
**User's
Manual**

**AQ1200A/AQ1200B/AQ1200C/
AQ1200E/AQ1205A/AQ1205E/
AQ1205F
OTDR Multi Field Tester**

Thank you for purchasing the AQ1200A/AQ1200B/AQ1200C/AQ1200E/AQ1205A/AQ1205E/AQ1205F OTDR (Optical Time Domain Reflectometer) Multi Field Tester. This user's manual explains the features, operating procedures, and handling precautions of the AQ1200x/AQ1205x. To ensure correct use, please read this manual thoroughly before operation. Keep this manual in a safe place for quick reference in the event that a question arises. This manual is one of three AQ1200x/AQ1205x manuals. Please read all the manuals.

List of Manuals

Manual Title	Manual No.	Description
AQ1200A/AQ1200B/AQ1200C/AQ1200E/ AQ1205A/AQ1205E/AQ1205F OTDR Multi Field Tester Operation Guide	IM AQ1200-02EN	This guide focuses on the handling precautions, basic operations, and specifications of the AQ1200x/AQ1205x.
AQ1200A/AQ1200B/AQ1200C/AQ1200E/ AQ1205A/AQ1205E/AQ1205F OTDR Multi Field Tester User's Manual (included in CD)	IM AQ1200-01EN	This manual. Explains all AQ1200x/AQ1205x features, except for the communication features, and how to use them.
AQ1200A/AQ1200B/AQ1200C/AQ1200E/ AQ1205A/AQ1205E/AQ1205F OTDR Multi Field Tester Communication Interface User's Manual (included in CD)	IM AQ1200-17EN	Explains the features related to using communication commands to control the AQ1200x/AQ1205x.
Battery Pack (MFT) Handling Precautions	IM 739882-01EN	This document explains the handling precautions of the battery pack.
AQ1200A/AQ1200B/AQ1200C/AQ1200E/ AQ1205A/AQ1205E/AQ1205F OTDR User's Manual	IM AQ1200-92Z1	A document for China.

The "-EN" in the manual number is the language code.

Contact information of Yokogawa offices worldwide is provided on the following sheet.

Document No.	Description
PIM 113-01Z2	List of worldwide contacts

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functionality. The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
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Conventions Used in This Manual

Notes

The notes and cautions in this manual are categorized using the following symbols.



Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING

Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION

Calls attention to actions or conditions that could cause light injury to the user or cause damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

French

AVERTISSEMENT

Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.

ATTENTION

Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.

Note

Calls attention to information that is important for proper operation of the instrument.

Symbols and Conventions Used in Procedural Explanations

The contents of the procedural explanations are indicated using the following symbols.

Procedure

Carry out the procedure according to the step numbers. All procedures are written under the assumption that you are starting operation at the beginning of the procedure, so you may not need to carry out all the steps in a procedure when you are changing the settings.

Explanation

This section describes the setup items and the limitations regarding the procedures. It may not give a detailed explanation of the feature. For a detailed explanation of the feature, see chapter 2.

Character Notations

Hard Key Names and Soft Key Names in Bold Characters

Indicate panel keys that are used in the procedure and soft keys and menu items that appear on the screen.

Unit

k Denotes 1000. Example: 12 kg, 100 kHz

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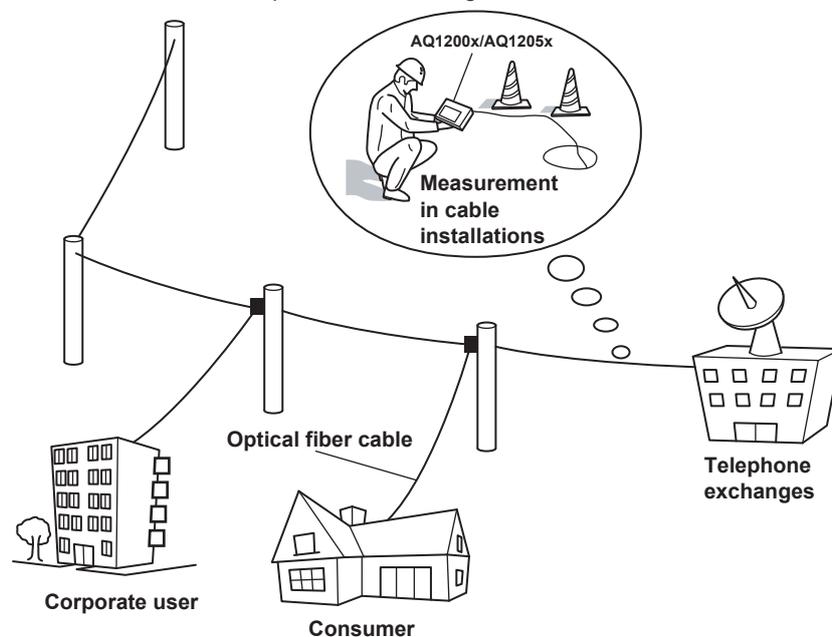
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1.1 Overview

This instrument is an OTDR (Optical Time Domain Reflectometer) with the features listed below. It is used in the optical fiber and line installation and maintenance servicing of access networks, which link telephone exchanges and service providers with subscribers, and user networks, which enable communication within a corporation or building.



OTDR Features

- Optical pulse measurement
 - Real-time, averaged measurement
- Waveform display
 - Can be zoomed and moved
- Waveform analysis
 - Cursor/marker, distance, splice-loss, return-loss measurement
 - Multi trace analysis
 - 2 way trace analysis
 - Differential trace
 - Section analysis
- Event analysis
 - Event editing
 - Event list editing

Loss Testing (/SLT or /HLT option)

- Loss-measurement light source and visible light source
- Optical power meter
- Loss measurement (loss testing)
- Multi-core loss testing

Visible light source (/VLS option)

Generation of visible light

Fault Locator

Location of breaks (faults) in optical fibers

Checking Fiber End Faces

You can use a fiber inspection probe* to photograph a fiber end face and display its state on the screen.

* For information about compatible fiber inspection probes, contact your nearest YOKOGAWA dealer.

IP Testing (/LAN option)

Simple connection testing that uses PING

PON power meter (/PPM option)

Simultaneous measurement of the optical power of different signal wavelengths (1310 nm, 1490 nm, and 1550 nm) of a PON system

Multi-Core Fiber Measurement

Using screens and menus specific to multi-core fiber measurement, you can efficiently and completely measure multi-core fibers.

Optical power meter (/SPM option)

Loss-measurement power meter

* This features covers firmware versions 3.01 or later of the AQ1200x/AQ1205x.

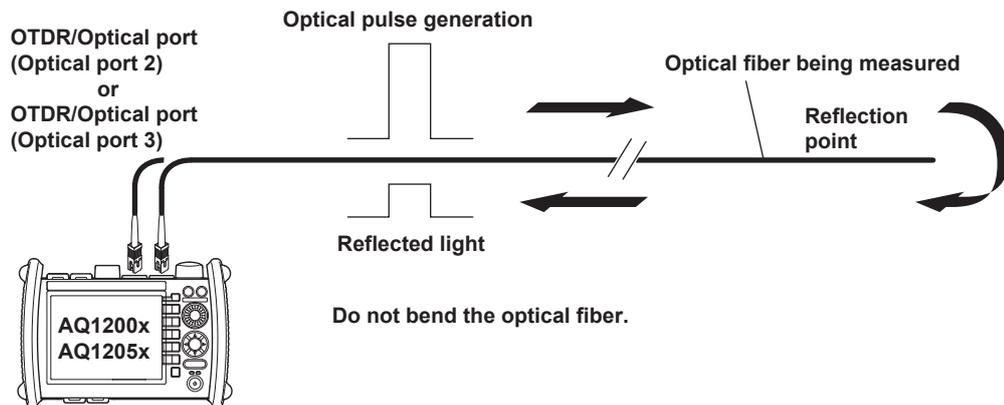
Light source (/SLS option)

Loss-measurement light source

* This features covers firmware versions 3.01 or later of the AQ1200x/AQ1205x.

1.2 Optical Pulse Measurement

The AQ1200x/AQ1205x applies an incident optical pulse to the connected optical fiber and measures the power level of the reflected light from the different sections of the optical fiber such as its splices, bent sections, and the open end of the fiber. The AQ1200x/AQ1205x uses the measured power level to determine the distance to the different points (splices, breaks, etc.) of the optical fiber and the loss and other phenomena that occur at those points.



Measurement Mode

The following three measurement modes are available depending on the items that you specify for measurement conditions.

Simple

In this mode, you can set the optical wavelength and turn the automatic saving of measured data on and off. All other measurement conditions are automatically configured or are fixed.

Detail

In this mode, you can set all measurement conditions.

Multi WL

In this mode, in addition to the settings that you can specify in Detail mode, you can select up to two optical wavelengths. The optical pulse whose wavelength you specified first is generated and measured. Next, the optical pulse whose wavelength you specified second is generated and measured. This operation is then repeated.

Analysis Mode

The following three analysis modes are available depending on the items that you specify for analysis conditions.

Simple

In this mode, you can set the approximation method. All other analysis conditions are automatically configured or are fixed.

Detail

In this mode, you can specify all analysis conditions.

Multi WL

In addition to the conditions in Detail mode, you can specify the index of refraction and the backscattering light level for each of the two wavelengths that you specified in the measurement Multi WL mode. You can also turn the macro bending (bending loss) display on and off.

Real-time Measurement

In real-time measurement, you can change measurement conditions such as the wavelength, distance range, and pulse width while waveform changes are being measured in real time.*

- * The measurement conditions that you can change vary depending on the measurement mode. For details about the measurement conditions, see the explanation of the measurement modes in chapter 3.

Averaged Measurement

When you want to detect reflections, splice loss, and other faint events that are generated from connections or splice points but are buried in noise, use averaged measurement. The AQ1200x/AQ1205x derives the measured data by averaging the specified number of optical pulse measurements or by averaging optical pulse measurements over the specified duration. During averaged measurement, you cannot change the measurement conditions. You can stop the averaged measurement before it completes.

Multi-Core Fiber Measurement

Using screens and setup menus specific to multi-core fiber measurement, you can efficiently and completely measure multi-core fibers.

Fiber-in-Use

Some models in the AQ1200x/AQ1205x use the same wavelength that is used in real communication to make measurements.

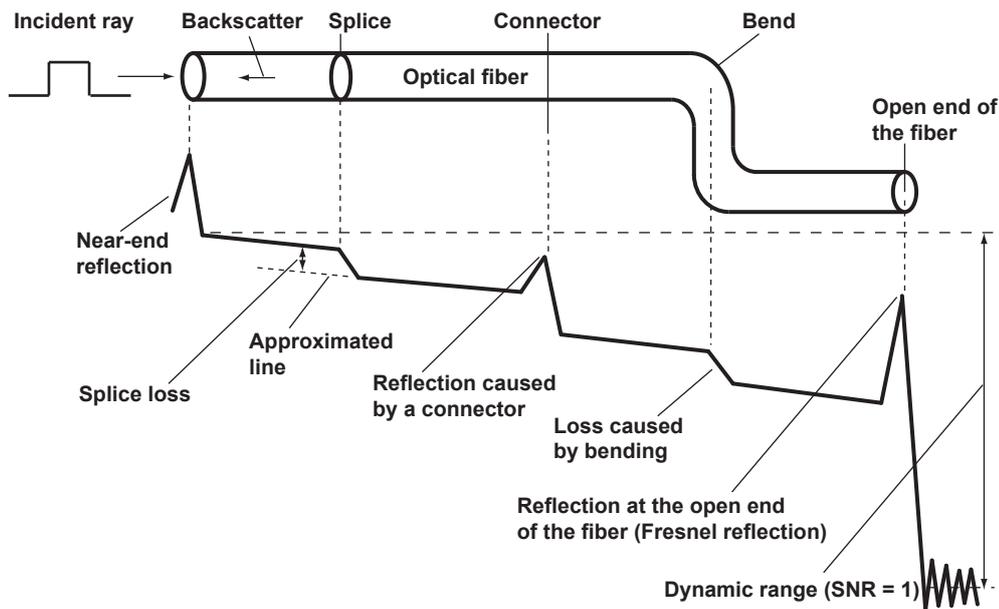
If communication light is present in the optical fiber that you want to measure (the fiber is in use), the communication will be affected. In this situation, the AQ1200x/AQ1205x will not be able to perform measurements correctly either. Take appropriate precautions to avoid communication interference. Check that there is no communication light present in the optical fiber before you use the AQ1200x/AQ1205x. The AQ1200x/AQ1205x has a feature for checking whether there is communication light (fiber-in-use alarm; see section 3.5).

1.3 Waveform Display

You can display the measured result as a waveform on the screen. You can zoom the displayed waveform and move the position that is displayed.

How to View Optical Pulse Waveforms

The optical pulse applied to the optical fiber is reflected at different points of the optical fiber such as its connections, bent sections, and the open end of the fiber. These sections generate loss. The measured result is displayed as a waveform that has distance represented in the horizontal direction and loss level represented in the vertical direction. On the waveform, detected points where loss or reflection occurs are known as events.



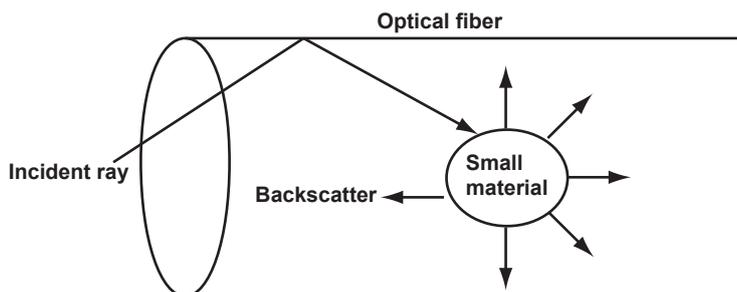
Near-end Reflection

This is the reflection that occurs at the point where the AQ1200x/AQ1205x and the optical fiber are connected. This also includes the AQ1200x/AQ1205x's internal reflection. In the section where this near-end reflection is detected, even if there are other connections, the loss and reflections that occur at these points cannot be detected. This section is the near-end dead zone.

When you are measuring a short distance, connect a dummy fiber to reduce the effect of the near-end reflection.

Backscatter

When light travels through an optical fiber, Rayleigh scattering caused by changes in the density of materials that are smaller than the light's wavelength and inconsistencies in the fiber's composition generates loss in the optical fiber itself. The portion of the scattered light that travels in the direction opposite to the direction of propagation is known as backscatter.

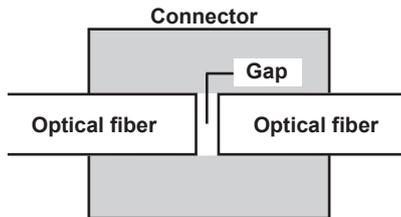


Splice Loss

Because spliced sections of optical fibers have a great number of changes in the material's density and inconsistencies in the fiber's composition, loss due to Rayleigh scattering becomes large, and splice loss occurs in these sections.

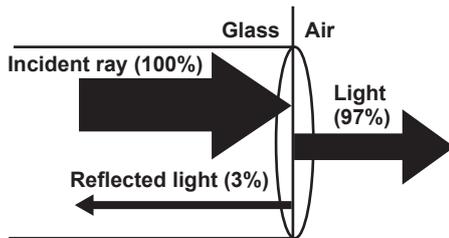
Reflection at the Connection Point of Connectors

Using a connector to connect two optical fibers is different from splicing them together in that a small gap remains between the two fibers. Because this gap has a different index of refraction, reflection occurs.



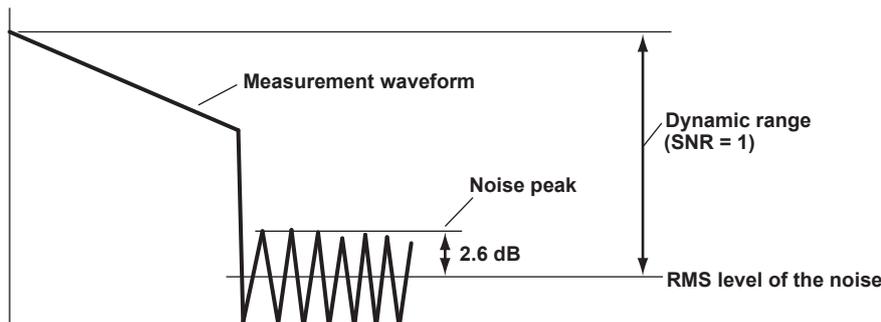
Fresnel Reflection at the Open End of the Fiber

This is the reflection that occurs at locations where the index of refraction changes (glass to air) such as where there are tears in the optical fiber or at the end of the optical fiber. When the optical fiber end face is vertical, approximately 3% of the incident optical power (-14.7 dB) is reflected.



Dynamic Range

Dynamic range refers to the range of optical power levels that can be measured. The larger the dynamic range, the greater the distance that optical pulses can be measured over.



Zooming the Waveform Display Scale

You can zoom the displayed waveform in the direction of the optical power level (vertically) or in the direction of the distance (horizontally). A rectangular frame that shows the zoom position is displayed on the overview screen that appears in the bottom right of the screen.

Moving the Waveform Display Position

You can move the displayed waveform in the direction of the optical power level (vertically) or in the direction of the distance (horizontally). A rectangular frame that shows the display position is displayed on the overview screen that appears in the bottom right of the screen. This is the same rectangular frame that shows the zoom position.

1.4 Waveform and Event Analysis

Waveform Analysis

You can use the cursor and markers to measure values such as the distance, splice loss, return loss, or reflection level between two points.

Measuring Distance

The AQ1200x/AQ1205x measures the time that it takes for an incident optical pulse to be reflected and return to the device. It uses this information and the following equation to calculate the distance (L).

$$L = C \times T / (2N) \text{ [m]}$$

C: The speed of light in a vacuum 2.99792×10^8 [m/s]

T: The time measured from when the incident pulse was generated to when the reflected light was received [s]

N: Index of refraction

In the above equation, the division by two accounts for the fact that the measured time represents the total time taken by the optical pulse to reach the reflection point and to return from it.

If the correct index of refraction is not specified, there will be errors in the distance measurement.

Setting the Index of Refraction

The AQ1200x/AQ1205x has preset indices of refraction that correspond to each wavelength. For details on the settings, see section 3.6. Contact the optical fiber manufacturer for the fiber's correct index of refraction.

Distance Range

You must select a distance range that is longer than the cable length of the optical fiber that you want to measure. As the distance becomes greater, the measurement time also increases. For details on the setting range, see section 3.5.

Pulse Width

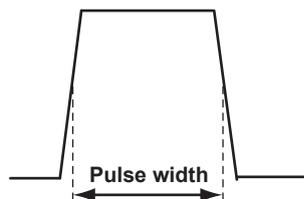
There are the following features depending on the length of the pulse width. The pulse width that you can select varies depending on the distance range that you have specified. For details on the settings, see section 3.5.

- **Short pulse width**

You can separate and measure adjacent events (reflection points and losses). However, you cannot measure long distances.

- **Long pulse width**

You can measure long distances. However, multiple adjacent events may be seen as one single event.



Dead Zone

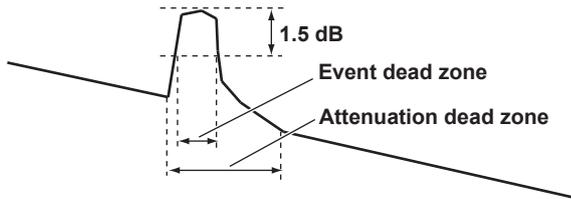
An area where the influence of a large event such as a connector's connection point makes it impossible to recognize other events that exist in that area is a dead zone. There are the following two types of dead zones.

- **Event dead zone**

An area where adjacent reflections cannot be separated. This is the area represented by the pulse width between the two points on the waveform at the level that is 1.5 dB below the peak value.

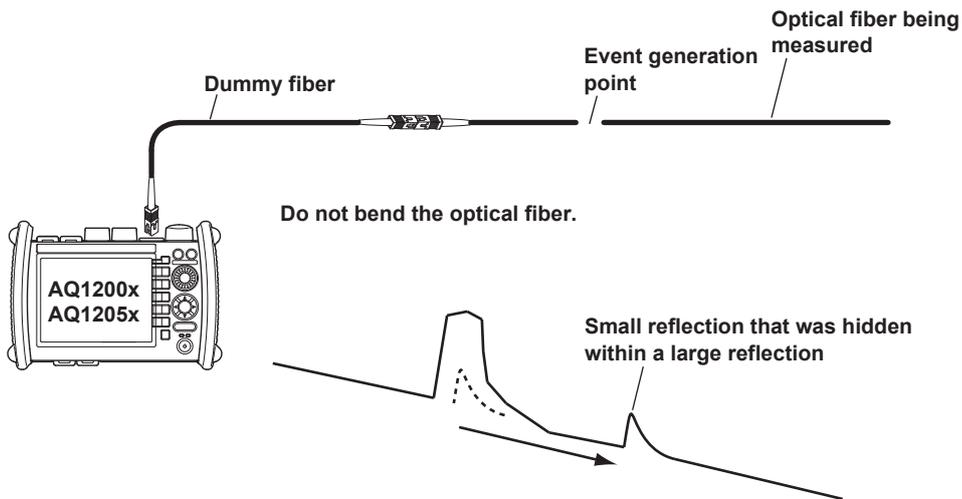
- **Attenuation dead zone**

An area where, because there is a large reflection, the surrounding splice losses cannot be measured.



Near-end Dead Zone Prevention

In sections where near-end reflection is detected, loss and reflections that occur at connections cannot be detected. If you are measuring a short distance, connect a dummy fiber to move events that are hidden in the near-end reflection the distance of the dummy fiber.

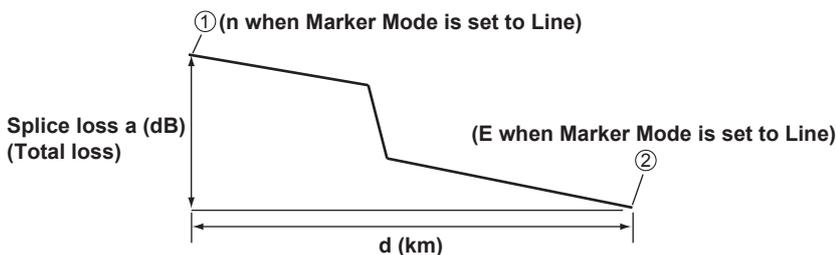


Splice Loss

The AQ1200x/AQ1205x measures the distance and the loss between the specified points.

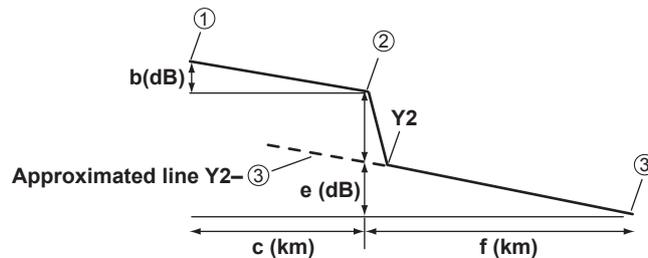
2 Point Markers

The AQ1200x/AQ1205x measures the distance and the loss between two points. If reflection is detected between the two points, the return loss is also measured. The splice loss value changes depending on the approximation method that you have specified. This can be used when Marker Mode is set to Marker or Line.



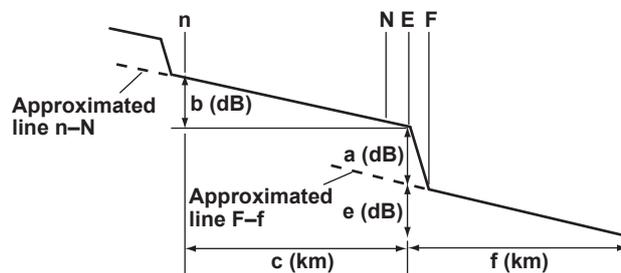
4 Point Markers

The AQ1200x/AQ1205x uses the following four points to perform the measurement: the measurement start point ①, the splice loss start point ②, the splice loss end point Y2, and the measurement end point ③. At position ②, the level difference between the approximated line ②–① and the approximated line Y2–③ is calculated as the splice loss. The splice loss changes greatly depending on the position of ②. Set the correct position for ②. The splice loss value changes depending on the approximation method that you have specified. This can only be used when Marker Mode is set to Marker.



5 Point Markers

The AQ1200x/AQ1205x uses the following five points to perform the measurement: the near-end point (n), a point (N) that is used to calculate the near-end side's approximated line, a point (E) where splice loss is detected, a point (F) that is used to calculate the far-end side's approximated line, and the far-end point (f). At position E, the level difference between the approximated line n–N and the approximated line F–f is calculated as the splice loss. The splice loss changes greatly depending on the position of E. Set the correct position for E. The splice loss value changes depending on the approximation method that you have specified. This can only be used when Marker Mode is set to Line.



Return Loss

Return loss RL is the ratio, in dB, of the reflected optical power level P_r to the incident optical power level P_i . It is calculated using the following equation. The larger the return loss, the smaller the reflected optical power. This implies that the performance of the measured optical line is good.

$$RL = -10\log(P_r/P_i) \text{ [dB]}$$

Multi Trace Analysis

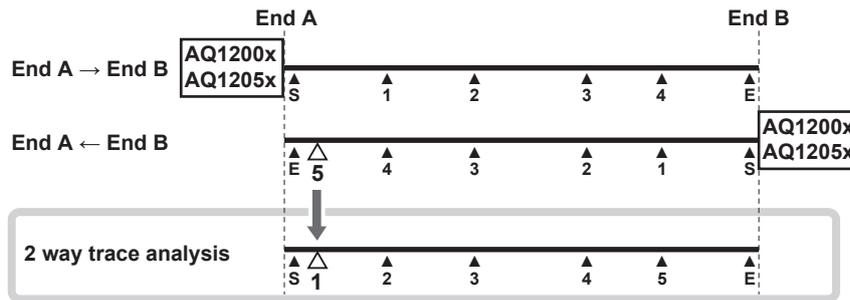
You can load up to four traces that have been measured on the AQ1200x/AQ1205x and display them simultaneously for comparison.

You can adjust the vertical display position of each loaded trace.

2 Way Trace Analysis

Trace events that have been measured from optical fiber cable end A to end B and those measured from end B to end A can be combined. This combination enables displaying of events that could not otherwise be measured because of dead zones.

In the figure below, the event that is in the near-end dead zone (point S) when measured from end A is detected as event number 5 when measured from end B. In the 2 way trace analysis display, it is displayed as event number 1.



An event of the other trace that exists within 6% of the position of an event of the current trace will be considered part of the current trace event.

If multiple events of the other trace that exists within 6% of the position of an event of the current trace, the closest event will be considered part of the current trace event.

Traces that meet the following conditions can be combined.

- Both have the same wavelength.
- Both have the same pulse width.
- Their end position offset is within 6%.
- Both have event lists.

Differential Trace

You can load two traces that have been measured on the AQ1200x/AQ1205x and display their difference as a trace.

The screen can display the loaded traces and the differential trace simultaneously.

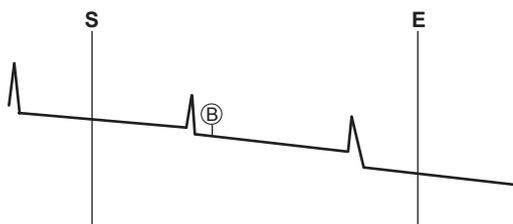
The differential trace is the result of subtracting the values of the current trace from those of the other trace.

You can use markers to read the following values of the differential trace.

- Loss between markers (dB)
- Distance between markers (km)
- Loss per unit distance between markers (dB/km)
- Distance to each marker

Section Analysis

You can set two markers, start point S and end point E, to measure the return loss and total loss in the section that you have specified. If you specify the reference point marker (B) for the return loss measurement, you can measure the return loss in the area between (B) and E.

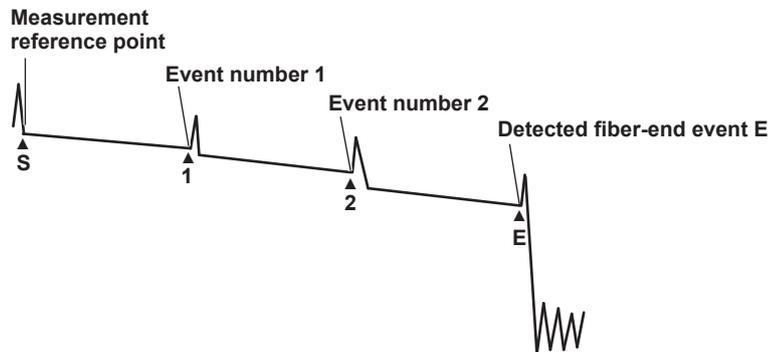


Event Analysis

You can search for events in the optical pulse measurement waveform and measure the splice loss and the return loss.

Event Editing

You can insert and delete events on the event screen. When you edit an event marker, the splice loss and the return loss can be recalculated.



Event List Editing

You can set indices of refraction for each event period on the event list. Setting the indices of refraction in accordance with the connected fiber makes accurate distance measurements possible.

These indices only affect event analysis. They do not affect the waveform display.

You can also change event distances. However, the events shown on the screen will not change.

1.5 Light Source and Optical Power Meters (Options)

The features listed for the loss-measurement light source and optical power meters are available on models with the /SLT, /HLT, or /PPM option. The features listed for the visible light source are available on models with the /VLS option.

Loss-Measurement Light Source

The following measurement light wavelengths can be generated.

Model	Measurement Light Wavelength
AQ1200A	SM 1310 nm, SM 1550 nm
AQ1200B	SM 1625 nm
AQ1200C	SM 1650 nm
AQ1200E	SM 1310 nm, SM 1550 nm, SM 1625 nm
AQ1205A	SM 1310 nm, SM 1550 nm
AQ1205E	SM 1310 nm, SM 1550 nm, SM 1625 nm
AQ1205F	SM 1310 nm, SM 1550 nm, SM 1650 nm

You can produce continuous light or light that has been modulated at the selected frequency (modulation mode).

Visible Light Source

You can produce visible light to visually identify breaks in the optical fiber under test. You can turn the visible light on and off independently of the measurement light source.

Optical Power Meter

The two instrument types listed below are available for measuring different types of optical power.

Item	Models with /SLT or /HLT Suffix Codes	Models with /SPM Suffix Codes	Models with /PPM Suffix Codes	
			Normal power meter selected	PON power meter selected
Wavelength	Yes	Yes	Fixed ^{10, 11}	Fixed ^{10, 11}
Wavelength mode ¹	Yes	Yes	—	—
Modulation mode ²	Yes	Yes	—	—
Unit	Yes (dB, dBm, W)	Yes (dB, dBm, W)	Yes (dB, dBm, W)	Yes (dBm, W)
Reference ³	Yes	Yes	Yes	—
Measured value display hold	Yes	Yes	Yes	Yes
Measured value logging	Yes	Yes	Yes	—
Zero set ⁴	Yes	Yes	Yes	Yes
Average count ⁵	Yes	Yes	Yes	Yes
Maximum and minimum value display ⁶	Yes	Yes	Yes	—
Interlocking of light source and optical power meter settings ⁷	Yes	—	Yes	—
Offset ⁸	Yes	Yes	Yes	Yes
Threshold ⁹	Yes	Yes	Yes	Yes
Measurement of the optical power from ONU to OLT for a particular signal wavelength ¹⁰	—	—	—	Yes
Measurement of the optical power from OLT to ONU for a particular signal wavelength ¹¹	—	—	—	Yes

Yes: Can be set or executed, —: Not available

- Wavelengths can be set with the wavelength mode set to Simple, Detail, or CWDM.
 - Simple: You can select from a list of preset wavelengths.
 - Detail: You can set the wavelength to a value from 800 to 1700 nm in 1 nm steps.
 - CWDM: You can set the wavelength to a value from 1270 to 1610 nm in 20 nm steps along the CWDM wavelength grid.

- 2 You can select the modulation frequency of the incident rays from a list of presets. You can also select CW (continuous).
- 3 You can make the displayed measured value the reference and display subsequent measured values as relative values.
- 4 You can adjust the internal deviation of the optical power measurement section and obtain more accurate absolute optical power values.
- 5 You can display averaged measured values.
- 6 You can display the maximum and minimum measured values.
- 7 You can interlock the light source and optical power meter settings when you connect an optical fiber between the light source port of an AQ1200x/AQ1205x and the optical power measurement port of another AQ1200x/AQ1205x.
- 8 You can add a specified value (the offset value) to measured optical power values.
- 9 You can set upper and lower threshold values and determine whether or not the measured values fall within them.
- 10 You can measure the optical power of an upstream signal from the ONU (optical network unit: the user's optical terminal) to the OLT (optical line termination: the telephone exchange's optical terminal). The optical power of the 1310 nm (data wavelength) signal is measured.
- 11 You can measure the optical power of downstream signals from the OLT to the ONU. The optical power of the 1490 nm (data wavelength) and 1550 nm (video wavelength) signals is measured.

Logging

You can measure short-term optical power stability. The optical power value during logging can be displayed on a graph, and you can calculate the maximum, minimum, and average. In addition, you can use cursors to calculate the optical power at a specified location or the maximum, minimum, and average within a specified area. The logging results can be saved to a file in CSV format.

1.6 Loss Test (Option)

You can easily measure optical fiber and optical line degradation. This feature is available on models with the /SLT or /HLT option.

Auto Loss Test (Using one AQ1200x/AQ1205x as the light source and another as the optical power meter)

Using the AQ1200x/AQ1205x as a light source and optical power meter, you can easily measure optical fiber and line degradation. You can also use the AQ1100 multi-field tester series instead of the AQ1200x/AQ1205x as the light source or optical power meter.

Light Source

You can set up to two measurement light wavelengths and produce them in order. You can produce a constant level of light if you use the optical power adjustment feature.

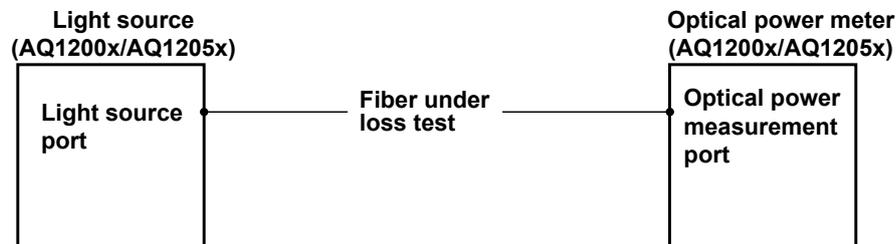
Optical Power Meter

The AQ1200x/AQ1205x automatically identifies the measurement light from the AQ1200x/AQ1205x that it is connected to and measures the optical power.

- The following items can be specified or executed. For details about these items, see section 1.5. The unit, reference, offset, and threshold values can be specified. The zero set and measured value display hold operations can be executed.

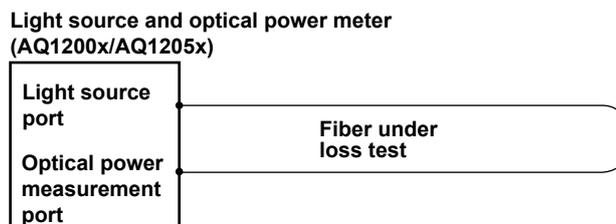
- You can attach fiber information to the measured values and save them.*

* Because the AQ1200x/AQ1205x is capable of identifying optical fiber and line cores, it is possible to number cores and tapes.



Loop-Back Loss Test (Using one AQ1200x/AQ1205x)

You can use the light source and optical power meter features on a single AQ1200x/AQ1205x to perform a loop-back loss test on an optical fiber or line. To perform loss testing, connect one end of the fiber that you want to perform loss testing on to the AQ1200x/AQ1205x light source port, and connect the other end to the optical power measurement port of the same AQ1200x/AQ1205x.



1.7 Multi-Core Loss Test (Option)

You can efficiently measure multi-core optical fiber and optical line degradation. This feature is available on models with the /SLT or /HLT option.

Master and Slave

Connect two AQ1200x/AQ1205xs and specify the optical power meter as the master and the light source as the slave. You can also use the AQ1100 multi-field tester series instead of the AQ1200x/AQ1205x as the master or slave.

Specifying the Optical Communication Fiber

To transfer, between the master and slave, project setup information and information about the fiber under loss test, you must specify a fiber from the multi-core optical fiber to use for communication. Connect one end of the optical communication fiber to the master's light source port (optical port 2), and connect the other end to the slave's optical power measurement port (optical port 1).

Information That Is Transferred from Master to Slave

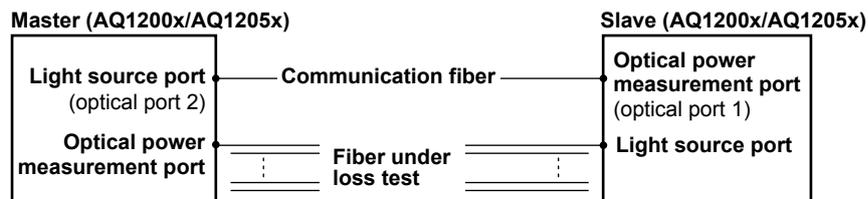
The following information can be transferred through the optical communication fiber from the master to the slave.

- Project information (see below for further details)
- Loss test results*

* Each time that the selected fiber's loss test finishes, that fiber's loss test result is automatically transferred.

Connecting the Optical Fiber under Loss Test

All fibers other than the optical communication fiber can be tested. For each optical fiber under loss test, connect one end to the master's optical power measurement port, and connect the other end to the slave's light source port. The core and tape numbers of the fibers under loss test are transferred from the master to the slave.



Executing a Loss Test

Transmit light from the slave. The master will automatically identify different wavelengths in the light from the slave and measure the optical power. Continue the loss test, switching the cores between the master and the slave in order.

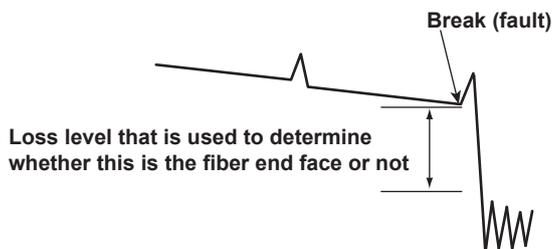
Projects

You can create projects with the master. You can specify the following project information:

- The project name, the number of the core to start loss testing at, the tape number type, the number of cores, and the transmitted or measured measurement light wavelengths (up to 2).
- You can transfer projects from the master to the slave and share information.
- When the master and the slave share a project and use that project to perform loss testing, if testing is stopped, the data up to the stop point is saved and you can begin testing again from the next core.
- You can save and load projects as CSV files.

1.8 Fault Locator

This feature enables you to search for breaks (faults) in an optical fiber or line. If there are no faults in the middle of a fiber, the fiber end face is detected as a fault. You can specify the wavelength and the loss level that is used to determine if a fault is a fiber end face or not when the AQ1200x/AQ1205x searches for faults. You can also zoom the display scale of the measured waveform and move the display position.



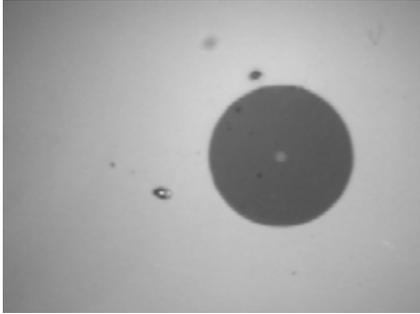
You can make measurements on the selected route.
The following five routes are available.

- **Normal**
Searches for faults in the fiber that connects the OLT¹ and ONU²
 - **OLT -> Splitter**
Searches the route from the OLT to the splitter
 - **OLT -> Splitter -> ONU**
Searches the routes from the OLT through the splitter to each ONU
 - **ONU -> Splitter**
Searches the route from an ONU to the splitter
 - **ONU -> Splitter -> OLT**
Searches the route from an ONU through the splitter to the OLT
- 1 OLT (optical line termination): the telephone exchange's optical terminal
2 ONU (optical network unit): the user's optical terminal

1.9 Checking Fiber End Faces

You can use a fiber inspection probe* to take a photograph that shows the state of a fiber end face. You can display this photograph on the AQ1200x/AQ1205x screen and save it.

* For information about compatible fiber inspection probes, contact your nearest dealer.



1.10 IP Test (Option)

You can check whether or not the network layer of an Ethernet LAN line is established. Before performing an IP test, make sure that the optical fiber or line is connected physically. IP testing is available on models with the /LAN option.

Ping Test

To ping an address (perform a simple IP test), specify the address and configure the Tx frame settings listed below. The results of pinging the address appear on the screen.

The frame length, Tx mode (continuation, number of frames to send, and transmission time), and measurement interval

1.11 Multi-Core Fiber Measurement

Multi-core fiber measurement takes time and effort. This feature makes it possible to efficiently measure multi-core fibers through a dedicated menu.

Projects

Items that you need to specify in order to make multi-core measurements such as measurement conditions, analysis conditions, and core information are managed in projects.

By creating a project before a measurement, you can measure cores under the same conditions.

You can save projects to files. You can load a previously saved project and make measurements under the same conditions.

List

Cores are listed. You can easily distinguish between cores that have been measured, cores that have not been measured, and cores that do not to be measured. This list prevents you from forgetting measurements and from making unnecessary measurements. (You can make measurements efficiently.)

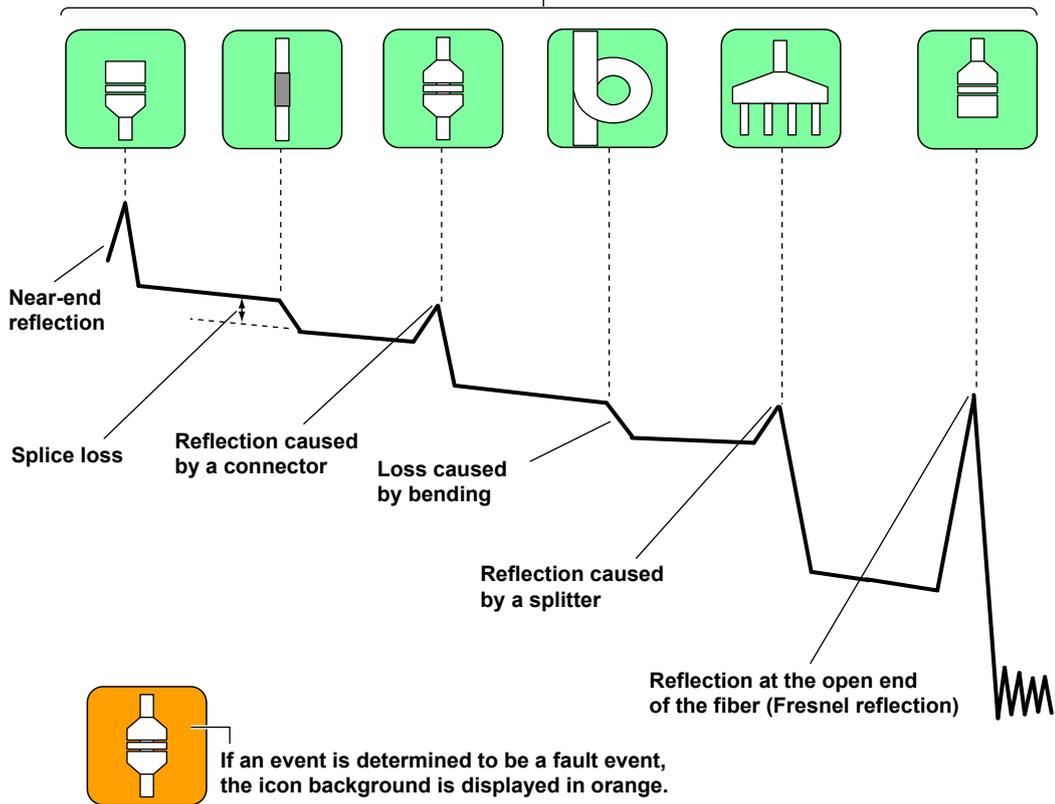
Measurement Result Storage

Measurement results of each core are automatically saved to a folder that is automatically created in the folder that the project file is saved in. The folder will have the same name as the project file.

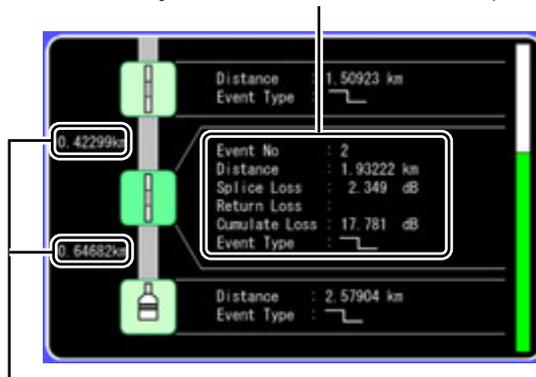
1.12 Event Mapper

You can display measured result events as icons on the screen. Detailed event analysis results are displayed along with the displayed icons. In addition, if fault events (see section 3.6) are specified, icons are displayed in different colors depending on the results of pass/fail judgments.

Each event is displayed as an icon. You can also switch to the waveform display using soft keys.



Detailed analysis results of the selected icon (event)



Distance between events

1.13 Other Features

The AQ1200x/AQ1205x also has the following features.

- **Data saving and loading**
- **Language selection**
- **Beep on/off**
- **Startup menu selection**
- **USB function selection (storage/communication)**
- **Screen color selection**
- **Current date and time configuration (see the operation guide, IM AQ1200-02EN)**
- **Power save settings**
- **Network settings (on models with the /LAN option)**
- **Setup information initialization (to the factory default values)**
- **AQ1200x/AQ1205x information display (model, serial no., suffix code, version, etc.)**
- **Self test execution**
- **Firmware version updating**

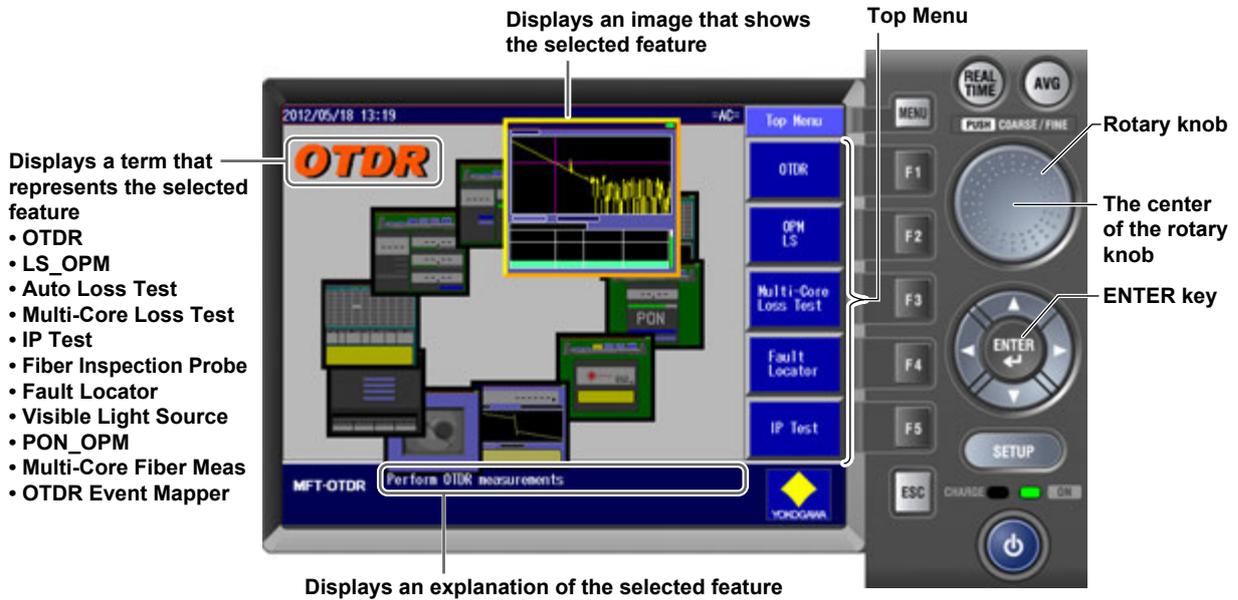
2.1 Top Screen

When you turn the AQ1200x/AQ1205x on and it starts, the top screen appears. First select a feature from this top screen, and then configure the feature or carry out the measurement that corresponds to the feature you have selected.

1. Turn on the Instrument.
2. Use the **rotary knob** to select the feature.
An image that shows the selected feature is displayed, and the feature name is displayed in the upper left of the screen.
3. Press the center of the **rotary knob** or **ENTER** to confirm your selection.
The setup or measurement operation menu for the selected feature is displayed.

In this manual, steps 2 and 3 above are described as shown below.

Example: To select the OTDR feature and confirm it:
“Using the **rotary knob** and **ENTER**, select **OTDR**.”



Procedural Explanations of Features

For explanations of the procedures to perform after you have selected and confirmed a feature, see the chapters or sections that are listed in the following table.

Function	Reference
OTDR (optical pulse measurement)	Chapters 3 to 7
LS_OPM (power meter and light source)	Chapters 8 and 9
Auto loss test (auto loss test and loopback loss test)	Chapter 11
Multi-core loss test	Chapter 12
IP test	Chapter 15
Fiber inspection probe (fiber end face check)	Chapter 14
Fault locator	Chapter 13
Visible light source	Section 8.2
PON_OPM (PON power meter) ¹	Chapter 10
Multi-Core Fiber Meas (multi-core fiber measurement) ²	Chapter 16
OTDR Event Mapper ³	Chapter 17

1 AQ1200x/AQ1205x firmware versions 1.10 and later support this feature.

2 AQ1200x/AQ1205x firmware versions 2.01 and later support this feature.

3 AQ1200x/AQ1205x firmware versions 2.03 and later support this feature.

Top Menu

- You can also use the soft keys (F1 to F5) on the right side of the top menu to select a feature and display its setup or measurement operation menu.
- The feature that you have used the rotary knob and ENTER to select is displayed in the top position (soft key F1) of the top menu.
- If you use the rotary knob and ENTER to select a feature that is already displayed in the top menu, the feature will move to the top position of the top menu. If you press a soft key (F1 to F5), the feature that you have selected will also be moved to the top position.
- Up to five features can be displayed. When you exceed this number, the feature that was displayed in the position by soft key F5 is deleted from the top menu.
- You can configure the top menu that is displayed when the AQ1200x/AQ1205x starts. For details, see section 19.1.

OTDR Top Menu

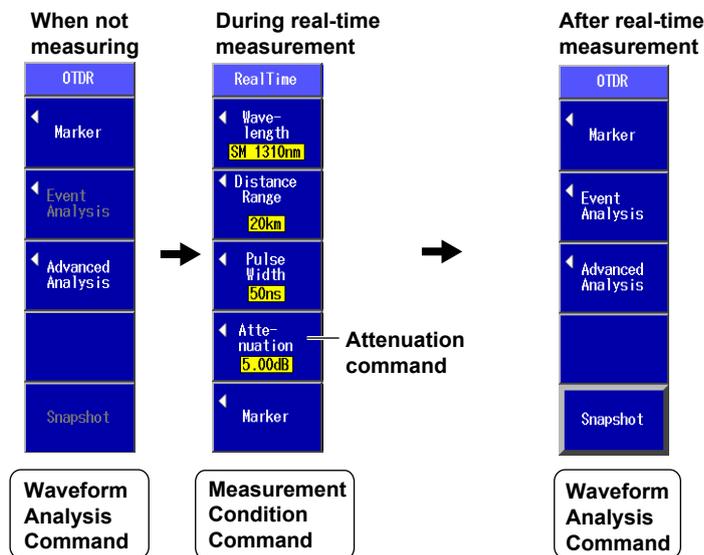
If you select the OTDR feature from the top menu, the OTDR menu (OTDR top menu) will appear. On AQ1200x/AQ1205xs with firmware version 2.03 and later, the OTDR top menu varies depending on the suffix code.

If the Suffix Code Is Not -HE (-HJ for example)

The OTDR top menu is the same as that of the previous version.

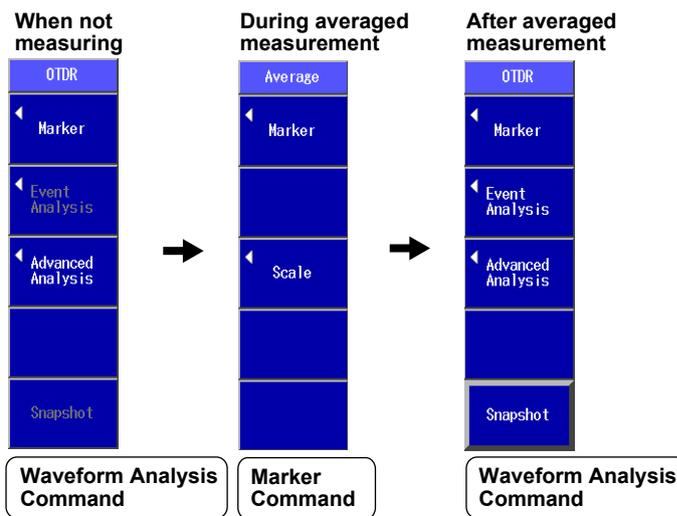
- The OTDR top menu will contain waveform analysis commands.
- During real-time measurement, marker and measurement condition commands appear. The F4 soft key will show the attenuation command.
- When real-time measurement finishes, the menu will return to displaying waveform analysis commands.

• OTDR Top Menu (during real-time measurement)



- During averaged measurement, the marker command appears.
- When averaged measurement finishes, the menu will return to displaying waveform analysis commands.

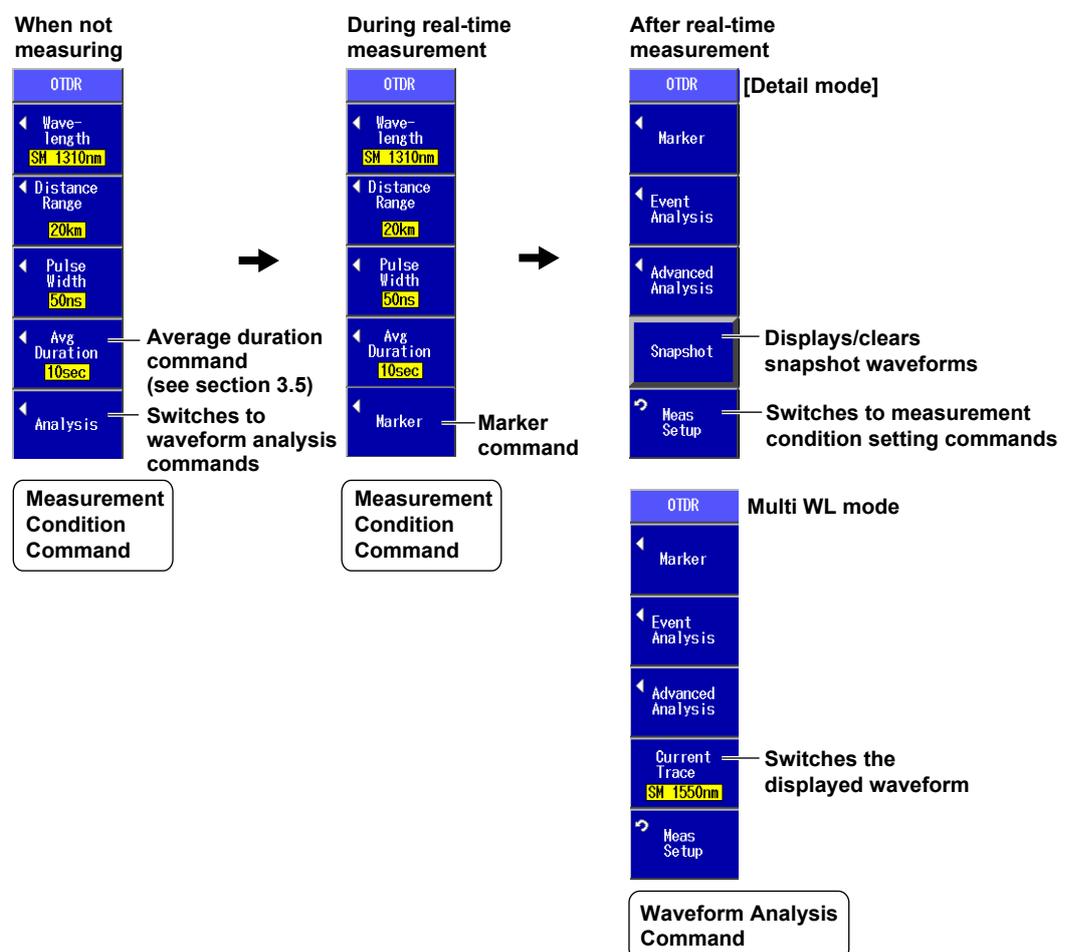
• OTDR Top Menu (during averaged measurement)



If the Suffix Code Is -HE

- The OTDR top menu will contain measurement condition setting commands. The F4 soft key will show the average duration command. The F5 soft key will show a command for switching to waveform analysis commands.
- During real-time measurement, measurement condition setting commands appear.
- When real-time measurement finishes, the menu will change to displaying waveform analysis commands.

