User's Manual

# AQ7260 OTDR

YOKOGAWA
Yokogawa Electric Corporation

IM 813920300-01E
2nd Edition

# Preface

Thank you for purchasing the AQ7260. The AQ7260 is a compact optical time domain reflectometer with various functions and is designed to measure loss and detect faults in optical fibers.

This user's manual refers to AQ7260 OTDR which software version is 2.00 or later.

Before using the AQ7260 (hereafter referred to as the instrument), please read this manual thoroughly. In particular, the “Safety Precautions” given at the beginning of this manual should be read to gain a full understanding of the instrument.

After reading, please keep this manual in a safe place so that it can be referred to anytime it is required.

**Caution**

This user's manual refers to AQ7260 OTDR which software version is 2.00 or later.

**Refer**

Procedure of checking software version, refer to page 10-4.



**TIP**

•The instrument uses Linux and Microwindows.

Linux is a trademark or a registered trademark of Linus Torvalds in U.S.A. and other countries.

• This product includes open source software. For the procedure of obtaining the source code, contact your nearest YOKOGAWA dealer.

# Warranty

- The warranty period is one year from the date of purchase.
- Should breakdown occur during the warranty period, repairs shall be made free of charge according to the warranty policy.
- Breakdown arising from operating mistakes or modifications performed by the user or breakdown/damage caused by natural disasters shall be exempt from this warranty policy, even if it occurs during the warranty period.
- A certificate of compliance to guarantee the designed quality accompanies YOKOGAWA products.

Prior to shipment, every YOKOGAWA product undergoes strict inspections that are carried out according to its quality assurance system. However, should breakdown occur arising from defects in manufacturing or accidents during transport, please contact the agent from whom the product was purchased.

**TIP**

• Recommended recalibration period is 1 year. Inquiry of about recalibration, please contact the agent from whom the instrument was purchased.

• The following parts are consumable parts and are not subject to the warranty period.

| product name | Part name | Life span *1 |
|---|---|---|
| Main Frame | Liquid Crystal Display (LCD) panel | 3 years |
| | Battery pack | 1 year |
| | Back up battery | 5 years |
| Optical Module | Ferrule on the connector | 1 year |
| Expansion unit | Printer | Equivalent to 3,000 roll of printer paper. |
| | FDD | 3 years |

*1: Each life span depends on the environmental conditions and frequency of use.

# Conventions Used in this Manual

## Safety Graphic Marks

The following graphic marks are given in this manual to ensure the safe use of this instrument and to prevent injury and property damage. Before operating the instrument, please read the following carefully to gain thorough understanding.

The following graphic marks indicate the degree of danger and damage that may occur as a result of improper handling.

| ⚠ WARNING |
| --- |
| Indicates a potentially hazardous situation that may possibly result in death or serious injury in the event of improper handling. |

| ⚠ CAUTION |
| --- |
| Indicates a potentially hazardous situation that may result in moderate injury or property damage in the event of improper handling. |

The degree of danger and damage is indicated by the following graphic symbols.

| | |
| --- | --- |
|  | "△" indicates a warning or caution.<br>This example indicates fire warning. |
|  | "○" indicates a prohibited operation.<br>This example indicates that disassembly is prohibited. |
|  | "●" indicates an obligatory operation.<br>This example indicates that the AC adapter must be removed from the power outlet. |

## Other Graphic Marks

**Caution**

This is called a caution mark. It indicates an operation or procedure that requires special care or a point to be observed regarding handling of the instrument.

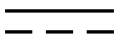
**TIP**

This is called a TIP mark. It indicates information that is useful for operation of the instrument.

**Refer**

This is called a reference mark. It indicates the reference page for the contents or terms used in this manual.

The following symbols are used on this instrument.

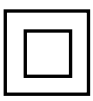


Direct current.

Alternating current.

Danger, Caution

Danger, risk of electronic shock.



Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION

# Safety Precautions

This section must be read to ensure safe use of the instrument. After reading, keep this manual in a safe place so that it can be referred to anytime it is required.

## For Safe Use of Laser Products

This instrument uses a laser light source and as such, falls into the category of “class 1M laser product” specified by “EN60825-1:1994 +A2:2001 Safety of Laser Products-Part 1: Equipment Classification, Requirements and User’s Guide”.

And the laser products comply with 21CFR1040.10 except for deviations pursuant to Laser Notice No.50, dated May 27 2001.

| Optical module | | | AQ7261 | AQ7264 |
|---|---|---|---|---|
| Laser type | | | FP-Laser InGaAsP | FP-Laser InGaAsP |
| Laser class | | | 1M | 1M |
| Center wavelength | | | 1310nm, 1550nm | 1310nm, 1550nm |
| Output power | CW | | ---------- | ≤1mW@1310nm, 1550nm |
| | PULSE | | ≤100mW@1310nm, 1550nm | ≤100mW@1310nm, 1550nm |
| | | PULSE WIDTH | ≤20μs@1310nm(duty:≤1.6%)<br>≤20μs@1550nm(duty:≤1.6%) | ≤20μs@1310nm(duty:≤1.6%)<br>≤20μs@1550nm(duty:≤1.6%)<br>50μs@1550nm(duty:≤0.8%) |

| Optical module | | | AQ7265 |
|---|---|---|---|
| Laser type | | | FP-Laser InGaAsP |
| Laser class | | | 1M |
| Center wavelength | | | 1310nm, 1550nm |
| Output power | CW | | ≤1mW@1310nm, 1550nm |
| | PULSE | | ≤100mW@1310nm, 1550nm |
| | | PULSE WIDTH | ≤20μs@1310nm(duty:≤1.6%)<br>≤20μs@1550nm(duty:≤1.6%)<br>50μs@1550nm(duty:≤0.8%) |

INVISIBLE LASER RADIATION
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
CLASS 1M LASER PRODUCT

| ⚠ WARNING | |
|---|---|
|  | Invisible laser beam is output from the emitter section. The emitter section is located on the top panel.<br>A message “LASER ON” is displayed while a laser beam is emitted.<br>Class 1M laser invisible radiation when LASER ON. *1<br>Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers and microscopes) within a distance of 100mm may pose eye hazard.<br>*1: When measuring or Light source function ON |
|  | These laser beams cannot be seen by the human eye. Should the beams enter the eyes, they may be seriously damaged, resulting in excessive deterioration of eyesight. To prevent such accidents, the following points must be strictly observed.<br>• Never emit laser beam if no optical fiber is connected to the emitter section.<br>• When disconnecting the optical fiber from the emitter section, stop emission first.<br>• While laser beam is output, never stare into the emitter section nor the end of the optical fiber that is connected to the emitter section. |
|  | Do not disassemble or modify the instrument, since high-power laser beams may be output when doing so.<br>If repair is necessary due to breakdown, contact the agent from whom the instrument was purchased. Repair is allowed by qualified personnel only. |

## Notes on Power Supply

The instrument can be powered by the following two methods.

- AC adapter (supplied with the instrument)
- Battery pack (Model name : 3UR18650F-2)

Refer

For details on use of power supply, refer to page 3-3.

Before connecting the instrument to the power, read the safety precautions given below.

### AC adapter

| ⚠ CAUTION | |
|---|---|
|  | Do not connect or disconnect the power cord while the instrument is powered ON.<br>Doing so may result in breakdown. |

## Battery Pack

| WARNING | |
|---|---|
|  | If the battery fluid leaks from the battery pack and enters the eyes, immediately wash with clean water, such as tap water, (never rub the eyes) and consult a doctor. Failure to do so may cause damage to the eyes. |
|  | The instrument and battery pack must be kept out of the reach of children. |
|  | If the battery fluid leaks and adheres to skin or clothes, immediately wash with clean water, such as tap water. Adhesion to the skin may produce irritation. |

| ⚠ CAUTION | |
|---|---|
|  | Do not disassemble or modify the battery pack. The battery pack has built-in safety and protective functions designed to prevent danger. If these functions are damaged, the battery fluid may leak from the battery pack, resulting in heat generation, smoke, explosion or fire. |
|  | Do not connect the "+" and "–" terminals of the battery pack with metal objects like a wire. In addition, do not carry the battery pack or store it near metal necklaces or hairpins. Doing so may short-circuit the battery pack. This may cause excessive current flow, resulting in leakage, heat generation, smoke, explosion or fire, or may cause the metal objects, necklaces or hairpins to generate heat. |
|  | Do not put the battery pack into a fire or heat it. Doing so may melt insulating materials, damage the protective circuit, or cause the battery fluid to catch fire, resulting in leakage, heat generation, smoke, explosion or fire. |
|  | Do not use or leave the battery pack near a fire or hot objects such as stoves. Doing so may cause short-circuit in the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Do not put the battery pack under any water, including seawater, or let it get wet. If the built-in protective circuit is damaged, the battery pack will be charged with abnormal current or voltage. This may cause a chemical reaction inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Do not charge the battery pack near a fire or under very hot sunshine. If it gets hot, the protective device will initiate to prevent danger, hindering charging, or it gets damaged causing charging with abnormal current or voltage. Such charging may cause a chemical reaction inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Charging of the battery pack must be performed on this instrument under the specified charging conditions. If charging is performed in an environment that does not conform to the specified charging conditions (e.g. at excessively high temperatures, with higher voltage/current than the specified, using a modified charger), the battery pack may be excessively charged, or charged with abnormal current. Such charging may cause an abnormal chemical reaction inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Do not pierce the battery pack with a nail, hit it with a hammer, or stamp on it. Doing so may damage or deform the battery pack. This may cause short-circuit inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Do not cause any excessive impact to the battery pack or throw it. Doing so may result in battery fluid leakage, heat generation, smoke, explosion or fire.<br>Furthermore, if the built-in protective circuit is damaged, the battery pack will be charged with abnormal current or voltage. This may cause an abnormal chemical reaction inside the battery pack, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Do not solder directly on the battery pack. Doing so may melt insulating materials, damage the protective circuit, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Do not use the battery pack if it shows excessive damage or deformation. Using it in such condition may result in battery fluid leakage, heat generation, smoke, explosion or fire. |

| ⚠ CAUTION | |
|---|---|
|  | The battery pack must only be used for this instrument. |
|  | If charging is not complete even if the specified charging time has elapsed, stop charging. Continuing to charge the battery pack may result in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Do not put the battery pack in a microwave oven or high-pressure container. The battery pack may be heated rapidly or may no longer be airtight, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | If battery fluid leakage or an odd smell is detected, immediately take the battery pack away from the heat source. Leaving it in such condition may cause the battery fluid to catch fire, resulting in smoke, explosion or fire. |
|  | If odd smells, heat generation, discoloration or deformation are noticed during use, charging or storage of the battery pack, disconnect it from the instrument or charger, and do not use it. Continuing to use it in such conditions may result in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | Do not use or leave the battery pack in strong direct sunlight or in places like inside an automobile under very strong sunshine. Doing so may result in battery fluid leakage, heat generation or smoke. It also may deteriorate the performance or life of the battery pack. |
|  | The battery pack has a built-in protective circuit designed to prevent danger. So, do not use the battery pack in places where static electricity that is likely to damage the protective device is generated. Using the battery pack in such places may damage the protective device, resulting in battery fluid leakage, heat generation, smoke, explosion or fire. |
|  | The battery pack can be charged in the following temperature range. Charging the battery pack outside this range may cause battery fluid leakage, heat generation or breakdown. It may also deteriorate the performance or life of the battery pack. Allowed charging temperature range: 5°C to 30°C |
|  | If rust, odd smells, heat generation or any other abnormality are found when using the instrument for the first time following purchase, stop its use and contact the agent from whom the instrument was purchased. |

# Notes on Operating Environment and Conditions

## Restrictions Regarding Operating Environment

| WARNING | |
|---|---|
|  | Take care not to let water enter the instrument or to allow it to get wet.<br>Failure to observe this may result in fire, electric shock or breakdown. |

## Restrictions Regarding Operating Conditions

| WARNING | |
|---|---|
|  | The power cord specified by YOKOGAWA must be used.<br>Use of any other power cord may result in fire, electric shock or accident. |

# Notes on Installation

## For Personnel Performing Installation

| ⚠ WARNING | |
|---|---|
|  | Do not connect the instrument to an AC outlet using an extension power cord.<br>Doing so may result in heat generation or fire. |

| ⚠ CAUTION | |
|---|---|
|  | Do not dissemble or modify the instrument.<br>Doing so may result in electric shock, fire or accident. |
|  | Do not expose the instrument to water splashes.<br>Failure to observe this may result in electric shock, fire or accident. |
|  | Do not allow the terminals to short-circuit.<br>Failure to observe this may result in fire or breakdown. |
|  | When using an AC adapter, make sure that it is inserted into the AC outlet properly.<br>If the power plug comes into contact with metal objects, fire or electric shock may result. |
|  | When carrying out work with the instrument on your shoulders, take care not to let it drop.<br>Failure to observe this may result in injury or breakdown. |

## Restricted and Prohibited Items Regarding Operating Environment and Conditions

| ⚠ WARNING | |
|---|---|
|  | Do not insert metal bars or such like into gaps on the instrument.<br>Doing so may result in fire, electric shock or accident. |

| ⚠ CAUTION | |
|---|---|
|  | Keep the power cord away from heaters etc.<br>Failure to observe this may result in electric shock. |
|  | Do not connect or disconnect the power plug with wet hands.<br>Doing so may result in electric shock. |
|  | Do not place the instrument in humid or dusty areas.<br>Doing so may result in electric shock or breakdown. |
|  | Do not place the instrument on an unstable surface like a shaky table or slope.<br>The instrument may drop or turn over, causing injury. |
|  | Do not place the instrument in areas where there is excessive vibration or impact.<br>The instrument may drop or turn over, causing injury. |
|  | When disconnecting the power cord, always hold the plug and pull it out.<br>Pulling the power cord may damage the cord, resulting in fire or electric shock. |
|  | Do not place the instrument in direct sunlight or in places like inside a car under the very hot sunshine.<br>Placing the instrument in such places may cause the temperature inside the instrument to rise, resulting in breakdown. |

## Prohibited Items Regarding Installation Method

| ⚠ WARNING | |
|---|---|
|  | Do not place heavy objects on the power cord, heat or pull it, and do not modify the power cord.<br>Doing so may damage the cord, resulting in fire or electric shock. |

| ⚠ CAUTION | |
|---|---|
|  | Before transferring the instrument to another site, make sure that the power plug is removed from the AC outlet and all the external connecting cables are disconnected.<br>Failure to observe this may damage the cord, resulting in fire or electric shock. |

## Notes on Handling

The instrument must be handled according to the procedures given in this manual.

Warning marks (“WARNING”, “CAUTION”) must be strictly observed.

| ⚠ WARNING | |
|---|---|
|  | Do not leave metal objects or containers of liquid, such as water, near the instrument.<br>Strong wind may turn over the container spilling the water or cause metal objects to hit the instrument, resulting in fire, electric shock or breakdown. |
|  | Do not modify the power cord, bend, twist or pull it excessively.<br>Failure to observe this may result in fire or electric shock. |
|  | Before plugging in or removing connectors from the instrument, make sure that the instrument is powered OFF.<br>Failure to observe this may result in fire, electric shock or breakdown. |
|  | Do not disassemble or modify the instrument.<br>Doing so may result in fire, electric shock or accident. |
|  | Do not allow the terminals of the battery pack to get wet.<br>Failure to observe this may result in rust, fire or electric shock. |

| ⚠ CAUTION | |
|---|---|
|  | When closing panels and covers, take care not to trap your fingers. |
|  | If you are not going to use the instrument for a long period of time, the power plug must be removed from the AC outlet for safety reasons. It must also be removed in the event of thunderstorms.<br>Failure to observe this may result in fire, electric shock or breakdown. |
|  | Do not use the instrument at -10°C or lower temperatures.<br>Operation of the indicators cannot be guaranteed. |
|  | Do not allow short-circuiting of the battery pack's terminals with metal objects.<br>Failure to observe this may result in fire or breakdown. |


If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.

## Notes on Maintenance and Inspection

Periodic maintenance and inspection of the instrument are recommended. For enquiries regarding maintenance and inspection, contact the agent from whom the instrument was purchased.

| ⚠ CAUTION | |
|---|---|
|  | Take care not to let dust or dirt collect inside the instrument.<br>Collection of dust or dirt inside the instrument may result in fire or breakdown. |

## Actions to be Taken in Case of Abnormalities

| ⚠ WARNING | |
|---|---|
|  | Do not repair the instrument even though the instrument becomes faulty.<br>Doing so may result in electric shock or injury. In addition, the instrument repaired by the user without permission will be exempt from the warranty. |
|  | Should the instrument be dropped or damaged, turn OFF the power switch on the instrument, disconnect the power plug from the AC outlet and then contact your agent from whom the instrument was purchased.<br>Continuing to use it may result in fire, electric shock or breakdown. |
|  | Should foreign items enter the instrument, turn OFF the power switch on the instrument, disconnect the power plug from the AC outlet and then contact your agent from whom the instrument was purchased.<br>Continuing to use it may result in fire, electric shock or breakdown. |
|  | Should smoke or odd smells be detected, turn OFF the power switch on the instrument, disconnect the power plug from the AC outlet and then contact your agent from whom the instrument was purchased.<br>Failure to observe this may result in fire, electric shock or breakdown. |
|  | If the power cord is damaged, contact the agent for replacement.<br>Continuing to use it may result in fire or electric shock. |

## Notes on Disposal

| ⚠ WARNING | |
|---|---|
|  | When disposing of the instrument, do not put it into a fire.<br>Doing so may cause explosion, resulting in fire or burns. |

| ⚠ CAUTION | |
|---|---|
|  | The instrument uses a lithium battery for memory backup and a gallium arsenide battery for the light source module. In addition, the liquid crystal display panel contains fluorescent tubes.<br>So, disposal of the instrument must be carried out according to the laws and regulations of the country and local authorities. |

# Other Precautions

## Notes on Backup Battery

| ⚠ CAUTION | |
|---|---|
|  | The instrument uses a lithium battery for memory backup. The instrument may malfunction suddenly due to battery life, therefore, early replacement of the battery is recommended.<br>The life of the battery is approximately five years. |

**Refer** For details on replacement of the backup battery, refer to page 1-25.

## Notes on LCD Panel

| ⚠ CAUTION | |
|---|---|
|  | This instrument uses a liquid crystal display panel. The display panel gradually becomes unclear due to the backlight life. The LCD panel needs to be replaced when it becomes unclear.<br>The life of the LCD panel is approximately three years.<br>Please contact the agent when the panel is no longer clear. |

# Structure of this Manual

## Chapter 1 BEFORE USING THE INSTRUMENT

Explains the names and functions of each part of the instrument, and how to carry out daily maintenance.

## Chapter 2 BEFORE STARTING MEASUREMENT

Explains how to set up the instrument.

## Chapter 3 PERFORMING MEASUREMENTS

Explains how to set measurement conditions and how to measure optical fiber cables.

## Chapter 4 ENTERING CHARACTERS

Explains how to enter label and file names.

## Chapter 5 EDITING AUTOMATIC SEARCH RESULTS

The instrument has a function that detects events in the measurement results automatically at the end of measurement. This chapter explains how to edit the detection results.

## Chapter 6 FILE OPERATION

Explains how to use (e.g. open, delete) files saved to a storage medium.

## Chapter 7 USING USEFUL FUNCTIONS

This instrument has various useful functions. This chapter explains these functions.

## Chapter 8 USING OPTIONS AND EXTERNAL DEVICES

Explains how to use options and external devices (e.g. USB printer) and how to control the instrument from a personal computer.

## Chapter 9 SPECIFICATIONS

Explains the specification of the instrument itself, optical module and options.

## Chapter 10 APPENDIX

Explains corrective actions to be carried out in case of breakdown. Also provides a list of technical terms regarding the instrument.

# Contents

# Chapter 1
# BEFORE USING THE INSTRUMENT

# 1.1 What is the AQ7260?

This instrument emits a light pulse into an optical fiber and searches faults from the end of the fiber, then calculates transmission loss effectively by detecting back scattering rays caused by Rayleigh scattering inside the fiber, and rays reflecting at connection points and fault points.

Since the optical section comes in a module, an appropriate optical module can be selected according to the wavelength and type of optical fiber to be used.

This instrument also can be used for light source depend on the mounted optical module.

# 1.2 Installation, Storage and Transport

This section explains points to be observed when installing, storing or transporting the instrument.

## Unpacking and Receiving Inspection

Prior to shipment, the instrument has undergone strict mechanical and electrical inspection to ensure its correct operation. On delivery, immediately unpack and check the instrument for any damage that might have occurred during transport.

### Mechanical Inspection

After the instrument is unpacked, check the appearance, operation of each switch and connector, and check for any damage or defects that might have occurred during transport. In addition check that all the accessories are present and correct.

**TIP**

It is recommended that packing materials, such as corrugated boxes and cushioning materials, be kept in a safe place so that they can be reused when transporting the instrument again.

### Operation Inspection

If no defects are found by mechanical inspection, check the instrument to see whether it conforms to the specifications.

### When Damage or Defects are Found

If damage or non-conformation to the specifications is found during mechanical or operation inspection, contact the agent from whom the instrument was purchased.

# Notes on Storage

This section explains points to be observed when storing the instrument for a long period of time.

## Notes Before Storage

Dust, fingerprints, dirt and stains etc. collected on the instrument must be wiped off with a piece of cloth.

Carry out operation inspection to check that the instrument operates correctly.

**Refer** For the method of cleaning the exterior of the instrument, refer to page 1-8.

## Storage Conditions

When storing the instrument, make sure it is stored under the following environmental conditions.

- Temperature −20 to 60°C
- Humidity 95%RH or less (No condensation allowed)
- Temperature/humidity does not change excessively throughout the day.
- Areas where the instrument will not be exposed to direct sunlight
- Areas where there is little dust
- Low-humidity areas where no water drops are generated or collect on the instrument
- Areas where the instrument will not be exposed to active gases or oxidized.

**Caution** If you are not going to use the instrument for a long period of time, store it with the battery pack removed. Furthermore, when storing the instrument outside the above temperature range, make sure that the battery pack is removed.

**Refer** For the method of removing the battery pack, refer to page 1-19.

## Notes When Re-Using the Instrument

When using the instrument again after storing it for a long period of time, first carry out operation inspection to check that the instrument operates correctly.

## Notes on Transport

This section explains points to be observed when transporting the instrument.

### Repacking

To repack the instrument, the packing materials used to deliver the instrument must be used. If they have been discarded or damaged, pack the instrument as explained below.

1. **Wrap the instrument with a thick vinyl sheet to prevent entry of dust.**
2. **Place cushioning material on projecting parts on the bottom and front/rear panels of the instrument to protect them.**
3. **Prepare a corrugated, wooden or aluminum box that is large enough to accommodate the instrument and allows 10 to 15 cm space between the surface of each part of the instrument (top, bottom, front, rear, right/left panels) and the sides of the box.**
4. **Put shock-absorbent materials at the bottom of the box to absorb shocks, such as vibration.**
5. **Place the instrument in the center of the box and fill the spaces (between the box's internal surface and each surface of the instrument: top, front, rear, right/left panels) with shock absorbent materials.**
6. **Secure the outside of the box with packing cord, adhesive tape or bands.**

**Caution**

The instrument must be packed so that any impact or vibration on the instrument is 50G or less. If the instrument is exposed to impact or vibration exceeding 50G, the instrument may get damaged. In particular, take care not to let any excessive pressure be exerted on the LCD.

**TIP**

It is recommended that packing materials used to deliver the instrument be kept in a safe place. Using these materials will facilitate packing work when transporting the instrument.

## Transport

During transport, make sure that vibration is avoided and the required storage conditions are satisfied.

**Refer** For details on the storage conditions, refer to page 1-4.

**Caution** When the battery pack is transport by using aircraft. Pleas each package contains 12 battery pack or less. However, airlines refuse transport battery packs. Please inquire to the airline in advance.

# 1.3 Power Supply

The instrument can run on AC power (AC battery is supplied with the instrument) or battery pack.

The AC adapter must be connected to an AC power outlet (100 to 240 V, 50/60Hz). Necessary measures must be taken to prevent the following.

- Accident by electric shock
- Internal damage of the instrument by abnormal voltage

# 1.4 Daily Maintenance

The instrument can be used for many years if daily maintenance is carried out properly.

Daily maintenance is also important to prevent trouble and breakdowns.

This section explains how to clean the following items.

- Exterior of the instrument
- Optical connector
- Optical adapter

## Cleaning the Exterior of the Instrument

Wet a cloth with lukewarm water, squeeze it thoroughly, wipe the LCD and exterior of the instrument with it, and then wipe the instrument with dry cloth.

**Caution**

- Before carrying out daily maintenance, make sure that the power is turned OFF.
- Do not use chemicals such as thinner, benzene and alcohol. Use of such chemicals may cause deterioration or discoloration of the exterior of the instrument.
- To prevent entry of water into the instrument, the wet cloth must be firmly squeezed before it is used to wipe the exterior.

## Cleaning the Optical Connector

The end of the optical connector must be kept clean at all times. Collection of dust or dirt on the end may damage the optical adapter of the instrument, hindering correct measurement.

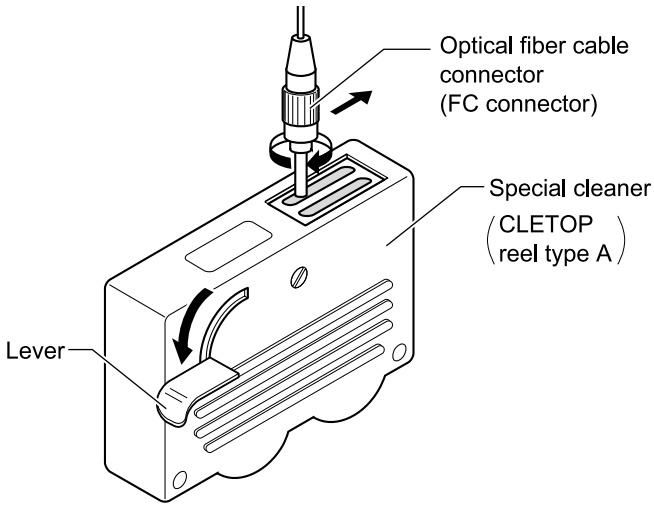
This section explains how to clean the end of the optical connector by taking a FC connector as an example.

1. **Place the end of the optical connector perpendicular to the cleaner's cleaning surface.**

2. **With the end of the optical connector pushed against the cleaning surface, turn it approximately one turn.**

3. **Then, slide the end of the optical connector.**

4. **Repeat steps 2 to 3 to clean the end of the optical connector.**




**Caution**

When cleaning the optical connector, make sure that it is pushed against the cleaner firmly. If not, the optical connector may not be cleaned sufficiently.

**TIP**

•To check the condition of the end of the optical connector, use of a surface check microscope (x200 to x400) is helpful.

•Various cleaners designed for optical fiber cables are available, including "OPTICAL FIBER CONNECTOR CLEANER" manufactured by NTT-ME.

| Product Name | Appropriate Connector Types |
|---|---|
| CLETOP reel-type A | SC, FC, ST, DIN, D4 |
| CLETOP reel-type B | MT, Biconic |
| CLETOP spare tape | ---------- |
| CLETOP stick-type | ---------- |

## Cleaning the Optical Adapter

This section explains how to clean the optical adapter.

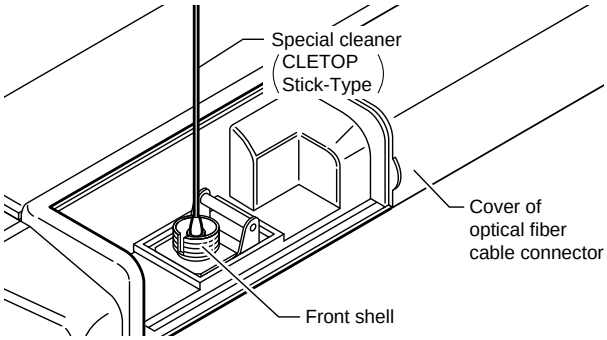
**1. Make sure that the power to the instrument is turned OFF.**

| ⚠ WARNING | |
|---|---|
| ⊘ | Never clean the instrument if the power is ON. Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight. |
| ⊘ | Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. |

**Refer** For the method of turning OFF the power, refer to page 3-107.

**2. Slide the optical connector cover on the top of the instrument to open it.**

**3. Clean the outer surface inside the optical adapter using a special cleaning stick. Also clean the end of the optical fiber with a special cleaning stick.**




**TIP** Various cleaners designed for optical adapters are available, including “CLETOP Stick-Type” manufactured by NTT-ME.

# 1.5 Replacing the Optical Module

This section explains how to replace the optical module with a new one.

## Removing the Optical Module

**Caution**

The optical module cannot be replaced if the expansion unit is connected.

**Refer**

For the method of removing the expansion unit, refer to page 8-5.

**1. Make sure that the power to the instrument is turned OFF.**

| ⚠ WARNING | |
|---|---|
|  | Do not replace the optical module while the instrument is powered ON.<br>Failure to observe this may result in electric shock or breakdown. |

**Refer**

For the method of turning OFF the power, refer to page 3-107.

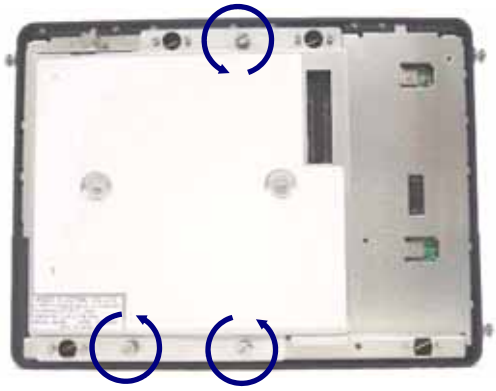
**2. Remove the optical module cover.**

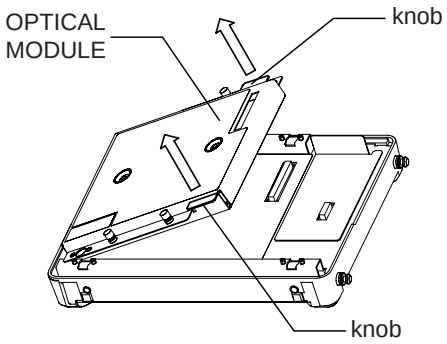
Loosen the four screws shown below counter-clockwise.

**3. Lift the optical module cover straight to remove it.**

**4. Remove the optical module.**

Loosen the three screws shown below counter-clockwise. Then, pull out the optical module as shown below to remove it.






| ⚠ CAUTION | |
|---|---|
| ⃠ | When removing the optical module, lift the two knobs slowly at the same time to detach them. Never shake it sideways or remove it by force.<br>Doing so may damage the connector. |
| ⃠ | Take care not to touch the connector on the optical module or the one on the instrument.<br>Doing so may result in breakdown. |

## Attaching a New Optical Module

This section explains how to attach a new optical module. It is assumed that the optical module and its cover have been removed.

### 1. Make sure that the power to the instrument is turned OFF.

| ⚠ WARNING | |
|---|---|
|  | Do not replace the optical module while the instrument is powered ON.<br>Failure to observe this may result in electric shock or breakdown. |

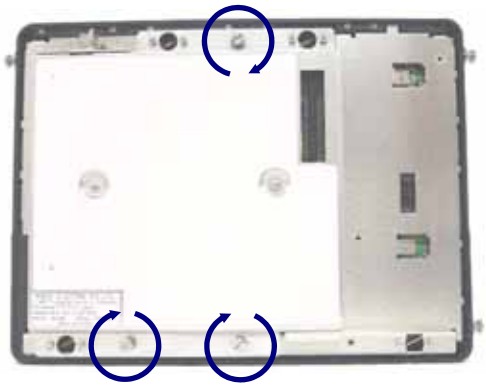
**Refer** For the method of turning OFF the power, refer to page 3-107.

### 2. Connect the optical module's connector to the one on the optical module.

| ⚠ CAUTION | |
|---|---|
|  | When attaching the optical module, insert the connector slowly. Never shake the connector sideways or insert it by force.<br>Doing so may damage the connector. |

### 3. Fix the optical module.

Tighten the three screws shown below clockwise to secure the optical module.



Caution

Make sure that the screws are tightened firmly.

### 4. Attach the optical module cover.

Tighten the four screws shown below clockwise.

Caution

Make sure that the screws are tightened firmly.

# 1.6 Replacing the Optical Adapter

This section explains how to replace the optical adapter with a new one.

## Removing the Optical Adapter

Refer

Refer to the Cautions given on page 1-18.

**1. Make sure that the power to the instrument is turned OFF.**

| ⚠ WARNING | |
|---|---|
|  | Do not replace the optical adapter while the power to the instrument is ON.<br>Should the laser emit and enter the eyes, they may be seriously damaged or loss of eyesight may result. |

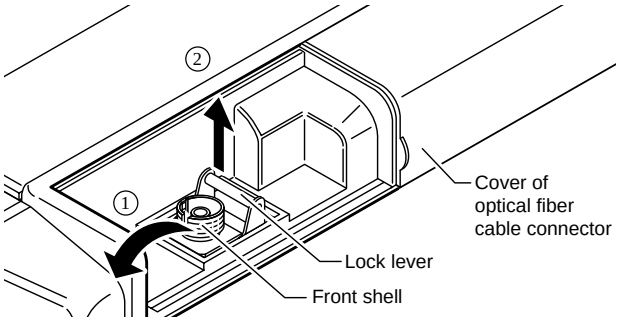
Refer

For the method of turning OFF the power, refer to page 3-107.

**2. Slide the optical connector cover on the top of the instrument to open it.**

**3. Push the optical adapter's lock lever inward to unlock the adapter.**

**4. Lift the adapter to pull it out.**



## Attaching a New Optical Adapter

Refer

Refer to the Cautions given on page 1-18.

**1. Make sure that the power to the instrument is turned OFF.**

| ⚠ WARNING | |
|---|---|
|  | Do not replace the optical adapter while the power to the instrument is ON.<br>Should the laser emit and enter the eyes, they may be seriously damaged or loss of eyesight may result. |

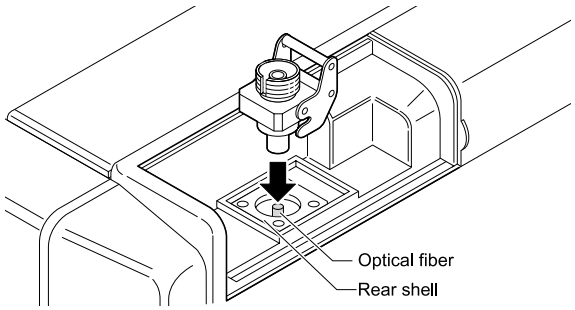
Refer

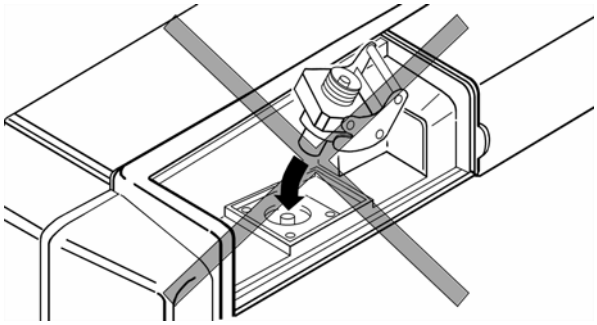
For the method of turning OFF the power, refer to page 3-107.

**2. Slide the optical connector cover on the top of the instrument to open it.**

**3. Insert the new optical adapter straight into the rear shell.**

**4. Push the optical adapter's lock lever outward to lock the adapter.**



| ⚠ CAUTION | |
|---|---|
| | • Take care not to damage the end of the optical fiberl.<br>If the end of the optical fiber is damaged, correct measurement may no longer be possible or the optical fiber to be measured may also be damaged.<br>• When removing/inserting the optical adapter, it must be removed/inserted slowly.<br>Shaking it sideways or removing/inserting by force may not only damage the optical adapter, but also damage the ferrule on the optical connector.<br>  |

# 1.7 Replacing the Battery Pack

This section explains how to replace the battery pack with a new one.

## Removing the Battery Pack

**1. Make sure that the power to the instrument is turned OFF.**

| WARNING | |
|---|---|
|  | Do not replace the battery pack while the power to the instrument is ON.<br>Failure to observe this may result in electric shock or breakdown. |

Refer For the method of turning OFF the power, refer to page 3-107.

**2. Open the battery pack protecting rubber.**

### 3. Remove the battery pack bracket.

Loosen the screw shown below counter-clockwise to remove the bracket.

| ⚠ CAUTION | |
|---|---|
|  | When removing the bracket, make sure that the right side of the instrument is not facing the floor.<br>Doing so may cause the battery pack to drop, resulting in damage. |

### 4. Remove the battery pack.

| ⚠ CAUTION | |
|---|---|
|  | Do not touch the electrodes on the removed battery pack.<br>Doing so may result in breakdown. |

## Attaching a New Battery Pack

This section explains how to attach a new battery pack. It is assumed that the battery pack bracket has been removed.

### 1. Make sure that the power to the instrument is turned OFF.

| ⚠ WARNING | |
|---|---|
|  | Do not replace the battery pack while the power to the instrument is ON.<br>Failure to observe this may result in electric shock or breakdown. |

**Refer** For the method of turning OFF the power, refer to page 3-107.

### 2. Insert a new battery pack into the instrument.

**Caution** Make sure that the battery pack is inserted in the correct direction.

### 3. Attach the battery pack bracket.

Tighten the screw shown below clockwise to secure the bracket.

**Caution** Make sure that the screw is tightened firmly.

### 4. Close the battery pack protecting rubber.

| ⚠ CAUTION | |
|---|---|
| ⊘ | Make sure that the battery pack protecting rubber is closed firmly.<br>Failure to observe this may result in breakdown. |

# 1.8 Charging the Battery Pack

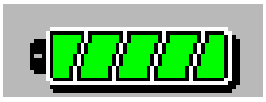
This section explains how to charge the battery pack.

When there is insufficient power in the battery pack, charge it as explained below.

**Caution**

Charging of the battery pack must be performed at temperatures of 5°C to 35°C. Charging outside this temperature range may not only deteriorate the battery pack's performance or shorten its life, but in the worst case may also prevent start of charging. The CHARGE LED blinks if charging is not yet started.

The remaining power in the battery pack can be seen on the power indicator located in the lower right corner of the screen.



Fully charged

Insufficient remaining power

The following message appears when there is insufficient power in the battery pack.

> Low battery.
> Please use AC adapter,
> or replace the charged battery.
>
> Push any key.

Take the required actions according to the above message. If the required actions are not taken within a few minutes following the appearance of the above message, the following message will appear and the power will be turned OFF automatically.

> ⚠
> Low battery.
> OTDR will shutdown in 10 sec.

When the battery pack is heated, the instrument prevents to charge the battery. If the battery pack is heated. Please remove the battery pack. After the temperature become cool to room temperature and insert battery pack.

**Refer** For the method of removing the battery pack, refer to page1-19.

**1. Make sure that the power to the instrument is turned OFF.**

**Refer** For the method of turning OFF the power, refer to page 3-107.

**2. With the battery pack installed in the instrument, connect the AC adapter to the instrument.**

**Refer**
- For the method of attaching the battery pack, refer to page 1-21.
- For the method of connecting the AC adapter, refer to page 3-4.

**3. Insert the AC adapter's power plug into an AC power outlet.**

Charging of the battery pack will start.

| ⚠ CAUTION | |
|---|---|
|  | Do not insert the AC adapter's power plug into an AC power outlet if the power to the instrument is ON.<br>Failure to observe this may result in breakdown. |

**TIP** The CHARGE LED will be lit steadily while the battery pack is charged, and will go out when charging is complete.

# 1.9 Replacing the Backup Battery

This section explains how to replace the backup battery with a new one.

The backup battery must be replaced with a new one periodically, since it may cause sudden malfunctions due to its battery life even though the instrument is working properly.

The backup battery must be replaced approximately every five years.

**Caution**

- When the backup battery is replaced, the date and time will be initialized.
- The battery model “CR2032” must be used.

**1. Make sure that the power to the instrument is turned OFF.**

| ⚠ WARNING | |
|---|---|
|  | Do not replace the backup battery while the power to the instrument is ON.<br>Failure to observe this may result in electric shock or breakdown. |

**Refer**

For the method of turning OFF the power, refer to page 3-107.

**2. Remove the optical module cover and then remove the optical module.**

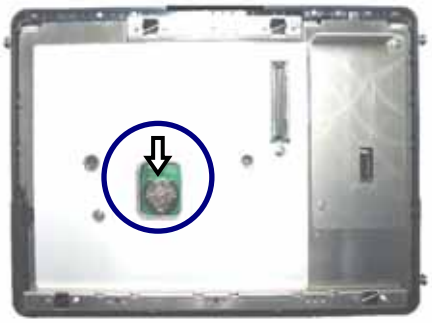
**Refer**

For the method of removing the optical module and its cover, refer to page 1-12.

**3. Remove the battery.**

**3-1. Slide the battery as shown below.**

**3-2. Pull up the battery**



**Caution**

When removing the backup battery, take care not to short-circuit the instrument.

**4. Insert a new battery.**

**Caution**

Make sure that the battery is inserted in the correct direction. The printing board side is minus.

**5. Attach the optical module and then attach its cover.**

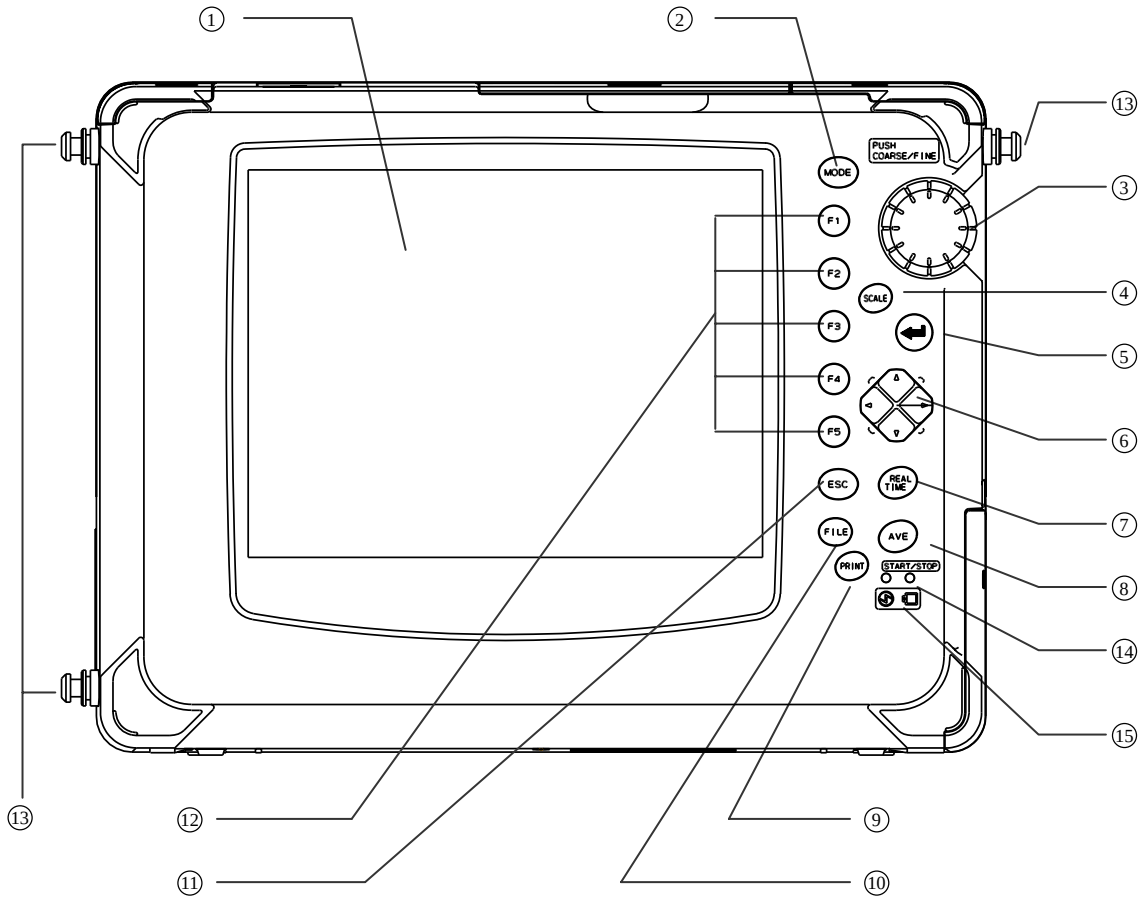
**Refer** For the method of attaching the optical module and its cover, refer to page 1-12.

| ⚠ CAUTION | |
|---|---|
| ⚠ | The instrument uses a lithium battery for memory backup.<br>So, disposal of the instrument must be carried out according to the laws and regulations of the country and local authorities. |

# 1.10 Names of Instrument Parts

This section explains the name and function of each part of the instrument (front, rear, top and right side panels). It also explains standard accessories and options.

