5us	△	△	△	△	△	△	√	√	√
10us	△	△	△	△	△	△	△	√	√

2.1.2 OTDR Parameter Settings

Various event measurement thresholds, including attenuation/reflection/slope/optical fiber end refractive index and scattering coefficient settings.

The refractive index is selected by the user and changing the refractive index setting will change the ranging result. The refractive index is provided by the fiber optic cable or fiber optic manufacturer. Users are advised to calibrate the group refractive index with a known length of fiber and remember it.

The scattering coefficient is usually obtained from the fiber optic cable manufacturer.

2.1.3 Restore the default

Restore to factory default Settings.

2.2 OTDR

On the OTDR panel is where test data will be displayed on the graph and event table below it. The following is the meaning of each label in the OTDR interface:

- **Cursor A**
  Allows the user to have control of the “A” Cursor. Selecting it a second time allows the user to have control of cursor “B”
- **Curve /Trace operation**
  Trace manipulation sub-menu, including: cursor, zoom and trace translation.

- **File operations**
  File operation submenu, including: open file, save file, multi trace operation and save file.

- **Event analysis**
  Trace analysis sub-menu, including: cursor, trace zoom, event list view, add and delete events

- **More (multi-trace operation and event analysis function description)**

-Add event : The event list is added accordingly.
-Delete events: The event list will delete the event accordingly.
-**Clear choice:** When multi-trace line loads, clear the selected trace and event list.
-Remove other: When multi-trace lines are loaded, clear the list of traces and events other than the selected trace.
-Clear all: Clear all measurement traces and event lists in the current measurement interface

REAL TIME MODE:

Parameter settings->Test time->Average mode press【REAL/AVG】key enter the real-time measurement mode. The current circuit is measured in real time and the measurement parameters cannot be modified in the measurement mode. If the parameters need to be modified, the test needs to be stopped first. Event analysis will not be conducted during the real-time test, and event analysis will only be conducted after the test is stopped.

REAL TIME MODE

Average mode

Parameter settings/Test time/XX seconds Press【REAL/AVG】key enter the real-time measurement mode, The trace (or sometimes referred to as “Curve”) consisting of the average values measured over a period of time can be displayed. The length of time can be edited in the "measurement time" option in [SETUP].

Average mode

When the measurement is finished, the measurement result will be automatically saved.
Under no circumstances shall the optical interface and the end of the tail fiber connected to the optical interface be directed to the eye of the operator or other person. Otherwise, the eyesight of the irradiated person can be damaged.

2.3 File storage

Press [FILE] to view and edit stored files

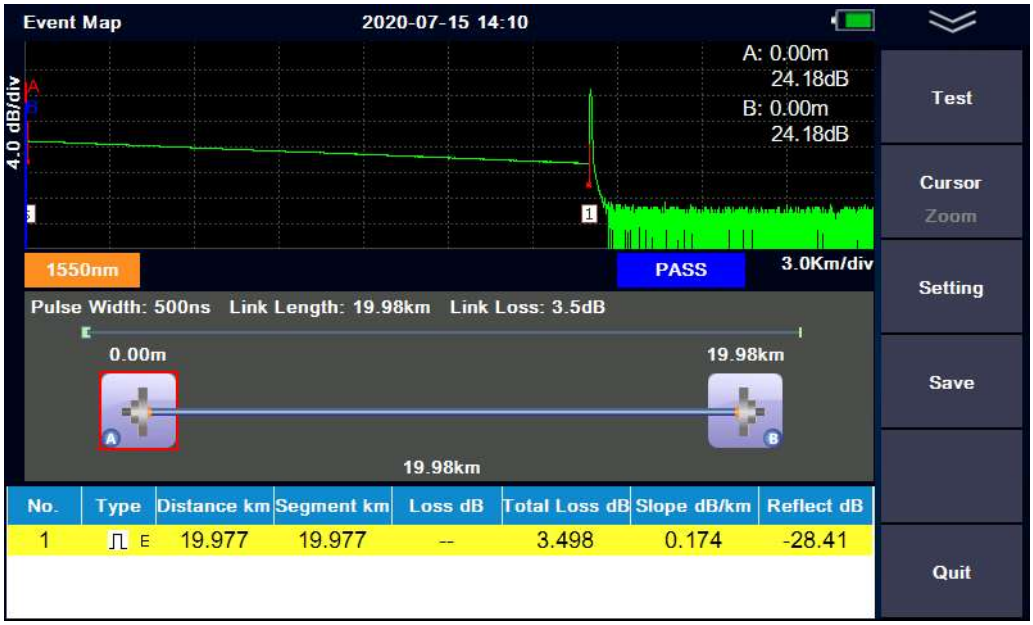
File operation

The menu provides a complete file storage call out function. The results of each measurement are automatically saved to internal storage (configurable) and marked with time, date, serial number and other information for easy reference. Users can name, number, comment on each measurement trace, and generate complete reports through the reporting attached software which is included on the SD memory card to be used on a PC. For more information on the PC (computer) software, go to page 14.