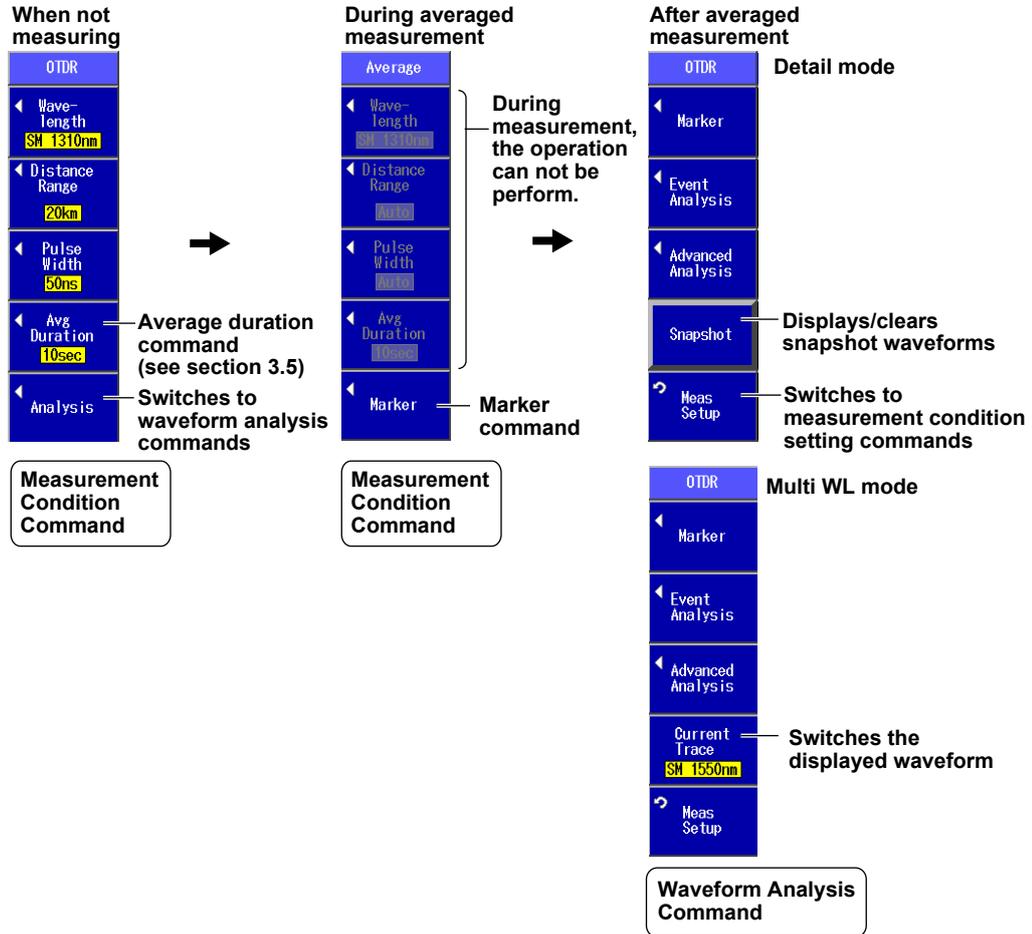
• OTDR Top Menu (during real-time measurement)



2.1 Top Screen

- During averaged measurement, marker and measurement condition commands (cannot be used during measurement) appear.
- When averaged measurement finishes, the menu will display waveform analysis commands.

• OTDR Top Menu (during averaged measurement)

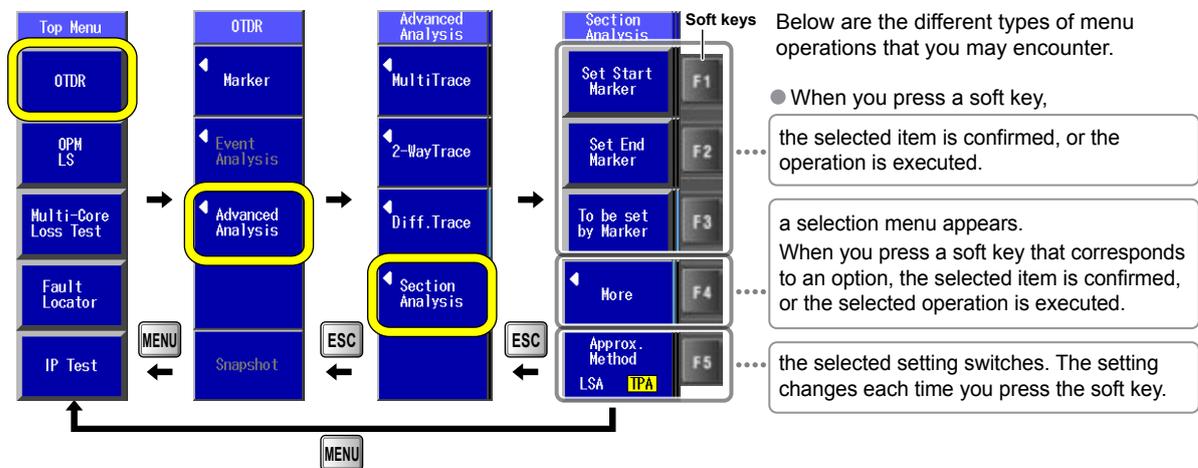


2.2 Key, Rotary Knob, and Arrow Key Operations

Key Operations

Key operations are explained below using an example. Here we will examine the steps you would take to select the section analysis menu from the top screen.

1. Use the **rotary knob** and **ENTER** to select **OTDR**. Or, press the **OTDR** soft key on the **top menu**.
The OTDR menu appears.
2. Press the **Advanced Analysis** soft key.
The waveform analysis menu appears.
3. Press the **Section Analysis** soft key.
The section analysis menu appears.



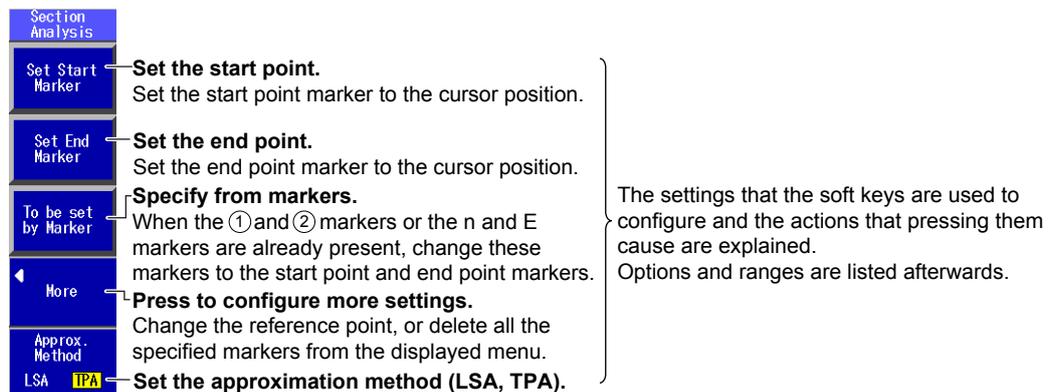
In this manual, the above key operation is described as shown below.

Example of an Explanation in This Manual

1. Use the **rotary knob** and **ENTER** to select **OTDR**.
2. Press the **Advanced Analysis** soft key.
3. Press the **Section Analysis** soft key. The following screen appears.

Or

Press the **OTDR** soft key > **Advanced Analysis** soft key > **Section Analysis** soft key. The following menu appears.



2.2 Key, Rotary Knob, and Arrow Key Operations

This manual explains procedures in accordance with the following guidelines.

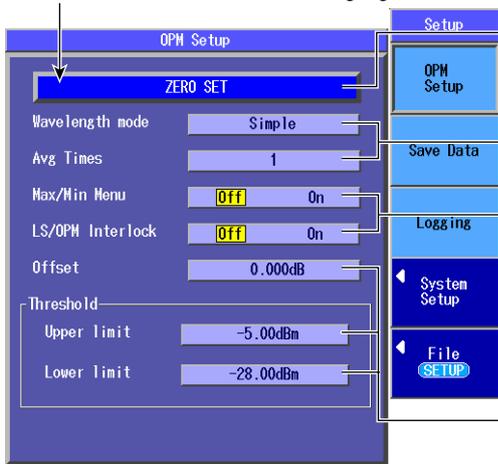
- The following types of procedures are simplified.
 - Repetitive operations.
 - Detailed operations for proceeding to the desired setup menu or dialog box and information about the accompanying screen changes.
- Step numbers are used in soft key explanations when there are many operations and when operations must be performed in different menus.
- The explanation for returning to the previous menu is omitted.

Rotary Knob and Arrow Key Operations

We will use the dialog box that appears when you press the OPM Setup soft key as an example to explain the rotary knob and arrow key operations.

1. Press the **OPN Setup** soft key.
The OPN Setup dialog box appears.
2. Use the **rotary knob** or the **arrow** keys to move the cursor to the item that you want to configure or execute.
The item at the cursor location is highlighted.
3. Press **ENTER**.

The item at the cursor location is highlighted.

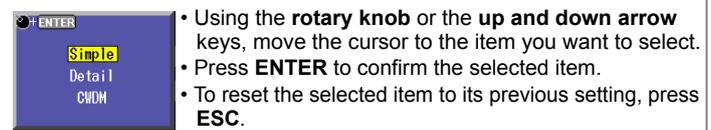


To return to the top menu, press **MENU**.

Below are the different types of setup operations that you may encounter.

Pressing **ENTER** confirms the selected item or executes its corresponding action.

Pressing **ENTER** display a menu.



- Using the **rotary knob** or the **up and down arrow** keys, move the cursor to the item you want to select.
- Press **ENTER** to confirm the selected item.
- To reset the selected item to its previous setting, press **ESC**.

Each time you press **ENTER**, the selected setting switches.

Pressing **ENTER** displays a text box.



- To increase or decrease a value, use the **rotary knob** or the **up and down arrow** keys.
- To move between digits, use the **left and right arrow** keys.
- Press **ENTER** to confirm the entered value.
- To reset the selected item to its previous setting, press **ESC**.

In this manual, the above rotary and arrow key operations are described as shown below.

Example of an Explanation in This Manual

Press the **OPN Setup** soft key. The following screen appears.

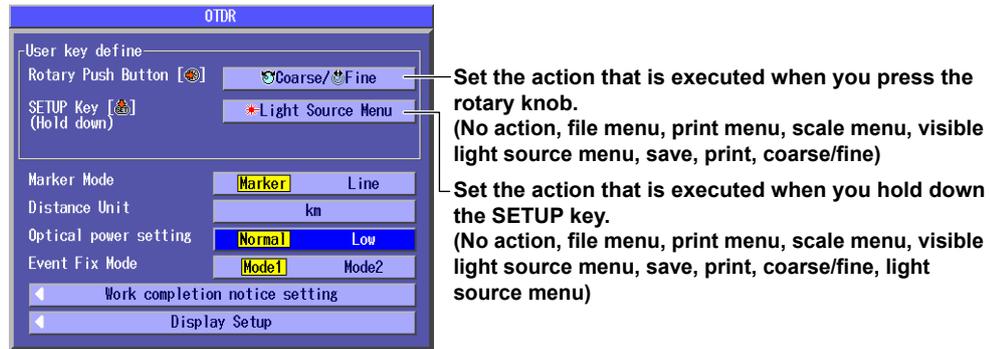
This manual omits the following descriptions.

- How to operate the rotary knob, arrow key, and ENTER key
- How to reset the selected item to its previous setting
- How to return to the previous menu

2.3 Shortcut Keys

The AQ1200x/AQ1205x's OTDR feature has a shortcut key feature. You can use the rotary knob and the SETUP key as shortcut keys. You can assign actions to each shortcut key.

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP**, the **System Setup** soft key, and then the **OTDR** soft key to display the following screen.



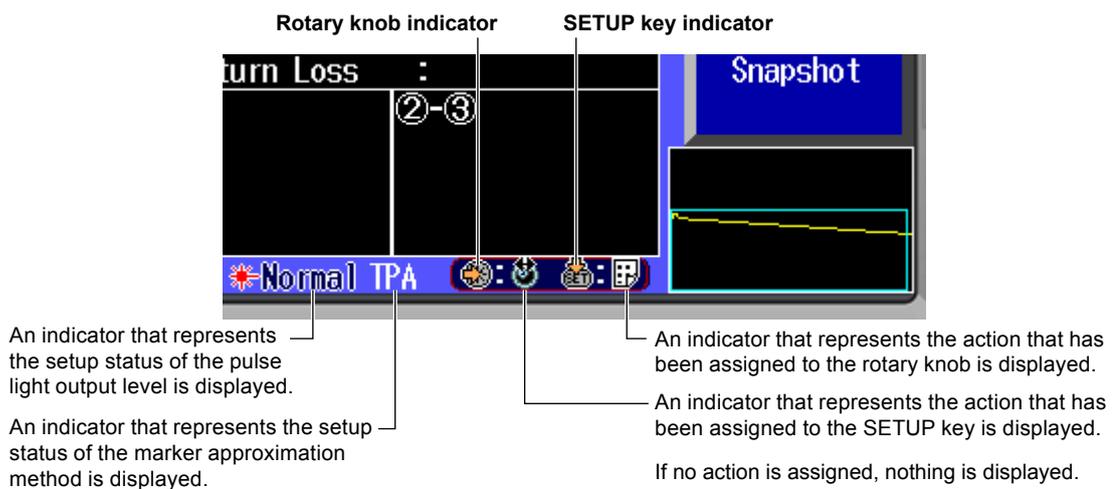
Note

- The shortcut feature is only enabled when you are operating the OTDR feature. Also, you can only make shortcut assignments when you are using the OTDR feature.
- The shortcut feature does not function on the top screen.
- You can assign the same action to both the rotary knob and the SETUP key.

Status Indicators

The indicators that represent the following AQ1200x/AQ1205x actions and statuses are displayed in the lower-right of the screen.

- The actions assigned to the rotary knob and the SETUP key
- Status of the pulse light output level
- Status of the marker approximation method



Meaning of the Status Indicators

Status Indicator	Meaning
None	No action assigned
	Displays the file menu
	Displays the print menu
	Displays the scale menu
	Displays the visible light source menu
	Starts saving
	Starts printing
 Coarse /  Fine	Switches the resolution between coarse and fine for the cursor movement that you control by turning the rotary knob
 Normal	Normal pulse light output level
 Low	Low pulse light output level

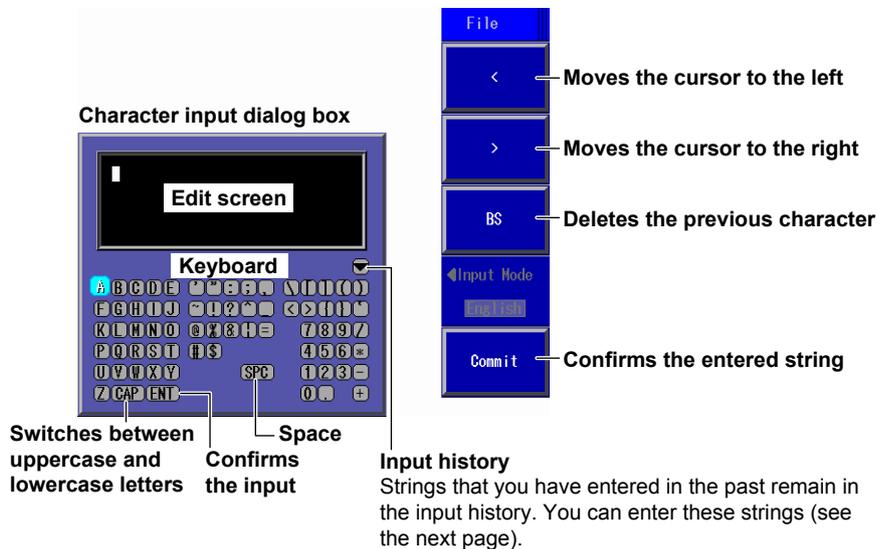
2.4 Entering Strings

After you have selected a setup item and pressed ENTER, a character input dialog box will appear if it is necessary. This section explains the operations that you can perform after the dialog box appears.

Entering Strings

1. Using the **rotary knob** and **ENTER**, enter a string. The string that you entered appears in the edit screen.
2. Press the various soft keys to edit the string as necessary.
3. After you have finished entering and editing the string, press the **OK** soft key to confirm the string that you entered and close the character input dialog box. The string will be applied to the relevant item.

You can also confirm the string by moving the cursor to **ENT** on the displayed keyboard and then pressing **ENTER**.

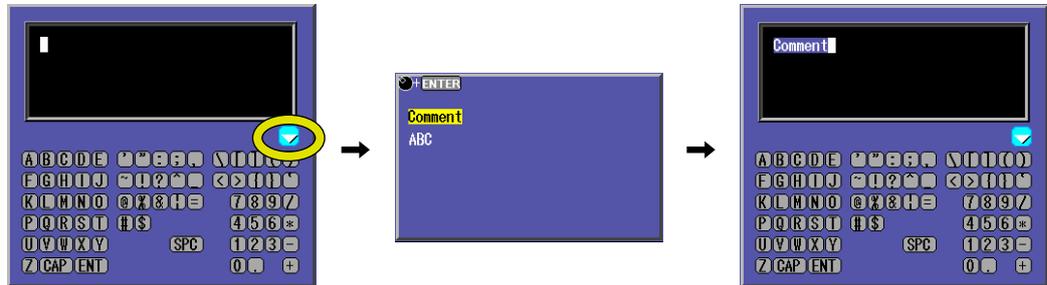


Note

- If there is a limit to the length of the string, you will not be able to enter characters after the limit is reached.
- You can also enter strings using a USB keyboard.

Entering Strings from the History

1. Using the **rotary knob** and **ENTER**, select ▼ to display the input history screen.
2. Using the **rotary knob** and **ENTER**, choose the string that you want to enter. The string appears in the edit screen.



Note

Entered strings are saved to the input history when you confirm them. Up to 50 strings can be saved. Newer strings appear at the top of the input history.

3.1 Selecting the Measurement Mode

Procedure

Measurement Screen

1. Using the rotary knob and **ENTER**, select **OTDR**.
2. Press **SETUP** and then the **Meas Setup** soft key to display the following screen.



Set the measurement mode (Simple, Detail, Multi WL, PON). The Multi WL option is not available on the AQ1200B and AQ1200C.

Explanation

Simple Mode

In this mode, the absolute minimum amount of measurement conditions are set manually. You only have to set the wavelength.

The following measurement conditions are set to the optimum values when measurement starts.

- Distance range
- Pulse width
- Event search

The measurement conditions that are available when the Instrument is in Simple (Full Auto) mode are listed below. You can view these conditions in the measurement condition information (see section 5.1) that is displayed on the screen.

Item	Setup
Distance range	Automatic
Pulse width	Automatic
Attenuation	Automatic
Duration to average over	Automatic
Average method	Hi-reflection
Average unit	Time
Sample interval	Standard

For the procedures to set the Simple mode measurement conditions, see sections 3.2 to 3.4.

Detail Mode

In this mode, all measurement conditions are set manually.

For the procedures to set the Detail mode measurement conditions, see sections 3.5 and 3.6.

Multi WL Mode

You can perform consecutive measurements over multiple wavelengths.

Depending on the AQ1200x/AQ1205x model, the wavelengths that can be measured and the number of waveforms that can be displayed vary.

For the procedures to set the Multi WL mode measurement conditions, see sections 3.5 and 3.6.

3.1 Selecting the Measurement Mode

PON Mode

In PON mode, you can set the measurement route details such as the number of splitter splits and measurement direction. In addition, an image of the specified route is displayed.

Set the number of splitter stages (1, 2).

Set the route (OLT -> ONU or ONU -> OLT).

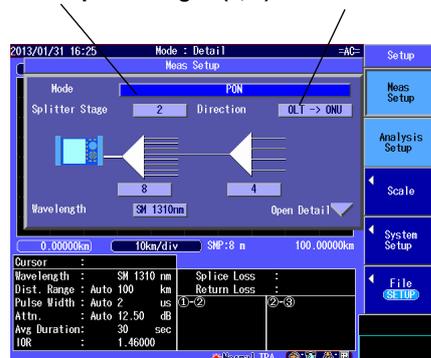
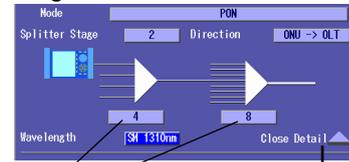


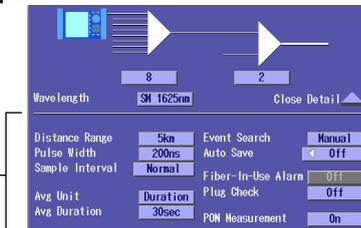
Image when the route is set to ONU -> OLT



Select the number of splits from the following:

2, 4, 8, 16, 32, 64, 128

The maximum total number of splits is 128.



The settings change to values that are suitable for the measurement of the specified number of stages and splits. You can also change the settings according to your measurement conditions.

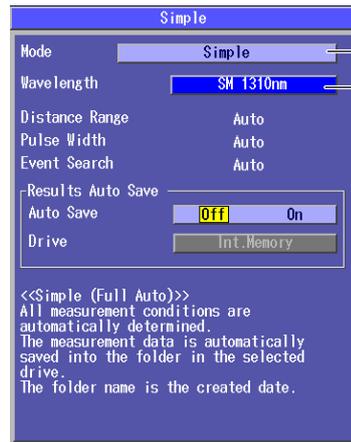
3.2 Selecting the Wavelength

<Simple (Full Auto) Mode>

Procedure

Measurement Screen

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP** and then the **Meas Setup** soft key.
3. Using the **rotary knob** and **ENTER**, set Mode to **Simple** to display the following screen.



Set Mode to "Simple."

Set the wavelength .

The available options vary depending on the model.
For details, see the explanation in section 3.5.

Explanation

Selecting the Measurement Wavelength

For details, see "Explanation" in section 3.5.

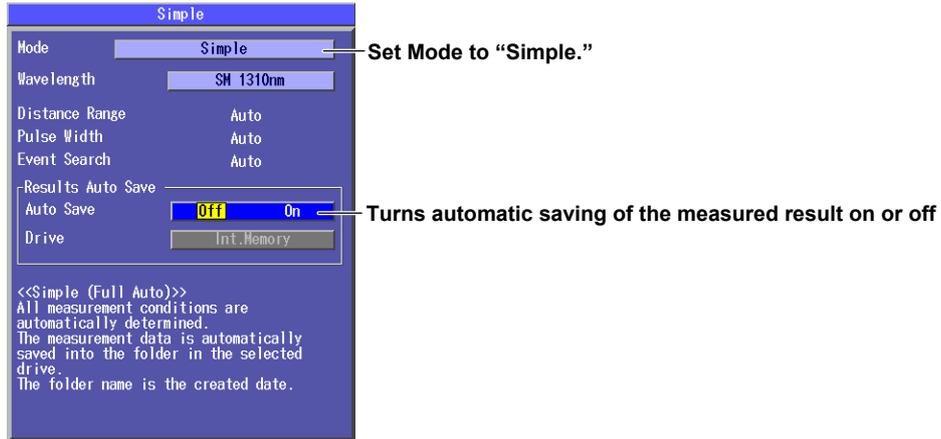
3.3 Automatically Saving Measured Data

<Simple (Full Auto) Mode>

Procedure

Measurement Screen

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP** and then the **Meas Setup** soft key.
3. Using the **rotary knob** and **ENTER**, set Mode to **Simple** to display the following screen.



Explanation

Automatically Saving the Measured Results

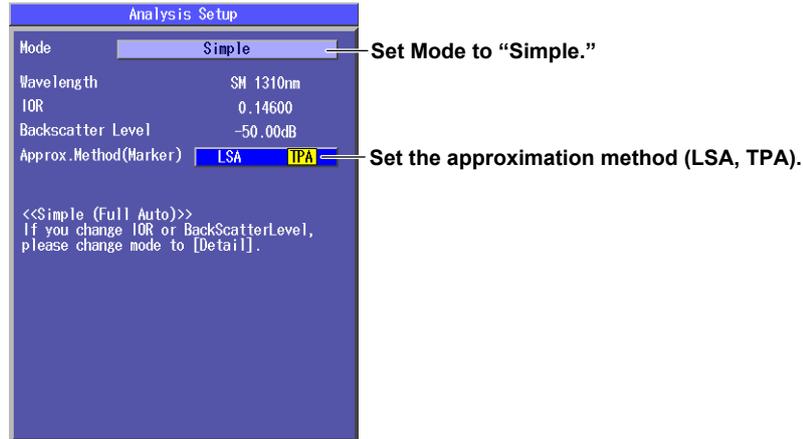
For details, see "Explanation" in section 3.5.

3.4 Selecting the Approximation Method (Marker) <Simple (Full Auto) Mode>

Procedure

Analysis Setup Screen

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP** and then the **Analysis Setup** soft key.
3. Using the **rotary knob** and **ENTER**, set Mode to **Simple** to display the following screen.



Approximation Method (Marker)

For details, see section 3.6.

3.5 Setting Measurement Conditions

<Detail Mode and Multi WL Mode>

Procedure

Measurement Screen

1. Using the rotary knob and **ENTER**, select **OTDR**.
2. Press **SETUP** and then the **Meas Setup** soft key.
3. Using the rotary knob and **ENTER**, set Mode to **Detail** or **Multi WL** to display the following screen.

Set Mode to "Detail" or "Multi WL."
The Multi WL option is not available on the AQ1200B and AQ1200C.

Set the wavelength.
You can specify Wavelength 2 and Wavelength 3 when Mode is set to Multi WL. The available options vary depending on the model. For details, see the explanation later in this section.

Set the distance range (Auto, 500m, 1km, 2km, 5km, 10km, 20km, 50km, 100km, 200km, 300km, 400km, 512km).

Set the pulse width (Auto, 3ns, 10ns, 20ns, 50ns, 100ns, 200ns, 500ns, 1μs, 2μs, 5μs, 10μs, 20μs).

Set the attenuation (Auto, 0.00dB, 2.50dB, 5.00dB, 7.50dB, 10.00dB, 12.50dB, 15.00dB, 17.50dB, 20.00dB, 22.50dB, 25.00dB, 27.50dB, 30.00dB).

Set the sample interval (Normal, High Resolution, 5cm, 10cm, 20cm, 50cm, 1m, 2m, 4m, 8m, 16m, 32m).

Set the average method (Hi-Speed, Hi-Reflection).

Set the average unit (Times, Duration).

Set the average count or the duration to average over.

- When the unit is times:
(Auto, 2¹⁰, 2¹¹, 2¹², 2¹³, 2¹⁴, 2¹⁵, 2¹⁶, 2¹⁷, 2¹⁸, 2¹⁹, 2²⁰)
- When the unit is duration:
(Auto, 5sec, 10sec, 20sec, 30sec, 1min, 3min, 5min, 10min, 20min, 30min)

Set the event search (Auto, Manual).

Set whether measured results are saved automatically or not.
Press **ENTER** to display the File Setup screen. See the File Setup screen that is described below.

Turns the fiber-in-use alarm on or off

Turns the plug check on or off

Turns the PON on or off

Initializes the settings
Press to reset the settings to their factory defaults.

Item	Value
Mode	Multi WL
Wavelength 1	SM 1310nm
Wavelength 2	SM 1550nm
Wavelength 3	Off
Distance Range	100km
Pulse Width	10ns
Attenuation	0.00dB
Sample Interval	4m
Avg Method	Hi-Speed
Avg Unit	Times
Avg Times	2 ¹⁸
Event Search	Auto
Auto Save	Setup [OFF]
Fiber-In-Use Alarm	Off
Plug Check	Off
PON	Off

File Setup Screen

Use this screen to configure the automatic saving of measured results. For details about these settings, see section 18.2.

Turns automatic saving on or off

Select a drive (Int.Memory, USB Memory).

Set how the automatically generated save-destination folders are named (Date, UserDefine).
Selecting UserDefine enables the File List button. Select [] to display the File List screen for setting the save destination.

- File list display (when the mode is UserDefine)
- Current save destination

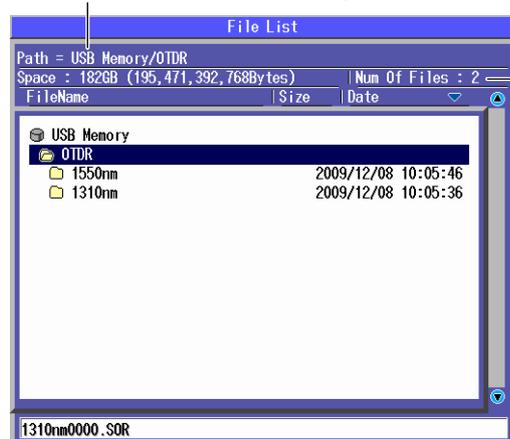
See section 17.2.

Item	Value
Auto Save	Off
Drive	Int.Memory
Dest. Folder	Auto
Mode	UserDefine
File List	Internal Memory
File Name Setup	File Name Setup

File List Screen

Use this screen to specify the folder where files will be saved to.

Folder path of the folder that you want to save to



The number of folders and files in the folder that you want to save to

Explanation

Measurement Wavelength

There are three instrument types, with the measurement light wavelengths listed below. Select a wavelength from the available settings on the Instrument that you are using.

Model	Measurement Light Wavelength	Output Port
AQ1200A	SM 1310 nm, SM 1550 nm	
AQ1200B	SM 1625 nm	Optical port 2
AQ1200C	SM 1650 nm	
AQ1200E	SM 1310 nm, SM 1550 nm	Optical port 2
	SM 1625 nm	Optical port 3
AQ1205A	SM 1310 nm, SM 1550 nm	Optical port 2
AQ1205E	SM 1310 nm, SM 1550 nm	Optical port 2
	SM 1625 nm	Optical port 3
AQ1205F	SM 1310 nm, SM 1550 nm	Optical port 2
	SM 1650 nm	Optical port 3

On the AQ1200A, AQ1200B, AQ1200C, and AQ1205A, the light for a single mode (SM) optical fiber is emitted from optical port 2.

On the AQ1200E, AQ1205E, and AQ1205F, light with a 1310 nm or 1550 nm wavelength is transmitted from optical port 2, and light with a 1625 nm or 1650 nm wavelength is transmitted from optical port 3. Firmly connect the optical fiber to the port that the light with the selected wavelength will be transmitted from.

Setting Wavelengths in Multi WL Measurement Mode

If the measurement mode is set to Multi WL, you can measure with both the 1310 nm wavelength and 1550 nm wavelength at the same time.

Depending on the model, you can set the wavelengths as shown below.

Model	Wavelength 1	Wavelength 2	Wavelength 3
AQ1200A	SM 1310nm	SM 1550nm/OFF	—
	SM 1550nm	SM 1310nm/OFF	—
AQ1200E	SM 1310nm	SM 1550nm/OFF	OFF
	SM 1550nm	SM 1310nm/OFF	OFF
	SM 1625nm	OFF	—
AQ1205A	SM 1310nm	SM 1550nm/OFF	—
	SM 1550nm	SM 1310nm/OFF	—
AQ1205E	SM 1310nm	SM 1550nm/OFF	OFF
	SM 1550nm	SM 1310nm/OFF	OFF
	SM 1625nm	OFF	—
AQ1205F	SM 1310nm	SM 1550nm/OFF	OFF
	SM 1550nm	SM 1310nm/OFF	OFF
	SM 1650nm	OFF	—

* The AQ1200B and AQ1200C do not have Multi WL mode.

Distance Range

Specify a distance range that matches the cable length. The distance range that you can select varies depending on the wavelength. Specify a distance range value that is greater than the length of the optical fiber that you will measure. If you specify a shorter value, the Instrument will not be able to perform measurements properly. The longer the distance that you specify, the more time measurements will take. When you specify the distance range, the optimum pulse width and attenuation values are set automatically.

Cable Length	Distance Range
Unknown	Automatic
0 m to 400 m	500 m
400 m to 800 m	1 km
800 m to 1.6 km	2 km
1.6 km to 4 km	5 km
4 km to 8 km	10 km
8 km to 16 km	20 km
16 km to 40 km	50 km
40 km to 80 km	100 km
80 km to 160 km	200 km
160 km to 240 km	300 km
240 km to 320 km	400 km
320 km to 410 km	512 km

Pulse Width

The pulse width has the following characteristics.

- A short pulse width enables you to measure with a high resolution, but you cannot measure long distances.
- A long pulse width enables you to measure long distances, but you cannot measure with a high resolution. Also, dead zones are larger with long pulse widths.

The pulse widths that you can select vary depending on the distance range, as shown in the following table.

Distance Range	Selectable Pulse Widths
500 m	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns
1 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μ s
2 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μ s
5 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μ s
10 km or 20 km	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μ s
50 km or greater	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μ s, 2 μ s, 5 μ s, 10 μ s, 20 μ s

- When the distance range is set automatically, you cannot select the pulse width.
- When you specify the pulse width, the attenuation is automatically set to the optimum value.

Attenuation

If large reflections are caused by optical connectors or by breaks in the optical fiber, the waveform may be saturated. Specify attenuation to prevent the waveform from being saturated.

The attenuations that you can select vary depending on the pulse width, as shown in the following table.

Pulse Width	Selectable Attenuations
3 ns to 50 ns	0 dB, 2.50 dB, 5.00 dB, 7.50 dB, 10.00 dB, 12.50 dB, 15.00 dB
100 ns to 1 μ s	0 dB, 2.50 dB, 5.00 dB, 7.50 dB, 10.00 dB, 12.50 dB, 15.00 dB, 17.50 dB, 20.00 dB
2 μ s to 5 μ s	0 dB, 2.50 dB, 5.00 dB, 7.50 dB, 10.00 dB, 12.50 dB, 15.00 dB, 17.50 dB, 20.00 dB, 22.50 dB, 25.00 dB
10 μ s, 20 μ s	0 dB, 2.50 dB, 5.00 dB, 7.50 dB, 10.00 dB, 12.50 dB, 15.00 dB, 17.50 dB, 20.00 dB, 22.50 dB, 25.00 dB, 27.50 dB, 30.00 dB

- If the distance range or pulse width is set automatically, or if the average method is set to high reflection, you cannot select the attenuation.
- If the waveform is saturated, you cannot perform measurements with high sensitivity, so specify a large value.

Sample Interval

The maximum number of sample data points is 128000. The shortest sample interval is determined by the distance range.

Normal: The Instrument uses the optimum sample interval for the measurement method to perform measurements.

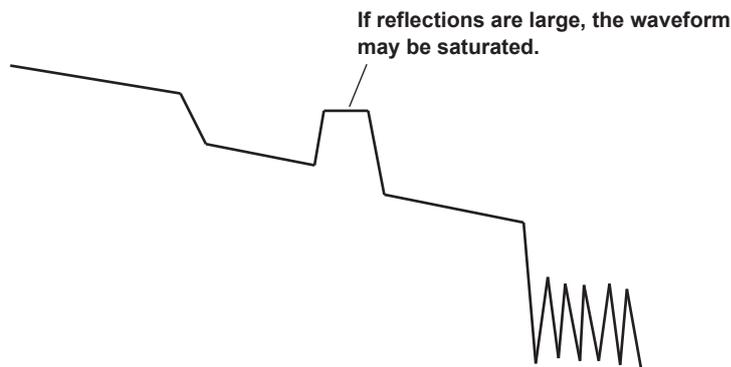
Hi-Resolution: The Instrument uses the shortest sample interval to perform measurements. If you use a short sample interval, you can measure for finer changes. However, the data size of the measured result becomes large. The sample intervals that you can select vary depending on the distance range, as shown in the following table.

Distance Range	Selectable Sample Intervals
500 m	5 cm, 10 cm, 20 cm, 50 cm, 1 m
1 km	5 cm, 10 cm, 20 cm, 50 cm, 1 m, 2 m
2 km	5 cm, 10 cm, 20 cm, 50 cm, 1 m, 2 m, 4 m
5 km	10 cm, 20 cm, 50 cm, 1 m, 2 m, 4 m, 8 m
10 km	20 cm, 50 cm, 1 m, 2 m, 4 m, 8 m
20 km	50 cm, 1 m, 2 m, 4 m, 8 m, 16 m
50 km	1 m, 2 m, 4 m, 8 m, 16 m
100 km	1 m, 2 m, 4 m, 8 m, 16 m
200 km, 300 km	4 m, 8 m, 16 m, 32 m
400 km, 512 km	

Average Method

Hi-Speed

In Hi-Speed mode, all sections are measured according to the specified attenuation. If the specified attenuation value is not appropriate and a large reflection occurs, the waveform for that section may be saturated.



Hi-Reflection

In Hi-Reflection mode, the Instrument can perform measurements correctly even if large reflections (excluding extremely large reflections caused by sections of the fiber such as the open end of the fiber) occur. In Hi-Reflection mode, the Instrument sets the optimum attenuation according to the backscattering light level for each section, and performs the measurement. Therefore, the measurement time is longer than in Hi-Speed mode. The partitioning of the optical fiber into sections and the specifying of the optimum attenuation are done automatically.

Note

We recommend that you use Hi-Speed mode when you are measuring a short optical fiber that has no reflections.

Average Unit

Duration: Measurements are performed only over the specified duration. If you specify a short duration, depending on the measurement conditions, measurements may not have finished when the specified time elapses.

Times: Measurements are performed only the specified number of times.

Average Count and Average Duration

You can select the following values.

Duration: 5sec, 10sec, 20sec, 30sec, 1min, 3min, 5min, 10min, 20min, 30min

Sec is seconds, and min is minutes.

Times: 2^{10} (1024 times), 2^{11} (2048 times), 2^{12} (4096 times), 2^{13} (8192 times), 2^{14} (16384 times), 2^{15} (32768 times), 2^{16} (65536 times), 2^{17} (131072 times), 2^{18} (262144 times), 2^{19} (524288 times), 2^{20} (1048576 times)
 2^{10} is 2 to the power of 10 (1024 times).

- The maximum average count is 2^{20} . If you specify a duration to average over that causes this number of times to be exceeded, the measurement will finish before the duration to average over elapses.
- Due to the influence of other measurement conditions, a measurement may take less time than the duration you have specified or it may not complete when the specified duration elapses.
- If you specify a large value for the number of times or the duration, you can perform highly precise measurements, but the measurement time becomes longer. Keep the Instrument's dynamic range and the loss of the optical fiber under measurement in mind when you specify these values.
- The display of the duration or the number of times is determined by the specified average unit.
- If Auto is selected, one of the options above is used.

Event Search

The event search is a feature that automatically searches for losses and reflections in the data that is acquired during averaged measurements. On the waveform, detected losses or reflections are known as events.

For details on analyzing detected events, see chapter 7.

Automatic: After averaged measurements complete, events are automatically searched for and listed, and the event analysis menu is displayed.

Manual: After averaged measurements complete, the waveform is displayed, but events are not searched for.

Auto Save

You can configure the Instrument to automatically save the measured data that it has acquired to the specified folder after averaged measurements complete.

Off: Measured data is not saved when averaged measurements complete. For details on saving data manually, see section 18.2.

On: Measured data is saved automatically when averaged measurements complete.

Note

- If auto save is turned on, measured data is automatically saved after averaged measurements complete, so be sure to specify the folder where measured data will be saved to before you start measuring.
 - If you want to change the selected drive, first set Auto Save to On. You cannot change the selected drive while Auto Save is set to Off.
 - For the file name format settings, see section 18.2.
-

Fiber-in-Use Alarm

Some models in the AQ1200x/AQ1205x use the same wavelength that is used in real communication to make measurements. If communication light is present in the optical fiber that you want to measure, the communication will be affected. When this communication light is present, we say that the fiber is in use.

The fiber-in-use alarm is a feature that checks if communication light is being transmitted along the optical fiber that you are trying to measure. If the fiber is in use, an alert message is displayed that suggests you stop the measurement. If the input level of the communication light is -20 dBm to 0 dBm, to prevent damage to the Instrument, the alert message is displayed repeatedly. If this occurs, stop measuring. For details on starting and stopping measurements, see chapter 4. For details about the message, see section 19.2.

On the AQ1200B and AQ1200C, because the light received at the wavelength for optical communication is blocked (not detected), fiber-in-use alarms do not occur.

Plug Check

The plug check is a feature that checks the state of the connection between the Instrument and an optical fiber. When you turn this feature on, you can prevent light from being transmitted from the Instrument light source port if an optical fiber is not connected to the Instrument or if the fiber is not connected correctly.

- Off: Plugs are not checked.
- On: Plugs are checked.

PON (Passive optical network)

If the optical fiber that you are trying to measure is connected to a PON system, because an optical splitter for splitting the optical fiber is installed in the system, you will not be able to measure optical pulses that are reflected from a position further away than the optical splitter using normal measurement. This feature enables you to correctly measure optical pulses that are reflected from positions such as this.

- Off: Optical pulses excluding those from PON systems can be measured.
- On: PON system optical pulses can be measured.

3.6 Setting Analysis Conditions

<Detail Mode and Multi WL Mode>

Procedure

Analysis Setup Screen

1. Using the rotary knob and ENTER, select OTDR.
2. Press SETUP and then the Analysis Setup soft key.
3. Using the rotary knob and ENTER, set Mode to Detail or Multi WL to display the following screen.

Detail Mode

Analysis Setup

Mode: Detail

Wavelength: SM 1310nm

IOR: 1.46000

Backscatter Level: -50.00dB

Approx. Method(Marker): LSA TPA

<< Event Analysis Setup >>

Approx. Method(Event): LSA TPA

-Event Search Conditions

Splice Loss: 0.10dB

Return Loss: 70dB

End of Fiber: Auto

Splitter Search: Off On

Splitter Loss: 3dB

Fault Event: Setup[OFF]

Default

Set Mode to "Detail."

Displays the specified wavelength

Set the index of refraction (1.30000 to 1.79999).

Set the backscattering light level (-10.00dB to -64.99dB).

Set the approximation method (marker; LSA, TPA).

Set the approximation method (event; LSA, TPA).

Set the event's splice loss (0.01dB to 9.99dB).

Set the event's return loss (20dB to 70dB).

Set the end of fiber (Fresnel reflection; 3dB to 65dB).

Turns splitter detection on or off

Threshold for splitter detection

Initializes the settings
Press to reset the settings to their factory defaults.

Set the fault event to On or Off.

If you set it to On, the following screen appears.

Fault Event

Display: Off On

Splice Loss: 1.00dB

Return Loss: 40dB

Judgement: Display Hide

Set the fault event's splice loss (0.01dB to 9.99dB).

Set the fault event's return loss (20dB to 70dB).

Set the fault event's PASS/FAIL judgement display (Display, Hide).

Multi WL Mode

For each wavelength set in the measurement conditions, set the index of refraction and backscatter level. In addition to the settings for Detail mode, you can set macro bending (bending loss).

Analysis Setup(Multi Wavelength)

Mode: Multi WL

Wavelength: SM 1310nm SM 1550nm Off

IOR: 1.46000 1.46000 0.00000

Backscatter Level: -50.00dB -52.00dB 0.00dB

Approx. Method(Marker): LSA TPA

<< Event Analysis Setup >>

Approx. Method(Event): LSA TPA

-Event Search Conditions

Splice Loss: 0.10dB

Return Loss: 70dB

End of Fiber: 3dB

Fault Event: Setup[ON]

Macro Bending: Setup[ON]

Default

Set Mode to "Multi WL."

Set macro bending to On or Off.
If you set it to On, the following screen appears.

Macro Bending

Display: Off On

Threshold: 1.000dB

Set the macro bending threshold (0.001dB to 99.999dB).

Turns the macro bending (bending loss) display on or off

Explanation

Index of Refraction

The Instrument uses indices of refraction in the calculations that it performs to measure distance. If you do not set the correct index of refraction, the distance measurement will be incorrect.

The Instrument has the following preset indices of refraction that correspond to each wavelength.

1310 nm: 1.46000
 1550 nm: 1.46000
 1625 nm: 1.46000
 1650 nm: 1.46000

You can specify a value from 1.30000 to 1.79999.

Backscattering Light Level

Light that travels through an optical fiber displays a phenomenon known as Rayleigh scattering. Due to this phenomenon, a portion of the light is sent backwards, in the direction opposite to the direction of propagation. This phenomenon is known as backscattering. The backscattering light level setting is used when the Instrument calculates the return loss and total return loss. If you do not set the correct backscattering light level, the return loss and total return loss measurements will be incorrect.

The Instrument has the following preset backscattering light levels that correspond to each wavelength.

1310 nm: -50 dB
 1550 nm: -52 dB
 1625 nm: -53 dB
 1650 nm: -53 dB

You can specify a value from -10.00 to -64.99.

Approximation Method

When the Instrument calculates splice loss, it extrapolates straight lines. These straight lines are known as approximated lines.

There are the following two kinds of approximated lines.

- Least squares approximation (written as LSA below)
- Two point approximation (written as TPA below)

LSA

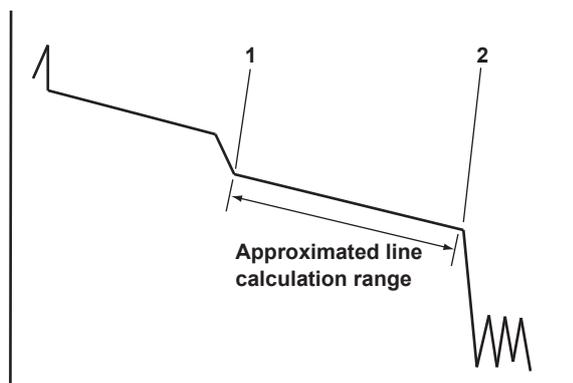
The Instrument calculates the loss between two points by using the least squares method on all the data between the two points.

This method has the following characteristics.

Merits: Because all the data between the two points is used, errors in the calculated value are small.
 Fluctuations in the calculated values are reduced, and highly reproducible values can be obtained.

Demerit: If a large reflection or splice loss is present in the section whose loss is being calculated, those values are also included in the calculation, so large errors result.

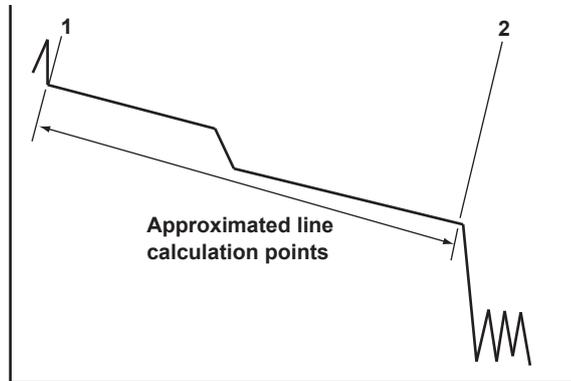
If no reflection and splice loss events are present in the section being calculated, the LSA provides a value that has a smaller degree of error than the TPA.



3.6 Setting Analysis Conditions

TPA

The Instrument uses the difference between the levels of the two specified points to calculate the loss. The level of fluctuation and reproducibility in the calculated value may vary greatly. If reflection and splice loss events are present in the section being calculated, the TPA provides a value that has a smaller degree of error than the LSA.



Event Search Conditions

Splice Loss

If a splice loss that exceeds the specified threshold occurs, it is detected as an event.
The range is 0.01 dB to 9.99 dB.

Return Loss

If a return loss that is less than or equal to the specified threshold occurs, it is detected as an event.
The larger the reflection, the smaller the return loss, so events (reflections) are detected when the return loss is less than or equal to the threshold.
The range is 20 dB to 70 dB.

Fiber Ends (Fresnel reflection)

If a reflection that exceeds the specified threshold occurs, it is detected as the end of the fiber.
The range is 3 dB to 65 dB.

Splitter Search

ON Losses (reflections) that exceed splitter loss are displayed as splitters.
The threshold at the end of the fiber is automatically set to its maximum value.
OFF Losses (reflections) that exceed splitter loss are displayed as normal events.

Splitter Loss

Events whose loss exceeds this value are assumed to be splitters.

Fault Events

Display

Events that are greater than or equal to the specified threshold (or reflections that are less than or equal to the specified threshold) are displayed as fault events.

- Off: Events that have exceeded their threshold values are not displayed with an asterisk attached to them.
- On: Events that have exceeded their threshold values are displayed with an asterisk attached to them.

Splice Loss and Return Loss

Set the threshold values that are used to display events as faults.

Splice loss: The range is 0.01 dB to 9.99 dB.

Return loss: The range is 20 dB to 70 dB.

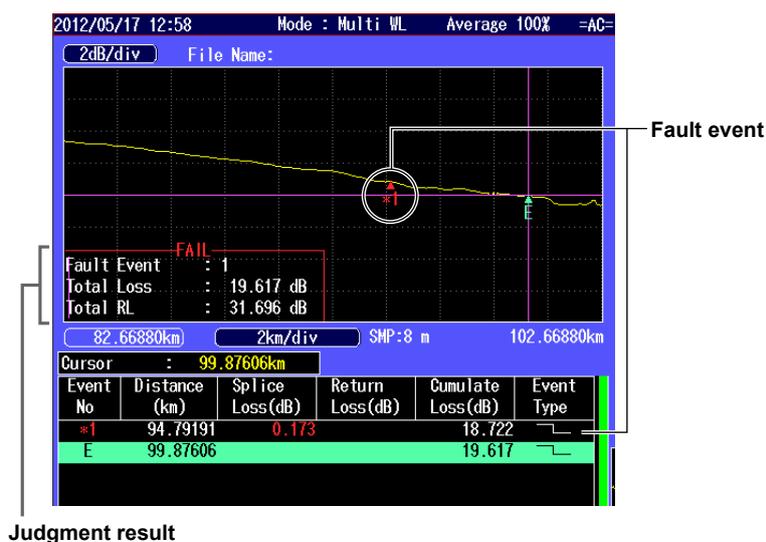
Because the end of fibers is handled as either a splice loss or a reflection, there is no fault event just for the end of fibers.

PASS/FAIL Judgement

If you have turned the fault event display on, you can display the result of PASS/FAIL judgment in the lower left of the waveform display area.

Display: FAIL or PASS and the number of fault events are displayed.

Hide: The judgment is not displayed.



Macro Bending (Bending Loss)

When an optical pulse measurement is performed in Multi WL measurement mode, you can compare the difference between the splice losses at wavelengths of 1310 nm and 1550 nm and display on the screen bending loss events that are caused by bends in the fiber.

Display

This function displays the detected bending losses in the event list on the event screen when optical pulses are measured.

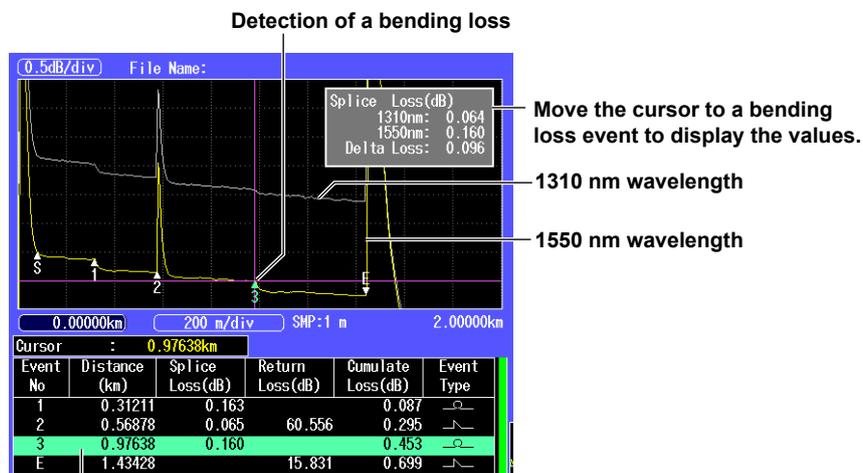
On: The bending losses are displayed in the event list.

Off: The bending losses are not displayed in the event list.

Threshold

This is the threshold of the difference between the splice losses of the 1310 nm wavelength and the 1550 nm wavelength when optical pulses are measured.

When the difference between the splice losses of the two wavelengths for the same event is larger than this value, the event is detected as a bending loss.



Move the cursor to a bending loss event to display the values.

1310 nm wavelength

1550 nm wavelength

Bending loss events are displayed in this event list.

In this example, the current trace has been set to the waveform with 1550 nm wavelength.

The waveform with 1310 nm wavelength, which is the waveform being compared, is displayed in gray.

If you switch the current trace to the waveform with 1310 nm wavelength, the waveform with 1550 nm wavelength, which is the waveform being compared, will be displayed in gray. In this situation, the bending loss event for 1550 nm wavelength (event number 3) will be displayed on the waveform with 1310 nm wavelength, which is the current trace.

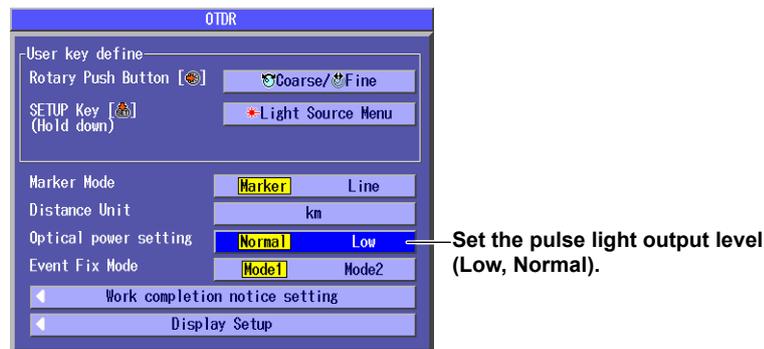
Note

- If the waveforms of the two wavelengths are not being acquired, bending losses cannot be detected.
- The waveform being compared (displayed in gray) is not displayed when Display next to Macro Bending is set to Off.
- For details on the event list, see chapter 7.
- For details on switching the current trace, see section 4.2.

3.7 Setting the Pulse Light Output Level

Procedure

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP**, the **System Setup** soft key, and then the **OTDR** soft key to display the following screen.