## Front View




**Caution**

The instrument uses a color LCD (hereafter called LCD). A filter plate is attached to the front surface of the LCD for protection. However, if the filter plate is exposed to strong impact, it may crack or the LCD itself may be damaged, so special care must be taken when handling it.

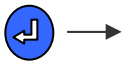
| No. | Name | Description |
|---|---|---|
| ① | LCD | 8.4-inch color TFT (640 x 480 dots). Measured trace, measurement conditions and measured values are displayed. |
| ② | MODE key | Used to switch the operation mode. |
| ③ | Rotary knob | Used to move the distance cursor or increase/decrease entered values.<br>Holding down the key will allow you to move the distance cursor at different speeds. |
| ④ | SCALE key | Used to enlarge/reduce the trace size or shift the trace. |
| ⑤ | ENTER key | Used to confirm entered values etc. |
| ⑥ | Arrow key | Used to move the trace, enlarge/reduce the trace size, or change entered values. |
| ⑦ | REAL TIME key | Starts/stops real-time measurement. |
| ⑧ | AVERAGE key | Starts/stops average measurement. |
| ⑨ | PRINT key | Prints out the information displayed on the screen. |
| ⑩ | FILE key | Used for file operation (saving, deleting, recalling). |
| ⑪ | ESC key | Used to cancel the operation or restore the previous screen contents. |
| ⑫ | Function keys | Performs the function inscribed on each key. |
| ⑬ | Shoulder belt fixture | Used to attach a shoulder belt to the instrument. |
| ⑭ | CHARGE LED | Lit while the battery pack is charged.<br>When the battery pack is full charged, the LED is off.<br>It blinks if the battery pack has not been charged or if it is in critical condition. |
| ⑮ | POWER LED | Lit while the power to the instrument is ON.<br>When the instrument is running on the battery pack, this LED turns from green to red when there is insufficient power in the battery pack. |

## Conventions Used in This Manual

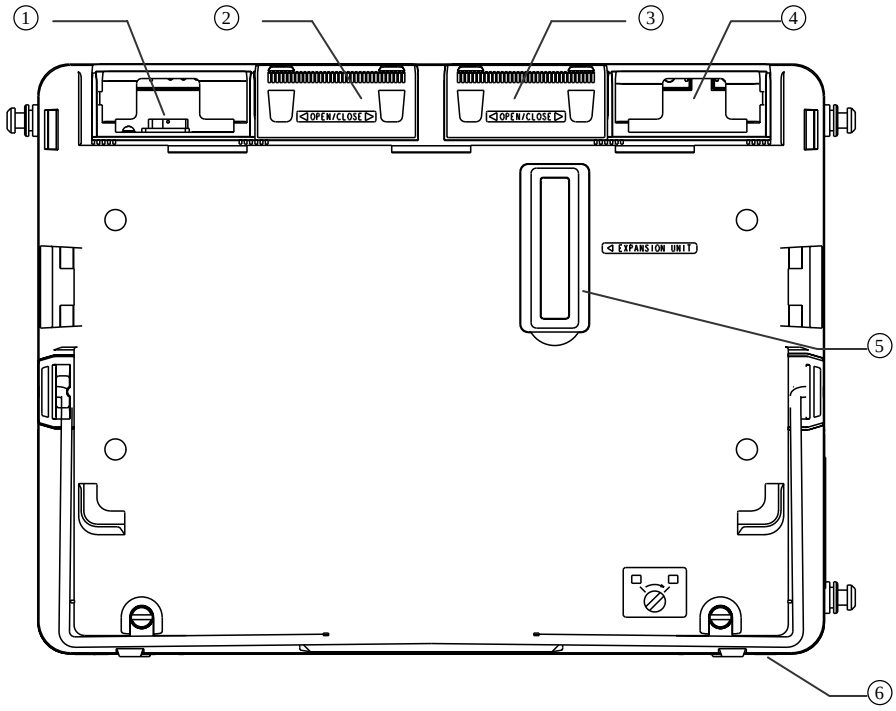
In this manual, each key is expressed as follows.

[key name]

Example

 [ENTER]

## Rear View




| No. | Name | Description |
|---|---|---|
| ① | Optical adapter | Used to connect the optical fiber to be measured. |
| ② | Optical adapter cover | Used to protect the optical adapter when the fiber to be measured is not connected. |
| ③ | Sub module cover | Used to protect the sub module port when no sub module is connected. |
| ④ | Sub module port | Used to connect a sub module. |
| ⑤ | Expansion unit port | Used to connect an expansion unit. |
| ⑥ | Stand | Used to support the instrument when it is placed on a desk etc. |

**Caution**

Class 1M laser invisible radiation when optical adapter cover open. *1

Do not view directly with optical instruments.

*1: When measuring or Light source function ON

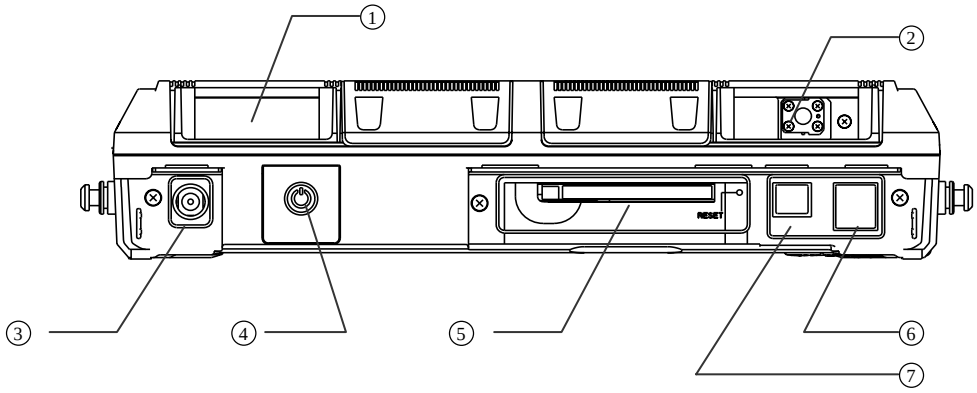
CATION

CLASS 1M INVISIBLE LASER RADIATION WHEN OPEN
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS

| ⚠ WARNING | |
|---|---|
|  | When no optical fiber is connected, make sure that the optical adapter cover is closed. Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight. |

| ⚠ CAUTION | |
|---|---|
|  | When carrying the instrument, do not carry it by the stand.<br>Doing so may damage the instrument. |

## Top View

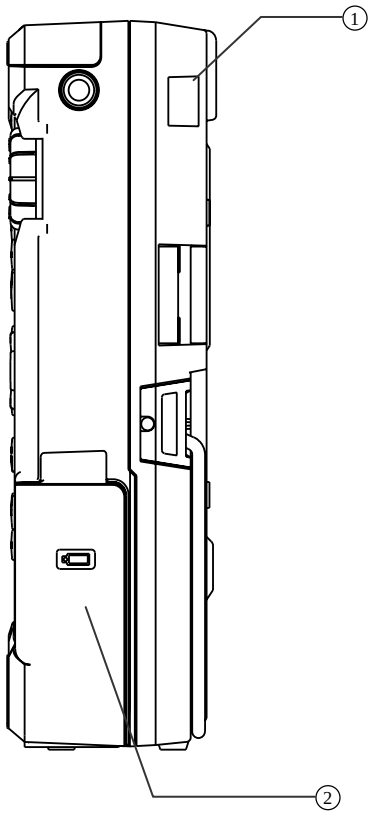



| No. | Name | Description |
|---|---|---|
| ① | Sub module port | Used to connect an optional visible light source or optical power meter. |
| ② | Optical adapter | Used to connect the optical fiber to be measured. |
| ③ | DC power connector | Used to connect the AC adapter. |
| ④ | Power switch | Used to turn ON/OFF the power to the instrument. |
| ⑤ | PCMCIA slot | Used to insert an optional IC card etc. |
| ⑥ | USB connector (host side)<br>2 ports | Used to connect FDD or memory. |
| ⑦ | USB connector (function side) | Used to connect a personal computer. |

**Caution**

- Two USB ports (host side) are available, but do not connect a storage medium or printer to both ports.
- Now, sub modules are not available. It will be developed.
- It does not support USB connector (function side) yet.

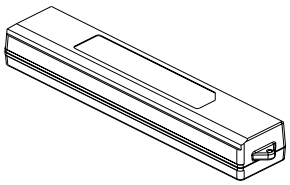
## Right Side View



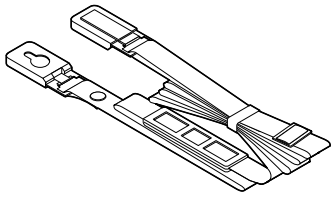

| No. | Name | Description |
|---|---|---|
| ① | Optical module cover | Used to protect the optical module |
| ② | Battery pack section | Used to accommodate a battery pack. |

## Accessories

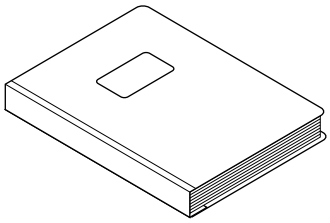
This section explains the accessories supplied with the instrument.



Battery pack



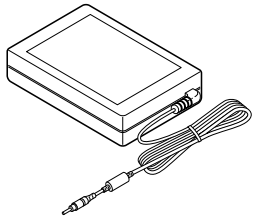
Shoulder belt



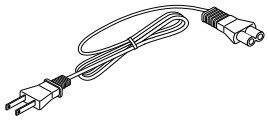
User's Manual

## Options

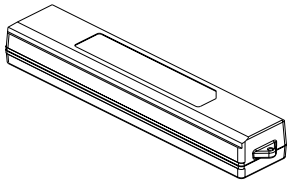
The section explains the options that can be purchased individually.



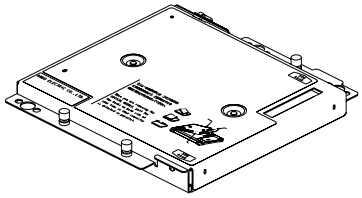
AC adapter



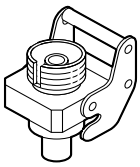
AC power cord



Battery pack



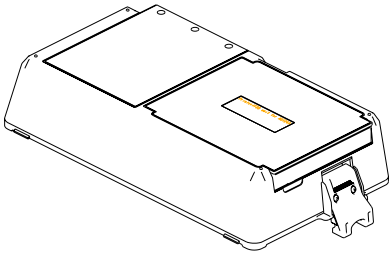
Optical module



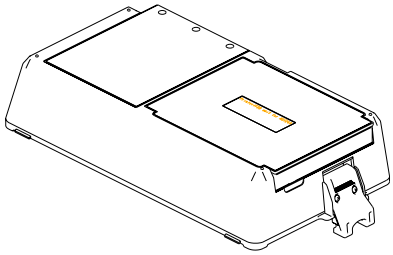
Universal adapter AQ9441 (*)

Soft carrying case

### Expansion Unit



Printer/FDD unit



Printer unit

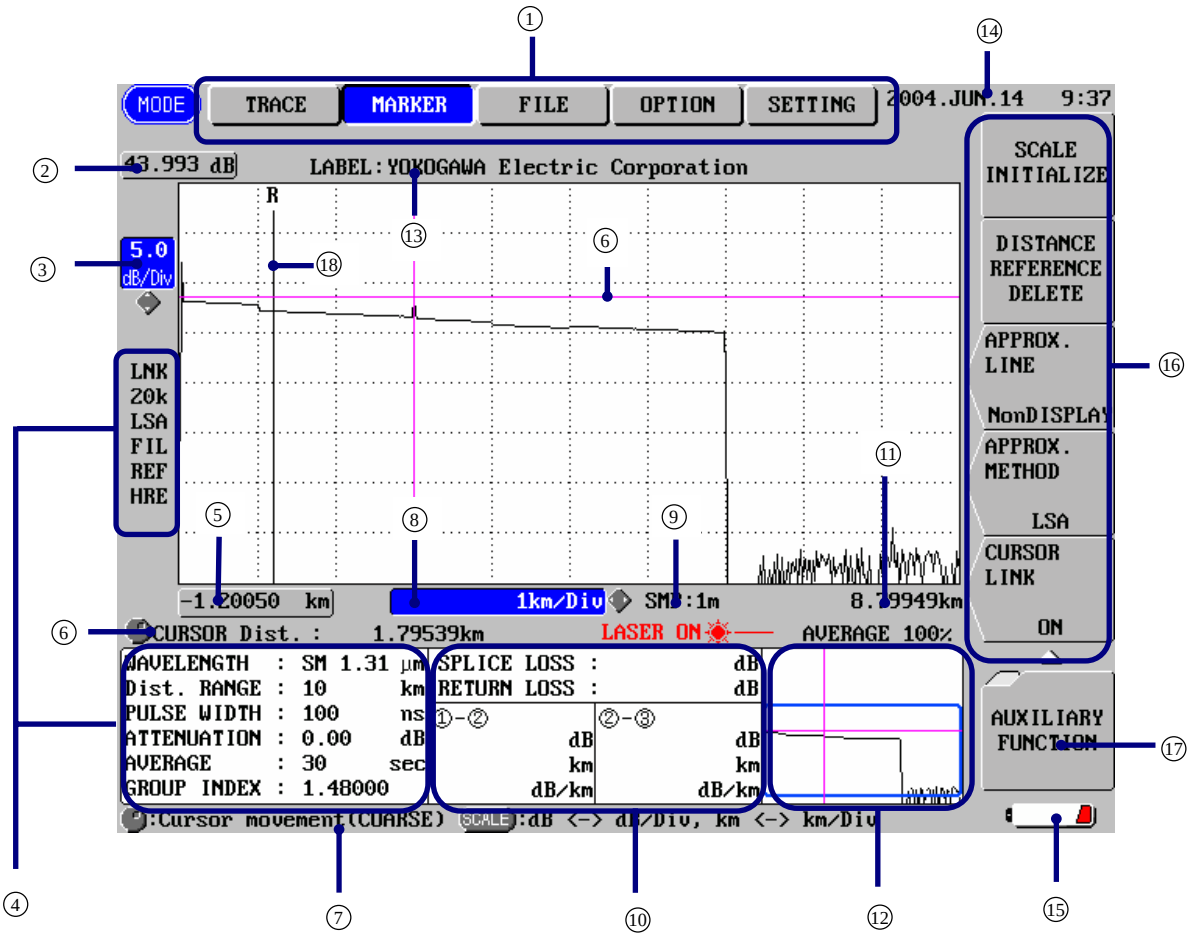
# 1.11 Screen Display

This section explains screen display.

## Description of Screen Display

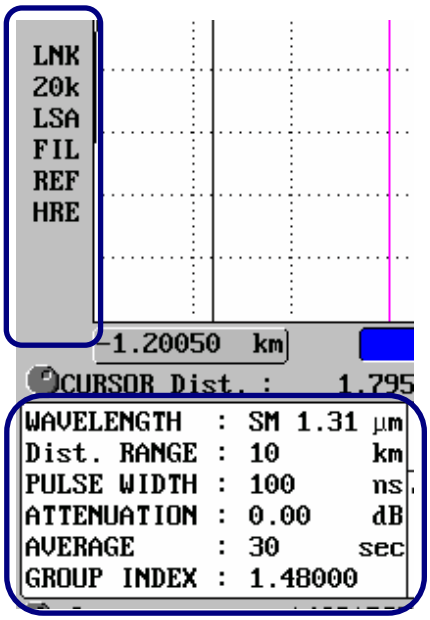
The main screen displays the measured trace and measurement conditions.

The name and function of each part of the screen are explained below.



| No. | Name | Description |
|---|---|---|
| ① | MODE | Highlights the currently selected mode. |
| ② | Display start level | Displays the vertical-axis display start level (above the trace display section). |
| ③ | Vertical-axis scale | Displays the value per grid along the vertical axis. |
| ④ | Measurement conditions | Displays various measurement conditions. |
| ⑤ | Display start distance | Displays the horizontal-axis display start distance (left to the trace display section). |
| ⑥ | Cursor distance | Displays the distance from the origin to the cursor point. |
| ⑦ | Guidance | Displays outline of the operation. |
| ⑧ | Horizontal-axis scale | Displays the value per grid along the horizontal axis. |
| ⑨ | SMP | Displays the sampling resolution. |
| ⑩ | Calculated values | Displays the calculation results obtained from the measurement data. |
| ⑪ | Display end distance | Displays the horizontal-axis display end distance (right to the trace display section). |
| ⑫ | Overall trace | Displays a measured trace for the entire measured range in simplified format. The part displayed in the main screen will be enclosed by a frame. |
| ⑬ | Label | Displays the entered label. |
| ⑭ | Date | Displays the current date and time. |
| ⑮ | Power | Displays the currently used power.<br>Battery mark: The instrument is running on the battery pack.<br>== AC ==: The instrument is running on AC power. |
| ⑯ | Function keys | Displays the functions of the current function keys. |
| ⑰ | Hierarchy level | Displays the hierarchy level of the operation.<br>The larger the tag count, the lower the hierarchy level. |
| ⑱ | Distance origin marker | Displays the position of the distance origin. |

## Display of Measurement Conditions



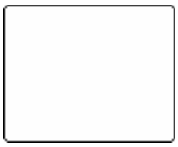

| Name | Description |
|---|---|
| LNK | Displayed when the cursor link function is currently enabled. |
| 20k | Displays the currently selected data size.<br>5k: 5k mode<br>20k: 20k mode<br>60k: 60k mode |
| LSA | Displays the currently selected approximate method.<br>LSA: Least squares approximate<br>TPA: Two point approximate |
| FIL | Displayed when the filter function is currently enabled. |
| REF | Displayed when the distance origin marker is currently set. |
| HRE | Displays the currently selected average method.<br>HRE: High return loss average<br>NOM: Normal average<br>HSP: High speed average |
| WAVELENGTH | Displays the wavelength to be used for measurement. |
| Dist. RANGE | Displays the distance range to be used for measurement. |
| PULSE WIDTH | Displays the width of light pulse to be used for measurement. |
| ATTENUATION | Displays the value set to restrict increase of the light to be measured. |
| AVERAGE | Displays the currently selected average time or average interval. |
| GROUP INDEX | Displays the currently selected group index. |

## Function Keys and Hierarchy Level Display

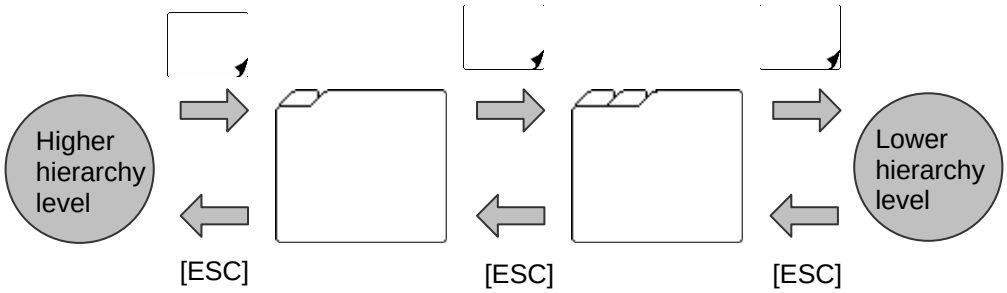
When [MODE] is pressed, the function menu for currently selected mode will be displayed.

The function keys are displayed in one of the three shapes, for each of which execution format has been set.

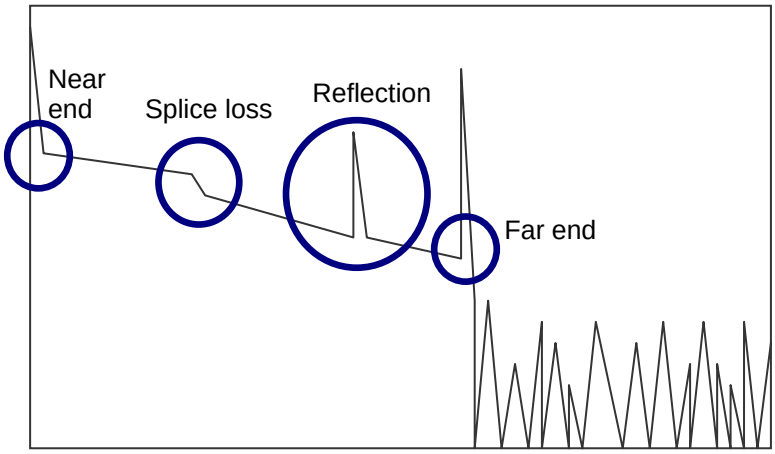
Execution format for each shape is explained below.

| Shape | Description |
|---|---|
|  | When a function key of this shape is pressed, a function window (lower-hierarchy window) relating to the function will appear.<br>The number of tags indicating the hierarchy level is also increased by one. To return to the previous hierarchy level, press [ESC] *1 |
|  | When a function key of this shape is pressed, a window allowing you to change the currently set values or setting conditions will appear. |
|  | When a function key of this shape is pressed, the function indicated on the key will be executed. |

* 1



## Meaning of Each Part of the Trace




**Near end**

Connection point between the instrument and optical fiber and its surrounding area

**Far end**

The end of an optical fiber cable and its surrounding area

If the end of the optical fiber cable cannot be detected due to noise, “far end” indicates the cross point of the noise and optical fiber and its surrounding area.

**Splice loss**

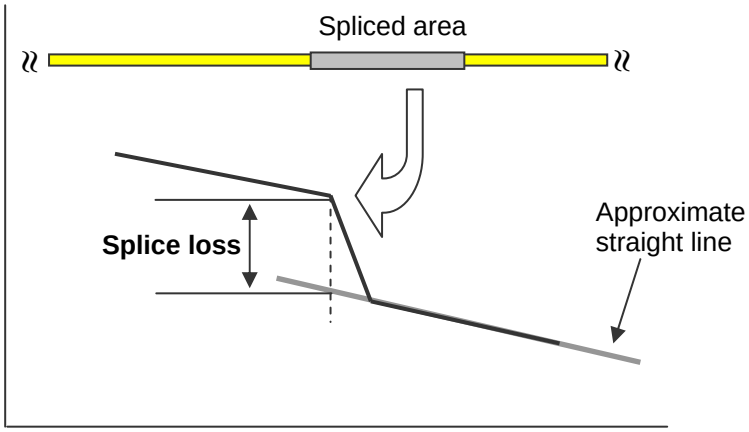
Explained on the next page.

**Reflection**

Explained on the next page.

## Splice Loss

Splice loss occurs at areas where the optical fiber cable is fusion spliced.



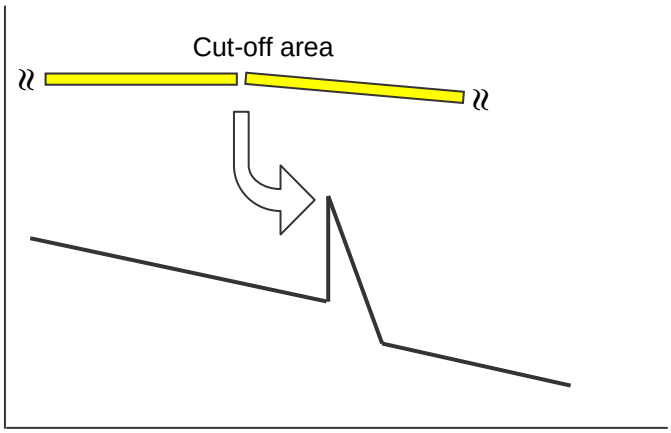

**Refer**

For details on approximate straight line, refer to pages 3-80 and 3-84.

## Reflection

Reflection occurs at areas where the optical fiber cable is connected by a connector or areas where the optical fiber is cut off.

Reflection level is often expressed by return loss.




**Refer**

For detail on return loss, refer to page 10-14.

# 1.12 Notes Before Performing Measurement

This section explains points to note when measuring a communication system. The following points must be observed when performing measurement.

## When Using AQ7261 / AQ7264 / AQ7265

These modules perform measurement by using the same wavelength as that used for communications. Thus, if the optical fiber to be measured contains communication light, communications will be affected. Furthermore, measurement cannot be performed correctly by this instrument. So, the measurement environment (presence/absence of communication light) must be taken sufficiently into account when using these modules. For the wavelength used by the modules, refer to “Chapter 9 Specifications”.

The AQ7260 main frame can use AQ7265 module at the software version 2.00 or later. Software version before 2.0 does not operate AQ7265 module.

| CAUTION | |
|---|---|
|  | Special care must be taken when using these modules since devices connected to the system to be<br>measured may be damaged depending on total power of the light. |


- Special care must be taken not to allow communication failure. Should communication failure occur by mistake by the user, YOKOGAWA will not accept responsibility arising from that communication failure.
- The AQ7260 main frame can use AQ7265 module at the software version 2.00 or later.


- Procedure of software upgrade, refer to page 10-2.
- Procedure of checking software version, refer to page 10-4.

Furthermore, take care not to allow any external light to enter the instrument.

| CAUTION | |
|---|---|
|  | Entry of external light may result in damage to the instrument. |

# Chapter 2
# BEFORE STARTING MEASUREMENT

# 2.1 Changing System Settings

This chapter explains how to change the following system settings.

- Changing the Display Language
- Changing the Trace Type
- Changing the Cursor Type
- Changing the Grid Setting
- Changing the Second Cursor Setting
- Changing the Trace Form Setting
- Changing the Distance Unit
- Changing the Distance Reference Mark Type
- Changing the Number of dB Display Digits
- Changing the Display Color
- Changing the Date/Time
- Changing the Lockout Setting
- Changing the Alarm Sound Setting
- Changing the Power Save Setting
- Changing the LCD Brightness
- Changing the Print Type
- Changing the Print Color

## Displaying the Setting Change Window

This section explains how to display the window by which system settings can be changed.

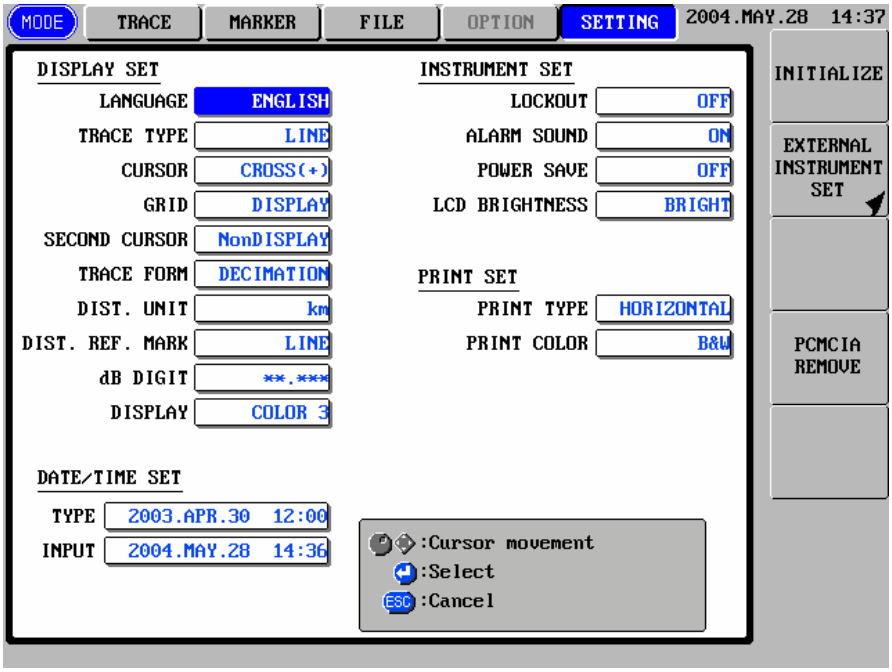
**1. Make sure there is no measurement currently in progress.**

**Caution**

If measurement is in progress, it is not possible to change system parameter settings.

**2. Press [MODE] to locate the cursor to “SETTING”.**

A window allowing you to change system settings will appear.



## Changing Settings

This section explains how to change the setting for each parameter.

**TIP**

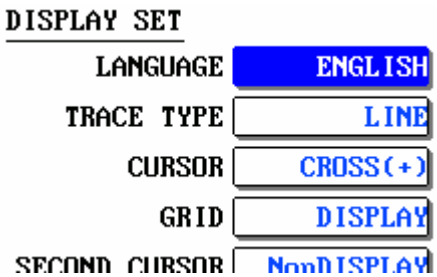
The system settings are retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the system settings in effect just before the instrument was turned OFF last time will be restored.

### Changing the Display Language

The display language can be changed as explained below.

♦ Example: “ENGLISH” → “**日本語**”

**1. Locate the cursor to “LANGUAGE” by using the rotary knob or the arrow key.**




**TIP**

The cursor is already at “LANGUAGE” when the setting change window appears.

**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable languages | **日本語** | Displays characters in Japanese. |
| | * ENGLISH | Displays characters in English. |

*: Indicates the default setting.

**3.** **Locate the cursor to "日本語" by using the rotary knob or [▲] / [▼].**

**4.** **Press [ENTER] to register the change made to the language setting.**

**Caution**

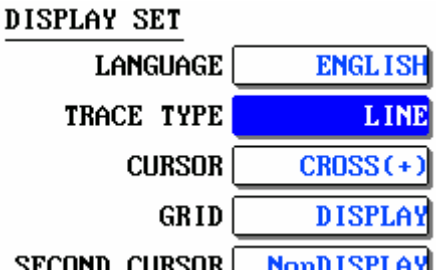
The change will not be registered if [ESC] is pressed instead of [ENTER].

## Changing the Trace Type

The trace type can be changed as explained below.

♦ Example: “LINE” → “DOT”

**1. Locate the cursor to “TRACE TYPE” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable trace types | *LINE | Displays the trace in line form. |
| | DOT | Displays the trace in dot form. |

*: Indicates the default setting.

**3. Locate the cursor to “DOT” by using the rotary knob or [▲] / [▼].**

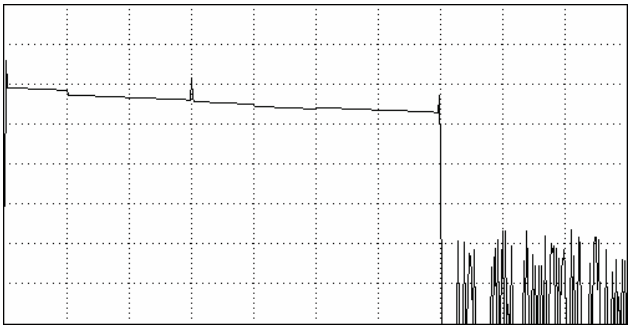
**4. Press [ENTER] to register the change made to the trace type.**

**Caution**

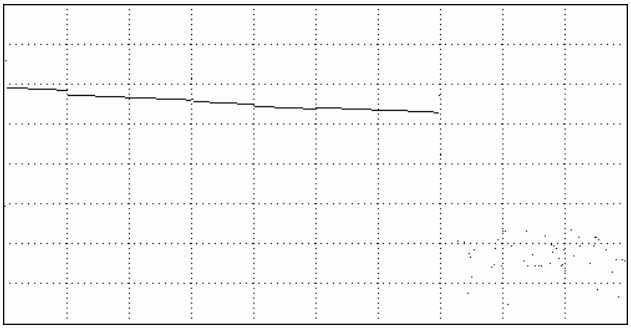
The change will not be registered if [ESC] is pressed instead of [ENTER].

**TIP**

When “LINE” is selected



When “DOT” is selected

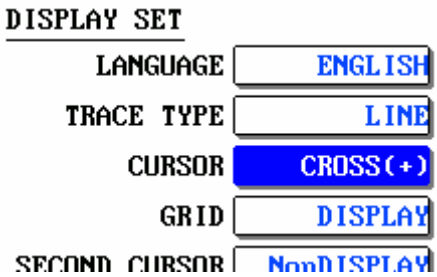


## Changing the Cursor Type

The cursor type can be changed as explained below.

♦ Example: “CROSS(+)” → “LINE( | )”

**1. Locate the cursor to “CURSOR” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

TIP

| | | |
|---|---|---|
| Selectable cursor types | *CROSS(+) | Displays the cursor by a cross (+). |
| | LINE( \| ) | Displays the cursor by a line ( \| ). |

*: Indicates the default setting.

**3. Locate the cursor to “LINE( | )” by using the rotary knob or [▲] / [▼].**

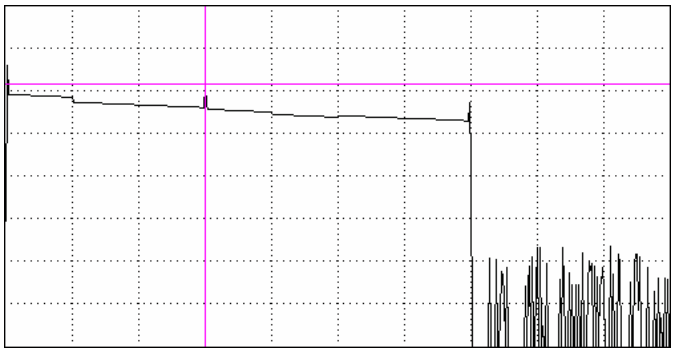
**4. Press [ENTER] to register the change made to the cursor type.**

Caution

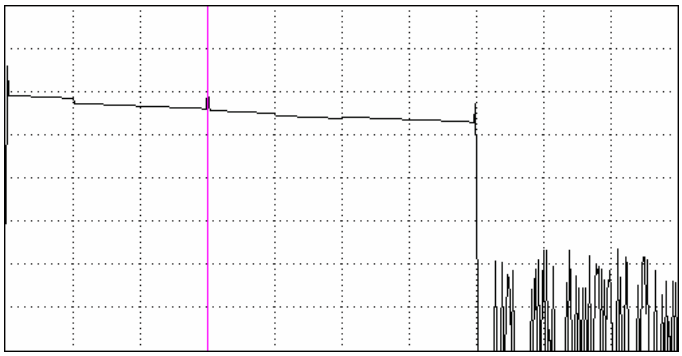
The change will not be registered if [ESC] is pressed instead of [ENTER].

**TIP**

When “CROSS(+)” is selected



When “LINE( | )” is selected

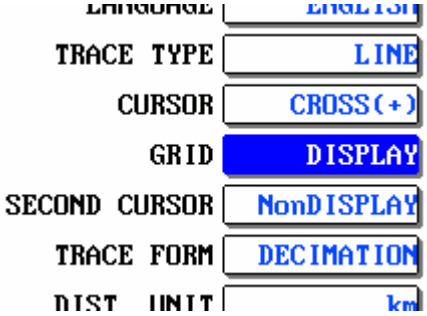


## Changing the Grid Setting

The grid setting can be changed as explained below.

♦ Example: “DISPLAY” → “NonDISPLAY”

**1. Locate the cursor to “GRID” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable grid settings | NonDISPLAY | Hides the grid. |
| | *DISPLAY | Shows the grid. |

*: Indicates the default setting.

**3. Locate the cursor to “NonDISPLAY” by using the rotary knob or [▲] / [▼].**

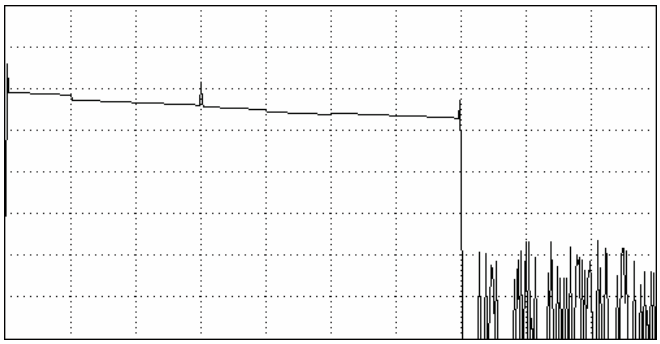
**4. Press [ENTER] to register the change made to the grid setting.**

**Caution**

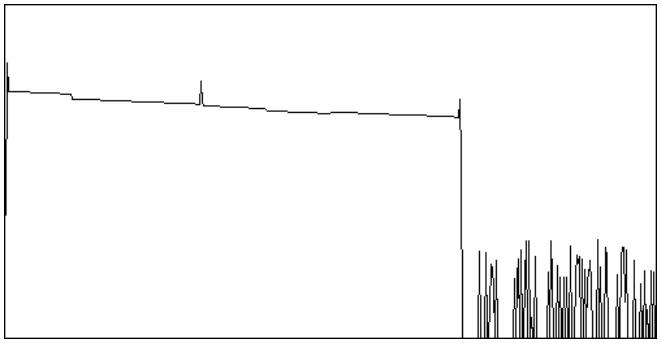
The change will not be registered if [ESC] is pressed instead of [ENTER].

**TIP**

When “DISPLAY” is selected



When “NonDISPLAY” is selected

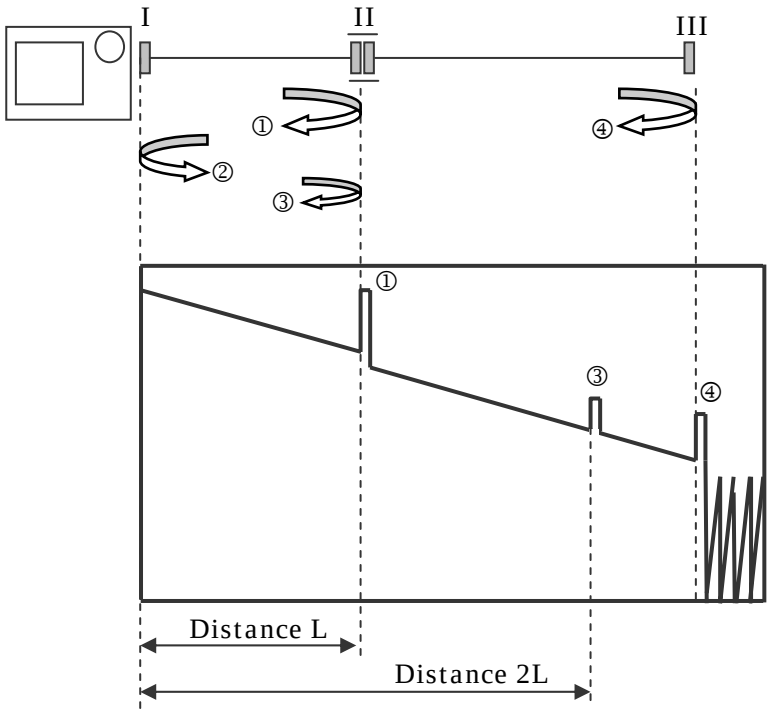


## Changing the Second Cursor Setting

Before explaining how to change the setting, an explanation is given below about the second cursor.

The second cursor is used to check for the secondary reflection.

The secondary reflection makes an event look as if it were present in places where it is actually not.




Assuming that excessive reflection occurs at point II

Mechanism of generation of secondary reflection

A pulsed ray that is output at point I advances toward point II.

↓

The ray (①) reflecting on the spliced surface at point II reflects again on the spliced surface at point I and advances toward point II (②).

The instrument acquires ① as data.

↓

Due to the ray ②, a reflection ray (③) is generated again on the spliced surface at point II.

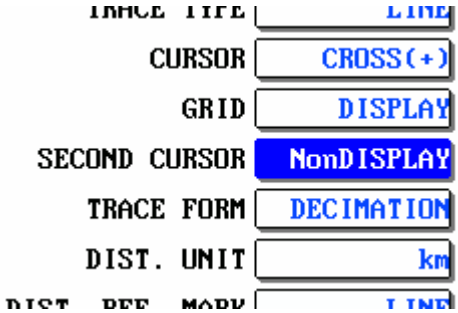
The instrument acquires ③ as data.

Since all the reflection rays (①, ③, ④) are measured by the instrument, ③ is also acquired as data in the same way as those that are actually generated, and is displayed. As a result, the secondary reflection makes an event look as if it were present in places where it is actually not.

The second cursor can be changed as explained below.

♦ Example: “NonDISPLAY” → “DISPLAY”

**1. Locate the cursor to “SECOND CURSOR” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

TIP

| | | |
|---|---|---|
| Selectable second cursor settings | *NonDISPLAY | Hides the second cursor. |
| | DISPLAY | Shows the second cursor. |

*: Indicates the default setting.

**3. Locate the cursor to “DISPLAY” by using the rotary knob or [▲] / [▼].**

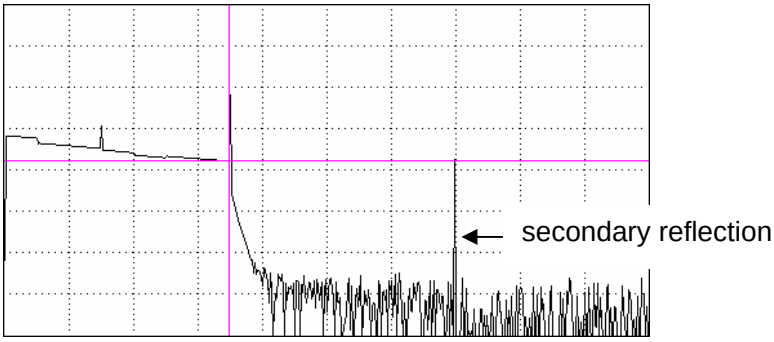
**4. Press [ENTER] to register the change made to the second cursor.**

Caution

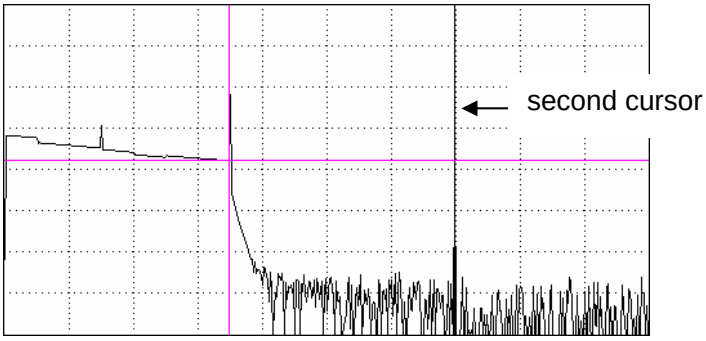
The change will not be registered if [ESC] is pressed instead of [ENTER].

**TIP**

When “NonDISPLAY” is selected




When “DISPLAY” is selected




The second cursor is displayed at a position twice as far as the distance from the zero point as the cursor.

## Changing the Trace Form Setting

Before explaining how to change the setting, an explanation is given below about trace form.