2.4 Graphical Event Map

Graphical event maps can be used to assist in viewing and troubleshooting fiber links for new technicians. The event map translates the connection of the whole fiber link directly into the physical schematic diagram, such as fusion splice connection, connector pair connection, optical splitter, launch and receive fibers and macro-bends.

Some analysis parameters need to be set before using graphical event map measurements (the OTDR has default classical values, if the user is not familiar with the link analysis parameters, it is recommended to use the default values directly).



Event map

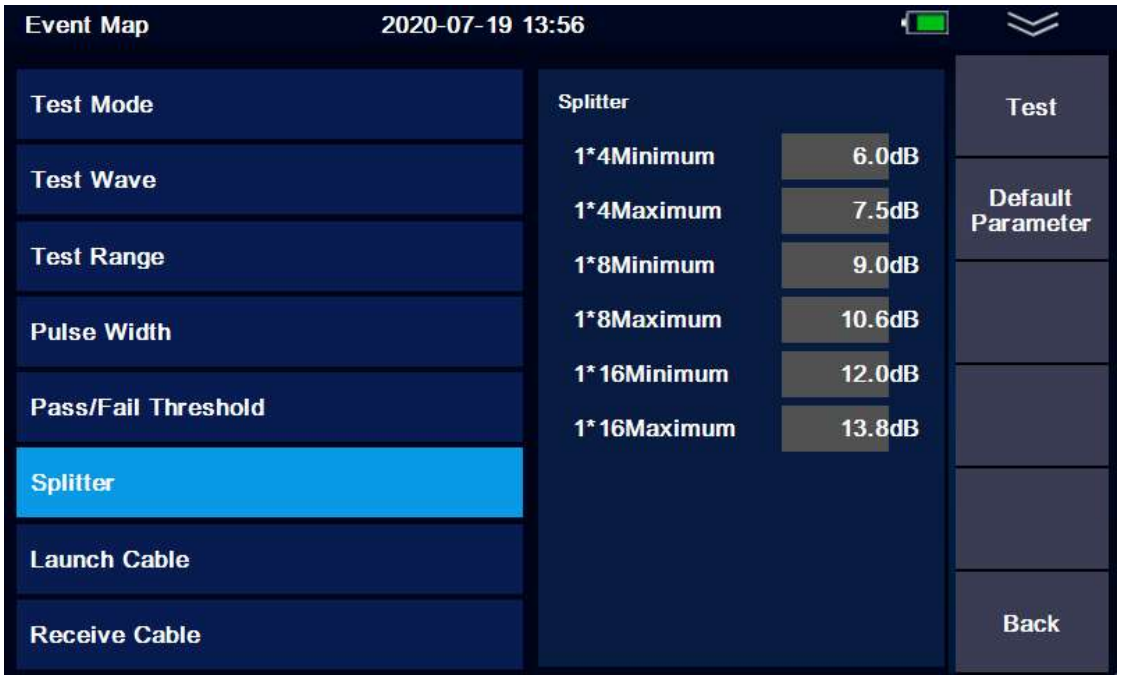
2.4.1 Pass/Fail Threshold

The pass/fail threshold parameter is used to judge whether the splice junction and connector pair connection point are within the qualified range or exceed the threshold parameter. The schematic diagram shows red, is values exceed threshold parameter, or green if the values are acceptable within parameters.

The threshold parameter

2.4.2 Splitter loss Settings

In a PON network there is usually 1 x N splitters, but the loss of each splitter may be different. Therefore it is necessary to limit the loss value of the splitter. If the value range is set incorrectly, the accuracy of the event map will be affected.



Splitter loss Settings

2.5 Computer softwaree

If the user needs to carry out multi-trace comparison, other further analysis functions or remote operation, the measurement data stored in the device after measurement can also be printed by the software.
(For detailed operation of desktop computer software, please refer to the operation manual of desktop computer software)
Note: the software installation package and software operation instructions are stored in the SD card of the device. Relevant files can be imported into the computer through the MINI USB cable.

OTDR Test Report

2020-03-31 17:45:36

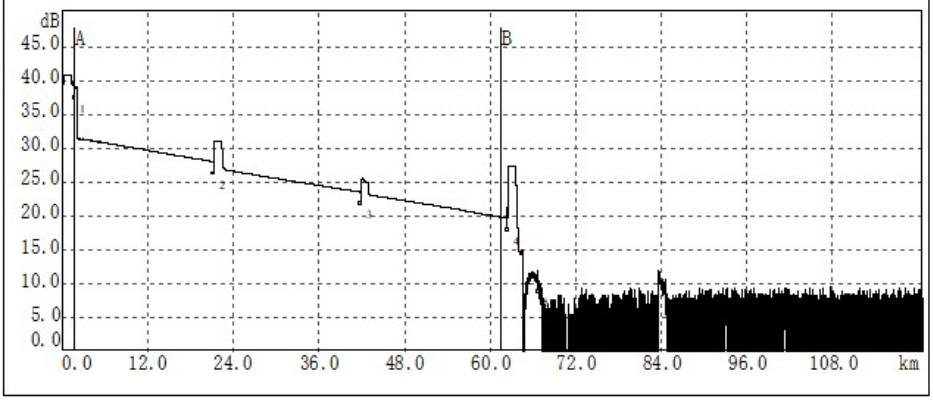
Task

Filename: iLOM-1550-10us-0009.sor Measurement date: 2020-02-21 12:17:18
Operator:

Configuration

Wave length	: 1550nm	Test range	: 120 km	Pulse width	: 10us
Average time	: 10s	Backscattering(dB)	: 81.0	Attenu threshold(dB)	: Auto
Reflex threshold(dB)	: Auto	Terminal threshold	: Auto	Refractive index	: 1.469
Cable Id	:	Fiber Id	:		

Trace



Fiber link information

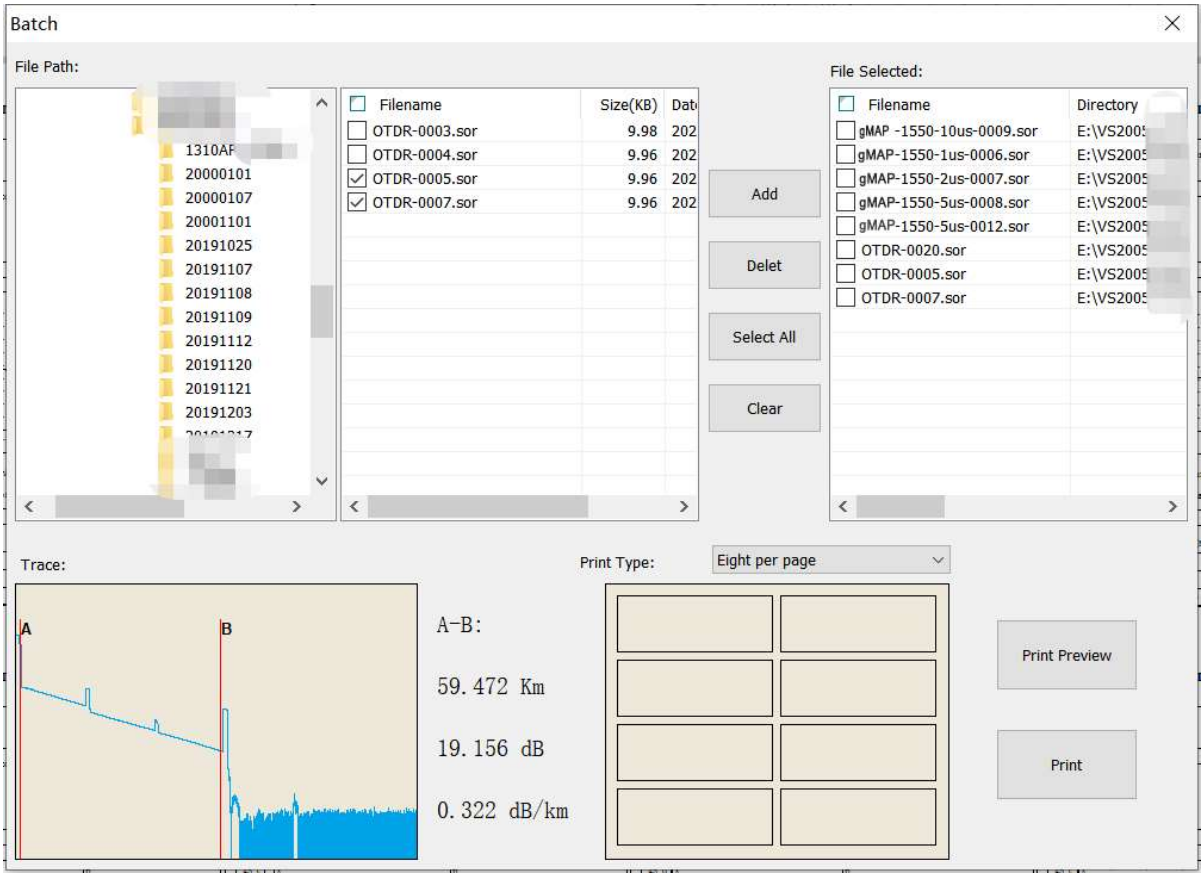
Length(A-B): 59.472 Km Total Loss(A-B): 19.156 dB Average Loss(A-B): 0.322 dB/km