Explanation

Pulse Light Output Level

The AQ1200x/AQ1205x consists of models that make measurements by using 1625 nm or 1650 nm optical pulse wavelengths. Even though these differ from the wavelength for optical communication, if communication light is present in the optical fiber (the fiber is in use), the communication itself may be affected. If a filter that blocks measurement light at 1625 nm or 1650 nm is not attached to the optical fiber that you are trying to measure, you can perform measurements without affecting the communication light that is present in the optical fiber by lowering the pulse light output level.

Normal: Pulse light is generated at the maximum power.

Low: Pulse light is generated at low power.

You cannot set the pulse light output level on the AQ1200A or AQ1205A.

3.8 Giving Notifications When Installations Are Complete

Procedure

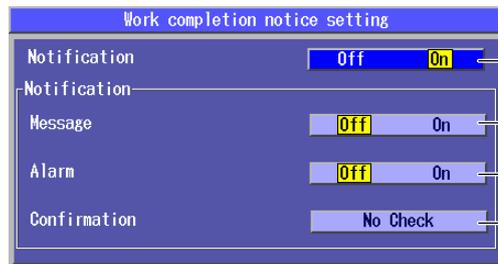
1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP**, the **System Setup** soft key, and then the **OTDR** soft key to display the following screen.



Configure the work completion notification.
Press **ENTER** to display the Work completion notice setting dialog box.
(See the Work completion notice setting dialog box below.)

Work Completion Notice Setting Dialog Box

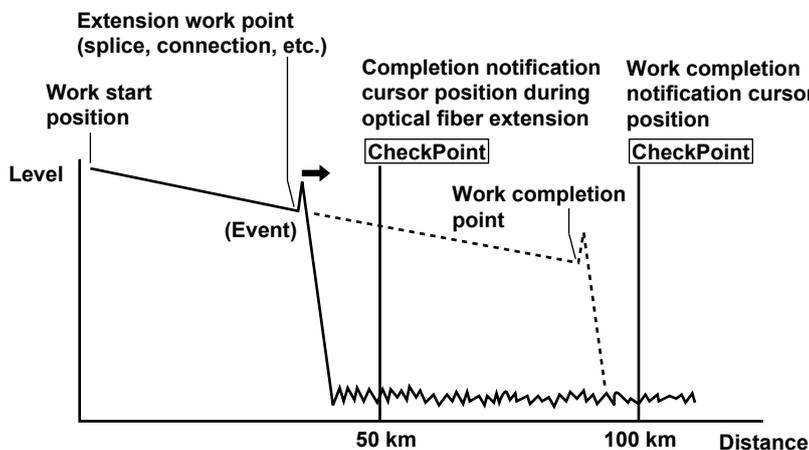
Configure the work completion notification.



Turns notifications on or off
Turns the message display upon work completion on or off
Turns the alarm notification upon work completion on or off
Set how to display the real-time measurement confirmation message
(No Check, Check only once, Check everytime).

Explanation

Before you check whether the work is complete, move the cursor to the fiber end point after the optical fiber has been installed (the extension work point or the work completion point) and turn on the work completion confirmation notification. When the fiber end detection position (the event) during real-time measurement is the same as the cursor position (CheckPoint), the Instrument gives a notification that the installation is complete.



Message Display

Off: Messages are not displayed.

On: Completion messages are displayed on the screen.

Alarm

Off: The Instrument does not sound an alarm.

On: The Instrument sounds an alarm.

Confirmation

When the Instrument checks the work completion, a message confirming whether you have set the cursor to a position that is a little after the installation point is displayed.

No Check: The confirmation message is not displayed.

Check only once: After you start the Instrument, the message is only displayed before the Instrument performs work completion notification for the first time.

Check everytime: The message is displayed each time before the Instrument performs work completion notification.

3.9 Selecting the Calculation Method for Total Loss and Total Return Loss

Procedure

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP**, the **System Setup** soft key, and then the **OTDR** soft key to display the following screen.



Set the calculation method for total loss (Cumulate loss, Loss between S and E).

Set the calculation method for total return loss (Include END, Exclude END).

Explanation

Calculation Method for Total Loss

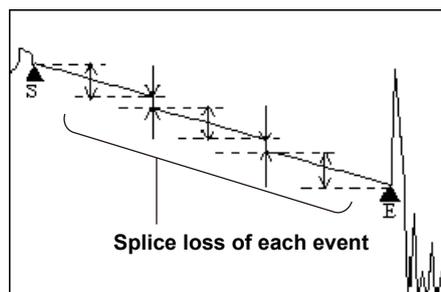
• Cumulate loss

The integrated value of the splice losses at each event from the measurement reference point (S) is displayed. This is the conventional calculation method (firmware version 2.05 and earlier).

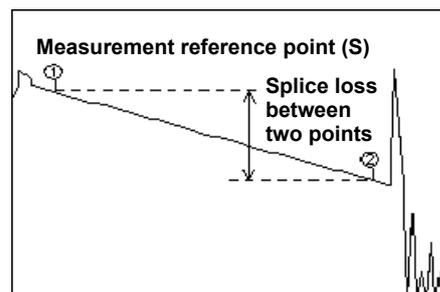
• Loss between S and E

The loss (TPA approximation method) between the measurement reference point (S) and the end of fiber (E) is displayed.

Cumulate loss



Cumulate loss Loss between S and E



Note

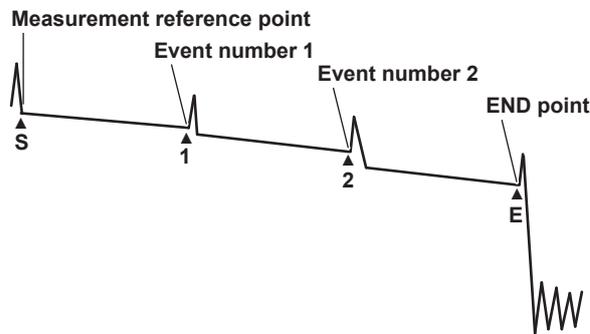
If Loss between S and E is selected, markers ① and ② are placed automatically at the measurement reference point (S) and the END point (E) when event analysis is executed.

Calculation Method for Total Return Loss

Select whether to include the return loss value at the end of fiber (E) in the total return loss.

Include END: The value is included in the total return loss.

Exclude END: The value is not included in the total return loss.



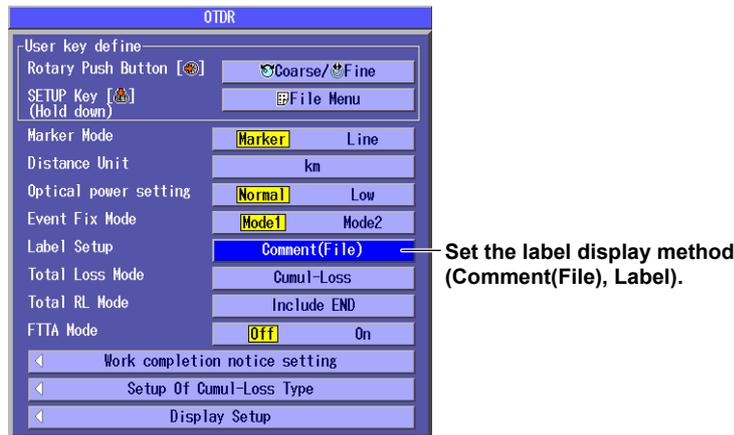
Note

If Exclude END is selected, markers S and E of the section analysis are placed automatically at the measurement reference point (S) and the END point (E) when event analysis is executed.

3.10 Selecting the Label Display Method

Procedure

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP**, the System Setup soft key, and then the **OTDR** soft key to display the following screen.



Explanation

Label Display Method

- **Comment(File)**

The text entered in Comment on the File Name Setup screen is displayed as the label that was used when the waveform data of optical pulse measurement was saved in SOR format. For details on the File Name Setup screen, see section 18.2.

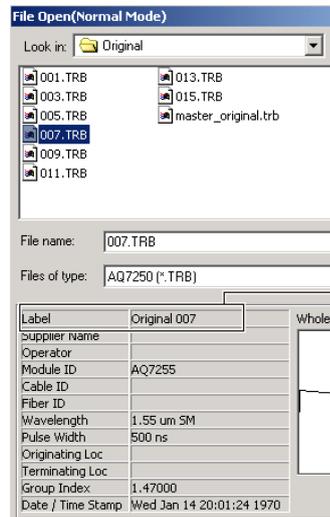
- **Label**

The text entered in Label when the Label Setup screen was opened from the File Name Setup screen is displayed as the label that was used when the waveform data of optical pulse measurement was saved in SOR format.

The same text is also displayed at the bottom of the instrument's display screen.

For details on the Label Setup screen of the File Name Setup screen, see section 18.2.

Example of loading SOR data using the AQ7932 OTDR emulation software, sold separately



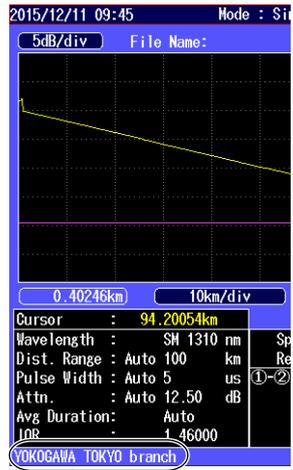
Label

When set to Comment(File):

Text in Comment of the File Name Setup screen

When set to Label:

Text in Label of the Label Setup screen



Shows the label at the bottom of the screen (only when Label Setup is set to Label)

4.1 Performing Real-time Measurement

In real-time measurement, you can view waveform changes in real time. You can change the conditions while measurement is being performed.



WARNING

- During measurement, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



AVERTISSEMENT

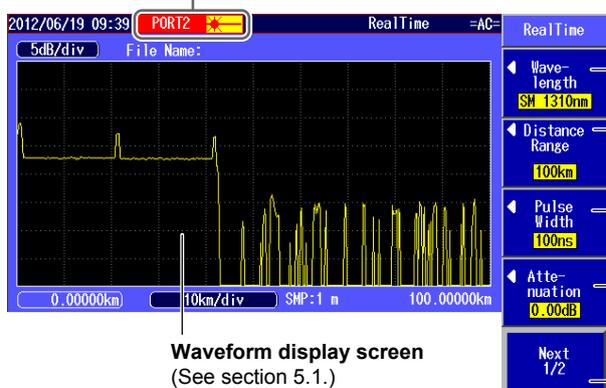
- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Procedure

Starting and Stopping Measurements

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **REAL TIME** to start the measurement and display the measured waveform on the screen. The soft key menu switches to the real-time menu. A mark appears on the display to indicate that the laser light is on.
3. During real-time measurement, press **REAL TIME** to stop the measurement. The soft key menu switches to the OTDR menu. The mark that indicates that the laser light is on disappears from the display.

Laser on indication



Waveform display screen
(See section 5.1.)

Set the wavelength (1310nm, 1550nm).
You cannot set the wavelength on the AQ1200B and AQ1200C.

Set the distance range (Auto, 500m, 1km, 2km, 5km, 10km, 20km, 50km, 100km, 200km, 300km, 400km, 512km).

Set the pulse width (Auto, 3ns, 10ns, 20ns, 50ns, 100ns, 200ns, 500ns, 1μs, 2μs, 5μs, 10μs, 20μs).

Set the attenuation (Auto, 0.00dB, 2.50dB, 5.00dB, 7.50dB, 10.00dB, 12.50dB, 15.00dB, 17.50dB, 20.00dB, 22.50dB, 25.00dB, 27.50dB, 30.00dB).

Switches to the menu that is used to operate markers and scale.

See section 5.2 or 6.1 in the user's manual.

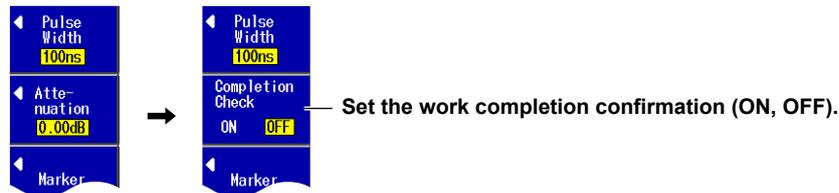
4.1 Performing Real-time Measurement

Setting the Work Completion Point

3. Move the cursor to a position that is a little after the installation point.
4. Press the **Completion Check** soft key to select ON.
 - **When Confirmation is set to “Check only once” or “Check everytime”**
A message appears asking whether you have moved the cursor to the work completion point. Click OK. Measurement starts. If the fiber end moves the distance indicated by the cursor position, the Instrument displays a message or sounds an alarm. Press REAL TIME to clear the message or turn off the alarm.

Note

The Completion Check soft key is only displayed when work completion notification is turned on. For the setup procedure, see section 3.8. Work completion confirmation is turned off automatically when measurement is stopped.



Explanation

Real-time Measurement

Measurement conditions are set before the actual measurement takes place, but during real-time measurement you can change the measurement conditions and adjust markers and the cursor. When you stop the measurement, the Instrument returns to the previous screen.

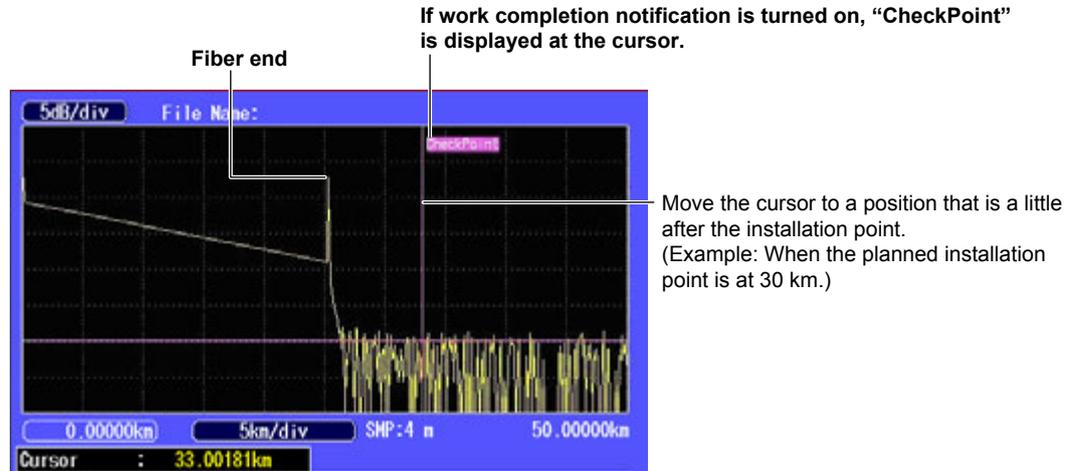
- In Simple (Full-Auto) mode, you can only change the wavelength.
- You cannot change the attenuation if the averaging mode is set to Hi-Reflection. For details, see section 3.5.

Wavelength Settings

- The “Wavelength 1” that has been set in the Multi WL mode measurement conditions is the default wavelength in real-time measurement.
- On the AQ1200B, the wavelength is fixed to 1625 nm. On the AQ1200C, the wavelength is fixed to 1650 nm.
- If you set “Wavelength 1” to 1625 nm or 1650 nm on the AQ1200E, AQ1205E, or AQ1205F, you cannot set “Wavelength 2” or “Wavelength 3” to 1310 nm or 1550 nm, which are emitted from a different output port.

Installation Completion Notification

Move the cursor to a position a little after the installation point before you perform real-time measurement. If the fiber end detection position is the same as the cursor position when you perform real-time measurement, the Instrument displays a message on the screen or sounds an alarm. For details, see section 3.8.



You can perform measurements efficiently by moving the cursor to a position a little after the installation point (depending on how fast fiber will be installed). This is because the instrument notifies you of the work completion, which is your sign to measure the connection loss at that point (splice, connection, etc.).

4.2 Performing Averaged Measurements

In averaged measurements, the data that is acquired from each pulse is averaged and displayed. By performing averaged measurements, you can improve the signal-to-noise (S/N) ratio. This is effective when you want to detect faint events that are buried in noise.



WARNING

- During measurement, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



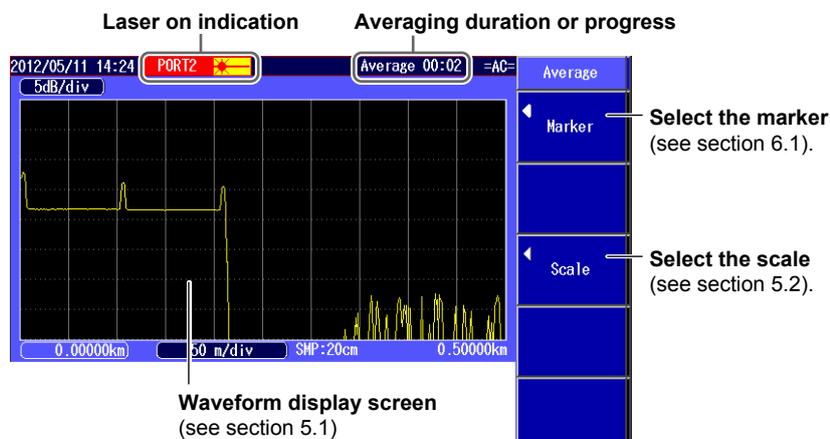
AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Procedure

Starting and Stopping Measurements

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **AVG**. The measurement begins, and the measured waveform is displayed on the screen. The Average menu appears. The average time or progress is displayed in the upper right of the screen. During measurement, a mark appears at the top of the display to indicate that the laser light is on.



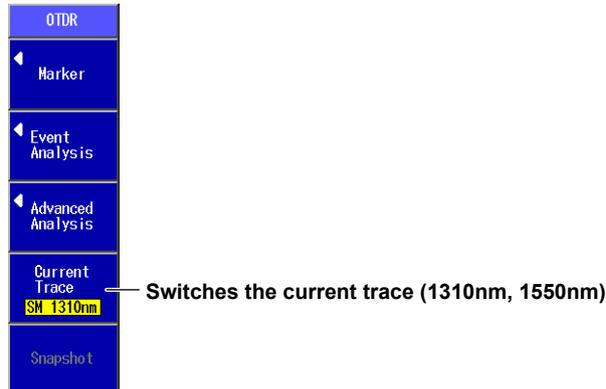
When the average measurement completes in accordance with the specified conditions, the measurement stops automatically.

The OTDR menu appears.

To stop the average measurement in progress, press **AVE**.

Switching the Current Trace (in Multi WL mode)

- Press the **Current Trace** soft key to switch the current trace.



Explanation

Averaged Measurement

A progress bar is displayed during averaged measurement. When the measurement finishes, the progress bar stops automatically. If you set Avg Duration to Auto, the duration to average over is displayed at the top of the screen. If you specify a setting other than Auto, a value that indicates the progress is displayed. When the measurement completes correctly, 100% is displayed. The time that the measurement takes to complete varies depending on settings such as the distance range and the average count.

If you are using markers to perform an averaged measurement, when the measurement completes correctly (100%), the Instrument automatically closes the marker measurement screen.

If Event Search is set to Auto, the event screen appears when the measurement is completed correctly.



Measured data can automatically be saved when averaged measurements are completed. For the setup procedure, see section 3.5.

Current Trace

You can only analyze the current trace using markers and cursors.

In Multi WL measurement mode, the Current Soft key is enabled when measurement of multiple wavelengths are completed. Press the Current Trace soft key to select the waveform that you want to analyze.

Limitations on Multi Wavelength Trace Display

When you are in the event analysis menu, only the current trace is displayed. When you finish event analysis, the multi wavelength trace display returns.

Disabling of the Multi Wavelength Trace Display

In the following situations, waveform data other than the current trace is cleared.

- When waveform data is loaded from a file.
- When waveform analysis (multi trace analysis, 2 way trace analysis, or differential trace analysis) is executed.
- When you exit Multi WL measurement mode. The current trace remains displayed.

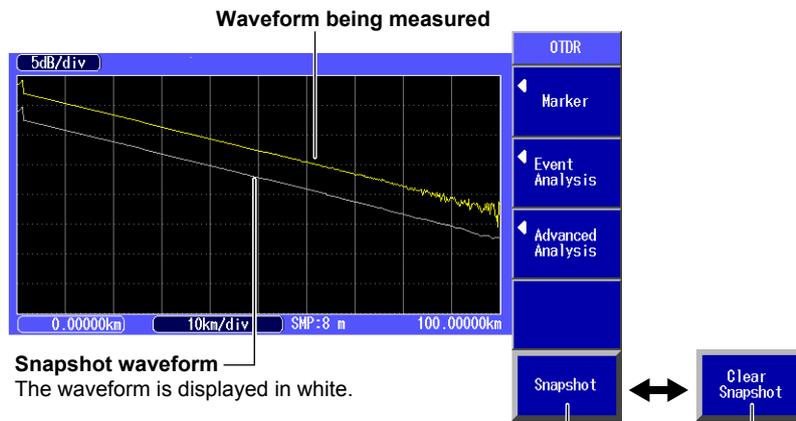
4.3 Displaying Snapshot Waveforms

You can measure waveforms while retaining the previous waveform on the screen (a snapshot). The Instrument displays the measured waveform and the snapshot waveform at the same time.

Procedure

Snapshot Screen

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Display the waveform on the screen, and then press the **Snapshot** soft key. The soft key's display color changes momentarily, and a snapshot waveform appears. The text displayed on the soft key changes from "Snapshot" to "Clear Snapshot."



Snapshot waveform
The waveform is displayed in white.

Take/clear a snapshot.

If you press this soft key when "Snapshot" is displayed, a snapshot will be taken of the displayed waveform, and the soft key will switch to display "Clear Snapshot."

If you press this soft key when "Clear Snapshot" is displayed, the snapshot waveform will be cleared, and the soft key will switch to display "Snapshot."

Explanation

Snapshot

You can also take a snapshot of waveforms that you load from files. For details on loading waveforms, see section 18.2. You cannot take snapshots in Multi WL mode.

5.1 Waveform Display Screen

Procedure

Display Screen

- Using the rotary knob and ENTER, select OTDR to display the following screen.

Date and time

See the operation guide, IM AQ1200-02EN.

Value per division on the vertical axis

Waveform display area

Measurement mode
(See section 3.1.)

Progress during averaged measurements (AVG)

The progress bar behind the characters indicates how far measurement has proceeded. (See section 4.2.)

Remaining battery power/AC

See the operation guide, IM AQ1200-02EN.

File name

The name of the measurement data file that is currently displayed is shown here. For details on file names, see section 17.2.

Position of the left edge of the screen

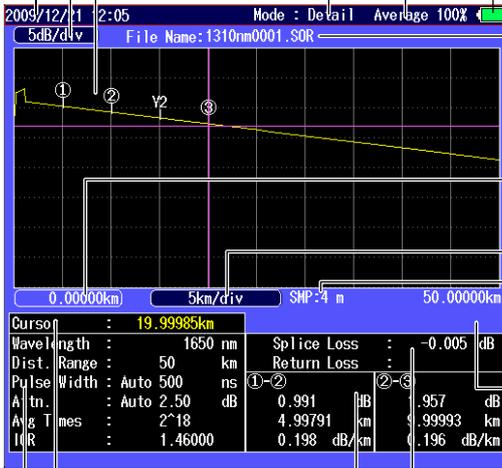
When the distance reference is set, the position of the distance reference is 0, and this displays the distance from the distance reference to the position of the left edge of the screen as a negative value.

Distance per division on the horizontal axis

Sample interval (See section 3.5.)

Position of the right edge of the screen

When the distance reference is set, this displays the distance from the distance reference to the position of the right edge of the screen.



Distance from the horizontal axis' measurement reference point to the cursor position
(See section 6.1.)

Measurement conditions
(See section 3.5.)

Full screen display of the waveform display area
The section that is displayed in the waveform display area is represented by a box (overview). (See sections 5.2 and 5.3.)

Splice loss/return loss

The values that are calculated from the specified markers are displayed. (See chapter 6.)

Marker section measured values

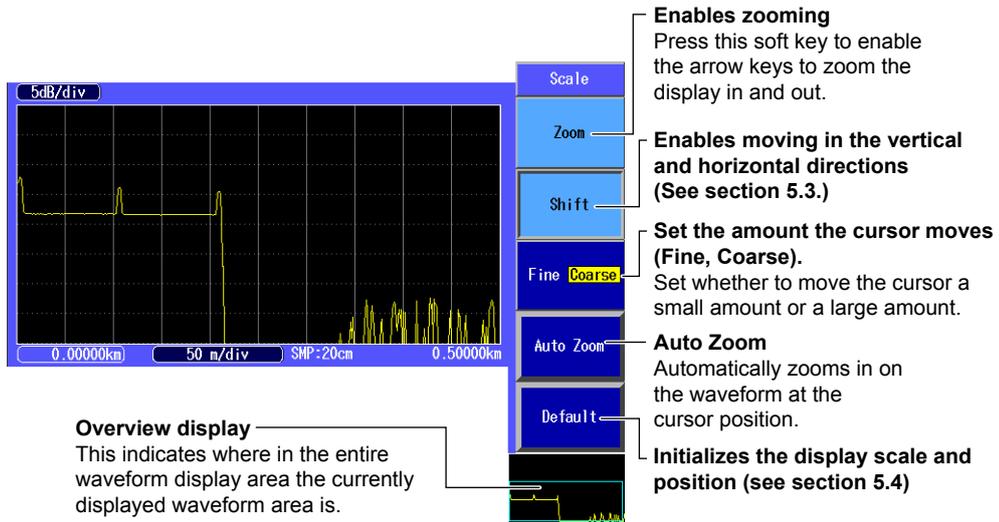
The attenuation, distance, and attenuation per km between the markers are displayed.

5.2 Zooming the Waveform Display Scale

Procedure

Switching between Zooming and Moving the Displayed Waveform

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP** and then the **Scale** soft key to display the following screen.



Zooming the Displayed Waveform

1. Press the arrow keys to zoom the displayed waveform in or out.

Note

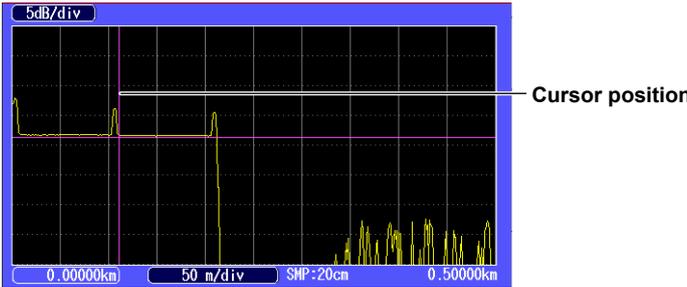
You can zoom the waveform during measurement or when measurements are stopped.

Explanation

Zooming In and Out

You can press the arrow keys to zoom the displayed waveform in or out. When the cursor is displayed, the waveform is zoomed at the cursor position. When the cursor is not displayed, the waveform is zoomed at the left edge of the display.

- Down arrow key: Zoom in on the waveform in the vertical direction.
- Up arrow key: Zoom out on the waveform in the vertical direction.
- Left arrow key: Zoom in on the waveform in the horizontal direction.
- Right arrow key: Zoom out on the waveform in the horizontal direction.



↓ Press the left arrow key to zoom the waveform display horizontally.



↓ Press the down arrow key to zoom the waveform display vertically.



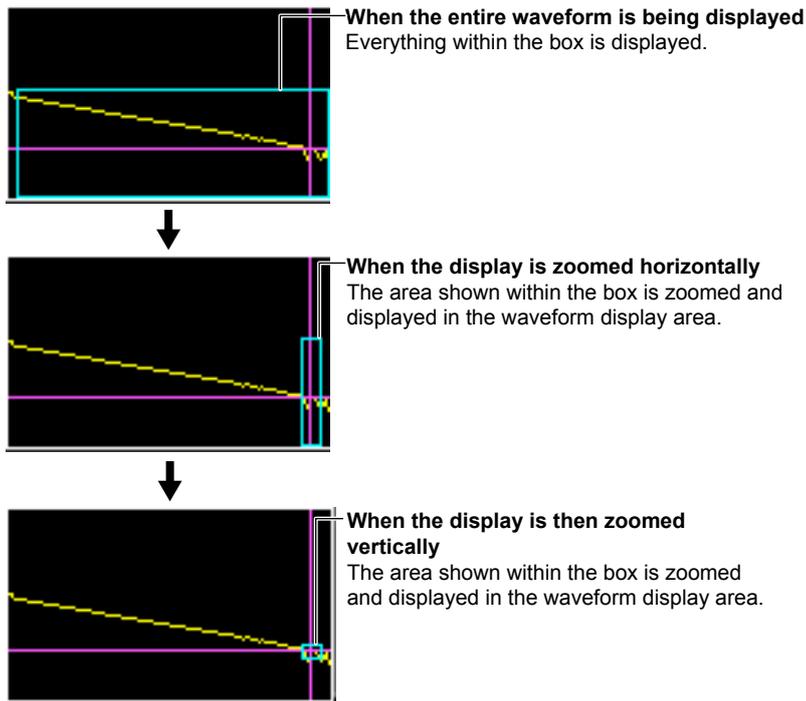
Auto Zoom

The auto zoom feature contains the following two types of zoomed displays.

- Zoom the waveform at the cursor position
The cursor on the waveform display screen is shown in the center of the zoomed display.
- Zoom the waveform at event positions
When the Instrument has detected events during event analysis, the selected event is zoomed and displayed.

Overview Display

The overview display is linked to the zoomed waveform display. The blue box indicates where in the entire waveform display area the zoomed waveform display is showing.

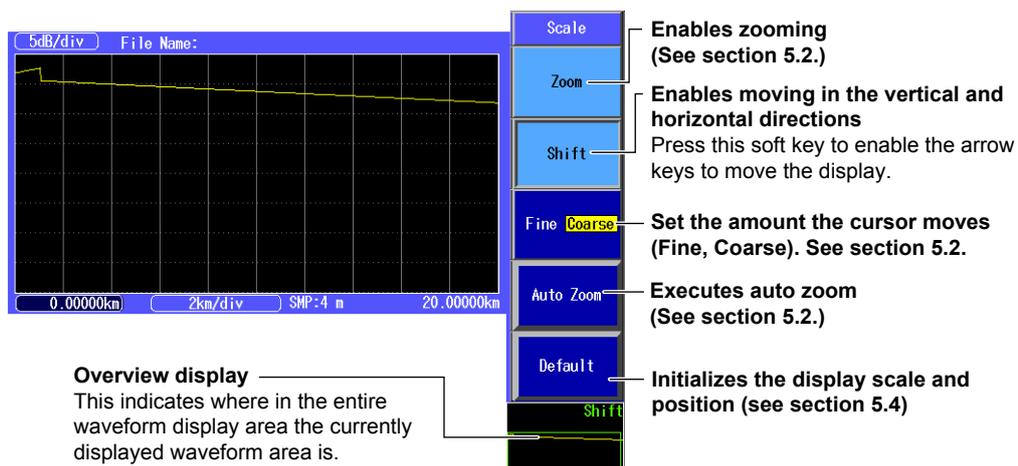


5.3 Moving the Waveform Display Position

Procedure

Switching between Zooming and Moving the Displayed Waveform

1. Using the rotary knob and **ENTER**, select **OTDR**.
2. Press **SETUP** and then the **Scale** soft key to display the following screen.



Moving the Displayed Waveform

1. Press the arrow keys to move the displayed waveform.

Note

You can move the displayed waveform during measurement or when measurements are stopped.

Explanation

Shifting the Horizontal and Vertical Axes

You can move the screen by pressing the arrow keys.

- Down arrow key: The screen moves down.
- Up arrow key: The screen moves up.
- Left arrow key: The screen moves left.
- Right arrow key: The screen moves right.

Overview Display

The green box indicates where in the entire waveform display area the currently displayed waveform area is.

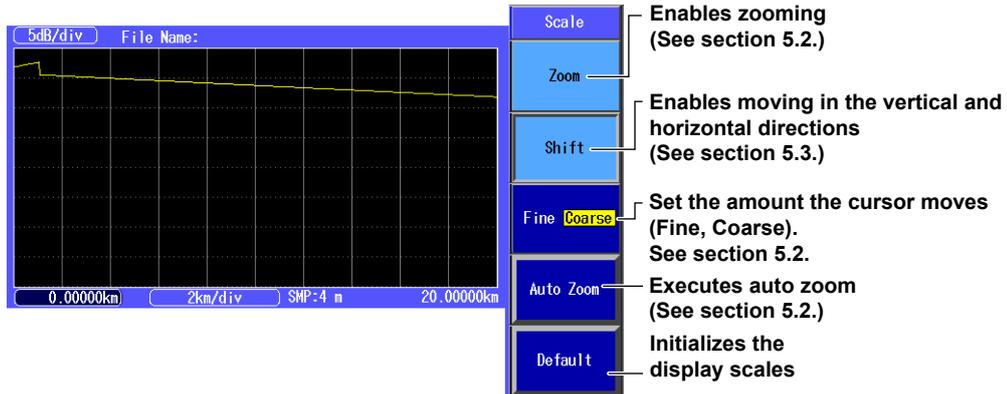


5.4 Initializing the Waveform Display Scale

Procedure

Initializing the Display Scale

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **SETUP** and then the **Scale** soft key to display the following screen.



Explanation

Initialization

When you initialize the display scale, the waveform is displayed with the total distance range that has been specified.

5.5 Setting the Waveform Information Display

Procedure

Waveform Display Information Setup Screen

1. Using the rotary knob and **ENTER**, select **OTDR**.
2. Press **SETUP**, the **System Setup** soft key, and then the **OTDR** soft key to display the following screen.

System setup screen



Configure the shortcut key.
(See section 2.3.)

Set the marker mode (Marker, Line).

Set the distance unit (km, mi(mile), kf(kfeet))*.

Set the pulse light output level (See section 3.7)

Set the event fix mode (Mode1, Mode2)
(See section 7.2)

* Displayed when the language is not set to "Japanese" in the system setup.
If set to "Japanese," you can select whether to display the return loss or reflection level for the reflection value. (See section 5.5 in IM AQ1200-01JA.)

Display setup screen



Turns the ghost cursor display on or off

Turns the approximated line display on or off

Turns the marker information display on or off

Turns the cursor dB value display on or off

Turns the event auto zoom on or off

Turns the scale display on or off

Turns the tooltip display on or off

Set the cursor display method (CROSS(+), Line(!)).

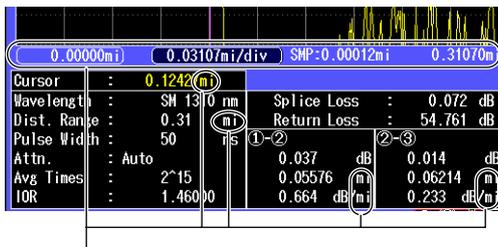
Select the events to display.

Explanation

Distance Unit

You can select the distance unit that is displayed on the screen from the units shown below. If you set the Instrument language to JAPANESE, the distance unit is fixed to km.

km, mile, kfeet



Example of when the distance unit is set to mile
All the distance units on the screen become miles (mi).

Marker Mode

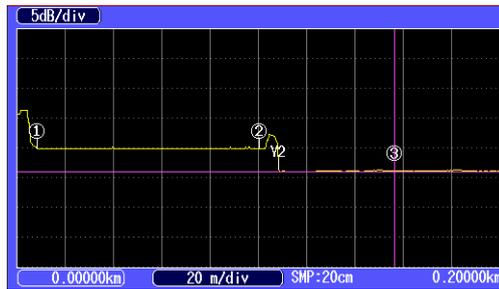
Marker

Move the cursor to the location that you want to measure, and set a marker. When you are measuring return loss and splice loss, they are calculated automatically when you set all the markers that are necessary for the measurement method that you are using.

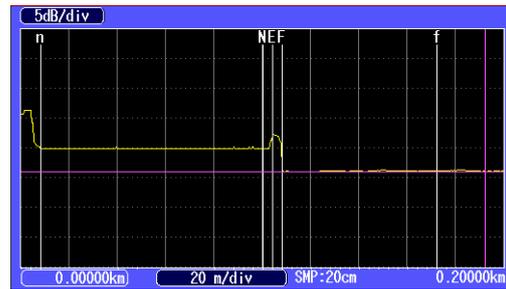
Line

After you select the line marker that you want to operate from a set of multiple line markers, move the selected line marker directly. The value of the line marker's section is calculated, and the return loss and splice loss are measured. Each value is calculated in real time as you move the line marker.

Marker



Line



Note

Line is often used outside of Japan. Marker is often used within Japan. It is used on existing YOKOGAWA models.

Displaying the Cursor dB Values

You can display not only the distance at the cursor position, but also the dB value.

Off: Only the distance at the cursor position is displayed.

On: The distance and the dB value at the cursor position are displayed.

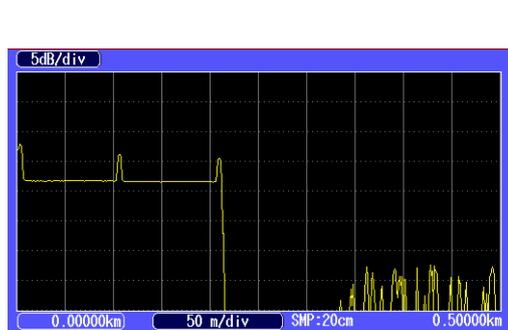


Displaying the Scale

You can display the scale values on the vertical and horizontal axes.

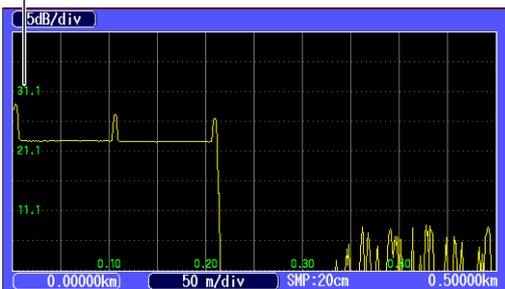
Off: The scale values are not displayed.

On: The scale values are displayed.



Scale display off

Scale value



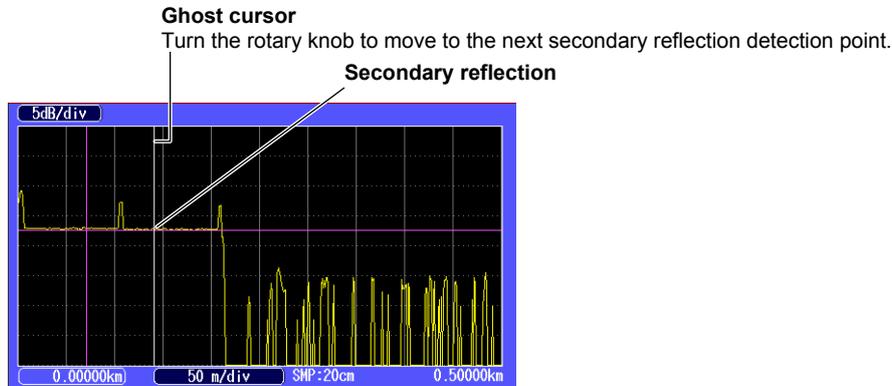
Scale display on

Ghost Cursors

Ghost cursors are used to check for secondary reflections. A secondary reflection is a reflection that is detected in a location where no event actually occurs.

Off: Ghost cursors are not displayed.

On: Ghost cursors are displayed.



How Secondary Reflections Are Generated

The optical pulse that is generated from position I in the following figure propagates in the direction of II.

↓

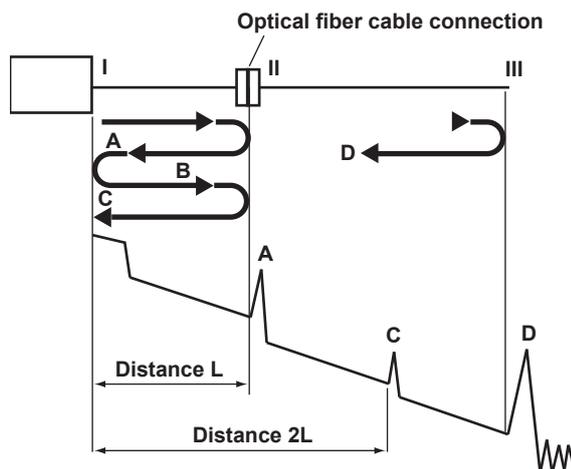
Light ray A that is reflected at connection II is reflected again at connection I and propagates in the direction of II as light ray B.

At this point, the Instrument detects A as an event.

↓

B is again reflected by connection II, and this generates reflected light ray C. At this point, the Instrument detects C as an event.

Because the Instrument measures all the reflected light rays, A, C, and D, C is also detected as an event in the same manner that an actually generated reflection is. Therefore, while there is no actual event in this location, it appears as if an event has in fact occurred.

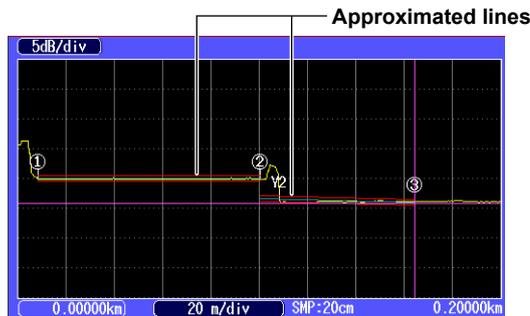


5.5 Setting the Waveform Information Display

Approximated Lines

In the 4 Point or 5 Point marker modes, you can display the approximated lines that are used to calculate splice loss or return loss.

- Off: Approximated lines are not displayed.
- On: Approximated lines are displayed.



Marker Information

You can display the distance from the measurement reference point to each marker on the waveform display area.

- Off: Marker information is not displayed.
- On: Marker information is displayed.



Event Auto Zoom

When events have been detected, you can zoom in on the event at the cursor position or the selected event. Each time that you select a different event, the zoom ratio of the vertical and horizontal axes is adjusted automatically. For details about event editing, see section 7.2.

Tooltips

You can configure the Instrument to display an explanation screen (Tooltip) for each measurement condition when it is selected.

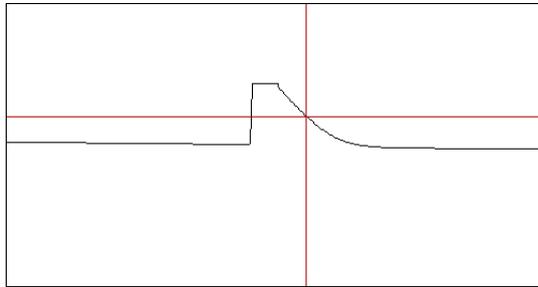
- Off: Tooltips are not displayed.
- On: Tooltips are displayed.



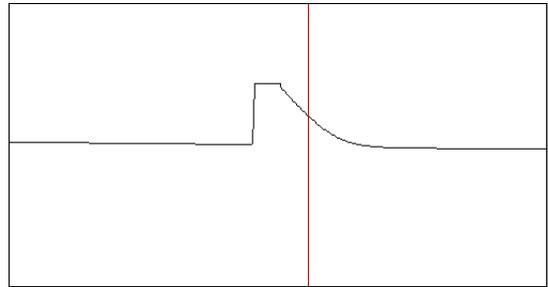
Selecting the Cursor Type

You can select the cursor type from the following:

Cross(+)	Uses a crosshair to indicate a position on the waveform.
Line(↓)	Uses a line to indicate a position on the waveform.



Crosshair display



Line display

Event List

In event analysis, you can select which items to display in the event list of the event screen. Up to six items can be displayed in the event list.

EventList Setup

No	EventNo	Off	On
	Distance	Off	On
	Splice Loss	Off	On
	Return Loss	Off	On
	Cumul-Loss	Off	On
	dB/km	Off	On
	Event Type	Off	On
	Section IOR	Off	On

Select the items to display.

Preview

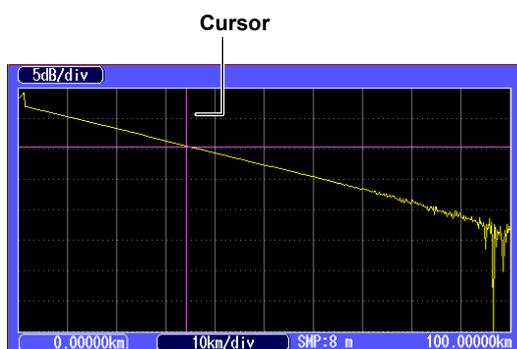
6.1 How to Operate the Cursor and Markers

You can use markers to measure values such as the distance, splice loss, or return loss between two points. This section will explain how to operate the cursor and markers. For information on the splice loss and return loss measurements, see sections 6.2 and later.

Procedure

Displaying and Moving the Cursor

1. Using the **rotary knob** and **ENTER**, select **OTDR** to display the following screen.
2. Turn the **rotary knob** to display the cursor.



Note

- The direction that the cursor moves differs depending on the direction that you rotate the rotary knob.
 - Clockwise: The cursor moves to the right.
 - Counterclockwise: The cursor moves to the left.
- If you turn the rotary knob counterclockwise to the point where the cursor reaches the left side of the screen, the cursor will disappear. If you reach the final measured point, the cursor will not move forward even if you turn the rotary knob clockwise.

Setting the Amount That the Cursor Moves

If you assign Coarse/Fine to a shortcut key, you can select whether the cursor moves a large amount or a small amount each time that you turn the rotary knob.

Coarse: The cursor moves a large amount.

Fine: The cursor moves a small amount.

For the shortcut key setup procedure, see section 2.3.

Displaying Markers (Marker mode: Marker)

- Using the **rotary knob** and **ENTER**, select **OTDR**.
- Press the **Marker** soft key to display the following screen.
When the suffix code is -HE, press the **Analysis** soft key and then the **Marker** soft key.

The screenshot shows a menu with four options:

- 2 Point Markers**: Press to switch to the screen that is used to measure the two-point markers. See "2 Point" later in this section.
- 4 Point Markers**: Press to switch to the screen that is used to measure the four-point markers. See "4 Point" later in this section.
- Distance Ref Setup**: Switches to the screen that is used to move the measurement reference point.
- Auxiliary Function**: Switches to the screen that is used to delete markers and the cursor.

A marker measurement outline is displayed on the screen. For details, see "Explanation" later in this section.

2 Point Markers

- Press the **2 Point Markers** soft key shown above to display the following screen.

The screenshot shows the 2 Point Markers screen with a graph and a data table. The graph displays a yellow trace with two vertical markers labeled Marker 1 and Marker 2. The data table below the graph provides the following information:

Cursor	: 34.00386km	Splice Loss	:
Wavelength	: SM 1310 nm	Return Loss	:
Dist. Range	: Auto 100 km		
Pulse Width	: Auto 5 us		
Attn.	: Auto 12.50 dB		
Avg Duration	: Auto		
IDR	: 1.46000		

On the right side of the screen, there are several soft keys:

- 2 Point Markers**: Set marker 1. Set marker 1 to the cursor position.
- 1**: Set marker 2. Set marker 2 to the cursor position.
- Distance Ref Setup**: See "Distance Reference" later in this section.
- Dist. Ref Delete**: See "Distance Reference" later in this section.
- Cursor Link**: Turns the cursor link on or off (currently Off).

Note

When you set the marker positions, set them so that the ① marker is the measurement start point (the distance reference).

4 Point Markers

3. Press the 4 Point Markers soft key shown on the previous page to display the following screen.

The screenshot shows a waveform on a grid with three markers labeled 1, 2, and 3. A vertical cursor is labeled Y2. The soft key menu on the right contains the following options:

- 1**: Set marker 1. Set marker 1 to the cursor position.
- 2**: Set marker 2. Set marker 2 to the cursor position.
- Y2**: Set marker Y2. Set marker Y2 to the cursor position.
- 3**: Set marker 3. Set marker 3 to the cursor position.
- More...**: Press to set all markers together.
- Distance Ref Setup**: See "Distance Reference" later in this section.
- Dist. Ref. Delete**: See "Distance Reference" later in this section.
- Cursor Link**: Turns the cursor link on or off (currently Off).

Note

Set the markers in the order shown above, starting with the measurement start point (the distance reference).

Distance Reference

3. Press the Distance Ref Setup soft key shown on the previous page to display the following screen.

The screenshot shows a waveform on a grid with a marker labeled R. The soft key menu on the right contains the following options:

- Distance Ref Setup**: Set the distance reference. Set the distance reference (marker R) to the cursor position.
- Dist. Ref. Delete**: Delete the distance reference. Delete the distance reference (marker R).

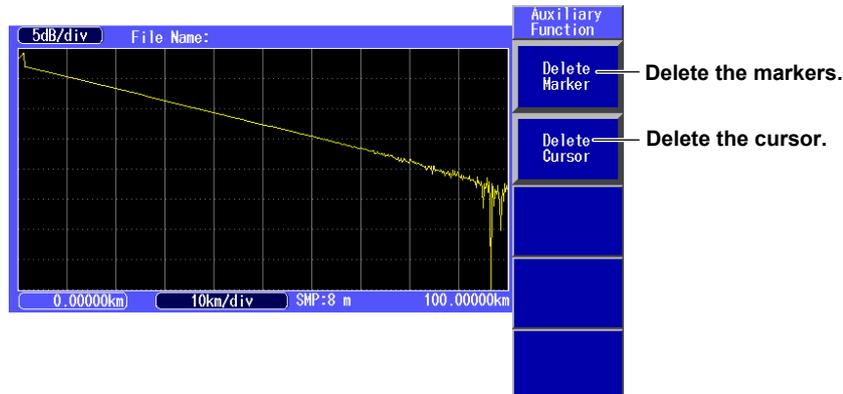
Note

The color of the displayed waveform to the left of the specified distance reference changes.

6.1 How to Operate the Cursor and Markers

Deleting Markers or the Cursor

- Press the **Auxiliary Function** soft key shown on page 6-2 to display the following screen.

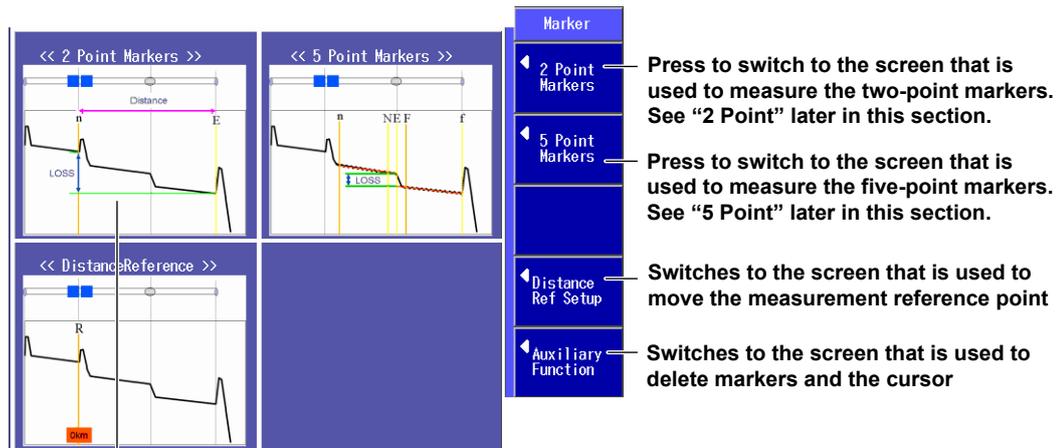


Note

For details on the marker modes, see section 5.5.

Displaying Markers (Marker mode: Line)

- Using the **rotary knob** and **ENTER**, select **OTDR**.
- Press the **Marker** soft key to display the following screen.
When the suffix code is -HE, press the **Analysis** soft key and then the **Marker** soft key.



A marker measurement outline is displayed on the screen. For details, see "Explanation" later in this section.

2 Point Markers

3. Press the **2 Point Markers** soft key shown on the previous page to display the following screen.

The screenshot shows a graph with a yellow line and two vertical markers labeled 'Marker n' and 'Marker E'. The graph has a scale of 5dB/div and 10km/div. Below the graph is a data table with the following values:

Cursor	: 51.99962km	Splice Loss	:	
Wavelength	: SM 1310 nm	Return Loss	:	
Dist. Range	: Auto 100 km	n-E	:	E-f
Pulse Width	: Auto 5 us	4.020	:	dB
Attn.	: Auto 12.50 dB	19.99985	:	km
Avg Duration	: Auto	0.201	:	dB/km
IOR	: 1.46000		:	

On the right side of the screen, there are several soft keys and their functions:

- 2 Point Markers**: Set the cursor. Turn the rotary knob to display and then move the cursor.
- Cursor**: Set marker n. Turn the rotary knob to display and then move marker n.
- n**: Set marker E. Turn the rotary knob to display and then move marker E.
- E**: Set the approximation method (see section 3.4).
- Approx Method (Marker)**: LSA, **IPA**
- Cursor Link**: Turns the cursor link on or off (Off, On)

Note

When you set the marker positions, set them so that the n marker is the measurement start point (the distance reference).

5 Point Markers

3. Press the **5 Point Markers** soft key shown on the previous page to display the following screen.

The screenshot shows a graph with a yellow line and five vertical markers labeled 'Marker n', 'Marker N', 'Marker E', 'Marker F', and 'Marker f'. The graph has a scale of 5dB/div and 10km/div. Below the graph is a data table with the following values:

Cursor	: 70.00359km	Splice Loss	:	-0.036 dB
Wavelength	: SM 1310 nm	Return Loss	:	
Dist. Range	: Auto 100 km	n-E	:	E-f
Pulse Width	: Auto 5 us	4.106	:	5.059 dB
Attn.	: Auto 12.50 dB	19.99985	:	25.99570 km
Avg Duration	: Auto	0.205	:	0.195 dB/km
IOR	: 1.46000		:	

On the right side of the screen, there are several soft keys and their functions:

- 5 Point Markers**: Press to set all markers together. All markers are displayed together.
- ALL**: Select the marker. Press this soft key to select the marker that you are operating.
- Select**: n N E F f
- Approx Method (Marker)**: LSA, **IPA**
- Cursor Link**: Turns the cursor link on or off (Off, On)

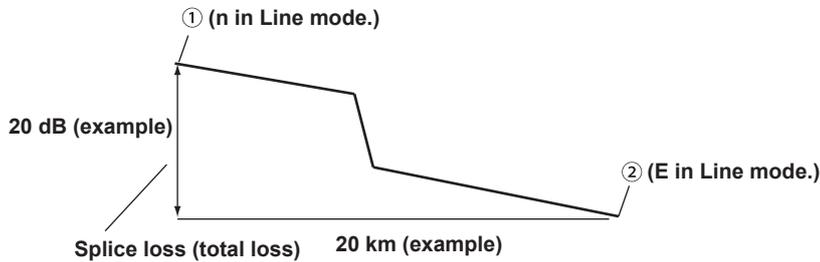
Note

- Only perform collective settings on all the markers when the cursor is displayed.
- Press the soft key to select either the cursor or a marker, and then turn the rotary knob to display and move it. "C" represents that the cursor is selected.

Explanation

2 Point Markers

The Instrument measures the distance and the loss between two points. If reflection is detected between the two points, the return loss is also measured.

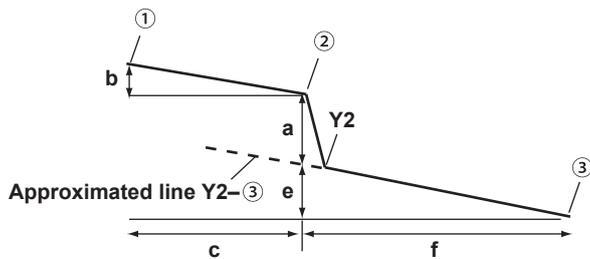


Splice loss:		Splice loss	
Return loss:		Return loss:	
①-②		②-③	
20	dB		
20	km		
1	dB/km		

The measured loss value differs depending on the specified approximation method. For details on the approximation methods, see section 3.6.