This instrument can acquire data of maximum 60,000 points. However, since the number of dots on the LCD is limited, it is not possible to display all the acquired data at the same time. Therefore, the instrument employs methods to display only the selected data. The following four display methods are available.

- DECIMATION
- MAXIMUM
- MEAN
- ENVELOPE

Before explaining each display method, an explanation is given below about the data display section of the instrument.

The instrument uses 500 dots (horizontal direction) on the LCD to display the acquired data.

So, the data quantity per dot can be calculated as follows.

**Data quantity per dot = Acquired data quantity / 500**

If the data size is 60,000 points, the data quantity assigned per dot will be 120 points.

**Refer** For the method of changing the data size, refer to page 3-28.

The procedure to choose and display data (120 points) assigned for each dot is shown below for each display method.

DECIMATION

The data to be displayed on each dot is the first data of those assigned for each dot.

1st dot: Displays the first data.

2nd dot: Displays the 121st data.

•

•

•

499th dot: Displays the 59761st data.

500th dot: Displays the 59881st data.

MAXIMUM

The data to be displayed on each dot is the maximum reflection level value among the data assigned to each dot.

1st dot: Display the maximum value among the 1st to 120th data.

2nd dot: Display the maximum value among the 121st to 240th data.

- 
- 
- 

499th dot: Display the maximum value among the 59761st to 59880th data.

500th dot: Display the maximum value among the 59881st to 60000th data.

MEAN

The data to be displayed on each dot is the mean value of all the data assigned to each dot.

1st dot: Displays the mean value among the 1st to 120th data.

2nd dot: Displays the mean value among the 121st to 240th data.

- 
- 
- 

499th dot: Displays the mean value among the 59761st to 59880th data.

500th dot: Displays the mean value among the 59881st to 60000th data.

ENVELOPE

The data to be displayed on each dot is the maximum and minimum reflection level values among the data assigned for each dot by turns. The maximum and minimum values are linked by a straight line.

1st dot: Displays the maximum values among the 1st to 120th data.

2nd dot: Displays the minimum values among the 121st to 240th data.

- 
- 
- 

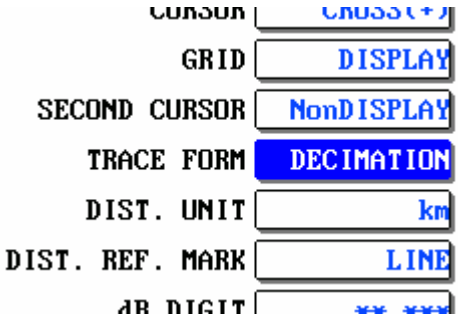
499th dot: Displays the maximum values among the 59761st to 59880th data.

500th dot: Displays the minimum values among the 59881st to 60000th data.

The trace form can be changed as explained below.

♦ Example: “DECIMATION” → “MAXIMUM”

**1. Locate the cursor to “TRACE FORM” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable race forms | *DECIMATION |
| | MEAN |
| | MAXIMUM |
| | ENVELOPE |

*: Indicates the default setting.

**3. Locate the cursor to “MAXIMUM” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the trace form.**

**Caution**

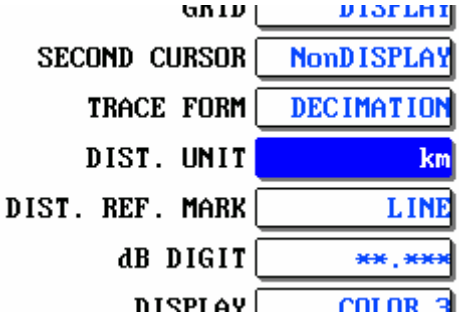
The change will not be registered if [ESC] is pressed instead of [ENTER].

## Changing the Distance Unit

The distance unit can be changed as explained below.

♦ Example: “km” → “mile”

**1. Locate the cursor to “DIST. UNIT” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable distance units | *km |
| | mile |
| | kf |

*: Indicates the default setting.

**3. Locate the cursor to “mile” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the distance unit.**

**Caution**

The change will not be registered if [ESC] is pressed instead of [ENTER].

## Changing the Distance Reference Mark Type

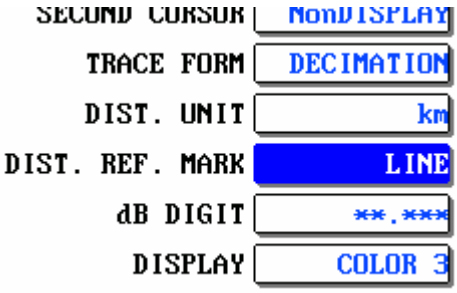
The distance reference mark type can be changed as explained below.

♦ Example: “LINE” → “ARROW”

**Refer**

For the method of changing the distance reference, refer to page 7-27.

**1. Locate the cursor to “DIST. REF. MARK” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable mark types | *LINE |
| | ARROW |

*: Indicates the default setting.

**3. Locate the cursor to “ARROW” by using the rotary knob or [▲] / [▼].**

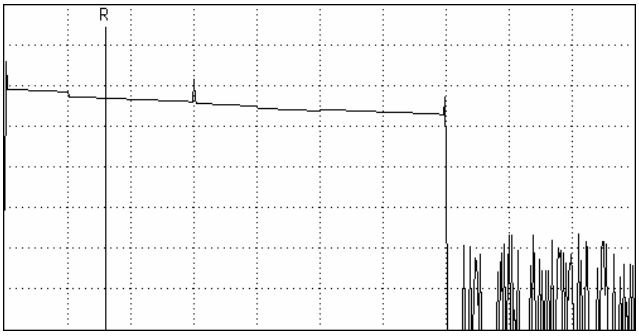
**4. Press [ENTER] to register the change made to the distance reference mark type.**

**Caution**

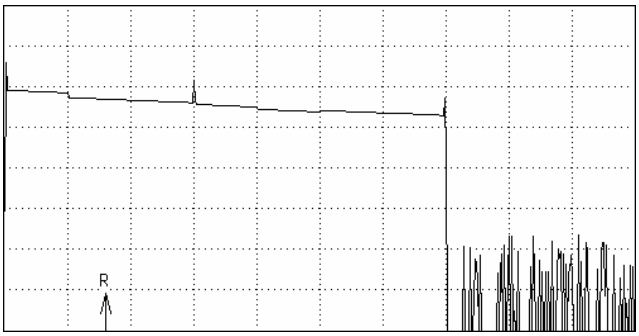
The change will not be registered if [ESC] is pressed instead of [ENTER].

**TIP**

When “LINE” is selected




When “ARROW” is selected

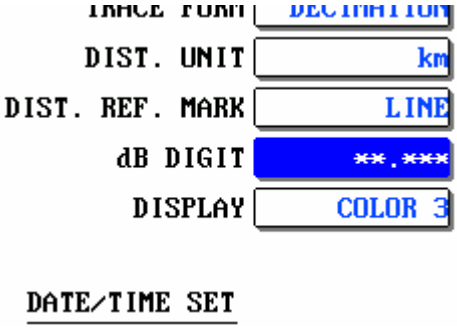


## Changing the Number of dB Display Digits

The number of dB display digits can be changed as explained below.

♦ Example: "**.***" → "**.**"

**1. Locate the cursor to "dB DIGIT" by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable dB digits | **.* | Displays dB with one decimal place. |
| | **.** | Displays dB with two decimal places. |
| | *.*** | Displays dB with three decimal places. |

*: Indicates the default setting.

**3. Locate the cursor to "**.**" by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the number of dB display digits.**

**Caution**

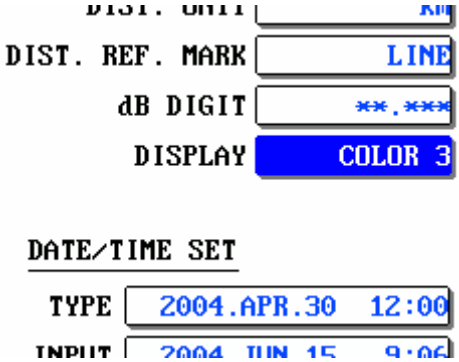
The change will not be registered if [ESC] is pressed instead of [ENTER].

## Changing the Display Color

The display color can be changed as explained below.

♦ Example: “COLOR3” → “B&W”

**1. Locate the cursor to “DISPLAY” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

TIP

| | |
|---|---|
| Selectable display colors | *COLOR1 |
| | COLOR2 |
| | COLOR3 |
| | B&W |

*: Indicates the default setting.

**3. Locate the cursor to “B&W” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the display color.**

Caution

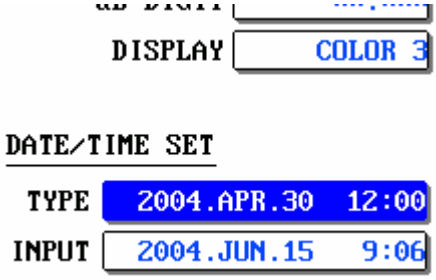
The change will not be registered if [ESC] is pressed instead of [ENTER].

## Changing the Date/Time Display Format

The date/time display format can be changed as explained below.

♦ Example: “2004.APR.30 12:00” → “2004.4.30 12:00”

**1. Locate the cursor to “TYPE” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

TIP

| | | |
|---|---|---|
| Selectable display formats | APR.30.2004 12:00 | Displays the date/time in order of MONTH (alphabet), DAY and YEAR. |
| | 4.30.2004 12:00 | Displays the date/time in order of MONTH (numeric), DAY and YEAR. |
| | 30.APR.2004 12:00 | Displays the date/time in order of DAY, MONTH (alphabet) and YEAR. |
| | 30.4.2004 12:00 | Displays the date/time in order of DAY, MONTH (numeric) and YEAR. |
| | *2004.APR.30 12:00 | Displays the date/time in order of YEAR, MONTH (alphabet) and DAY. |
| | 2004.4.30 12:00 | Displays the date/time in order of YEAR, MONTH (numeric) and DAY. |
| | NonDISPLAY | Hides the date/time. |

*: Indicates the default setting.

The date/time displayed in the selection window is an example only to show how it will look, not the actual date/time.

The date/time can be changed in the [INPUT] field.

**3. Locate the cursor to “2004.4.30 12:00” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the date/time display format.**

**Caution**

The change will not be registered if [ESC] is pressed instead of [ENTER].

**TIP**

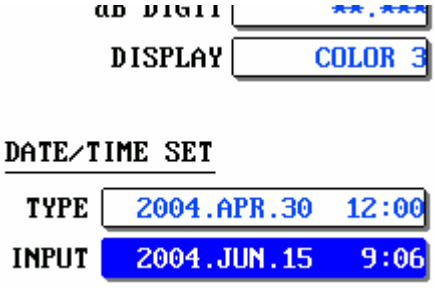
The selected display format will be reflected on the current time (displayed in the upper right corner of the screen), and date/time for the file list.

## Changing the Date/Time

The date/time can be changed as explained below.

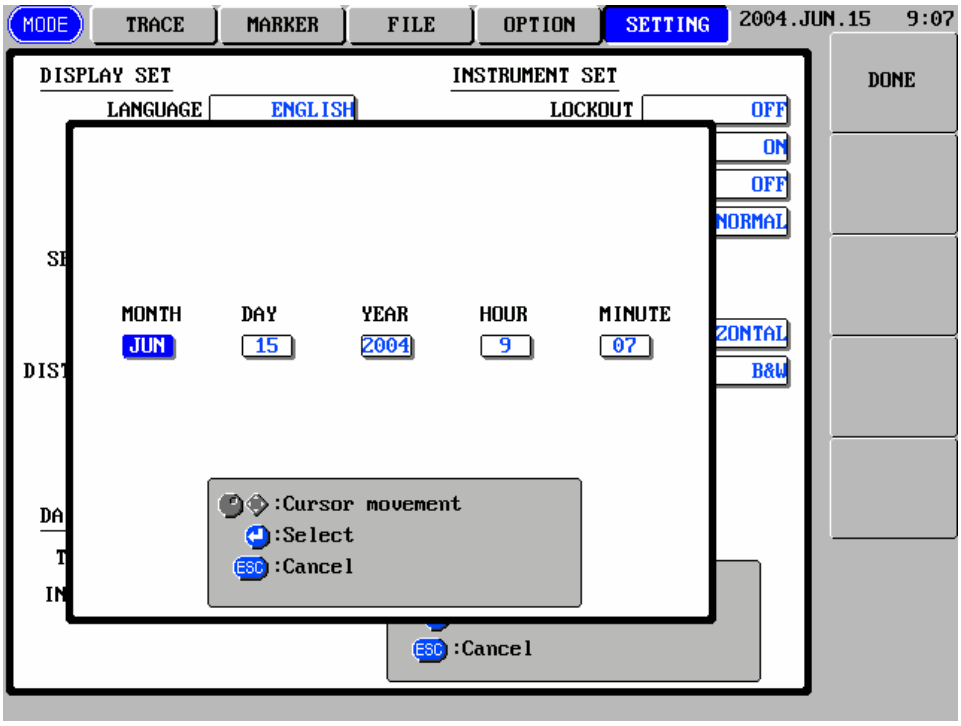
♦ Example: “2004.JUN.15 9:06” → “2005.JUN.15 9:20”

**1. Locate the cursor to “INPUT” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

The following window will appear.



**3. Change the year.**

**3-1. Locate the cursor to “YEAR” by using the rotary knob or [◀] / [▶].**

**3-2. Press [ENTER].**

A selection window will appear.

**3-3. Locate the cursor to “2005” by using the rotary knob or [▲] / [▼].**

**3-4. Press [ENTER] to register the change made to the year.**

**4. Change the minute.**

**4-1. Locate the cursor to “MINUTE” by using the rotary knob or [◀] / [▶].**

**4-2. Press [ENTER].**

A selection window will appear.

**4-3. Locate the cursor to “20” by using the rotary knob or [▲] / [▼].**

**4-4. Press [ENTER] to register the change made to the minute.**

**TIP**

The month, day and hour can be changed in the same way as year and minute.

**5. Press [F1](DONE) to register the change made to the date/time .**

**Caution**

The change will not be registered if [ESC] is pressed instead of [ENTER].

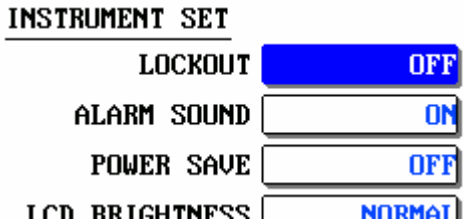
## Changing the Lockout Setting

The lockout function is to prevent the preset measurement conditions and system settings being changed by other operators. If this function is enabled, the measurement conditions and system settings cannot be changed.

The lockout setting can be changed as explained below.

♦ Example: “OFF” → “ON” (setting the lockout code to “7260”)

**1. Locate the cursor to “LOCKOUT” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

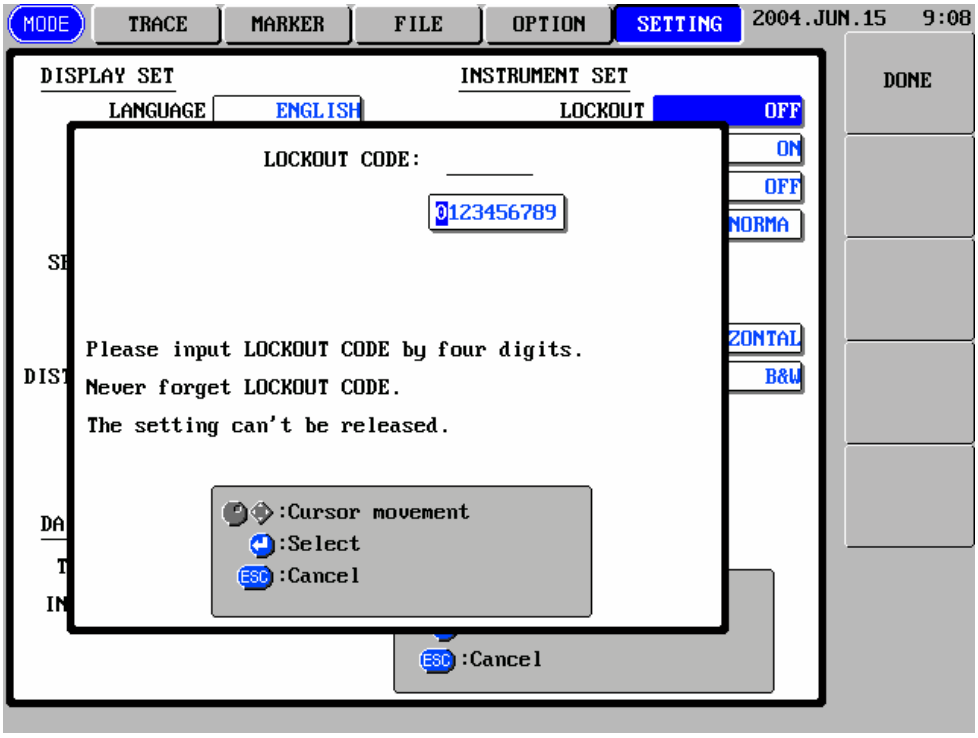
| | | |
|---|---|---|
| Selectable lockout settings | *OFF | Disables the lockout function. |
| | ON | Enables the lockout function. |

*: Indicates the default setting.

**3. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

The following window will appear.




**5. Enter a lockout code (4-digit code) as follows. In this example, "7260" is entered.**

**5-1 Locate the cursor to "7" by using the rotary knob or [◀] / [▶].**

**5-2 Press [ENTER].**

**5-3 Locate the cursor to "2" by using the rotary knob or [◀] / [▶].**

**5-4 Press [ENTER].**

**5-5 Locate the cursor to "6" by using the rotary knob or [◀] / [▶].**

**5-6 Press [ENTER].**

**5-7 Locate the cursor to "0" by using the rotary knob or [◀] / [▶].**

**5-8 Press [ENTER].**

**5-9 Press the [F1](DONE) key.**

Caution

The lockout code must be a 4-digit number.

**6. Enter the same lockout code again.**

Enter it according to steps 5-1 to 5-9.

**Caution**

- The lockout function will be enabled when the same lockout code is entered at both steps 5 and 6.
- Do not forget the lockout code. It will be required when disabling the function.

Disabling the Lockout Function

1. **Perform steps 1 and 2.**
2. **Select “OFF” in the selection window.**
3. **Enter the same lockout code.**
4. **Press the [F1] (DONE) key.**

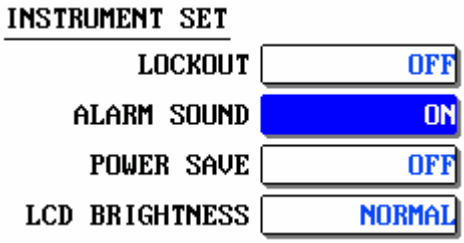
## Changing the Alarm Sound Setting

If this setting is enabled (ON), the buzzer will sound when a warning message is displayed.

The alarm sound setting can be changed as explained below.

♦ Example: “ON” → “OFF”

**1. Locate the cursor to “ALARM SOUND” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable alarm sound settings | OFF | Disables the buzzer. |
| | *ON | Enables the buzzer. |

*: Indicates the default setting.

**3. Locate the cursor to “OFF” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the alarm sound setting.**

**Caution**

The change will not be registered if [ESC] is pressed instead of [ENTER].

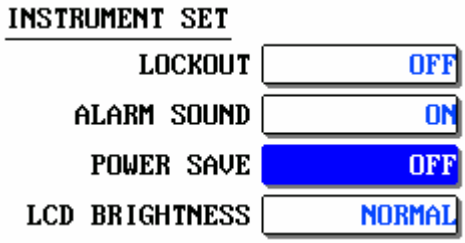
## Changing the Power Save Setting

The power save function is to save power consumption by turning OFF the LCD display's backlight automatically when the instrument is ON but not operated for a certain period of time.

The power save setting can be changed as explained below.

♦ Example: "OFF" → "3min"

**1. Locate the cursor to "POWER SAVE" by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable power save settings | *OFF | Disables the power save function. |
| | 30sec | Enables the power save function if no keys are pressed for 30 seconds. |
| | 1min | Enables the power save function if no keys are pressed for 1 minute. |
| | 3min | Enables the power save function if no keys are pressed for 3 minutes. |
| | 5min | Enables the power save function if no keys are pressed for 5 minutes. |
| | 10min | Enables the power save function if no keys are pressed for 10 minutes. |
| | 20min | Enables the power save function if no keys are pressed for 20 minutes. |

*: Indicates the default setting.

**3. Locate the cursor to “3min” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the power save setting.**

**Caution** The change will not be registered if [ESC] is pressed instead of [ENTER].

**TIP** The screen becomes darker when the power save function is ON.

Disabling the Power Save Function

**1. Press any key.**

## Changing the LCD Brightness

Ease of reading the LCD display varies considerably with its brightness.

The LCD brightness can be changed as explained below.

♦ Example: “NORMAL” → “DARK”

**TIP**

In general, each brightness mode has the following features.

BRIGHT

The screen is easy to see when the surroundings are dark.

However, this mode consumes a lot of power.

When using the instrument by the battery pack only, always pay attention to the remaining power of the battery pack.

DARK

The screen is a little difficult to see, but sufficient even when the surroundings are dark.

When operating the instrument by the battery pack only, it can be operated continuously and longer than “BRIGHT”.

**1. Locate the cursor to “LCD BRIGHTNESS” by using the rotary knob or the arrow key.**

**2. Press [ENTER].**

A selection window will appear.

TIP

| | |
|---|---|
| Selectable LCD brightness levels | BRIGHT |
| | *NORMAL |
| | DARK |

*: Indicates the default setting.

**3. Locate the cursor to “DARK” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the LCD brightness.**

Caution

The change will not be registered if [ESC] is pressed instead of [ENTER].

## Changing the Print Type

The print type can be changed as explained below.

♦ Example: “HORIZONTAL” → “SCREEN”

**1. Locate the cursor to “PRINT TYPE” by using the rotary knob or the arrow key.**


**2. Press [ENTER].**

A selection window will appear.

TIP

| | | |
|---|---|---|
| Selectable print types | *HORIZONTAL | Prints along the print direction.<br>The mode, function, time and guidance will not be printed. |
| | VERTICAL | Prints across the print direction.<br>The mode, function, time and guidance will not be printed. |
| | SCREEN | Prints across the print direction.<br>All the pieces of information displayed in the screen is printed. |

*: Indicates the default setting.

**3. Locate the cursor to “SCREEN” by using the rotary knob or [▲] / [▼].**

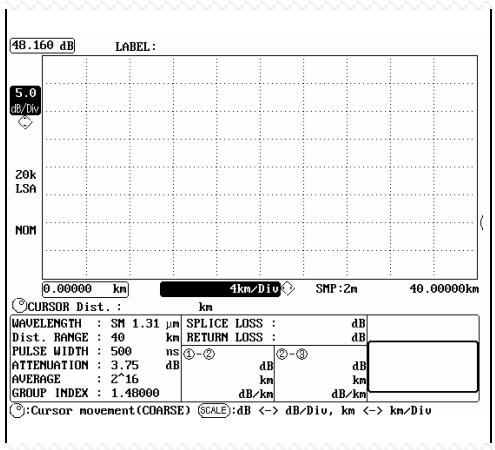
**4. Press [ENTER] to register the change made to the print type.**

Caution

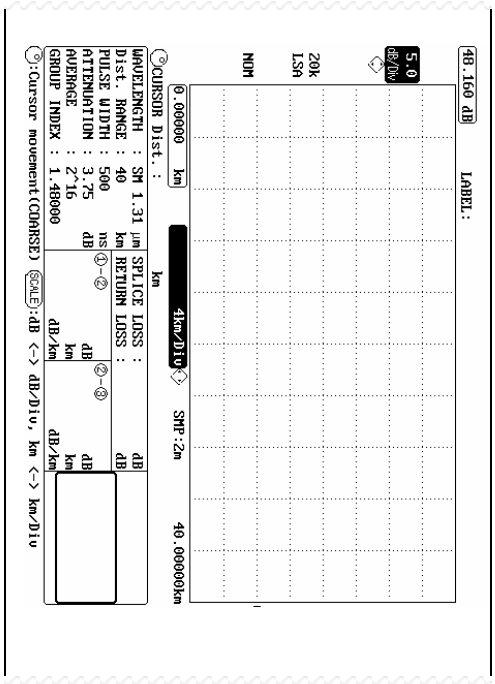
The change will not be registered if [ESC] is pressed instead of [ENTER].

**TIP**

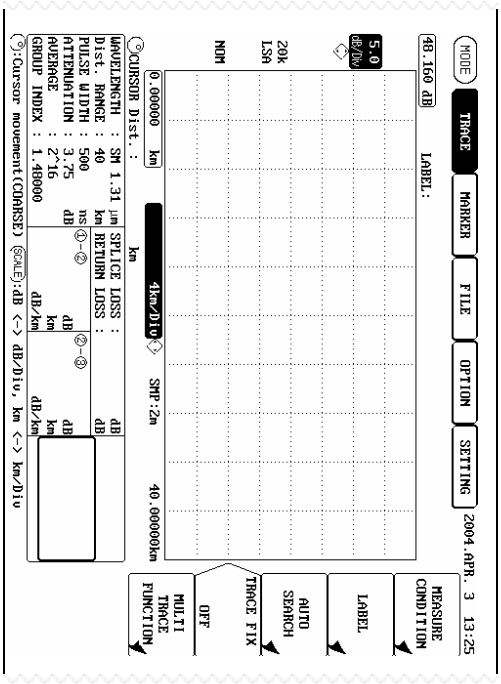
When “HORIZONTAL” is selected




When “VERTICAL” is selected




When “SCREEN” is selected



## Changing the Print Color

The print color can be changed as explained below.

♦ Example: "B&W" → "DISPLAY"

**Caution**

Selection of print color is not possible if an expansion unit has been set in the printer setting. Only black & white print is possible (B&W) if an expansion unit has been set.

**Refer**

For the method for making printer settings, refer to page 8-6, 8-18.

**1. Locate the cursor to "PRINT COLOR" by using the rotary knob or the arrow key.**


**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable Print colors | DISPLAY |
| | B&W |

**3. Locate the cursor to "DISPLAY" by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the print color.**

**Caution**

The change will not be registered if [ESC] is pressed instead of [ENTER].

## Restoring the Default System Settings

This section explains how to restore the default settings for all the system parameters.

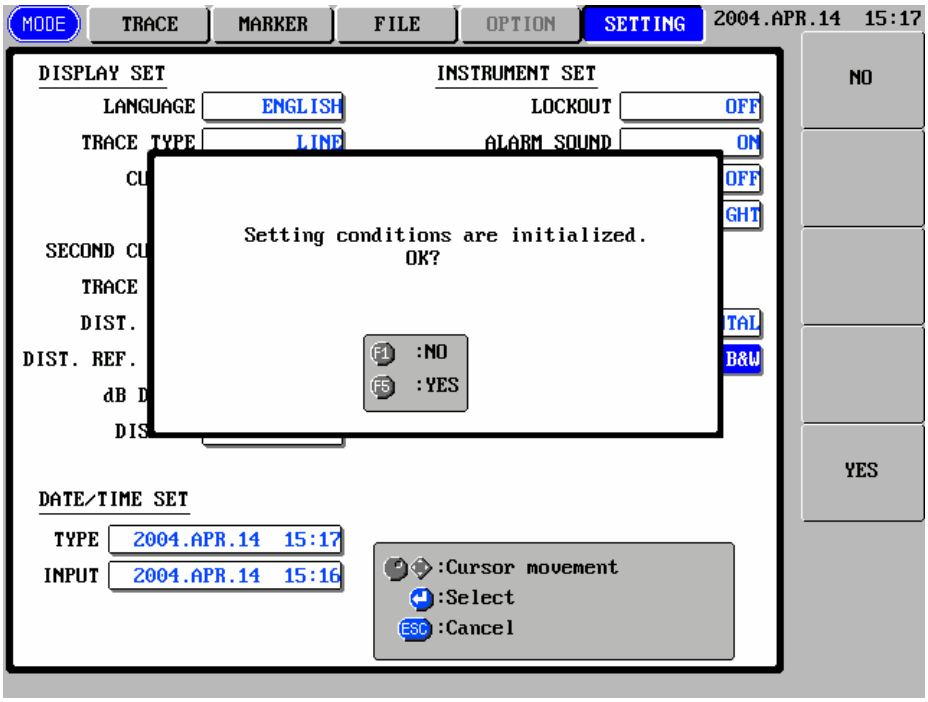
### 1. Display the setting change window.

Refer

For the method of displaying the setting change window, refer to page 2-3.

### 2. Press [F1](INITIALIZE).

The following window will appear.




### 3. Press [F5](YES) to restore the default system settings.

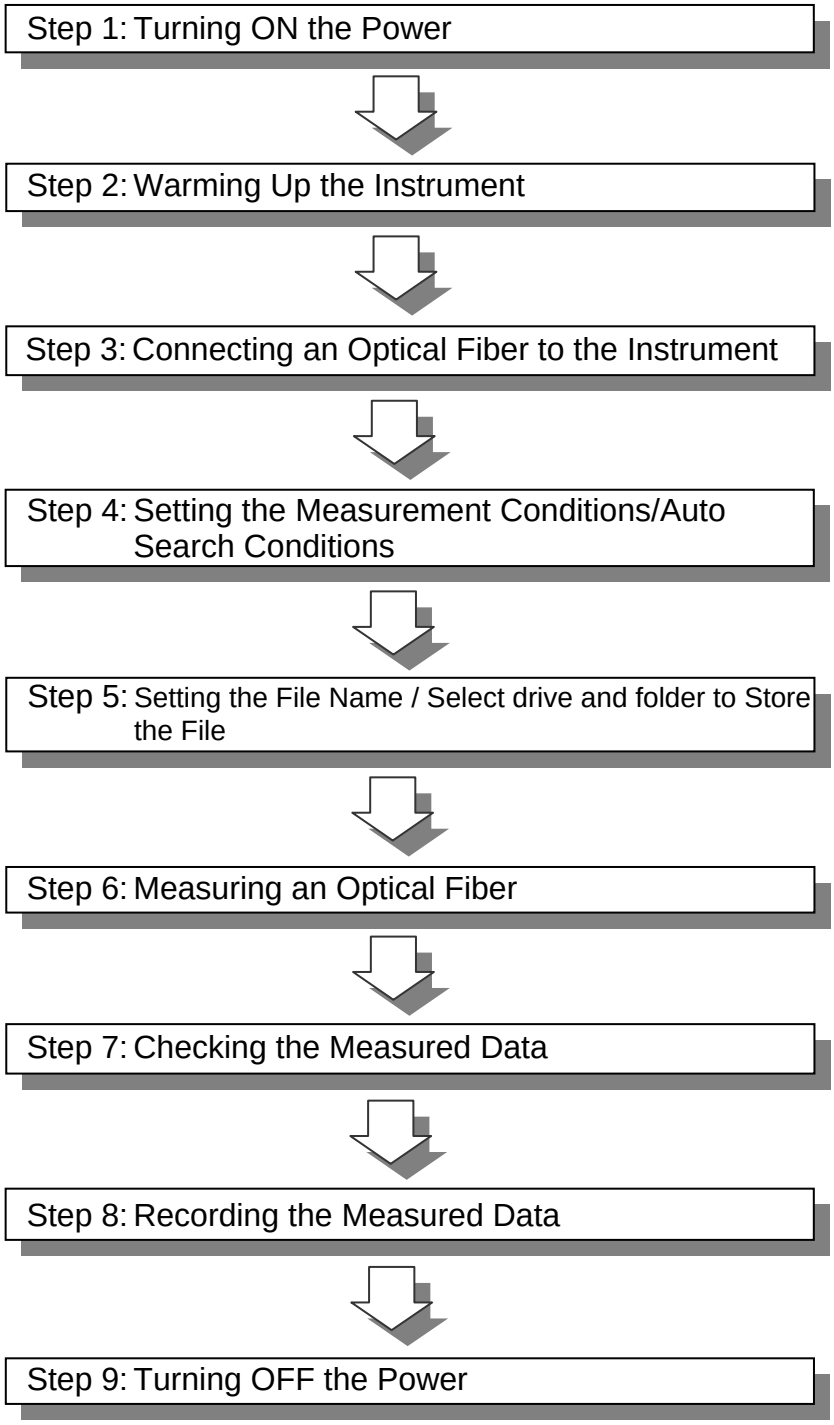
TIP

The display language and date/time will remain unchanged.

# Chapter 3
# PERFORMING MEASUREMENTS

# 3.1 Flow of Measurement Steps

This section explains the flow of optical fiber measurement.




| WARNING | |
|---|---|
| | Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. |

# 3.2 Turning ON the Power [Step 1]

This section explains how to turn ON the power to the instrument.

**Caution**

If the instrument has been stored outside the operating temperature range, do not turn ON the power immediately. A temperature sensor is provided inside the instrument. If the internal temperature is either too high or too low, a warning message will appear, so take required action according to the message. If the required actions are not taken, the power will be turned OFF forcibly to prevent damage to the instrument. A similar message may also appear if the instrument is operated at high or low temperatures.

## When Using AC Power

**Caution**

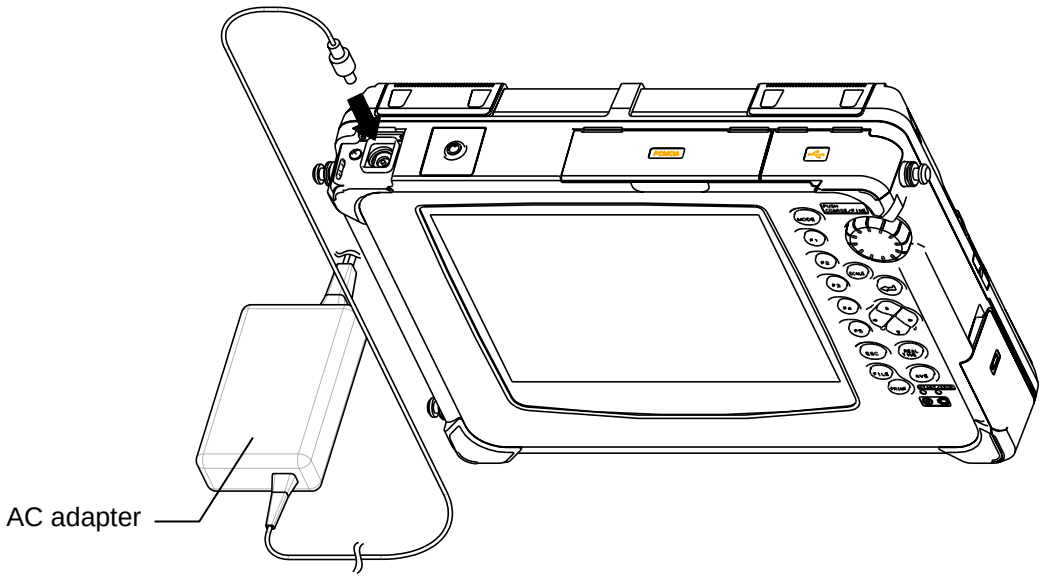
- If you are going to use AC power to operate the instrument, the battery pack must be removed from the instrument.
- Using AC adapter is only indoors (0 to 40 °C). Don't use outdoors.

**Refer**

For the method of removing the battery pack, refer to page 1-19.

1. **Read the "Safety Precautions" given at the beginning of this manual thoroughly to ensure safety.**

2. **Connect the AC adapter to the instrument.**




3. **Insert the AC adapter's power plug into an AC power outlet.**

4. **Press the power switch located on the top of the instrument to turn ON the power.**

**TIP**

The POWER LED will be lit while the power to the instrument is ON.

## When Using the Battery Pack

**Caution**

- To prevent trouble with the battery pack, check its appearance periodically for damage, such as cracks and deformation, and battery fluid leakage.
- If the charged battery pack is stored for a long period of time, the operating time will be shortened due to natural discharge.
- To prevent over discharge, the battery pack must be charged periodically (every other month).
- Charging of the battery pack must be performed at temperatures of 5°C to 35°C. Charging outside this temperature range may not only deteriorate the battery pack's performance or shorten its life, but in the worst case may also prevent charging.
- If you are not going to use the instrument for a long period of time, the battery pack must be removed from the instrument. The battery pack must be stored in an area of low humidity and at a temperature between −20°C and +60°C.

**Refer**

For the method of charging the battery pack, refer to page 1-19.

1. **Read the "Safety Precautions" given at the beginning of this manual thoroughly to ensure safety.**

2. **Press the power switch located on the top of the instrument to turn ON the power.**

**TIP**

- The POWER LED will be lit while the power to the instrument is ON.
- The remaining power in the battery pack can be seen on the power indicator located in the lower right corner of the screen.

# 3.3 Warming Up the Instrument [Step 2]

After the instrument is powered ON (Step 1), warm up the instrument for 30 minutes to stabilize it.

**TIP**

Warm-up operation will enable acquisition of more accurate measurement data.

# 3.4 Connecting an Optical Fiber to the Instrument [Step 3]

This section explains how to connect the optical fiber to be measured to the instrument.

## Cleaning the Optical Connector and Adapter

**1. Check the type of the optical adapter.**

Before cleaning the optical connector and adapter, make sure that the connector of the optical fiber to be measured has the same type as that of the optical adapter. If not, replace the optical adapter with one of the same type.

**Refer** For the method of replacing the optical adapter, refer to page 1-16.

**2. Clean the optical connector and adapter.**

**Refer** For the method of cleaning the optical connector and adapter, refer to pages 1-9 and 1-11.

## Connecting the Optical Fiber

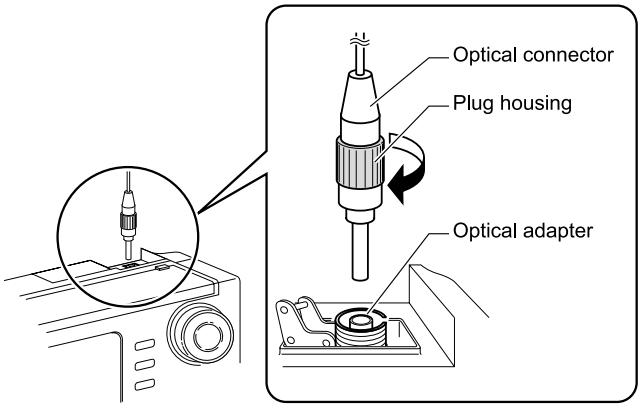
This section explains how to connect an optical fiber by taking an example of connecting a FC connector.

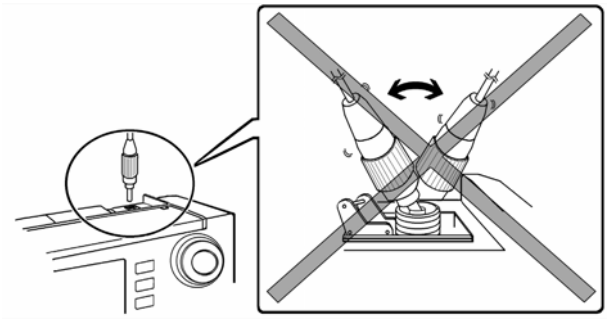
1. **Open the optical connector cover on the top of the instrument.**

2. **Fit the tab of the optical connector into the slot on the optical adapter, and insert the connector into the adapter.**

3. **Turn the plug housing clockwise to secure the connector.**

FC connector




| ⚠ CAUTION | |
|---|---|
| ⃠ | When connecting the optical connector, gently insert it perpendicularly into the optical adapter. Shaking it sideways or inserting it by force may not only damage the optical adapter, but also damage the ferrule on the optical connector.  |

# 3.5 Setting the Measurement Conditions/Auto Search Conditions [Step 4]

Before starting measurement of the optical fiber, it is necessary to set conditions under which the measurement is to be performed. This section explains how to change the following measurement conditions and auto search conditions.

- Wavelength
- Measurement condition auto set
- Distance range
- Pulse width
- Attenuation
- Average condition
- Average time / average interval
- Group index
- Data size
- Average method
- Auto saving
- Event search
- Approximate method
- Back scatter level
- Splice loss threshold
- Return loss threshold
- Fiber end threshold
- Filter
- Plug check
- Average measurement continue

## Displaying the Measurement Condition Change Window

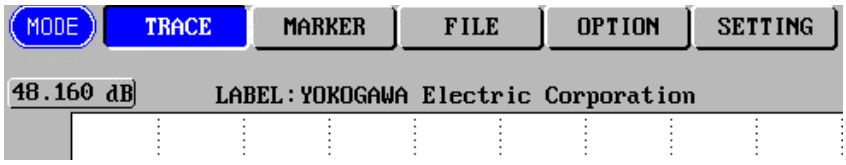
This section explains how to display the window by which the measurement conditions can be changed.

**1. Make sure there is no measurement currently in progress.**

Caution

If measurement is in progress, some items cannot be changed.

**2. Press [MODE] to locate the cursor to “TRACE”.**




**3. Press [F1](MEASURE CONDITION).**

The following conditions can be changed using [F1] to [F4].

- Wavelength
- Distance range
- Pulse width
- Attenuation

Caution

•The distance range, pulse width and attenuation cannot be changed if “AUTO RANGE” has been selected for AUTO SET.

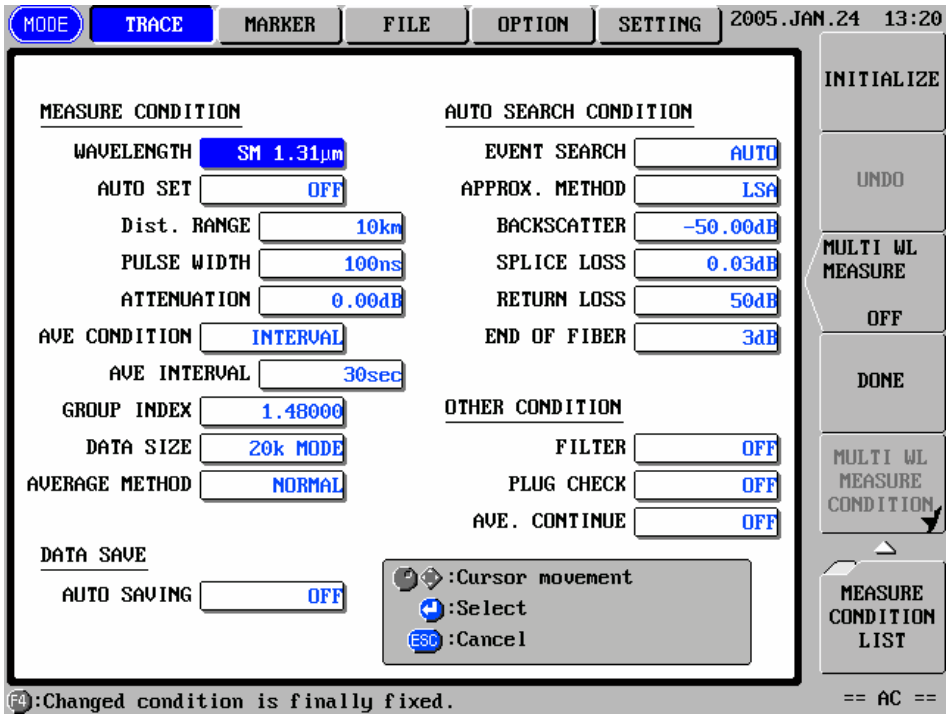
•The attenuation cannot be changed if “AUTO ATTN” has been selected for AUTO SET.

Refer

For details on measurement condition auto setting, refer to page 3-14.

**4. Press [F5](MEASURE CONDITION LIST).**

The following measurement condition change window will appear.