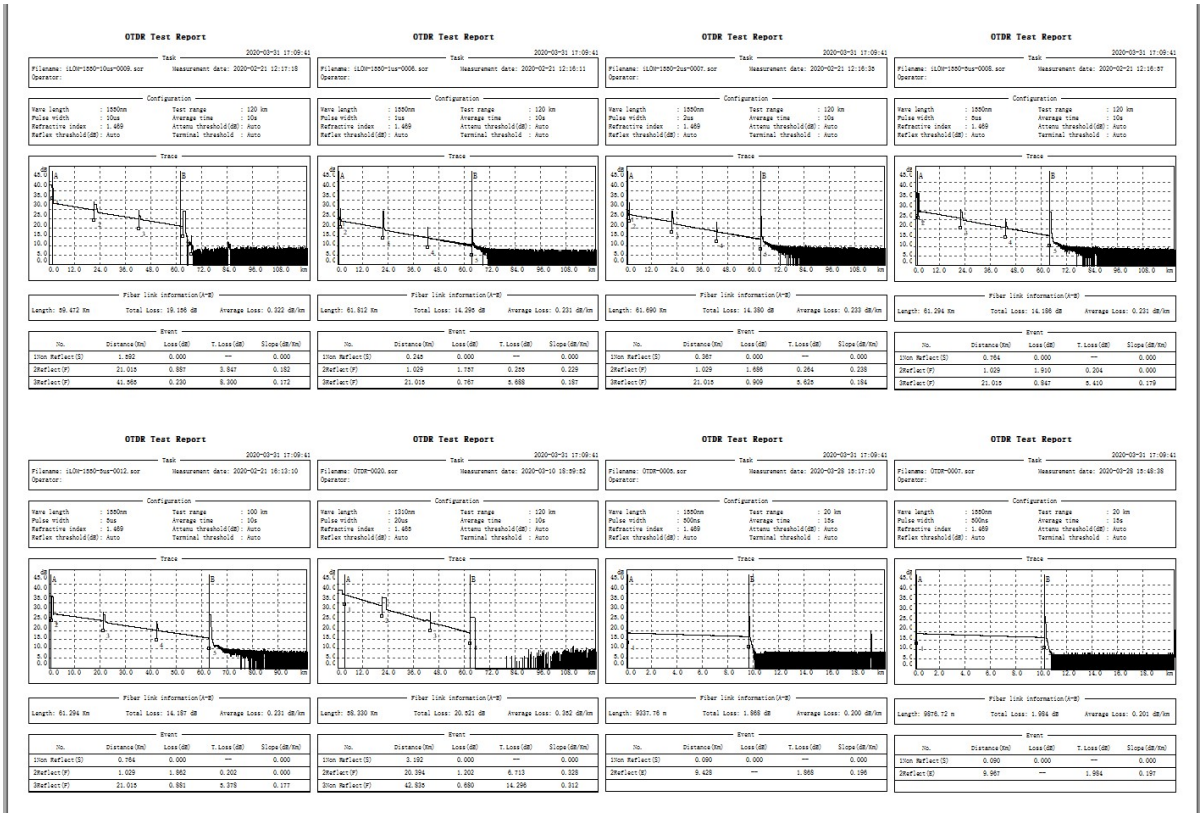
Event

No.	Distance(Km)	Segment(Km)	Loss(dB)	T.Loss(dB)	Slope(dB/Km)	Reflect(dB)
1Non Reflect(S)	1.592	0.000	0.000	--	0.000	--
2Reflect(F)	21.015	19.423	0.887	3.847	0.182	-14.088
3Reflect(F)	41.565	20.550	0.230	8.300	0.172	-14.088
4Reflect(F)	62.057	20.492	8.791	12.128	0.178	-14.088
5Non Reflect(E)	66.316	4.259	--	21.255	0.208	--

Batch printing:

You can set the A/B cursor of each picture arbitrarily, A/B cursor information will be printed on the report.A/B cursor is located at the start and end events by default.


Batch
File Path:
1310AF
20000101
20000107
20001101
20191025
20191107
20191108
20191109
20191112
20191120
20191121
20191203
Filename
Size(KB)
Dat
OTDR-0003.sor
9.98
202
OTDR-0004.sor
9.96
202
OTDR-0005.sor
9.96
202
OTDR-0007.sor
9.96
202
Add
Delet
Select All
Clear
File Selected:
Filename
Directory
gMAP -1550-10us-0009.sor
E:\VS200
gMAP-1550-1us-0006.sor
E:\VS200
gMAP-1550-2us-0007.sor
E:\VS200
gMAP-1550-5us-0008.sor
E:\VS200
gMAP-1550-5us-0012.sor
E:\VS200
OTDR-0020.sor
E:\VS200
OTDR-0005.sor
E:\VS200
OTDR-0007.sor
E:\VS200
Trace:
A
B
A-B:
59.472 Km
19.156 dB
0.322 dB/km
Print Type:
Eight per page
Print Preview
Print


OTDR Test Report
OTDR Test Report
OTDR Test Report
OTDR Test Report
OTDR Test Report
OTDR Test Report
OTDR Test Report
OTDR Test Report

3. Other Features:

3.1 Visual Fault Locator (VFL)

VFL module（650nm）

VFL module

VFL module has two emission modes:

CW MODE: In this mode a continuous stream of visible red light is emitted.
2Hz MODE: In this mode, visible red light flashes at a frequency of 2Hz.