4 Point Markers

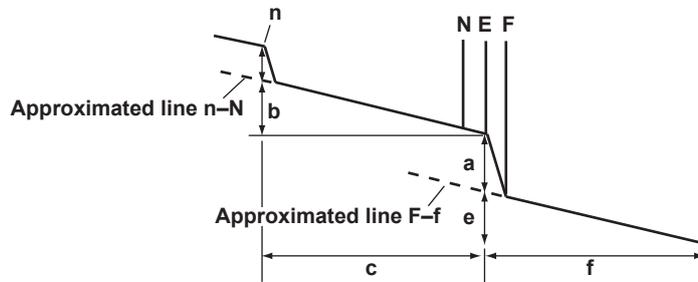
This mode is only enabled when the Marker Mode is set to Marker. The Instrument uses the following four points to perform the measurement: the measurement start point ①, the splice loss start point ②, the splice loss end point Y2, and the measurement end point ③. At the position of marker ②, the level difference between the approximated line ①-② and the approximated line Y2-③ is calculated as the splice loss.



Splice loss:		a	dB
Return loss:		Return loss:	
①-②		②-③	
b	dB	e	dB
c	km	f	km
b/c	dB/km	e/f	dB/km

5 Point Markers

This mode is only enabled when the Marker Mode is set to Line. The Instrument uses the following five points to perform the measurement: the near-end point (n), a point (N) that is used to calculate the near-end side's approximated line, a point (E) where splice loss is detected, a point (F) that is used to calculate the far-end side's approximated line, and the far-end point (f). At the position of marker E, the level difference between the approximated line n–N and the approximated line F–f is calculated as the splice loss.



Splice loss:		a	dB
Return loss:			
n – E		E – f	
b	dB	e	dB
c	km	f	km
b/c	dB/km	e/f	dB/km

- The measured loss value differs depending on the specified approximation method.
- Set the correct position for the E line. The splice loss changes greatly depending on the position of E.

Distance Reference

Normally, the location where the Instrument and the optical fiber are connected is the measurement reference point. This reference point is the distance reference. It is used to calculate the distance to the cursor and markers. If you are using a dummy fiber to perform measurements, move the distance reference the length of the dummy fiber before performing measurements.

Cursor Link (Moving all markers together)

You can move all markers while maintaining the distance between them.

6.2 Measuring Distances

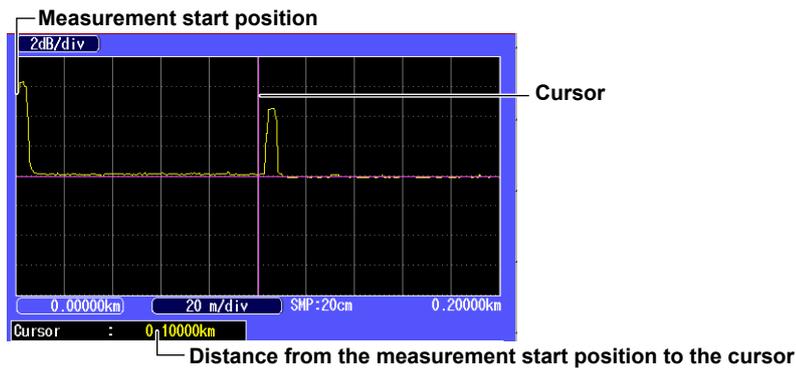
By placing the cursor on the acquired waveform, you can measure the distance to events such as reflections and splice losses.

Procedure

Using the Cursor to Measure the Distance

Follow the procedure below to measure the distance between the distance reference and the cursor.

1. Using the **rotary knob** and **ENTER**, select **OTDR** to display the following screen.
2. Turn the rotary knob to display the cursor.
3. Move the cursor to a position where an event is displayed.



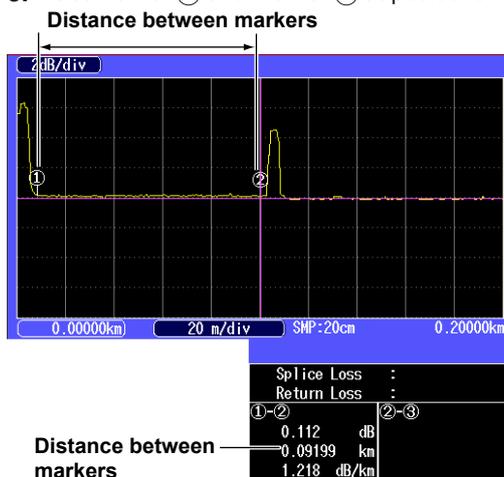
Note

- For details on the cursor, see section 6.1.
- The location where the Instrument and the optical fiber are connected is the distance reference. To perform more accurate measurements, zoom in on the waveform.

Using Markers to Measure the Distance

Follow the procedure below to measure the distance between two markers.

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press the **Marker** soft key and then the **2 Point Markers** soft key to display the following screen.
3. Set marker ① and marker ② at positions where events are displayed.



Note

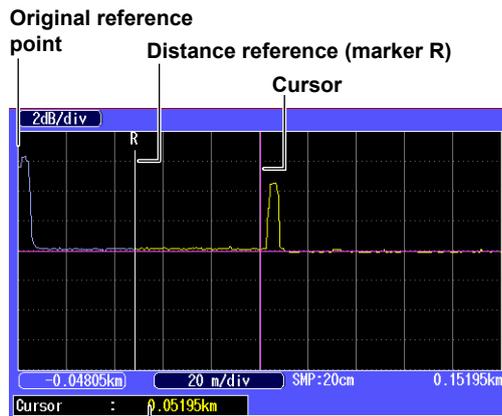
- Place the markers so that marker ① (or marker n if Marker Mode is set to Line) is the measurement start point (the distance reference). (The figure shown above is an example where Marker Mode is set to Marker.)
- For details on the soft keys, see section 6.1.

6.3 Moving the Distance Measurement Reference Point

Procedure

Moving the Distance Reference

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press the **Marker** soft key and then the **Distance Ref Setup** soft key to display the following screen.
When the suffix code is -HE, press the **Analysis** soft key, the **Marker** soft key, and then the **Distance Ref Setup** soft key.
3. Turn the rotary knob to move the distance reference (marker R) to the measurement start point.



If you set the distance reference, the distance from the distance reference to the cursor is measured

Note

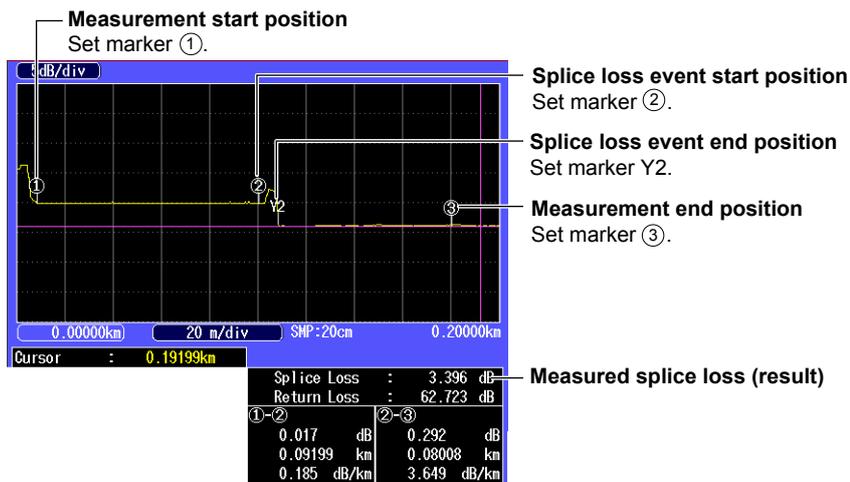
For details on the soft keys, see section 6.1.

6.4 Measuring the Splice Loss

Procedure

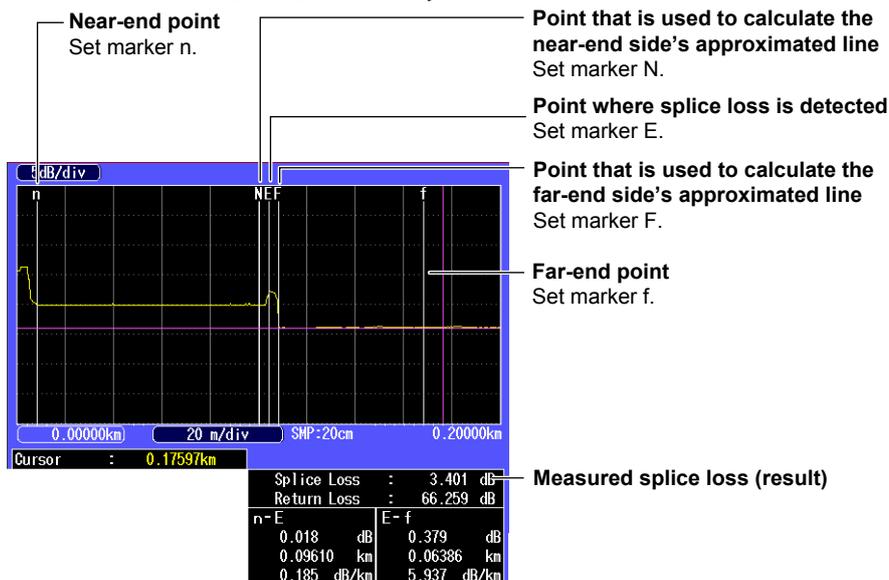
When Marker Mode Is Set to Marker

- Using the **rotary knob** and **ENTER**, select **OTDR**.
- Press the **Marker** soft key and then the **4 Point Markers** soft key to display the following screen.
When the suffix code is -HE, press the **Analysis** soft key, the **Marker** soft key, and then the **4 Point Markers** soft key.



When Marker Mode Is Set to Line

- Using the **rotary knob** and **ENTER**, select **OTDR**.
- Press the **Marker** soft key and then the **5 Point Markers** soft key to display the following screen.
When the suffix code is -HE, press the **Analysis** soft key, the **Marker** soft key, and then the **5 Point Markers** soft key.



Note

- For details on the soft keys, see section 6.1.
- For details on the marker modes, see section 5.5.

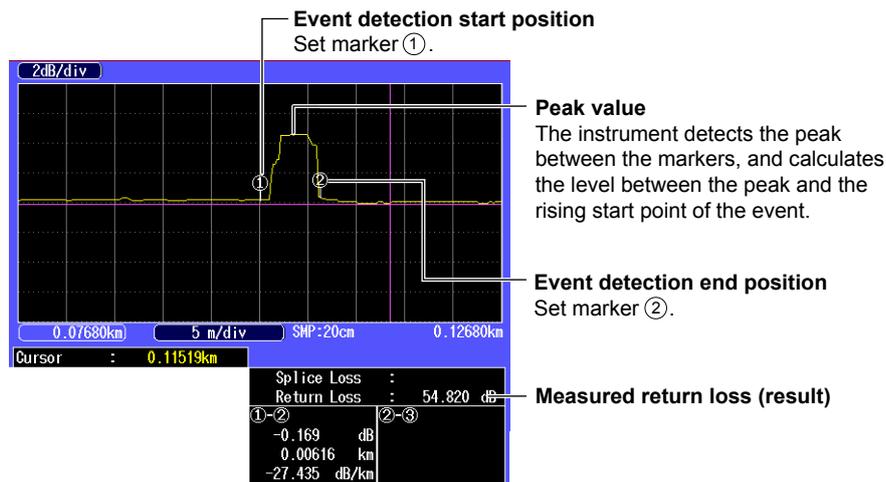
6.5 Measuring the Return Loss

Procedure

When Marker Mode Is Set to Marker

1. Using the rotary knob and **ENTER**, select **OTDR**.
2. Press the **Marker** soft key and then the **2 Point Markers** soft key to display the following screen.

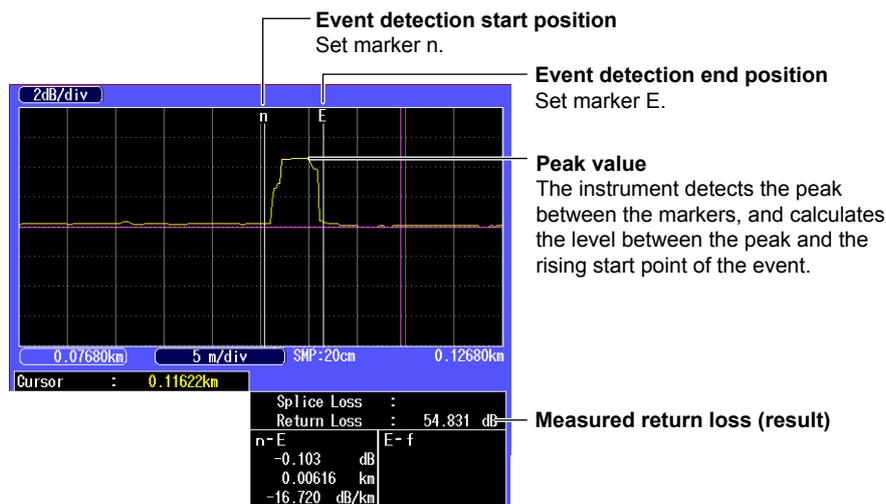
When the suffix code is -HE, press the **Analysis** soft key, the **Marker** soft key, and then the **2 Point Markers** soft key.



When Marker Mode Is Set to Line

1. Using the rotary knob and **ENTER**, select **OTDR**.
2. Press the **Marker** soft key and then the **2 Point Markers** soft key to display the following screen.

When the suffix code is -HE, press the **Analysis** soft key, the **Marker** soft key, and then the **2 Point Markers** soft key.



Note

- For details on the soft keys, see section 6.1.
- For details on the marker modes, see section 5.5.

Explanation

Return Loss

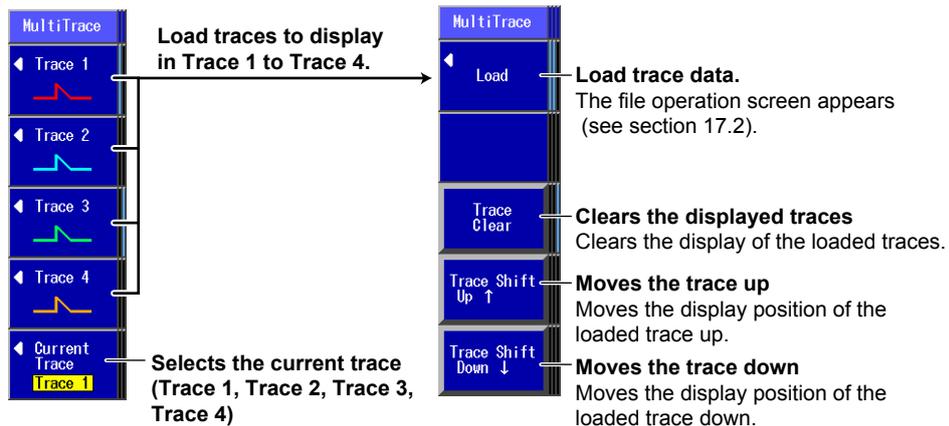
- If “<” is displayed next to the return loss value, the measured waveform is saturated. If the waveform is saturated, the actual reflection value is larger than the value shown. To prevent a waveform from being saturated, you can:
 - Select a large attenuation value, and perform the measurement again.
 - Select Hi-Reflection for the average method, and perform the measurement again.
 - Select a large pulse width value, and perform the measurement again.
- When reflections are small (less than or equal to about 0.5 dB), the return loss is not displayed.

6.6 Displaying Multiple Traces

Procedure

Multi Trace Analysis Screen

1. Use the **rotary knob** and **ENTER** to select **OTDR**.
2. Press the **Advanced Analysis** soft key and then the **MultiTrace** soft key. The MultiTrace menu appears.
When the suffix code is -HE, press the **Analysis** soft key, the **Advanced Analysis** soft key and then **MultiTrace** soft key.



Explanation

Loading Trace Data

Up to four traces can be loaded. Loaded traces are displayed on a single screen, so you can compare them. The type of file that you can load is SOR.

Loaded traces are displayed in line with the current trace. They are displayed at the 0 m position on the horizontal axis or so that their distance references match that of the current trace. Each loaded trace can be moved vertically as you like.

Current Trace

You can select the current trace from Trace 1 to Trace 4.

When you expand or reduce the current trace, other traces are adjusted accordingly.

Cursors are displayed on the current trace. Return loss and splice loss that are displayed in the measurement conditions are those of the current trace.



6.7 Combining Two Traces

Procedure

2-WayTrace Screen

1. Use the **rotary knob** and **ENTER** to select **OTDR**.
2. Press the **Advanced Analysis** soft key and then the **2-WayTrace** soft key. The following screen appears.

When the suffix code is -HE, press the **Analysis** soft key, the **Advanced Analysis** soft key and then the **2-WayTrace** soft key.

The screenshot shows the 2-WayTrace Analysis screen with two traces (Trace 1 and Trace 2) overlaid on a graph. The graph displays distance in km on the x-axis and loss in dB on the y-axis. A cursor is positioned at 31.63524km. Below the graph is an event list table with the following data:

Event No	Distance (km)	Splice Loss (dB)	Return Loss (dB)	Cumulate Loss (dB)	Event Type
R	0.00000	0.248		0.000	
1	5.75928	0.036		1.566	
2	8.98969	0.053		2.231	
3	18.27306	0.040		4.098	

Annotations on the right side of the screen indicate the following functions:

- Screen (Trace+List, List)**: See section 7.1.
- Display Type (Reverse, Normal)**: Selects the display type.
- Rotary Knob Cursor (Event)**: Selects the rotary knob function (Cursor, Event).

Annotations on the left side of the screen indicate the following steps:

- Trace 1**: Load traces to display in Trace 1 and Trace 2. The file operation screen appears (see section 17.2).
- Trace 2**: Load traces to display in Trace 1 and Trace 2. The file operation screen appears (see section 17.2).
- Current Trace (Trace 1, Trace 2)**: Selects the current trace (Trace 1, Trace 2).
- 2-WayTrace Analysis**: Executes 2 way trace analysis. The event screen of 2 way trace analysis appears.

Explanation

Loading Trace Data

The type of file that you can load is SOR.

Note

Traces that meet the following conditions can be combined.

- Event lists are available.
- The wavelengths and pulse widths of the two traces are the same.
- The distances from the measurement reference (S) to the end event (E) are the same.

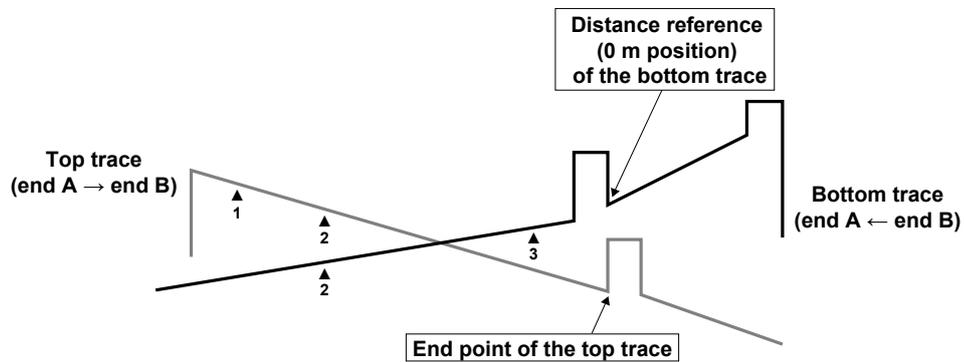
Current Trace

The current trace can be set to one of the combined traces.

Cursors are displayed on the current trace.

Event Screen of 2 Way Trace Analysis

The horizontal axes of the combined traces are aligned so that the end point of the top trace (end A → end B) match the 0 m position (distance reference) of the bottom trace (end A ← end B).



As shown in the above figure, markers are added only to the trace in which events are found. Event numbers are the same as the event list numbers after the combining of the traces.

Display Type

- Reverse: The display direction of the trace that is not the current trace is reversed.
- Normal: The display direction of the trace that is not the current trace is not reversed.

6.8 Displaying Differential Traces

Procedure

Differential Trace Screen

1. Use the **rotary knob** and **ENTER** to select **OTDR**.
2. Press the **Advanced Analysis** soft key and then the **Diff. Trace** soft key. The following screen appears.
When the suffix code is -HE, press the **Analysis** soft key, the **Advanced Analysis** soft key and then **Diff. Trace** soft key.

The diagram illustrates the process of loading traces and executing differential trace analysis. It shows a sequence of soft key presses: **Diff.Trace**, **Trace 1**, **Trace 2**, **Current Trace** (with **Trace 1** selected), and **Diff. Trace Analysis**. Annotations explain each step: loading traces to display in Trace 1 and Trace 2, selecting the current trace (Trace 1, Trace 2), and executing differential trace analysis. Two resulting screen views are shown: one for **When marker mode is set to Marker** and one for **When marker mode is set to Line**. The **Marker** mode screen displays a graph with a cursor and a data table with fields for Wavelength, Dist. Range, Pulse Width, Attn., Avg Duration, IOR, Splice Loss, and Return Loss. The **Line** mode screen displays a graph with a cursor and a data table with fields for Splice Loss and Return Loss.

Explanation

Loading Trace Data

The type of file that you can load is SOR.

Note

A differential trace of traces that meet the following conditions can be displayed.

- Sample interval
- Measurement start position

Current Trace

The current trace can be set to one of the traces that are used for taking the difference.

Cursors are displayed on the current trace. Return loss and splice loss that are displayed in the measurement conditions are those of the current trace.

Differential Trace Analysis

The differential trace is the result of subtracting the values of the current trace from those of the other trace.

Marker Features

You can place cursors and markers on the differential trace.

You can display the distance at each cursor position as well as the following values between markers.

- Loss (dB)
- Distance (km)
- dB/km
- For the operations when marker mode is set to Marker, see “4 Point Markers” in section 6.1.
- For the operations when marker mode is set to Line, see “5 Point Markers” in section 6.1.
- The return loss and splice loss of differential traces cannot be saved.

6.9 Analyzing Sections

Follow the procedure below to measure the return loss and the total loss for the specified section.

Procedure

Section Analysis Screen

- Using the rotary knob and ENTER, select OTDR.
- Press the **Advanced Analysis** soft key, and then the **Section Analysis** soft key to display the following screen.
When the suffix code is -HE, press the **Analysis** soft key, the **Advanced Analysis** soft key and then **Section Analysis** soft key.

Analysis start position
Set marker S.

Analysis end position
Set marker E.

Section S-E analysis results

Base Level	: 22.683 dB
Start Distance	: 0.09692 km
End Distance	: 0.19692 km
Distance	: 0.10000 km
Loss	: 0.114 dB
dB/km	: 1.140 dB/km
Return Loss	: 49.270 dB

Section Analysis

- Set Start Marker** — Set the start point marker to the cursor position.
- Set End Marker** — Set the end point marker to the cursor position.
- To be set by Marker** — **Specify from markers.** When the ① and ② markers or the n and E markers are already present, change these markers to the start point and end point markers.
- More** — **Press to configure more settings.** See "Adjusting the Reference Level" below.
- Approx. Method** — **Set the approximation method** (see section 3.4).

Adjusting the Reference Level

- Press the **More** soft key to display the following screen.

Marker ②
This is the reference point for the return loss measurement. The measured value between S and E is the splice loss, but the measured value between ② and E is the return loss. In the example shown here, the return loss from the event detection point onwards is being measured.

More

- Reference Level Adjust** — **Set the reference level adjustment.** Set marker ② to the cursor position.
- SetupClear** — **Clear the settings.** Press this to delete the start point, end point, and reference level adjustment markers.

Measured value between ② and E

Base Level	: 22.703 dB
Start Distance	: 0.09692 km
End Distance	: 0.19692 km
Distance	: 0.10000 km
Loss	: 0.114 dB
dB/km	: 1.140 dB/km
Return Loss	: 49.310 dB

Explanation**Section Analysis**

In sections 6.2 to 6.5, each item was measured with the distance reference as the reference point, but in section analysis, each item is measured with the location that is specified as the start point within the specified section as the reference point.

The distance, return loss, total loss, and loss per division (dB/km) between the S and E markers are displayed on the screen.

Marker Auto Setup

You can automatically set marker ① or marker n as the start point and marker ② or marker E as the end point.

You can use this feature to automatically set markers on waveform data in which marker ① and ② or n and E are already set.

Adjusting the Reference Level

If you set marker ③, which represents the reference point, the return loss is measured with this location as the reference. The Instrument uses the backscattering light level of the reference point to calculate the return loss. If you do not set the reference point, the start point is used as the reference point.

7.1 Displaying the Event Screen

Procedure

Event Screen

Screen display items: Trace+List

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press the **Event Analysis** soft key to display the following screen.
When the suffix code is -HE, press the **Analysis** soft key and then the **Event Analysis** soft key.

Measurement reference point: S

Event number 1

Detected fiber-end event

Waveform display

List display

Event Analysis

- Display Trace+List List: Set the displayed items to "Trace+List."
- Distance Ref Setup: Press to move the distance reference (see section 6.3).
- Event Edit/Fix: Edit or fix events (see section 7.2).
- 2 Point Markers: Press to configure the two-point markers. See "2 Point Markers" later in this section. For details on the two-point markers, see section 6.1.
- Rotary Knob Cursor Event: Select the rotary knob function (Cursor, Event).

Event No	Distance (km)	Splice Loss (dB)	Return Loss (dB)	Cumulate Loss (dB)	Event Type
1	0.10267	0.126	54.840	-0.011	↔
E	0.20534		55.811	0.125	↔

The analysis results of detected events are displayed in the event list. For setting the items to display in the event list, see section 5.5.

Screen display item: List

3. Press the **Display** soft key to select List. The following screen appears.

Measurement conditions

For details on the measurement conditions, see section 3.5.

Analysis values

List display

Event Analysis

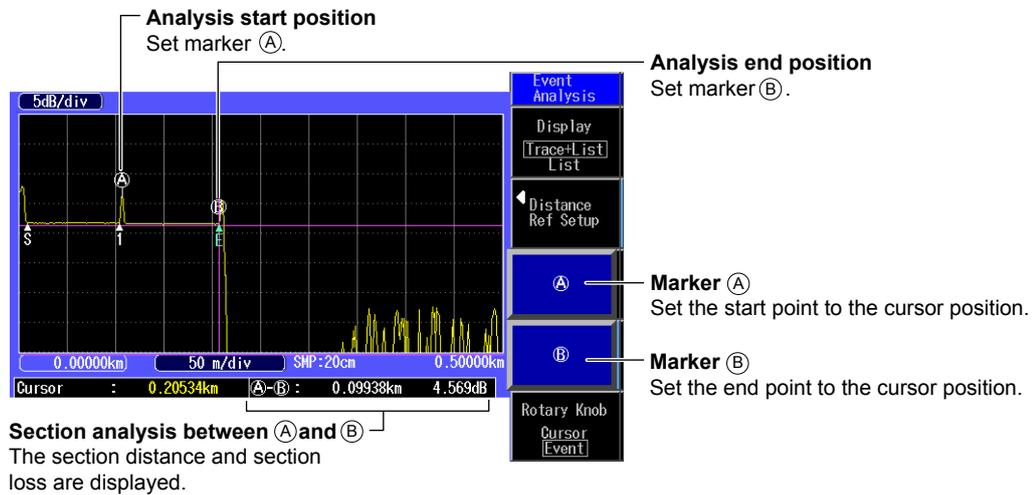
- Display Trace+List List: Set the displayed items to "List."
- List Edit: Edit the event list (see section 7.3).

Event No	Distance (km)	Splice Loss (dB)	Return Loss (dB)	Cumulate Loss (dB)	Event Type
1	0.10267	0.126	54.840	-0.011	↔
E	0.20534		55.811	0.125	↔

2 Point Markers

This feature is not available on models with -HE suffix codes.

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press the **Event Analysis** soft key and then the **2 Point Markers** soft key to display the following screen. The distance between marker (A) and (B) is measured.



Explanation

Event Screen

Event Number

A number is displayed on the waveform next to the event. The numbers are ordered from the left of the display. If there is an asterisk to the left of an event's number, the event is a fault event. For details about fault events, see section 3.6.

Distance

The distance from the measurement reference point to each event is displayed. If you move the distance reference, which is the measurement reference point, the distance from the distance reference to each event is displayed. For details about the distance reference, see section 6.3.

Splice Loss

The splice loss for each event is displayed. When the fault event display is turned on, splice losses that exceed the fault event threshold are displayed in red characters.

Return Loss

The return loss for each event is displayed. When the fault event display is turned on, return losses that exceed the fault event threshold are displayed in red characters.

Cumulate Loss

The loss from the measurement reference point is displayed. If the distance reference is specified, the distance reference is the measurement reference point. If the distance reference is not specified, the measurement reference point (S) is the measurement reference.

Event Types

The type of each event is displayed using the following symbols.

- : Positive splice loss
- ▣: Negative splice loss
- ∧: Reflection
- : Macro bending (bending loss)

Section Group Index (Section IOR)

The index of refraction between events is displayed.

Analysis Values

- **Total RL**

The integrated value of the return losses of each event.

- **Total distance**

The distance between the measurement reference point and the END point.

- **Total Loss**

Displayed in the following manner depending on the total loss calculation method.

Cumulate loss:

The integrated value of the splice losses at each event from the measurement reference point (S) is displayed.

Loss between S and E:

The loss between the measurement reference point (S) and the end of fiber (E) is displayed.

Rotary Knob Feature

You can select the operation that occurs when you turn the rotary knob from the following.

Cursor: The cursor moves continuously.

Event: The cursor moves directly between detected events.

Event Detection

Events are detected automatically. For details, see section 3.5.

7.2 Editing Events

There may be cases where, because the backscattering light level is too small at a reflection point in an optical fiber, the reflection cannot be detected as an event, or there may be cases where noise is detected as an event.

In such cases, you can adjust the events by editing them as follows:

- Inserts events
- Deletes events
- Edit event markers
- Turn the event position fix feature on and off

Procedure

Editing Events

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press the **Event Analysis** soft key and then the **Event Edit/Fix** soft key to display the following screen.

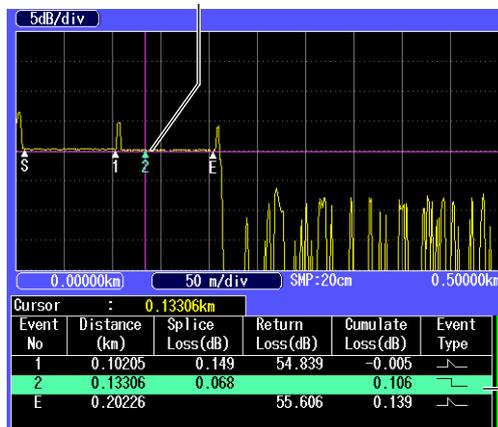
When the suffix code is -HE, press the **Analysis** soft key, the **Event Analysis** soft key and then **Event Edit/Fix** soft key.

Event Edit	
Ins. Event (Cursor)	Inserts an event You can insert events when Cursor is selected on the Rotary Knob soft key.
Del. Event (Event)	Deletes an event You can delete events when Event is selected on the Rotary Knob soft key.
Event MarkerEdit	Edit event markers. See "Editing an Event Marker" described later.
Event Fix OFF ON	Turns the event position fix feature on or off ON: Event positions are fixed. OFF: Event positions are not fixed.
Rotary Knob Cursor Event	Selects the rotary knob function (Cursor, Event)

Inserting an Event

3. Press the **Rotary Knob** soft key to select List. Press the **Ins. Event** soft key. The following screen appears.

A virtual event is inserted at the cursor position.



The inserted event is added to the event list.

Deleting an Event

3. Press the **Rotary Knob** soft key to select Event.
4. Use the **rotary knob** to select the event that you want to delete. Press the **Del. Event** soft key.

The selected event's color changes.

The event is deleted virtually. When the event is deleted, the subsequent event numbers are each decreased by one.

The deleted event is deleted from the event list.

Event No	Distance (km)	Splice Loss (dB)	Return Loss (dB)	Cumulate Loss (dB)	Event Type
1	0.10267	0.243	54.840	-0.011	—
2	0.13593	0.046	0.070	—	—
E	0.20534	—	55.811	0.125	—

Event No	Distance (km)	Splice Loss (dB)
1	0.13593	0.422
E	0.20534	—

Editing an Event Marker

You can move an event marker to recalculate return loss and splice loss.

3. Press the **Rotary Knob** soft key to select Event.
4. Turn the **rotary knob** to move the cursor to the event that you want to edit. The selected event's color changes.
5. Press the **Event MarkerEdit** soft key. The Event MarkerEdit menu appears, and event markers are displayed.

When Marker Mode Is Set to Marker

① Sets marker ①. Marker ① moves to the cursor position.

② Sets marker ②. Marker ② moves to the cursor position.

Y2 Set marker Y2. Marker Y2 moves to the cursor position.

③ Sets marker ③. Marker ③ moves to the cursor position.

Rotary Knob Set the rotary knob function to **Cursor**.

Cursor	: 82.00350km	Splice Loss	: —
EventNo	: E	Return Loss	: 47.420 dB
Distance	: 91.95004 km	①-②	6.535 dB
Cumul-Loss	: 18.271 dB	②-③	30.19280 km
dB/km	: 0.202 dB/km		1.03490 km
Event Type	: —		0.216 dB/km
Section 10R	: 1.46000		

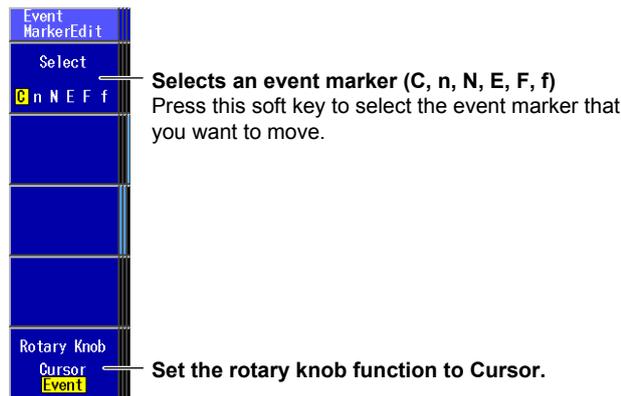
Detail display

6. Turn the **rotary knob** to move the cursor on the waveform to the position that you want to move an event to.
7. Press the appropriate event marker soft key. The event moves to the cursor position. The reflection loss and splice loss are recalculated and displayed in the detail display area at the bottom of the screen.

Note

For details on each event marker, see “4 Point Markers” in section 6.1.

When Marker Mode Is Set to Line



Selects an event marker (C, n, N, E, F, f)
Press this soft key to select the event marker that you want to move.

Set the rotary knob function to Cursor.

6. Press the **Select** soft key to select the event marker that you want to move.
7. Turn the **rotary knob** to move the event marker.
The reflection loss and splice loss are recalculated and displayed in the detail display area at the bottom of the screen.

Note

For details on each event marker, see “5 Point Markers” in section 6.1.

Explanation

Inserting Events

- The event list can display up to 100 events.
- If you insert an event between two events that are displayed, the new event takes on the number that follows the event on the left, and all subsequent event numbers are increased by one. You cannot insert events to the left of the S point.
- You cannot insert events to the left of the distance reference. You can use the Distance Ref Setup soft key to move the distance reference. For details about the distance reference, see section 6.3.
- If you insert an event to the right of the E event, the inserted event becomes the E event, and a new number is assigned to the former E event.

Deleting Events

- If only the S point and the E event are displayed, you cannot delete any events.
- If you delete an event, the subsequent event numbers will all be reduced by one.
- You cannot delete the S point.
- If you set a distance reference (R point), the S point disappears from the screen. In this situation, the measurement reference point is the distance reference. If you delete the distance reference, the S point is displayed again at its original position.
- If you delete the E event, the event that has the largest number becomes the E event.

Editing Event Markers

Event markers are used to calculate the splices losses and reflection losses at event positions. Normally, event markers are automatically assigned, but when event markers are assigned to noise and other undesirable waveforms, correct values cannot be calculated. In such cases, you can obtain correct values by moving event markers.

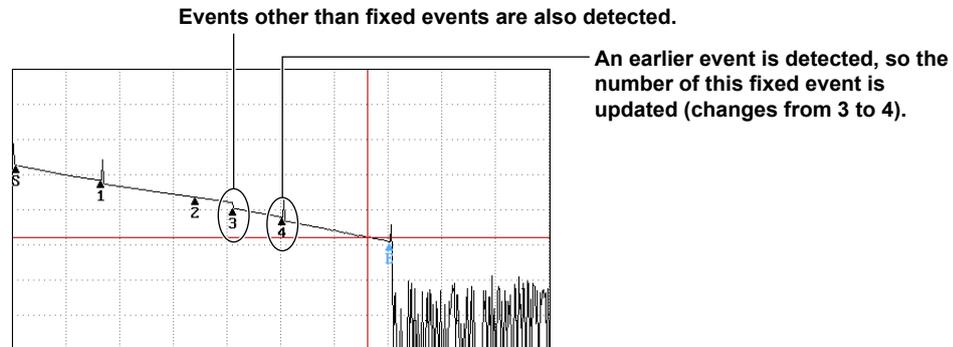
Turning the Event Position Fix Feature On and Off

Event positions can be fixed. Fixed events are handled as master events. You can configure the Instrument so that in subsequent event analysis only master events are handled.

How the events that are detected at positions other than the master event positions are displayed varies depending on the Event Fix Mode as follows:

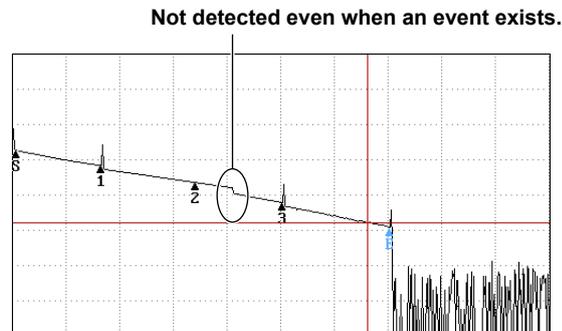
When Event Fix Mode Is Set to Mode1

Events detected at positions other than the master event positions are displayed in the event list.



When Event Fix Mode Is Set to Mode2

Only the events that are detected at the master event positions are displayed in the event list.



Note

For setting the Event Fix Mode, see section 5.5.

7.3 Editing the Event List

Procedure

Editing Events

1. Use the **rotary knob** and **ENTER** to select **OTDR**.
2. Press the **Event Analysis** soft key and then the **Display** soft key to select List.
When the suffix code is -HE, press the **Analysis** soft key, the **Event Analysis** soft key and then **Display** soft key.
3. Use the **arrow** keys or the **rotary knob** to move the cursor to the event that you want to edit.
4. Press the **List Edit** soft key. The List Edit screen appears.

Move the cursor to the event that you want to edit.

The screenshot shows the OTDR interface. On the left, the 'Event List' table is displayed with event 8 highlighted. On the right, the 'List Edit' screen is shown with three fields: Distance (89.72419), Return Loss (48.034), and Section IOR (1.46000). Arrows point from text labels to these fields.

Event No	Distance (km)	Splice Loss (dB)	Return Loss (dB)	Cumulative Loss (dB)	Event Type
5	86.66877	-0.706	46.262	17.107	↵
6	87.29299	-0.231	46.974	17.233	↵
7	87.65439	-0.717	43.750	18.058	↵
8	89.72419	-0.583	48.034	17.661	↵
9	91.63793	-0.772	44.064	18.748	↵
10	92.15538	-1.243	45.024	18.416	↵
11	93.25599	2.057	43.284	18.781	↵
12	93.99520	-0.066	48.045	18.359	↵
13	95.14509	0.364	45.199	18.910	↵
14	96.97670	-1.611	43.692	19.198	↵
E	99.69789		37.693	20.975	↵

List Edit

- Distance: 89.72419 (Edit the distance.)
- Return Loss: 48.034 (Edit the return loss (see section 6.5).)
- Section IOR: 1.46000 (Edit the section group Index.)

Explanation

Editing Distances

- When you change the distance of an event, the section group index (section IOR) is recalculated.
- When you change the distance of an event but the event cannot be set at the specified position, the distance is adjusted to a position where the event can be set.
- Changing the distance of an event affects the values of other events.
- You cannot change the distance of the distance reference (point R).

Editing Return Losses

When you change the return loss of an event, the backscatter level is recalculated. The return losses of other events are measured on the basis of the recalculated backscatter level.

Editing Section Group Indices (Section IORs)

- When you change the section group index of an event, the distance is recalculated.
- You cannot change the section group index of the distance reference (point R).

8.1 Producing Measurement Light



WARNING

- While the Instrument is producing light, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



AVERTISSEMENT

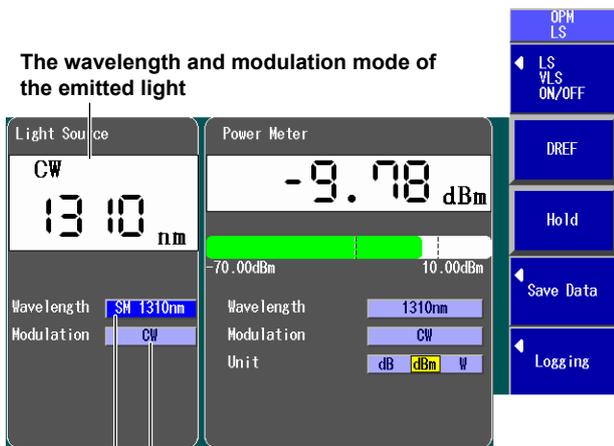
- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Procedure

Models with the /SLT, /HLT, or /PPM Option

Light Source Screen

Using the **rotary knob** and **ENTER**, select **LS_OPM** (the power meter light source) to display the following screen.



The wavelength and modulation mode of the emitted light

Set the modulation mode (CW, 270Hz, 1kHz, 2kHz).

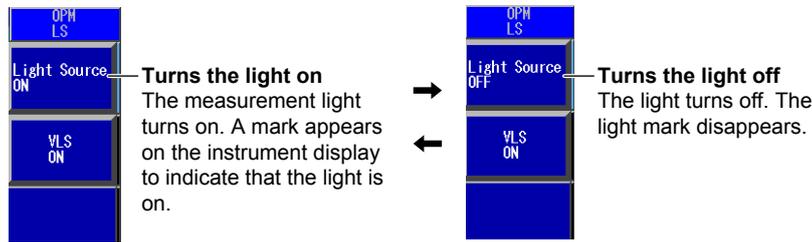
Set the wavelength.

The available settings vary depending on the models.

Turning the Light Source On and Off

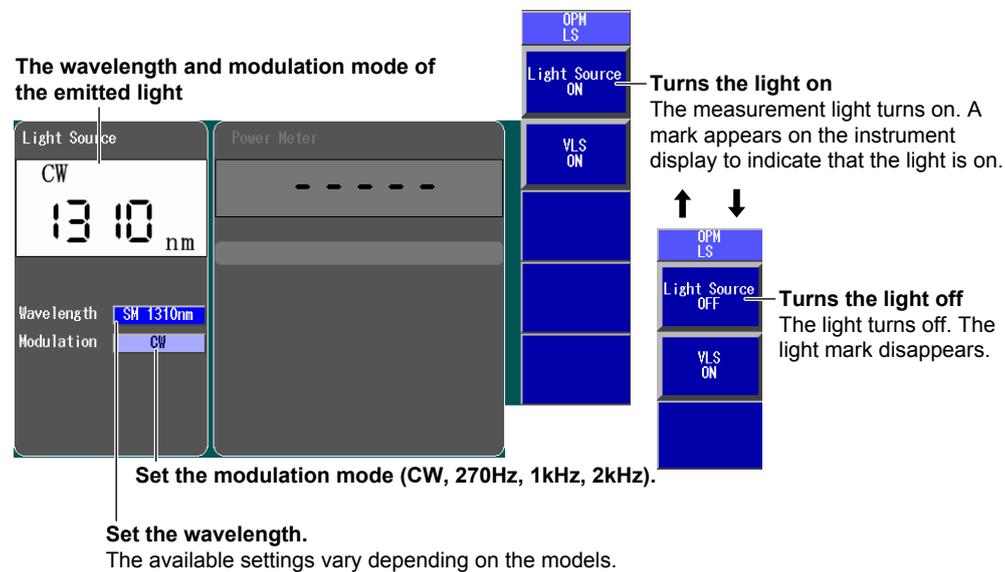
Turn the light source on after you set the wavelength and the modulation mode.

Press the **LS VLS ON/OFF** soft key to display the following menu.



Models with the /SLS Option Light Source Screen

Using the **rotary knob** and **ENTER**, select **LS_OPM** (the power meter light source) to display the following screen.



Explanation

This feature is available on models with the /SLT, /HLT, /PPM or /SLS option.

Loss-Measurement Light Source Wavelength

The following measurement light wavelengths can be generated.

Model	Measurement Light Wavelength
AQ1200A	SM 1310 nm, SM 1550 nm
AQ1200B	SM 1625 nm
AQ1200C	SM 1650 nm
AQ1200E	SM 1310 nm, SM 1550 nm, SM 1625 nm
AQ1205A	SM 1310 nm, SM 1550 nm
AQ1205E	SM 1310 nm, SM 1550 nm, SM 1625 nm
AQ1205F	SM 1310 nm, SM 1550 nm, SM 1650 nm

On the AQ1200A, AQ1200B, AQ1200C, and AQ1205A, the light for a single mode (SM) optical fiber is emitted from optical port 2.

On the AQ1200E, AQ1205E, and AQ1205F, light with a 1310 nm or 1550 nm wavelength is transmitted from optical port 2, and light with a 1625 nm or 1650 nm wavelength is transmitted from optical port 3. Firmly connect the optical fiber to the port that the light with the selected wavelength will be transmitted from.

Modulation Mode

You can set the frequency of the light to one of the following options.

CW (continuous light), 270 Hz, 1 kHz, 2 kHz

8.2 Turning On the Visible Light



WARNING

- While the Instrument is producing light, light is emitted from the light source port. Do not look directly at this light. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Procedure

There are two types of operation screens that you can use to generate visible light: a screen that displays the menus for both the measurement light source and the visible light source and a screen that displays just the menu for the visible light source.

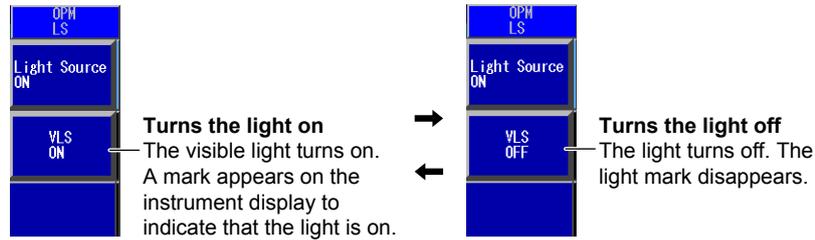
Measurement Light Source and Visible Light Source Screen (/SLT, /HLT or /PPM option)

Using the **rotary knob** and **ENTER**, select **LS_OPM** (the power meter light source) to display the following screen.



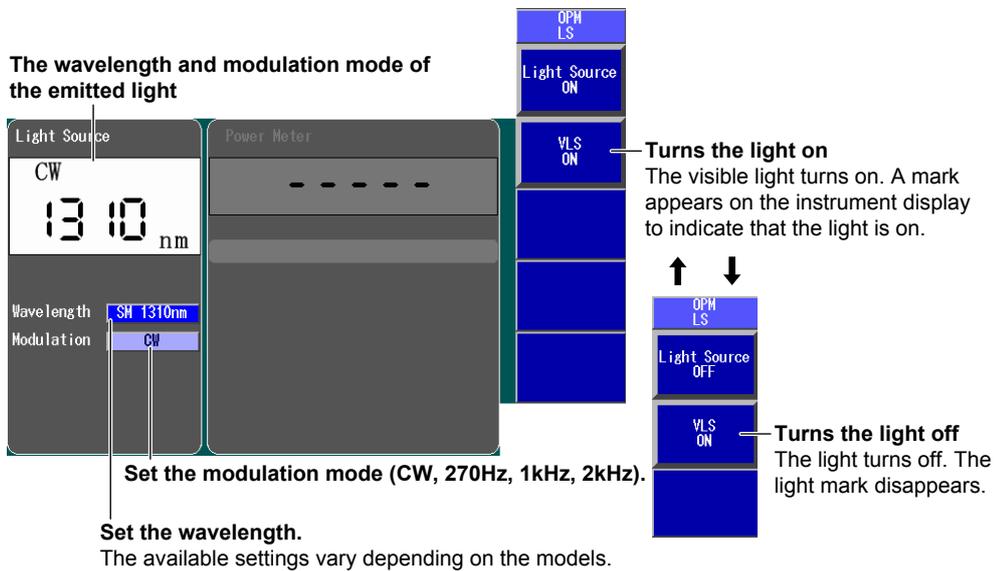
Turning the Light Source On and Off

Press the **LS VLS ON/OFF** soft key to display the following menu.



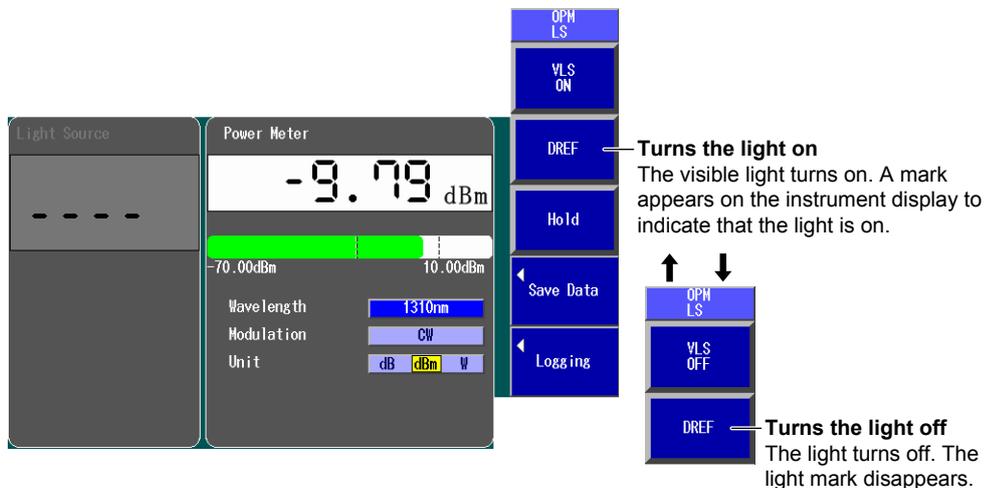
Measurement Light Source and Visible Light Source Screen (/SLS option)

Using the **rotary knob** and **ENTER**, select **LS_OPM** (the power meter light source) to display the following screen.



Power Meter and Visible Light Source Screen (/SPM option)

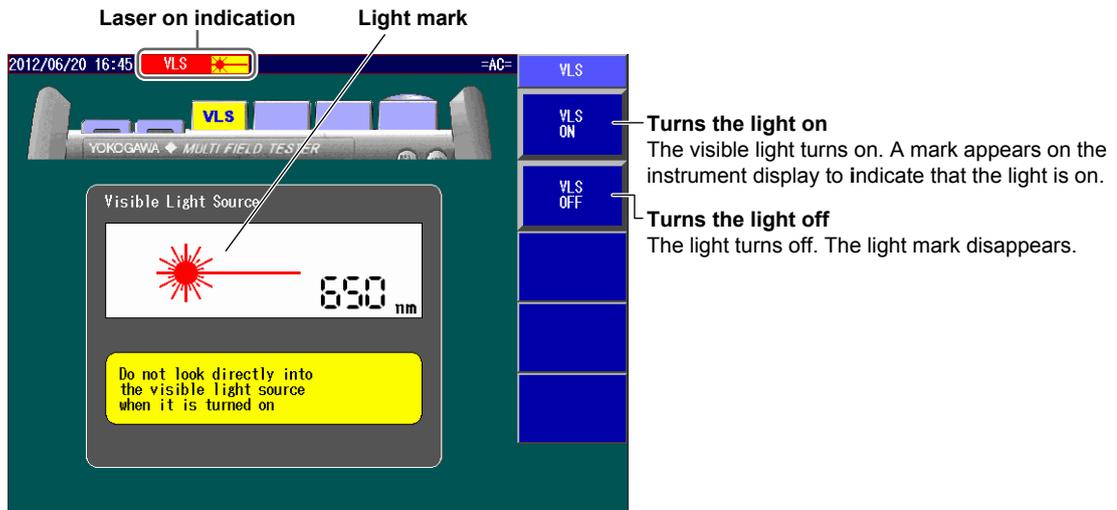
Using the **rotary knob** and **ENTER**, select **LS_OPM** (the power meter light source) to display the following screen.



8.2 Turning On the Visible Light

Visible Light Source Screen

Using the rotary knob and ENTER, select **Visible Light Source** to display the following screen.



Explanation

The visible light source is available on models with the /VLS option.

Visible light is emitted from the visible light source port (optical port 4).

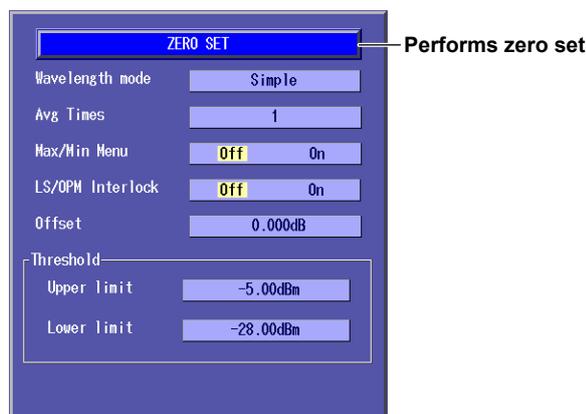
9.1 Making Preparations for Measurements

Remove the optical fiber cables from the Instrument and close the optical connector covers, or make sure that the power meter is not receiving any light, and then start the optical power meter zero set procedure.

Procedure

Performing Zero Set

1. Using the **rotary knob** and **ENTER**, select **LS_OPM** (the power meter light source).
2. Press **SETUP** and then the **OPM Setup** soft key to display the following screen.



Explanation

This feature is available on models with the /SLT, /HLT, /PPM or /SPM option.

Perform zero set whenever necessary, such as after you have turned on the power or when the ambient temperature changes. Performing zero set adjusts the internal deviation of the optical power measurement section and enables you to obtain more accurate absolute optical power values.

9.2 Setting Optical Power Measurement Conditions and Holding the Display

Procedure

Power Meter Screen

Using the rotary knob and **ENTER**, select **LS_OPM** (the power meter light source) to display the following screen.

(Model with /SPM option)

Bar graph display of the measured value

Measured value: 0.00 dB

Power Meter: 0.00 dB

Wavelength: 1310nm

Modulation: CW

Unit: dB

Reference: -9.94dBm

Lower threshold line: -70.00dBm

Upper threshold line: 10.00dBm

OPM LS

LS VLS ON/OFF

DREF

Hold

Save Data

Logging

OPM LS

VLS OFF

— Sets the reference to the currently displayed measured value

— Holds the measured value display

— Set the wavelength. This setting varies depending on the wavelength mode that you set in the detailed setup screen in the next section.

— Set the modulation mode (CW, 270Hz, 1kHz, 2kHz).

— Set the unit (dB, dBm, W).

— Set the reference manually (–80 to 40 dBm). The Reference box appears if you press the DREF soft key or set the unit to dB.