## Changing the Measurement Conditions

TIP

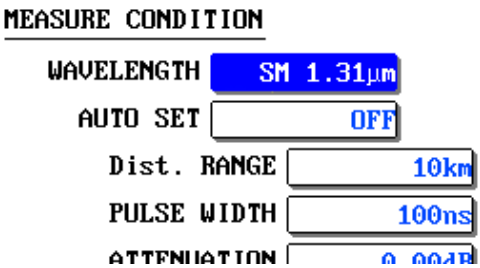
Measurement conditions will be retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the measurement conditions in effect immediately before the instrument was turned OFF previously will be restored. However, this is not true if the optical module has been changed.

### Changing the Wavelength

The wavelength can be changed as explained below.

♦ Example: “SM 1.31µm” → “SM 1.55µm”

**1. Locate the cursor to “WAVELENGTH” by using the rotary knob or the arrow key.**




Caution

When F3 [MULTI WL MEASURE] is selected “ON”, the cursor can not move on wavelength.

**2. Press [ENTER].**

A selection window will appear.

**TIP**

This instrument also allows setting multiple wavelengths and continuously measures an optical fiber cable with the set wavelengths.

The wavelengths that can be set vary with the optical module used.

| Optical module | Selectable wavelengths |
|---|---|
| AQ7261 | *SM 1.31µm, SM 1.55µm |
| AQ7264 | *SM 1.31µm, SM 1.55µm |
| AQ7265 | *SM 1.31µm, SM 1.55µm |

*: Indicates the default setting.

**Refer** For continuous measurement with multiple wavelengths, refer to page 7-52.

**3. Locate the cursor to "SM 1.55µm" by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the wavelength.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer** Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Measurement Condition Auto Setting

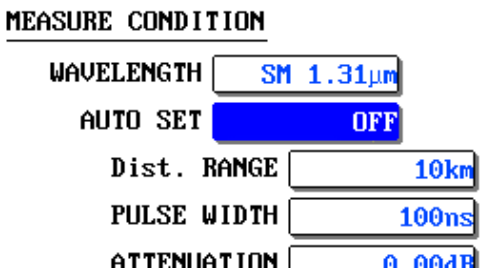
To simplify operation, the instrument provides a function that allows it to check the state of the optical fiber at the start of measurement and set the following measurement conditions automatically.

- Distance range
- Pulse width
- Attenuation

This measurement condition auto setting can be changed as explained below.

♦ Example: “OFF” → “AUTO RANGE”

**1. Locate the cursor to “AUTO SET” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable auto setting | OFF | Performs measurement using the preset distance range, pulse width and attenuation. |
| | *AUTO RANGE | Sets distance range, pulse width and attenuation automatically at the start of measurement. |
| | AUTO ATTN | Sets attenuation automatically at the start of measurement. |

*: Indicates the default setting.

**3.** **Locate the cursor to "AUTO RANGE" by using the rotary knob or [▲] / [▼].**

**4.** **Press [ENTER] to register the change made to the measurement condition auto setting.**

**5.** **Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Distance Range

The distance range can be changed as explained below.

♦ Example: “40km” → “80km”

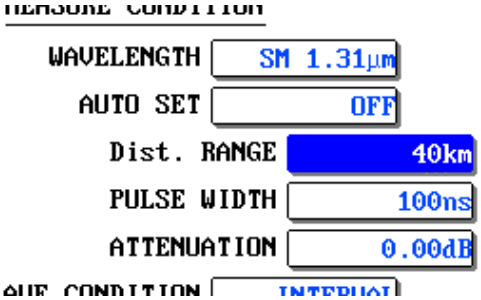
**TIP**

•The distance range cannot be changed if “AUTO RANGE” has been selected for AUTO SET.

•A distance range that is longer than the optical fiber to be measured must be set. Correct measurement will not be possible if a distance range shorter than the optical fiber is set.

•The larger the distance range, the longer the measurement time.

**1. Locate the cursor to “Dist. RANGE” by using the rotary knob or the arrow key.**



**2. Press [ENTER].**

A selection window will appear.

**TIP**

The distance ranges that can be selected vary with the optical module and wavelength used. The table below shows the distance ranges that can be selected in the case of AQ7264 optical module.

| Wavelength | 1.31µm | 1.55µm |
|---|---|---|
| Shorter ↑ | 2km | 2km |
| | 5km | 5km |
| | 10km | 10km |
| | 20km | 20km |
| Selectable | 40km | 40km |
| distance ranges | 80km | 80km |
| | 160km | 160km |
| | 240km | 240km |
| ↓ | 320km | 320km |
| Longer | | 640km |

**3. Locate the cursor to "80km" by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the distance range setting.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

•When a new distance range is set, appropriate pulse width and attenuation will be set automatically.

•When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Pulse Width

The pulse width can be changed as explained below.

♦ Example: “100ns” → “200ns”

**Caution**

The pulse width cannot be changed if “AUTO RANGE” has been selected for AUTO SET.

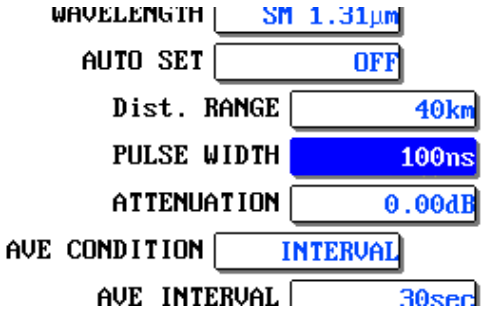
**TIP**

The pulse width has the following features.

•Short pulse width:Enables measurement with high spatial resolution, but not measurement at long distances.

•Long pulse width: Enables measurement at long distances, but not measurement with high spatial resolution.

**1. Locate the cursor to “PULSE WIDTH” by using the rotary knob or the arrow key.**



**2. Press [ENTER].**

A selection window will appear.

**TIP**

The pulse widths that can be selected vary with the optical module, wavelength and distance range selected. The table below shows the pulse widths that can be selected in the case of AQ7264 optical module and wavelength of 1.55µm.

| Distance range | 2km<br>5km | 10km<br>20km | 40km | 80km<br>160km<br>240km<br>320km | 640km |
|---|---|---|---|---|---|
| Shorter ↑ | 10ns | 10ns | 10ns | 10ns | 10ns |
| | 20ns | 20ns | 20ns | 20ns | 20ns |
| | 50ns | 50ns | 50ns | 50ns | 50ns |
| | 100ns | 100ns | 100ns | 100ns | 100ns |
| | 200ns | 200ns | 200ns | 200ns | 200ns |
| Selectable pulse widths | 500ns | 500ns | 500ns | 500ns | 500ns |
| | | 1µs | 1µs | 1µs | 1µs |
| | | | 4µs | 4µs | 4µs |
| | | | 10µs | 10µs | 10µs |
| Longer ↓ | | | | 20µs | 20µs |
| | | | | | 50µs |

**3. Locate the cursor to “200ns” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the pulse width setting.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

- When a new pulse width is set, appropriate attenuation will be set automatically.
- When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Attenuation

If excessive reflection occurs at the optical connector's connection point or optical fiber's break point, the trace may be saturated. To prevent saturation of the trace, attenuation is used.

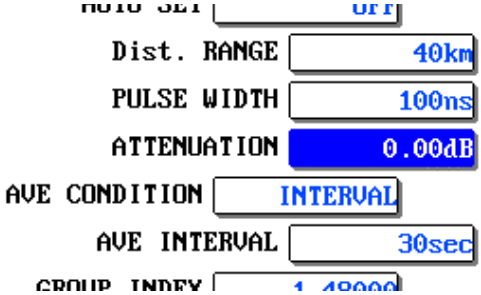
The attenuation setting can be changed as explained below.

♦ Example: "0.00dB" → "10.00dB"

**Caution** The attenuation setting cannot be changed if "AUTO RANGE" or "AUTO ATTN" has been selected for AUTO SET.

**Refer** For details on saturation of trace, refer to "Checking the Return Loss" on page 3-87.

**1. Locate the cursor to "ATTENUATION" by using the rotary knob or the arrow key.**



**2. Press [ENTER].**

A selection window will appear.

**TIP**

•If the trace is saturated, measurement cannot be performed with high sensitivity.

•The attenuations that can be selected vary with the optical module, wavelength and pulse width selected. The table below shows the attenuations that can be selected in the case of AQ7264 optical module and wavelength 1.55µm.

| Pulse width | 10ns<br>20ns<br>50ns | 100ns<br>200ns<br>500ns | 1µs<br>4µs | 10µs<br>20µs<br>50µs |
|---|---|---|---|---|
| Smaller ↑<br>Selectable attenuations<br>↓ Larger | 0.00dB<br>to<br>16.25dB<br>(1.25dB step) | 0.00dB<br>to<br>20.00dB<br>(1.25dB step) | 0.00dB<br>to<br>23.75dB<br>(1.25dB step) | 0.00dB<br>to<br>26.25dB<br>(1.25dB step) |

**3. Locate the cursor to "10.00dB" by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the attenuation setting.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

•When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Average Condition

Average condition means the method of averaging the data obtained by measurement. The following two average methods are available.

- Averaging by times
- Averaging by intervals

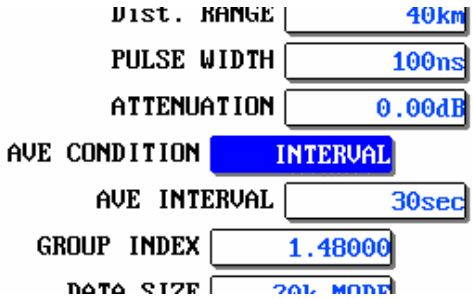
The average condition can be changed as explained below.

♦ Example: “INTERVAL” → “TIMES 2^*”

Refer

For details on average measurement, refer to page 3-56.

**1. Locate the cursor to “AVE CONDITION” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

TIP

| | |
|---|---|
| Selectable average conditions | TIMES 2^* |
| | TIMES *k |
| | *INTERVAL |

*: Indicates the default setting.

**3. Locate the cursor to “TIMES 2^*” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the average condition setting.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

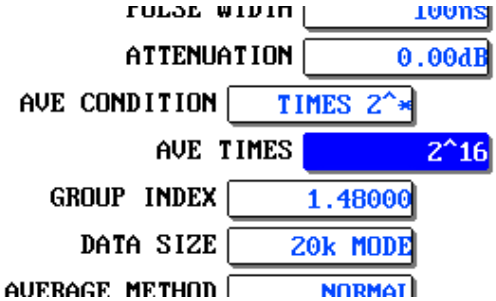
## Changing the Average Time/Average Interval

The average time can be changed as explained below.

♦ Example: “2^16” → “2^13”

**1. Locate the cursor to “AVE TIMES”(*1) by using the rotary knob or the arrow key.**

*1: “AVE TIME” is displayed if “TIMES 2^*” or “TIMES *k” is selected for “AVE CONDITION”, and “AVE INTERVAL” will be displayed if “INTERVAL” is selected for “AVE CONDITION”.




**2. Press [ENTER].**

A selection window will appear.

**TIP**

• The larger the average time/average interval, the higher the accuracy of measurement results. However, measurement time will be prolonged, so an appropriate average time/average interval must be set with the instrument’s dynamic range and loss of optical fiber taken into account.

• The average time/average interval that can be set vary with the selected average condition.

| AVE CONDITION | TIMES 2^* | TIMES *k | INTERVAL |
|---|---|---|---|
| Smaller ↑ | 2^10 | 1k times | 10sec |
| | 2^11 | 2k times | 20sec |
| | 2^12 | 4k times | *30sec |
| Selectable average time / average interval | 2^13 | 8k times | 1min |
| | *2^14 | *16k times | 3min |
| | 2^15 | 32k times | 5min |
| | 2^16 | 65k times | 10min |
| | 2^17 | 131k times | 20min |
| Larger ↓ | 2^18 | 262k times | 30min |

*: Indicates the default setting.

3. **Locate the cursor to “2^13” by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the average time.**

5. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

**Caution**

Influenced by other measurement conditions, the actual averaging time may be shorter than the set period.

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Group Index

The group index can be changed as explained below.

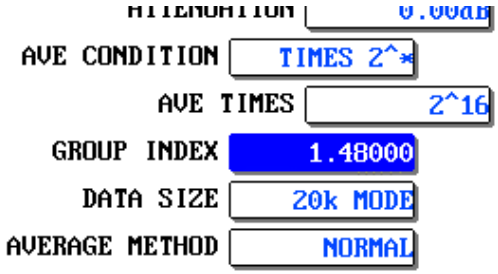
♦ Example: “1.48000” → “1.50000”

**Caution**

•Distance calculation is performed using the group index. So measured distance will not be accurate if the given group index is also not accurate.

•The group index for each wavelength is stored in the memory. So if the wavelength is changed, the group index set for each wavelength will be displayed.

**1. Locate the cursor to “GROUP INDEX” by using the rotary knob or the arrow key.**




**Caution**

When F3 [MULTI WL MEASURE] is selected “ON”, the cursor can not move on group index.

**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable group index range | 1.00000 to 1.99999 (0.00001 step) |

Default setting: 1.48000

3. **Locate the cursor to “4” by using [◀] / [▶].**

4. **Change to “5” by using the rotary knob or [▲].**

5. **Locate the cursor to “8” by using [◀] / [▶].**

6. **Change to “0” by using the rotary knob or [▼].**

7. **Press [ENTER] to register the change made to the group index.**

8. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

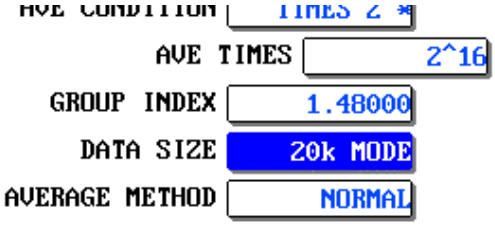
Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Data Size

The data size can be changed as explained below.

♦ Example: “20k MODE” → “5k MODE”

**1. Locate the cursor to “DATA SIZE” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

Data size has the following features.

Large data size: More accurate measured trace, but longer measurement time.

When the measured trace is saved in a file, the file size will be large.

Small data size: Smaller file size and shorter measurement time.

However, some events may not be detected since the sampling interval (i.e. interval at which data is acquired) gets longer.

| | |
|---|---|
| Selectable data size | 5k MODE |
| | *20k MODE |
| | 60k MODE |

*: Indicates the default setting.

**Caution**

The size of actually acquired data may differ from the selected data size due to influences of the other measurement conditions.

**3.** **Locate the cursor to “5k MODE” by using the rotary knob or [▲] / [▼].**

**4.** **Press [ENTER] to register the change made to the data size.**

**5.** **Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Average Method

Before explaining how to change the setting, an explanation is given below regarding average method.

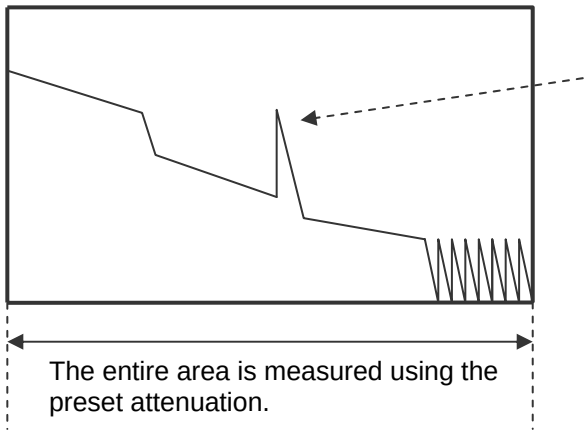
This instrument allows use of the following three average methods.

- Hi-Speed
- Normal
- Hi-Return

Hi-Speed

This method is used to measure the entire area using the preset attenuation.

If excessive reflection occurs when the preset attenuation is not appropriate, that part of the trace may be saturated.




**TIP**

This method is recommended when measuring short optical fiber cables (no reflection in the fiber).

**Refer**

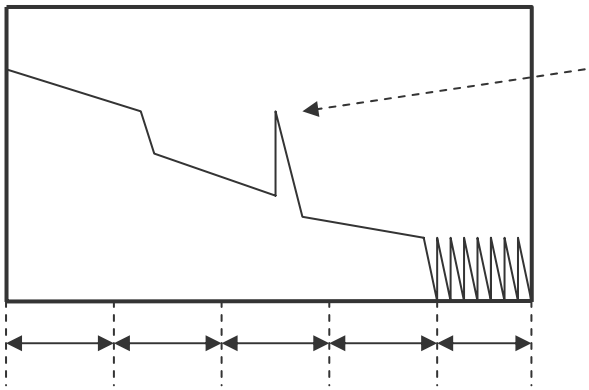
For saturation of trace and the method of setting the attenuation, refer to page 3-87.

Normal

This method is used to obtain a satisfactory trace when measuring a long optical fiber, by dividing the measurement area into blocks and setting an appropriate attenuation for each block.

Division of the measurement area into blocks and setting of an appropriate attenuation for each block are carried out automatically by the instrument. So, measurement time will be longer compared to the total average method.

Furthermore, since the attenuation is set based on the back scatter level at the near end, if excessive reflection occurs in a block the trace for that block may be saturated.




**TIP**

This method is recommended when there is no excessive reflection in the optical fiber to be measured.

**Refer**

For details on saturation of trace, refer to page 3-87.

Hi-Return

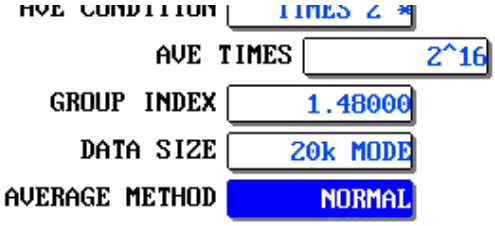
Like the division average method, this method is used to measure each block using the attenuation set for each block. Instead of setting attenuation for each block using the back scatter level at the near end, it is set based on the back scatter level at each block. As a result, measurement time will be longer compared to the division average method.

Division of the measurement area into blocks and setting of an appropriate attenuation for each block are carried out automatically by the instrument.

The average method can be changed as explained below.

♦ Example: “NORMAL” → “Hi-RETURN”

**1. Locate the cursor to “AVERAGE METHOD” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable average methods | Hi-RETURN |
| | *NORMAL |
| | Hi-SPEED |

*: Indicates the default setting.

**3. Locate the cursor to “Hi-RETURN” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the average method.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

# Changing the Measured Data Auto Saving Conditions

## Changing the Measured Data Auto Saving Setting

Measured data auto saving is a function to save the acquired data in a specified storage media after average measurement was done.

This section explains how to change the measured data auto saving setting.

♦ Example: "OFF" → "ON"

**Refer**

•For the method to perform an average measurement, refer to page 3-56.

•For the method to specify storage media, refer to page 3-88.

**1. Locate the cursor to "AUTO SAVING" by using the rotary knob or the arrow key.**


**TIP**

The cursor is already at "AUTO SAVING" when measurement condition change window appears.

**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable auto saving | ON | Measured data is saved after average measurement was done. |
| | *OFF | Measured data is not saved after average measurement was done. |

*: Indicates the default setting.

3. **Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the auto saving.**

5. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

**Caution**

If this function has been set to ON, the acquired data is automatically saved. So make sure to set the saving condition prior to measurement.

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

- For the method to set the saving condition, refer to page 3-88.
- Refer to the notes given on changing the measurement conditions (page 3-50).

# Changing the Auto Search Conditions

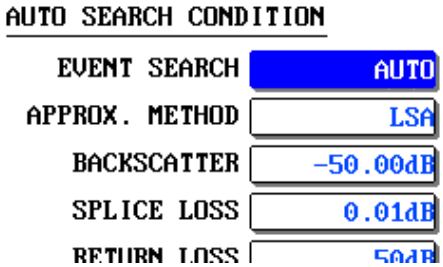
## Changing the Event Search Setting

Event search is a function to automatically search for events in the acquired data after average measurement was done.

The event search setting can be changed as explained below.

♦ Example: “AUTO” → “MANUAL”

**1. Locate the cursor to “EVENT SEARCH” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable event search setting | *AUTO | Searches events automatically at the end of average measurement, and creates a table summarizing event information. |
| | MANUAL | Displays a trace at the end of average measurement, but does not search events. |

*: Indicates the default setting.

**3. Locate the cursor to “MANUAL” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the event search setting.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Approximate Method

Before explaining how to change the setting, an explanation is given below regarding approximate method.

When calculating splice loss or return loss, a straight line is assumed for calculation. This straight line is called the approximate line. The following two methods are available to assume the approximate line.

- Least squares approximate (hereafter called LSA)
- Two point approximate (hereafter called TPA)

LSA

An explanation of LSA is given below.

LSA calculates the loss between two points (①-②) using least squares approximate. Features of LSA are given below.

Advantages

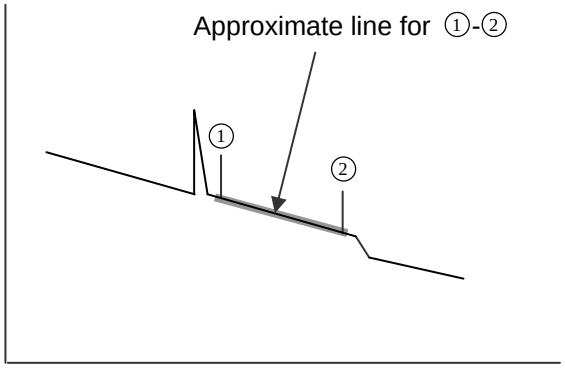
- Loss can be calculated with high accuracy since all the data present between the two points are used.
- Variation of calculated loss caused by operators is reduced and repeatability of calculated loss is improved.

Disadvantages

If excessive reflection or large step is present within the area between the specified two points, calculation of loss will be performed with such reflection and step taken into account, resulting in larger measurement error.

Use LSA when you want to check the loss within a section where no events are present as shown below.

LSA enables calculation of loss with higher accuracy than TPA.




**Refer**

For the method of displaying the approximate line, refer to page 7-3.

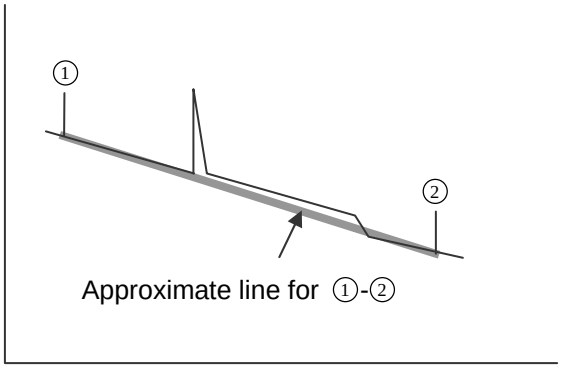
TPA

An explanation of TPA is given below.

TPA calculates the loss based on the level difference between the specified two points.

There is a possibility that variation of calculated loss caused by operators is reduced and repeatability of calculated loss is changed considerably.

Use TPA when you want to check the loss for each event or the loss in the area where events are present as shown below.

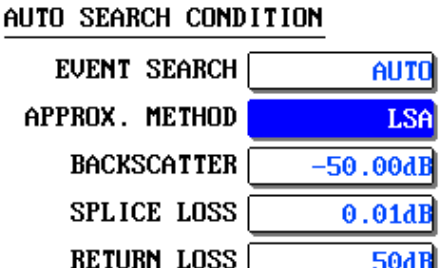



**Refer** For the method of displaying the approximate line, refer to page 7-3.

The approximate method can be changed as explained below.

♦ Example: “LSA” → “TPA”

**1. Locate the cursor to “APPROX. METHOD” by using the rotary knob or the arrow key.**



**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable approximate methods | *LSA |
| | TPA |

*: Indicates the default setting.

**3. Locate the cursor to "TPA" by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the approximate method.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Back Scatter Level

The light traveling through an optical fiber causes phenomena called Rayleigh scattering. Among these scattering rays, those which travel in the opposite direction of incident rays are called back scattering rays.

The backscatter level set here will be used as a constant to calculate the return loss for each event and the total return loss.

The backscatter level can be changed as explained below.

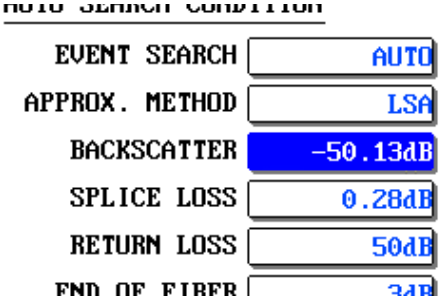
♦ Example: "–50.13dB" → "–52.00dB"

**Caution**

•The calculated return loss for each event and the total return loss will not be accurate unless the back scatter level set here is accurate.

•The back scatter level set for each wavelength is stored in the memory. So if the wavelength is changed, the backscatter level set for each wavelength will be displayed.

**1. Locate the cursor to "BACKSCATTER" by using the rotary knob or the arrow key.**




**Caution**

When F3 [MULTI WL MEASURE] is selected "ON", the cursor can not move on backscatter.

**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable back scatter level | –10.00dB to –64.99dB (0.01dB step) |

Default setting

Wavelength 1.31µm: –50.00dB

Wavelength 1.55µm: –52.00dB

**3. Locate the cursor to "0" by using [◀] / [▶].**

**4. Change to "2" by using the rotary knob or [▲].**

**5. Locate the cursor to "1" by using [◀] / [▶].**

**6. Change to "0" by using the rotary knob or [▼].**

**7. Locate the cursor to "3" by using [◀] / [▶].**

**8. Change to "0" by using the rotary knob or [▼].**

**9. Press [ENTER] to register the change made to the backscatter level.**

**10. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer** Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Splice Loss Threshold

When auto search is executed, splice losses exceeding the threshold set here will be detected as events.

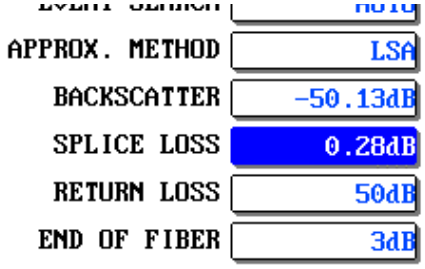
The splice loss threshold can be changed as explained below.

♦ Example: “0.28dB” → “0.35dB”

**Refer**

For details on splice loss, refer to page 1-41.

**1. Locate the cursor to “SPLICE LOSS” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable splice loss threshold | 0.01dB to 9.99dB (0.01dB step) |

Default setting: 0.03dB

**3. Locate the cursor to “2” by using [◀] / [▶].**

**4. Change to “3” by using the rotary knob or [▲].**

**5.** **Locate the cursor to “8” by using [◀] / [▶].**

**6.** **Change to “5” by using the rotary knob or [▼].**

**7.** **Press [ENTER] to register the change made to the splice loss threshold.**

**8.** **Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Return Loss Threshold

When auto search is executed, return losses exceeding the threshold set here will be detected as events.

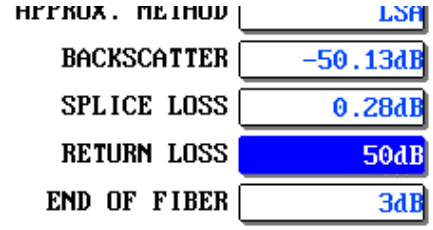
The return loss threshold can be changed as explained below.

♦ Example: “50dB” → “38dB”

**Refer**

For details on return loss, refer to page 1-41.

**1. Locate the cursor to “RETURN LOSS” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable return loss threshold | 20 to 70 (1dB step) |

Default setting: 50dB

**3. Locate the cursor to “5” by using [◀] / [▶].**

**4. Change to “3” by using the rotary knob or [▼].**

**5. Locate the cursor to “0” by using [◀] / [▶].**

**6. Change to “8” by using the rotary knob or [▲].**

**7. Press [ENTER] to register the change made to the return loss threshold.**

**8. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Fiber End Threshold

When auto search is executed, events exceeding the threshold set here will be detected as the fiber end.

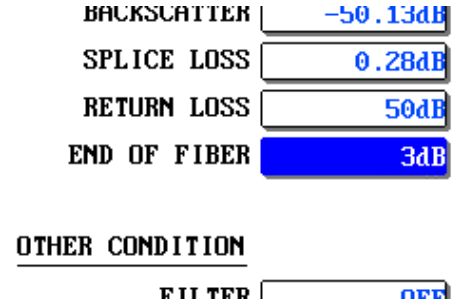
The fiber end threshold can be changed as explained below.

♦ Example: “3dB” → “10dB”

**Refer**

For details on the fiber end, refer to page 1-40.

**1. Locate the cursor to “END OF FIBER” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable fiber end threshold | *3dB |
| | 4dB |
| | 5dB |
| | 6dB |
| | 7dB |
| | 8dB |
| | 9dB |
| | 10dB |

*: Indicates the default setting.

**3. Locate the cursor to “10dB” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the fiber end threshold.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Filter Setting

**Refer**

For the method of changing the filter setting, refer to page 3-59.

## Changing the Plug Check Setting

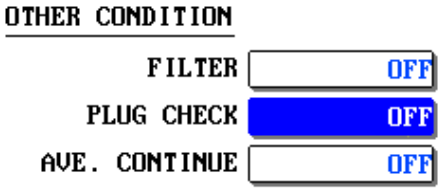
The plug check function checks the connection condition between the instrument and optical fiber to be measured.

When this function is enabled (ON), emission of laser from the instrument will be prevented if the optical fiber is not connected or it is connected but not properly.

The plug check setting can be changed as explained below.

♦ Example: “OFF” → “ON”

**1. Locate the cursor to “PLUG CHECK” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable plug check setting | *OFF | Disables the plug check function. |
| | ON | Enables the plug check function. |

*: Indicates the default setting.

**3. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the plug check function setting.**

**5. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F4].

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing the Average Continue Setting

**Refer**

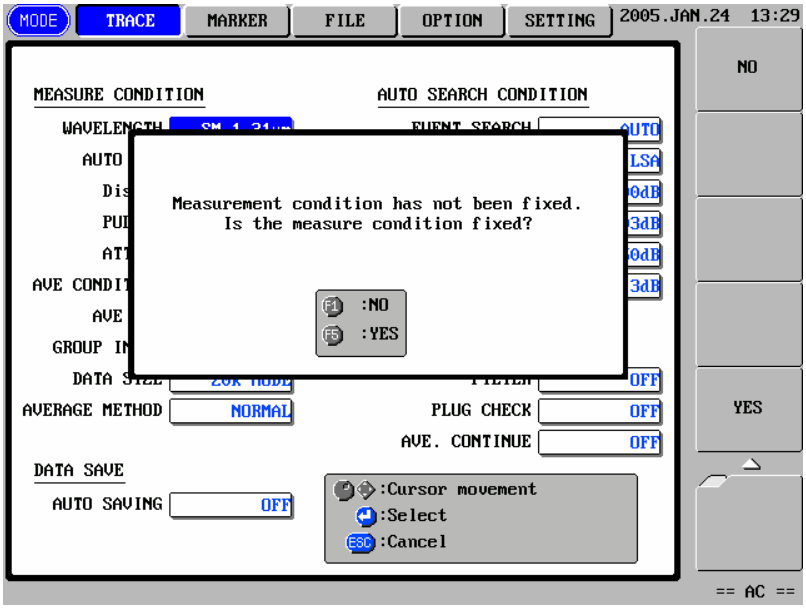
For average measurement continue and the method of changing the average continue setting, refer to page 3-62.

## Notes on Changing of Measurement Conditions / Auto Search Conditions

**Caution**

If you try to close the measurement condition / auto search condition change window without pressing [F4] (DONE)(*1), the following message will appear.

*1: Press [MODE] or [ESC].



**TIP**

To restore the previous condition setting, press [F2] (UNDO).

Undo can be performed up to five times.

Assuming that the wavelength, distance range and pulse width are changed in this order as follows.

Wavelength :1.31µm → 1.55µm

⇩

Distance range:40km → 80km

⇩

Pulse width :20µs → 10µs

After the measurement conditions are changed as above, press [F2] (UNDO).

Press [F2] (UNDO): The pulse width will return to 20µs.

⇩

Press [F2] (UNDO): The distance range will return to 40km.

⇩

Press [F2] (UNDO): The wavelength will return to 1.31µm.

## Restoring the Default Measurement Conditions / Auto Search Conditions

This section explains how to restore the default measurement conditions / auto search conditions.

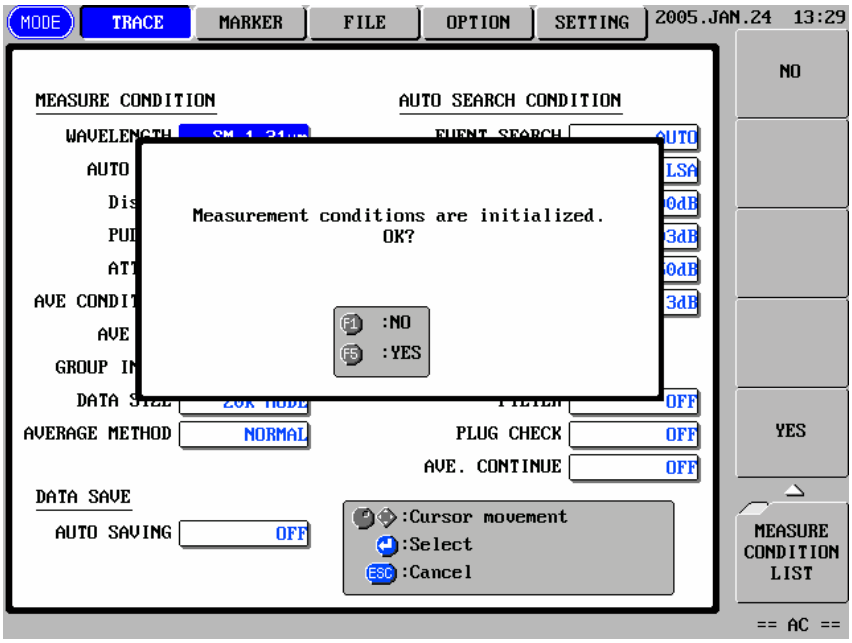
### 1. Display the measurement condition setting window.

**Refer**

For the method of displaying the measurement condition setting window, refer to page 3-10.

### 2. Press [F1] (INITIALIZE).

The following window will appear.




### 3. Press [F5] (YES) to restore the default measurement conditions / auto search conditions.

# 3.6 Setting the File Name/Location to Store the File [Step 5]

If the measured data auto saving function of the measurement condition has been enabled, the acquired data is automatically saved when an average measurement is completed. So it is necessary to set the file name and to select drive and folder to store the data, prior to measurement.

**Refer**

- For the method to enable the measured data auto saving function, refer to page 3-33.
- For the method to set the file name, refer to page 3-96, page 3-103.
- For the method to set the location to store the data, refer to page 3-91.

# 3.7 Measuring an Optical Fiber [Step 6]

This section explains how to measure the optical fiber connected to the instrument and display the measured data. This instrument allows use of the following two measurement methods.

- Real time measurement
- Average measurement


Use of devices, such as cellular phones, that generate a strong magnetic field near the instrument during measurement may affect measured data. So, such devices should not be used during measurement.

## Performing Real Time Measurement

Real time measurement uses the default average time set to the instrument to perform measurement and display the measured data. The average time set by the user will be disabled.

Since measurement conditions can be changed during real time measurement, changes in the trace occurring as a result of changes in the measurement conditions can be observed in real time.

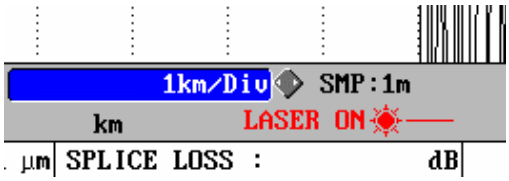
### 1. Press [REALTIME].

Real time measurement will start.

| WARNING | |
|---|---|
| | Do not disconnect the optical fiber from the instrument during measurement.<br>Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight. |

**TIP**

•A message “LASER ON” is displayed during measurement.




•To stop real time measurement, press [REALTIME] again.

•Information such as comment and operator’s name can be added to the trace during measurement.

**Refer**

For the method of entering information, refer to Chapter 4.

## Performing Average Measurement

Average measurement obtains data for each pulse, calculates the mean of the data obtained for all the pulses, and then displays it.

This method improves the signal to noise ratio (S/N), and is effective when you want to detect weak signals overwhelmed by noise.

If “NORMAL” or “Hi-RETURN” has been set for “AVERAGE METHOD”, the attenuation that has been set will be disabled since the instrument sets an appropriate attenuation automatically and performs measurement.

**Refer** For details on average method, refer to page 3-30.

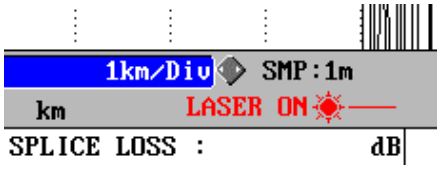
### 1. Press [AVE].

Average measurement will start.

| WARNING | |
|---|---|
|  | Do not disconnect the optical fiber from the instrument during measurement.<br>Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight. |

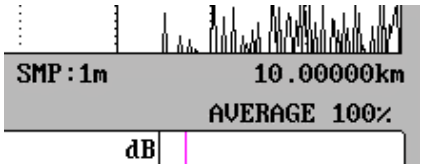
TIP

•A message “LASER ON” is displayed during measurement.

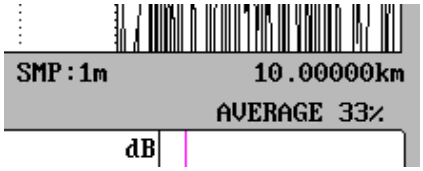



•The following bar showing progress will appear during measurement.


•Average measurement will end automatically, and “100%” will be displayed when it is completed successfully.




•If [AVE] is pressed during measurement, measurement will stop and the progress of averaging performed so far will be displayed.




•Time required up to the end of measurement varies with measurement conditions (distance range, average time).

•Information such as label and operator’s name can be added to the trace during measurement.

•If the event search function has been set to AUTO, an event search is performed when a measurement is successfully completed.

•If the measured data auto saving function has been set to ON, the measured data is saved in a selected storage media when a measurement is successfully completed.

**Refer**

- For the method of entering information, refer to Chapter 4.
- For the method to enable the event search function, refer to page 3-35.
- For the method to enable the automatic saving function, refer to page 3-33.
- For the method to select a storage media, refer to page 3-91.

## When the Trace Contains a Lot of Noise

If the trace obtained by average measurement contains so much noise that the trace cannot be observed clearly, remove noise as explained below.

- Use the filter function to eliminate noise.
- Use the average measurement continue function to eliminate noise.
- Increase the average time/interval and perform average measurement again.
- Increase the pulse width and perform average measurement again.
- Switch the average method to “DIVISION” and perform measurement again.

### Using the Filter Function

The filter function setting can be changed as explained below.

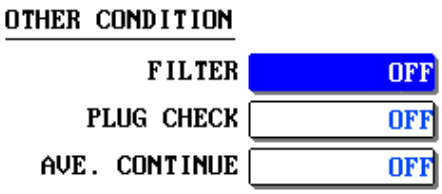
♦ Example: “OFF” → “ON”

**1. Display the measurement condition/auto search condition change window.**

**Refer**

For the method of displaying the window, refer to page 3-10.

**2. Locate the cursor to “FILTER” by using the rotary knob or the arrow key.**



**3. Press [ENTER].**

A selection window will appear.

**TIP**

- The filter function can be used for measured traces or recalled traces.
- The filter has the following features.

The signal to noise ratio (S/N) is improved by processing the trace digitally. However, this makes edges of the trace round, and therefore difficult to identify Fresnel reflection occurring in adjacent areas.

| | | |
|---|---|---|
| Selectable filter setting | *OFF | Disables the filter function. |
| | ON | Enables the filter function. |

*: Indicates the default setting.

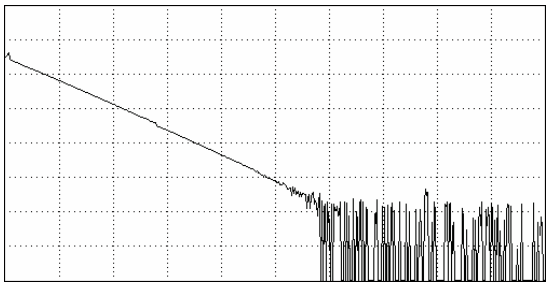
**4. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**5. Press [ENTER] to register the change made to the filter setting.**

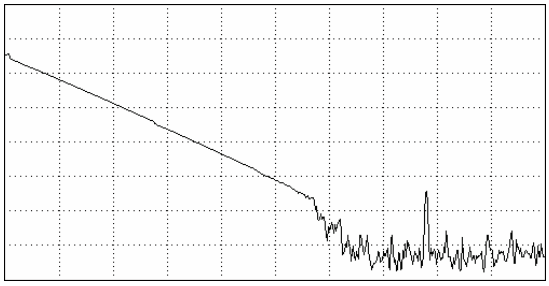
**6. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**TIP**

When “OFF” is selected



When “ON” is selected



**Caution**

The filter setting will be retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the measurement conditions in effect immediately before the instrument was turned OFF previously will be restored.

**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Using the Average Measurement Continue Function

The average measurement continue function allows you to perform average measurement on the obtained trace additionally.

For instance, if the data obtained by average measurement (2^16) contains a lot of noise, enabling this function and starting average measurement will continue to perform average measurement on that data up to 2^18 times. This results in shorter measurement time, compared to that when increasing the average time and performing average measurement from the beginning again.

The average measurement continue setting can be changed as explained below.

♦ Example: “OFF” → “ON”

**Caution**

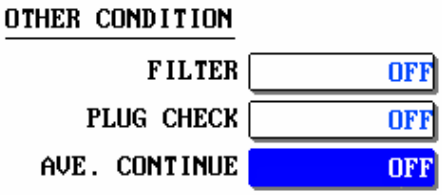
- This function cannot be used for data obtained by “2^18”, “262k” or “30min”.
- This function cannot be changed if “AUTO RANGE” or “AUTO ATTENUATION” has been selected for AUTO SET. And multi wavelength is set.

**1. Display the measurement condition/auto search condition change window.**

**Refer**

For the method of displaying the window, refer to page 3-10.

**2. Locate the cursor to “AVE. CONTINUE” by using the rotary knob or the arrow key.**




**3. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable average measurement continue setting | *OFF | Disables the average measurement continue function. |
| | ON | Enables the average measurement continue function. |

*: Indicates the default setting.

4. **Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

5. **Press [ENTER] to register the change made to the average measurement continue setting.**

6. **Press [F4] (DONE) to register the changes made to the measurement conditions.**

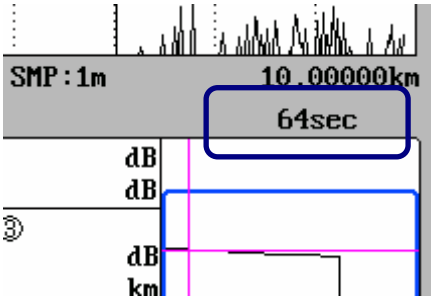
7. **Press [AVE] to start measurement.**

**Caution**

The average measurement continue setting will be retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the measurement conditions in effect immediately before the instrument was turned OFF previously will be restored.

**TIP**

Averaging time or averaging interval is displayed, when measurement start.




**Refer**

Refer to the notes given on changing the measurement conditions (page 3-50).

## Changing measurement conditions and average measurement again

**Refer**

•For the method of changing the measurement conditions, refer to page 3-12.

•For the method of performing average measurement, refer to page 3-56.