Press [Shutdown], [Quit] or [ESC] to turn off the VFL

When using the VFL module, do not aim the emitting laser at person's eyes, it may cause irreversible damage.

3.2 Optical Power Meter (OPM)

Unit: dB, dBm, uW or mW

OPM module

Start/Shutdown
Turn on and off optical power meter function.

Wavelength switching:
Press the "λ switch" TAB to switch the current wavelength.

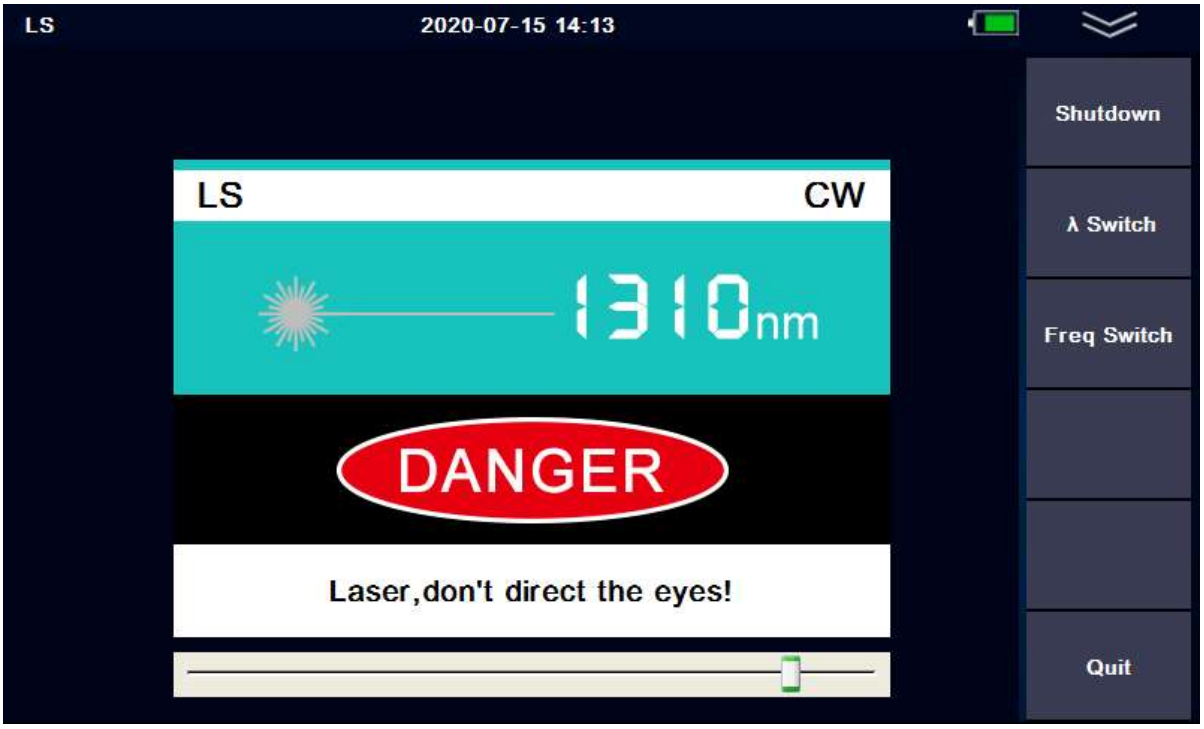
Set as the reference value:
Press the "REF" TAB to set the current value to the optical power meter reference.

Clear zero:
Press the “Zero” TAB to restore the reference value set.

Frequency:
The power meter has a frequency identification function and can identify 270Hz / 1kHz / 2kHz.

3.3 Laser source module

The light source module and OTDR use the same optical port.



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Light source module

Start/Shutdown

Turn on or Turn off the light source module.

Wavelength Switch

Press“λ Switch”to change wavelength.

Frequency switching

Press the "frequency switch" TAB to switch the output frequency of the laser: Continuous Wave (CW)/270Hz/1kHz/2kHz