These lines indicate the upper and lower threshold values

Detailed Setup Screen

Press **SETUP** and then the **OPM Setup** soft key to display the following screen.

ZERO SET

Wavelength mode: Simple

Avg Times: 1

Max/Min Menu: Off On

LS/OPM Interlock: Off On

Offset: 0.000dB

Threshold

Upper limit: -5.00dBm

Lower limit: -28.00dBm

— Set the wavelength mode (Simple, Detail, CWDM). Can be set on models with /SLT or /HLT options.

— Set the average count (1, 10, 50, 100).

— Turns the display of the max/min value menu on and off

— Turns the interlocking of the light source and optical power meter settings on and off

— Can be set on models with /SLT or /HLT options. Can not be set on models with /SPM option (the soft key will not be displayed on the screen).

— Set the offset (–9.900 to 9.900 dB).

— Set the threshold values (–80 to 40 dBm). You can set the upper and lower values.

Explanation

This feature is available on models with the /SLT, /HLT, /PPM or /SPM option.

Wavelength

The light receiving element of the optical power measurement section has a wavelength sensitivity characteristic. The Instrument measures optical power more accurately by adjusting the sensitivity according to the specified wavelength.

Models with /SLT, /HLT or /SPM option

The wavelength ranges and steps vary depending on the wavelength mode that you set in the detailed setup screen. You can set the wavelength within the following ranges.

Wavelength Mode	Range and Steps
Simple	You can select from 850 nm, 1300 nm, 1310 nm, 1490 nm, 1550 nm, 1625 nm, and 1650 nm.
Detail	You can set the wavelength to a value from 800 to 1700 nm in 1 nm steps.
CWDM	You can set the wavelength to a value from 1270 to 1610 nm in 20 nm steps.

Models with /PPM option

You can set the wavelength to one of the following values.

1310 nm, 1490 nm, 1550 nm

Modulation Mode

You can set the modulation mode for optical measurement to one of the following options.

CW (continuous light), 270 Hz, 1 kHz, 2 kHz

Unit

You can set the optical power display unit to one of the following options.

dB (relative value), dBm (absolute value), W (absolute value)

- The following prefixes are attached to W: m (10^{-3}), μ (10^{-6}), n (10^{-9}), and p (10^{-12}).
- The relationship between the absolute values dBm and W is indicated below.

$$P_{\text{dBm}} = 10 \times \log (P_w \times 10^3)$$

Where P_{dBm} is the optical power in units of dBm and P_w is the optical power in units of W.

Reference

You can set a reference and display measured values as relative values (display their difference from the reference).

- Press the DREF soft key to make the displayed measured value the reference and display subsequent measured values as relative values. The unit will change to dB.
- Press the DREF soft key or set the unit to dB to display the Reference box in the Power Meter screen.
- You can set the reference manually in the Reference box. The range is -80 to 40 dBm.
- If you set the unit to dBm or W, the Reference box disappears and the measured values are displayed as absolute values.

Wavelength Mode

You can set the mode to one of the following options.

Simple, Detail, CWDM

When you change the wavelength mode, the wavelength range and steps for the Wavelength item change as explained above.

Average Count

Averages of the measured values are displayed. You can set the number of values to average to one of the following options.

1, 10, 50, 100

Turning the Maximum and Minimum Value Menu On and Off

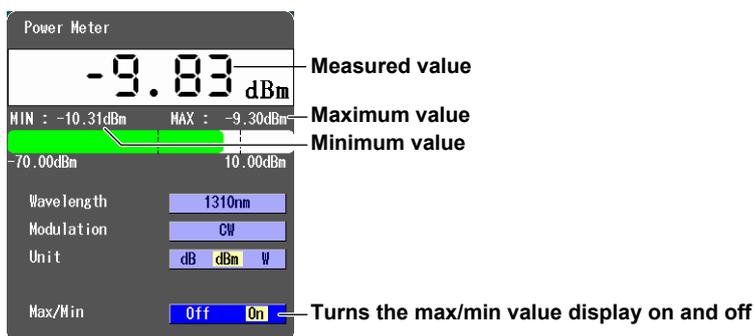
In the Power Meter screen, you can display a menu that shows the maximum (Max) and minimum (Min) measured values.

On	The menu is displayed.
Off	The menu is not displayed.

Turning the Maximum and Minimum Value Display On and Off

In the menu that appears in the Power Meter screen, you can start the display of the maximum and minimum measured values. The maximum and minimum value displays are constantly updated while measurement is being performed.

On	The maximum and minimum measured values from the time that you selected On are constantly updated and displayed.
Off	The maximum and minimum values are not displayed. The maximum and minimum values are reset when you select Off.



Turning the Interlocking of the Light Source and Optical Power Meter Settings On and Off

You can connect an optical fiber between the light source port of an Instrument and the optical power measurement port of another Instrument and use this setting so that the power meter settings are synchronized to the light source wavelength and modulation mode settings.

This feature is available on models with the /SLT, /HLT or /PPM option.

On	After On is selected, the power meter settings are synchronized to the light source settings.
Off	The power meter settings are not synchronized to the light source settings.

Offset

The value that you specify (the offset value) is added to the measured optical power values that are displayed. The range is -9.900 to 9.900 dB.

Threshold Value

You can set upper and lower threshold values and determine whether or not the measured values fall within them.

- The range for the upper and lower threshold values is -80 to 40 dBm. You must set the values so that the upper threshold value is greater than the lower threshold value.
- When a measured value is within the upper and lower thresholds, its bar graph is green.
- When a measured value exceeds the upper threshold or falls below the lower threshold, its bar graph is red.

Holding the Measured Value Display

When you press the HOLD soft key, the following actions are held: the updating of the measured values, bar graph, and maximum and minimum values and the showing or hiding of the maximum and minimum value display. The values at the time that you pressed the HOLD soft key remain displayed. To release the hold on the display, press the HOLD soft key again.



9.3 Logging Measured Values and Saving Logged Results

Procedure

Logging Screen

Screen display items: Power Meter

- Using the rotary knob and ENTER, select LS_OPM (the power meter light source).
- Press the Logging soft key to select Power Meter. The following screen appears.

Logging

Display

Power Meter — Set Display to “Power Meter.”

Logging

Setup — Displays the detailed setup screen
This performs the same operation as when you press SETUP. See the Detailed Setup screen on page 9-7.

Logging Data Save — Saves log data
A screen for setting the file save destination and the file name appears. See the File Save screen described below.

Logging START — Starts logging
Set the measurement interval and the logging count in the Detailed Setup screen on page 9-7.
After the specified number of logs are recorded, a screen for saving the logged results appears (see the File Save screen described below).

Screen display items: Logging

- Press the Display soft key to select Logging. The following screen appears.

Horizontal zoom factor

Vertical zoom factor

Date and time
See the operation guide, IM AQ1200-02EN.

Value per division on the vertical axis

Cursor

Optical power (vertical axis)

Logging time (horizontal axis)

Date and time that logging was executed

Optical power at the cursor position

Maximum, minimum, and average of all the logging data

Maximum, minimum, and average of the logging data within the area specified by the cursor

Lower threshold

Upper threshold

Measurement count
The number of times that logging has currently been executed and the total number of times to execute logging

Remaining battery power or AC
See the operation guide, IM AQ1200-02EN.

Set Display to “Logging.”

Select the cursor (C1, C2).

See the description of the “Logging Data Save” soft key above.

See the description of the “Logging START” soft key above.

Distance per division on the horizontal axis

Entire graph
The section that is displayed in the display area is indicated by a box (overview).

	C1	C2	C1-C2	total	LogMax	LogMin	Average
0.0s	-10.02dBm	-10.02dBm	0.00dBm	-9.50dBm	-10.06dBm	-10.02dBm	-3.77dBm

9.3 Logging Measured Values and Saving Logged Results

Display: Logging > Display

- Press the **Auxiliary Function** soft key to show the display's setup screen.

The screenshot shows the logging setup screen with a graph and a data table. The graph displays a signal with a cursor at -28.00. The data table shows the following values:

	Total	C1-C2
ogMax	-9.50dBm	-10.02dBm
ogMin	-10.06dBm	-10.02dBm
verage	-9.77dBm	-10.02dBm

The menu options shown are:

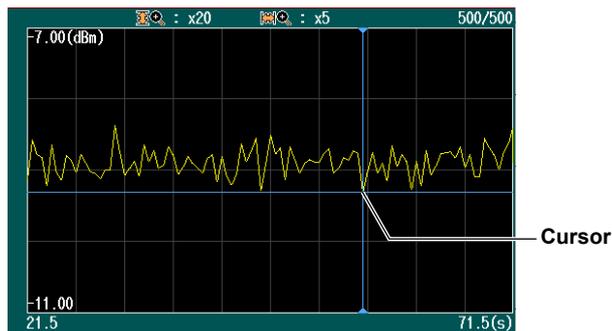
- Display
- Auto Zoom
- Zoom Initialize
- Clear Cursor
- Threshold Display (On/Off)

Descriptions for the menu options:

- Auto zoom**: Automatically zooms in on the graph at the cursor position.
- Zoom initialization**: Resets the scale so that the graph displays the entire optical power range.
- Clears the cursor**: Clears the cursor.
- Turns the threshold display on or off**: Turns the threshold display on or off.

Displaying and Moving the Cursor

- Turn the **rotary knob** to display the cursor.



Note

The direction that the cursor moves differs depending on the direction that you rotate the rotary knob.

Clockwise: The cursor moves to the right.

Counterclockwise: The cursor moves to the left.

Zooming in on the Graph Display

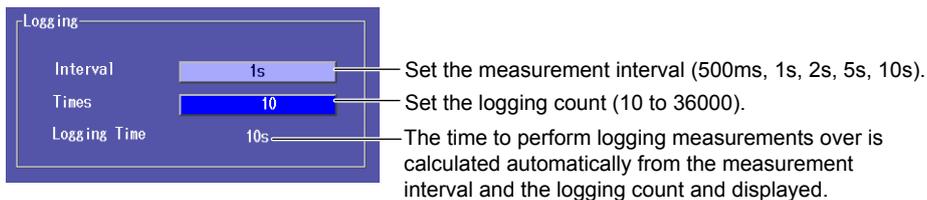
- Press an **arrow** key to zoom the graph display in or out at the cursor position.

NOTE

You can zoom the graph display during measurement or when measurements are stopped.

Detailed Setup Screen

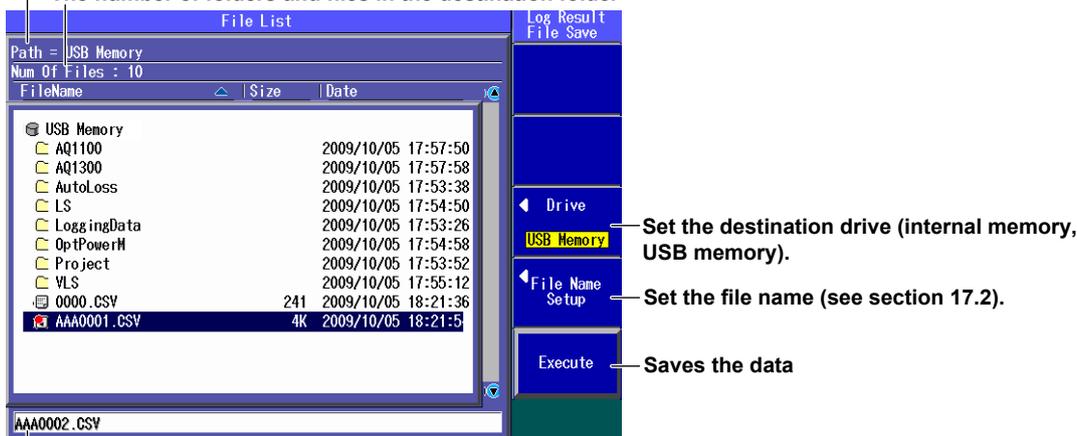
Press the **SETUP** soft key and then the **Data Save Logging** soft key to display the following screen.



File Save Screen

The path of the destination folder

The number of folders and files in the destination folder



The file name candidate for the next save operation

Explanation

This feature is available on models with the /SLT, /HLT or /PPM option.

Creating and Saving Logs

The Instrument is always measuring power when the Power Meter screen is displayed. To save the measured values, you must log them.

- To start logging, press the Logging START soft key. During logging, on the menu, "Logging START" changes to "Logging STOP."
- Logging stops when the specified number of logs are recorded or when you press the Logging STOP soft key. Then, on the menu, "Logging STOP" changes to "Logging START," and the file save screen appears.
- You can save logged results in CSV format.

Measurement Interval

You can set the interval for logging measured values to one of the following values.

500 ms, 1 s, 2 s, 5 s, 10 s

Logging Count

You can set the number of values to log within the following range.
10 to 36000

Drive to Save To

You can set the destination drive to one of the following options.
Internal memory, USB memory

File Name

You can specify file names by combining comments and numbers. For details, see section 18.2.
For an example of the saved data being displayed using spreadsheet software, see appendix 1.

Graph Display of Logging Data

Set Display to "Logging" to display the measured values on a graph in real time during logging.
Logging results that have been saved in CSV format cannot be displayed on a graph.

Selecting the Cursors

You can switch between the two cursors (C1 and C2) that are displayed on the screen. If the selected cursor is outside of the display area, the cursor's display position is automatically changed so that it is in the center of the screen. If the cursor is at the left or right edge of the screen, because the sections that are outside of the measurement range cannot be displayed, even if you switch to the other cursor, the selected cursor will not be displayed in the center of the screen.

Auto Zoom

The vertical zoom factor is set automatically so that all the data on the screen is displayed.
The median value between the maximum and minimum of the logging data is the center position on the screen.
If there is no logging data, auto zoom is not performed.

Zoom Initialization

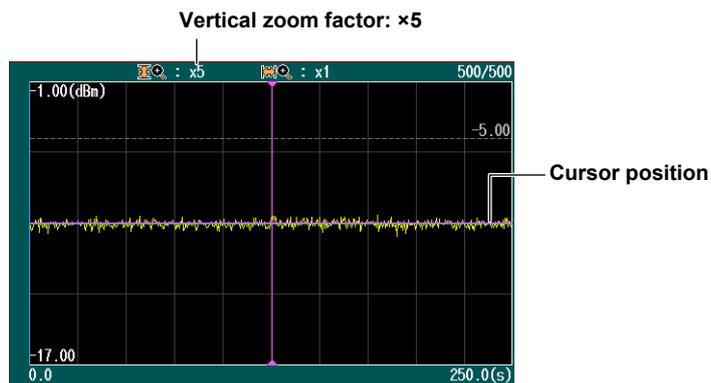
Zoom initialization returns the vertical and horizontal zoom factors to $\times 1$.

Zooming In and Out

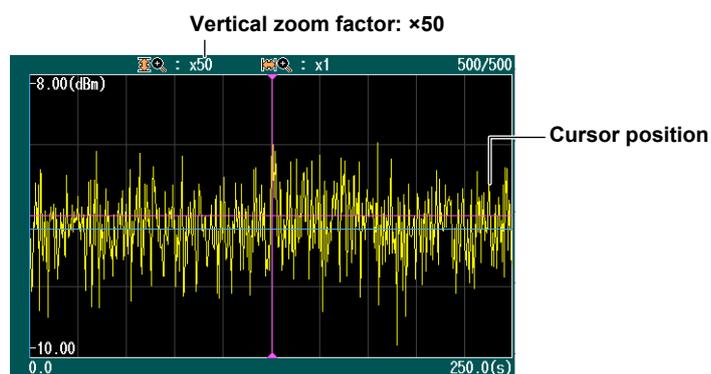
You can press the arrow keys to zoom the displayed graph in or out. The graph is zoomed at the cursor position.

Up and down arrow keys: Zoom in and out vertically. The up arrow key zooms in, and the down arrow key zooms out. Zoom factors are $\times 1$, $\times 2$, $\times 5$, $\times 10$, $\times 20$, and $\times 50$.

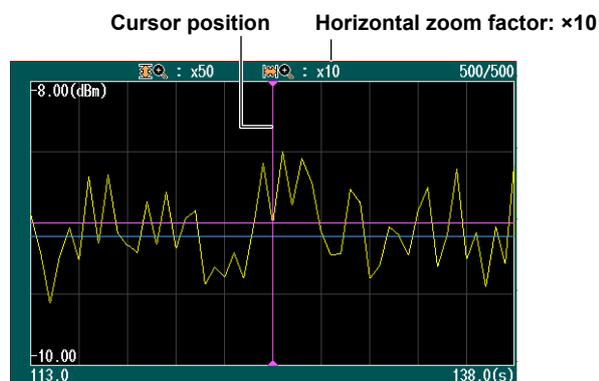
Left and right arrow keys: Zoom in and out horizontally. The right arrow key zooms in, and the left arrow key zooms out. Zoom factors are $\times 1$, $\times 2$, $\times 5$, $\times 10$, $\times 20$, and $\times 50$.
You cannot zoom in on the graph so much that there are less than 11 logging data points on the screen.



Press the down arrow key to zoom the graph display vertically.



Press the left arrow key to zoom the graph display horizontally.



Overview Display

The overview display is linked to the zoomed graph display. The blue box indicates where in the entire graph display area the zoomed graph display is showing. For details, see “Overview Display” in section 5.2.

9.4 Selecting and Saving Core and Tape Numbers

Procedure

Data Save Screen

- Using the **rotary knob** and **ENTER**, select **LS_OPM** (the power meter light source).
- Press the **Save Data** soft key to display the following screen.
On the detailed setup screen on the next page, you can set the starting core number, tape number type, and number of fibers.

When "Display" is set to "Core List"

Check mark indicating that the data has been saved

Skipped core numbers are dimmed.

The core number that is set as the save destination is highlighted.

Core no.

11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Core	No	nm	Data	Mod.	Ref	Offset	Date
4	1	---	---	---	---	---	---
4	2	---	---	---	---	---	---
4	3	---	---	---	---	---	---

Power Meter				
Wavelength	Modulation	Reference	Offset	Data
1310 nm	CW	-30.00 dBm	0.00 dB	-9.87 dBm

Save area

Power Meter

1310 nm CW -30.00 dBm 0.00 dB -9.87 dBm

Use the rotary knob and the arrow keys to select a core number.

Set the list to show (Core List, List).

Delete data (see the Delete Data screen in the next page).

Specify skipping. To cancel skipping, press this soft key again.

Saves the data

You can save up to three sets of data in the save area of the specified core.

Data (measurement conditions and measured values)

The data set in section 9.2 is displayed.

When "Display" is set to "List"

Core no.

4	1	---	---	---	---	---	---
4	2	---	---	---	---	---	---
4	3	---	---	---	---	---	---
5	1	---	---	---	---	---	---
5	2	---	---	---	---	---	---
5	3	---	---	---	---	---	---
6	1	---	---	---	---	---	---
6	2	---	---	---	---	---	---
6	3	---	---	---	---	---	---
7	1	---	---	---	---	---	---
7	2	---	---	---	---	---	---
7	3	---	---	---	---	---	---

Core	No	nm	Data	Mod.	Ref	Offset	Date
4	1	---	---	---	---	---	---
4	2	---	---	---	---	---	---
4	3	---	---	---	---	---	---

Power Meter				
Wavelength	Modulation	Reference	Offset	Data
1310 nm	CW	-30.00 dBm	0.00 dB	-9.84 dBm

Save area

Power Meter

1310 nm CW -30.00 dBm 0.00 dB -9.84 dBm

Use the rotary knob and the arrow keys to select a core number.

You can save up to three sets of data in the save area of the specified core.

Delete Data Screen

Core no. No. 1, 2, and 3

Core	No	nm	Data	Mod.	Ref	Offset	Date
1	1	1310	-9.54 dBm	CW	-30.00 dBm	0.00 dB	10/14 09:55
11	12	13	14	15	16	17	18
21	22	23	24	25	26	27	28
31	32	33	34	35	36	37	38
41	42	43	44	45	46	47	48
51	52	53	54	55	56	57	58
61	62	63	64	65	66	67	68
71	72	73	74	75	76	77	78
81	82	83	84	85	86	87	88
91	92	93	94	95	96	97	98
99	100						

Use the rotary knob and the arrow keys to select a core number.

Save Data

LS VLS ON/OFF

Display Core List List

Delete Data

Skip

Save

Delete Data

No.1

No.2

No.3

No.1 No.2 No.3

All Core Data

If you delete data, the Save Data menu is displayed.

Detailed Setup Screen

Press **SETUP** and then the **Data Save** soft key to display the following screen.

Save Data

Data is to be initialized by changing Data save setup.

start No: 1

Tape no. Type: Off

Num Of Fibers: 100

- Set the starting core number (1 to 9900).
- Set the tape number type (Off, a-b(2), a-c(3), a-d(4), a-e(5), a-f(6), a-g(7), a-h(8)).
- Set the number of fibers or tapes (up to 100 fibers when Tape no. Type is set to Off, up to 50 tapes when Tape no. Type is set to a-b(2), ..., up to 12 tapes when Tape no. Type is set to a-h(8)).

Saving Data to a File

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The file save screen appears. Follow the procedure in section 18.2 to save the data.

Explanation

This feature is available on models with the /SLT or /HLT option.

You can specify core numbers and tape number types and save data (measurement conditions and measured values) to the Instrument internal memory. You can also save the data to a file.

Displayed List

You can set the list to show to one of the following options. The list display format changes depending on the starting core number, tape number type, and number of fibers (or tapes) that you set in the detailed setup screen.

Core List	A list of core numbers and the saved data of the highlighted core number are displayed.
List	The core numbers and saved data are displayed.

Example When the Starting Core Number Is Set to “5,” the Tape Number Type Is Set to “a-h(8),” and the Number of Tapes Is Set to “10”

Core List

The list begins with the starting core number 5. Each core number is divided into eight tape numbers from a to h.

5a	5b	5c	5d	5e	5f	5g	5h
6a	6b	6c	6d	6e	6f	6g	6h
7a	7b	7c	7d	7e	7f	7g	7h
8a	8b	8c	8d	8e	8f	8g	8h
9a	9b	9c	9d	9e	9f	9g	9h
10a	10b	10c	10d	10e	10f	10g	10h
11a	11b	11c	11d	11e	11f	11g	11h
12a	12b	12c	12d	12e	12f	12g	12h
13a	13b	13c	13d	13e	13f	13g	13h
14a	14b	14c	14d	14e	14f	14g	14h

Core	No	nm	Data	Mod.	Ref	Offset	Date
5a	1						
5a	2						
5a	3						

The data of the highlighted core and tape number pair (5a here) is displayed. There are 10 tapes, so the cores are numbered 5a through 14h.

List

The list begins with the starting core number 5. Each core number is divided into eight tape numbers from a to h. The data for the core and tape number pairs through 14h is displayed.

Core	No	nm	Data	Mod.	Ref	Offset	Date
5a	1						
5a	2						
5a	3						
5b	1						
5b	2						
5b	3						
5c	1						
5c	2						
5c	3						
5d	1						
5d	2						
5d	3						

Use the rotary knob and the arrow keys to scroll through the list.

Skipping

When Skip is selected, the corresponding core is not measured. By specifying Skip on cores that do not need to be measured, you can save time.

Saving Data

You can save up to three sets of data in the save area of the specified core. For details about saving the data to a file, see section 18.2.

Deleting Data

You can delete the data for individual core numbers in a save area or delete all the data at once.

Starting Core Number

You can set the starting core number to a value within the following range.
1 to 9900

Tape Number Type

You can set the tape number type to one of the following options.
Off, a-b(2), a-c(3), a-d(4), a-e(5), a-f(6), a-g(7), a-h(8)

Number of Fibers or Tapes

You can set the number of fibers or tapes to a value within one of the following ranges.

Tape Number Type	Number of Fibers or Tapes
Off	10 to 100 fibers
a-b(2)	10 to 50 tapes
a-c(3)	10 to 33 tapes
a-d(4)	10 to 25 tapes
a-e(5)	10 to 20 tapes
a-f(6)	10 to 16 tapes
a-g(7)	10 to 14 tapes
a-h(8)	10 to 12 tapes

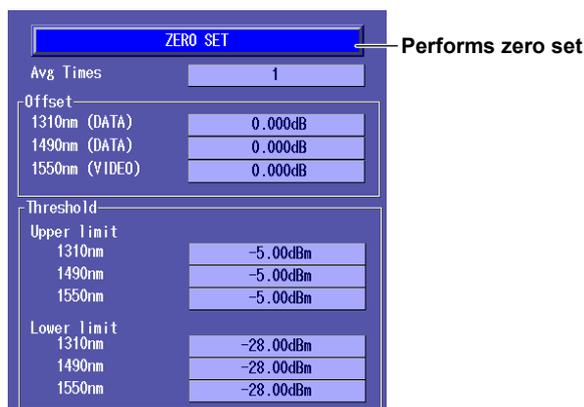
10.1 Making Preparations for Measurements

Remove the optical fiber cables from the Instrument and close the optical connector covers, or make sure that the power meter is not receiving any light, and then start the PON power meter zero set procedure.

Procedure

Performing Zero Set

1. Using the rotary **knob** and **ENTER**, select **PON_OPM** (PON power meter).
2. Press **SETUP** and then the **OPM Setup** soft key to display the following screen.



Explanation

Perform zero set whenever necessary, such as after you have turned on the power or when the ambient temperature changes. Performing zero set adjusts the internal deviation of the optical power measurement section and enables you to obtain more accurate absolute optical power values.

10.2 Setting PON System Optical Power Measurement Conditions and Holding the Display

Procedure

Power Meter Screen

Using the rotary knob and **ENTER**, select **PON_OPM** (PON power meter) to display the following screen.

When the Signal Direction Is ONU -> OLT

Bar graph display of the measured value

Measured value

PON Power Meter
10nm (DATA)
PASS -9.98 dBm

70.00dBm 10.00dBm

ONU -> OLT

Unit dBm W

PON Power Meter
VLS ON
Hold
Save Data

Holds the measured value display

Set the signal direction (ONU -> OLT, OLT -> ONU).

Set the unit (dB, W).

Lower threshold line Upper threshold line

These lines indicate the upper and lower threshold values (see the detailed setup screen in section).

When the Signal Direction Is OLT -> ONU

PON Power Meter
1490nm (DATA)
PASS -10.14 dBm

70.00dBm 10.00dBm

1550nm (VIDEO)
PASS -9.79 dBm

50.00dBm 30.00dBm

OLT -> ONU

Unit dBm W

PON Power Meter
VLS ON
Hold
Save Data

Detailed Setup Screen

Press **SETUP** and then the **OPM SETUP** soft key to display the following screen.

The screenshot shows the 'ZERO SET' screen with the following settings:

- Avg Times:** 1
- Offset:** 1310nm (DATA) 0.000dB, 1490nm (DATA) 0.000dB, 1550nm (VIDEO) 0.000dB
- Threshold:**
 - Upper limit: 1310nm -5.00dBm, 1490nm -5.00dBm, 1550nm -5.00dBm
 - Lower limit: 1310nm -28.00dBm, 1490nm -28.00dBm, 1550nm -28.00dBm

Annotations on the right side of the screen:

- Set the average count (1, 10, 50, 100).
- Set the offset (–9.900 to 9.900 dB). Set it for each PON system wavelength.
- Set the threshold values (–80 to 40 dBm). Set the upper and lower limits for each PON system wavelength.

Explanation

The PON power meter is only available on models with -PPM suffix codes.

Wavelength

The wavelengths that you can specify when measuring the optical power of a PON system are listed below. The wavelengths vary depending on the signal direction.

Signal Direction	Wavelength
ONU -> OLT ¹	1310 nm
OLT -> ONU ²	1490 nm and 1550 nm

- 1 You can measure the optical power of the upstream signal wavelength from the ONU (optical network unit: the user's optical terminal) to the OLT (optical line termination: the telephone exchange's optical terminal). The optical power of the 1310 nm (data wavelength) signal is measured.
- 2 You can measure the optical power of the downstream signal wavelengths from the OLT to the ONU. The optical power of the 1490 nm (data wavelength) and 1550 nm (video wavelength) signals is measured.

Unit

You can set the optical power display unit to one of the following options.
dBm (absolute value), W (absolute value)

- The following prefixes are attached to W: m (10^{-3}), μ (10^{-6}), n (10^{-9}), and p (10^{-12}).
- The relationship between the absolute values dBm and W is indicated below.

$$P_{\text{dBm}} = 10 \times \log (P_w \times 10^3)$$

Where P_{dBm} is the optical power in units of dBm and P_w is the optical power in units of W.

Average Count

Averages of the measured values are displayed. You can set the number of values to average to one of the following options.

1, 10, 50, 100

Offset

For each wavelength, the value that you specify (the offset value) is added to the measured optical power values that are displayed.

The range is –9.900 to 9.900 dB.

Threshold Value

For each wavelength, you can set upper and lower threshold values and determine whether or not the measured values fall within them.

- The range for the upper and lower threshold values is -80 to 40 dBm. You must set the values so that the upper threshold value is greater than the lower threshold value.
- When a measured value is within the upper and lower thresholds, its bar graph is green. "PASS" appears in the measured value area.
- When a measured value exceeds the upper threshold or falls below the lower threshold, its bar graph is red. "FAIL" appears in the measured value area.

Holding the Measured Value Display

When you press the HOLD soft key, the updating of the measured values and bar graph is held. The values at the time that you pressed the HOLD soft key remain displayed. To release the hold on the display, press the HOLD soft key again.

The display is being held.



10.3 Selecting and Saving Core and Tape Numbers

Procedure

Data Save Screen

- Using the rotary knob and ENTER, select PON_OPM (PON power meter).
- Press SAVE DATA to display the following screen.
On the detailed setup screen on the next page, you can set the starting core number, the tape number type, and the number of fibers.

When "Display" is set to "Core List"

Check mark indicating that the data has been saved

Skipped core numbers are dimmed.

The core number that is set as the save destination is highlighted.

Core no.

Save Data Use the rotary knob and the arrow keys to select a core number.

Display Set the list to show (Core List, List).

Delete Data Delete data (see the Delete Data screen in the next section).

Skip Specify skipping. To cancel skipping, press this soft key again.

Save Saves the data

You can save up to three sets of data in the save area of the specified core.

Core	No	nm	Data	Mod.	Ref	Offset	Date
4	1	---	---	---	---	---	---/--:--
4	2	---	---	---	---	---	---/--:--
4	3	---	---	---	---	---	---/--:--

Power Meter				
Wave length	Modulation	Reference	Offset	Data
1310 nm	CW	-30.00 dBm	0.00 dB	-9.87 dBm

Example of the data (measurement conditions and measured values) when the signal direction is ONU -> OLT
The data set in section 10.2 is displayed.

When "Display" is set to "List"

Core no.

Save area

Use the rotary knob and the arrow keys to select a core number.

You can save up to three sets of data in the save area of the specified core.

Core	No	nm	Data	Mod.	Ref	Offset	Date
4	1	---	---	---	---	---	---/--:--
4	2	---	---	---	---	---	---/--:--
4	3	---	---	---	---	---	---/--:--
5	1	---	---	---	---	---	---/--:--
5	2	---	---	---	---	---	---/--:--
5	3	---	---	---	---	---	---/--:--
6	1	---	---	---	---	---	---/--:--
6	2	---	---	---	---	---	---/--:--
6	3	---	---	---	---	---	---/--:--
7	1	---	---	---	---	---	---/--:--
7	2	---	---	---	---	---	---/--:--
7	3	---	---	---	---	---	---/--:--

Power Meter				
Wave length	Modulation	Reference	Offset	Data
1310 nm	CW	-30.00 dBm	0.00 dB	-9.84 dBm

Delete Data Screen

Core no. No. 1, 2, and 3

Core	No	nm	Data	Mod.	Ref	Offset	Date
1	1	1310	-9.54 dBm	CW	-30.00 dBm	0.00 dB	10/14 09:55
11	12	13	14	15	16	17	18
21	22	23	24	25	26	27	28
31	32	33	34	35	36	37	38
41	42	43	44	45	46	47	48
51	52	53	54	55	56	57	58
61	62	63	64	65	66	67	68
71	72	73	74	75	76	77	78
81	82	83	84	85	86	87	88
91	92	93	94	95	96	97	98

Use the rotary knob and the arrow keys to select a core number.

Save Data menu options:

- Save Data
- LS VLS ON/OFF
- Display Core List
- Delete Data (highlighted)
- Skip
- Save

Delete Data menu options:

- Delete Data (If you delete data, the Save Data menu is displayed.)
- Select Core no. Data (Deletes the data of all the selected cores)
- All Core Data (Deletes all the core data)

Detailed Setup Screen

Press **SETUP** and then the **Save Data** soft key to display the following screen.

Save Data

Data is to be initialized by changing Data save setup.

start No: 1

Tape no. Type: Off

Num Of Fibers: 100

- Set the starting core number (1 to 9900).
- Set the tape number type (Off, a-b(2), a-c(3), a-d(4), a-e(5), a-f(6), a-g(7), a-h(8)).
- Set the number of fibers or tapes (up to 100 fibers when Tape no. Type is set to Off, up to 50 tapes when Tape no. Type is set to a-b(2), ..., up to 12 tapes when Tape no. Type is set to a-h(8)).

Saving Data to a File

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The file save screen appears. Follow the procedure in section 18.2 to save the data.

Explanation

The PON power meter is only available on models with -PPM suffix codes.

You can specify core numbers and tape number types and save data (measurement conditions and measured values) to the Instrument internal memory. You can also save the data to a file.

Displayed List

You can set the list to show to one of the following options. The list display format changes depending on the starting core number, tape number type, and number of fibers (or tapes) that you set in the detailed setup screen.

Core List	A list of core numbers and the saved data of the highlighted core number are displayed.
List	The core numbers and saved data are displayed.

Example When the Starting Core Number Is Set to “5,” the Tape Number Type Is Set to “a-h(8),” and the Number of Tapes Is Set to “10”

Core List

The list begins with the starting core number 5. Each core number is divided into eight tape numbers from a to h.

5a	5b	5c	5d	5e	5f	5g	5h
6a	6b	6c	6d	6e	6f	6g	6h
7a	7b	7c	7d	7e	7f	7g	7h
8a	8b	8c	8d	8e	8f	8g	8h
9a	9b	9c	9d	9e	9f	9g	9h
10a	10b	10c	10d	10e	10f	10g	10h
11a	11b	11c	11d	11e	11f	11g	11h
12a	12b	12c	12d	12e	12f	12g	12h
13a	13b	13c	13d	13e	13f	13g	13h
14a	14b	14c	14d	14e	14f	14g	14h

Core	No	nm	Data	Mod.	Ref	Offset	Date
5a	1						
5a	2						
5a	3						

The data of the highlighted core and tape number pair (5a here) is displayed.

There are 10 tapes, so the cores are numbered 5a through 14h.

List

The list begins with the starting core number 5. Each core number is divided into eight tape numbers from a to h. The data for the core and tape number pairs through 14h is displayed.

Core	No	nm	Data	Mod.	Ref	Offset	Date
5a	1						
5a	2						
5a	3						
5b	1						
5b	2						
5b	3						
5c	1						
5c	2						
5c	3						
5d	1						
5d	2						
5d	3						

Use the rotary knob and the arrow keys to scroll through the list.

Skipping

When Skip is selected, the corresponding core is not measured. By specifying Skip on cores that do not need to be measured, you can save time.

Saving Data

You can save up to three sets of data in the save area of the specified core. When the signal direction is from the OLT to the ONU, you can save the data for two wavelengths at the same time. For details about saving the data to a file, see section 18.2.

Deleting Data

You can delete the data for individual core numbers in a save area or delete all the data at once.

Starting Core Number

You can set the starting core number to a value within the following range.
1 to 9900

Tape Number Type

You can set the tape number type to one of the following options.
Off, a-b(2), a-c(3), a-d(4), a-e(5), a-f(6), a-g(7), a-h(8)

Number of Fibers or Tapes

You can set the number of fibers or tapes to a value within one of the following ranges.

Tape Number Type	Number of Fibers or Tapes
Off	10 to 100 fibers
a-b(2)	10 to 50 tapes
a-c(3)	10 to 33 tapes
a-d(4)	10 to 25 tapes
a-e(5)	10 to 20 tapes
a-f(6)	10 to 16 tapes
a-g(7)	10 to 14 tapes
a-h(8)	10 to 12 tapes

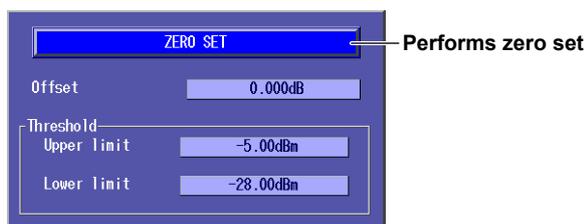
11.1 Making Preparations and Adjustments for Loss Testing

Procedure

Performing Zero Set

Remove the optical fiber cables from the Instrument and close the optical connector covers, or make sure that the power meter is not receiving any light, and then start the optical power meter zero set procedure.

1. Using the **rotary knob** and **ENTER**, select **Auto Loss Test**.
2. Press **SETUP** and then the **OPM Setup** soft key to display the following screen.



Adjusting the Optical Power



WARNING

- While the Instrument is producing light, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



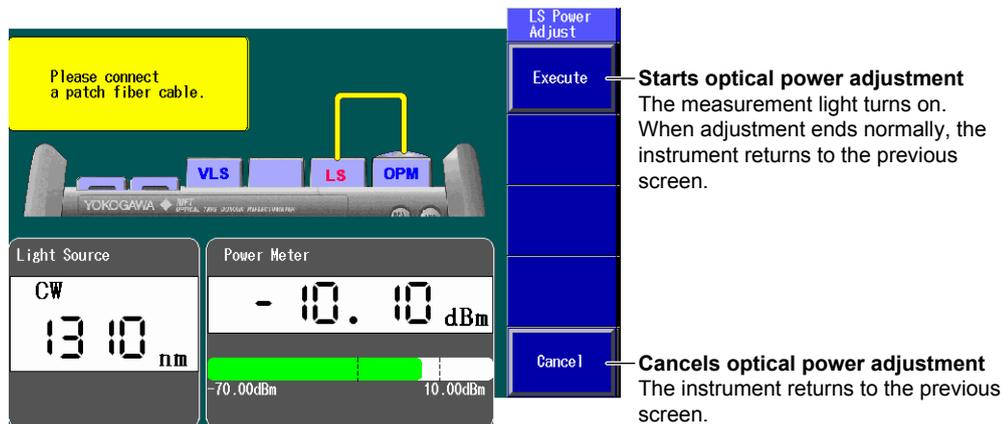
AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

11.1 Making Preparations and Adjustments for Loss Testing

Use a short optical fiber to connect an Instrument light source port to an Instrument optical power measurement port, and then perform optical power adjustment.

1. Using the **rotary knob** and **ENTER**, select **Auto Loss Test**.
2. Press the **Function Select** soft key and then the **Light Source** or **Loop Back** soft key.
3. Using the **rotary knob** and **ENTER**, select the **Wavelength** at which you need to perform loss testing.
4. Using the **rotary knob** and **ENTER**, select **LS Power Adjust** to display the following screen.



Explanation

This feature is available on models with the /SLT or /HLT option.

Models with the /PPM option do not have the Auto Loss Test feature, so combine these models with a light source and the optical power meter feature to perform the loss test. For details, see chapters 8 and 9. Additionally, on the AQ1200B and AQ1200C models with the /PPM option, the wavelengths of the light source and the optical power meter are different, so you cannot perform the loss test with a single unit. Use a model (sold separately) that has a light source whose wavelength is compatible (such as the AQ1200A, or AQ1100 series).

Zero Set

Perform zero set whenever necessary, such as after you have turned on the power or when the ambient temperature changes. Performing zero set adjusts the internal deviation of the optical power measurement section and enables you to obtain more accurate absolute optical power values. Perform zero set on the optical power meter.

Optical Power Adjustment

Adjust the optical power of the light source as necessary.

When you execute optical power adjustment, the Instrument automatically identifies the optical power level and adjusts itself accordingly. Perform optical power adjustment on the light source.

- Optical power adjustment begins when you press the Execute soft key. When it ends normally, the Instrument returns to the previous screen. During adjustment, “Execute” changes to “Abort.” All soft keys other than the Abort soft key are unavailable.
- Press the Abort soft key to stop optical power adjustment. “Abort” will change to “Execute.” The adjustment value will return to the value that it was at before adjustment was executed.
- Connect a short optical fiber of a few meters or less in length. Make sure that the fiber is free from dirt, scratches, bends, and other potential causes of optical degradation.
- The initial adjustment value is the factory default setting.

11.2 Performing an Auto Loss Test

Procedure

Configuring the Optical Power Meter

Power Meter Screen

1. Using the rotary knob and ENTER, select **Auto Loss Test**.
2. Press the **Function Select** soft key and then the **Power Meter** soft key to display the following screen.

Bar graph display of the measured value

Measured value: -30.00dBm

Unit: dB

Lower threshold line: -30.00dBm

Upper threshold line: -30.00dBm

These lines indicate the upper and lower threshold values (see the detailed setup screen in section).

Annotations:

- Auto Loss Test**: Set the reference manually (-80 to 40 dBm). The Reference box appears if you press the DREF soft key or set the unit to dB.
- Function Select**: Sets the reference to the currently displayed measured value
- Power Meter**: Holds the measured value display
- DREF**: Sets the reference to the currently displayed measured value
- Hold**: Holds the measured value display
- Save Data**: Save Data
- Unit**: Set the unit (dB, dBm, W).

Detailed Setup Screen

Press **SETUP** and then the **OPM SETUP** soft key to display the following screen.

ZERO SET

Offset: 0.000dB

Threshold Upper limit: -5.00dBm

Threshold Lower limit: -28.00dBm

Annotations:

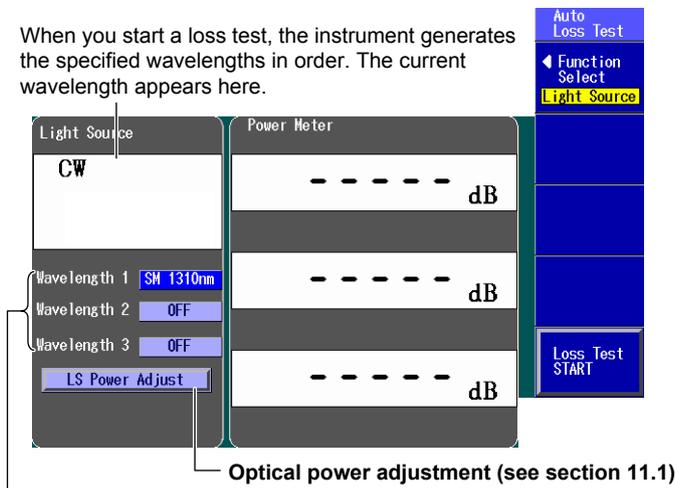
- Offset**: Set the offset (-9.900 to 9.900 dB).
- Threshold Upper limit**: Set the threshold values (-80 to 40 dBm). You can set the upper and lower values.
- Threshold Lower limit**: Set the threshold values (-80 to 40 dBm). You can set the upper and lower values.

Configuring the Light Source and Executing an Auto Loss Test

Light Source Screen

1. Using the **rotary knob** and **ENTER**, select **Auto Loss Test**.
2. Press the **Function Select** soft key and then the **Light Source** soft key to display the following screen.

When you start a loss test, the instrument generates the specified wavelengths in order. The current wavelength appears here.



Optical power adjustment (see section 11.1)

Set the wavelength.

The available settings vary depending on the models.

Executing an Auto Loss Test



WARNING

- While the Instrument is producing light, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Connect one end of the optical fiber or line that you need to perform loss testing on to the optical power measurement port of the power meter, and connect the other end to the light source port of the light source.



Executes an auto loss test
The light source generates the specified wavelengths of measurement light in order.
The optical power meter measures the optical power of the light that it receives.

Saving Data

Data Save Screen

In the Power Meter screen of the optical power meter, press the **Save Data** soft key to display the following screen. On the detailed setup screen on the next page, you can set the starting core number, tape number type, and number of fibers.

When "Display" is set to "Core List"

Check mark indicating that the data has been saved

Skipped core numbers are dimmed.

The core number that is set as the save destination is highlighted.

Core no.									
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Core	No	nm	Data	Mod.	Ref	Offset	Date
4	1	---	---	---	---	---	---/---:---
4	2	---	---	---	---	---	---/---:---
4	3	---	---	---	---	---	---/---:---

Save area

Power Meter				
Wavelength	Modulation	Reference	Offset	Data
1310 nm	CW	-3.00 dBm	0.00 dB	-9.87 dBm

Save Data
Display Core List
Delete Data
Skip
Save

Use the rotary knob and the arrow keys to select a core number.

Set the list to show (Core List, List).

Delete data (see the Delete Data screen in the next section).

Specify skipping. To cancel skipping, press this soft key again.

Saves the data

You can save up to three sets of data in the save area of the specified core.

Data (measurement conditions and measured values)

The data set on the power meter screen is displayed.

When "Display" is set to "List"

Core no.							
4	1	---	---	---	---	---	---/---:---
4	2	---	---	---	---	---	---/---:---
4	3	---	---	---	---	---	---/---:---
5	1	---	---	---	---	---	---/---:---
5	2	---	---	---	---	---	---/---:---
5	3	---	---	---	---	---	---/---:---
6	1	---	---	---	---	---	---/---:---
6	2	---	---	---	---	---	---/---:---
6	3	---	---	---	---	---	---/---:---
7	1	---	---	---	---	---	---/---:---
7	2	---	---	---	---	---	---/---:---
7	3	---	---	---	---	---	---/---:---

Power Meter				
Wavelength	Modulation	Reference	Offset	Data
1310 nm	CW	-3.00 dBm	0.00 dB	-9.87 dBm

Display Core List
Delete Data
Skip
Save

Use the rotary knob and the arrow keys to select a core number.

You can save up to three sets of data in the save area of the specified core.

11.2 Performing an Auto Loss Test

Delete Data Screen

Core no. No. 1, 2, and 3

Core No	nm	Data	Mod.	Ref	Offset	Date
1	1	1310	-9.87 dBm	CW	-3.00 dBm	0.00 dB 12/22 18:39
4	1					
4	2					
4	3					

Use the rotary knob and the arrow keys to select a core number.

Save Data

Display Core List List

Delete Data

Skip

Save

Delete Data

Select Core no. Data

All Core Data

Deletes the data of all the selected cores

Deletes all the core data

If you delete data, the Save Data menu is displayed.

Detailed Setup Screen

Press the **SETUP** soft key and then the **Save Data** soft key to display the following screen.

-Save Data

Data is to be initialized by changing Data save setup.

start No

Tape no. Type

Num Of Fibers

Set the starting core number (1 to 9900).

Set the tape number type (Off, a-b(2), a-c(3), a-d(4), a-e(5), a-f(6), a-g(7), a-h(8)).

Set the number of fibers or tapes (up to 100 fibers when Tape no. Type is set to Off, up to 50 tapes when Tape no. Type is set to a-b(2), ..., up to 12 tapes when Tape no. Type is set to a-h(8)).

Saving Data to a File

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The file save screen appears. Follow the procedure in section 18.2 to save the data.

Explanation

This feature is available on models with the /SLT or /HLT option.

You can use the Instrument as a light source and as an optical power meter to perform loss testing for up to three wavelengths on an optical fiber or line.

Optical Power Meter

Unit, Reference, Offset, Threshold Values, and Holding of the Display of Measured Values

For information about the unit, reference, offset, threshold values, and the holding of the display of measured values, see "Explanation" in section 10.2.

Light Source

Measurement Light Wavelength

The following measurement light wavelengths can be generated.

Model	Measurement Light Wavelength
AQ1200A	SM 1310 nm, SM 1550 nm
AQ1200B	SM 1625 nm
AQ1200C	SM 1650 nm
AQ1200E	SM 1310 nm, SM 1550 nm, SM 1625 nm
AQ1205A	SM 1310 nm, SM 1550 nm
AQ1205E	SM 1310 nm, SM 1550 nm, SM 1625 nm
AQ1205F	SM 1310 nm, SM 1550 nm, SM 1650 nm

On the AQ1200A, AQ1200B, AQ1200C, and AQ1205A, the light for a single mode (SM) optical fiber is emitted from optical port 2.

On the AQ1200E, AQ1205E, and AQ1205F, light with a 1310 nm or 1550 nm wavelength is transmitted from optical port 2, and light with a 1625 nm or 1650 nm wavelength is transmitted from optical port 3.

Firmly connect the optical fiber to the port that the light with the selected wavelength will be transmitted from.

Executing an Auto Loss Test

To perform loss testing, configure the settings for the optical power meter and the light source, connect one end of the optical fiber or line that you need to perform loss testing on to the optical power measurement port of the power meter, and connect the other end to the light source port of the light source.

The optical power meter measures the power of the light that passes through the optical fiber or line under loss test.

Saving Data

You can specify core numbers and tape number types and save data (measurement conditions and measured values) to the Instrument internal memory. You can also save the data to a file.

Display List, Skipping, Saving, Deleting Data, Starting Core Number, Tape Number Type, and Number of Cores or Tapes

For information about the display list, skipping, saving, deleting data, the starting core number, the tape number type, and the number of cores or tapes, see “Explanation” in section 9.4.

11.3 Performing a Loop-Back Loss Test

Procedure

Configuring the Optical Power Meter and Light Source

Power Meter and Light Source Screens

- Using the rotary knob and ENTER, select **Auto Loss Test**.
- Press the **Function Select** soft key and then the **Loop Back** soft key to display the following screen.

When you start a loss test, the instrument generates the specified wavelengths in order. The current wavelength appears here.

Bar graph display of the measured value
Measured value: -30.00dBm

Light Source
CW
Wave length 1: SM 1310nm
Wave length 2: OFF
Wave length 3: OFF
LS Power Adjust

Power Meter
1310nm
-30.00dBm
dB

Unit
dB dBm W

Auto Loss Test
Function Select
Loop Back

DREF
Hold
Save Data
Loss Test START

Set the reference manually (-80 to 40 dBm).
The Reference box appears if you press the DREF soft key or set the unit to dB.

Sets the reference to the currently displayed measured value

Holds the measured value display

Set the unit (dB, dBm, W).

Lower threshold line **Upper threshold line**
These lines indicate the upper and lower threshold values (see the detailed setup screen in section).

Optical power adjustment (see section 11.1)

Set the wavelength.
The available settings vary depending on the models.

Detailed Setup Screen

Press **SETUP** and then the **OPM SETUP** soft key to display the following screen.

ZERO SET

Offset: 0.000dB

Threshold
Upper limit: -5.00dBm
Lower limit: -28.00dBm

Set the offset (-9.900 to 9.900 dB).

Set the threshold values (-80 to 40 dBm).
You can set the upper and lower values.

Executing a Loop-Back Loss Test



WARNING

- While the Instrument is producing light, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

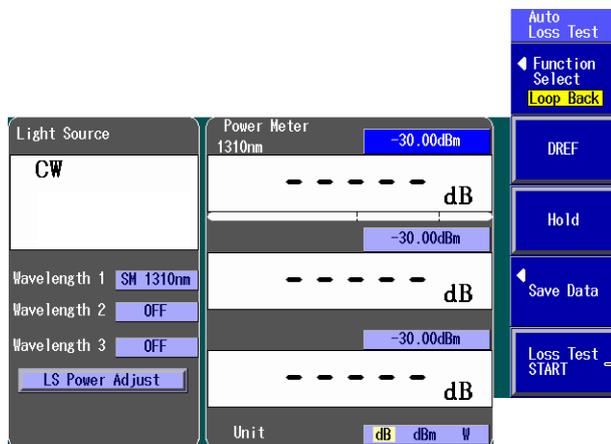
French



AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Connect one end of the optical fiber or line that you need to perform loss testing on to the Instrument optical power measurement port, and connect the other end to the light source port of the same Instrument.



Executes a loop-back loss test

The light source generates the specified wavelengths of measurement light in order. The optical power meter measures the optical power of the light that it receives.

Saving Data

Data Save Screen

In the Power Meter screen of the optical power meter, press the **Save Data** soft key to display the following screen. Follow the procedure in section 11.2 to save the data.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Core	No	nm	Data	Mod.	Ref	Offset	Date
1	1	---	---	---	---	---	--/------
1	2	---	---	---	---	---	--/------
1	3	---	---	---	---	---	--/------

Power Meter				
Wave length	Modulation	Reference	Offset	Data
1310 nm	CW	-3.00 dBm	0.00 dB	-9.90 dBm

Saving Data to a File

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The file save screen appears. Follow the procedure in section 18.2 to save the data.

Explanation

This feature is available on models with the /SLT or /HLT option.

You can use the light source and optical power meter features on a single Instrument to perform a loop-back loss test on an optical fiber or line.

Optical Power Meter

Unit, Reference, Offset, Threshold Values, and Holding of the Display of Measured Values

For information about the unit, reference, offset, threshold values, and the holding of the display of measured values, see “Explanation” in section 9.2.

Light Source

Light is emitted at the measurement light wavelength. For details, see “Explanation” in section 11.2.

Executing a Loop-Back Loss Test

To perform loop-back loss testing, configure the optical power meter and light source settings, connect one end of the optical fiber or line that you need to perform loss testing on to the Instrument optical power measurement port, and connect the other end to the light source port of the same Instrument. The optical power meter measures the power of the light that passes through the optical fiber or line under loss test.

Saving Data

You can save up to three sets of data in the save area of the specified core. For details about saving the data to a file, see section 18.2.

12.1 Creating New Projects

Procedure

New Project Screen

1. Using the rotary knob and **ENTER**, select **Multi-Core Loss Test**.
2. Press the **Master/Slave** soft key to select **Master**.
3. Press the **New Project** soft key to display the following screen.

Complete
Press this soft key after you have configured the project, wavelength, and offset settings. The loss test screen shown in the next section appears.
If you enter a project name and specify at least one wavelength, this key becomes available.

Project Name
To set the project name, follow the procedure in section 2.4.

Set the starting core number (1 to 9900).

Set the tape number type (Off, a-b(2), a-c(3), a-d(4), a-e(5), a-f(6), a-g(7), a-h(8)).

Set the number of fibers or tapes (up to 100 fibers when Tape no. Type is set to Off, up to 50 tapes when Tape no. Type is set to a-b(2), ..., up to 12 tapes when Tape no. Type is set to a-h(8)).

Set the wavelength.
The available settings vary depending on the models.

Cancel
Cancel the project settings.
The instrument returns to the previous screen.

Set the offset (-9.900 to 9.900 dB).

Loss Test Screen

Press the **Complete** soft key to display the following screen.

The selected core number is highlighted.
Skipped core numbers are dimmed.

Multi-Core Loss Test
Use the rotary knob and the arrow keys to select a core number.

Display
Core List
List
Set the list to show (Core List, List).
For list examples, see section 9.4.

Loss Test START
Starts loss testing (see section 12.3)

Skip
Specify skipping.

Project Transmission START
Starts the transmission of project information (see section 12.2)

Core	No	nm	Data	Mod.	Ref	Offset	Date
1	1	---	---	---	---	---	---/---:---
1	2	---	---	---	---	---	---/---:---
1	3	---	---	---	---	---	---/---:---

Saving Project Information

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The file save screen appears. Follow the procedure in section 18.2 to save the project information that you configured.

Explanation

This feature is available on models with the /SLT or /HLT option.

You can create a new project.