# 3.8 Checking the Measured Data [Step 7]

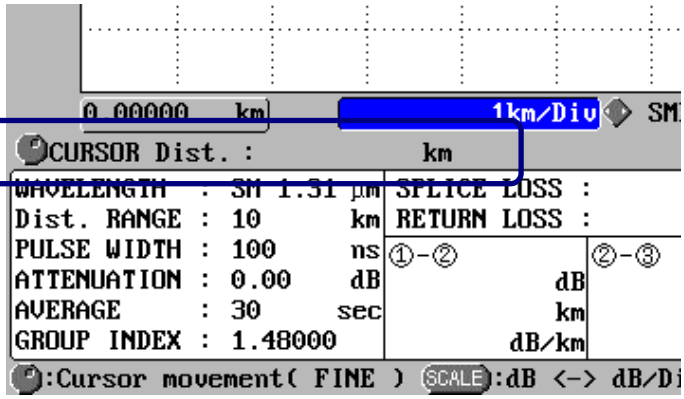
This section explains how to display and check the details of measured data.

## Basic Operations

### Moving the Cursor

The cursor can be moved as explained below.

**1. Make sure the CURSOR Dist. field is displayed in the window.**

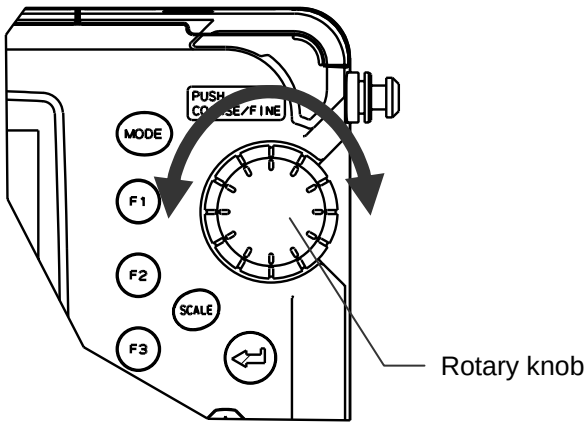



**2. Turn the rotary knob.**

The cursor will move.

Clockwise: The cursor moves to the right.

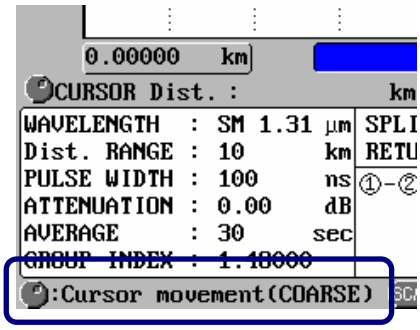
Counter-clockwise: The cursor moves to the left.

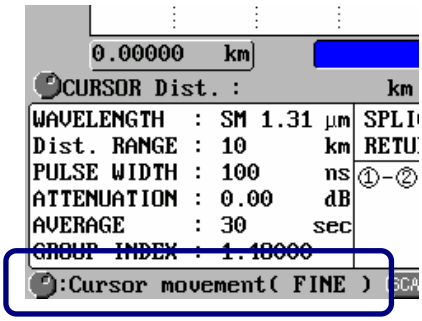


TIP

•The cursor can move between the measurement start and end points. However, at the measurement start point, the cursor will not move any more even if the rotary knob is rotated counter-clockwise. Similarly, it will not move even if the rotary knob is rotated clockwise at the measurement end point.

Holding down the rotary knob will allow you to change the cursor speed.



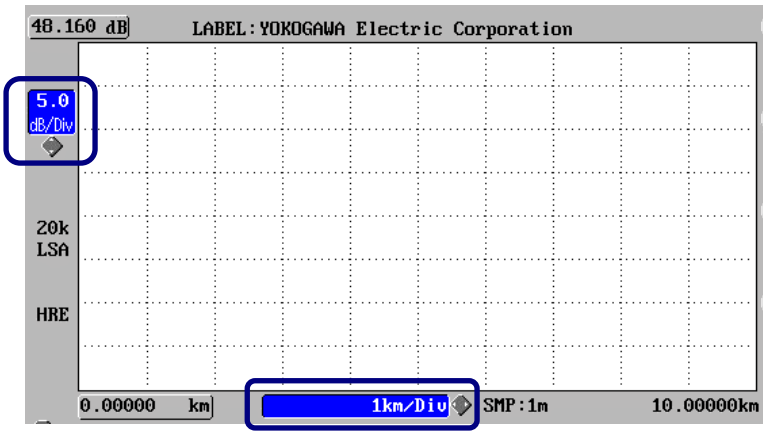

•If a trace is currently displayed, the cursor will move along it.

## Enlarging/Reducing the Trace in Size

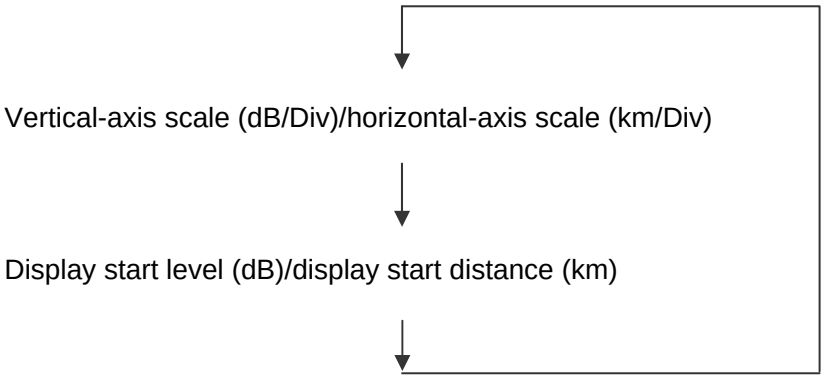
The currently displayed trace can be enlarged or reduced in size as explained below.

**1. Locate the cursor to that part of the trace you want to enlarge or reduce by turning the rotary knob.**

**2. Press [SCALE] to highlight the vertical-axis scale (dB/Div)/horizontal-axis scale (km/Div).**




The following items will be highlighted alternately each time [SCALE] is pressed.




**3. Use the arrow keys to enlarge/reduce the trace.**

Press [▲]: Reduces the trace along the vertical-axis (dB/Div).

Press [▼]: Enlarges the trace along the vertical-axis (dB/Div).

Press [◀]: Enlarges the trace along the horizontal-axis (km/Div).

Press [▶]: Reduces the trace along the horizontal-axis (km/Div).

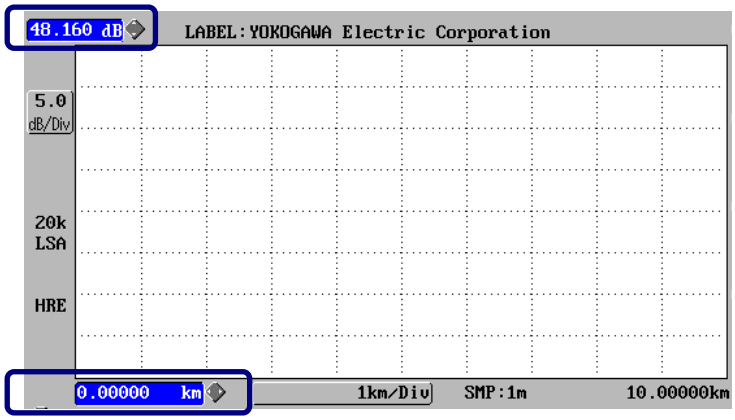
**TIP**

The trace will be enlarged/reduced around the cursor position.

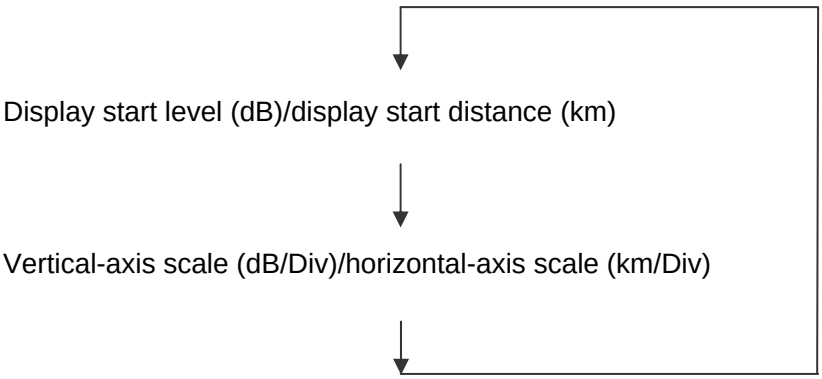
## Shifting the Trace

The currently displayed trace can be shifted as explained below.

**1. Press [SCALE] to highlight the display start level (dB)/display start distance (km).**




The following items will be highlighted alternately each time [SCALE] is pressed.




**2. Use the arrow keys to shift the trace.**

Press [▲]: Shifts the trace downward.

Press [▼]: Shifts the trace upward.

Press [◀]: Shifts the trace to the left.

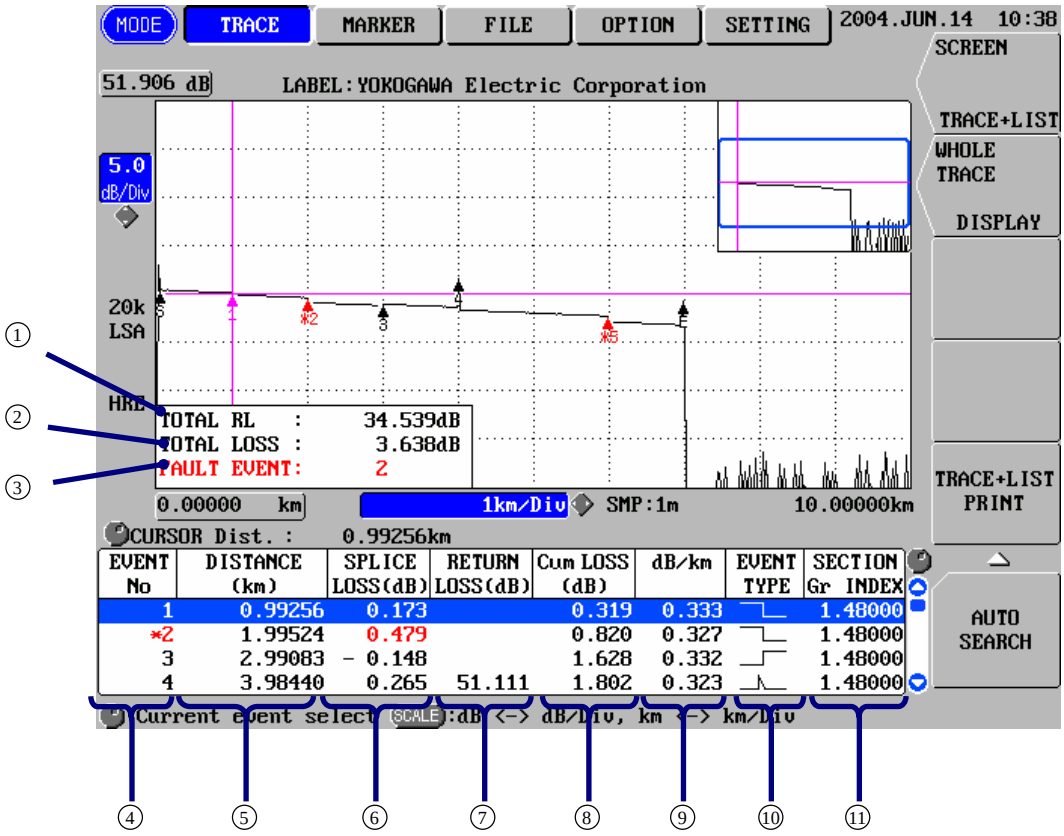
Press [▶]: Shifts the trace to the right.

**Caution** This trace shift function is effective only if the trace is currently enlarged.

**TIP** The trace is shifted by turned rotary knob to same direction continuously after cursor is moved to the left end or the right end when the trace is enlarge.

## When “AUTO” is Selected for “EVENT SEARCH”

When average measurement is completed successfully with “AUTO” currently selected for “EVENT SEARCH”, events will be searched and displayed as shown below.




**TIP**

In the example of the above window, both trace and event list are displayed.

It is possible to display an event list only or a trace only.

**Refer**

For the method of displaying an event list only or a trace only, refer to pages 3-106 and 5-3.

| No. | Name | Description |
|---|---|---|
| ① | TOTAL RL | TOTAL RL Displays the return loss occurring between S and E points.<br>If R point has been set, the return loss occurring between R and E points will be displayed. |
| ② | TOTAL LOSS | Displays the total loss occurring between S and E points.<br>If R point has been set, the total loss occurring between R and E points will be displayed. |
| ③ | FAULT EVENT | Displays the number of events (fault events) whose splice loss or return loss exceeds the preset threshold. |
| ④ | EVENT No. | Displays event Nos. in ascending order, starting from the one nearest to the left edge of the fiber cable.<br>"*" is displayed in front of fault event Nos. |
| ⑤ | DISTANCE (km) | Displays the distance from the origin to the event. |
| ⑥ | SPLICE LOSS(dB) | Displays the splice loss for the event.<br>It will be displayed in red if it exceeds the threshold |
| ⑦ | RETURN LOSS(dB) | Displays the return loss for the event. It will be displayed in red if it exceeds the threshold. |
| ⑧ | Cum LOSS(dB) | Displays the loss accumulated, starting from the first event up to the one you are currently referring to. |
| ⑨ | dB/km | Displays the loss (per km) between events. |
| ⑩ | EVENT TYPE |  : Indicates that the event is a negative loss.<br>  : Indicates that the event is a positive loss.<br>  : Indicates that the event is reflection. |
| ⑪ | SECTION Gr INDEX | Displays the group index between events. |

**Refer**

For the method of setting the threshold for fault events, refer to page 5-36 and 5-37.

## Changing the Current Event

The current event is the event you are currently referring to.

**1. The current event can be changed by turning the rotary knob.**

**TIP**

Event 1 will be set as the current event just after auto search is completed.

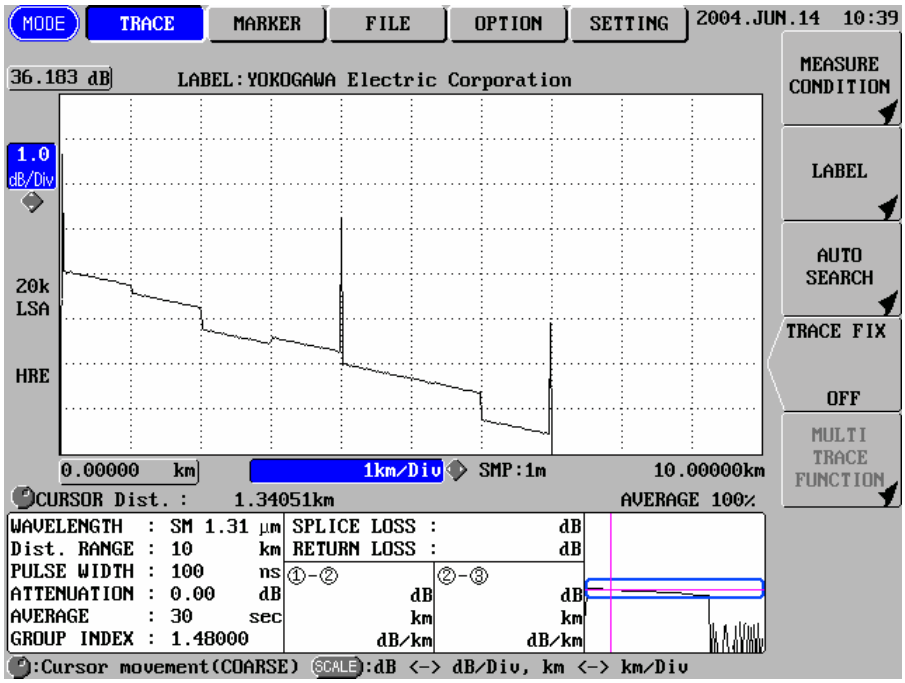
But the R point will be set as current event, if distance reference will be set.

**Refer**

For details on the distance reference, refer to page 7-27.

## When “MANUAL” is Selected for “EVENT SEARCH”

The following window will appear at the end of average measurement if “MANUAL” is currently selected for “EVENT SEARCH”.




**TIP**

If [F3] is pressed in this window, auto search will be performed automatically and the window shown on page 3-68 will appear.

**Refer**

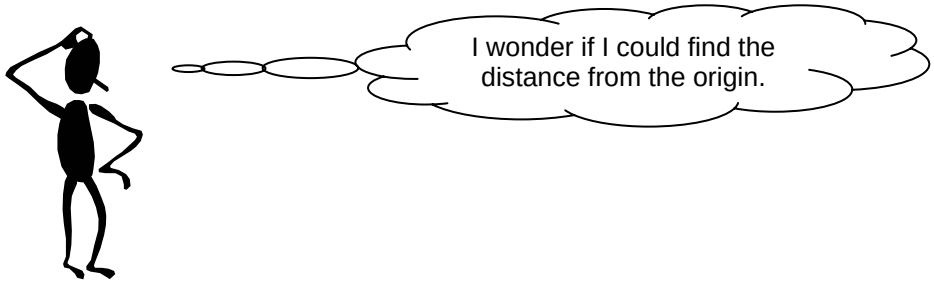
For the method of searching events, refer to page 3-35.

This section explains how to check the following items manually.

- Distance from the origin
- Distance between two points
- Splice loss
- Return loss

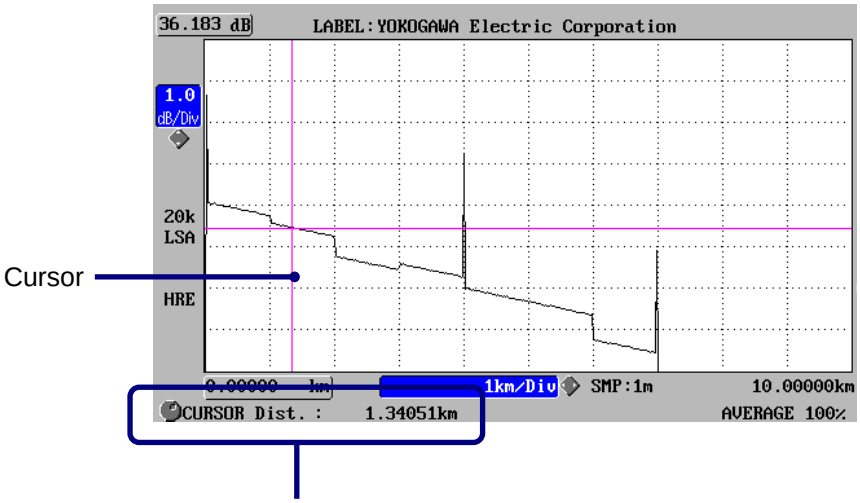
## Checking the Distance from the Origin

This section explains how to check the distance from the distance origin.




### 1. Turn the rotary knob.

The distance from the origin to the cursor position will be displayed.




**TIP**

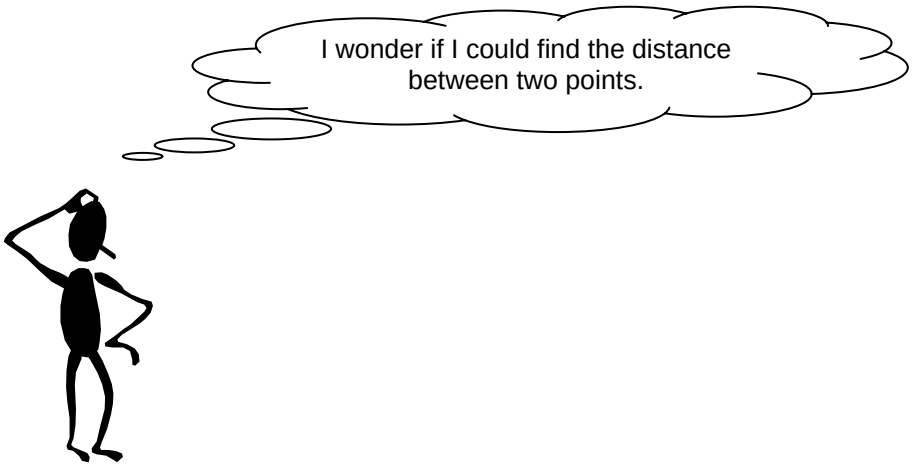
- Normally, the distance origin means the connection point between the instrument and optical fiber.
- The position of the distance origin can be changed.
- The cursor type (shape) can be changed.
- To find more accurate distance, enlarge the trace and adjust the cursor position.

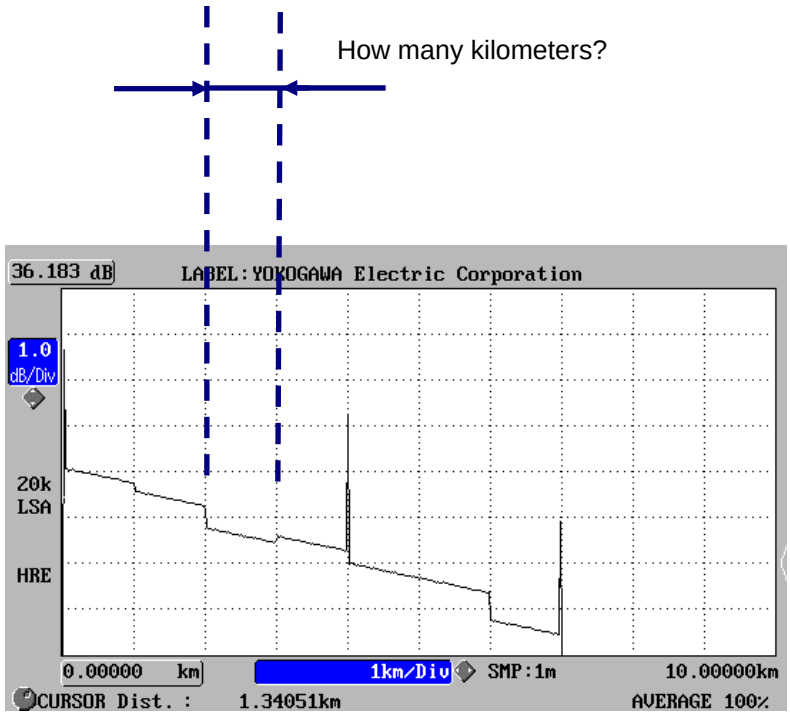
**Refer**

- For the method of moving the cursor, refer to page 3-64.
- For the method of changing the distance origin, refer to page 7-27.
- For the method of changing the cursor type (shape), refer to page 2-8.
- For the method of enlarging the trace, refer to page 3-66.

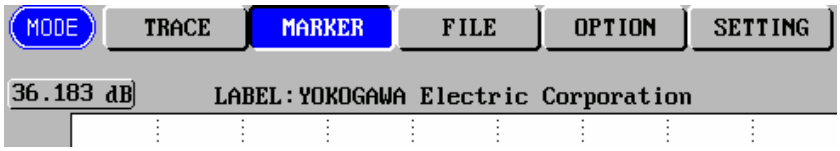
## Checking the Distance between Two Points

This section explains how to check the distance between the desired two points.



**1. Press [MODE] to locate the cursor to “MARKER” (“MARKER” is highlighted).**



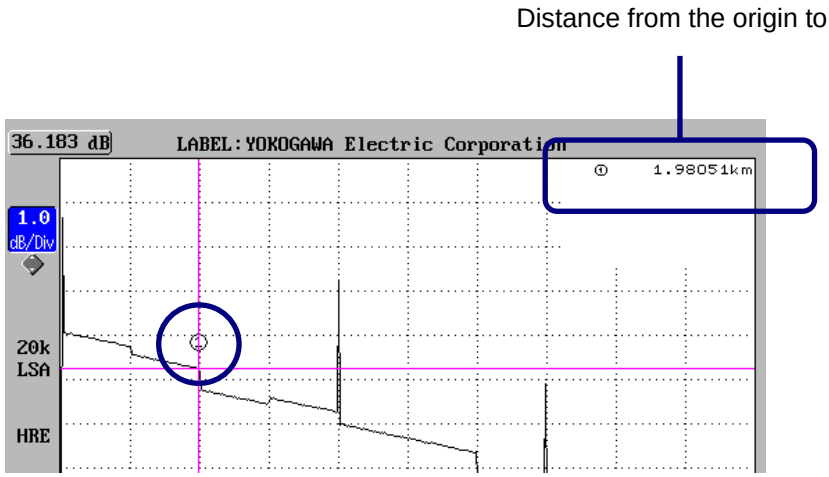

**2. Turn the rotary knob and locate the cursor to the start point of the distance to be found.**

**Refer**

For the method of moving the cursor, refer to page 3-64.

**3. Press [F1] (①).**

Marker ① will appear at the cursor position.

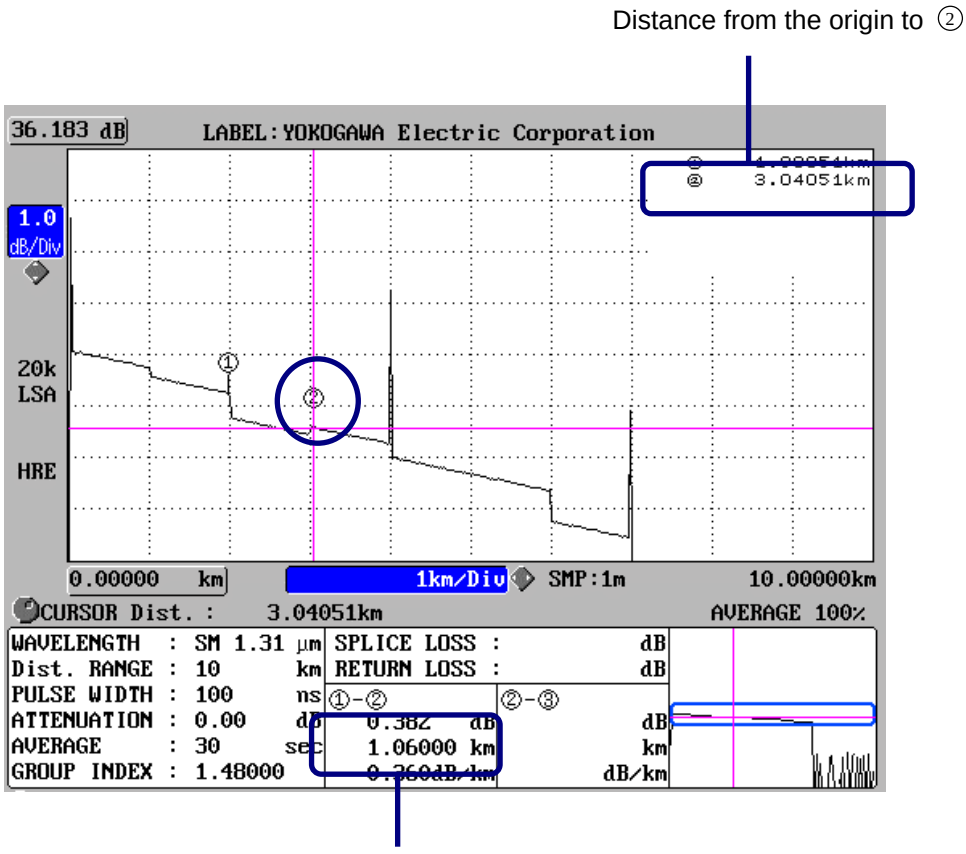



**4. Locate the cursor to the end point of the distance you want to know, by turning the rotary knob.**

**5. Press [F2] (②).**

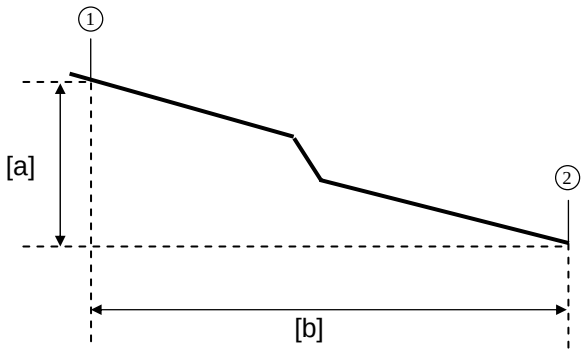
"②" will appear at the cursor position.

The distance between the two points will be displayed.




Inter-marker information

| SPLICE LOSS : | | dB |
|---|---|---|
| RETURN LOSS : | | |
| ①-② | | ②-③ |
| [a] | dB | dB |
| [b] | km | km |
| [a] / [b] | dB/km | dB/km |



**Caution**

The inter-marker values (dB and dB/km) vary considerably depending on the currently selected approximate method.

**TIP**

To find more accurate distance, enlarge the trace and fine-adjust the markers.

**Refer**

•For details on approximate method, refer to page 3-37.

•For the method of enlarging the trace, refer to page 3-66.

To clear the markers

1. **Press [F5] (NEXT PAGE) in this window.**
2. **Press [F3] (MARKER DELETE).**

To clear the cursor

1. **Press [F5] (NEXT PAGE) in this window.**
2. **Press [F4] (CURSOR DELETE).**

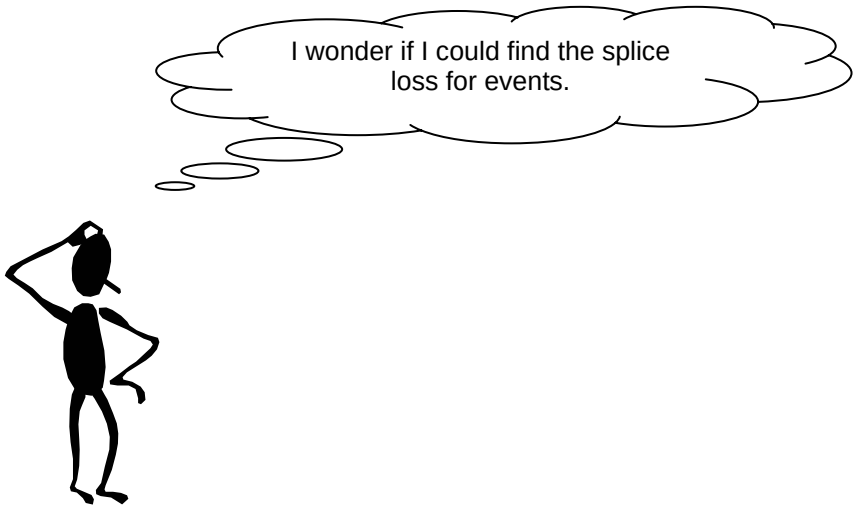
## Checking the Splice Loss

Splice loss can be checked using the following two methods.

- 4-point method
- 6-point method

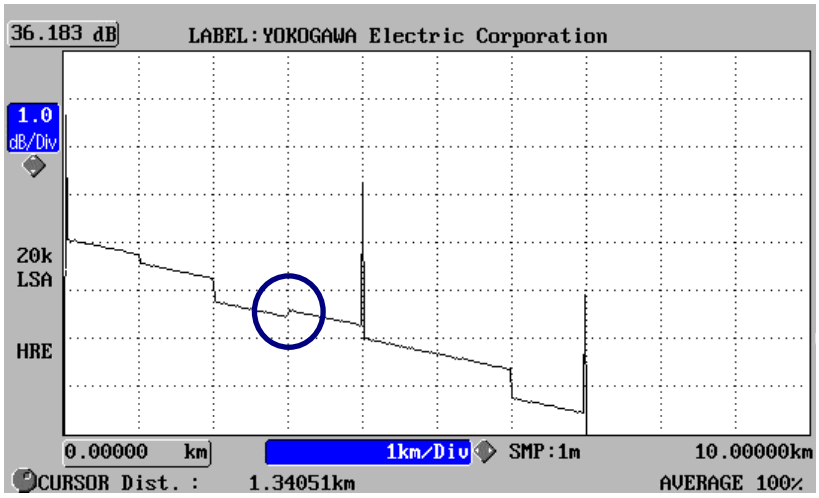
An explanation is given above for each method.

**Refer** For details on splice loss, refer to page 1-41.

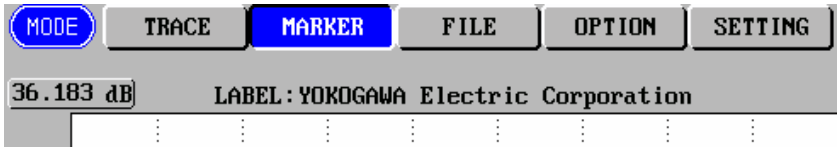


4-Point Method

The 4-point method allows you to check splice loss for the desired events using four markers.




**1. Press [MODE] to locate the cursor to “MARKER” (“MARKER” is highlighted).**



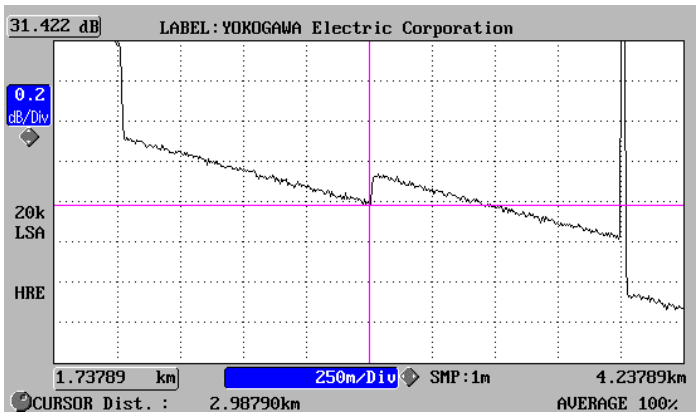

**2. Locate the cursor near the desired event by turning the rotary knob.**

Refer For the method of moving the cursor, refer to page 3-64.

**3. Enlarge the trace.**

Refer For the method of enlarging the trace, refer to page 3-66.

**4. Locate the cursor on the desired event by turning the rotary knob.**




**Caution**

Events (▼) indicate the following positions.

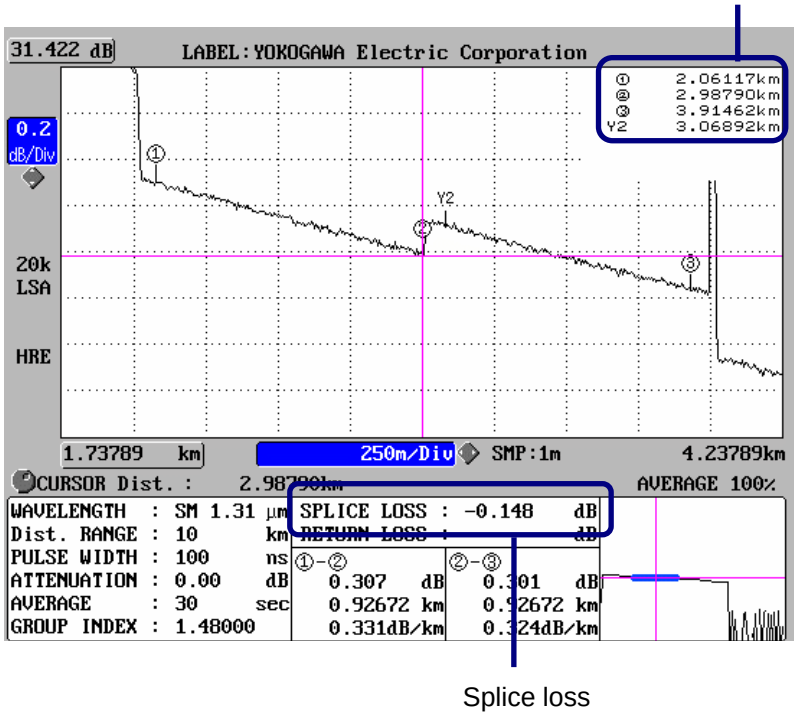

**5. Press [F2] (②).**

"②" will appear at the cursor position.

Markers ①, Y2 and ③ will be set when ② marker is displayed.

The splice loss will be displayed.

Distance from the origin to each marker




Splice loss

**Caution**

•If markers ①, Y2, ③, Y1 and Y3 are already set before ②, markers ①, Y2 and ③ will not be set automatically.

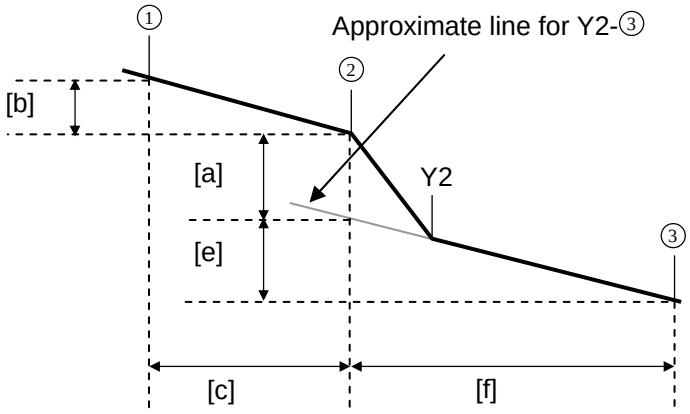
•Make sure that ② is set at the exact position. The splice loss will vary considerably depending on the position of marker ②.

**TIP**

Markers ① and ③ move closer to ② each time [F2] is pressed. If [F2] is pressed when they are located closest to ②, they will return to the edges of the window. This operation can be repeated as many times as you like, however, if another operation is carried out in between, this operation can no longer be carried out.

Inter-marker information

| SPLICE LOSS : [a] dB<br>RETURN LOSS : | |
|---|---|
| ①-② | ②-③ |
| [b] dB | [e] dB |
| [c] km | [f] km |
| [b] / [c] dB/km | [e] / [f] dB/km |



**Caution**

The inter-marker values (dB and dB/km) vary considerably depending on the currently selected approximate method.

**Refer**

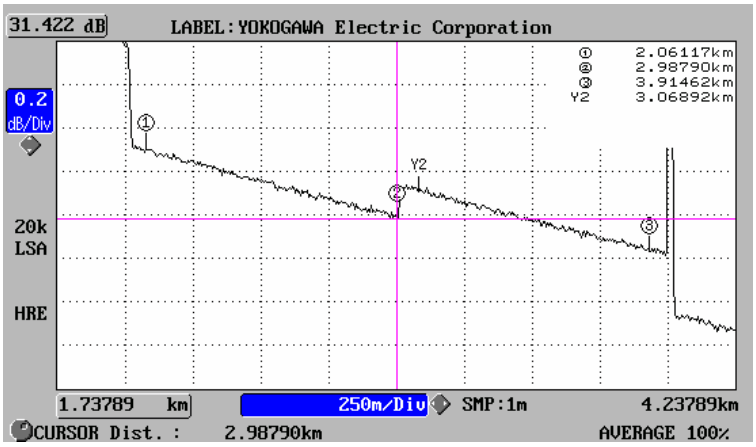
- For details on approximate method, refer to page 3-37.
- For the method of deleting markers and cursor, refer to page 3-76.
- For the method of displaying the approximate line, refer to page 7-3.

6-Point Method

The 6-point method allows you to check splice loss for the desired events using six markers.

The distance from the previous event can be found by performing this method.

In this explanation, it is assumed that four markers (① to ③, Y2) have already been set.




**Refer**

For the method of setting four markers, refer to page 3-78.

**1. Move ①.**

**1-1. Locate the cursor to the event just before the current one by turning the rotary knob.**

**TIP**

For the position for marker ①, refer to page 3-84.

**1-2. Press [F1] (①).**

The position of marker ① will move.

## 2. Set marker Y1.

**2-1. Locate the cursor to the position where Y1 is to be set, by turning the rotary knob.**

Refer

For the position for marker Y1, refer to page 3-84.

**2-2. Press [F5] (NEXT PAGE).**

**2-3. Press [F1] (Y1).**

"Y1" will appear at the cursor position.

## 3. Set marker Y3.

**3-1. Locate the cursor to the position where Y3 is to be set, by turning the rotary knob.**

Refer

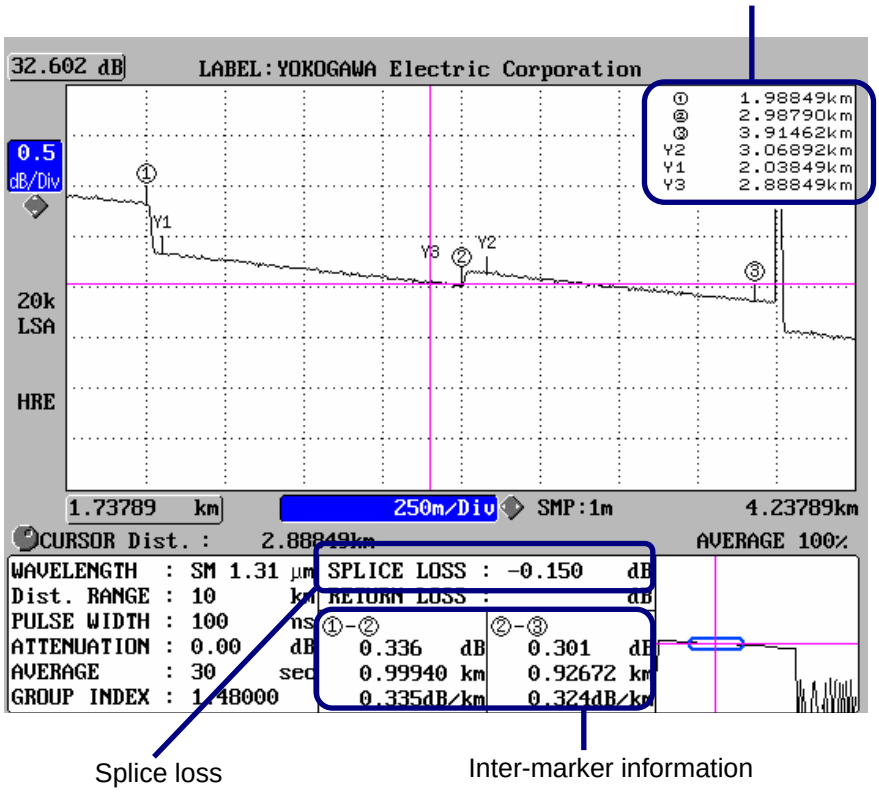
For the position for marker Y3, refer to page 3-84.

**3-2. Press [F2] (Y3).**

Marker Y3 will appear at the cursor position.

The splice loss will be displayed.