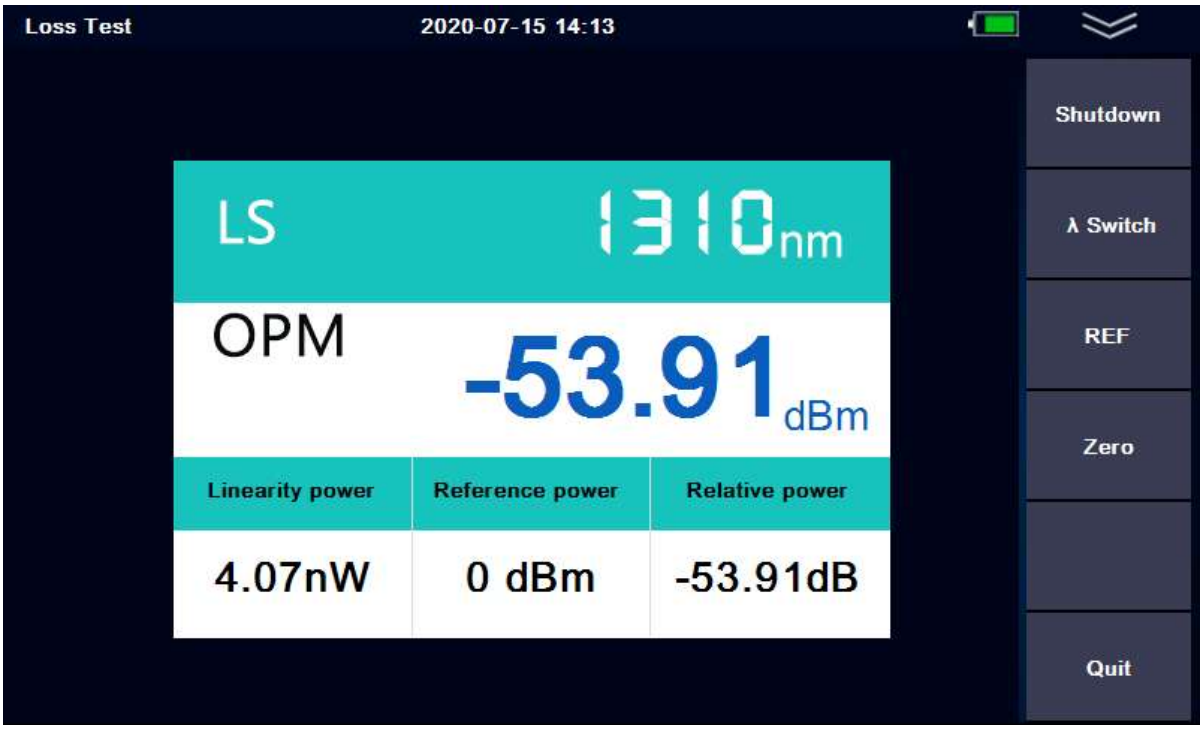
Description of function and index of light source

1）The output power of the laser:-4dBm~-10dBm ± 2dB

2）Optimize laser stability time: 3 minutes

3.4 Optical Loss Test Set

When the unit is installed with both the stable light source and the optical power meter, the loss test set module will be automatically activated.



Optical Loss Test Set Module Interface

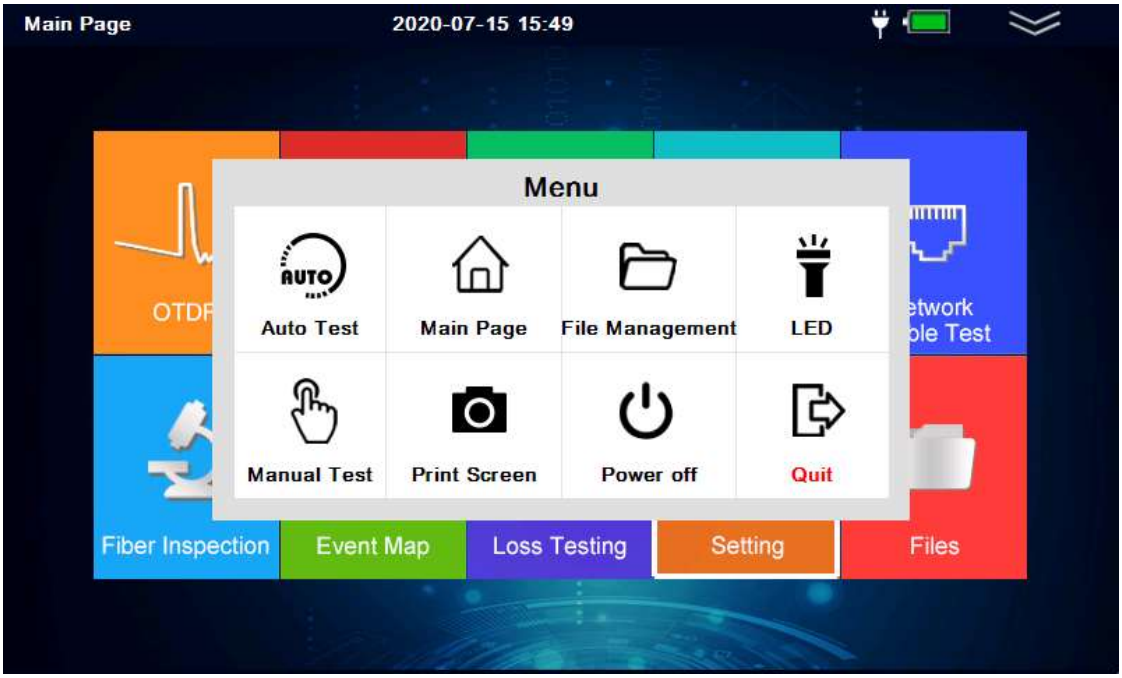
Start/stop: Turn on and off the loss test set module.
λ Switch: Press the "**λ Switch**" TAB to switch the current wavelength.
REF: Set the reference value. Use this to get ready to test for dB loss
Zero: Restore the set reference value. Use this to reset your reference value for a new test

3.5 LED Flashlight

The instrument is equipped with a LED, which is convenient for users to operate in dark areas.