Creating a New Project

Only the master can create a new project. You can specify the following project information.

Project Name

You can set the name using up to 30 characters.

Starting Core Number

You can set the starting core number to a value within the following range.
1 to 9900

Tape Number Type

Off, a-b(2), a-c(3), a-d(4), a-e(5), a-f(6), a-g(7), a-h(8)

Number of Fibers or Tapes

You can set the number of fibers or tapes to a value within one of the following ranges.

Tape Number Type	Number of Fibers or Tapes
Off	10 to 100 fibers
a-b(2)	10 to 50 tapes
a-c(3)	10 to 33 tapes
a-d(4)	10 to 25 tapes
a-e(5)	10 to 20 tapes
a-f(6)	10 to 16 tapes
a-g(7)	10 to 14 tapes
a-h(8)	10 to 12 tapes

Measurement Light Wavelength

The following measurement light wavelengths can be generated.

Model	Measurement Light Wavelength
AQ1200A	SM 1310 nm, SM 1550 nm
AQ1200B	SM 1625 nm
AQ1200C	SM 1650 nm
AQ1200E	SM 1310 nm, SM 1550 nm, SM 1625 nm
AQ1205A	SM 1310 nm, SM 1550 nm
AQ1205E	SM 1310 nm, SM 1550 nm, SM 1625 nm
AQ1205F	SM 1310 nm, SM 1550 nm, SM 1650 nm

On the AQ1200A, AQ1200B, AQ1200C, and AQ1205A, the light for a single mode (SM) optical fiber is emitted from optical port 2.

On the AQ1200E, AQ1205E, and AQ1205F, light with a 1310 nm or 1550 nm wavelength is transmitted from optical port 2, and light with a 1625 nm or 1650 nm wavelength is transmitted from optical port 3.

Firmly connect the optical fiber to the port that the light with the selected wavelength will be transmitted from.

Offset

See "Explanation" in section 9.2.

Skipping

When Skip is selected, the corresponding core is not measured. By specifying Skip on cores that do not need to be measured, you can save time.

Saving Project Information

You can save project information to a file. For the procedure for saving project information to a file, see section 18.2. You can load saved files to both the master and the slave (see section 12.2).

12.2 Sharing Projects

Project information can be shared between the master and slave in the following three ways.

- Sending projects
- Loading project files
- Restarting interrupted loss tests

Procedure

Sending a Project



WARNING

- While the Instrument is producing light, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Connect one end of the communication fiber that you specified to the master's light source port, and connect the other end to the slave's optical power measurement port. Then transfer the project information.

12.2 Sharing Projects

Slave

- Using the **rotary knob** and **ENTER**, select **Multi-Core Loss Test**.
- Press the **Master/Slave** soft key to select **Slave**. The following menu appears.



Optical Power Adjustment
Adjust as necessary (see section 12.4).

- Press the **Receive Project from Master** soft key.

On the menu, "Receive Project from Master" changes to "Abort."
After reception finishes, "Abort" changes back to "Receive Project from Master" and the following screen appears.

Master

- Using the **rotary knob** and **ENTER**, select **Multi-Core Loss Test**.
- Press the **Master/Slave** soft key to select **Master**.
- Create a new project (see section 12.1), or load a project file (see the next page). The following menu appears.



- Press the **Project Transmission START** soft key to generate the optical signal used to transmit the project information.

On the menu, "Project Transmission START" changes to "Project Transmission STOP."
After transmission finishes, "Project Transmission STOP" changes back to "Project Transmission START" and the following screen appears.

Loss Test Screen

Project Name : P100

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Core	No	nm	Data	Mod.	Ref	Offset	Date
1	1	---	---	---	---	---	---/---:--
1	2	---	---	---	---	---	---/---:--
1	3	---	---	---	---	---	---/---:--

Loss Test Screen

Project Name : P100

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

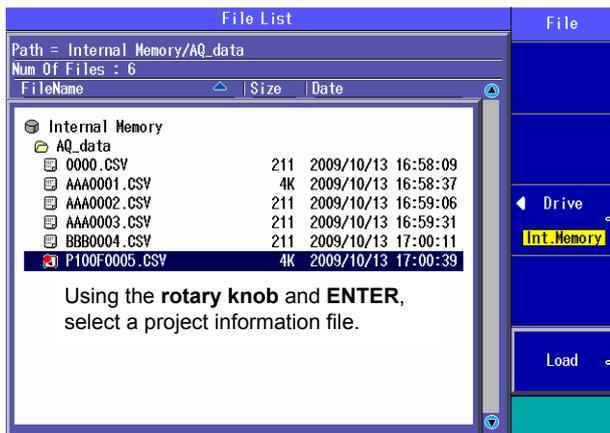
Core	No	nm	Data	Mod.	Ref	Offset	Date
1	1	---	---	---	---	---	---/---:--
1	2	---	---	---	---	---	---/---:--
1	3	---	---	---	---	---	---/---:--

Now the master and slave share the same project information.

Loading a Project File

Load the same project file onto the master and the slave.

- Using the **rotary knob** and **ENTER**, select **Multi-Core Loss Test**.
- Press the **File** soft key to display the following screen.



Set the drive to load from (internal memory, USB memory)

Loads the file
The project information is loaded from the selected file, and the loss test screen appears.

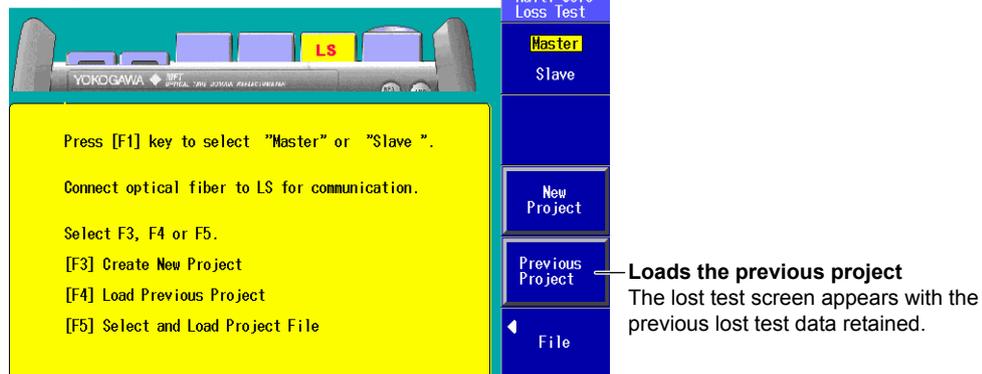
Restarting an Interrupted Loss Test

When the loss test for a shared project is interrupted, you can restart it where it left off, retaining the results of the test so far.

The operation for restarting the test is the same for both the master and the slave.

1. Using the **rotary knob** and **ENTER**, select **Multi-Core Loss Test**.
2. Press the **Previous Project** soft key to display the following screen.

Display Example: Master



Explanation

This feature is available on models with the /SLT or /HLT option.

The master and slave must share the same project information. The methods for sharing project information are listed below.

Sending a Project

You can send project information from the master to the slave.

First, you must specify a fiber for communicating the project information from the master to the slave. Before you transfer the project information, connect one end of the communication fiber that you specified to the master's light source port, and connect the other end to the slave's optical power measurement port.

- Prepare the slave to receive the project information.
- After you have confirmed that the slave is ready to receive the information, send it from the master.

Note

When a project is sent, loss test results and skip information are not transmitted.

Loading a Project File

Load the same project file onto the master and the slave. Use a project file that you have saved to internal or USB memory.

Restarting an Interrupted Loss Test

A Multi-core fiber loss test may be stopped before all the cores have been tested. When the test for a shared project is interrupted, you can restart it where it left off, retaining the results of the test so far. Data is maintained even when you turn the Instrument off.

- You must be performing the loss test with the same project.
- If you reload a project file, the loss test data up to that point is deleted and cannot be recovered.
- If you set Start Menu to Last Function, the loss test measurement screen is displayed when you restart a loss test. Select master or slave on the displayed screen, and restart the loss test. For instructions on how to set Start Menu, see section 19.1.

12.3 Performing a Multi-Core Loss Test

Connect one end of the communication fiber that you specified to the master's light source port (optical port 2), and connect the other end to the slave's optical power measurement port (optical port 1). Then perform the multi-core loss test.

Procedure

After the settings in sections 12.1 to 12.2 have been completed, open the loss test screen, and perform the multi-core loss test procedure.

Executing a Multi-Core Loss Test



WARNING

- While the Instrument is producing light, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Master

1. Connect the optical fiber under loss test to the optical power measurement port.
2. Use the **rotary knob** and the **arrow** keys to select the core number of the connected fiber.
3. Press the **Loss Test START** soft key.
The optical signal used to transmit the core number is sent to the slave.



Loss Test START
On the menu, "Loss Test START" changes to "Loss Test STOP."
After loss testing stops, "Loss Test STOP" changes back to "Loss Test START."

Skip
Specify skipping as necessary.

Slave

4. Connect to the light source port the optical fiber that corresponds to the core number transmitted from the master.
It may take time to receive the core number from the master.
When the core number is received, the Loss Test START soft key is enabled.



Loss Test START
On the menu, "Loss Test START" changes to "Loss Test STOP."
After loss testing stops, "Loss Test STOP" changes back to "Loss Test START."

Optical Power Adjustment
Adjust as necessary (see section 12.4).

5. Press the **Loss Test START** soft key.
The light turns on.

Follow steps 1 to 5 to perform a multi-core loss test.
Check marks appear over core numbers whose loss tests have been completed.

12.3 Performing a Multi-Core Loss Test

Displayed List

Check mark indicating that the core's loss test has been completed
 Skipped core numbers are dimmed.
 The core number that is undergoing loss testing is highlighted.

Project Name : P100									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Core no.

Core	No	nm	Data	Mod.	Ref	Offset	Date
4	1	1310	19.86 dB	CW	-30.00 dBm	0.00 dB	10/13 17:11
4	2	----	----	----	----	----	---/---:---
4	3	----	----	----	----	----	---/---:---

Loss Test Results
 Use the **rotary knob** and the **arrow** keys to select a core number. The loss test results of the selected core number are displayed.

Saving Multi-Core Loss Test Results

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The file save screen appears. Follow the procedure in section 18.2 to save the data.

Explanation

This feature is available on models with the /SLT or /HLT option.

Multi-core loss testing is performed while information such as project, core number, loss test result, and device information is transferred between the master and slave. Execute a multi-core loss test in the loss test screen after the settings in sections 12.1 to 12.2 have been completed.

Displayed List

For list examples, see section 9.4.

Saving Multi-Core Loss Test Results

You can save multi-core loss test results to a file. For the procedure for saving project information to a file, see section 18.2.

12.4 Optical Power Adjustment

Procedure



WARNING

- While the Instrument is producing light, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French

AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Use a short optical fiber to connect an Instrument light source port to an Instrument optical power measurement port, and then perform optical power adjustment.

In the loss test screen (see section 12.3) of the slave, press the **LS Power Adjust** soft key to display the following screen.

Execute — Starts optical power adjustment
The measurement light turns on.
When adjustment ends normally, the instrument returns to the previous screen.

Cancel — Cancels optical power adjustment
The instrument returns to the previous screen.

Explanation

Adjust the optical power of the light source as necessary.

When you execute optical power adjustment, the Instrument automatically identifies the optical power level and adjusts itself accordingly. Perform optical power adjustment on the light source (slave).

- Optical power adjustment begins when you press the Execute soft key. When it ends normally, the Instrument returns to the previous screen. During adjustment, "Execute" changes to "Abort." All soft keys other than the Abort soft key are unavailable.
- Press the Abort soft key to stop optical power adjustment. "Abort" will change to "Execute." The adjustment value will return to the value that it was at before adjustment was executed.
- Connect a short optical fiber of a few meters or less in length. Make sure that the fiber is free from dirt, scratches, bends, and other potential causes of optical degradation.
- The initial adjustment value is the factory default setting.

13.1 Locating Breaks (Faults) in Optical Fibers

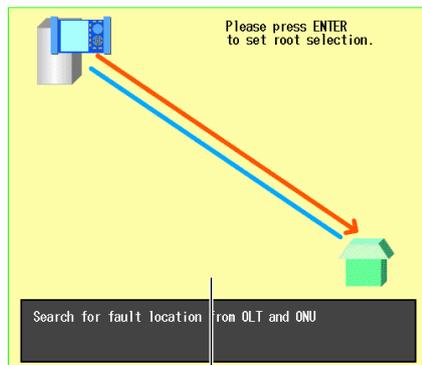
The Instrument is equipped with a feature that you can use to locate and display faults in optical fibers. This feature works by performing an OTDR averaged measurement and then automatically performing an OTDR event analysis. Use the OTDR feature to analyze waveforms.

Procedure

Select Route Menu

- Using the **rotary knob** and **ENTER**, select **Fault Locator**. The following screen appears.

Example of a screen that appears when "Normal" is selected



Pressing the soft key that corresponds to the route you want to search displays an illustration that shows the routes that will be searched.

Select Route

- Normal
- OLT -> Splitter
- OLT -> Splitter -> ONU
- ONU -> Splitter
- ONU -> Splitter -> OLT

Normal
Select this to search for faults in the fiber that connects the OLT¹ and ONU².

OLT -> Splitter
Select this to search the route from the OLT to the splitter.

OLT -> Splitter -> ONU
Select this to search the routes from the OLT through the splitter to each ONU.

ONU -> Splitter
Select this to search the route from an ONU to the splitter.

ONU -> Splitter -> OLT
Select this to search the route from an ONU through the splitter to the OLT.

1 OLT (optical line termination): the telephone exchange's optical terminal
 2 ONU (optical network unit): the user's optical terminal

Fault Locator Screen

2. Select the soft key that corresponds to the route in which to search for breaks, and press **ENTER**. The following screen appears.

The screenshot shows the 'Fault location' screen. At the top, a 'Faulty Point' is indicated with a value of 53.29735 km. Below this is a waveform display with a grid. A vertical cursor is positioned at 53.29735 km. The screen includes several soft keys: 'Fault Locator', 'Wave-length' (set to SM 1310nm), 'Distance Ref Setup', and 'OTDR'. A 'Select Route' menu is visible at the bottom.

Waveform display screen
(See section 5.1.)

Cursor position
(See section 6.1.)

Set the wavelength .
The available options vary depending on the model. For details, see the explanation in section 3.5.

Press to move the distance reference (see section 6.3).

Press to access the OTDR feature (see chapters 3 to 7).
If you press this soft key, the OTDR screen will be displayed. After you use the OTDR feature to perform analysis, to return to the fault locator feature, press **MENU**, and then press the **Fault Locator** soft key.

Measurement Screen

3. Press **SETUP** to display the following screen.

The screenshot shows the 'Setup' screen. It includes settings for 'Wavelength' (SM 1310nm) and 'End of Fiber' (3dB). A text box explains the 'Fiber END' detection: '<< Fiber END >> The fiber end is a point where the transient loss exceeds the preset threshold for the end detection.' Below this is a small waveform diagram showing the 'End Of Fiber' point. At the bottom, there is a 'Select Route' menu.

Set the wavelength.
See "Explanation" in section 3.5.

Set the end of fiber (Fresnel reflection; 3dB to 65dB).
See "Explanation" in section 3.6.

Select the route.
The Select Route menu will appear. You can change the route to measure.

Measuring



WARNING

- During measurement, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French

AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

4. Press **AVG** to start the averaged measurement. When the averaged measurement completes, the fault locations are automatically displayed.

Note

You can save measured data, but saved waveform data cannot be loaded on the Instrument. For details on saving measured data, see section 18.2.

Explanation**Select Route Menu**

Before starting the fault locator feature, you can select the route in which to search for breaks. After confirming the route, press ENTER. The optimal measurement conditions for the selected route will automatically be selected.

Fault Location Display

The fault locator uses averaged measurements to detect faults. The cursor position is automatically set to a fault location on the waveform, and the distance from the measurement reference point to the fault is displayed.

Faults are not detected during real-time measurement. In the fault locator's real-time measurement, you can perform cursor operations or select the wavelength during measurements. If you cancel measurements prematurely, faults will not be detected.

Distance Unit

You can select the distance unit that is displayed on the screen from the units shown below.

km, mile, kfeet

If you set the Instrument language to JAPANESE, the distance unit is fixed to km. For the setup procedure, see section 5.5.

14.1 Using Fiber Inspection Probes to View the Status of Optical Fiber End Faces

By connecting a commercially available fiber inspection probe that has a USB interface, to an Instrument USB port, you can show photographs of optical fiber end faces on the Instrument display. These pictures can be saved as data.

Procedure

Fiber End Face Checking Screen

1. Using the **rotary knob** and **ENTER**, select **Fiber Inspection Probe** to display the following screen.
2. Connect the fiber inspection probe's USB cable to the USB Type A port on the Instrument. Just connecting the probe to the Instrument will display the picture on the screen. If you disconnect the USB cable, the picture will disappear.

The screenshot shows a blue background with a central grayscale image of a fiber end face. At the top left, the word "HOLD" is displayed in yellow. At the bottom left, it says "Next File Name:" followed by "0000.BMP". On the right side, there is a vertical menu with four options: "Fiber Inspect. Probe", "Full Screen", "Hold", and "File". Below the menu is a "Save" button. Arrows point from text labels to these elements.

This is displayed when the screen is in the hold state.

Fiber inspection probe display

Switches the full-screen display
Press this soft key to switch to the full-screen display. Press a soft key or an operation key to return to the previous screen.

Holds the screen
Press this soft key to put the screen into the hold state. When in the hold state, "HOLD" is displayed at the top of the screen. If you press this soft key again, the hold state will be cleared.

File
See section 17.2. The only file operation that you can perform is saving files. You can save the file as one of the following three file types.

- BMP
- PNG
- JPG

You can set the file type when the screen is in the hold state.

Starts saving
Press this soft key to save the screen that is displayed.

The next file name that will be saved
For details on file names, see section 17.2.

Explanation

Connecting Fiber Inspection Probes

Hot-plugging is supported; you can connect or disconnect the USB device at any time, regardless of whether the Instrument is on or off.

If you connect the USB fiber inspection probe while the Instrument is on, the Instrument will automatically recognize the probe.

For cautions regarding connecting the probe, see Note in section 18.1.

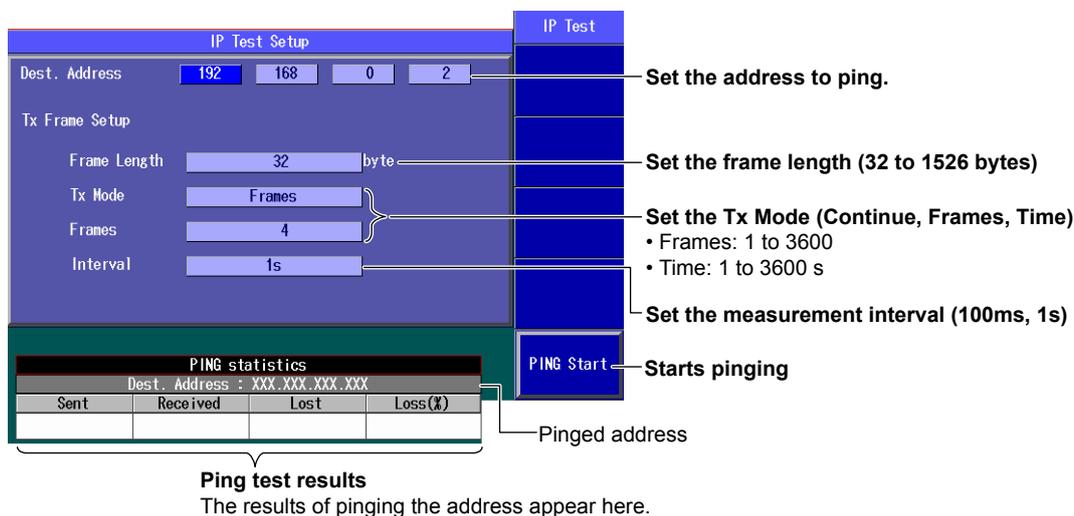
For information about compatible fiber inspection probes, contact your nearest YOKOGAWA dealer.

15.1 Performing an IP Test

Procedure

Ping Test Setup Screen

Using the **rotary knob** and **ENTER**, select **IP Test** to display the following screen.



Explanation

IP testing is available on models with the /LAN option.
Use the Ethernet port to execute a ping test.

Pinging

Target Address

Specify the address that you want to ping.

Tx Frame

Set the conditions of the frame you will use for pinging.

- **Frame Length**

You can set the length of the frame that will be sent in a single ping to a value within the following range.

32 to 1526 bytes

- **Tx Mode**

You can set the Tx mode to one of the following options. Depending on the Tx mode that you set, you may set the number of frames and the time in the next menu.

Continue	Frames are sent continuously, regardless of the set number of frames and time.
----------	--------------------------------------------------------------------------------

Frames	1 to 3600
--------	-----------

Time	1 to 3600 s
------	-------------

Measurement Interval

Set the interval at which to measure the ping test items (see the next page) to one of the following values.

100 ms, 1 s

15.1 Performing an IP Test

Pinging

Pinging is executed according to the Tx mode that you set.

- When it ends normally, the Instrument returns to the previous screen. During pinging, “PING Start” changes to “PING Stop.” All soft keys other than the PING Stop soft key are unavailable.
- To stop pinging, press the PING Stop soft key. “PING Stop” will change to “PING Start.”

Ping Test Results

The ping test results are listed below. The pinged IP address and the ping test results are indicated in the PING statistics table.

- Sent frames
- Received frames
- Lost frames (reception failed)
- Loss rate

16.1 Creating a New Project

Procedure

Main View Screen

- Using the rotary knob and ENTER, select **Multi-Core Fiber Meas.** The following screen appears.

The last measurement project appears.

If you are using this feature for the first time after purchase or if the settings have been initialized, "NewProject" will appear. "NewProject" is an empty project.

The core number at the cursor location is highlighted.

The drive/folder name/project name of the current project

Creating a New Project

- Press the **New Project** soft key. The following screen appears. Change the project name by following the procedure in section 2.4.

Entering Measurement Core Information

Project Setup Screen

3. Press **SETUP** and then the **Project Setup** soft key. The following screen appears.

Change the project name.
A character input dialog box will open (see “Creating a New Project” on the previous page). If you created a new project in step 2, you do not have to change the project name here.

Set the starting core number (1 to 9900)

Set the number of fibers or tapes (1 to 100)

Set the tape number (OFF, a-b (2), a-c (3), a-d (4), a-e (5), a-f (6), a-g (7), a-h (8)).

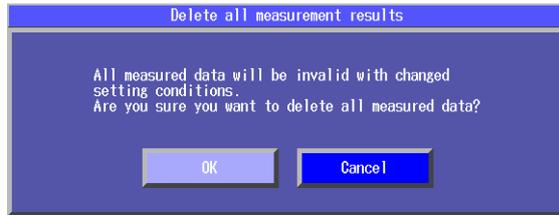
Set the number of fibers in each division (8 cores, 10 cores).
You can set this when the tape number is set to OFF.

Set the file name type (WL + No., No. + WL, Project Name + WL + No., No. + Project Name + WL, WL + Project Name + No.).

Field	Value
Project Name	ABCDE
start No	1
Num Of Fibers	88
Tape No	OFF
Num of Units	8 cores / 10 cores
Name Type	WL + Project Name + No.

Note

If a core number cell on the main view screen has a check mark and a new project has not been created, changing the measurement core information will cause the following confirmation screen to appear.



Setting Measurement Conditions

Meas Setup (Multi Wavelength) Screen

4. Press the **Meas Setup** soft key. The following screen appears.
Follow the procedure in section 3.5, “Setting Measurement Conditions.”

Set the wavelengths.
Set at what wavelength to measure each fiber.
• Measurement of all cores is performed at the specified wavelength.
• To measure using multiple wavelengths, set “Wavelength 2” and “Wavelength 3.”

Event Search
If the fault event display is turned on, this is set to Auto.

Sets automatic saving of the measured results (Off, On)
On: Measured results are automatically saved. After measurement is complete, the main view screen appears.
Off: Measured results are not automatically saved. You can continue with the analysis.

Turns PON measurement on or off

Field	Value
Mode	Multi WL
Wavelength 1	SH 1310nm
Wavelength 2	SH 1550nm
Wavelength 3	Off
Distance Range	100km
Pulse Width	100ns
Attenuation	0.00dB
Sample Interval	4m
Avg Method	Hi-Speed
Avg Unit	Times / Duration
Avg Times	2^18
Event Search	Auto / Manual
Auto Save	Setup [OFF]
Fiber-In-Use Alarm	Off / On
Plug Check	Off / On
PON Measurement	Off / On
Default	

Note

Depending on the measurement conditions that you change, measured data may be cleared. For details, see “Changing Measurement Conditions” in “Explanation.”

Setting Analysis Conditions

Analysis Setup (Multi Wavelength) Screen

- Press the **Analysis Setup** soft key. The following screen appears.
Follow the procedure in section 3.6, "Setting Analysis Conditions."

Analysis Setup(Multi Wavelength)			
Project Name	ABCDE		
Wavelength	SM 1310nm	SM 1550nm	Off
IOR	1.46000	1.48000	0.00000
Backscatter Level	-50.00dB	-52.00dB	0.00dB
Approx.Method(Marker)	LSA	TPA	
<< Event Analysis Setup >>			
Approx.Method(Event)	LSA	TPA	
Event Search Conditions			
Splice Loss	0.10dB		
Return Loss	70dB		
End of Fiber	3dB		
Fault Event	Setup[OFF]		
Default			

Note

Depending on the analysis conditions that you change, event detection of all fibers may be executed again. For details, see "Changing Analysis Conditions" in "Explanation."

Checking Measurement Details

Project Information Screen

- Press **ESC** and then the **Project info** soft key. The following screen appears. You can check the settings.

You are ready to start a multi-core fiber measurement.

2012/06/22 11:38		Num Of Fibers:00/88		-AC-	
Project Name	: ABCDE	Project info			
Drive	: Int.Memory	Screen Image Save			Saves a screen image
Dest. Folder	: /MPJ				
Save Folder (SOR)	: /MPJ/ABCDE				
File Name	: 1310nm_ABCDE_0001.SOR				
Measure Conditions		Fiber information			
Wavelength 1	: SM 1310nm	start No	: 1		
Wavelength 2	: SM 1550nm	Num Of Fibers	: 88		
Wavelength 3	: Off	Tape No.	: Off		
Event Search	: Manual				
Auto Save	: Off				

Explanation

Projects

Projects are group of items for measuring multi-core fibers. Projects include the measurement fiber’s number of cores, measurement conditions, analysis conditions, save destination of measured results, etc.

When you select the multi-core measurement feature, the last measurement project appears on the main view screen. To measure using a project different from the previous project, set the project in one of the following ways.

- Create a new project
- Load an existing project file containing project information from the internal memory or a USB memory device (see section 16.2).

Main View Screen

The project information is displayed in a list. For details on the main view screen, see section 16.3.

- Check marks that appear in core number cells and the pass/fail judgment result display make it easy to distinguish cores that have been measured and saved from cores that have not been measured.
- The preview area at the bottom of the screen enables you to view the setup information and measured waveform of the specified core number without having to open the file.

Skip

Specify “Skip” for cores that will not be measured. Core numbers set to Skip appear dimmed.

Creating a New Project

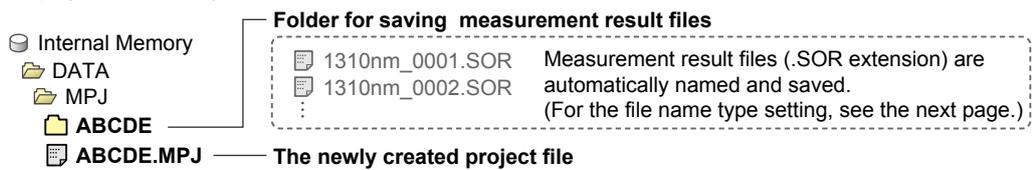
To create a new project, change the project name, and create a new project file.

Project Name

Set up to 15 characters. For the types of strings and characters that you can use, see section 18.2.

Note

- When you change the project name, a project file (.MPJ extension) and a folder for saving measurement result files (.SOR extension) are created.
- The project file name and the folder name for saving measurement results files will both be set to the project name that you entered.



Entering Project Information

When you create a new project file, enter the following project information.

- Measurement core information
- Measurement conditions
- Analysis conditions

Measurement and analysis conditions are applied uniformly to all cores in the project. You cannot set conditions separately for each core on the Instrument.

Starting core number

Set the starting core number in the following range.

1 to 9900

Number of Fibers or Tapes

Set the number of fibers or tapes in the following range.

Tape No	Number of Fibers or Tapes	
OFF	10 to 100 fibers (10 cores)	8 to 96 fibers (8 cores)
a-b (2)	10 to 50 tapes	1 to 50 tapes
a-c (3)	10 to 33 tapes	1 to 33 tapes
a-d (4)	10 to 25 tapes	1 to 25 tapes
a-e (5)	10 to 20 tapes	1 to 20 tapes
a-f (6)	10 to 16 tapes	1 to 16 tapes
a-g (7)	10 to 14 tapes	1 to 14 tapes
a-h (8)	10 to 12 tapes	1 to 12 tapes

You can set the number of fibers in steps of 8 when the number of fibers in each division is set to “8 cores” and in steps of 10 when the number of fibers in each division is set to “10 cores.”

Example: When the number of fibers in each division is set to “8 cores,” even if you set the number of fibers to 12, it will be set to 16.

Tape No

Set the tape number to one of the following options.

OFF, a-b (2), a-c (3), a-d (4), a-e (5), a-f (6), a-g (7), a-h (8)

Setting the Number of Fibers in Each Division

When Tape No is set to OFF, you can set the number of columns shown on the main view screen.

If you will set the number of fibers to 97 or higher, first set Num of Units to 10 cores.

8 cores

8 columns

10 cores

10 columns

Setting the File Name Type

Set the file name type for measurement result files (.SOR extension) to one of the following options.

- WL + No.
- No. + WL
- Project Name + WL + No.
- No. + Project Name + WL
- WL + Project Name + No.

Wavelength 1, Wavelength 2, and Wavelength 3

To measure using multiple wavelengths, set “Wavelength 2” and “Wavelength 3” in addition to “Wavelength 1.” You can only select the wavelengths that can be emitted from each port.

- On the AQ1200B, “Wavelength 1” is fixed at 1625 nm.
- On the AQ1200C, “Wavelength 1” is fixed at 1650 nm.
- If you set “Wavelength 1” to 1625 nm or 1650 nm on the AQ1200E, AQ1205E, or AQ1205F, you cannot set “Wavelength 2” or “Wavelength 3” to 1310 nm or 1550 nm, which are emitted from a different output port.

Multi-Core Fiber Measurement

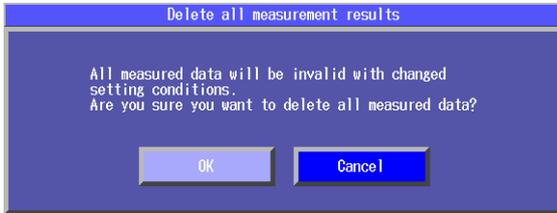
The following optical pulse measurements are possible. For details, see section 16.3.

- Real-time measurement
- Averaged measurement

Changing Measurement and Analysis Conditions

After a project setup is complete and multi-core fiber measurement is started, if measured data is already saved, changing the following measurement conditions will cause a confirmation screen for deleting the measured data to appear. If you confirm, all measured data is deleted.

- Wavelength 1, Wavelength 2, and Wavelength 3
- Distance range
- Pulse width
- Attenuation
- Sample interval
- Average method
- Average unit
- Average count or average duration
- Default



The following setup conditions can be changed while retaining measured data. When you change them, settings of unmeasured core numbers will change.

- Measurement conditions
 - Event search
 - Auto save
 - Fiber-in-use alarm
 - Plug check

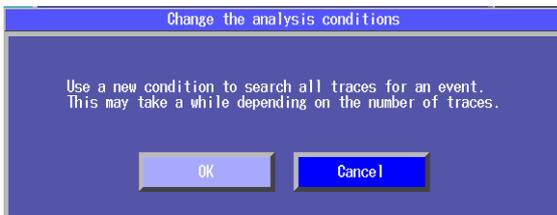
Changing Analysis Conditions

After a project setup is complete and multi-core fiber measurement is started, if measured data is already saved and event analysis has already been executed, changing the following analysis conditions will cause a confirmation screen for re-executing the entire event search to appear. If you confirm, event search will be executed.

If the fault event display is turned on, pass/fail judgment will be re-executed.

The measured data up to that point will be retained.

- Index of refraction
- Backscattering Light Level
- Event search conditions



If you change the fault event condition, pass/fail judgment will be re-executed on all waveforms.

Saving Project Information

When you change measurement core information, measurement conditions, or analysis conditions, the project file (.MPJ extension) is overwritten.

Saving Screen Images

Screen images are saved to the file MultiFiberProjetInfo.BMP in the root directory of the internal memory.

If the file already exists, it will be overwritten.

16.2 Loading a Project

CAUTION

Do not remove USB memory or turn off the power when the USB memory access indicator is blinking or when data is being saved or loaded from internal memory. Doing so may damage the storage medium (USB memory or internal memory) or corrupt its data.

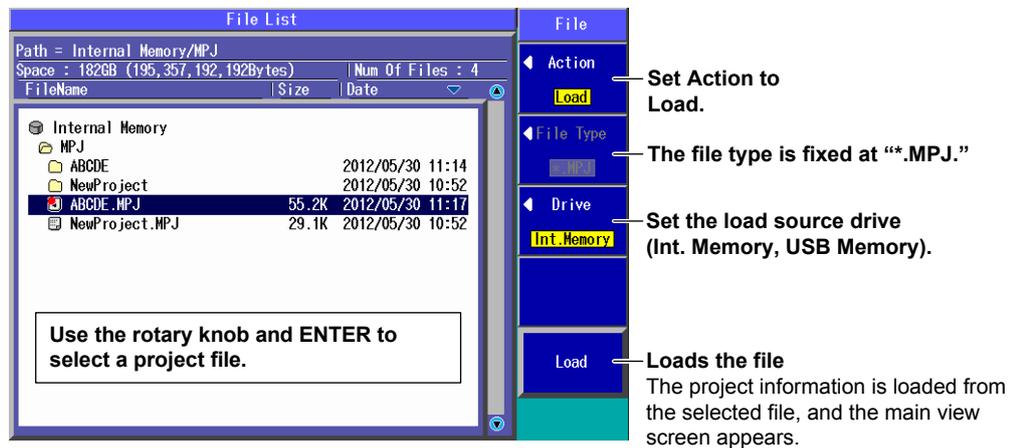
French

ATTENTION

N'enlevez pas un dispositif de mémoire USB et ne coupez pas l'alimentation électrique lorsque l'indicateur d'accès à la mémoire USB clignote ou lorsque les données sont en train d'être enregistrées ou chargées à partir d'une mémoire interne. Vous risqueriez d'endommager le support de stockage (mémoire USB ou mémoire interne) ou les données qu'il contient.

Procedure

1. Using the **rotary knob** and **ENTER**, select **Multi-Core Fiber Meas**. The main view screen appears.
The last measurement project appears.
If you are using this feature for the first time after purchase or if the settings have been initialized, "NewProject" will appear. "NewProject" is an empty project.
2. Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.



Note

If a project file is loaded from a USB memory device, measurement result files (.SOR extension) will be saved in a folder in the same folder as the project file (in the USB memory device). The folder will have the same name as the project file.

Explanation

For firmware versions 2.01 and later, all project files created by AQ1200x/AQ1205x models can be loaded by AQ1200x/AQ1205xs. However, if a project file contains an invalid measurement condition even for just one core, the file cannot be loaded. In this situation, an error message will be displayed.

16.3 Measuring Multi-Core Fibers

Using screens and menus specific to multi-core fiber measurement, you can efficiently and completely measure multi-core fibers.



WARNING

- During measurement, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French



AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

Note

You cannot use communication commands when the multi-core fiber measurement feature is selected.

Procedure

Main View Screen

- Using the **rotary knob** and **ENTER**, select **Multi-Core Fiber Meas**. The following screen appears.

The last measurement project appears.

If you are using this feature for the first time after purchase or if the settings have been initialized, "NewProject" will appear. "NewProject" is an empty project.

Check mark indicating that the data has been saved or pass/fail judgment result indication

The drive/folder name/project name of the current project

Core numbers set to Skip appear dimmed.

The number of cores whose measurement results have been saved

Using the arrow keys or the rotary knob, move the cursor to the cell of a core number you want to measure.

Core number

Create a new project.
(See section 16.1.)

Confirm the waveform.
You can confirm the measured waveform.
You can check marker and event positions.

Project information
Displays project information

Set the wavelength.
You can select one of the wavelengths that have been set in the measurement conditions or "All."

Clear the check mark.
Clears the check mark or the pass/fail judgment result indication from the cell at the cursor location and deletes the cell data

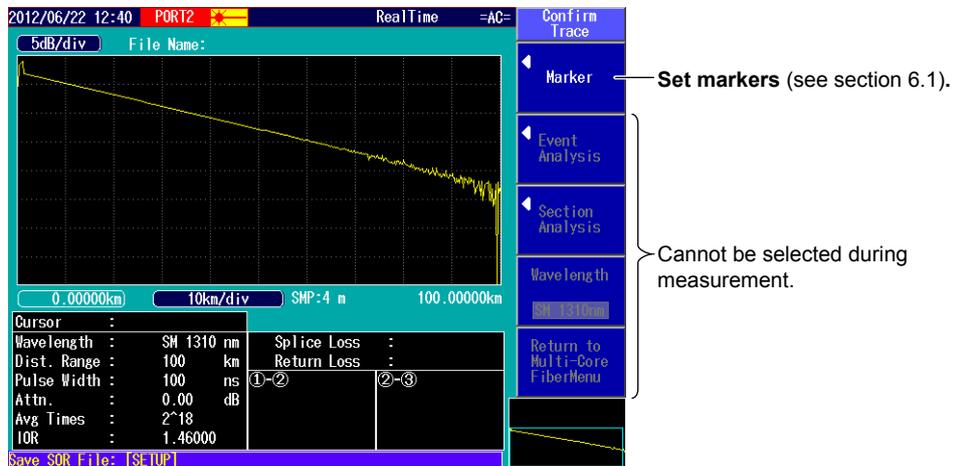
Preview area
Information about the core number at the cursor location

Specifies skip
You can select this soft key when the cell at the cursor location does not have a check mark or the pass/fail judgment result indication.
To cancel skipping, press this soft key again.

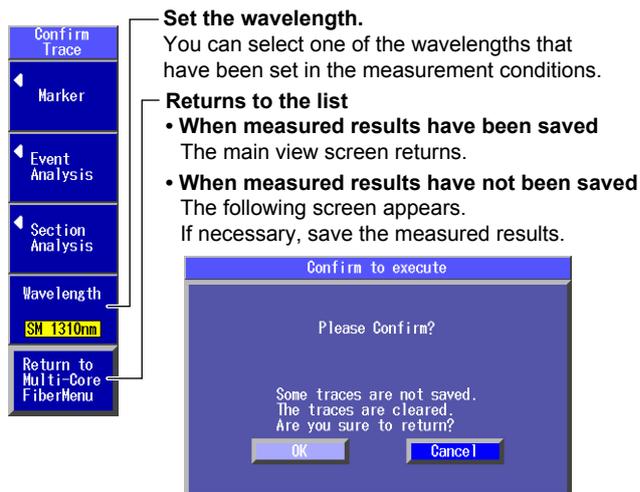
- Create a new project (see section 16.1), or load a previously saved project (see section 16.2). The main view screen shows the measurement project.
- Using the **arrow** keys or the **rotary knob**, move the cursor to the cell of a core number you want to measure.
- Press the **Wavelength** soft key to select the wavelength.

Real-time Measurement

- Press **REAL TIME**. Measurement of “Wavelength 1” begins.
The screen shows the measured waveform, and the Confirm Trace menu appears.
During measurement, a mark appears at the top of the display to indicate that the laser light is on.



- Press **REAL TIME**. Measurement of “Wavelength 1” is complete.
All the items on the Confirm Trace menu become available.



- Press **SETUP** and then the **Save Waveform** soft key. The measured results are saved.
When the save operation is complete, the Confirm Trace menu appears.

Note

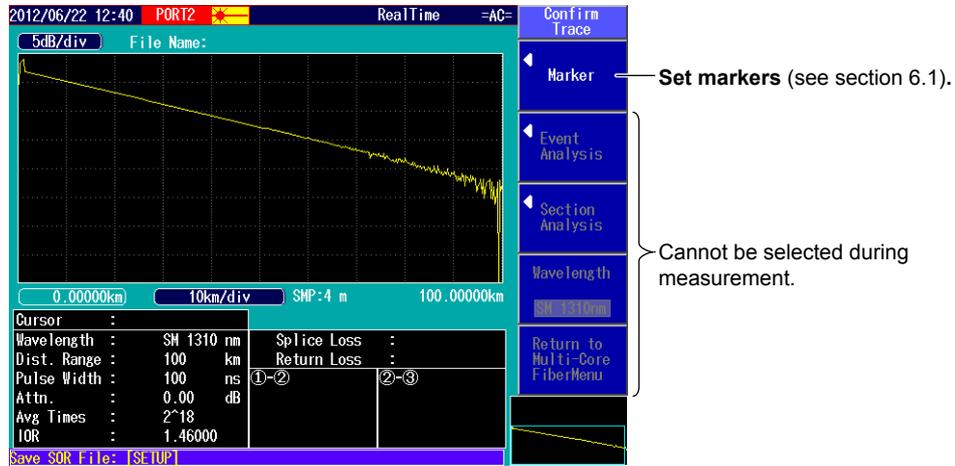
- In real-time measurement, measured results are not automatically saved.
- For Multi WL measurement, if Wavelength on the main view screen is set to “All,” measurement of “Waveform 1” is executed. To measure “Wavelength 2” and later, save the measured results of “Waveform 1,” and then press the Waveform soft key in the Confirm Trace menu to switch the wavelength.

Averaged Measurement

5. Press **AVE**. Averaged measurement begins.

The screen shows the measured waveform, and the Confirm Trace menu appears.

During measurement, a mark appears at the top of the display to indicate that the laser light is on.



Note

In the measurement conditions, if you set “Wavelength 2” and “Wavelength 3” in addition to “Wavelength 1,” you can perform multi wavelength measurement. If Wavelength on the main view screen is set to “All,” measurement is executed using multiple wavelengths for each core.

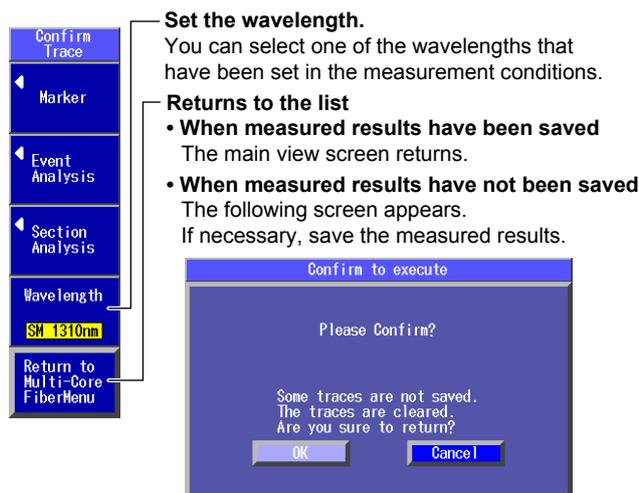
When Auto Save is Set to On in the Project Measurement Conditions

When measurement is complete, the measured results are automatically saved. The main view screen appears, and check marks or pass/fail judgment indications appear in the core number cells whose measurement results have been saved.

When Auto Save is Set to Off in the Project Measurement Conditions

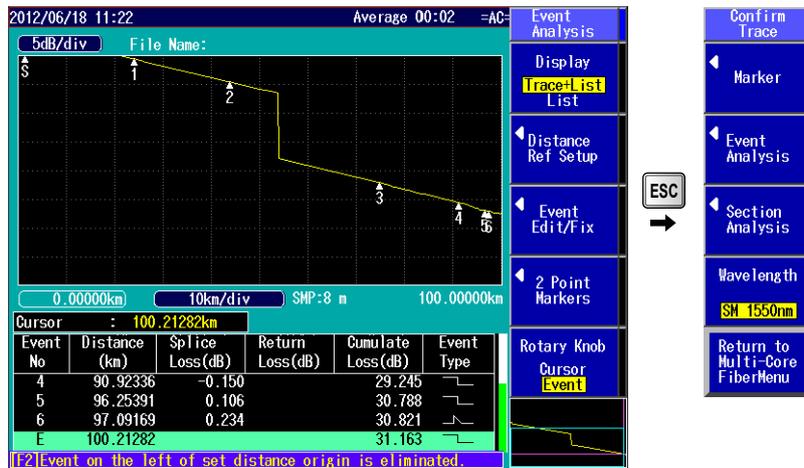
6. When measurement is complete, the measured results are not automatically saved.

All the items on the Confirm Trace menu become available.



You can continue with the analysis. Save the measured results after analysis is complete.

- If Event Search is set to Auto, after measurement is complete, the event screen and event analysis menu appear.

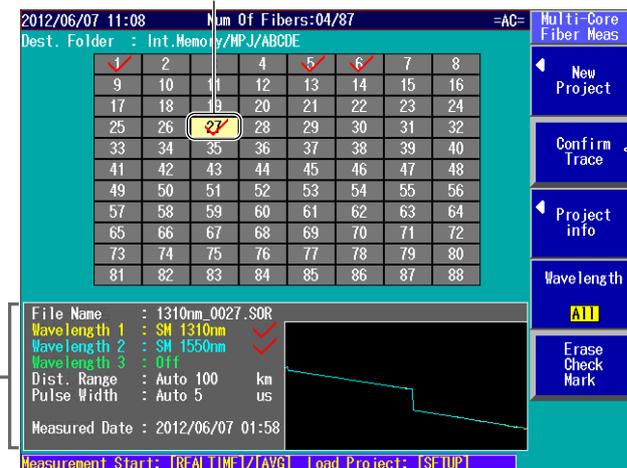


Confirming and Analyzing Traces

1. Using the **arrow** keys or the **rotary knob**, move the cursor to a core number cell with a check mark or a pass/fail judgment result indication on the main view screen.

The preview area at the bottom of the screen displays the measurement conditions, measurement date, and the measurement result waveform of the selected core number.

Select a cell with a check mark or a pass/fail judgment result indication.



Confirm the waveform.
You can confirm the waveform of the core number that is specified by the cursor.

Preview area

Information about the core number at the cursor location

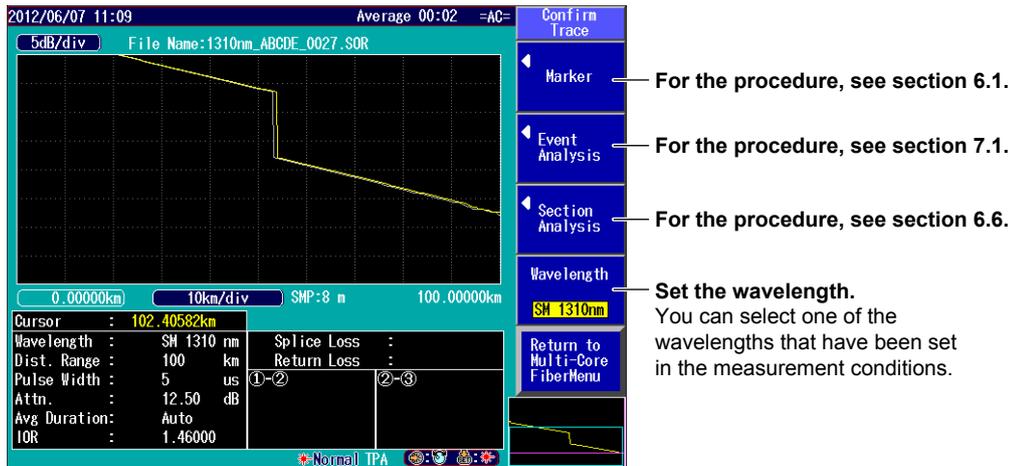
Note

If you turn on the fault event display (see section 3.6), the check mark display will change. For details, see "Explanation" in this section.

16.3 Measuring Multi-Core Fibers

2. Press the **Confirm Trace** soft key.

The waveform of the core number that is specified by the cursor appears.



3. Press the **Wavelength** soft key.

The current waveform switches to a trace with a different measurement wavelength.

4. Press the soft key for the item you want to analyze.

The soft key menu of the selected analysis appears.

Saving the Analysis Results

5. Press **SETUP** and then the **Save Waveform** soft key.

Analysis results are saved in measurement result files (.SOR extension), and the project file (.MPJ extension) is overwritten.

Explanation

During measurement, the OTDR measurement screen is displayed.

As with normal OTDR measurements, averaged measurement can be performed after real-time measurement.

Real-time Measurement

During real-time measurement of multi-core fibers, you can adjust markers and cursors but not measurement conditions.

For details, see section 4.1.

Averaged Measurement

During averaged measurement of multi-core fibers, you can adjust markers and cursors.

For details, see section 4.2.

Skip

Specify "Skip" for cores that will not be measured. Core numbers set to Skip appear dimmed.

Check Marks

- **When Fault Event Is Off**

When measured data is saved, the corresponding core number in the list will be marked with a check mark.

For multi wavelength measurements, the check mark appears when the measured data of all wavelengths have been saved. You can view the save condition of each wavelength in the preview area. A check mark appears next to the wavelength whose measured data has been saved.

- **When Fault Event Is On**

When measured data is saved, the corresponding core number in the list will display the pass/fail judgment result.

If the measured value is less than or equal to the fault event threshold (greater than equal in the case of reflection), the result is pass. Otherwise, the result is fail.

For multi wavelength measurements, the pass/fail judgment result appears when the measured data of all wavelengths have been saved.

You can view the save condition of each wavelength in the preview area.

A pass/fail judgment result appears next to the wavelength whose measured data has been saved.



Pass/fail judgment result

The pass and fail counts of the current core (which is in the list) are displayed in the lower right of the display.

Pass : ① — Current count
 Fail : 0
 NoJudge: 0

Note

NoJudge display

If an MPJ file of an older version is loaded, the file may contain core information whose event analysis has not been executed even when the fault event display is turned on.

If this occurs, you can turn off the fault event setting once and then turn it back on so that pass/fail judgment is executed again on the measured data and pass or fail is indicated.

Erase Check Mark

Pressing the Error Check Mark soft key deletes the measured data that has been saved for the selected core number.

A deletion confirmation screen shown below appears. If you select OK and press ENTER, the measured result data is deleted, and the check mark or the pass/fail judgment result indication for the core number is cleared.



Where Measured Results Are Saved

Measurement result files (.SOR extension) for each core are saved to a folder in the folder where the project file (.MPJ extension) is saved. The folder name is the same as the project name.

If a project is loaded from a USB memory device, measured results will be saved to the USB memory device. For details, see section 16.2.

Saving the Project

The project file and measurement result files of each core can be compressed in MPZ format and saved.

For the procedure to save files, see section 18.2.

16.3 Measuring Multi-Core Fibers

Note

Decompressing MPZ Files

On the File menu of the AQ7932 OTDR Emulation Software (version 4.30 or later), click Batch Conversion and then MPZ. Select the source file (MPZ file) and the conversion destination. An MPJ file and SOR files will be extracted.

AQ7932 (sold separately) is a PC software application for analyzing and creating reports of waveform data measured by the Instrument.

17.1 Displaying Optical Fiber Events as Icons

The Instrument is equipped with a feature that detects various events along the optical fiber route and displays them as icons. This feature works by performing an OTDR averaged measurement and then automatically performing an OTDR event analysis.

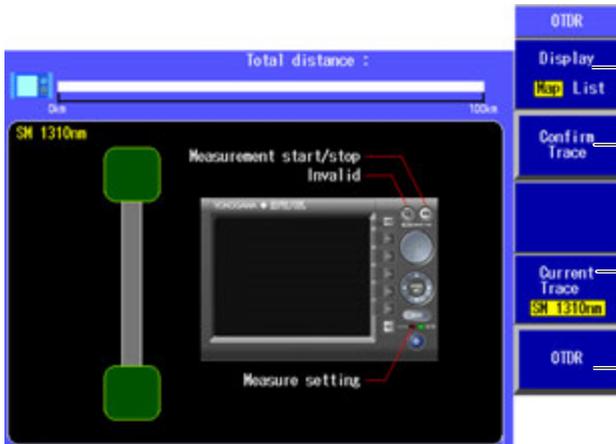
Detailed event analysis results are displayed along with the icon of each event.

Procedure

Event Mapper Screen

1. Use the rotary knob and ENTER to select Event Mapper.

The following screen appears.



Select the screen display item (Map, List).

Confirm the waveform. You can confirm the waveform of the event that is specified by the cursor.

Set the wavelength. The available options vary depending on the model. For details, see the explanation in section 3.5.

Press to access the OTDR feature (see chapters 3 to 7).

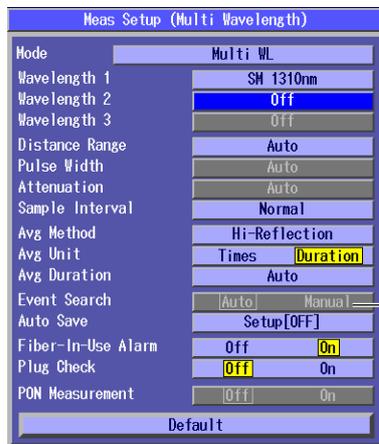
If you press this soft key, the original screen will not reappear.

To return to the event mapper feature after analyzing with the OTDR feature, press MENU and then the OTDR Event Mapper soft key.

Setting Measurement Conditions

2. Press SETUP and then the Meas Setup soft key.
3. Using the rotary knob and ENTER, set Mode to Detail or Multi WL. The following screen appears.

Follow the procedure in section 3.5, "Setting Measurement Conditions."

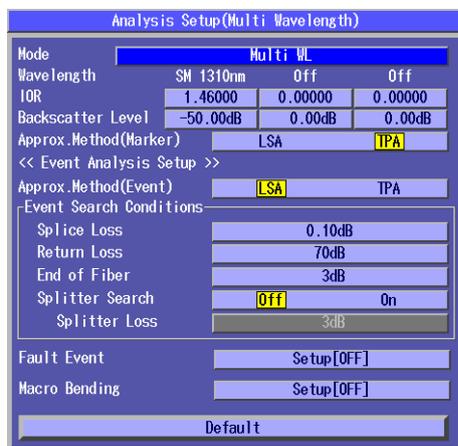


Event Search
This is fixed to Auto.

Setting Analysis Conditions

2. Press SETUP and then the Analysis Setup soft key.
3. Using the rotary knob and ENTER, set Mode to Detail or Multi WL. The following screen appears.

Follow the procedure in section 3.6, "Setting Analysis Conditions."



Executing Measurements



WARNING

- During measurement, do not remove the optical fiber cable, because light is emitted from the light source port. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

French

AVERTISSEMENT

- Lorsque l'AQ1200x/AQ1205x génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Masquer les orifices de source lumineuse sur lesquels aucun câble à fibres optiques n'est branché. Sur les modèles d'au moins deux orifices de source lumineuse, une déficience visuelle peut se produire si la lumière émise par erreur du mauvais orifice pénètre dans l'œil.