Distance from the origin to each marker

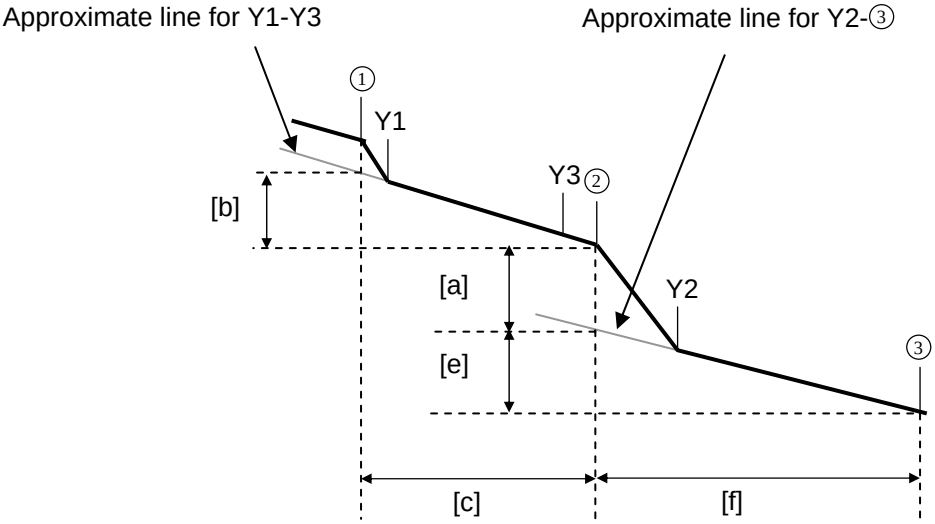



Splice loss

Inter-marker information

Inter-marker information

| SPLICE LOSS : | [a] | dB | | | |
|---|---|---|---|---|---|
| RETURN LOSS : | | | | | |
| ①-② | | | ②-③ | | |
| | [b] | dB | | [e] | dB |
| | [c] | km | | [f] | km |
| | [b] / [c] | dB/km | | [e] / [f] | dB/km |




**Caution**

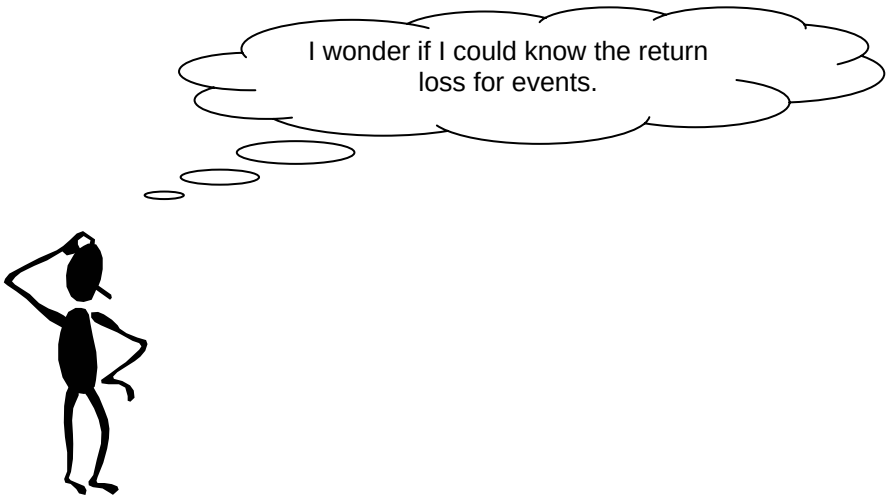
The inter-marker values (dB and dB/km) vary considerably depending on the currently selected approximate method.

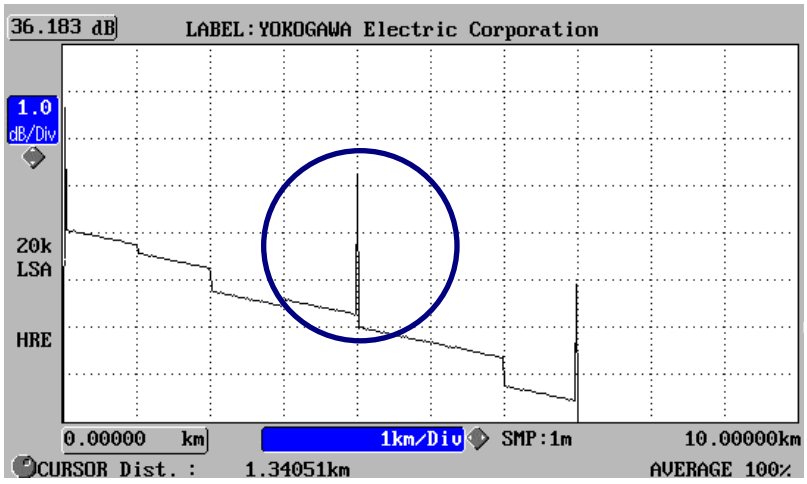
**Refer**

- For details on approximate method, refer to page 3-37.
- For the method of deleting markers and cursor, refer to page 3-76.
- For the method of displaying the approximate line, refer to page 7-3.

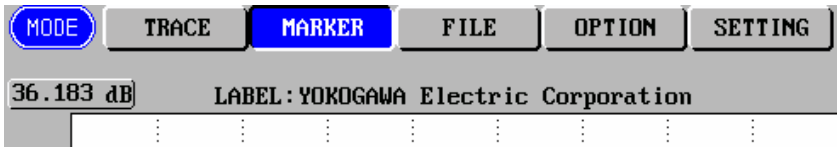
## Checking the Return Loss

This section explains how to check the return loss for the desired event.



**1. Press [MODE] to locate the cursor to “MARKER” (“MARKER” is highlighted).**




**2. Locate the cursor near the desired event by turning the rotary knob.**

Refer

For the method of moving the cursor, refer to page 3-64.

**3. Enlarge the trace.**

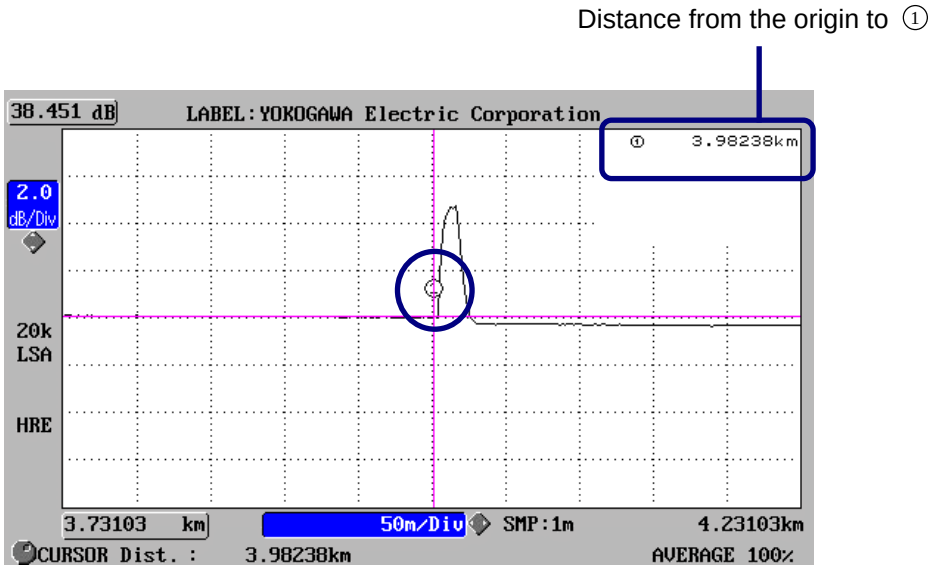
Refer

For the method of enlarging the trace, refer to page 3-66.

**4. Locate the cursor to the event by turning the rotary knob.**

**5. Press [F1] (①).**

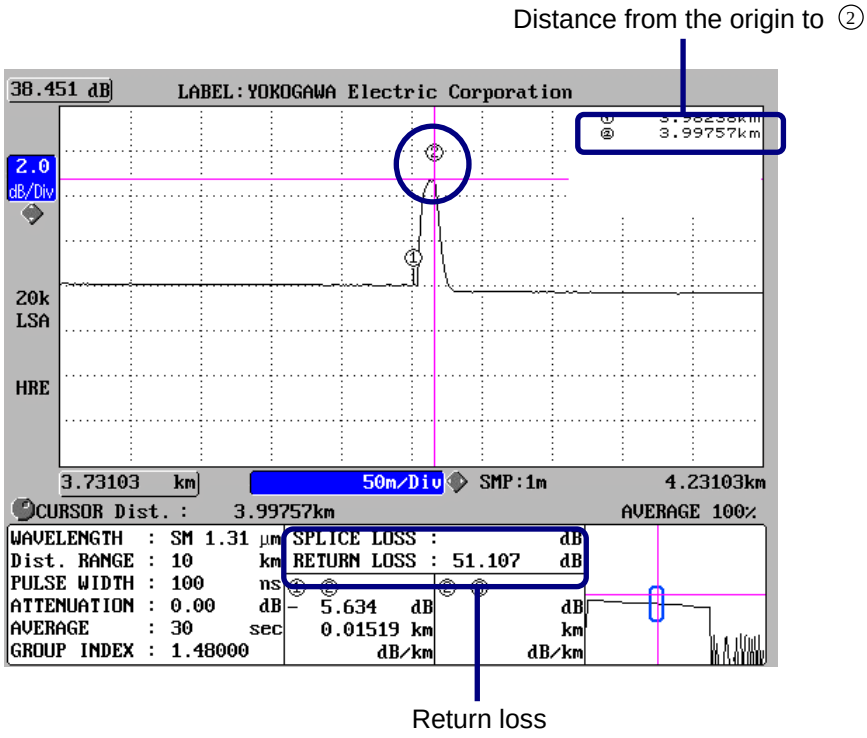
Marker ① will appear at the cursor position.



**6. Locate the cursor at the peak of the event by turning the rotary knob.**

**7. Press [F2] (②).**

The return loss will be displayed.




**Caution**

"<" mark will appear in front of the return loss value if the trace is saturated.

```
SPLICE LOSS :          dB
RETURN LOSS :<51.107   dB
```

The level of reflection occurring when the trace is saturated will be actually larger than that displayed.

To prevent saturation, the following two methods are available.

- Measuring again with larger attenuation
- Measuring again with "Hi-RETURN" average method
- Measuring again with wider pulse width

**Refer**

- For the method of changing the attenuation, refer to page 3-20.
- For the method of deleting markers and cursor, refer to page 3-76.

# 3.9 Recording the Measured Data [Step 8]

This section explains how to save and print the measured data.

## Saving the Measured Data

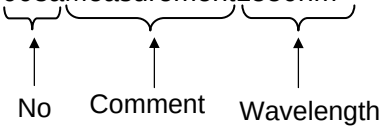
This section explains how to save the measured data, by taking an example of the following file name and location.

Save destination drive: PCMCIA

Save destination folder: 2004/Jun/16-30

File type: .SOR(Telcordia)

File name: 003aMeasurement1550nm



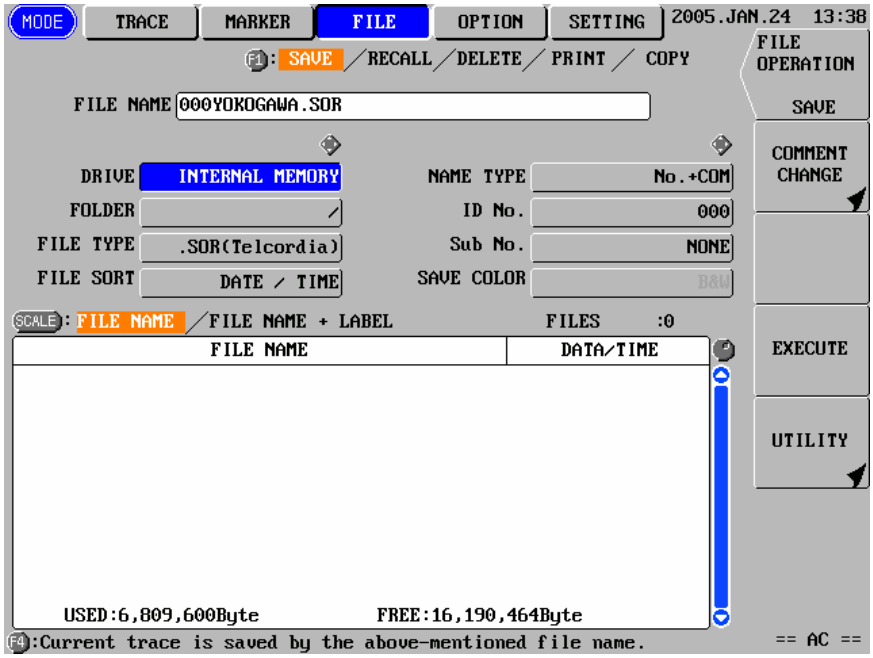

**Caution** If the measured data auto saving function has been set to ON, the measured data is saved under the various conditions set in this section when an average measurement is completed.

**Refer** For the method to enable the automatic saving function, refer to page 3-33.

## Displaying the File Operation Window

**1. Press [FILE].**

The following file operation window will appear.




**TIP**

The file operation window can also be displayed by pressing [MODE] and locating the cursor at the desired file.

## Changing the File Operation Setting

This instrument allows various file operations (saving, recalling, deleting, printing, copying).

This section explains how to change the file operation .

♦ Example: “COPY” → “SAVE”

**1. Press [F1] (FILE OPERATION).**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable file operations | *SAVE | Saves the measured data. |
| | RECALL | Recalls a saved file. |
| | DELETE | Deletes a saved file. |
| | PRINT | Recalls a saved file and prints its data. |
| | COPY | Copies a saved file to another drive or directory. |

*: Indicates the default setting.

**2. Locate the cursor to “SAVE” by using the rotary knob or [▲] / [▼].**

**3. Press [ENTER] to register the change made to the file operation setting.**

## Switching the Drive to Another

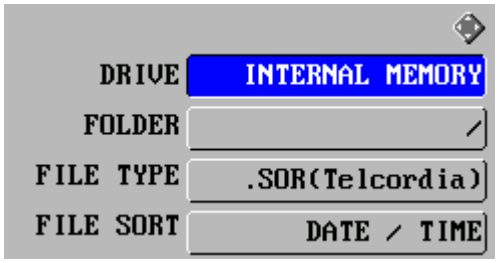
This section explains how to switch the drive.

♦ Example: “INTERNAL MEMORY” → “PCMCIA”

**Caution**

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, the measured data will be saved to the internal memory. The floppy disk drive cannot be selected unless a floppy disk is inserted into the floppy disk drive.

**1. Locate the cursor to “DRIVE” by using the arrow key.**




**TIP**

The cursor is already located at “DRIVE” when the file operation window is displayed.

**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable drives | EXTENSION UNIT |
| | USB |
| | PCMCIA |
| | *INTERNAL MEMORY |

*: Indicates the default setting.

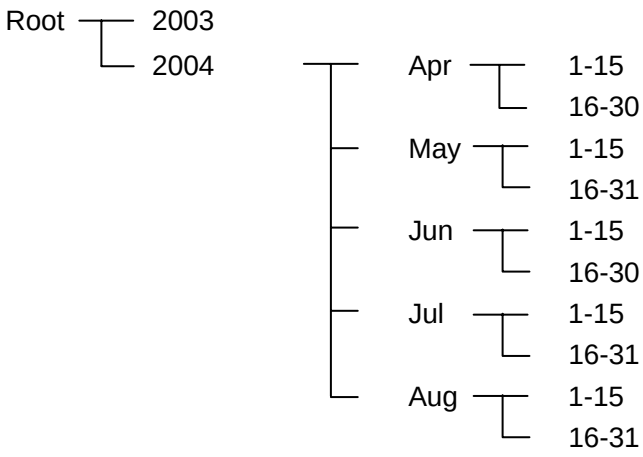
**3. Locate the cursor to “PCMCIA” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the drive setting.**

## Switching the Folder to Another

This section explains how to change the folder.

Assuming that the selected drive has the following folder structure.




The method of changing from one folder to another is explained below.

♦ Example: “Root folder” → “2004” → “Jun” → “16-30”

**Caution**

•Before specifying a folder, make sure that the folder is created using a personal computer or by this instrument. It is not possible to specify a folder if it is not created. In this case, the measured data will be saved to the root folder.

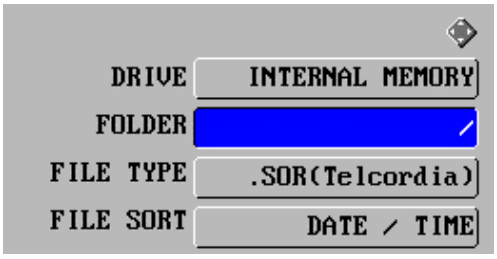
•In the case of the root folder on a storage media that has been initialized by FAT 16, up to 512 files (*1) can be stored.

*1:File names must consist of 8 characters (excluding file extension). “512” also includes the number of folders.

**Refer**

For the method of creating a folder by this instrument, refer to page 6-27.

### 1. Locate the cursor to “FOLDER” by using the arrow key.

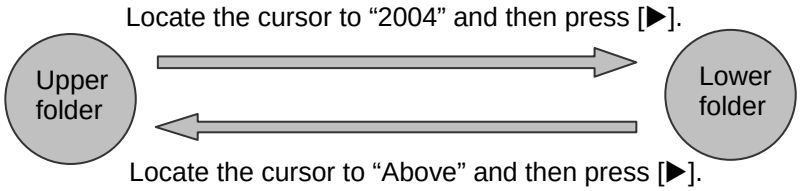


**2. Press [ENTER].**

A selection window will appear.

**TIP**

The folder (e.g. root folder) selected in the selection window shows all the sub folders. To display all the sub folders of a sub folder, locate the cursor to the sub folder, and press [◀] or [▶]. To move the upper folder, locate cursor to “Above” and press [◀] or [▶].




Display example

| / |
|---|
| 2003 |
| 2004 |

| Above |
|---|
| 2004 |
| Apr |
| May |
| Jun |
| Jul |
| Aug |

**3. Locate the cursor to “2004” by using the rotary knob or [▲] / [▼].**

**4. Press [◀] or [▶].**

**5. Locate the cursor to “Jun” by using the rotary knob or [▲] / [▼].**

**6. Press [◀] or [▶].**

**7. Locate the cursor to “16-30” by using the rotary knob or [▲] / [▼].**

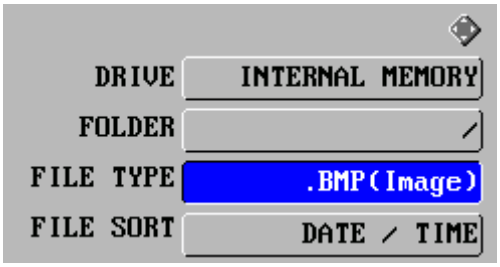
**8. Press [ENTER] to register the change made to the folder setting.**

## Changing the File Type (Extension)

This section explains how to change the file type.

♦ Example: ".BMP(Image)" → ".SOR (Telcordia)"

### 1. Locate the cursor to "FILE TYPE" by using [▲] / [▼].




### 2. Press [ENTER].

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable file types | *.SOR (Telcordia) | Saves the measured data in a format that conforms to Telcordia SR-4731. |
| | .TRD(AQ7260) | Saves the measured data in AQ7260's file format. |
| | .SET (Setup) | Saves the measurement conditions. |
| | .LST (Event List) | Saves the event list in text format.<br>The measurement conditions and traces are not saved. |
| | .BMP (Image) | Saves the screen displayed before [FILE] is pressed in BITMAP format. |
| | .TIF (Image) | Saves the screen displayed before [FILE] is pressed in TIFF format. |
| | .SOR(Bellcore) | Saves the measured data in a format that conforms to Bellcore GR-196-CORE. |
| | .CSV | Saves the measured data in CSV format. |

*: Indicates the default setting.

**Caution**

- To recall a file saved using AQ7931 emulation software (Ver.2.8 or later), make sure that the data is saved in .TRD or SOR (Bellcore) format.
- The trace data of measured by 60k in data size or 640km in distance range cannot be saved in TRD format.
- Even if data has been saved in SOR (Bellcore) format, it cannot be recalled using AQ7931 emulation software (Ver.2.8) if its data size exceeds 20,000.

**TIP**

For the AQ7932 Emulation Software supporting all the file formats and conditions, contact the dealer from which you purchased the instrument.

**3. Locate the cursor to ".SOR(Telcordia)" by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the file type.**

## Changing the File Name Format

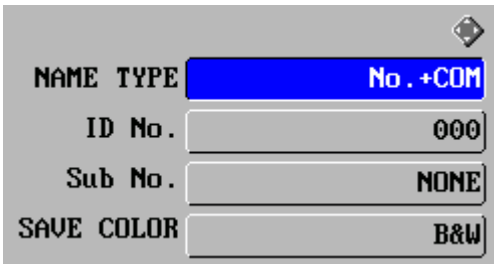
This section explains how to change the name type of a file.

♦ Example: “No.+COM” → ”No.+COM+No.”

**Caution**

When file type is selected .TRD(AQ7260) or .SOR(Bellcore), File name type can not be changed.

**1. Locate the cursor to “NAME TYPE” by using the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable file name formats | No.+COM | File name<br>@@@@@@@····@@@@****.$$$ |
| | COM+ No. | ****@@@@@@@····@@@@.$$$ |
| | No. | ****.$$$ |
| | COM | @@@@@@@····@@@@.$$$ |
| | *No.+COM+WL | ****@@@@@@@····@@@@&&&&nm.$$$ |
| | NO.+WL+COM | ****&&&&nm @@@@@@@····@@@@.$$$ |
| | COM+No.+WL | @@@@@@@····@@@@****&&&&nm.$$$ |
| | COM+WL+No. | @@@@@@@····@@@@&&&&nm****.$$$ |
| | WL+No.+COM | &&&&nm****@@@@@@@····@@@@.$$$ |
| | WL+COM+No. | &&&&nm@@@@@@@····@@@@****.$$$ |

@: COMMENT, ∗: No., &: Wavelength, $: Extension

*: Indicates the default setting.

For the wavelength, the value used for measurement is displayed.

Refer

For details on No., refer to page 3-98.

**3. Locate the cursor to "No.+COM+WL" by using the rotary knob or [▲] / [▼].**

TIP

When using multi wavelength measurement function, please selects file name included wavelength as file name type.

Refer

For continuous measurement with multiple wavelengths, refer to page 7-52.

**4. Press [ENTER] to register the change made to the file name format.**

## Changing the ID No.

The No. is used in combination with the SUB No. described in the next section.

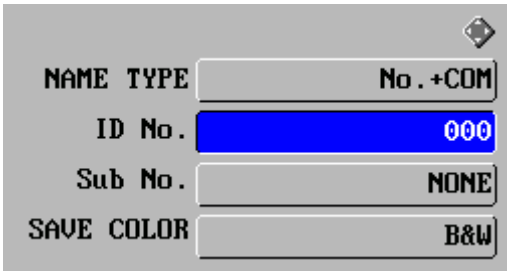
**Refer** For the description on the increment of No., refer to page 3-100.

This section explains how to change the main No. attached to a file name.

♦ Example: “000” → “003”

**Caution** No. cannot be changed if “COM” has been selected as the file name format.

**1. Locate the cursor to “ID No.” by using the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable ID No. | * 000<br>to<br>999<br>(1 step) |

*: Indicates the default setting.

3. **Locate the cursor to “0” (one’s digit) by using [◀] / [▶].**

4. **Change to “3” by using the rotary knob or [▲].**

5. **Press [ENTER] to register the change made to the ID No.**

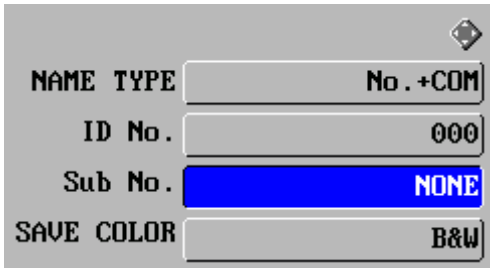
## Changing the Sub No.

This section explains how to change the Sub No. attached to a file name.

♦ Example: “NONE” → “a-c”

**Caution** **When file type is selected .TRD(AQ7260) or .SOR(Bellcore), SUB No. can not be changed.**

### 1. Locate the cursor to “Sub No.” by using the arrow key.




### 2. Press [ENTER].

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable sub No. | *NONE |
| | a-b |
| | a-c |
| | a-d |
| | a-e |
| | a-f |
| | a-g |
| | a-h |

*: Indicates the default setting.

The label No. will increase as follows when “NONE” or “a-c” is selected.

NONE: 003→004→005→006→…

a-c : 003a→003b→003c→004a→004b→004c→…

(When the start No. is set to “003”)

3. **Locate the cursor to “a-c” by using the rotary knob or [▲] / [▼].**

4. **Press [ENTER] to register the change made to the sub No.**

## Changing the Save Color

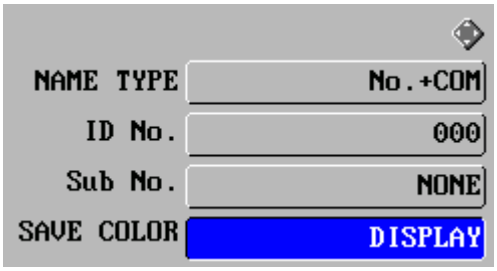
This section explains how to change the save color.

♦ Example: “DISPLAY” → “B&W”

**Caution**

The save color can be specified only if “.BMP(Image)” or “.TIF(Image)” is selected as the file type.

**1. Locate the cursor to “SAVE COLOR” by using the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable save colors | DISPLAY |
| | *B&W |

*: Indicates the default setting.

**3. Locate the cursor to “B&W” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the save color.**

## Changing the File Name

This section explains how to change the comment part of the file name.

**Caution**

- The file name can consist of up to 43 characters in total.

  Comment: 29 characters

  No.: 4 characters

  Wavelength: 6 characters

  Extension: 4 characters

- The comment cannot be changed if “No.” has been selected as the file name format.

**1. Press [F2] (COMMENT CHANGE).**

A window allowing you to change the comment will appear.

**Refer**

For method of input the character, refer to Chapter 4.

## Saving the Data

**1. Press [F4] (EXECUTE) to save the data.**

**TIP**

After the data has been saved, the trace mode will be activated.

## Printing the Measured Data

The following three print functions are available.

- Printing the currently displayed window
- Printing the trace and event list
- Printing the event list

**Caution**

Before starting to print, make sure that a printer is connected to the instrument and correct print settings are made.

**Refer**

- For the method of connecting a printer, refer to pages 8-3 and 8-16.
- For the method of changing the printer, refer to pages 8-6 and 8-18.
- For the method of setting the print direction, refer to page 2-35.
- For the method of setting the print color, refer to page 2-37.

### Printing the Currently Displayed Window

This section explains how to print the currently displayed window.

**1. Press [PRINT].**

Printing will start.

## Printing the Trace and Event List

This section explains how to print both the measured trace and information on the events detected by auto search.

**Caution** The trace and event list can be printed only if auto search has been performed.

**1. Display a window showing the trace and event list.**

**Refer** For the method of displaying the trace+event list window, refer to page 3-68.

**2. Press [F5] (TRACE+LIST PRINT).**

Printing will start.

## Printing the Event List

This section explains how to print only the information regarding the events detected by auto search.

**Caution** The event list can be printed only if auto search has been performed.

**1. Display a window showing the trace and event list.**

**Refe** For the method of displaying the trace+event list window, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

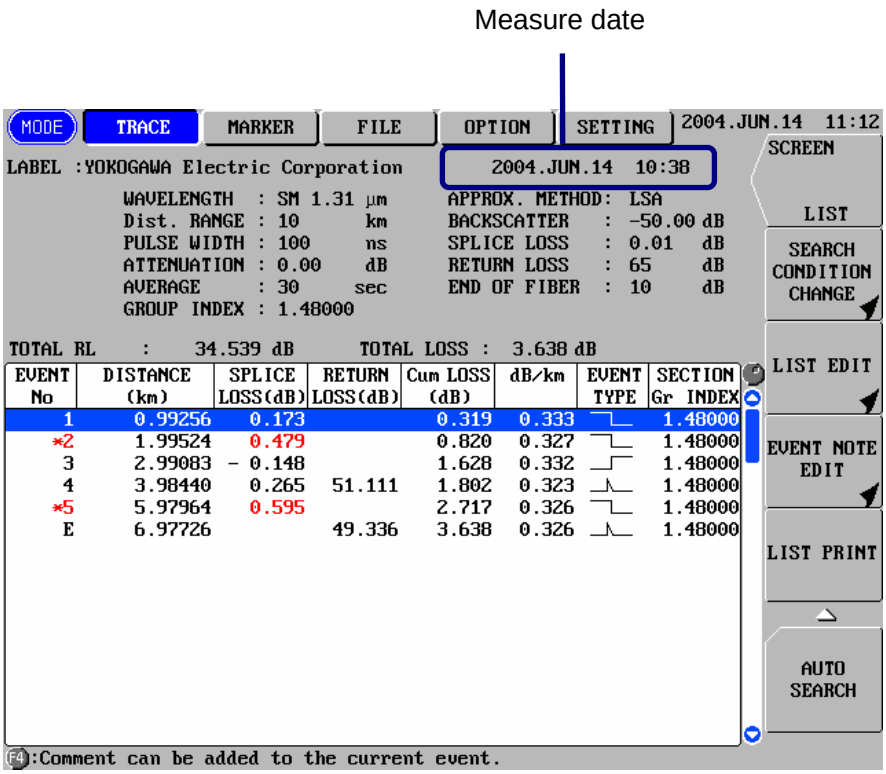
**TIP**

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “LIST” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the print object setting.**




**5. Press [F5] (LIST PRINT).**

Printing will start.

# 3.10 Turning OFF the Power [Step 9]

## Turning OFF the Power

This section explains how to turn OFF the power to the instrument.

**1. Make sure there is no measurement currently in progress.**

**TIP**

A message “LASER ON” is displayed during measurement.

**Refer**

For the display in the laser ON , refer to page 3-55.

| CAUTION | |
|---|---|
| | Before turning OFF the power, make sure that no measurement is in progress.<br>Turning OFF the power while measurement is in progress may damage the optical module. |

| WARNING | |
|---|---|
| | Before turning OFF the power, make sure that measurement is stopped.<br>Laser beams are emitted during measurement.<br>Never stare into the laser. Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight. |

**2. Press the power switch located on the top of the instrument to turn OFF the power.**

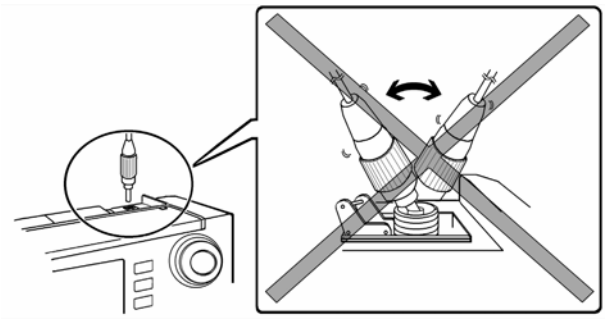
**TIP**

The POWER LED will go out when the power to the instrument is OFF.

**3. If you are operating the instrument by AC power, remove the AC adapter from the instrument. Also disconnect the power plug from the AC power outlet.**

## Disconnecting the Optical Fiber

**1. Disconnect the optical fiber that has been measured from the instrument.**

| ⚠ CAUTION | |
|---|---|
| | When disconnecting the optical connector, position the connector perpendicular to the optical adapter and remove it gently. Shaking it sideways or removing by force may not only damage the optical adapter, but also damage the ferrule on the optical connector.  |

**2. Close the connector cover.**

# Chapter 4
# ENTERING CHARACTERS

# 4.1 Entering Characters

With this instrument, a comment (label) on traces can be entered. In addition to the comment, detailed information, such as the names of the company and personal who measured the optical fiber, and the file name to be used to save the measured data can be entered.

This section gives an example of entering a label in order to explain how to enter characters.

Labels can be entered by the following methods.

- Entering a new label
- Using a label that has already been entered. [Fixed form input]

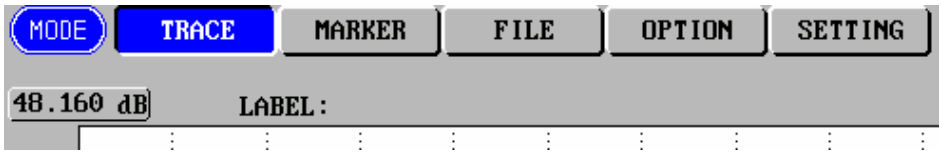
This section explains how to enter a new label.

**Refer**

- For how to enter a file name, refer to page 3-103.
- For details on the fixed form input method, refer to page 7-11.
- For how to enter detailed information, refer to page 7-16.

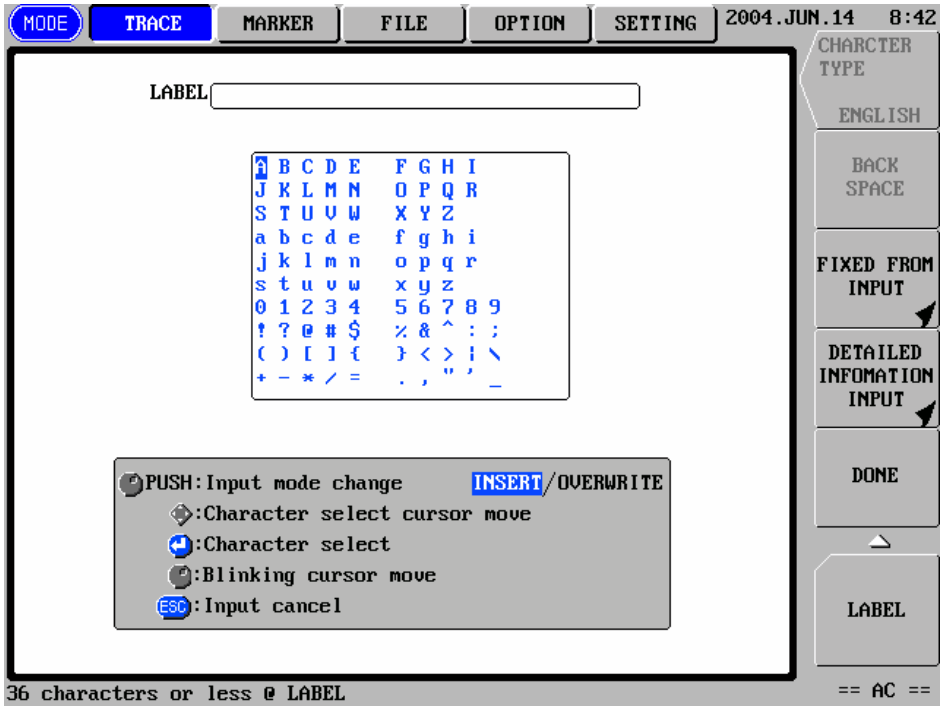
## Displaying the Label Input Window

**1. Press [MODE] and locate the cursor to “TRACE”.**




**2. Press [F2] (LABEL).**

A window allowing you to enter a label will appear.



## Entering a Label

This section explains how to enter the following characters.

♦ Example: AQ7260 OTDR

**Caution**

The label can consist of up to 36 characters.

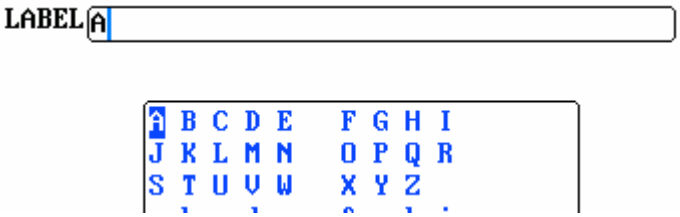
**TIP**

A label can be entered even when measurement is in progress.

**1. Locate the character cursor to “A” by using the arrow key.**

**2. Press [ENTER].**

“A” will be displayed in the [LABEL] field.




**3. Locate the character cursor to “Q” by using the arrow key.**

**4. Press [ENTER].**

**5. Locate the character cursor to “7” by using the arrow key.**

**6. Press [ENTER].**

**7. Locate the character cursor to “2” by using the arrow key.**

**8. Press [ENTER].**

**9. Locate the character cursor to “6” by using the arrow key.**

**10.** **Press [ENTER].**

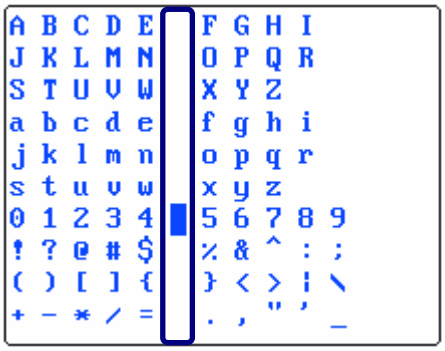
**11.** **Locate the character cursor to “0” by using the arrow key.**

**12.** **Press [ENTER].**

**13.** **Locate the character cursor to “space” by using the arrow key.**

**TIP**

A space is provided for each line.




**14.** **Press [ENTER].**

**15.** **Locate the character cursor to “O” by using the arrow key.**

**16.** **Press [ENTER].**

**17.** **Locate the character cursor to “T” by using the arrow key.**

**18.** **Press [ENTER].**

**19.** **Locate the character cursor to “D” by using the arrow key.**

**20.** **Press [ENTER].**

**21.** **Locate the character cursor to “R” by using the arrow key.**

**22. Press [ENTER].**

TIP

"AQ7260 OTDR" is displayed in the [LABEL] field at the end of step 22.

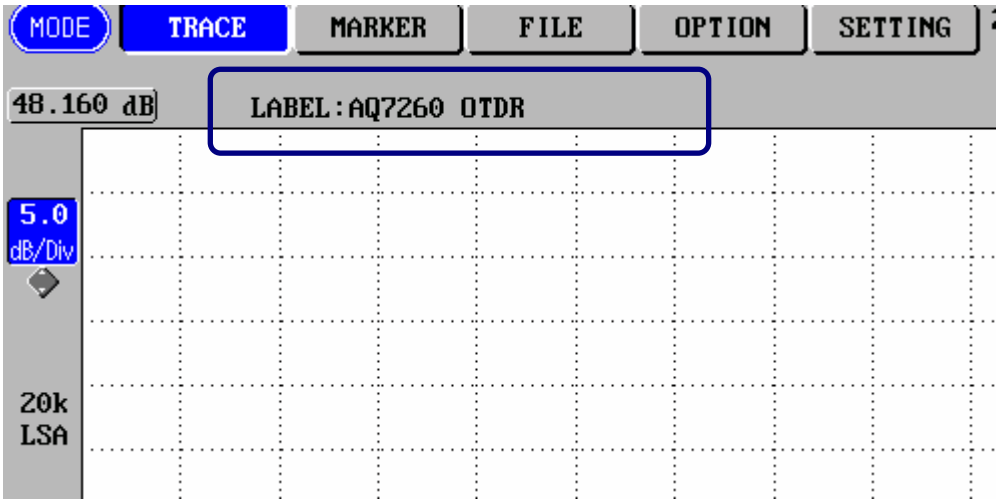
**23. Check whether "AQ7260 OTDR" is displayed in the [LABEL] field.**

Refer

For the method of editing the entered characters, refer to page4-7.

**24. Press [F5] (DONE) to register the label.**

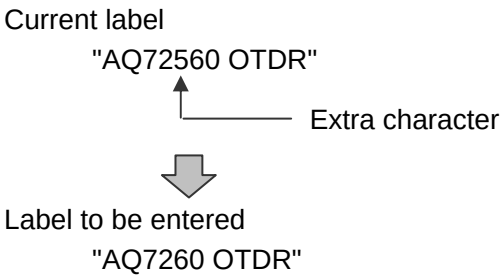
The entered character string will be displayed in the [LABEL] field.



# 4.2 Editing Characters

## Deleting a Character

This section explains how to delete a character by taking an example in which an superfluous character is entered by mistake into the label.

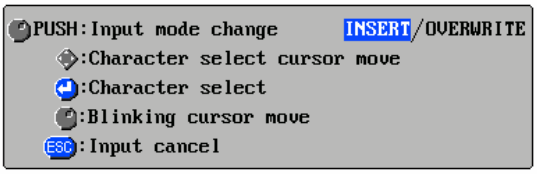



**1. Display the label input window.**

**Refer**

For the method of displaying the label input window, refer to page 4-3.

**2. Push the rotary knob to switch the input mode to “INSERT”.**




**3. Locate the blink cursor after the character “5” to be deleted by turning the rotary knob.**

**TIP**

If the current input mode is “OVERWRITE”, locate the blinking cursor on “5”.

**4. Press [F2] (BACK SPACE) to delete the unwanted character (“5”).**

**5. Press [F5] (DONE) to register the label.**

## Changing a Character

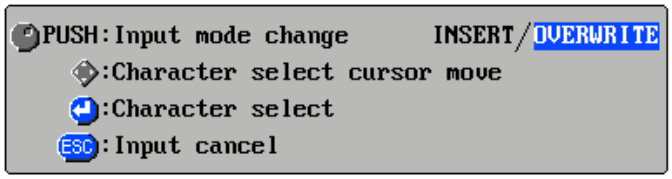
This section explains how to change a character by taking an example in which a wrong character is entered by mistake into the label.

Current label
"AQ7250 OTDR"
Wrong character
Label to be entered
"AQ7260 OTDR"

**1. Display the label input window.**

**Refer** For the method of displaying the label input window, refer to page 4-3.

**2. Push the rotary knob to switch the input mode to “OVERWRITE”.**




**3. Locate the blink cursor to the character “5” to be changed by turning the rotary knob.**

**4. Locate the cursor to “6” by using the arrow key.**

**5. Press [ENTER].**

**6. Press [F5] (DONE) to register the label.**

## Adding a Character

This section explains how to add a character by taking an example in which a character is omitted by mistake from the label.

Current label
"AQ7260 ODR"
"T" is missing.
Label to be entered
"AQ7260 OTDR"

**Caution**

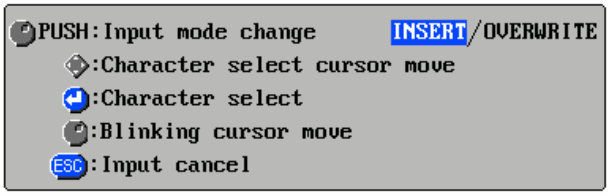
If the allowed maximum number of characters has already been entered or will be exceeded by adding new characters, it will not be possible to add them.

**1. Display the label input window.**

**Refer**

For the method of displaying the label input window, refer to page 4-3.

**2. Push the rotary knob to switch the input mode to “INSERT”.**




**3. Locate the blink cursor after the character “O” by using the rotary knob.**

**4. Locate the cursor to “T” by using the arrow key.**

**5. Press [ENTER].**

Caution

- The character you want to add will be added next to the blinking cursor.
- When adding the character, make sure that the input mode is set to “INSERT”. If “OVERWRITE” is selected, the character at the blinking cursor will be overwritten by the one you enter.

**6. Press [F5] (DONE) to register the label.**

# Chapter 5
# EDITING AUTOMATIC SEARCH RESULTS

# 5.1 Editing an Event

When measurement of an optical fiber starts and auto search is performed, detection of events will be performed by the instrument. In some cases, the instrument cannot detect events since the back scatter level at reflection points is excessively low or it detects noise as an event.

This section explains the following event edit functions.

- Inserting an event
- Deleting an event
- Moving an event

## Inserting an Event

This section explains how to insert an event.

**1. Measure the optical fiber and perform auto search.**

**Refer**

- For the method of measuring an optical fiber, refer to page 3-56.
- For the screen that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

**TIP**

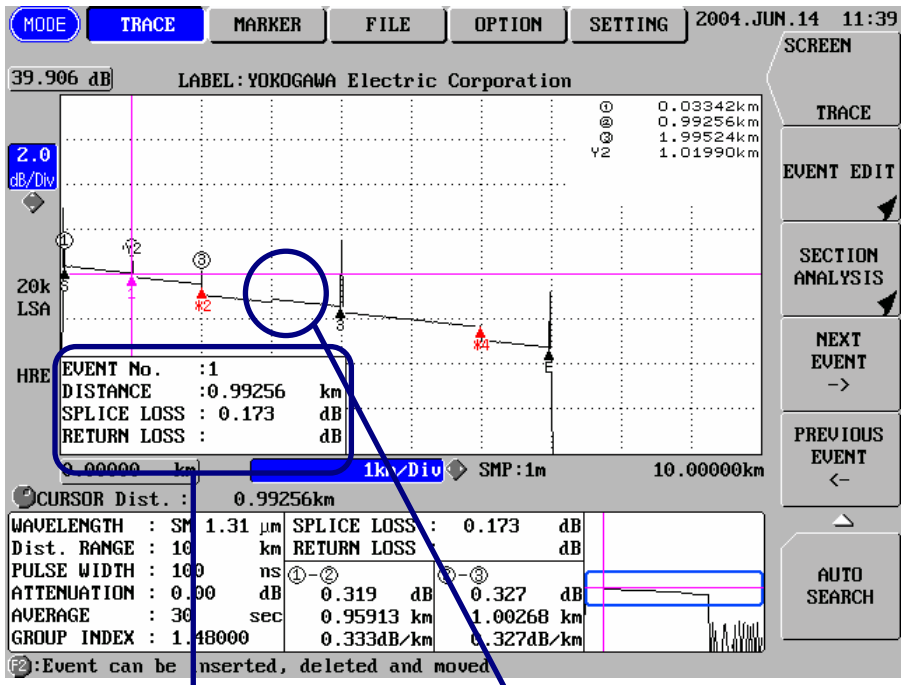
| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

The following screen will appear.