Operation method 1: In the start-up state, short press the "power key", you can turn the flashlight on and off.

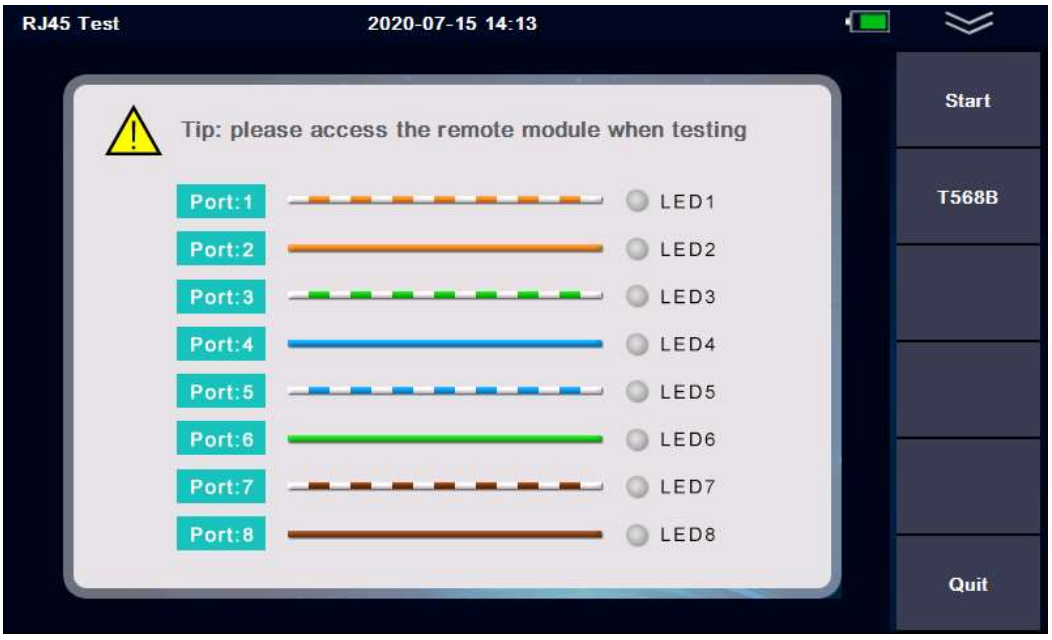
Operation method 2: In the startup state, there is a “LED” switch button in the pull-down dialog box in the operation menu in the upper right corner to activate the flashlight switch.



MENU

3.6 Network Cable Test module

This module is used for the line sequence test and line alignment test of RJ45 standard network cable. It can check whether the network cable is connected and whether the line sequence is correct, which is convenient for terminal installation and maintenance technicians to analyze the network link condition. The module must match a cable test terminal. There are two test modes: T568A and T568B