4. Press AVG.
Averaged measurement begins.
When the averaged measurement finishes, icons and analysis results of events are automatically displayed.
5. Use the rotary knob and the arrow keys to select the icon of the event you want to display the details of.
The background color is displayed more brightly than that of other icons.

Distance between events

The event positions displayed on the screen is enclosed in a frame.

Distance from the start point to the end point

Total distance : 2.038 km

SH 1550nm

Distance	: 0.000 km
Event Type	:
EventNo	: 1
Distance	: 1.063 km
Splice Loss	: 0.237 dB
Return Loss	: 0.163 dB
Cumul-Loss	:
Event Type	:
Distance	: 1.257 km
Event Type	:

OTDR

Display

Map List

Confirm Trace

Current Trace

SH 1550nm

OTDR

Set the displayed items to "Map."

Confirm the waveform. You can confirm the waveform of the selected event.

Set the wavelength. The events for the selected wavelength are displayed. The available options vary depending on the model. For details, see the explanation in section 3.5.

Overview display

The position of the selected event is indicated with a marker.

Icon of the selected event

The background color is displayed more brightly than that of other icons, and detailed event information is displayed.

Note

- To stop the averaged measurement in progress, press AVE. The averaged measurement will stop, and the screen that was showing before the measurement will reappear.
- During averaged measurement, you cannot set the measurement conditions.
- You can start averaged measurement by pressing AVG even while the measurement setting screen is showing.
- You cannot use event mapper during real-time measurement.

5. Press the Display soft key to select List.

The following screen appears.

6. Turn the rotary knob to move the cursor to the event that you want to display the measurement conditions for.

Measurement conditions

For details on the measurement conditions, see section 3.5.

OTDR

Display

Map List

Confirm Trace

Current Trace

SH 1550nm

OTDR

Set the displayed items to "List."

List display

File Name	:				
Wavelength	: SM 1550nm	Backscatter Level: -52.00dB			
Dist. Range	: 100km	Splice Loss : 0.10dB			
Pulse Width	: 5us	Return Loss : 70dB			
Attn.	:	End of Fiber : 3dB			
Avg Duration	: Auto				
IOR	: 1.46000				
Total RL	: <31.732dB	Total Loss : 10.376dB			
Event No	Distance (km)	Splice Loss (dB)	Return Loss (dB)	Cumulate Loss (dB)	Event Type
E	53.256			10.376	

Waveform Confirmation Screen

You can view waveforms to perform detailed event analysis and edit events.

5. Press the Confirm Trace soft key. The following screen appears. The cursor appears on the selected event on the waveform.

For details on the screen, see section 7.1.

Event No	Distance (km)	Splice Loss (dB)	Return Loss (dB)	Cumulate Loss (dB)	Event Type
1	0.10267	0.126	54.840	-0.011	
E	0.20534	55.811	0.125		

- Confirm Trace
- Distance Ref Setup — For the procedure, see section 6.3.
- Event Edit/Fix — For the procedure, see section 7.2.
- Current Trace — Set the wavelength. You can select one of the wavelengths that have been set in the measurement conditions.
- Rotary Knob
- Cursor Event — For the procedure, see section 7.1.
- Return to the Map Menu

Multi Pulse Width Measurement (on models with the -HJ suffix code)

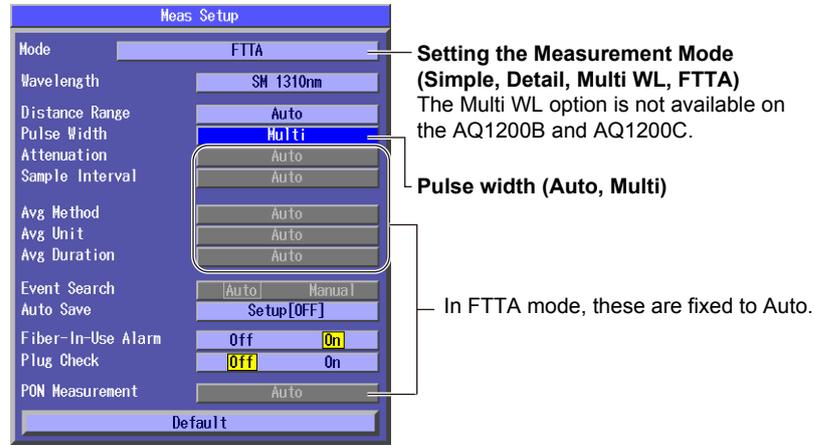
This function uses multiple pulse widths to simultaneously measure near-end side events and far-end side events. This function is only available on models with the -HJ suffix code.

Setting Measurement Conditions

- **Setting FTTA Mode (Multi pulse width measurement)**
2. Press **SETUP**, the System **Setup** soft key, and then the **OTDR** soft key to display the following screen.
 3. Using the **rotary knob** and **ENTER**, set FTTA mode to On.

- Rotary Push Button [] Coarse/Fine
- SETUP Key [] File Menu
- Marker Mode Marker Line
- Distance Unit km
- Optical power setting Normal Low
- Event Fix Mode Mode1 Mode2
- Label Setup Comment(File)
- Total Loss Mode Cumul-Loss
- Total RL Mode Include END
- FTTA Mode Off **On** — Multi pulse width measurement (On, Off)
- Work completion notice setting
- Setup Of Cumul-Loss Type
- Display Setup

- **Setting the Measurement Mode and Pulse Width**
- 4. Press **SETUP** and then the **Meas Setup** soft key. The following screen appears.
- 5. Using the **rotary knob** and **ENTER**, set the mode to FTFA.
- 6. Using the **rotary knob** and **ENTER**, set the pulse width to multi pulse width.

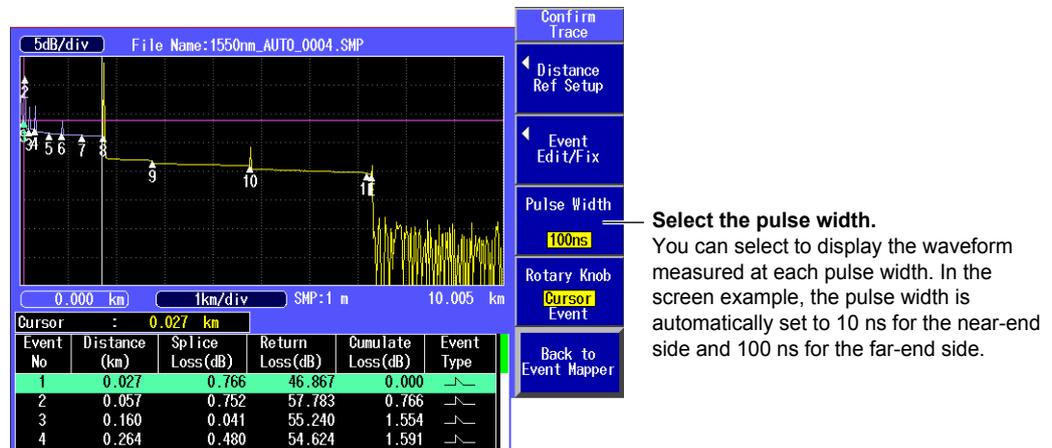


Setting Analysis Conditions and Executing Measurements (See page 17-2)

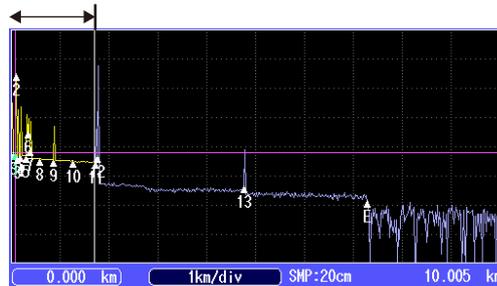
The procedure is the same as that in Detail mode (except the Current Trace soft key is not displayed on the OTDR menu when executing measurements). During measurement, averaged measurement of multiple pulse widths is continuously executed.

Waveform Confirmation Screen

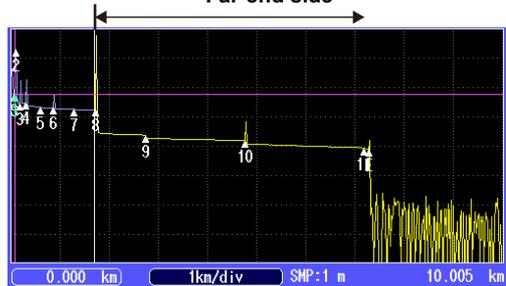
The waveforms measured using multiple pulse widths can be displayed alternately on the screen. Press the Confirm Trace soft key. The following screen appears.



Waveform of 10 ns pulse width Near-end side



Waveform of auto pulse width (100 ns) Far-end side

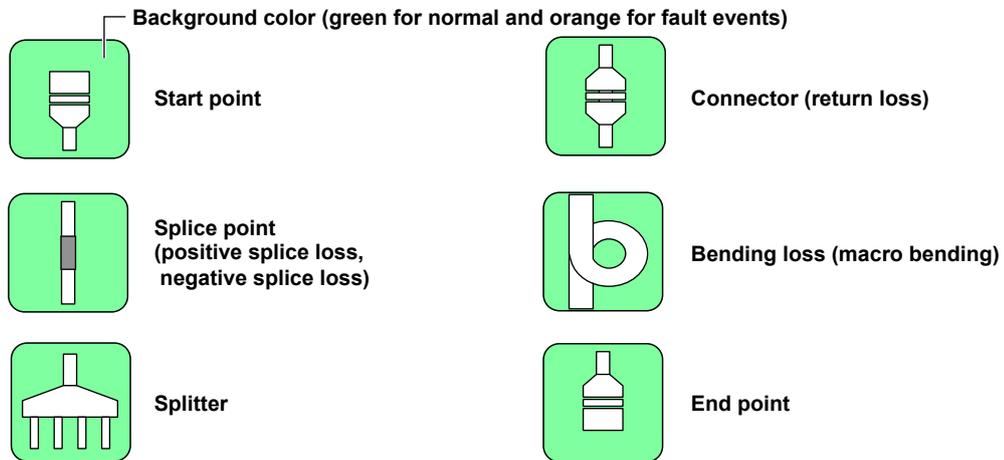


The boundary between near end and far end is set automatically. You cannot move the boundary. The yellow portion is the waveform display of the near-end side or far-end side.

Explanation

Event Icon

The following events are displayed as icons. The background color of icons is normally green. If the fault event display is turned on, the icon background color of fault events will be orange. For details about fault events, see section 3.6.



Analysis Details

The following analysis results are displayed.

Event No.

Event identification number on the route.

The numbers are assigned in ascending order from the measurement reference point.

Distance

For details, see the explanation in section 7.1.

Splice Loss

The splice loss for the selected event is displayed. When the fault event display is turned on, splice losses that exceed the fault event threshold are displayed.

Return Loss

The return loss for the selected event is displayed. When the fault event display is turned on, return losses that exceed the fault event threshold are displayed.

Cumulate Loss

For details, see the explanation in section 7.1.

Event Type

For details, see the explanation in section 7.1.

Multi pulse width measurement

This function uses multiple pulse widths to measure the same route.

The following pulse widths are used.

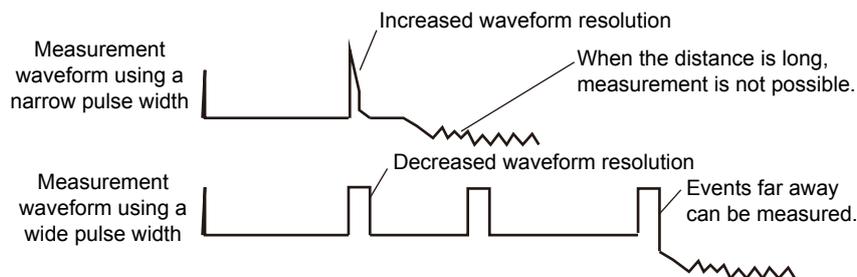
- Short pulse width: The near-end side events are measured. The value is set automatically by the instrument according to the distance range (e.g., 10 ns).
- Auto: The far-end side events are measured. The value is set automatically by the instrument according to the distance range.

In an optical fiber cable measurement, reducing the pulse width of optical pulse measurement increases the measurement resolution of the waveform in the near-end section but causes the optical pulse to attenuate in the far-end section, preventing correct measurement.

Conversely, increasing the pulse width of optical pulse measurement allows correct measurement in the far-end section but decreases the measurement resolution of the waveform in the near-end section.

The multi pulse width measurement compensates for these measurement accuracy degradations by performing optical pulse measurements using multiple pulse widths for the same wavelength and showing the waveforms one by one on the screen.

The instrument automatically determines the far-end side pulse widths depending on the specified distance range and wavelength.



18.1 Connecting a USB Storage Medium to the USB Port

CAUTION

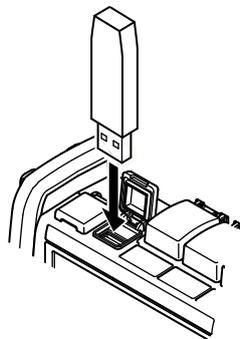
Do not remove USB memory or turn off the power when the USB memory access indicator is blinking or when data is being saved or loaded from internal memory. Doing so may damage the storage medium (USB memory or internal memory) or corrupt its data.

French

ATTENTION

N'enlevez pas un dispositif de mémoire USB et ne coupez pas l'alimentation électrique lorsque l'indicateur d'accès à la mémoire USB clignote ou lorsque les données sont en train d'être enregistrées ou chargées à partir d'une mémoire interne. Vous risqueriez d'endommager le support de stockage (mémoire USB ou mémoire interne) ou les données qu'il contient.

Use a portable USB storage medium. Connect it directly to the USB Type A port on the Instrument. Hot-plugging is supported: you can connect or disconnect the USB device at any time, regardless of whether the Instrument is on or off. When the power is on, the Instrument automatically detects the USB storage medium after it is connected.



Note

- Connect USB storage devices to the Instrument directly, not through a USB hub.
- Use a portable USB storage medium. Do not connect an incompatible USB storage medium.
- You cannot use protected USB storage devices (such as those that contain encrypted content).
- Do not connect and disconnect a USB device repetitively. Provide a 10-second interval between removal and connection.
- Do not connect or disconnect a USB device during the time from when the Instrument is turned on until key operation becomes available.
- You can use USB storage devices that comply with USB 1.1.

18.2 Saving and Loading Data

CAUTION

Do not remove USB memory or turn off the power when the USB memory access indicator is blinking or when data is being saved or loaded from internal memory. Doing so may damage the storage medium (USB memory or internal memory) or corrupt its data.

French

ATTENTION

N'enlevez pas un dispositif de mémoire USB et ne coupez pas l'alimentation électrique lorsque l'indicateur d'accès à la mémoire USB clignote ou lorsque les données sont en train d'être enregistrées ou chargées à partir d'une mémoire interne. Vous risqueriez d'endommager le support de stockage (mémoire USB ou mémoire interne) ou les données qu'il contient.

Procedure

File Operation Screen

When you have selected a feature other than the multi-core loss test from the top screen or top menu

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.

Folder path

The number of folders and files in the selected folder

File List

Path = USB Memory
Num Of Files : 12

FileName	Size	Date
USB Memory		
AQ1100		2009/10/05 17:57:50
AQ1200		2009/10/05 17:57:58
AutoLoss		2009/10/05 17:53:38
IMAGE		2009/10/06 13:28:54
IMAGE2		2009/10/06 13:30:42
LS		2009/10/05 17:54:50
LoggingData		2009/10/05 17:53:26
OptPowerH		2009/10/05 17:54:58
Project		2009/10/05 17:53:52

Using the rotary knob and ENTER, select the save destination or the file that you want to load.

File

Action
Save

File Type
CSV

Drive
USB Memory

File Name Setup

Save

Set the action (Save, Load).

Set the file type.
Set the extension of the file type you want to save or load. For details, see the explanation later in this section.

Set the destination drive (internal memory, USB memory).

Set the file name (see the File Name Setup screen in the next section).
• This is not displayed when multi-core fiber measurement is in use.

Saves or loads the file
Whether "Save" or "Load" is displayed depends on which option you choose for the Action setting.

The file name candidate for the next save operation

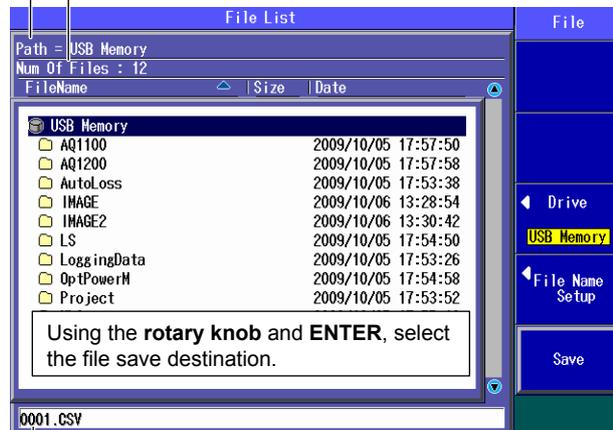
This indication appears when you set the action to "Save."

When you have selected the multi-core loss test feature from the top screen or top menu

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.

Folder path

The number of folders and files in the selected folder

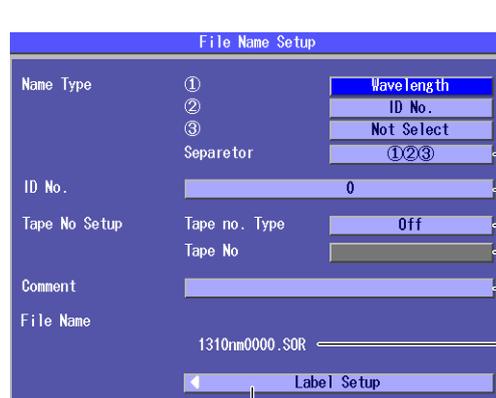


- ← Drive
USB Memory → Set the destination drive (internal memory, USB memory).
- ← File Name Setup → Set the file name (see the File Name Setup screen in the next section).
- Save → Saves the file
For the procedure to load files, see section 12.2.

The file name candidate for the next save operation

File Name Setup Screen

When you are using the OTDR, fault-locator or event mapper feature

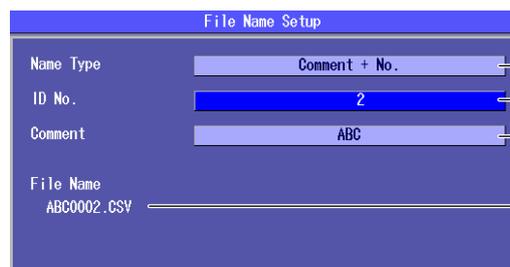


- ① Wavelength
② ID No.
③ Not Select
→ Set the parts of the file name (ID No., Wavelength, Comment, Company Name, Name, Cable ID, Fiber ID, Cable Code, Originating Loc, Terminating Loc). Set the items that will be entered into part ①, ②, and ③ of the file name.
- Separator ①②③ → Set the separator (①②③, ①_②_③, ①~②~③, ①^②^③).
- ID No. 0 → Set the ID number (0 to 9999).
- Tape No. Setup: Tape no. Type Off, Tape No. → Set the tape number type (Off, a-b(2), a-c(3), a-d(4), a-e(5), a-f(6), a-g(7), a-h(8)).
- Set the tape number start character. Set, within the specified tape number type range, the tape number start character that will be attached to the file name.
- Comment → Set the comment (up to 30 characters). To enter a comment, follow the procedure in section 2.4.
- File Name 1310nm0000.SOR → File name
The file name that is determined by the above settings is displayed.

Press to configure the label.

On the screen that appears, enter the values for the items according to the instructions in section 2.4 and select which items will be displayed on the screen. The label items are company name, name, cable ID, fiber ID, fiber type, cable code, start position, end position, and current data flag.

When you are using a feature other than the OTDR or fault-locator feature



- Name Type Comment + No. → Set the file name format (No., Comment, Comment + No., No. + Comment).
- ID No. 2 → Set the ID number (0 to 9999).
- Comment ABC → Specify a comment (up to 30 characters). To enter a comment, follow the procedure in section 2.4.
- File Name ABC0002.CSV → File Name
The file name that is produced by the above settings is displayed.

Explanation

Action

Select “Save” or “Load.”

The types of files that you can save are listed below.

File Type

Set the extension depending on the type of file that you want to save or load.

Saving

The types of files that you can save are listed below.

• **When you are using the OTDR, fault-locator or event mapper feature**

.SOR	Waveform data measured from an optical pulse; the data is in a file format that conforms to Telcordia SR-4731.
.CSV (waveform)	CSV file that contains waveform data measured from an optical pulse
.CSV (event)	CSV file that contains event data
.SET	Measurement conditions information file
.CFG	Information file that contains the measurement and analysis modes, display settings, and system settings
.BMP	BMP screen image data file
.PNG	PNG screen image data file
.JPG	JPG screen image data file
.TXT	Text file that contains a user-specified string; the supported character code is UTF-8.

* “Screen Image Save” may appear on the menu. Press this soft key to save the image displayed by “Screen Image Save” to the root directory of the internal memory with the file name SystemInfo.BMP.

• **When you are using the multi-core fiber measurement feature**

.SOR	Waveform data of multi-core measurement. The data is in a file format that conforms to Telcordia SR-4731.
.MPZ	File for storage that contains compressed waveform data of multi-core measurement (.SOR files) and project file (.MPJ file).

• **When you are using a feature other than the OTDR, fault-locator, or multi-core fiber measurement**

.CSV	A CSV format measurement data file ¹ The measurement data (including measurement conditions such as the wavelength and offset) for the specified core and tape numbers is saved. • Optical power meter measurement data (see section 9.4) • Loss test results (see section 11.2) • Loop-back loss test results (see section 11.3) • Multi-core loss test results (see section 12.3), project information (see section 12.1)
.LTS	File containing optical power meter measurement conditions and optical output conditions
.CFG	System setup data file
.BMP	BMP screen image data file
.PNG	PNG screen image data file
.JPG	JPG screen image data file

1 Logging results are also saved to CSV files. Logging results are saved in the file save screen that appears after logging stops (see section 9.3).

2 “Screen Image Save” may appear on the menu. Press this soft key to save the image displayed by “Screen Image Save” to the root directory of the internal memory with the file name SystemInfo.BMP.

Loading

The types of files that you can load are listed below.

• **When you are using the OTDR, fault-locator or event mapper feature**

.SOR	File in a format that conforms to Telcordia SR-4731 or Bellcore GR-196-CORE. (The file must contain data of measurement conditions that can be set using the AQ1200x/AQ1205x.)
.SET	Information file that contains the measurement conditions that have been saved using the AQ1200x/AQ1205x
.CFG	Information file that contains the measurement and analysis modes, display settings, and system settings
.TXT	Text file that contains a user-specified string; the supported character code is UTF-8.

- **When you are using the multi-core fiber measurement feature**

.MPJ	Project information file for multi-core measurement. For details, see section 16.1.
------	-------------------------------------------------------------------------------------

- **When you are using a feature other than the OTDR, fault-locator, or multi-core fiber measurement**

.CSV	For details, see the table under the heading "When you are using a feature other than the OTDR, fault-locator, or multi-core fiber measurement" (previous page) under "Saving."
.LTS	
.CFG	

Drive to Save To

You can set the destination drive to one of the following options.

Internal memory	The Instrument internal memory
USB memory	The USB storage medium connected to the USB Type A port on the Instrument.

Note

- Do not save files directly to the root directory. Create a folder, and save files to that folder. If there are many folders in the root directory, it will take some time to save files to a folder that is at a lower level in the folder hierarchy.
- You can create or save up to 256 files and folders in the root directory.

File Name

File Name Format

You can set the file-name format to one of the following options. For all formats, the maximum number of characters is 36.

- **When you are using the OTDR, fault-locator or event mapper feature**

You can select up to three items to be used for file names. The selected items are used as parts of the file name in the following order: ①, ②, ③.

ID No.	Four characters The range is 0 to 9999. Four characters are assigned for the file name. For example, if you set the number to "1," "0001" will be used in the file name. One character (tape number) If you select to use the ID number for the file name, when Tape Number Type is set to anything other than Off, the tape number is automatically appended to the ID number. Example: If you have a combination of ID No. "0" and Tape Number Type "a to c (3)," the file names will be set as follows: 0000a → 0000b → 0000c → 0001a → 0001b → 0001c.
Wavelength	Six characters
Comment	Up to 30 characters
Company name	
Name	You can select some of the label items. For details, see the table under "Label" later in this section.
Cable ID	
Fiber ID	When you select one of the label items, the first 10 characters of the item are used as part of the file name. Even if the selected item is not 10 characters long, it will be counted as the 10 characters for the part of the file name.
Cable code	
Start position	
End position	
Extension	Four characters, including the period

- The string entered for the comment is saved as label information in SOR files. You can open and view SOR files on a PC (firmware version 2.01 and later).
- If the whole file name is longer than 36 characters, characters will be deleted from the end of the comment item so that the file name is 36 characters long.
- The length of the file name includes the characters that are used for the selected separator and the extension.
- You cannot set the first item that makes up the file name to Blank.
- You cannot use the same item that you used for the first part of the file name in the second or third parts of the file name.
- If you use the same item that you used for the second part of the file name in the first or third part of the file name, the second part of the file name will be set to Blank. Also, if you use the same item that you used for the third part of the file name in the first or second part of the file name, the third part of the file name will be set to Blank.

18.2 Saving and Loading Data

- **When you are using the multi-core fiber measurement feature**

File Name Type of Measured Waveform Data (.SOR)

On the project setup screen, select one of the following combination options (see section 16.1).

- WL + No.
- No. + WL
- Project Name + WL + No.
- No. + Project Name + WL
- WL + Project Name + No.

For details on the number (ID No.), see the previous table.

File Name of Storage Files (.MPZ)

Storage files are saved with the same name as the project name that has been assigned on the top view screen or project setup screen (see section 16.3).

- **When you are using a feature other than the OTDR, fault-locator, or multi-core fiber measurement**

Select one of the following combinations.

No., Comment, Comment + No., No. + Comment

For details on the number (ID No.) and comment, see the previous table.

String and Character Types That Can Be Used in File and Folder Names

There are limitations on the types of strings and characters that you can use in file and folder names.

- The following character strings cannot be used as file or folder names due to MS-DOS limitations.
AUX, CON, PRN, NUL, CLOCK, CLOCK\$, LPT0, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9, COM0, COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, COM9
- The following types of characters can be used: 0 to 9, A to Z, a to z, _, -, =, (,), {, }, [,], #, \$, %, &, ~, !, `, and @.
@ cannot be entered consecutively.
- Make sure that the full file path (absolute path from the root folder) is less than or equal to 200 characters in length. If it exceeds 200 characters, an error occurs when you perform a file operation (such as saving, copying, renaming, or creating a folder).

Full file path: When an operation is being performed on a folder, the full path is up to the name of the folder.

When an operation is being performed on a file, the full path is up to the name of the file.

Label

When you are using the OTDR or fault-locator feature, you can specify the following items. If you save waveform data measured from an optical pulse to a file in SOR format, the following label information is also saved.

Company name	Up to 36 characters
Name	Up to 36 characters
Cable ID	Up to 36 characters
Fiber ID	Up to 36 characters
Fiber type	652:SMF Single-mode fiber 653:DSF Dispersion-shifted fiber 655:NZ-DSF Non-zero, dispersion-shifted, single-mode fiber 651:MMF Multi-mode fiber
Cable code	Up to 36 characters
Start position	Up to 36 characters
End position	Up to 36 characters
Current data flag	Shows the operation state. BUILT (BC), REPAIRED (RC), OTHER (OT), and CURRENT (CC)

File List

You can set items that are displayed in the file list. For details, see section 18.9.

The total number of files and folders that can be displayed in the file list is 1000 (256 for the root directory). If there are more than a total of 1000 files and folders in a given folder, the file list for that folder will only display 1000 files and folders. There is no way to set which files and folders are displayed.

About the File Operation Screen

Depending on the model and the selected feature, the operations for opening the file operation screen and the screens that appear vary.

- When multi-core loss testing is selected on models with the /SLT or /HLT option, a screen for saving the project information and core loss test results in CSV format appears.
- For information about loading files when multi-core loss testing is selected on models with the /SLT or /HLT option, see section 12.2. Select a file that contains project information and multi-core loss test results and load it.

18.3 Deleting and Copying Files

CAUTION

Do not remove USB memory or turn off the power when the USB memory access indicator is blinking or when data is being saved or loaded from internal memory. Doing so may damage the storage medium (USB memory or internal memory) or corrupt its data.

French

ATTENTION

N'enlevez pas un dispositif de mémoire USB et ne coupez pas l'alimentation électrique lorsque l'indicateur d'accès à la mémoire USB clignote ou lorsque les données sont en train d'être enregistrées ou chargées à partir d'une mémoire interne. Vous risqueriez d'endommager le support de stockage (mémoire USB ou mémoire interne) ou les données qu'il contient.

Procedure

File Operation Screen

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.

Folder path

The number of folders and files in the selected folder

File List

Path = USB Memory
Num Of Files : 12

FileName	Size	Date
USB Memory		
AQ1100		2009/10/05 17:57:50
AQ1200		2009/10/05 17:57:58
Autoloss		2009/10/05 17:53:38
IMAGE		2009/10/06 13:28:54
IMAGE2		2009/10/06 13:30:42
LS		2009/10/05 17:54:50
LoggingData		2009/10/05 17:53:26
OptPowerM		2009/10/05 17:54:58
Project		2009/10/05 17:53:52
VLS		2009/10/05 17:55:12
0000.CSV	211	2009/10/13 14:51:52
AAA0001.CSV	211	2009/10/13 14:54:22

File

- Action
- Delete
- File Type
- File Type
- File Type
- Drive
- USB Memory
- All Select
- Delete

Using the **rotary knob** and **ENTER**, select the files you want to delete or copy.
Selected files are indicated with this mark: .
To deselect a file, press **ENTER** again.

Set the action (Delete, Copy).

Set the file type.
Set the extension of the file type you want to delete or copy.

Set the destination drive
(internal memory, USB memory).

Selecting All Files

Deletes the selected files or displays a screen for selecting the copy destination.

Whether "Delete" or "Dest. Folder" is displayed depends on which option you choose for the Action setting.

When you press the **Dest. Folder** soft key, a screen for selecting the copy destination folder appears.

In that screen, select the destination folder and press the **Execute** soft key to copy the files.

Explanation**Action**

Select “Delete” or “Copy.”

File Type

The files of the type that you selected appear in the File List screen.

- For details about file types, see “Explanation” in section 18.2.
- To display all the files in the current folder, set the file type to “*. *”.

Drive to Save To

See “Explanation” in section 18.2.

Selecting All Files

All the files in the current folder will be deleted or copied.

- When you press the All Select soft key, “All Select” changes to “All Deselect.”
- When you press the All Deselect soft key, “All Deselect” changes to “All Select.” All the files in the current folder are deselected.

Deleting

The selected files are deleted.

Setting the Copy Destination and Copying

After selecting the files to copy, set the destination folder and copy the files.

About the File Operation Screen

Depending on the model and the selected feature, the operations for opening the file operation screen and the screens that appear vary.

On models with the /SLT or /HLT option, you cannot delete or copy files when multi-core loss testing is selected.

Note

Using the mini B USB port on the Instrument, you can send the files and folders in the Instrument internal memory to a PC. To do this, set the Instrument mini B USB port function to Storage (see section 19.1). When the PC accesses the Instrument and downloads the files, the download speed depends on the performance of the PC.

18.4 Changing File Names

CAUTION

Do not remove USB memory or turn off the power when the USB memory access indicator is blinking or when data is being saved or loaded from internal memory. Doing so may damage the storage medium (USB memory or internal memory) or corrupt its data.

French

ATTENTION

N'enlevez pas un dispositif de mémoire USB et ne coupez pas l'alimentation électrique lorsque l'indicateur d'accès à la mémoire USB clignote ou lorsque les données sont en train d'être enregistrées ou chargées à partir d'une mémoire interne. Vous risqueriez d'endommager le support de stockage (mémoire USB ou mémoire interne) ou les données qu'il contient.

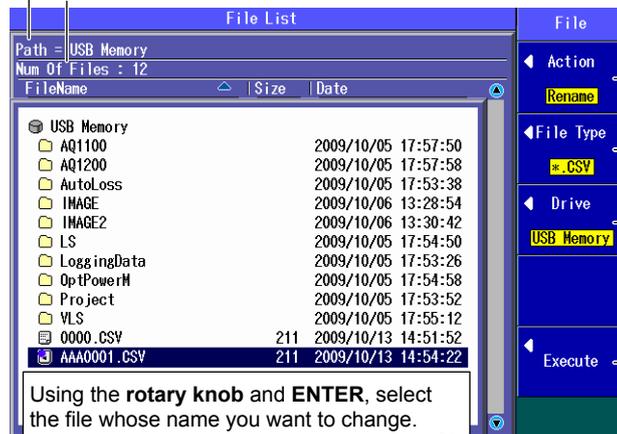
Procedure

File Operation Screen

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.

Folder path

The number of folders and files in the selected folder



Set the action (Rename).

Set the file type.

Set the extension of the file type of the file whose name you want to change.

Set the destination drive (internal memory, USB memory).

Enter a new file name.

The character input dialog box appears. To set the file name, follow the procedure in section 2.4. Enter the extension as well. After you have entered the file name, press the **Commit** soft key to change the file name to the name that you entered.

Using the **rotary knob** and **ENTER**, select the file whose name you want to change. Selected files are indicated with this mark: . To deselect a file, press **ENTER** again.

Explanation

Action

Select "Rename."

File Type

The files of the type that you selected appear in the File List screen.

- For details about file types, see "Explanation" in section 18.2.
- To display all the files in the current folder, set the file type to "**.*".

Drive to Save To

See "Explanation" in section 18.2.

Entering a File Name

Enter a file name into the character input dialog box that appears. Follow the procedure in section 2.4.

- Use the character input dialog box to enter the extension as well.
- When you press the Commit soft key, the file name changes to the name that you entered.

About the File Operation Screen

Depending on the model and the selected feature, the operations for opening the file operation screen and the screens that appear vary.

On models with the /SLT or /HLT option, you cannot change file names when multi-core loss testing is selected.

18.5 Creating Folders

CAUTION

Do not remove USB memory or turn off the power when the USB memory access indicator is blinking or when data is being saved or loaded from internal memory. Doing so may damage the storage medium (USB memory or internal memory) or corrupt its data.

French

ATTENTION

N'enlevez pas un dispositif de mémoire USB et ne coupez pas l'alimentation électrique lorsque l'indicateur d'accès à la mémoire USB clignote ou lorsque les données sont en train d'être enregistrées ou chargées à partir d'une mémoire interne. Vous risqueriez d'endommager le support de stockage (mémoire USB ou mémoire interne) ou les données qu'il contient.

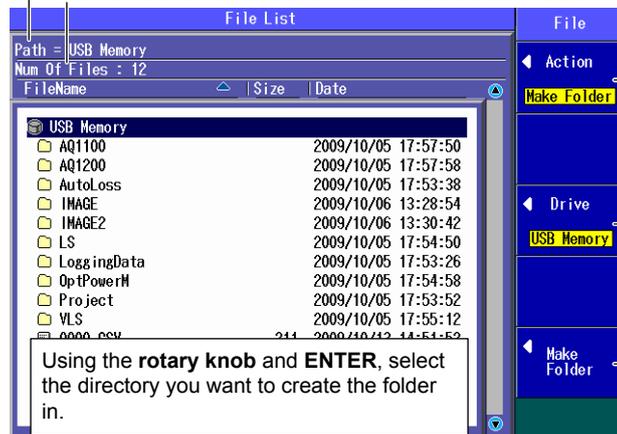
Procedure

File Operation Screen

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.

Folder path

The number of folders and files in the selected folder



Set the action (Make Folder).

Set the destination drive (internal memory, USB memory).

Create a folder.

The character input dialog box appears. To set the folder name, follow the procedure in section 2.4. After you have entered the folder name, press the **Commit** soft key to create the folder.

Explanation**Action**

Select "Make Folder."

Note

If you create a folder deep within the folder hierarchy, you may not be able to delete or copy the folder.

Drive to Save To

See "Explanation" in section 18.2.

Entering a Folder Name

Enter a folder name into the character input dialog box that appears. You can use up to 20 characters. Follow the procedure in section 2.4. When you press the Commit soft key in the character input dialog box, a folder with the name that you specified is created.

About the File Operation Screen

Depending on the model and the selected feature, the operations for opening the file operation screen and the screens that appear vary.

On models with the /SLT or /HLT option, you cannot create folders when multi-core loss testing is selected.

18.6 Deleting and Copying Folders

CAUTION

Do not remove USB memory or turn off the power when the USB memory access indicator is blinking or when data is being saved or loaded from internal memory. Doing so may damage the storage medium (USB memory or internal memory) or corrupt its data.

French

ATTENTION

N'enlevez pas un dispositif de mémoire USB et ne coupez pas l'alimentation électrique lorsque l'indicateur d'accès à la mémoire USB clignote ou lorsque les données sont en train d'être enregistrées ou chargées à partir d'une mémoire interne. Vous risqueriez d'endommager le support de stockage (mémoire USB ou mémoire interne) ou les données qu'il contient.

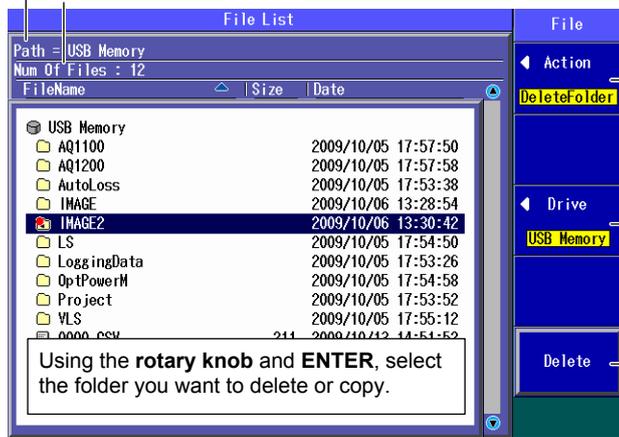
Procedure

File Operation Screen

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.

Folder path

The number of folders and files in the selected folder



Using the **rotary knob** and **ENTER**, select the folder you want to delete or copy.

Set the action (DeleteFolder, Copy Folder).

Set the destination drive (internal memory, USB memory).

Deletes the selected files or displays a screen for selecting the copy destination. Whether "Delete" or "Dest. Folder" is displayed depends on which option you choose for the Action setting.

When you press the **Dest. Folder** soft key, a screen for selecting the copy destination folder appears.

Make sure that the copy destination and source drives are different (see the explanation later in this section).

In the screen that appears, select the destination folder and press the **Execute** soft key to copy the files.

Explanation**Action**

Select “DeleteFolder” or “Copy Folder.”

Drive to Save To

See “Explanation” in section 18.2.

Deleting

The selected folders are deleted.

Setting the Copy Destination and Copying

After selecting the folders to copy, set the destination folder and copy the selected folders to it.

You cannot copy from the internal memory to the internal memory or from the USB memory to the USB memory. Copy folders from the internal memory to the USB memory or from the USB memory to the internal memory.

About the File Operation Screen

Depending on the model and the selected feature, the operations for opening the file operation screen and the screens that appear vary.

On models with the /SLT or /HLT option, you cannot delete or copy folders when multi-core loss testing is selected.

Note

- You may not be able to copy or delete the selected folder if it contains many levels of folders.
- Using the mini B USB port on the Instrument, you can send the files and folders in the Instrument internal memory to a PC. To do this, set the Instrument mini B USB port function to Storage (see section 19.1). When the PC accesses the Instrument and downloads the files, the download speed depends on the performance of the PC.

18.7 Initializing the Internal Memory

CAUTION

Do not remove USB memory or turn off the power when the USB memory access indicator is blinking or when data is being saved or loaded from internal memory. Doing so may damage the storage medium (USB memory or internal memory) or corrupt its data.

French

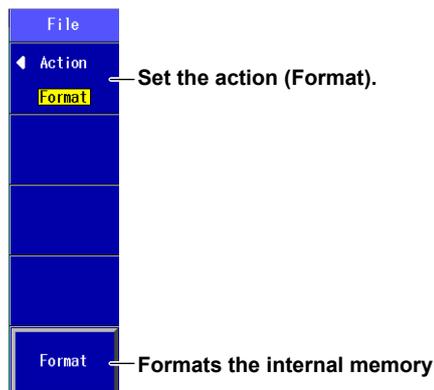
ATTENTION

N'enlevez pas un dispositif de mémoire USB et ne coupez pas l'alimentation électrique lorsque l'indicateur d'accès à la mémoire USB clignote ou lorsque les données sont en train d'être enregistrées ou chargées à partir d'une mémoire interne. Vous risqueriez d'endommager le support de stockage (mémoire USB ou mémoire interne) ou les données qu'il contient.

Procedure

File Operation Screen

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.



Explanation

Action

Select "Format."

Formatting

The internal memory is initialized. All the data in the internal memory is deleted. Before you initialize the internal memory, backup the data as necessary.

Note

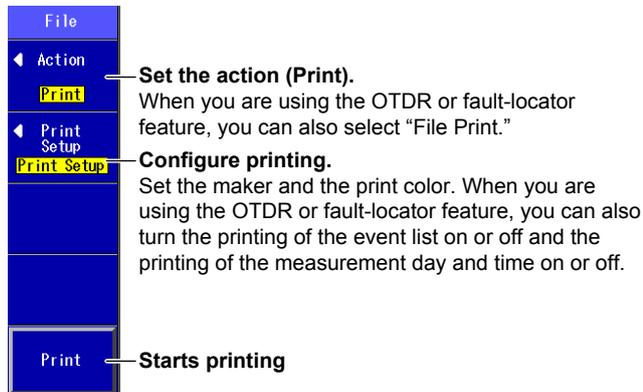
- Using the mini B USB port on the Instrument, you can send the files and folders in the Instrument internal memory to a PC. To do this, set the Instrument mini B USB port function to Storage (see section 19.1). When the PC accesses the Instrument and downloads the files, the download speed depends on the performance of the PC.
- If the Instrument cannot start normally and a message that prompts you to initialize the internal memory appears, see section 20.6.

18.8 Printing

Procedure

File Operation Screen

Press **SETUP** and the **File** soft key. Or, press **SETUP** twice. The following screen appears.



Explanation

Action

- Select "Print."
- When you are using the OTDR or fault-locator feature, you can also select "File Print." If you select "File Print," the drive selection menu is displayed. Select the drive or the SOR file that you want to print

Print Setup

Specify the maker of the printer connected to the Instrument and the print color.

- Connect the printer to the USB Type A port on the Instrument.
- You can use printers that comply with USB Printer Class Ver 1.1.

Printing

- When the action is "Print," the screen image is printed.
- When the action is "File Print," the selected SOR file's data is printed.

About the File Operation Screen

Depending on the model and the selected feature, the operations for opening the file operation screen and the screens that appear vary.

On models with the /SLT or /HLT option, you cannot print when multi-core loss testing is selected.

Note

- Do not connect incompatible printers.
- For USB printers that have been tested for compatibility, contact your nearest YOKOGAWA dealer.

18.9 Specifying the Items That Are Displayed in the File List

Procedure

File List Setup Screen

1. Press **SETUP**.
2. Using the **rotary knob** and **ENTER**, select **File List Setup** to display the following screen.

When Display is set to Default or File List

The screenshot shows the 'File List Setup' menu. The 'Display' option is set to 'Default'. Under the 'Customize' section, 'Size', 'Date', 'Date Format', 'Sort by', 'Sort Order', and 'Tree View' are all set to 'Off'. A preview table at the bottom shows columns for 'FileName', 'Size', and 'Date' with sample data.

FileName	Size	Date
DriveName		
TreeA		
FileNameA		15:00
FileNameC		12:00
FileNameB		09:00

Set Display to "Default" or "File List."

You cannot perform these operations.

File list preview

You can use this preview to check the way that the File List is displayed on the file operation screen (see section 17.2).

When Display is set to Customize

The screenshot shows the 'File List Setup' menu with 'Display' set to 'Customize'. Under 'Customize', 'Size', 'Date', and 'Tree View' are set to 'On', while 'Date Format', 'Sort by', and 'Sort Order' are set to 'Off'. The 'Sort by' dropdown is set to 'Date' and 'Sort Order' is set to 'A -> Z'. The preview table is identical to the previous screenshot.

FileName	Size	Date
DriveName		
TreeA		
FileNameA		15:00
FileNameC		12:00
FileNameB		09:00

Set Display to "Customize."

Turns the file size display on or off

Turns the display of the date when the file was saved on or off

Set the date format (Year/month/day hour:minute:second, year/month/day hour:minute, year (short form)/month/day hour:minute, month/day hour:minute, hour:minute).

Set what to sort by (Date, File Name).

Set the sort order (A -> Z, Z -> A).

Turns the tree view on or off

Preview

You can use this preview to check the way that the File List is displayed on the file operation screen (see section 17.2).

Explanation

You can select the items that are displayed in the internal memory and USB memory file lists. You can also display a preview of the file list display.

Default

File names, file sizes, and dates are displayed.

File List

Only file names are shown in a list. File names can be displayed up to their first 36 characters.

Customize

You can specify the items you want to display in the file list.

- File size, date the file was saved, and tree view on or off
- Date format, what to sort by, and the sort order

19.1 Configuring the Language, Beep, Start Menu, USB Function, and Screen Color

Procedure

System Setup Screen

Press **SETUP** to display the following menu.

The screenshot shows a menu titled 'Common' with the following options and their corresponding callouts:

- Language**: English. Callout: Set the display language. The options that appear vary depending on the language specification.
- Beep**: Off. Callout: Turns the beep on and off.
- Start Menu**: Top Menu. Callout: Set the start menu (Top Menu, Last Function).
- USB Function**: Control I/O. Callout: Set the USB function (Storage, Control I/O).
- Screen Color**: Color. Callout: Set the screen colors (Color, B&W).
- File List Setup**: Callout: Configure the file list display (see section 18.9).
- Date & Time Set**: Callout: Set the date and time (see the operation guide, IM AQ1200-02EN).
- Power Save**: Callout: Configure the power-save feature (see section 19.2).
- Network Setup**: Callout: Configure the network settings (see section 19.7).
- Operation Lock Setup**: Callout: Set operation restrictions.
- Expiration Date Setup**: Callout: Set the expiration date (see section 19.6).
- Top Menu Func Setup**: Callout: Configure the top menu.
- Factory Setting**: Callout: Initialize (see section 19.3).

Explanation

Display Language

Set the language to display on the Instrument screen. The options that appear vary depending on the product's language specification.

Turning the Beep On and Off

You can make the Instrument beep whenever an operation error occurs or an error message is displayed.

On	The Instrument beeps.
Off	The Instrument does not beep.

Start Menu

You can choose which screen will appear first when you turn on the Instrument.

Top Menu	The menu that appears when you press the MENU key on the front panel.
Last Function	The menu of the last function that you were using before the Instrument was turned off appears. The first menu that appears is one of the menus that appears after you press a soft key in the Top Menu.

USB Function

You can set the function of the mini B USB port on the Instrument.

Storage	You can access the Instrument internal memory from a PC and load and save data.
Control I/O	You can use communication commands to control the Instrument from a PC.

Screen Color

Set the screen display colors.

Color, B&W

19.2 Configuring Power Save Settings

Even when you set LCD Brightness to Off, if you press a panel key, the backlight turns on at the “Power save” brightness level.

If you do not perform any operations for 5 seconds, the backlight turns off again.

This feature is useful when you move the Instrument to a dark place after setting LCD Brightness to Off.

Procedure

Power Save Screen

1. Press **SETUP**.
2. Using the **rotary knob** and **ENTER**, select **Power Save** to display the following screen.

Using AC power

- Auto Power OFF: Off. Configure the auto power off feature (Off, AutoPowerOff 1m, AutoPowerOff 5m, AutoPowerOff 10m, AutoPowerOff 30m).
- LCD Brightness: Bright. Set the LCD brightness (Bright, Normal, Power save, Off)

Using battery

- Auto Power OFF: Off. Configure the auto power off feature (Off, AutoPowerOff 1m, AutoPowerOff 5m, AutoPowerOff 10m, AutoPowerOff 30m).
- LCD Brightness: Bright. Set the LCD brightness (Bright, Normal, Power save, Off)
- Screen Save: Off On. Set the screen save feature.

Explanation

To reduce power consumption, you can set separate power save settings for when the Instrument is using an AC adapter and for when it is using a battery.

Auto Power Off

When the Instrument is on, it can turn itself off automatically after it has not been used for awhile.

However, it cannot turn itself off when the OTDR feature is generating an optical pulse.

Off	The power does not turn off automatically.
AutoPowerOff 1m	The power turns off automatically after one minute.
AutoPowerOff 5m	The power turns off automatically after 5 minutes.
AutoPowerOff 10m	The power turns off automatically after 10 minutes.
AutoPowerOff 30m	The power turns off automatically after 30 minutes.

LCD Brightness

You can set the LCD brightness.

Bright	The screen is bright. Choose this setting when you are in a bright area. Because this setting uses a great deal of power, pay close attention to the remaining battery power when you are using a battery.
Normal	Normal brightness.
Power save	The screen is less bright than it is when you select Normal. You can view the screen at this brightness when you are in a dark area. You can use the battery longer than you can when you select Bright.
Off	The LCD backlight is turned off. If you are in an extremely bright area, such as under sunlight, this setting makes the LCD easier to see than when you set the brightness to Bright. You can use the battery even longer than you can when you select Power save. When you press any key, the backlight turns on for approximately 10 seconds.

Screen Save

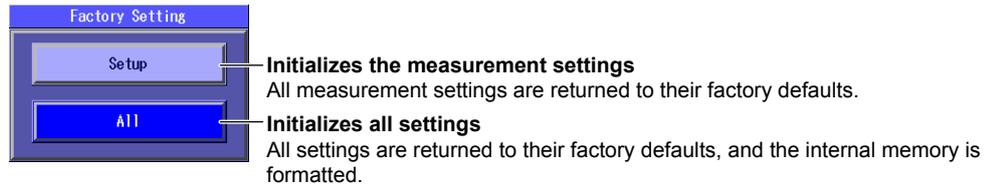
When the Instrument is on and is using the battery, the Instrument can turn its display off automatically after it has not been used for 15 seconds.

19.3 Resetting the Instrument to Its Factory Default Settings

Procedure

Initialization Screen

1. Press **SETUP**.
2. Using the **rotary knob** and **ENTER**, select **Factory Setting** to display the following screen.



Explanation

You can reset the Instrument to its factory default settings.

Initializing the Measurement Settings

All the settings are reset to their factory defaults, but the internal memory and the day and time settings (excluding the type) are not initialized.

Initializing All Settings

All the settings are reset to their factory defaults, and the internal memory is initialized. All the data in the internal memory is deleted. Before you initialize the internal memory, backup the data as necessary. The day and time settings (excluding the type) are not initialized.

Note

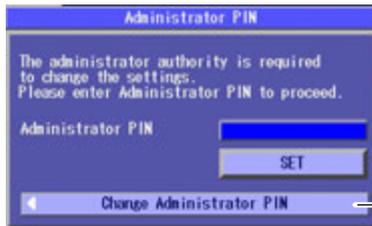
Using the mini B USB port on the Instrument, you can send the files and folders in the Instrument internal memory to a PC. To do this, set the Instrument mini B USB port function to Storage (see section 19.1). When the PC accesses the Instrument and downloads the files, the download speed depends on the performance of the PC.

19.4 Setting Operation Restrictions

Procedure

Operation Setup Restrictions Screen

1. Press **SETUP**.
2. Using the **rotary knob** and **ENTER**, select **Operation Lock Setup** to display the following screen.



Displays the Operation Lock Setup screen (see step 4)

Displays the Change Administrator PIN screen

Changing the Administrator PIN

3. Using the **rotary knob** and **ENTER**, select **Change Administrator PIN** to display the following screen.



Enter the old PIN (the default number is 0000).

Enter the new PIN.

Reenter the PIN to confirm that it has been entered correctly.

Confirms the settings

Changing the User PIN and Setting Operation Restrictions

4. After you perform step 2, use the **rotary knob** and **ENTER** to select **Administrator PIN**. A screen for entering the PIN appears.
5. Using the **rotary knob** and **ENTER**, enter the administrator PIN that you set, and then press **SET** to display the following screen.



Select a restriction method.

- No Check: You can perform operations without entering a PIN.

- Check only once: You need to enter the PIN to perform the first operation, but not to perform subsequent operations.

- Check everytime: You need to enter the PIN to perform each operation.

Enter the old PIN (the default number is 0000).

Enter the new PIN.

Reenter the PIN to confirm that it has been entered correctly.

Confirms the settings

6. Press **ESC** to return to the screen that appeared in step 2. Press **ESC** again to return to the top screen.

Initializing the PIN

When you initialize the settings, the administrator and user PINs are also initialized. For details, see section 19.3.

Explanation

You can restrict the following operations by requiring a PIN (password) to be entered before they can be performed.

Operations That Can Be Restricted

- The generation of light by the Instrument
 - When the OTDR feature is enabled and the **REAL TIME** or **AVG** key is pressed
 - When the optional light source feature is enabled(/SLT, /HLT, or /VLS) and the **LS ON** or **VLS ON** soft key is pressed.
 - During auto loss testing, when the **Execute** soft key for optical power adjustment is pressed (light source, loop-back test)
 - During multi-core loss testing, when the **Execute** soft key for optical power adjustment is pressed (light source, loop-back test)
 - While the Instrument is being used as a light source for auto loss testing, when the **Loss Test START** soft key for executing loop-back testing is pressed
 - When the **Loss Test START** soft key for executing multi-core loss testing is pressed
- The changing of the OTDR measurement mode
 - When the user tries to switch from Simple mode to Detail mode
 - When the user tries to switch from Simple mode to Multi WL mode

PINs

The two types of PINs are described below.

- User PIN
 - This PIN is required to perform the operations listed above.
 - The default number is 0000.
- Administrator PIN
 - This PIN is necessary for setting the user PIN and applying restrictions to the operations listed above.
 - The default number is 0000.

19.5 Assigning Menu Items That Are Displayed on the Top Menu

You can configure the menu that appears in the top screen.

Procedure

Top Menu Screen

1. Press **SETUP**.
2. Using the **rotary knob** and **ENTER**, select **Top Menu Func Setup** to display the following screen.



Select Use Frequency Order or Fixed.

- Use Frequency Order:
Functions are displayed in the order that they are used.
The function assignments are invalid.
- Fixed: Functions are displayed in their assigned positions.

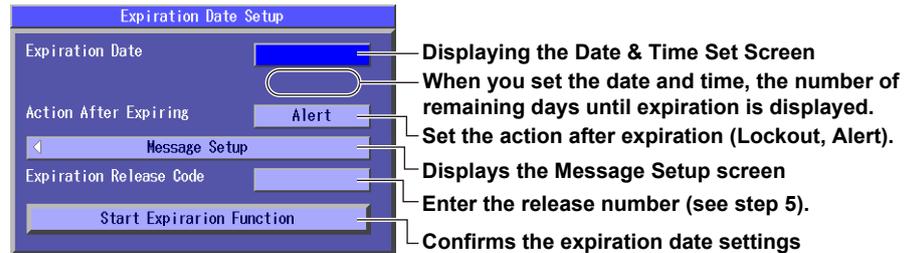
Select the functions (when Button Order is set to Fixed).