Information regarding the current event is displayed.

An event is to be inserted here.

**5. Press [F2] (EVENT EDIT).**

**6. Locate the cursor to the point where an event is to be inserted by turning the rotary knob.**

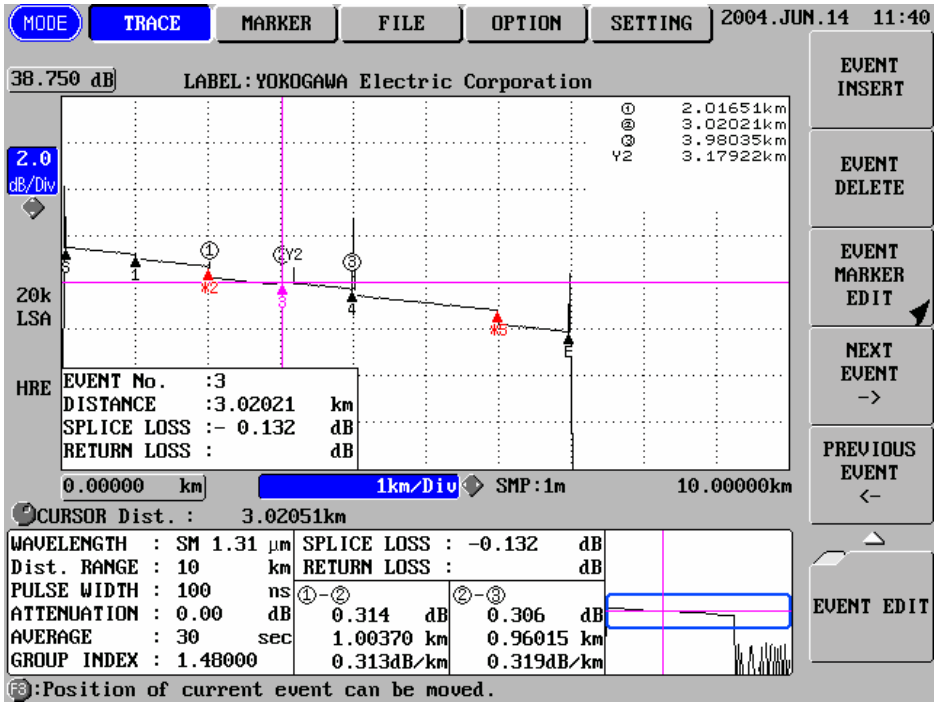
If necessary, enlarge the trace.

**Refer**

- For the method of moving the cursor, refer to page 3-64.
- For the method of enlarging the trace, refer to page 3-66.

## 7. Press [F1] (EVENT INSERT).

The event is inserted.




**Caution**

One trace can be set up to 100 events.

**TIP**

- When an event is inserted between event Nos. 2 and 3, the inserted event will be set as event 3 and a new No. will be assigned to each subsequent event.
- If an event is inserted to the left of the S event, the inserted event will be set as the S event and a new No. will be assigned to each subsequent event.
- If an event is inserted to the right of the E event, the inserted event will be set as the E event and a number event will be set at the point of the original E event

## Deleting an Event

This section explains how to delete an event.

♦ Example: Deleting event 5

**Caution** This function is not possible if only S and E events exist.

**1. Measure the optical fiber and perform auto search.**

**Refer**

- For the method of measuring an optical fiber, refer to page 3-56.
- For the screen that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

**TIP**

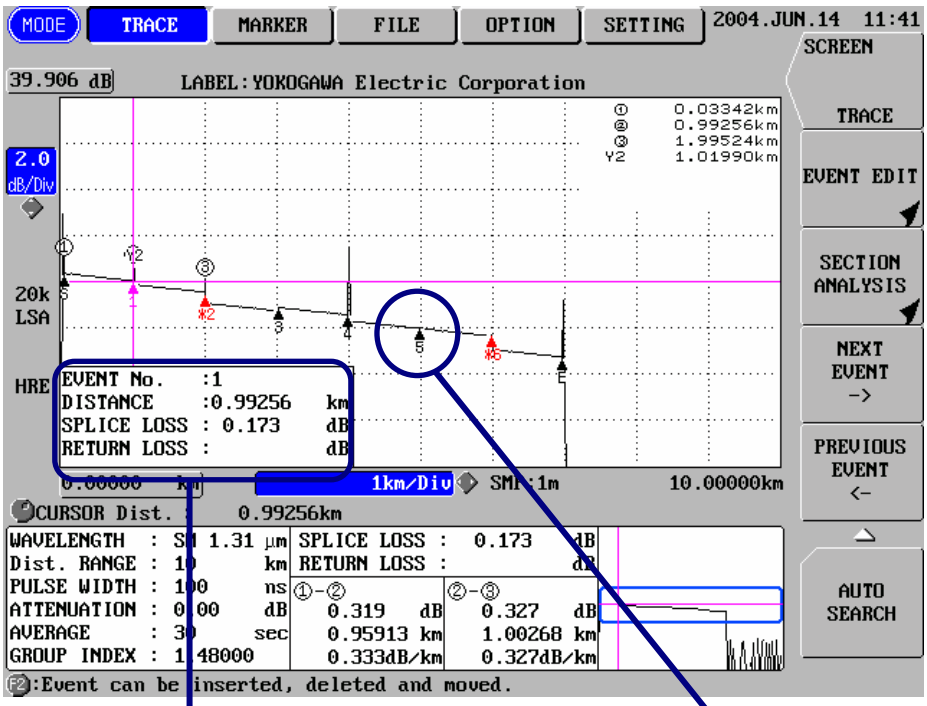
| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

The following screen will appear.




An event is to be deleted here.

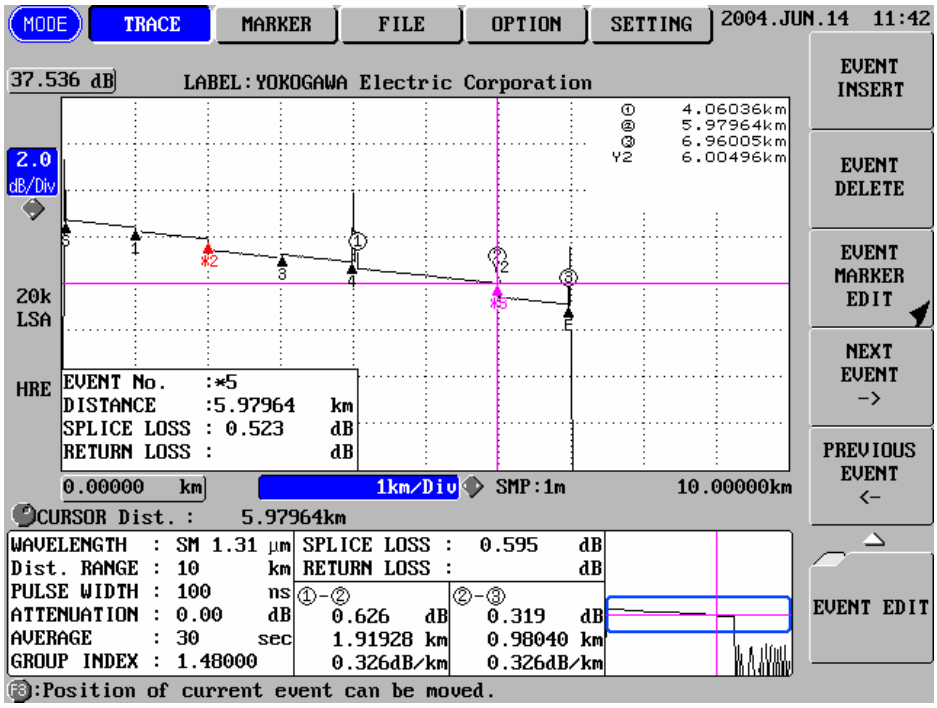
Information regarding the current event is displayed

**5. Press [F2] (EVENT EDIT).**

**6. Press [F4] (NEXT EVENT) or [F5] (PREVIOUS EVENT) to set event 5 as the current event.**

**7. Press [F2] (EVENT DELETE).**

The event is deleted.




**TIP**

- A new No. will be assigned to each event located after the deleted event.
- If the S event is deleted, event 1 will be set as the S event, and a new event No. will be assigned to each subsequent event.
- If the E event is deleted, the event with the largest event No. will be set as the E event.

## Moving an Event

This section explains how to move an event.

♦ Example: Moving event 3

**1. Measure the optical fiber and perform auto search.**

**Refer**

•For the method of measuring an optical fiber, refer to page 3-56.

•For the screen that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

**TIP**

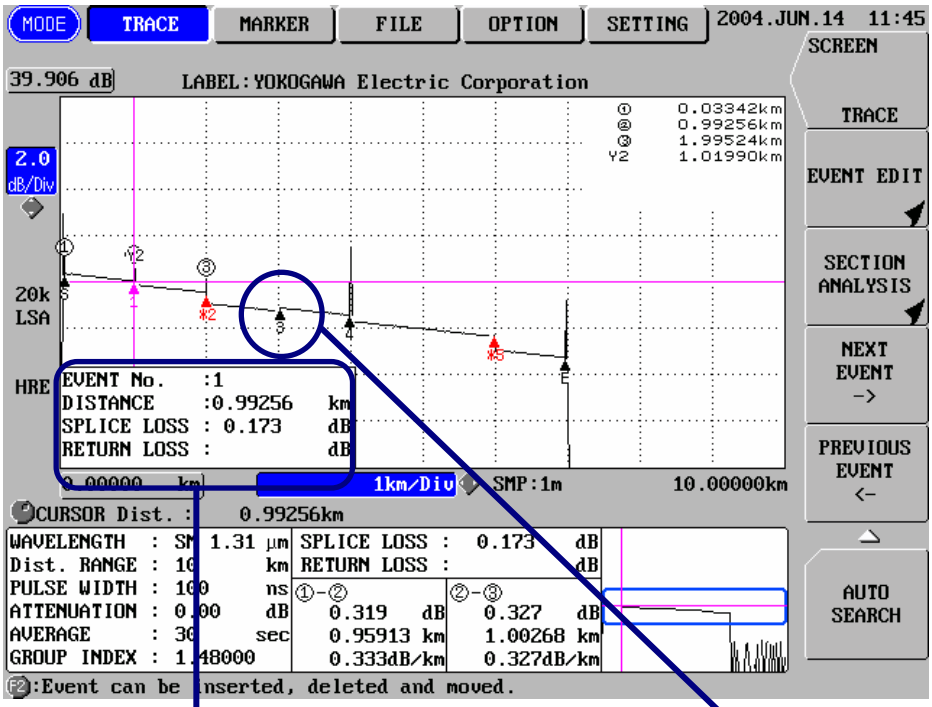
| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

The following screen will appear.




An event is to be moved here.

Information regarding the current event is displayed.

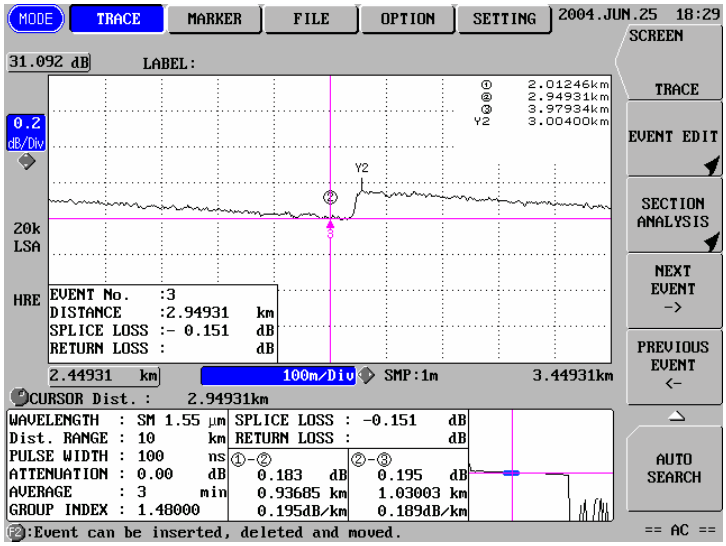
**5. Press [F2] (EVENT EDIT).**

**6. Press [F4] (NEXT EVENT) or [F5] (PREVIOUS EVENT) to set event No.3 as the current event.**

**7. Press [F3] (EVENT MARKER EDIT).**

**8. Locate the cursor to the point to which the current event is to be moved by turning the rotary knob.**

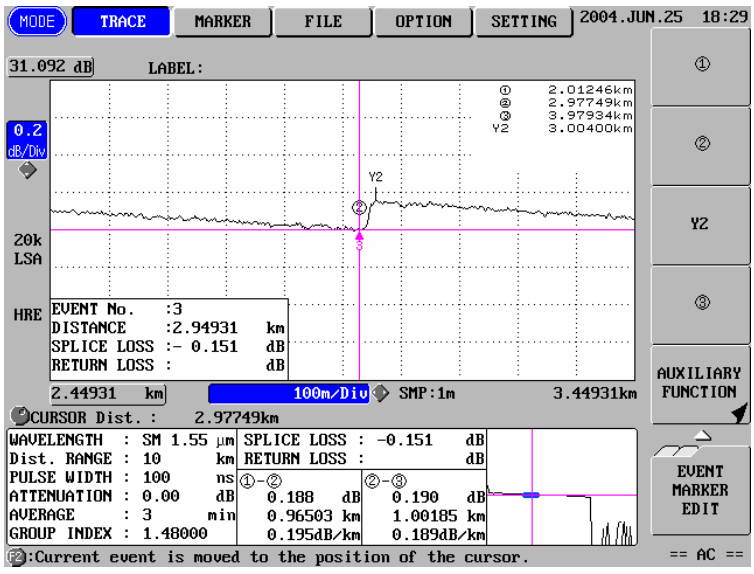
If necessary, enlarge the trace.




**Refer** For the method of moving the cursor, refer to page 3-64.

**9. Press [F2] (②)**

The event moves.




**Caution** The event can be moved between ① and Y2.

# 5.2 Editing an Event Marker

When auto search is performed, events will be searched by the instrument. An event marker (①,②, Y2, ③) is added to each detected event to calculate splice loss etc.

The splice loss and dB/km vary slightly depending on the event marker positions.

This section explains how to change the marker position assigned to an event.

♦ Example: Changing the position of event marker ① assigned to event 3

**Refer**

For details on splice loss, refer to pages 1-40 and 3-77.

**1. Measure the optical fiber and perform auto search.**

**Refer**

•For the method of measuring an optical fiber, refer to page 3-56.

•For the screen that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

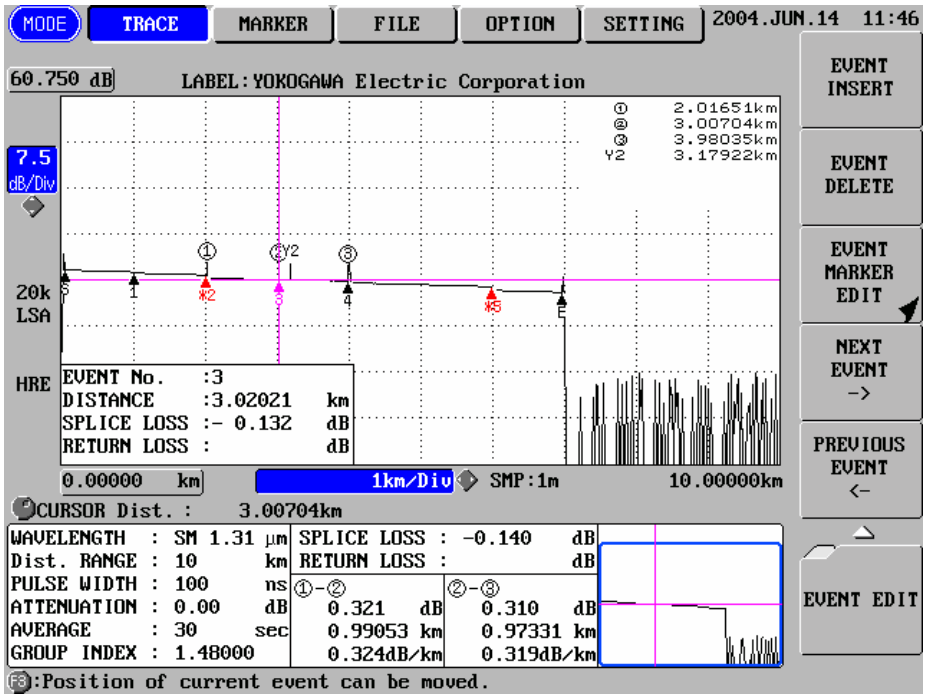
*: Indicates the default setting.

**3. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**4.** **Press [ENTER].**

**5.** **Press [F2] (EVENT EDIT).**

**6.** **Press [F4] (NEXT EVENT) or [F5] (PREVIOUS EVENT) to set event No.3 as the current event.**




**7.** **Press [F3].**

**8.** **Locate the cursor to the point to which marker ① is to be moved by turning the rotary knob.**

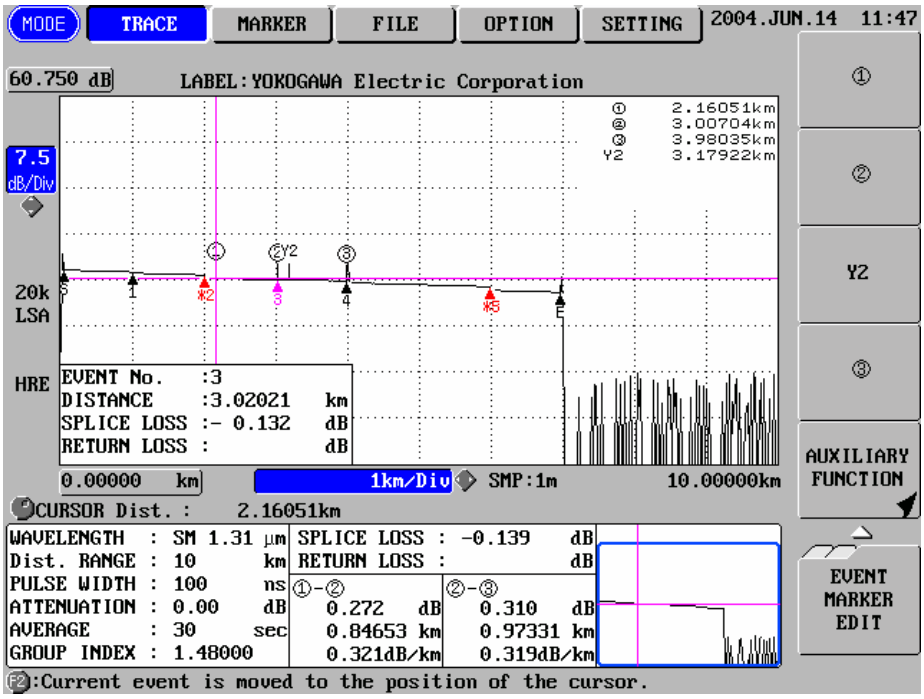
If necessary, enlarge the trace.

**Refer**

- For the method of moving the cursor, refer to page 3-64.
- For the method of enlarging the trace, refer to page 3-66.

**9. Press [F1] (①).**

The marker ① moves.




**TIP**

- When a marker is moved, the information regarding events will be searched re-calculated.
- The other marker positions can also be changed in the same way.

# 5.3 Editing the Event List

Distance calculation is performed using the group index set in the measurement conditions. However, if two or more optical fibers are connected as a result of installation of new transmission system, the group index varies with the optical fibers. In this case, distance calculation can be performed with higher accuracy by setting the group index of each optical fiber. To obtain accurate analysis results, it is necessary to edit the value between certain points.

This section explains the following event list edit functions.

- Editing an interval distance
- Editing a return loss
- Editing an interval group index

## Displaying the List Edit Window

This section explains how to display the window by which the event list can be changed.

**1. Measure the optical fiber and perform auto search.**

Refer

- For the method of measuring an optical fiber and performing auto search, refer to page 3-56.
- For the screen that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

TIP

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “LIST” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

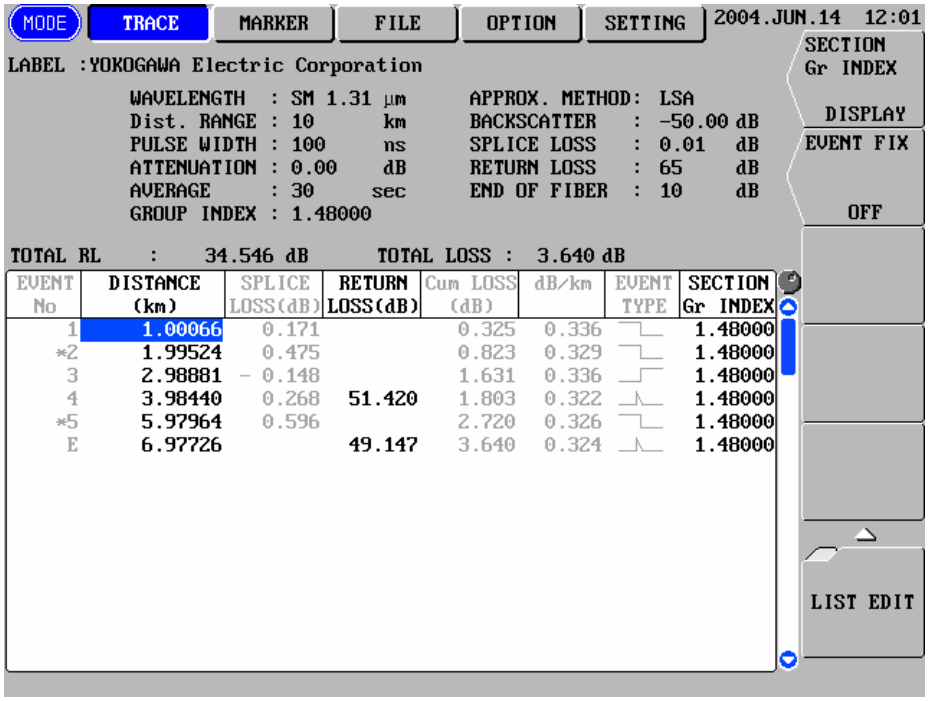
A new screen will appear.

Refer

For the new window, refer to page 3-106.

**5. Press [F3] (LIST EDIT).**

The following window will appear.



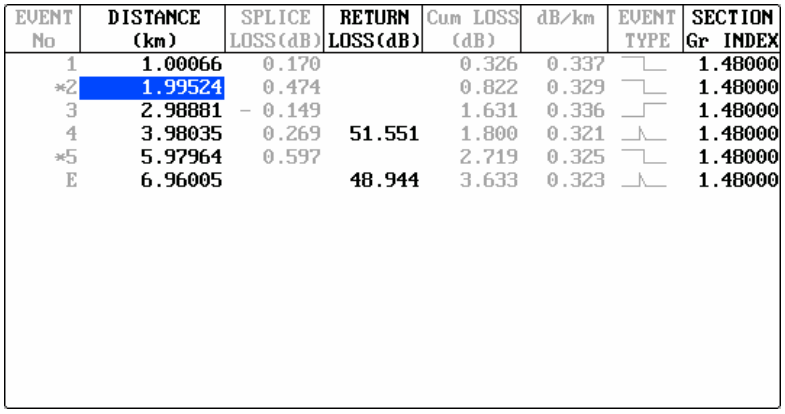
# Editing the Event List

## Editing an Interval Distance

With this instrument, the distance is calculated using the group index. However, in some cases, the distance between two points on the optical fiber is already known. In this case, the interval group index can be calculated by changing the distance.

The method of changing the interval distance is given below.

**1. Locate the cursor to the distance to be changed by using the rotary knob or the arrow key.**



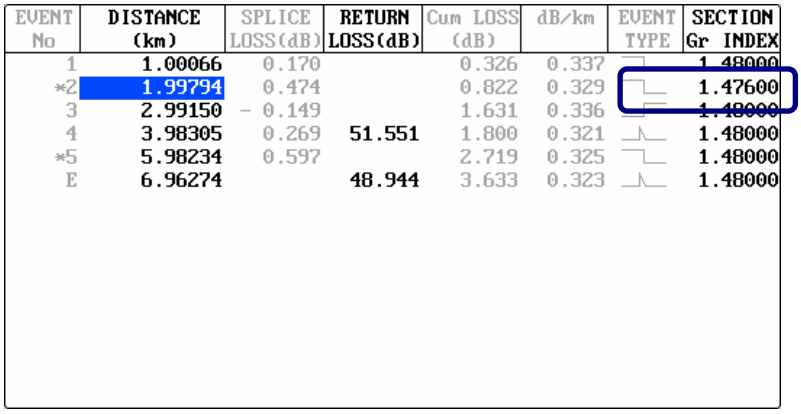
| EVENT No | DISTANCE (km) | SPLICE LOSS(dB) | RETURN LOSS(dB) | Cum LOSS (dB) | dB/km | EVENT TYPE | SECTION Gr INDEX |
|---|---|---|---|---|---|---|---|
| 1 | 1.00066 | 0.170 | | 0.326 | 0.337 | | 1.48000 |
| *2 | 1.99524 | 0.474 | | 0.822 | 0.329 | | 1.48000 |
| 3 | 2.98881 | - 0.149 | | 1.631 | 0.336 | | 1.48000 |
| 4 | 3.98035 | 0.269 | 51.551 | 1.800 | 0.321 | | 1.48000 |
| *5 | 5.97964 | 0.597 | | 2.719 | 0.325 | | 1.48000 |
| E | 6.96005 | | 48.944 | 3.633 | 0.323 | | 1.48000 |

**2. Press [ENTER].**

A selection window will appear.

**3. Change the value by using the rotary knob or the arrow key.**

**4. Press [ENTER], and the value is fixed.**



| EVENT No | DISTANCE (km) | SPLICE LOSS(dB) | RETURN LOSS(dB) | Cum LOSS (dB) | dB/km | EVENT TYPE | SECTION Gr INDEX |
|---|---|---|---|---|---|---|---|
| 1 | 1.00066 | 0.170 | | 0.326 | 0.337 | | 1.48000 |
| *2 | 1.99794 | 0.474 | | 0.822 | 0.329 | | 1.47600 |
| 3 | 2.99150 | - 0.149 | | 1.631 | 0.336 | | 1.48000 |
| 4 | 3.98305 | 0.269 | 51.551 | 1.800 | 0.321 | | 1.48000 |
| *5 | 5.98234 | 0.597 | | 2.719 | 0.325 | | 1.48000 |
| E | 6.96274 | | 48.944 | 3.633 | 0.323 | | 1.48000 |

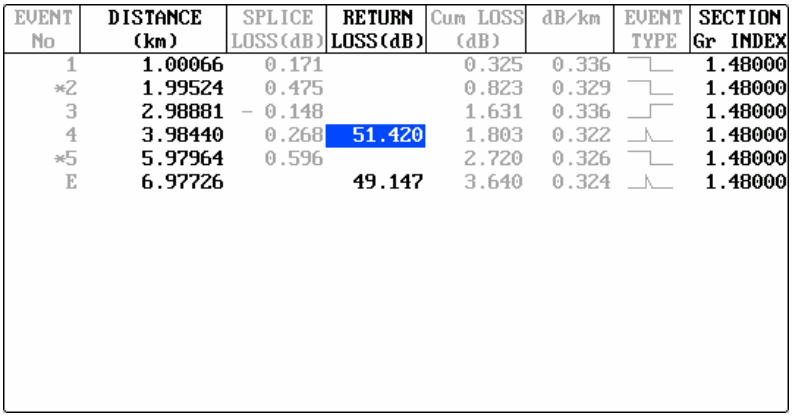
**TIP**

When the distance is changed, the interval group index for the changed events and the distances for the subsequent events will be re-calculated.

## Editing a Return Loss

With this instrument, the return loss is normally calculated based on the back scatter level. However, in some cases, the return loss is already known. In this case, enter the return loss to calculate the back scatter level.

**1. Locate the cursor to the return loss to be changed by using the rotary knob or the arrow key.**



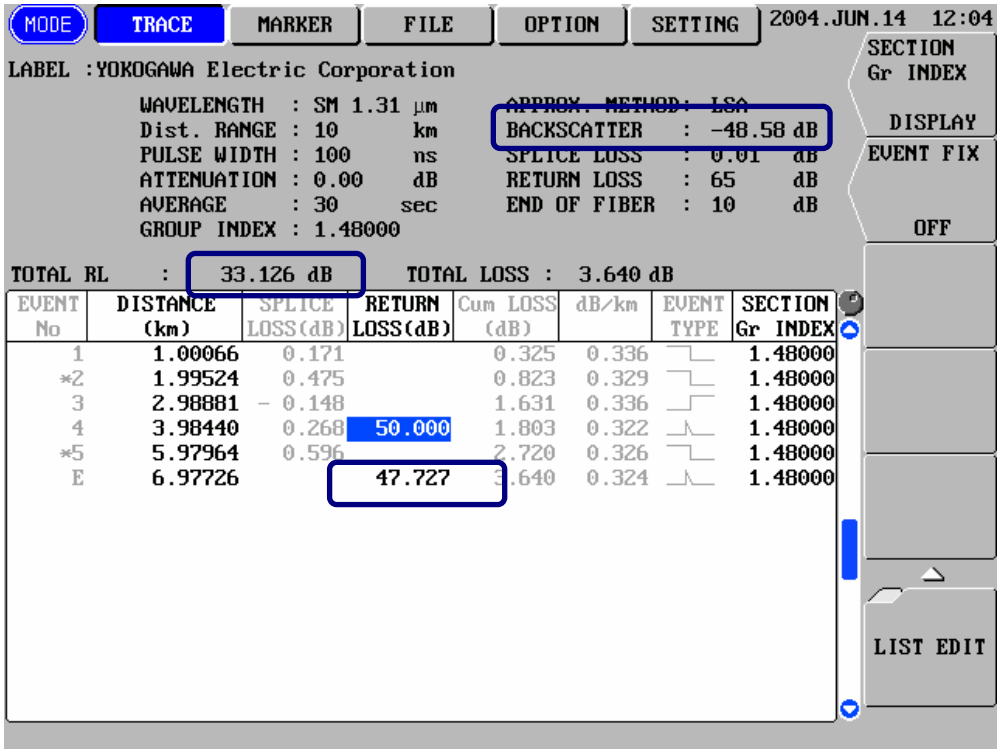
| EVENT No | DISTANCE (km) | SPLICE LOSS(dB) | RETURN LOSS(dB) | Cum LOSS (dB) | dB/km | EVENT TYPE | SECTION Gr INDEX |
|---|---|---|---|---|---|---|---|
| 1 | 1.00066 | 0.171 | | 0.325 | 0.336 | | 1.48000 |
| *2 | 1.99524 | 0.475 | | 0.823 | 0.329 | | 1.48000 |
| 3 | 2.98881 | - 0.148 | | 1.631 | 0.336 | | 1.48000 |
| 4 | 3.98440 | 0.268 | 51.420 | 1.803 | 0.322 | | 1.48000 |
| *5 | 5.97964 | 0.596 | | 2.720 | 0.326 | | 1.48000 |
| E | 6.97726 | | 49.147 | 3.640 | 0.324 | | 1.48000 |

**2. Press [ENTER].**

A selection window will appear.

**3.** **Change the value by using the rotary knob or the arrow key.**

**4.** **Press [ENTER], and the value is fixed.**




**TIP**

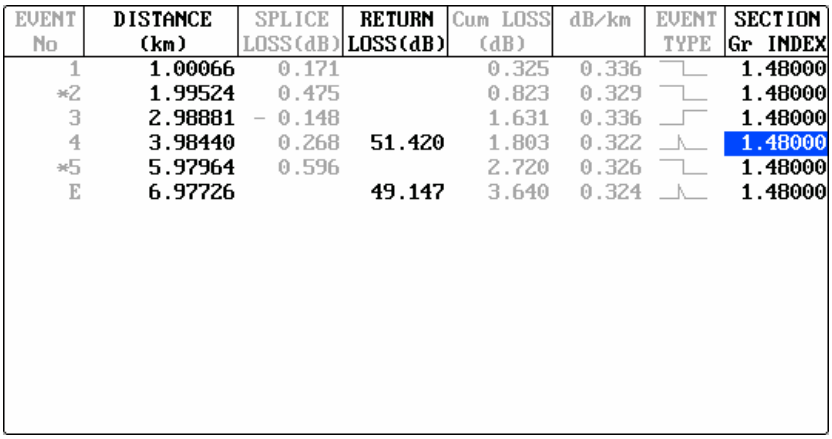
When the return loss is changed, the back scatter level will be re-calculated.

The return loss for all the events is then re-calculated based on the newly calculated back scatter level.

## Editing an Section Group Index

If two or more optical fibers are connected as a result of installation of new transmission system, the group index varies with the optical fibers. In this case, calculation of interval distance can be performed with higher accuracy by setting the group index of each optical fiber.

**1. Locate the cursor to the interval group index to be changed by using the rotary knob or the arrow key.**



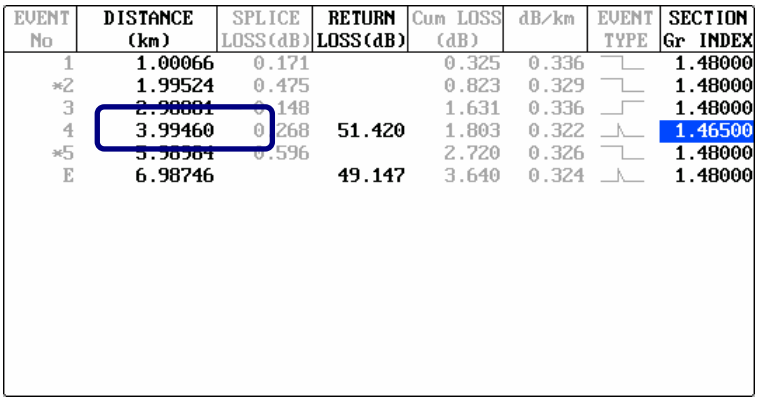
| EVENT No | DISTANCE (km) | SPLICE LOSS(dB) | RETURN LOSS(dB) | Cum LOSS (dB) | dB/km | EVENT TYPE | SECTION Gr INDEX |
|---|---|---|---|---|---|---|---|
| 1 | 1.00066 | 0.171 | | 0.325 | 0.336 | | 1.48000 |
| *2 | 1.99524 | 0.475 | | 0.823 | 0.329 | | 1.48000 |
| 3 | 2.98881 | - 0.148 | | 1.631 | 0.336 | | 1.48000 |
| 4 | 3.98440 | 0.268 | 51.420 | 1.803 | 0.322 | | 1.48000 |
| *5 | 5.97964 | 0.596 | | 2.720 | 0.326 | | 1.48000 |
| E | 6.97726 | | 49.147 | 3.640 | 0.324 | | 1.48000 |

**2. Press [ENTER].**

A selection window will appear.

**3.** **Change the value by using the rotary knob or the arrow key.**

**4.** **Press [ENTER], and the value is fixed.**



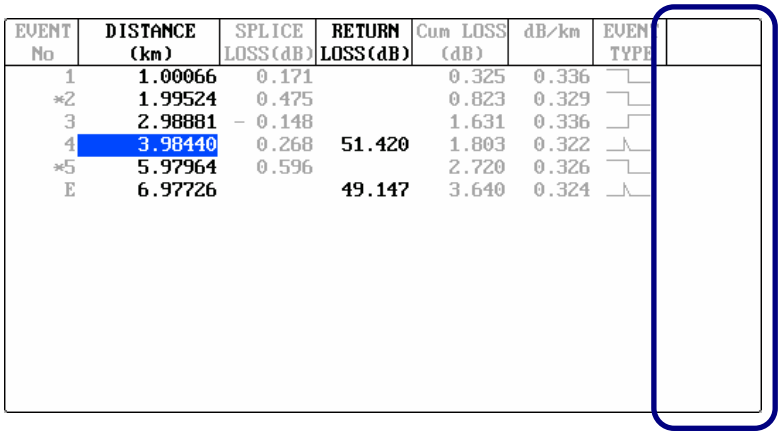
| EVENT No | DISTANCE (km) | SPLICE LOSS(dB) | RETURN LOSS(dB) | Cum LOSS (dB) | dB/km | EVENT TYPE | SECTION Gr INDEX |
|---|---|---|---|---|---|---|---|
| 1 | 1.00066 | 0.171 | | 0.325 | 0.336 | | 1.48000 |
| *2 | 1.99524 | 0.475 | | 0.823 | 0.329 | | 1.48000 |
| 3 | 2.98881 | 0.148 | | 1.631 | 0.336 | | 1.48000 |
| 4 | 3.99460 | 0.268 | 51.420 | 1.803 | 0.322 | | 1.46500 |
| *5 | 5.98984 | 0.596 | | 2.720 | 0.326 | | 1.48000 |
| E | 6.98746 | | 49.147 | 3.640 | 0.324 | | 1.48000 |

**TIP**

•When the interval group index is changed, the distance for the changed event will be re-calculated.

•It is also possible not to display the interval group index. The method is given below.

1. With this screen displayed, press [F1] (SECTION Gr INDEX).
2. Locate the cursor to “NonDISPLAY”.
3. Press [ENTER].



| EVENT No | DISTANCE (km) | SPLICE LOSS(dB) | RETURN LOSS(dB) | Cum LOSS (dB) | dB/km | EVENT TYPE |
|---|---|---|---|---|---|---|
| 1 | 1.00066 | 0.171 | | 0.325 | 0.336 | |
| *2 | 1.99524 | 0.475 | | 0.823 | 0.329 | |
| 3 | 2.98881 | 0.148 | | 1.631 | 0.336 | |
| 4 | 3.98440 | 0.268 | 51.420 | 1.803 | 0.322 | |
| *5 | 5.97964 | 0.596 | | 2.720 | 0.326 | |
| E | 6.97726 | | 49.147 | 3.640 | 0.324 | |

# 5.4 Attaching a Comment to an Event

This instrument allows you to attach a comment (event note) to each event detected by auto search.

This method of attaching a comment to an event is explained below.

♦ Example: Attaching a comment to event 1

**Caution**

A comment can consist of up to 36 characters.

**1. Measure the optical fiber and perform auto search.**

**Refer**

•For the method of measuring an optical fiber and performing auto search, refer to page 3-56.

•For the screen that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “LIST” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

A new screen will appear.

**Refer**

For the new screen, refer to page 3-106.

**5. Locate the cursor to “No.1 Event” by using the rotary knob or [▲] / [▼].**

**6. Press [F4] (EVENT NOTE EDIT).**

The comment input window will appear, so enter the desired comment.

**Refer**

For the comment input window and the method of entering a comment, refer to Chapter 4.

**7. After the comment is input, press [F5] (DONE).**

The entered comment will appear below the information for event 1.

**TIP**

| EVENT No | DISTANCE (km) | SPLICE LOSS(dB) | RETURN LOSS(dB) | Cum LOSS (dB) | dB/km | EVENT TYPE | SECTION Gr INDEX |
|---|---|---|---|---|---|---|---|
| 1 | 1.00066 | 0.170 | | 0.326 | 0.337 | | 1.48000 |
| *2 | 1.99524 | 0.474 | | 0.822 | 0.329 | | 1.48000 |
| F-Event:AQ7260/AQ7261 | | | | | | | |
| 3 | 2.98881 | - 0.149 | | 1.631 | 0.336 | | 1.48000 |
| 4 | 3.98035 | 0.269 | 51.551 | 1.800 | 0.321 | | 1.48000 |
| *5 | 5.97964 | 0.597 | | 2.719 | 0.325 | | 1.48000 |
| E | 6.96005 | | 48.944 | 3.633 | 0.323 | | 1.48000 |

**Caution**

The event note will be cleared when the power is turned OFF or when the next measurement is started.

# 5.5 Changing the Conditions and Performing Auto Search Again

It is possible to change search conditions for the data obtained by auto search, and perform auto search with the new conditions.

The method of changing the following search conditions is explained below.

- Group index
- Approximate method
- Back scatter level
- Splice loss threshold
- Return loss threshold
- Fiber end threshold
- Fault event show/hide setting
- Splice loss threshold for fault events
- Return loss threshold for fault events

## Displaying the Auto Search Condition Change Window

This section explains how to display the window by which the auto search conditions can be changed.

**1. Measure the optical fiber and perform auto search.**

**Refer**

•For the method of measuring an optical fiber and performing auto search, refer to page 3-56.

•For the screen that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “LIST” by using the rotary knob or [▲] / [▼].**

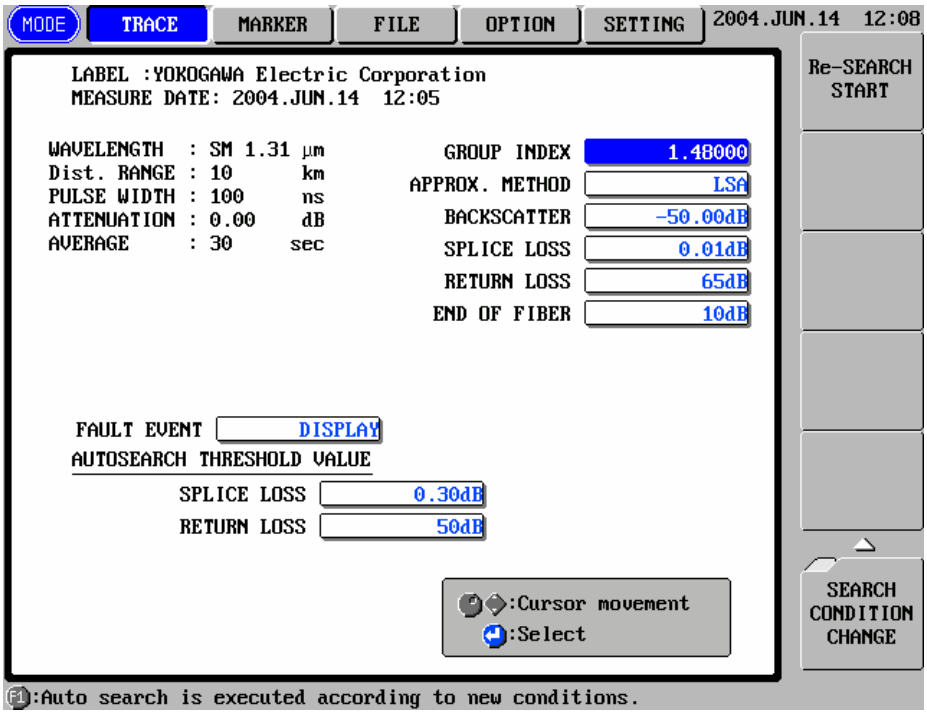
**4. Press [ENTER].**

**Refer**

For the new screen, refer to page 3-106.

**5. Press [F2] (SEARCH CONDITION CHANGE).**

The auto search condition change window will appear as shown below.



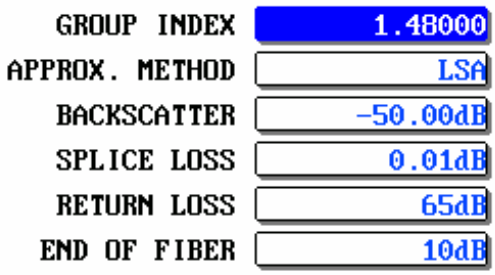
# Changing the Auto Search Conditions

## Changing the Group Index

Refer

For details on group index, refer to page 3-26.