Network Cable Test

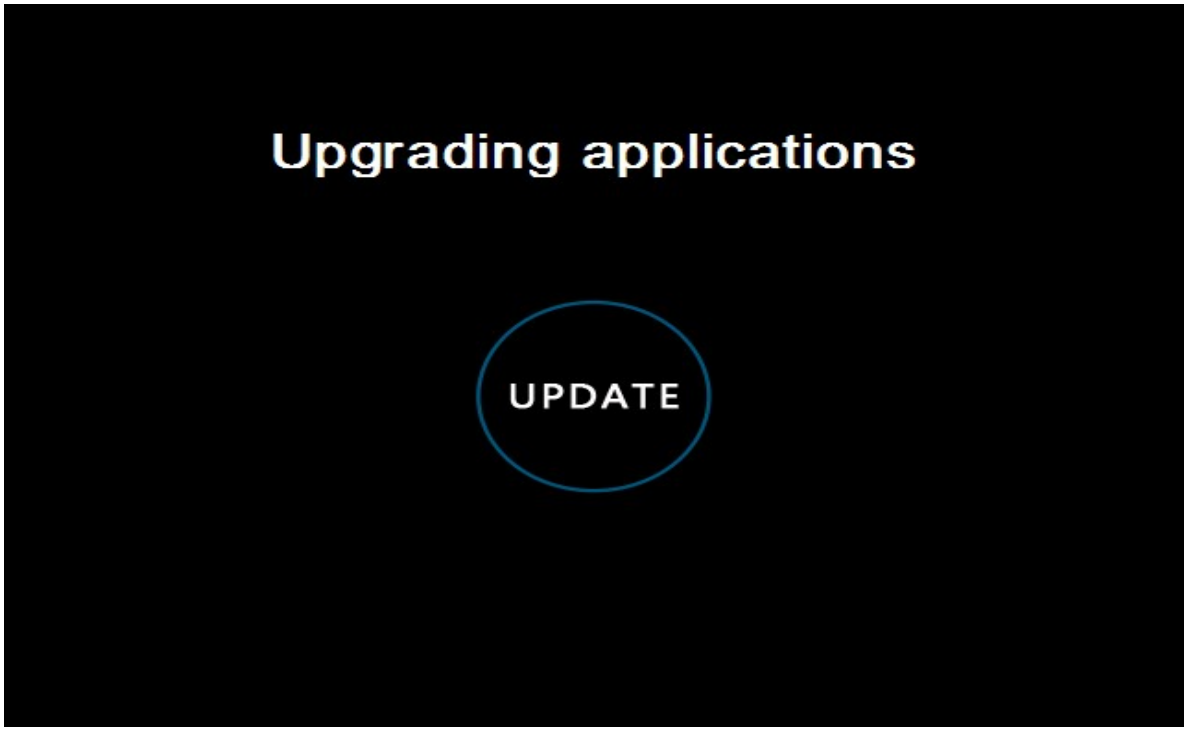
4. Software upgrade

Firmware updates are made by plugging a USB drive into the USB port (the upgrade software must be in the root directory).

Steps:

1） Place the software upgrade package in the root directory of your USB flash drive.
2） Turn on the instrument and insert the USB disk into the USB port of the instrument.
3） The main interface-->System Settings-->Software upgrade
4） After entering the upgrade interface, the upgrade will be completed automatically

****Important Note****: during the upgrade, **please do not turn off the power or unplug the USB drive**. These illegal operations may cause system software damage and the OTDR will not start normally. Once this happens, user will have to contact FIS for system repair.



5. Instrument maintenance and trouble shooting

5.1 Cleaning of fiber connectors

The optical output interface of this series of fiber optic comprehensive tester is a universal replaceable interface. In case the instrument fails to test normally, or the test result is not accurate, consider cleaning the interface connector first.
When cleaning, be sure to do it when the OTDR function and visual red light fault location function are turned off. Unscrew the output port and wipe the end face with a woven lint free clean wipe moistened with alcohol, then follow with a dry clean woven lint free wipe. Or utilize ferrule rotating end face cleaner for a strictly dry clean procedure.
After cleaning, cover the port with dust cap until next use of the instrument and always keep it clean.

5.2 Instrument screen cleaning

The display of this series of OTDR is a 4.3-inch TFT color LCD with touch screen. Do not touch the LCD screen with sharp objects when using, if so the LCD screen may be damaged. When cleaning, wipe the LCD screen with a soft woven cloth. Do not use organic solvent to wipe the LCD screen as it may cause damage.

5.3 Calibration

It is recommended to calibrate the OTDR every 12 months. For calibration, please contact Fiber Instrument Sales Inc. Phone: 800-500-0347 or 315-736-2206.

Trouble Description	Cause	Solution
The OTDR does not start properly	Battery dead	Charge the battery and observe the charging indicator light. If the light is red, continue charging. Trouble persists, contact FIS.
The OTDR cannot be charged properly	The environment doesn't' meet the charging condition	Charge the instrument at -10℃ (14F)- 50℃(131F)
	Battery problems, or internal circuit problems	Contact the FIS to replace the battery
User can't measure a normal trace	Instrument parameters are not set correctly	Reset the correct test parameters
	The output connector of the optical fiber is dirty or contaminated	Clean the OTDR connector port.
	OTDR laser output connector or port is damaged	Utilize video scope to view or return to FIS.
	The optical output connector does not match	Replace with matching fiber connector port
Test trace spike is big, Unsmoothness of waveform	The output interface is not properly connected	Reconnect the appropriate output interface
	Use a smaller pulse width	Switch to a larger pulse width
Saturation (flat top) appears at the front of the test trace	Pulse width setting is too large	Use a smaller pulse width
At the beginning of the test trace, the reflection peak drops slowly and the tail drags	The output end of the optical fiber is contaminated	Clean the connector's interface
	OTDR light output connector damaged	Replace the output connector
	The optical output connector does not match	Replace with matching fiber connector
The reflection peak at the end of the fiber cannot be measured	The range setting is too small	Increase the test range value
	pulse width setting is to small	Increase the pulse width parameter
False positives in trace analysis	The threshold of poor quality event of test trace is set to be too small	Increase the test pulse width parameter and increase the event threshold value
The measured fiber length is not accurate	Instrument parameters are not set correctly	Reset the appropriate parameters
	Optical fiber refractive index setting is not accurate	Reset the refractive index of the fiber
The measured fiber average loss value is not accurate	The front end of the test trace is too long	Clean the connector's interface
	The cursor position is not set properly	Reset the cursor position

6. Common faults and troubleshooting methods

Above troubleshooting items are for reference only. During the use of the Atlas Mini OTDR, if there are any questions, contact Fiber Instrument Sales. Users are strictly prohibited to dismantle OTDR in effort to repair, by doing so will result in void warranty and additional cost for repair.