19.6 Setting the Expiration Date

Procedure

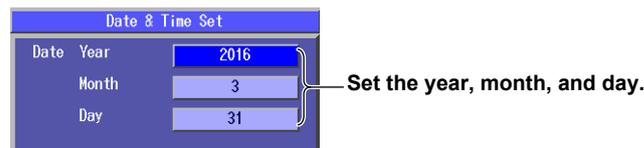
Expiration Date Setup Screen

1. Press **SETUP**.
2. Using the **rotary knob** and **ENTER**, select **Expiration Date Setup**. The following screen appears.



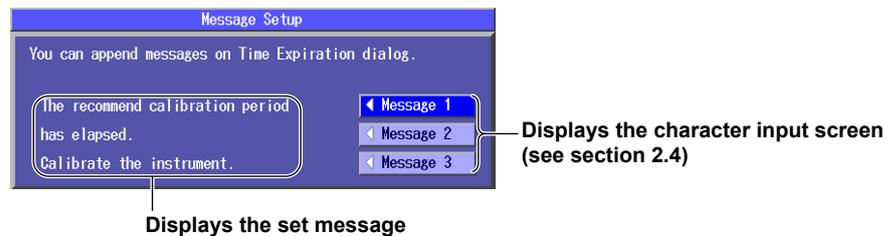
Setting the Date and Time (Expiration Date)

3. Using the **rotary knob** and **ENTER**, select **Expiration Date**. The following screen appears.



Setting the Message

4. Using the **rotary knob** and **ENTER**, select **Message Setup**. The following screen appears.



Enabling the Expiration Date Settings

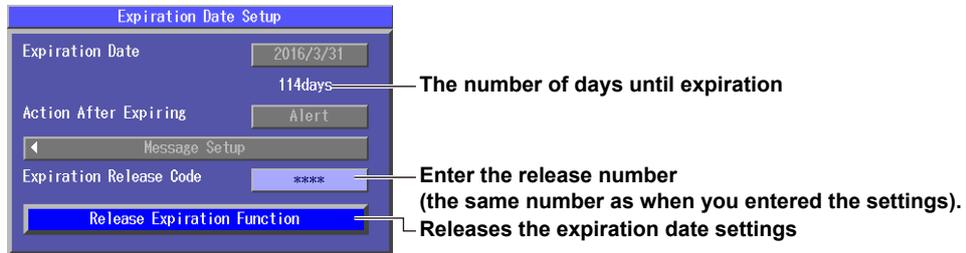
5. After step 2, using **rotary knob** and **ENTER**, select **Expiration Release Code**.
6. Using the **rotary knob** and **ENTER**, enter the release number.
7. Using the **rotary knob** and **ENTER**, select **Start Expiration Function**. The Expiration Date Setup screen appears.
8. Using the **rotary knob** and **ENTER**, select **Execute**. The expiration date setting is enabled.



19.6 Setting the Expiration Date

Releasing the Expiration Date Settings

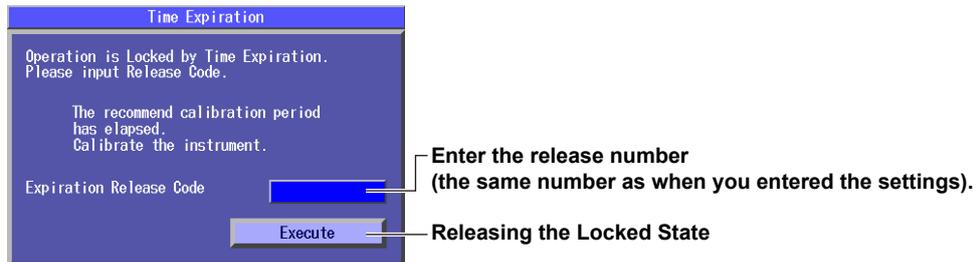
9. After step 2, using **rotary knob** and **ENTER**, select **Expiration Release Code**.
10. Using the **rotary knob** and **ENTER**, enter the release number.
This is the same number that you entered when you set the expiration date.
11. Using the **rotary knob** and **ENTER**, select **Release Expiration Function**. The expiration date setting is disabled.



Releasing the Locked State

When the expiration date is reached, a screen indicating that the instrument is locked is displayed at startup.

1. Using **rotary knob** and **ENTER**, select **Expiration Release Code**.
2. Using the **rotary knob** and **ENTER**, enter the release number.
This is the same number that you entered when you set the expiration date.
3. Using the **rotary knob** and **ENTER**, select **Execute**. The locked state is released.



Note

If you forget the release number, you will not be able to release the expiration date settings. The release number cannot be initialized. Be sure to manage the release number carefully. If you forget the release number, contact your nearest YOKOGAWA dealer.

Explanation

This feature displays a message at startup or locks the instrument when the specified expiration date arrives. You can display a message that urges you to calibrate the instrument or the like when the recommended calibration period elapses.

Expiration Date

The year is displayed according to the Gregorian calendar. The instrument supports leap years. When the number of remaining days until expiration reaches 7 days (1 week before expiration), a message that you specified in the message settings is displayed on the screen when the instrument starts.

Action After Expiring

Lockout: When the expiration date is reached, you need to enter a release number when the instrument starts. If you do not enter the correct number, the instrument will not start. Note that if the expiration date arrives while you are using the instrument (startup completed condition), the instrument is not locked.

Alert: When the expiration date is reached, a message that you specified in the message settings is displayed on the screen when the instrument starts. When you close the message screen, the instrument starts normally. While the expiration date setting is enabled, the message is displayed every time the instrument starts.

Message Setup

Enter the message to be displayed on the screen when the expiration date is reached. You can set up to three messages. You can enter the following number of characters in each message.

When the input mode is English: 40 characters

When the input mode is Japanese: 20 characters

19.7 Configuring Network Settings (Option)

Procedure

Network Setup Screen

1. Press **SETUP**.
2. Using the **rotary knob** and **ENTER**, select **Network Setup** to display the following screen.

The screenshot shows the Network Setup screen with the following fields and annotations:

- Valid / Invalid**: A toggle switch set to **Valid**. Annotation: "Enables or disables the network setup".
- User Name**: A text field containing **anonymous**. Annotation: "Set the user name and password. To set the user name and password, follow the procedure in section 2.4."
- Password**: An empty text field.
- Time Out(sec)**: A text field containing **Infinite**. Annotation: "Set the timeout value."
- DHCP**: A toggle switch set to **Off**.
- IP Address**: A numeric keypad showing **192 168 0 2**.
- Subnet Mask**: A numeric keypad showing **255 255 255 0**.
- Gateway**: A numeric keypad showing **192 168 0 1**.
- Annotation: "Configure the TCP/IP settings." (bracketed around the IP Address, Subnet Mask, and Gateway fields).
- At the bottom: "To apply the changes, power-cycle the AQ1100."

Note

You must restart the Instrument after you have changed the network settings. Before you restart the Instrument, the settings from before you changed the settings are used.

Explanation

IP testing is available on models with the /LAN option.

You can use communication commands through the Ethernet port to control the Instrument or access the Instrument from a PC that has an FTP client and download the data that is stored on the Instrument internal memory.

For details about the network that you intend to connect the Instrument to, contact your network administrator.

Enabling or Disabling the Network Setup

After you have set the user name, password, timeout value, and TCP/IP parameters, select Valid and restart the Instrument to use the network connection.

Valid	The Instrument can communicate over the network.
Invalid	The Instrument cannot communicate over the network.

If Valid is selected and the Instrument is not connected to a network, it will require more time to start.

User Name and Password

Set the user name and password to use for user authentication when the Instrument is accessed by a PC.

User Name

You can use up to 15 characters. The default setting is "anonymous."

Password

You can use up to 15 characters.

Note

- The Instrument terminates the connection if there is an error in the user authentication process.
- You do not need to enter a password when the user name is set to "anonymous."

Timeout Value

The connection to the network is automatically disconnected if there is no access to the Instrument for the specified time.

Range: 1 to 3600 s or Infinite

The Instrument will not time out if you set the timeout value to Infinite. If the Instrument is connected to a network and the connection between the Instrument and another device is broken abnormally due to an external cause, the Instrument will remain connected to the network until the power is turned off. To avoid this kind of situation, we recommend that you set a finite timeout value.

TCP/IP

DHCP

If you are connecting the Instrument to a network with a DHCP server and you want to use the server, set DHCP to “On.”

On	The IP address, subnet mask, and gateway information is assigned automatically.
Off	You must enter the IP address, netmask, and gateway information.

- Ask your network administrator whether or not DHCP is available.
- When DHCP is set to On, the information can change whenever you restart the Instrument or enable or disable the network setup as described in the previous section. Check the information when you access the Instrument from a PC.

IP Address

You can set the IP address assigned to the Instrument. The IP address is an ID that is assigned to each device on a network such as the Internet or an intranet. Obtain an IP address from your network administrator. In a network that supports DHCP, this parameter is set automatically when DHCP is set to On.

Subnet Mask

You can set the mask value used to determine the subnet network address from the IP address. Networks such as the Internet are often divided up into smaller networks called subnetworks. The subnet mask is a value that specifies the number of bits of the IP address that are used to identify the network address. Consult your network administrator for the subnet mask value. In a network that supports DHCP, this parameter is set automatically when DHCP is set to On.

Gateway

You can set the IP address of the default gateway (which is a gateway used to communicate with other networks). The default gateway handles data exchange between multiple networks so that data transmission proceeds smoothly. Consult your network administrator for the default gateway value. In a network that supports DHCP, this parameter is set automatically when DHCP is set to On.

20.1 If a Problem Occurs

Dealing with Unusual Circumstances

- If a message appears on the screen, see the following pages for reference.
- If servicing is necessary or the AQ1200x/AQ1205x does not operate properly even after you have attempted to deal with the problem according to the instructions in this section, contact your nearest YOKOGAWA dealer.

Symptom	Solution	Reference
Even when the power is on, nothing appears on the screen.	If you are using an AC adapter, make sure that the plug is connected firmly to the outlet, the power cord is connected firmly to the AC adapter, and the AC adapter's DC plug is connected firmly to the AQ1200x/AQ1205x.	— ¹
	If you are using a battery pack, make sure that it is attached firmly.	— ¹
	Charge the battery pack, and make sure that the ON lamp is illuminated.	20.8
	The LCD turns black at high temperatures. At low temperatures, its display speed becomes slower. Make sure that the temperature of the area where you are using the AQ1200x/AQ1205x is within the operating temperature range.	— ¹
The display disappears after time passes.	The AQ1200x/AQ1205x turns off automatically when its battery is low. Check the remaining battery power.	20.8
	If you have specified a time for the Power Save setting, the AQ1200x/AQ1205x will turn off automatically if no operations have been performed for the specified time. Check the settings.	19.2
The screen is dark.	The screen is dark when the LCD Brightness setting is set to "Power save." Check the settings.	19.2
	The LCD may be worn out. Servicing is required.	20.12
	When the temperature of the AQ1200x/AQ1205x or its battery pack is high, the AQ1200x/AQ1205x lowers the LCD brightness automatically to prevent damage. Make sure that the temperature of the area where you are using the AQ1200x/AQ1205x is within the operating temperature range.	— ¹
The power turns off automatically while the AQ1200x/AQ1205x is being used.	The AQ1200x/AQ1205x turns off automatically when it detects an error. A warning message will appear when this happens. Read the message. Fix the problem indicated in the message, and then turn on the AQ1200x/AQ1205x.	20.2 ²
The battery pack cannot be charged.	The battery pack temperature may be too low or too high. Make sure that the temperature of the area where you are using the AQ1200x/AQ1205x is within the operating temperature range. Remove the battery pack from the AQ1200x/AQ1205x and let it sit for awhile in a room temperature environment.	— ¹
	The battery pack may be reaching the end of its life expectancy. Replace it with a new one.	20.12
The power turns off automatically while the AQ1200x/AQ1205x is starting.	You may have accidentally pressed the power switch twice.	—
When you turn on the power, a screen that prompts you to initialize the internal memory appears.	If an improper file operation takes place, the AQ1200x/AQ1205x may not be able to start correctly and may require internal memory initialization. Follow the instructions on the screen. Back up necessary files to a PC, and initialize the internal memory.	20.6

1 See the operation guide, IM AQ1200-02EN.

2 When it is likely that the usage limitations of the AQ1200x/AQ1205x will be exceeded, the AQ1200x/AQ1205x will display a warning message and turn off automatically to prevent damage. For the conditions under which messages appear, see section 20.2.

20.2 Error Messages

Error Messages

Messages may appear on the screen during operation. This section describes the error messages and how to respond to them. Messages can be displayed in English or Japanese (see section 19.1). If the corrective action states that servicing is required, contact your nearest YOKOGAWA dealer. In addition to the following messages, there are also communications error messages. These error messages are described in the *Communications Interface User's Manual* (IM AQ1200-17EN).

Error in Execution

Code	Message
20	Network Option is not installed.
24	One or more conditions in this file are not supported by this product.
25	The Real Time measurement is executed. Thus, the setting mode has been changed from Multi-wavelength Mode to Advanced Mode.
27	The end point is different between acquired data and reference data. Please check the connected fiber cable.
28	The measurement may not be completed within the specified duration.
29	In remote control mode, all keys are locked except F1 key. Please hit F1 key to exit the remote control mode.
33	File operation is cancelled.
35	The optical plug may not be connected securely.
36	Either of the analysis information below could not be retrieved. (Cursor info, Free marker info., Event info.)
37	The end point distance does not match with the master end point.
40	No more averaging is allowed. (already MAX averaging condition) Set "Average Continue" OFF for new measurement.
41	Now updating firmware. Please wait. It takes approx. 20 seconds. Do not turn off power during update. Restart automatically after successful updating.
64	Failed to adjust LS power. Please check whether the patch fiber cable is properly connected between LS port and OPM port.
65	Project Information doesn't match between Master and Slave.
66	The project sent from master includes an unsuitable wavelength.
500	The measurement condition is failed. Please reset ***** in SETUP menu.
501	Not executable during measurement. Please stop the measurement and execute again.
502	The measurement cannot be started during printing. Please either wait until the end of the printing or interrupt the printing.
503	The measurement cannot be started during the file operation. Please either interrupt the file operation or wait until the end of the file operation.
504	The measurement could not be completed within the specified averaging duration. Please modify the averaging duration.
505	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
506	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
507	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
508	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
509	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
512	ZERO SET ERROR
513	ZERO SET ERROR
514	Exceeding limit. It may cause damage of the instrument. Please disconnect the plug.
515	ZERO SET ERROR
516	Fiber In Use Alarm Error 1
517	Fiber In Use Alarm Error 2
601	Cannot save onto the media. This media is for read-only.
602, 603	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
604	Storage media has been disconnected while the media is being accessed.
605	Same file name or folder name exists.
606, 607	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
608	Invalid file name or folder name
609	Invalid file format

Code	Message
610, 611	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
612	Invalid path name
613	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
614	Unknown file or folder
615	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
616	Cannot save onto the media. This media is for read-only.
617 to 619	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
620	Free space is not enough
621	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
622	Unknown folder
623	Folder is not empty.
624 to 628	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
629	Writing to USB memory is not allowed.
630 to 633	Can not recognize file system. - Internal memory:Contact Yokogawa's representatives. - USB memory:Try the other media or format again with FAT.
634	Folder cannot be deleted. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
635	Folder cannot be deleted. The path name or the file name is too long.
636	Folder cannot be deleted. The hierarchy below the specified folder is too deep.
637	Folder cannot be deleted. The path name is invalid.
638	Folder cannot be deleted. It failed in the deletion of the file. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
639	Folder cannot be copied. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
640	Folder cannot be copied. The path name or the file name is too long.
641	Folder cannot be copied. The hierarchy below the specified folder is too deep.
642	Failed to copy the folder. The path name is invalid.
643	Folder cannot be copied. It failed in the creation of the destination folder. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
644	Folder cannot be copied. It failed in the creation of the destination file. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
645	The path name is too long.
646	USB memory can not be recognized
647	Can not make file or folder in this folder.
690	Cannot save the measurement data. Please confirm the following. - Media is correctly installed. - Media is formatted. - Media is not read-only.
691	There is **** files in the destination folder. Please use other folder.
692	Media is full. Please install new media.
693	Cannot make a folder. Please change the folder name.
694	Cannot open the file. Please confirm the following. - Media is correctly inserted.- Media is not changed.
695	One or more conditions in this file cannot be restored. The instrument automatically determines those conditions.
696	Folder cannot be deleted. Please confirm the following. -There is no file or folder in this folder.
697	Folder can't be copied. The destination folder is a subfolder of the source folder.

20.2 Error Messages

Code	Message
698	Folder can not be copied. Please confirm the following. - There is no file or folder in this folder. - Media is correctly inserted. - Media is formatted. - Media is not read-only.
700	Failed to open the file.
701	Failed to close the file.
702	Failed to read the file.
703	Irregular file format.
704	Failed to write the file.
705	Cannot be saved. No trace data.
706	Cannot be saved. No event data.
707	One or more measurement conditions are not specified. Please confirm the measurement conditions.
708	Cannot be saved. This data is not taken with this instrument.
710	File cannot be retrieved. Invalid wavelength.
711	File cannot be retrieved. Invalid distance range.
712	File cannot be retrieved. Invalid pulse width.
713	File cannot be retrieved. Invalid sampling points.
716	File cannot be retrieved. Actual averaging times or duration is not set.
717	Duplicate file name.
718	File is damaged. Check the file.
719	File name too long. Maximum length is 36 letters.
720	File is now being accessed. Execute after access is released.
721	Cannot load this file. Invalid file format or this firmware version is old.
722	Recall Setup File cannot load the measurement condition which sampling interval has been changed to shorter than the standard sampling interval at Meas. Range Change function.
752	Print Error. Printer cannot be found.
754	USB printer error Perform the power cycle.
755	USB printer is offline.
756	No paper (USB printer)
757	USB printer cannot be found. Perform the power cycle.
758	The printer is out of order, and needs to be repaired. Please contact Yokogawa's representatives.
759	Event list cannot be printed because event analysis is not performed.
760	Cannot execute it while printing.
761	This operation is not executed while light is emitting. Stop emitting the light then execute the operation.
800	This function is not supported.
814	Failed network initialize. Please confirm network connection and setting.
816	Network setting is updated. Rebooting is required to reflect the changes.
817	Test Error occurred.
818	Test succeeded.
854	In USB Storage mode, all keys are locked. Please disconnect the USB Cable.
855	While a measurement is progressed or a file is accessed, it cannot go to USB storage mode. Please try again after stopping a measurement or a file access.
900	Backup data is damaged. This instrument starts up with the factory setting.
901	Optical connector is not correctly connected. Please clean and reconnect the connector again.
902	Battery is low Please power it off, and charge the battery or replace the battery. Or, please use the AC power supply.
903	Backup battery failed, and needs to be repaired. Please contact Yokogawa's representatives.
904	Hardware failed, and needs to be repaired. Please contact Yokogawa's representatives.
905	Battery error. Please replace the battery.
906	Battery is low. The instrument will be powered off in 10 sec.
907	Battery temperature is too high. The instrument will be powered off in 10 sec. Please turn off power to cool battery.
908	Battery temperature is too low. The instrument may be damaged if used in this condition. The instrument will be powered off in 10 sec. Please turn off power and use battery with proper operating temperature.
909	The temperature inside the instrument is too high. The instrument may be damaged if used in this condition. The instrument will be powered off in 10 sec. Please turn off power to allow instrument to cool down.
910	The temperature inside the instrument is too low. The instrument may be damaged if it is used in this condition. The instrument will be powered off in 10 sec. Please turn off power until internal temperature is increased.
911	The Voltage of AC power supply is too low. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please make sure of using the dedicated AC adapter.
912	The Voltage of AC power supply is too high. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please make sure of using the dedicated AC adapter.
913	Battery is low. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please use AC adapter.

20.2 Error Messages

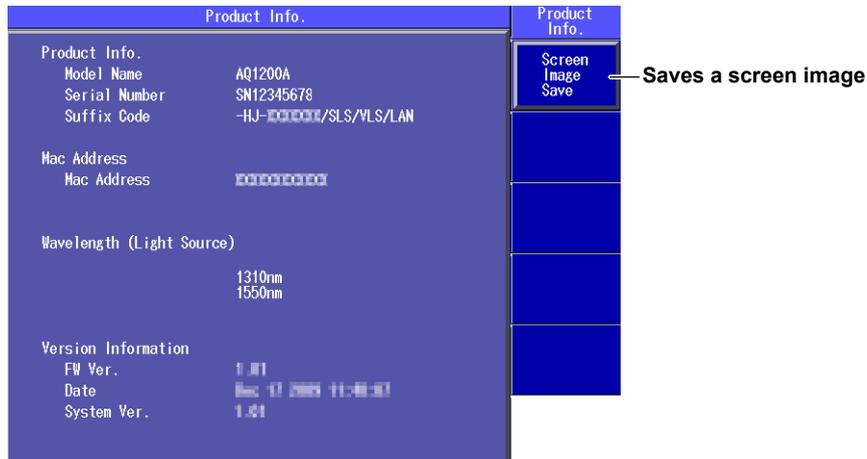
Code	Message
914	Errors in the battery or in the charging circuit. The instrument may be damaged if it is kept using in this condition. The instrument will be powered off in 10 sec. Please remove the battery and use AC adapter.
915	Battery temperature is too high. Please stop measuring, and wait for a while.
916	The temperature inside the instrument is increasing. Please stop measuring, and wait for a while.
917	The temperature inside the instrument is increasing. Please stop measuring, and wait for a while.
918	The temperature inside the instrument is too high. The measurement was aborted. Please power it off.
921	There is incoming light. Or, optical module may be damaged.
922	Incorrect date and time setting. Set the correct date and time.
923	The ambient temperature is out of range. The light source cannot be turned on.
925	Please use AC adapter.

20.3 Viewing the Product Information

Procedure

Product Information Screen

Press **SETUP** and then the **Product Info.** soft key to display the following screen.



Explanation

The following information about the Instrument is displayed.

Model Name, Serial Number, Suffix Code, Mac Address, Version Information, etc.

Executing Screen Image Save

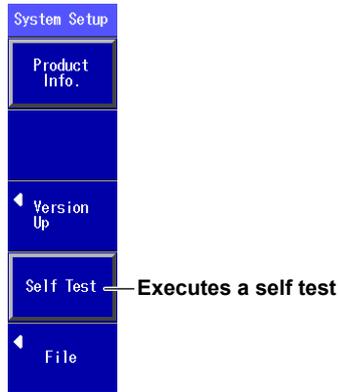
When you execute Screen Image Save, an image of the screen is saved to SystemInfo.BMP in the root directory of the internal memory.

20.4 Performing a Self Test

Procedure

System Setup Menu

Press **SETUP** to display the following menu.



Explanation

The Instrument checks the operation of the:

- Internal memory.
- RTC (real time clock) battery.
- Battery pack voltage.

Note

Perform a self test with the battery pack installed in the Instrument.
If the battery pack is not installed, the test will result in error.

If the results of the self test are normal, "Test succeeded" appears. If an error occurs, "Test Error occurred" appears.

When an Error Occurs during a Self Test

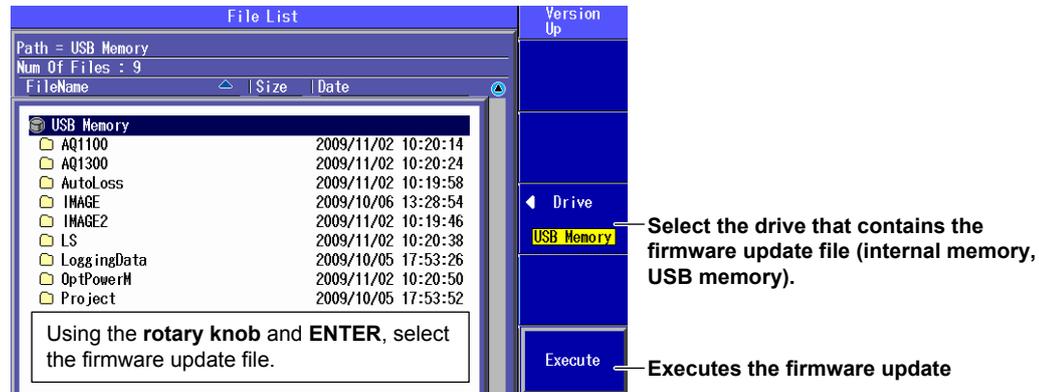
If an error occurs, contact your nearest YOKOGAWA dealer.

20.5 Updating the Firmware

Procedure

Version Up Screen

Press **SETUP** and then the **Version Up** soft key to display the following screen.



Explanation

To update the firmware, select a firmware update file (.YMC extension).

- You can change file names, except for the extension, as necessary. For instructions on how to change the file name, see section 18.4.
- When the firmware update ends successfully, the Instrument restarts automatically.
- When the firmware update fails, "Cannot load this file. Invalid file" appears. Make sure that there are no problems with the firmware update file.
- For instructions on how to view the version of your Instrument, see section 20.3.
- Connect the AC adapter.
- You cannot revert to firmware version earlier than 3.02.

20.6 Backing Up Necessary Files to a PC and Initializing the Internal Memory (Firmware version 1.12 and later)

If an improper file operation indicated below takes place, the Instrument may not be able to start correctly, and a message that prompts you to initialize the internal memory may appear.

Improper File Operations

- Saving files to folders other than the AQ1200x/AQ1205x's DATA folder
- Manipulating (creating, deleting, or renaming) folders on the Instrument from a PC.

Follow the instructions on the screen, and back up necessary waveform data, screen images, measurement conditions, and other files from the AQ1200x/AQ1205x's DATA folder to a folder on a PC.

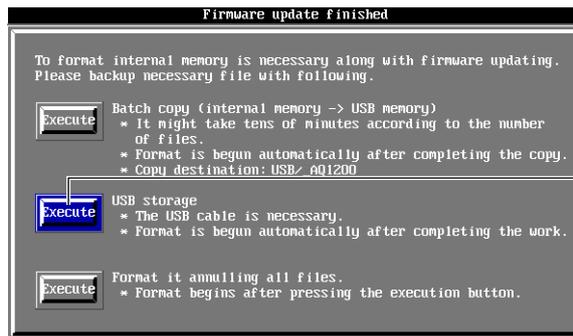
Procedure

Message Screen

1. Press **Execute** next to USB storage.

The function of the mini B USB port on the Instrument changes to "Storage," allowing you to access the instrument internal memory from a PC.

* The internal memory is not initialized at this point.



Changes the USB function of the instrument to "Storage" (see section 18.1)

2. Access the Instrument internal memory from a PC, and copy necessary files from the AQ1200x/AQ1205x's DATA folder to a folder on the PC.
3. Turn off the Instrument.
The internal memory is initialized.
4. Turn the power back on. If the Instrument starts correctly, initialization is complete.

20.7 Performing a Mechanical Inspection and Checking Operations

Mechanical Inspection

WARNING

Make sure that the power is off while you are inspecting the Instrument.

CAUTION

- If foreign objects are stuck in the connectors, malfunction and damage may occur.
 - The Instrument may not operate properly if its connectors are loose.
-

French

AVERTISSEMENT

Veiller à couper le courant avant d'effectuer une inspection mécanique.

ATTENTION

- Si des corps étrangers se retrouvent emprisonnés dans les différents connecteurs, un dysfonctionnement ou un endommagement risque de se produire.
 - Si l'ajustement de l'un des différents types de connecteurs n'est pas parfait, l'instrument risque de ne pas fonctionner normalement.
-

Make sure that:

- There is no external damage or deformation on the outside of the Instrument.
- There are no switches, connectors, or other components that are loose.
- All switches and moving parts can be operated smoothly.

If there are any problems, contact your nearest YOKOGAWA dealer.

Checking Operations

Turn on the Instrument, perform the typical operations, and make sure that the Instrument performs normally.

20.8 Replacing the Battery Pack

Handling Precautions

Failure to comply with the precautions below could lead to damage to the instrument, injury, or death.



WARNING

Prohibitions against Actions That Cause Leaking, Heating, Ignition, and Explosion

- Do not charge the battery pack or leave it in a location that is exposed to direct sunlight, such as on a car dashboard or by a window, or in a location that is subject to high temperatures, such as in a car parked under the scorching sun.
- Do not throw the battery pack into fire or heat it.
- Do not expose the battery pack to strong mechanical shock.
- Do not allow the battery pack to be covered in water or other liquids.
- Do not disassemble or modify the battery pack.
- Do not short the positive and negative battery pack terminals. Also, do not move the battery or store it with metal items such as necklaces, hair pins, coins, or keys.
- Do not place combustible material on top of the battery pack or cover it with anything other than its case while it is providing electricity or being charged.
- Leakage from the battery pack can cause blindness if it comes into contact with your eyes. If you get leakage from the battery in your eyes, do not rub them; clean them thoroughly with clean water and then see a doctor immediately.
- Do not use or charge battery packs with the Instrument that are not made by YOKOGAWA.
- When you attach the battery pack to the Instrument, attach it properly.

Prohibitions against Careless Use

- Keep the battery pack away from infants so that they do not lick it, put it in their mouths, bite it, or do other dangerous things with it.
- Leakage from the battery pack may cause damage to clothing and skin.

Prohibition against Use under Abnormal Conditions

If you notice that the battery pack is leaking, smells strange, is becoming hot, has changed color or shape, or exhibits some other abnormality, stop charging or using it, and turn off the power. If the battery pack is leaking, move it away from sources of fire.

Changing the Battery Pack

- To prevent electric shock, turn the Instrument off, and disconnect the AC adapter power supply from it.
- When you remove the battery pack cover, do not do so with the back of the Instrument facing down. Also, after you attach the battery pack, be sure to close the battery cover completely. Otherwise, the battery pack may fall out and cause injury or be damaged.



CAUTION

Replacement Procedure

- Do not touch the battery pack electrodes. Doing so may damage the battery pack.
- When you put the battery pack in the battery case, make sure that the battery pack is facing the right direction.
- When you place the Instrument so that its LCD is facing down, be careful not to damage the LCD.

20.8 Replacing the Battery Pack

Storage Precautions

- If you will not be using the battery pack for an extended period of time, remove it from the Instrument and store it in a dry place.
- Avoid storing the battery pack for an extended period of time when it is fully charged (after it has just been charged) or when it has no power left (when the Instrument will not turn on). Storing the battery pack under these conditions will degrade its performance and reduce its longevity. It is better to store the battery pack when it is 40 to 50% charged. This is equivalent to the state the battery is in after you turn off the Instrument and charge an empty battery for an hour at room temperature.

Disposal

- When disposing of the batteries, follow the proper disposal regulations as specified by the relevant ordinance in your area.
- When disposing of the batteries in the EU, follow the Waste Electrical and Electronic Equipment (WEEE) Directive.

French



AVERTISSEMENT

Interdictions en matière d'actions entraînant une fuite, une surchauffe, une combustion et une explosion

- Ne pas charger ou laisser le pack de piles en plein soleil (par exemple sur le tableau de bord de la voiture ou sur le rebord d'une fenêtre), dans un véhicule stationné sous un soleil de plomb, à proximité d'une gazinière ou de toute autre source de chaleur ou dans tout autre endroit chaud.
- Ne pas jeter le pack de piles dans le feu et ne pas le chauffer.
- Ne pas exposer le pack de piles à de violents chocs mécaniques.
- Ne pas laisser le pack de piles immergé dans de l'eau ou d'autres liquides.
- Ne pas démonter ou modifier le pack de piles.
- Ne pas créer de court-circuit au niveau des bornes positives et négatives du pack de piles. De plus, ne pas déplacer la pile ou la stocker avec des éléments métalliques, tels que des colliers, des épingles à cheveux, des pièces ou des clés.
- Ne pas placer de matériau combustible sur le dessus du pack de piles ou le recouvrir de n'importe quel matériau autre que son boîtier lors de sa charge ou de sa décharge.
- Une fuite du pack de piles risque d'entraîner la cécité en cas de contact avec les yeux. Si une fuite de liquide des piles atteint les yeux, ne pas les frotter ; les nettoyer soigneusement à l'eau claire, puis consulter immédiatement un médecin.
- Ce pack de piles est spécialement conçu pour AQ1200x/AQ1205x. Ne pas l'utiliser, ni le charger sur d'autres appareils.
- Brancher correctement le pack de piles au dispositif AQ1200x/AQ1205x.

Interdictions en matière d'utilisation négligente

- Maintenir le pack de piles hors de portée des enfants de manière à ce qu'ils ne le lèchent pas, ne le mettent pas dans leur bouche, ne le croquent pas ou ne fassent pas d'autres choses dangereuses avec.
- Une fuite du pack de piles risque d'abîmer les vêtements et la peau. Rincer immédiatement à l'eau claire.

Interdictions en matière d'utilisation dans des conditions anormales

S'il s'avère que le pack de piles fuit, qu'il dégage une odeur étrange, qu'il chauffe, qu'il a changé de couleur ou de forme ou qu'il présente d'autres anomalies, arrêter de le charger ou de l'utiliser et couper l'alimentation. Si le pack de piles fuit, le retirer des sources d'incendie.

Remplacement du pack de piles

- Afin d'éviter un choc électrique, éteindre l'instrument et couper l'alimentation de l'adaptateur CA de l'instrument.
- Lors de la dépose du couvercle du pack de piles, ne pas placer l'arrière du dispositif AQ1200x/AQ1205x face en bas. De plus, après avoir branché le pack de piles, bien fermer le couvercle des piles. Le pack de piles risquerait sinon de tomber et de blesser quelqu'un ou d'endommager le matériel.



ATTENTION

Procédure de remplacement

- Ne pas toucher les électrodes du pack de piles. Cela risquerait d'endommager le pack de piles.
- Lorsque le pack de piles est placé dans le boîtier de piles, s'assurer que le pack de piles est dans le bon sens.
- Lorsque le dispositif AQ1200x/AQ1205x est placé de manière à ce que son écran LCD soit face en bas, faire attention de ne pas endommager l'écran LCD.

Précautions de stockage

- Si le pack de piles n'est pas utilisé pendant une longue période, le retirer de l'instrument et le stocker dans un endroit sec.
- Éviter de stocker le pack de piles pendant une longue période s'il est entièrement chargé (une fois qu'il vient d'être chargé) ou s'il ne lui reste plus d'alimentation (si l'instrument ne démarre pas). Le fait de stocker le pack de piles dans ces conditions entraîne une dégradation de ses performances et réduit sa durée de vie.
Il est préférable de stocker le pack de piles lorsqu'il est chargé à 40 ou 50 %. Cela équivaut à l'état des piles une fois que le dispositif AQ1200x/AQ1205x a été éteint et qu'une pile vide est chargée pendant une 1 heures et demi à température ambiante.

Mise au rebut

- Lors de la mise au rebut des piles, suivre les réglementations adaptées de mise au rebut telles qu'elles sont spécifiées dans l'ordonnance correspondante locale.
- Lors de la mise au rebut des piles dans la Communauté européenne, suivre la directive relative aux déchets d'équipements électriques et électroniques.

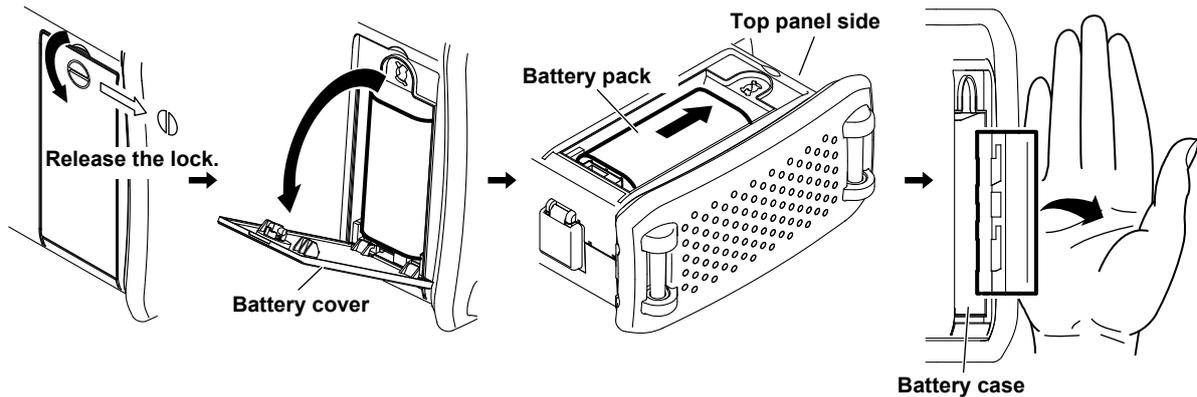
Contact your nearest YOKOGAWA dealer under the following circumstances.

- When the battery pack is broken or behaves strangely.
- When the battery run time becomes short and the battery pack needs to be replaced (the battery pack is a consumable item).

Removing the Battery Pack

Before you remove the battery, turn off the power and unplug the AC adapter from the Instrument.

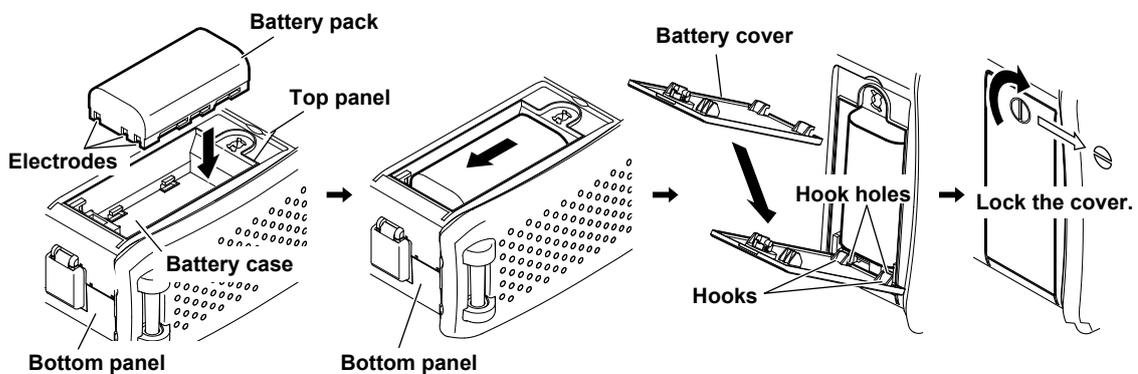
1. Unlock the battery cover on the Instrument rear panel.
Insert a coin or screwdriver with a thickness that will not damage the lock slot into the lock slot, and release the lock.
2. Remove the battery cover.
3. Slide the battery pack towards the top panel.
4. Turn the Instrument so that it is facing you, and remove the battery pack from the case.
Put your hand next to the battery case so that the battery pack does not fall out.



Attaching a Battery Pack

Before you attach the battery, turn off the power, and unplug the AC adapter from the Instrument.

1. Remove the battery cover by following the first two steps in the previous section.
2. Insert the battery pack into the battery case, towards the top panel.
 - Insert the battery pack so that its electrodes are near the bottom panel facing down.
 - Make sure that the entire battery pack is inserted into the case securely.
3. Pushing the battery pack towards the back of the case, pull it towards the bottom panel.
4. Close the battery cover.
Attach the battery cover from the bottom panel side, making sure that the hooks on the cover enter their holes on the case.
5. Lock the battery cover.
Insert a coin or screwdriver with a thickness that will not damage the lock slot into the lock slot, and lock the battery cover.



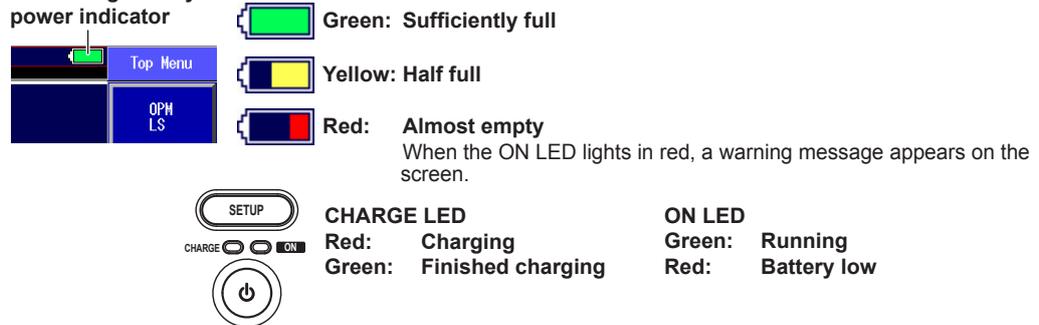
Charging a Battery Pack

When the battery is low, a warning message will appear. When this happens, charge the battery.

1. Connect the power cord to the AC adapter.
2. Connect the AC adapter plug to the Instrument.
3. Connect the power plug to an outlet.

The remaining battery pack power appears at the top of the screen.

Remaining battery power indicator



Note

- The Instrument will turn off automatically a few minutes after the warning message about the remaining battery power appears.
- If the battery pack is hot, wait for it to return to room temperature before you charge it.
- The battery run time depends on how you use the Instrument: whether or not you make the screen bright, use the printer, etc.
- If battery charging does not start, the CHARGE lamp turns off. Check that the battery pack is properly installed. If the battery pack is properly installed but fails to be charged, contact your nearest Yokogawa dealer.

20.9 Replacing an Optical Adapter



WARNING

When you replace an optical adapter, turn the Instrument power off so that you do not accidentally emit light from the light source port. If you replace an optical adapter (universal or connector adapter) while the power is on, you may accidentally get light in your eyes, damage them, and impair your vision.

French

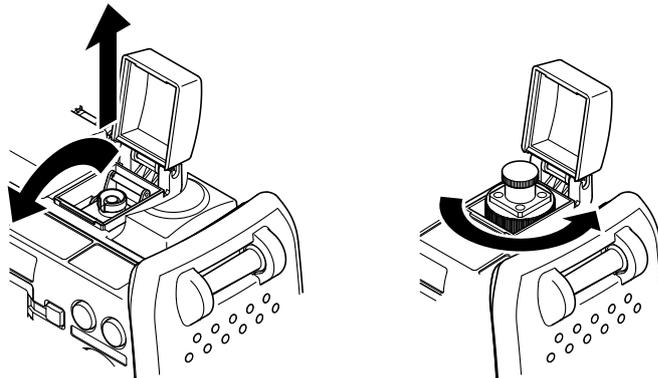


AVERTISSEMENT

Lors du remplacement d'un adaptateur optique, mettre l'AQ7280 hors tension pour empêcher l'émission accidentelle de lumière depuis le port de la source lumineuse. Le remplacement de l'adaptateur optique (adaptateur universel) ou (adaptateur de connecteur) avec l'AQ7280 sous tension peut permettre à la lumière émise de pénétrer accidentellement dans les yeux. Ceci peut provoquer des lésions oculaires ou une déficience visuelle.

Removal

1. Make sure that the Instrument power is off.
2. Open the optical port cover.
3. Pull the optical adapter lock lever down and inwards to release it. If the adapter is screwed in, turn the knob to the left to loosen it.
4. Pull out the optical adapter.



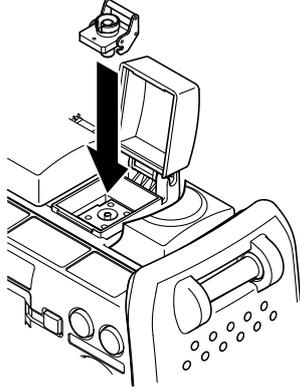
Note

If the optical port cover comes off, bend the cover axle with your finger, and reattach it.

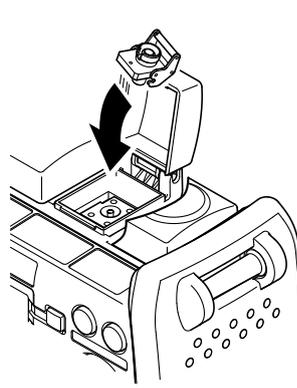
Attachment

1. Make sure that the Instrument power is off.
2. Open the optical port cover.
3. Insert the optical adapter directly into the rear shell.
4. Pull the optical adapter lock lever down and outwards to lock it. If the adapter is screwed in, turn the knob to the right to tighten it.

Good example



Bad example



Note

Insert the optical adapter carefully and straight. If the adapter shakes to the left and right or is forced in or out, it may be damaged, and the optical port ferrule may also be damaged.

20.10 Routine Maintenance

Cleaning the Outside of the AQ1200x/AQ1205x

To clean the LCD and the outside of the Instrument, turn off the power; remove the power cord from the outlet; use a damp, well-wrung cloth to wipe the LCD and the outside of the Instrument; and then wipe them off with a dry cloth.

Note

- Turn the power off when you clean the Instrument.
- Do not use chemicals such as thinner, benzene, or alcohol. Doing so may cause deformation and discoloring.
- Use a well-wrung cloth. Otherwise, water may get inside the Instrument.

Cleaning an Optical Adapter



WARNING

When you clean the optical components of the Instrument, turn the Instrument power off so that you do not accidentally emit light from the light source port. If you clean the optical components while the power is on, you may accidentally get light in your eyes, damage them, and impair your vision.

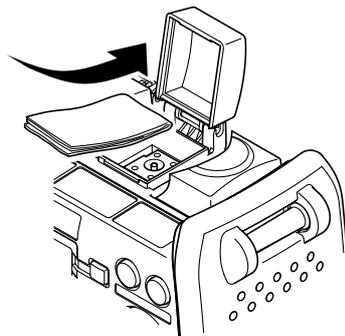
French



AVERTISSEMENT

Lors du nettoyage de l'émetteur de lumière, mettre l'AQ7280 hors tension pour empêcher l'émission accidentelle de lumière provenant du port de la source lumineuse. Le nettoyage de l'émetteur de lumière avec l'AQ7280 sous tension peut permettre à la lumière émise de pénétrer accidentellement dans les yeux. Ceci peut provoquer des lésions oculaires ou une déficience visuelle.

1. Make sure that the Instrument power is off.
2. Open the optical port cover.
3. If the optical adapter is connected, follow the steps in section 20.9 to remove it.
4. Use a lens cleaner to clean the optical components.



When the End of the Optical Fiber Is Slanted

If the end of the optical fiber is slanted, as with /ASC option models, while being careful not to tear the cleaner on the top edge of the fiber or get lint on the fiber, clean from the bottom of the fiber end to the top.



Note

- Clean the optical components using a smooth lens cleaner that will not leave lint or dust on the lenses.
 - You can clean the light source ports without removing the optical adapters by using a stick-shaped cleaning tool, but we recommend that you remove the optical adapters when you clean.
-

20.11 Storage Precautions

Before You Store the AQ1200x/AQ1205x

Clean the Instrument before you store it. For information about cleaning, see section 20.10.

Storage Conditions

Store the Instrument in a place that meets the following conditions.

- Within the storage temperature and humidity ranges
- Subject to very little change in temperature and humidity within a single day
- Not subject to direct sunlight
- Not dusty
- Free from activated gas

Note

- To prevent against over discharge, if you will not be using the Instrument for a week or more, charge the battery pack, remove it from the Instrument, and place it in a location where it will not be exposed to direct sunlight and where the temperature is 10 to 30°C.
 - When you store the battery pack for six months or longer, to replace the power that has been lost through self discharge, recharge the battery using the Instrument once every six months. For instructions on how to remove the battery pack, see section 20.8.
 - Avoid storing the battery pack for an extended period of time when it is fully charged (after it has just been charged) or when it has no power left (when the instrument will not turn on). Storing the battery pack under these conditions will degrade its performance and reduce its longevity. It is best to store the battery pack when it is 40 to 50% charged. This is equivalent to the state the battery is in after you turn off the Instrument and charge an empty battery for an hour at room temperature.
-

Reuse

When you use the Instrument after storing it for a long period of time, make sure that it is functioning properly.

Packaging

To package the Instrument, follow the steps listed below.

1. Wrap the Instrument in thick plastic so that it does not get dust inside of it.
2. Use cushioning to protect the LCD.
3. Prepare a box that is 10 to 15 cm larger than the Instrument on all sides.
4. Insert cushioning in the bottom of the box.
5. Insert cushioning between the Instrument and the box.
6. Close the box securely using adhesive tape or some other method.

Shipping

- When you ship the Instrument, avoid exposing it to vibrations.
- Ship the Instrument in an environment that meets the storage conditions.
- When you ship multiple battery packs by plane, follow all relevant regulations, such as the airline regulations and UN transportation regulations. For details about the regulations, contact your airline in advance.

20.12 Recommended Replacement Parts

For part replacement, contact your nearest YOKOGAWA dealer.

Parts with Limited Service Lives

Part Name	Service Life	Notes
Battery pack	Approx. 300 charges	The service life varies depending on the environment in which the battery pack is used.

Consumables

We recommend that you replace the following parts at the intervals listed below.

Part Name	Recommended Replacement Interval*	Notes
Backup battery (lithium battery)	5 years	Send to factory to replace
LCD	Approx. 50,000 hours	Send to factory to replace
Measurement connector ferrule	One year	Send to factory to replace
Universal and connector adapters	One year	Purchase and replace
DC power supply connector	5000 times	Send to factory to replace
USB connector	1500 times	Send to factory to replace
RJ-45 connector	200 times	Send to factory to replace

* The recommended replacement interval can vary greatly depending on the operating environment and the frequency of use. The above intervals are estimates.

20.13 Calibration

Periodic calibration is an effective means of keeping the instrument performing correctly for a long time and of detecting malfunctions at an early stage. We recommend that you have the Instrument calibrated once a year.

Appendix 1 Data File Formats

CSV File Formats

The following examples show the saved data being displayed in a spreadsheet program.

Optical Pulse Measurement (OTDR) Waveform Data

A1	Label		
	A	B	C
1	Label	Yokogawa Mitaka-Kofu	
2	Date/Time	Wed Nov 22 04:32:47 2006	
3			
4	Wavelength	SM 1310nm	
5	Distance Range	5km	
6	Pulse Width	50ns	
7	Attenuation	0.00dB	
8	Avg Times	2*16	
9	IOR		1.46
10	Data Size		1250
11	Sample Interval	4 m	
12			
13			
14	[km]	[dB]	
15		0	32.841
16		0.00411	29.985
17		0.00821	25.667
18		0.01232	25.089
19		0.01643	24.893
20		0.02053	24.879
21		0.02464	24.835
22		0.02875	24.878
23		0.03285	24.8
24		0.03696	24.819
25		0.04107	24.828
26		0.04517	24.864
27		0.04928	24.851
28		0.05339	24.813
29		0.05749	24.83
30		0.0616	24.818
31		0.06571	24.861

Optical Pulse Measurement (OTDR) Event Data

A1	Label							
	A	B	C	D	E	F	G	H
1	Label	Yokogawa Mitaka-Kofu						
2	Date/Time	Wed Nov 22 04:32:47 2006						
3								
4	Wavelength	SM 1310nm						
5	Distance Range	5km						
6	Pulse Width	50ns						
7	Attenuation	0.00dB						
8	Avg Times	2*16						
9	IOR		1.46					
10	Data Size		1250					
11	Sample Interval	4 m						
12								
13	Approx.Method	LSA						
14	Backscatter Level	-50.00dB						
15	Splice Loss	0.03dB						
16	Return Loss	70dB						
17	End of Fiber	3dB						
18								
19								
20	EventNo	Distance(km)	Splice Loss(dB)	Return Loss(dB)	Cumul-Loss(dB)	dB/km	Event Type	Section IOR
21		1	0.86652	0.093	55.561	0.356	0.421 R	1.46
22		2	1.11703	0.208		0.551	0.406 S+	1.46
23	END	1.42093		<40.708		0.854	0.313 R	1.46

Optical Power Meter Logging Results

	A	B	C	D	E
1	Company	Yokogawa Electric Corporation			
2	Model	AQ1200A			
3	Function	Logging			
4	Start Date	Tue Oct 27 15:23:14 2009			
5					
6	Wavelength	1310			
7	Modulation	CW			
8	Offset	0			
9	Unit	dBm			
10	Interval(ms)	1000			
11	Measurement Number	10			
12	Logging Count	11			
13					
14					
15		-9752			
16		-10112			
17		-9718			
18		-9868			
19		-9841			
20		-9727			
21		-10338			
22		-9913			
23		-9660			
24		-9875			
25		-9705			
26					

Measured Data from the Optical Power Meter

	A	B	C	D	E	F	G	H	I	J	K
1	Company	Yokogawa Electric Corporation									
2	Model	AQ1200A									
3	Function	PowerMeter									
4	Start No	1									
5	Tape No Type	off									
6	Number Of Fibers	100									
7											
8	Data	Ver1.00									
9	Core	No	nm	Data	Unit	Modulation	Reference(dBm)	Offset(dB)	Date		SKIP
10	1	1	1310	-9.629	dBm	CW	-3	0	2009/10/27 15:42		
11	1	2	1310	-9.474	dBm	CW	-3	0	2009/10/27 15:42		
12	1	3									
13	2	1									SKIP
14	2	2									SKIP
15	2	3									SKIP
16	3	1	1550	-10.06	dBm	CW	-3	0	2009/10/27 15:42		
17	3	2	1550	-9.695	dBm	CW	-3	0	2009/10/27 15:42		
18	3	3									
19	4	1	1550	-10.07	dBm	CW	-3	0	2009/10/27 15:43		
20	4	2	1310	-9.829	dBm	CW	-3	0	2009/10/27 15:43		
21	4	3	1310	-9.601	dBm	CW	-3	0	2009/10/27 15:43		
22	5	1									
23	5	2									

Loss Test Results

	A	B	C	D	E	F	G	H	I	J	K
1	Company	Yokogawa Electric Corporation									
2	Model	AQ1200A									
3	Function	PowerMeter									
4	Start No	1									
5	Tape No Type	a-d									
6	Number Of Fibers	25									
7											
8	Data	Ver1.00									
9	Core	No	nm	Data	Unit	Modulation	Reference(dBm)	Offset(dB)	Date		SKIP
10	1a	1	1310	-9.608	dBm	CW	-3	0	2009/10/27 16:19		
11	1a	2	1550	-9.831	dBm	CW	-3	0	2009/10/27 16:19		
12	1a	3									
13	1b	1									SKIP
14	1b	2									SKIP
15	1b	3									SKIP
16	1c	1	1310	-10.14	dBm	CW	-3	0	2009/10/27 16:21		
17	1c	2	1550	-9.924	dBm	CW	-3	0	2009/10/27 16:21		
18	1c	3									
19	1d	1	1310	-9.738	dBm	CW	-3	0	2009/10/27 16:22		
20	1d	2	1550	-9.75	dBm	CW	-3	0	2009/10/27 16:22		
21	1d	3									
22	2a	1									
23	2a	2									

Project Information (multi-core loss testing)

	A	B	C	D	E	F	G	H	I	J	k
1	Company	Yokogawa Electric Corporation									
2	Model	AQ1200A									
3	Function	Multi Fiber LossTest									
4	Project Name	P100									
5	Wavelength1	850									
6	Wavelength2	1300									
7	Wavelength3	0									
8	Offset	0									
9	Start No	10									
10	Tape No Type	a-e									
11	Number Of Fibers	20									
12											
13	Data	Ver1.00									
14	Core	No	nm	Data	Unit	Modulation	Reference(dBm)	Offset(dB)	Date	SKIP	
15	10a	1									
16	10a	2									
17	10a	3									
18	10b	1								SKIP	
19	10b	2								SKIP	
20	10b	3								SKIP	
21	10c	1									
22	10c	2									
23	10c	3									
24	10d	1								SKIP	
25	10d	2								SKIP	
26	10d	3								SKIP	
27	10e	1									
28	10e	2									
29	10e	3									
30	11 a	1									
31	11 a	2									

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