**1. Locate the cursor to “GROUP INDEX” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**3. Change to the desired group index.**

Refer

For the method of changing the group index, refer to page 3-26.

**4. Press [F1] (Re-SEARCH START).**

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

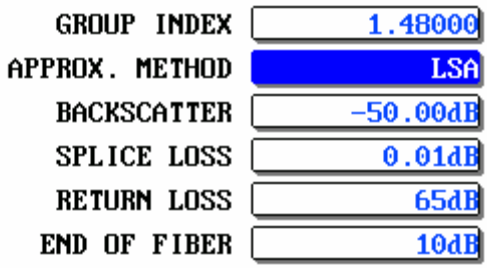
Refer to the notes given on changing the search conditions (page 5-38).

## Changing the Approximate Method

Refer

For details on approximate method, refer to page 3-37.

**1. Locate the cursor to "APPROX. METHOD" by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**3. Change to the desired approximate method.**

Refer

For the method of changing the approximate method, refer to page 3-37.

**4. Press [F1] (Re-SEARCH START).**

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

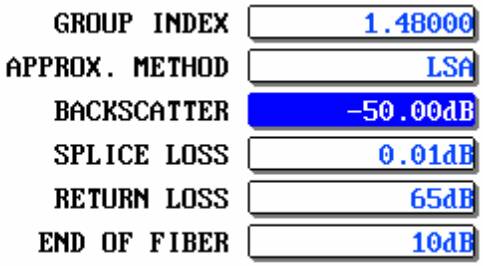
Refer to the notes given on changing the search conditions (page 5-38).

## Changing the Back Scatter Level

Refer

For details on back scatter level, refer to page 3-40.

**1. Locate the cursor to “BACKSCATTER” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**3. Change to the desired back scatter level.**

Refer

For the method of changing the back scatter level, refer to page 3-40.

**4. Press [F1] (Re-SEARCH START).**

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

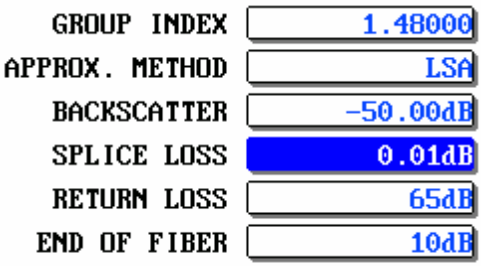
Refer to the notes given on changing the search conditions (page 5-38).

## Changing the Splice Loss Threshold

Refer

For details on splice loss threshold, refer to page 3-42.

**1. Locate the cursor to “SPLICE LOSS” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**3. Change to the desired splice loss threshold.**

Refer

For method of changing the splice loss threshold, refer to page 3-42.

**4. Press [F1] (Re-SEARCH START).**

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

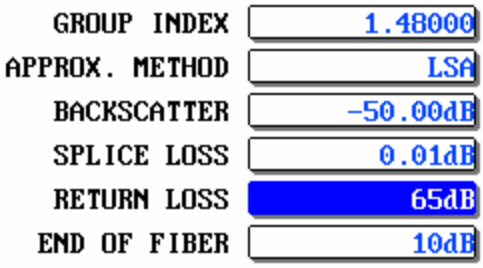
Refer to the notes given on changing the search conditions (page 5-38).

## Changing the Return Loss Threshold

Refer

For details on return loss threshold, refer to page 3-44.

**1. Locate the cursor to “RETURN LOSS” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**3. Change to the desired return loss threshold.**

Refer

For method of changing the return loss threshold, refer to page 3-44.

**4. Press [F1] (Re-SEARCH START).**

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

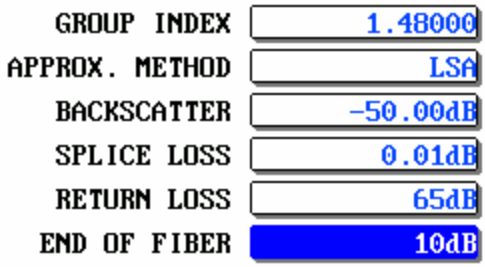
Refer to the notes given on changing the search conditions (page 5-38).

## Changing the Fiber End Threshold

Refer

For details on fiber end threshold, refer to page 3-46.

**1. Locate the cursor to "END OF FIBER" by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**3. Change to the desired fiber end threshold.**

Refer

For the method of changing the fiber end threshold, refer to page 3-46.

**4. Press [F1] (Re-SEARCH START).**

Auto search will start with the newly set search conditions.

TIP

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

Refer

Refer to the notes given on changing the search conditions (page 5-38).

## Changing the Fault Event Show/Hide Setting

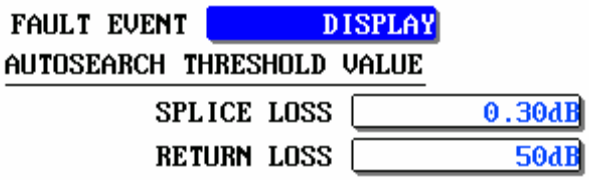
The fault event show/hide setting can be changed as explained below.

♦ Example: “DISPLAY” → “NonDISPLAY”

Refer

For details on fault event, refer to page 3-68.

**1. Locate the cursor to “FAULT EVENT” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

TIP

| | | |
|---|---|---|
| Selectable fault event settings | *DISPLAY | Performs auto search and displays noticeably the fault events if any. |
| | NonDISPLAY | Performs auto search, and handles fault events as normal events and displays them. |

*: Indicates the default setting.

Refer

For the method of displaying fault events, refer to page 3-68.

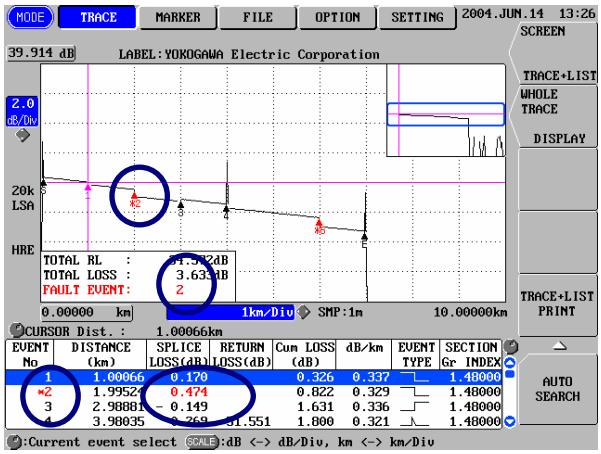
**3. Locate the cursor to “NonDISPLAY” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the fault event show/hide setting.**

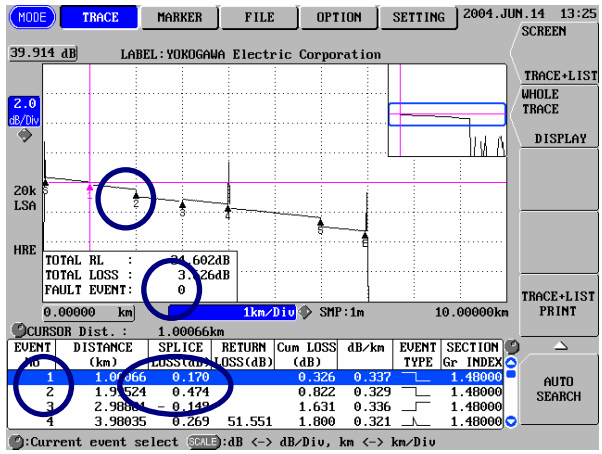
**5. Press [F1] (Re-SEARCH START).**

**TIP**

When “DISPLAY” is selected




When “NonDISPLAY” is selected




**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

**Refer**

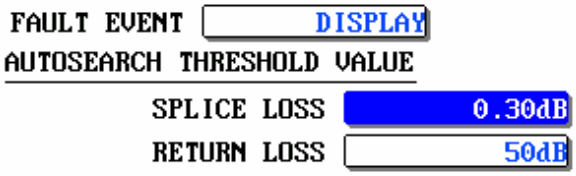
Refer to the notes given on changing the search conditions (page 5-38).

## Changing the Splice Loss Threshold for Fault Events

**Caution**

The splice loss threshold for fault events cannot be changed if “NonDISPLAY” is selected for “FAULT EVENT”.

**1. Locate the cursor to “SPLICE LOSS” for “AUTOSEARCH THRESHOLD VALUE” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**3. Change to the desired splice loss threshold.**

**Refer**

For method of changing the splice loss threshold, refer to page 3-42.

**4. Press [F1] (Re-SEARCH START).**

Auto search will start with the newly set search conditions.

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

**Refer**

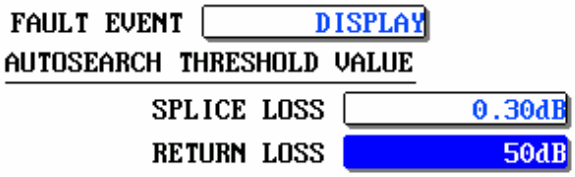
Refer to the notes given on changing the search conditions (page 5-38).

## Changing the Return Loss Threshold for Fault Events

**Caution**

The return loss threshold for fault events cannot be changed if “NonDISPLAY” is selected for “FAULT EVENT”.

**1. Locate the cursor to “RETURN LOSS” for “AUTOSEARCH THRESHOLD VALUE” by using the rotary knob or the arrow key.**




**2. Press [ENTER].**

A selection window will appear.

**3. Change to the desired return loss threshold.**

**Refer**

For method of changing the return loss threshold, refer to page 3-44.

**4. Press [F1] (Re-SEARCH START).**

Auto search will start with the newly set search conditions.

**TIP**

When changing the condition for two or more items, it is recommended to change the condition for each item first and then press [F1].

**Refer**

Refer to the notes given on changing the search conditions (page 5-38).

## Notes on Changing of Auto Search Conditions

**Caution**

If the auto search conditions are changed using this window, they will be used as the measurement conditions and auto search conditions to obtain data next time.

If you are not going to use the conditions set by this window to obtain new data, the measurement conditions and auto search conditions must be changed.

**Refer**

For the method of setting the conditions to be applied when obtaining new data, refer to page 3-9.

# Chapter 6
# FILE OPERATION

# 6.1 File Operation

This section explains the following file operation functions.

- Saving a file
- Recalling a file
- Deleting a file
- Printing a file
- Copying a file

## Saving a File


For the method of saving a file, refer to page 3-88.

# Recalling a File

This section explains how to recall a file.

## Displaying the File Operation Window

**1. Press [FILE] to display the file operation window.**

Refer

For details on the file operation window, refer to page 3-89.

**2. Press [F1] (FILE OPERATION).**

A selection window will appear.

TIP

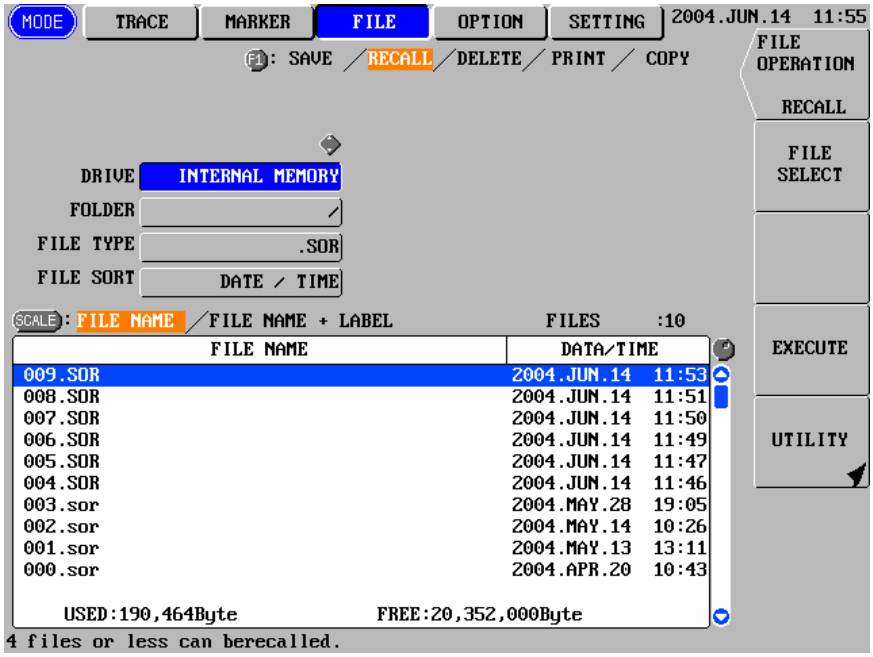
| | |
|---|---|
| Selectable file operations | *SAVE |
| | RECALL |
| | DELETE |
| | PRINT |
| | COPY |

*: Indicates the default setting.

**3. Locate the cursor to “RECALL” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to change file operation.**

The following window will appear.




## Selecting a Drive

**Caution**

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, only files that are stored in the internal memory can be recalled. In the case of the floppy disk drive, this function is not possible unless a floppy disk is inserted into the floppy disk drive.

**5. Select the drive.**

**Refer**

For the method of changing the drive, refer to page 3-91.

## Selecting a Folder

**6. Select the desired folder.**

Refer

For the method of selecting a folder, refer to page 3-92.

## Selecting a File Type (Extension)

**7. Select the file type of the file to be recalled.**

Refer

For the method of selecting a file type, refer to page 3-94.

TIP

| | | |
|---|---|---|
| Selectable file types | .SOR | Displays a list of files saved in the file type that conforms to Bellcore GR-196-CORE and Telcordia SR-4731. |
| | TRD (AQ7260) | Displays a list of files that have been saved by AQ7260. |
| | .SET (Setup) | Displays a list of files containing only the measurement conditions. |
| | .LST (Event List) | Displays a list of files containing an event list. |
| | .TRB (AQ7250) | Displays a list of files that have been saved by AQ7250. |
| | .TRA (AQ7210/20) | Displays a list of files that have been saved by AQ7210/20. |
| | .4 (AQ-7140C/D) | Displays a list of files that have been saved by AQ-7140C/D. |

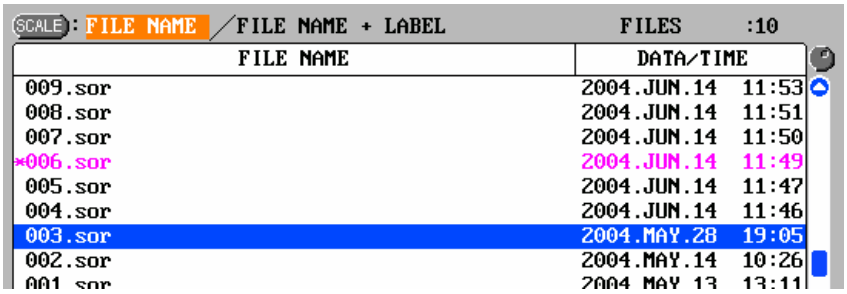
## Selecting the File to be Recalled

**8. Locate the cursor to the file to be recalled by turning the rotary knob.**

**9. Press [F2] (FILE SELECT) to select the file.**

**TIP**

The color of the selected file name will change. “*” also appears in front of the file name.




Up to four files (traces) can be selected.

•If a file(s) that you do not want to recall is selected by mistake, repeat steps 8 and 9. This will cancel selection of that file(s).

•By pressing [SCALE], the file list display format can be changed. However, if “FILE NAME + LABEL” is selected, it will take some time before the file list is displayed.


FILE NAME + LABEL

## Recalling the Selected File(s)

**10. Press [F4] (EXECUTE) to recall the selected file(s).**

# Deleting a File

This section explains how to delete a file.

## Displaying the File Operation Window

**1. Press [FILE] to display the file operation window.**

Refer

For details on the file operation window, refer to page 3-89.

**2. Press [F1] (FILE OPERATION).**

A selection window will appear.

TIP

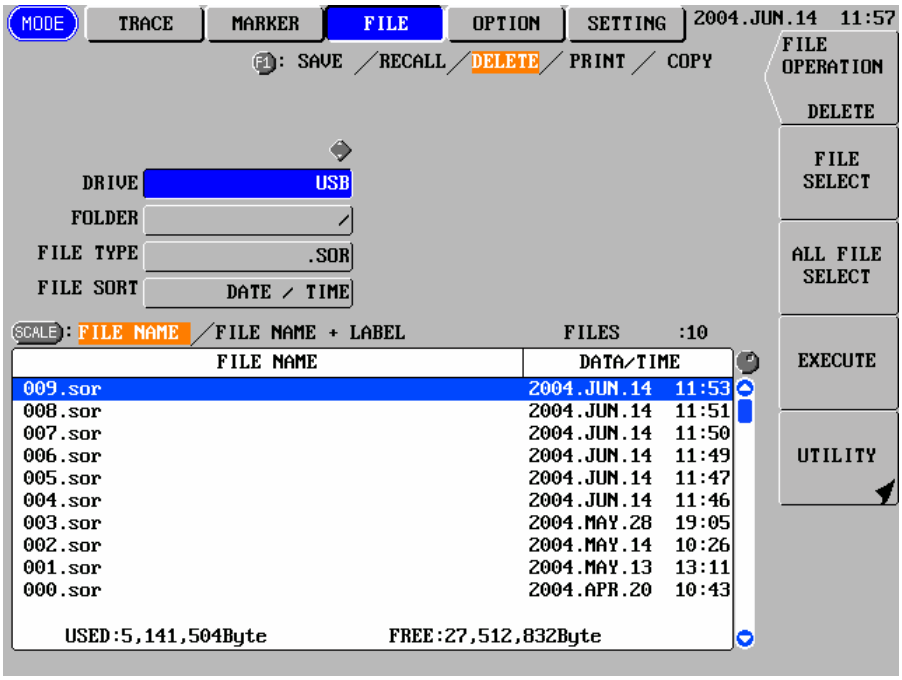
| | |
|---|---|
| Selectable file operations | *SAVE |
| | RECALL |
| | DELETE |
| | PRINT |
| | COPY |

*: Indicates the default setting.

**3. Locate the cursor to “DELETE” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to change file operation.**

The following window will appear.




## Selecting a Drive

**Caution**

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, only files that are stored in the internal memory can be deleted. In the case of the floppy disk drive, this function is not possible unless a floppy disk is inserted into the floppy disk drive.

**5. Select the drive.**

**Refer**

For the method of changing the drive, refer to page 3-91.

## Selecting a Folder

**6. Select the desired folder.**

Refer

For the method of selecting a folder, refer to page 3-92.

## Selecting a File Type (Extension)

**7. Select the file type of the file to be deleted.**

Refer

For the method of selecting a file type, refer to page 3-94.

TIP

| | | |
|---|---|---|
| Selectable file types | .SOR | Displays a list of files saved in the file type that conforms to Bellcore GR-196-CORE and Telcordia SR-4731. |
| | .TRD (AQ7260) | Displays a list of files that have been saved by AQ7260. |
| | .SET (Setup) | Displays a list of files containing only the measurement conditions. |
| | .LST (Event List) | Displays a list of files containing an event list. |
| | .BMP (Image) | Displays a list of files that have been saved in BITMAP format. |
| | .TIF (Image) | Displays a list of files that have been saved in TIFF format. |
| | .CSV | Displays a list of files that have been saved in CSV format. |
| | *.* (All) | Displays a list of the files stored in the specified folder. |

## Selecting the File to be Deleted

**8. Locate the cursor to the file to be deleted by turning the rotary knob.**

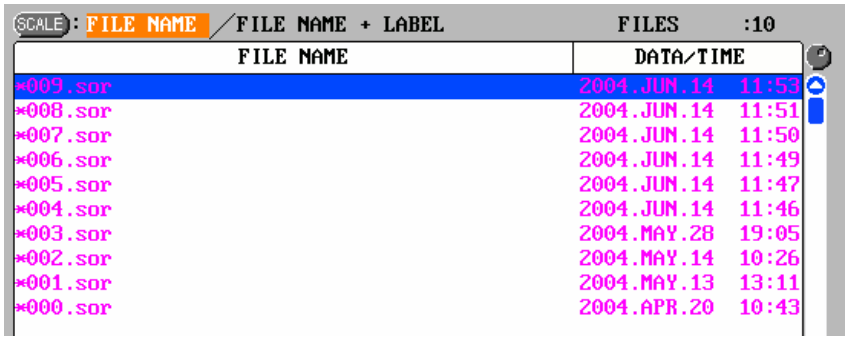
**9. Press [F2] (FILE SELECT) to select the file.**

**TIP**

•The color of the selected file name will change. "*" also appears in front of the file name. (Refer to page 6-6.)

•If a file(s) that you do not want to delete is selected by mistake, repeat steps 8 and 9. This will cancel selection of that file(s).

•When you want to delete all the files displayed in the list, they can be selected by pressing [F3] (ALL FILE SELECT) at step 8.

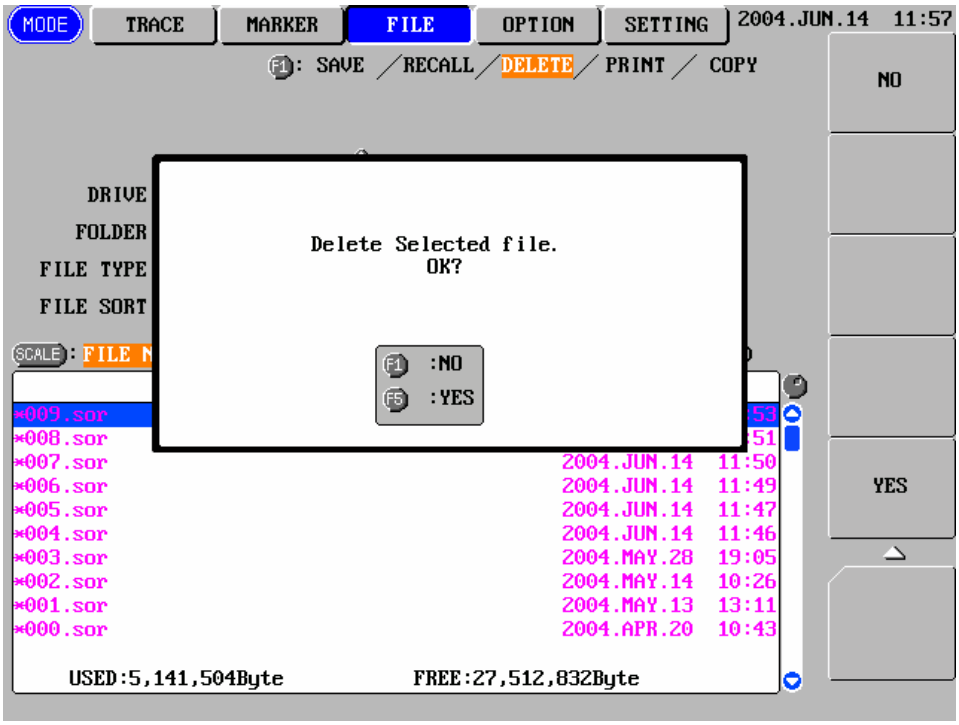



•By pressing [SCALE], the file list display format can be changed. However, if "FILE NAME + LABEL" is selected, it will take some time before the file list is displayed. (Refer to page 6-6.)

## Deleting the Selected File(s)

### 10. Press [F4] (EXECUTE).

The following window will appear.




### 11. Press [F5] (YES) to delete the selected file(s).

**TIP**

If [F1] (NO) is pressed, the procedure will go back to the end of step 9.

## Printing a File

This section explains how to print the data saved in a file.

**Caution** Before starting to print, make sure that a printer is connected to the instrument and correct print settings are made.

**Refer** For the method of connecting/selecting a printer, refer to pages 8-3, 8-6, 8-16, and 8-18.

### Displaying the File Operation Window

**1. Press [FILE] to display the file operation window.**

**Refer** For details on the file operation window, refer to page 3-89.

**2. Press [F1] (FILE OPERATION).**

A selection window will appear.

**TIP**

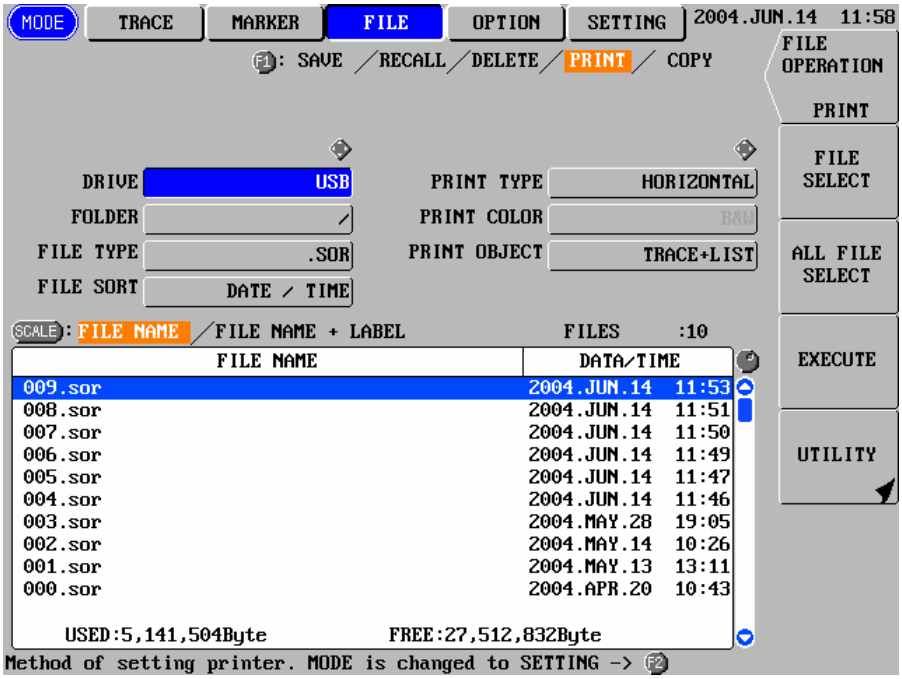
| | |
|---|---|
| Selectable file operations | *SAVE |
| | RECALL |
| | DELETE |
| | PRINT |
| | COPY |

*: Indicates the default setting.

**3.** **Locate the cursor to “PRINT” by using the rotary knob or [▲] / [▼].**

**4.** **Press [ENTER] to change file operation.**

The following window will appear.




## Selecting a Drive

**Caution**

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, only files that are stored in the internal memory can be printed. In the case of the floppy disk drive, this function is not possible unless a floppy disk is inserted into the floppy disk drive.

**5.** **Select the drive.**

**Refer**

For the method of changing the drive, refer to page 3-91.

## Selecting a Folder

**6. Select the desired folder.**

Refer

For the method of selecting a folder, refer to page 3-92.

## Selecting a File Type (Extension)

**7. Select the file type of the file to be printed.**

Refer

For the method of selecting a file type, refer to page 3-94.

TIP

| | | |
|---|---|---|
| Selectable file types | .SOR | Displays a list of files saved in the file type that conforms to Bellcore GR-196-CORE and Telcordia SR-4731. |
| | .TRD (AQ7260) | Displays a list of files that have been saved by AQ7260. |
| | .LST (Event List) | Displays a list of files containing an event list. |
| | .TRB (AQ7250) | Displays a list of files that have been saved by AQ7250. |
| | .TRA (AQ7210/20) | Displays a list of files that have been saved by AQ7210/20. |
| | .4 (AQ-7140C/D) | Displays a list of files that have been saved by AQ-7140C/D. |

## Selecting a Print Type

**8. Select the desired print type.**

**TIP**

The print type can also be selected in the SETTING mode.

**Refer**

For details on print type, refer to page 2-35.

## Selecting a Print Color

**9. Select the desired print color.**

**TIP**

The print type can also be selected in the SETTING mode.

**Refer**

For the method of selecting a print color, refer to page 2-37.

## Selecting a Print Object

The print object can be changed as explained below.

♦ Example: “TRACE + LIST” → “TRACE”

**Caution** The print object cannot be changed if “.LST” has been selected as the file type.

**10. Locate the cursor to “PRINT OBJECT” by using the arrow key.**

**11. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable objects | *TRACE + LIST | Prints both the trace and event list. |
| | TRACE | Prints the trace only. |
| | LIST | Prints the event list only. |

*: Indicates the default setting.

**12. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**13. Press [ENTER] to register the change made to the print object setting.**

## Selecting the File to be Printed

**14.** **Locate the cursor to the file to be printed by turning the rotary knob.**

**15.** **Press [F2] (FILE SELECT) to select the file.**

**TIP**

- The color of the selected file name will change. "*" also appears in front of the file name. (Refer to page 6-6.)
- If a file(s) that you do not want to print is selected by mistake, repeat steps 14 and 15. This will cancel selection of that file(s).
- When you want to print all the files displayed in the list, they can be selected by pressing [F3] (ALL FILE SELECT) at step 14. (Refer to page 6-10.)
- By pressing [SCALE], the file list display format can be changed. However, if "FILE NAME + LABEL" is selected, it will take some time before the file list is displayed. (Refer to page 6-6.)

## Printing the Selected File(s)

**16.** **Press [F4] (EXECUTE).**

**Caution**

Once printing starts, it cannot be stopped halfway.

# Copying a File

This section explains how to copy a file to another folder.

## Displaying the File Operation Window

**1. Press [FILE] to display the file operation window.**

Refer

For details on the file operation window, refer to page 3-89.

**2. Press [F1] (FILE OPERATION).**

A selection window will appear.

TIP

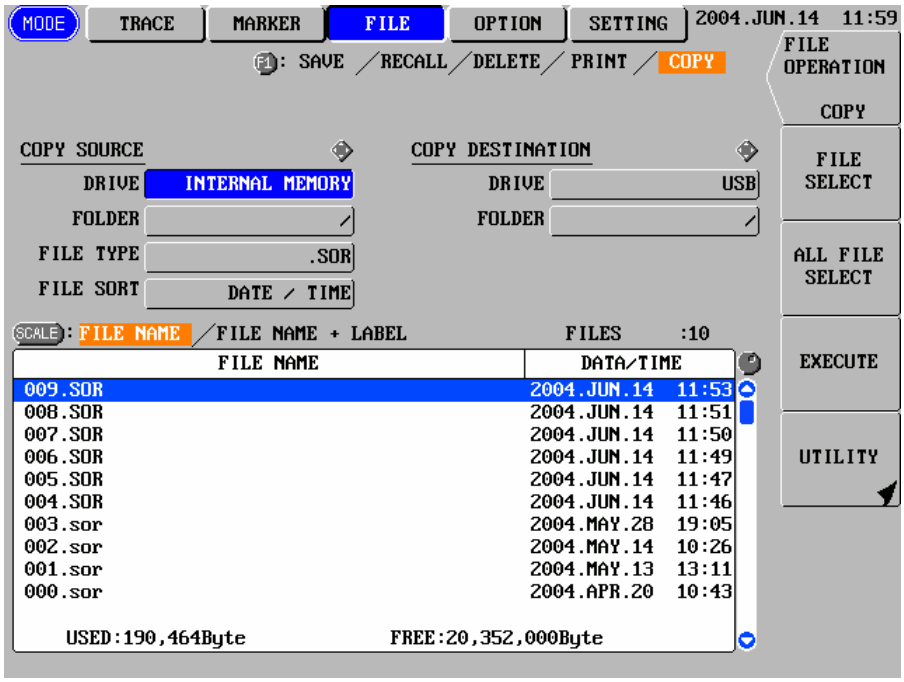
| | |
|---|---|
| Selectable file operations | *SAVE |
| | RECALL |
| | DELETE |
| | PRINT |
| | COPY |

*: Indicates the default setting.

**3. Locate the cursor to “COPY” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to change file operation.**

The following window will appear.




## Selecting the Copy Source/Destination (Drive)

**Caution**

If no drives are installed on the instrument or if they are installed but not connected, it is not possible to select them. In this case, files can be copied within the internal memory. In the case of the floppy disk drive, this function is not possible unless a floppy disk is inserted into the floppy disk drive.

**5. Select the drive.**

**Refer**

For the method of changing the drive, refer to page 3-91.

## Selecting the Copy Source/Destination (Folder)

**6. Select the desired folder.**

Refer

For the method of selecting a folder, refer to page 3-92.

## Selecting a File Type (Extension)

**7. Select the file type of the file to be copied.**

Refer

For the method of selecting a file type, refer to page 3-94.

TIP

| | | |
|---|---|---|
| Selectable file types | .SOR | Displays a list of files saved in the file type that conforms to Bellcore GR-196-CORE and Telcordia SR-4731. |
| | .TRD (AQ7260) | Displays a list of files that have been saved by AQ7260. |
| | .SET (Setup) | Displays a list of files containing only the measurement conditions. |
| | .LST (Event List) | Displays a list of files containing an event list. |
| | .BMP (Image) | Displays a list of files that have been saved in BITMAP format. |
| | .TIF (Image) | Displays a list of files that have been saved in TIFF format. |
| | .CSV | Displays a list of files that have been saved in CSV format. |
| | *.* (All) | Displays a list of the files stored in the specified folder. |

## Selecting the File to be Copied

**8. Locate the cursor to the file to be copied by turning the rotary knob.**

**9. Press [F2] (FILE SELECT) to select the file.**

**TIP**

- The color of the selected file name will change. "*" also appears in front of the beginning of the file name. (Refer to page 6-6.)
- If a file(s) that you do not want to copy is selected by mistake, repeat steps 8 and 9. This will cancel selection of that file(s).
- When you want to copy all the files displayed in the list, they can be selected by pressing [F3] (ALL FILE SELECT) at step 8. (Refer to page 6-10.)
- By pressing [SCALE], the file list display format can be changed. However, if "FILE NAME + LABEL" is selected, it will take some time before the file list is displayed. (Refer to page 6-6.)

## Copying the Selected File(s)

**10. Press [F4] (EXECUTE).**

# 6.2 Using the Utility Functions

This chapter explains how to use the following utility functions.

- Initializing a drive
- Deleting a folder
- Creating a folder
- Copying a folder

## Initializing a Drive

This section explains how to initialize the specified storage media.

**Caution**

- Storage media for more than 32G byte cannot be formatted.
- The storage media which does not format by DOS can not be initialized.

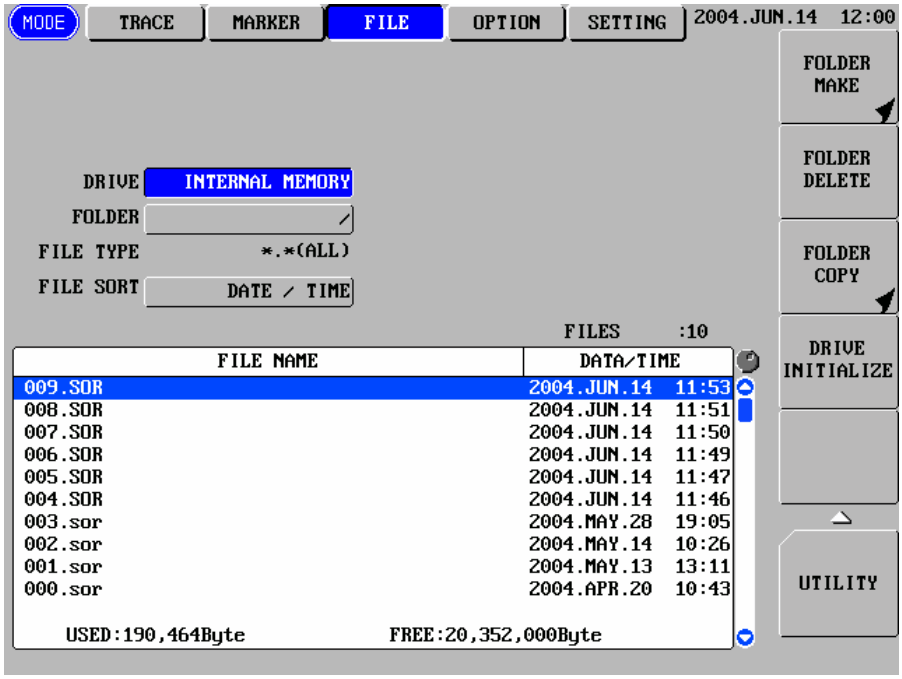
### 1. Press [FILE].

**Refer**

For details on the file operation window, refer to page 3-89.

### 2. Press [F5] (UTILITY).

The following window will appear.

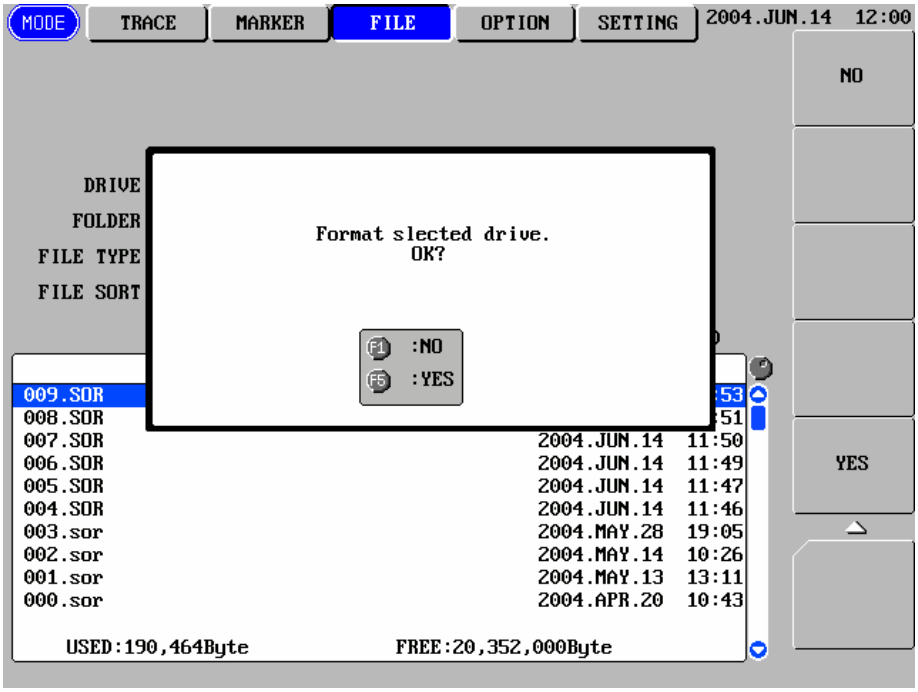


**3. Select the drive to be initialized.**

Refer — For the method of selecting a drive, refer to page 3-91.

**4. Press [F4] (DRIVE INITIALIZE).**

The following window will appear.




**5. Press [F5] (YES) to start initialization.**

Caution — All the folders and files in the drive will be deleted.

TIP — The drive will not be initialized if [F1] (NO) is pressed.

## Deleting a Folder

This section explains how to delete the desired folder.

**1. Press [FILE].**

Refer

For details on the file operation window, refer to page 3-89.

**2. Press [F5] (UTILITY).**

**3. Select the drive that contains the folder to be deleted.**

Refer

For the method of selecting a drive, refer to page 3-91.

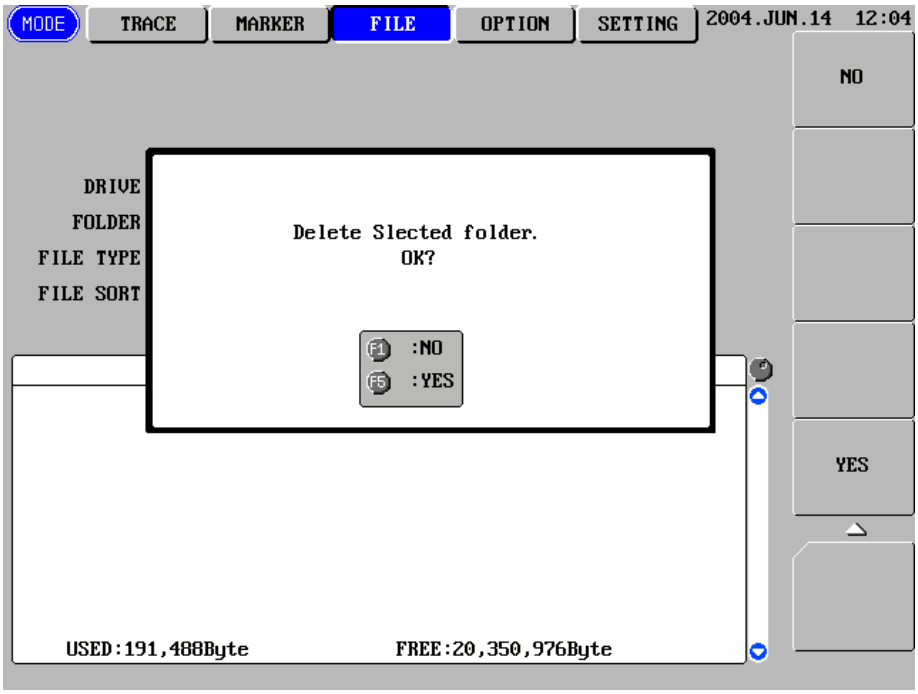
**4. Select the folder to be deleted.**

Refer

For the method of specifying a folder, refer to page 3-92.

**5. Press [F2] (FOLDER DELETE).**

The following window will appear.




**6. Press [F5] (YES) to start deletion.**

**Caution** If the specified folder contains files or sub folders, it cannot be deleted. In this case, a message will appear, so take necessary steps according the message.

**TIP** The folder will not be deleted if [F1] (NO) is pressed.

## Creating a Folder

This section explains how to create a folder.

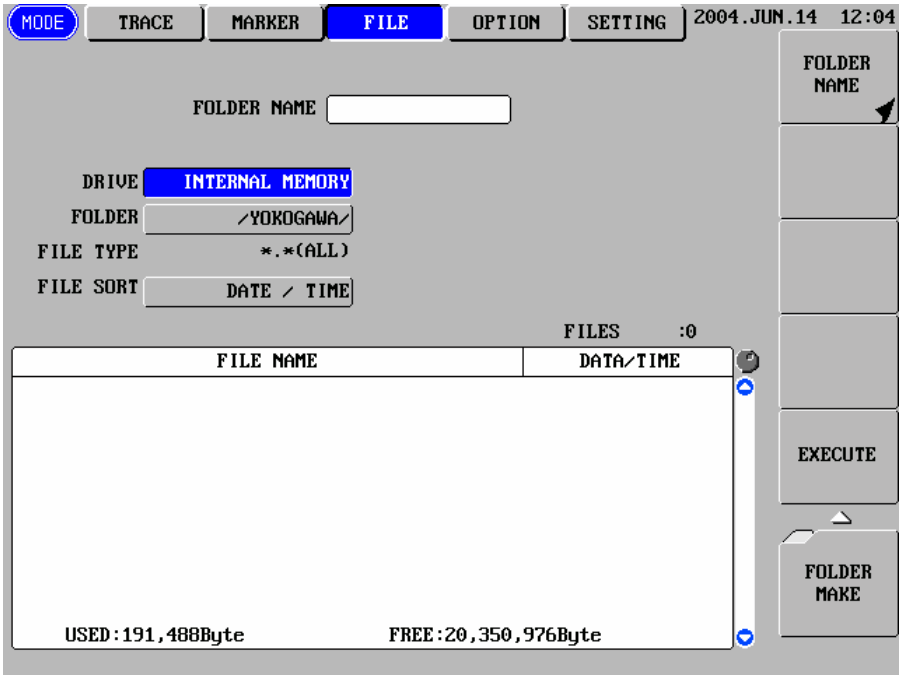
**1. Press [FILE].**

Refer — For details on the file operation window, refer to page 3-89.

**2. Press [F5] (UTILITY).**

**3. Press [F1] (FOLDER MAKE).**

The following window will appear.



**4. Select the drive in which you want to create a folder.**

**Refer** For the method of selecting a drive, refer to page 3-91.

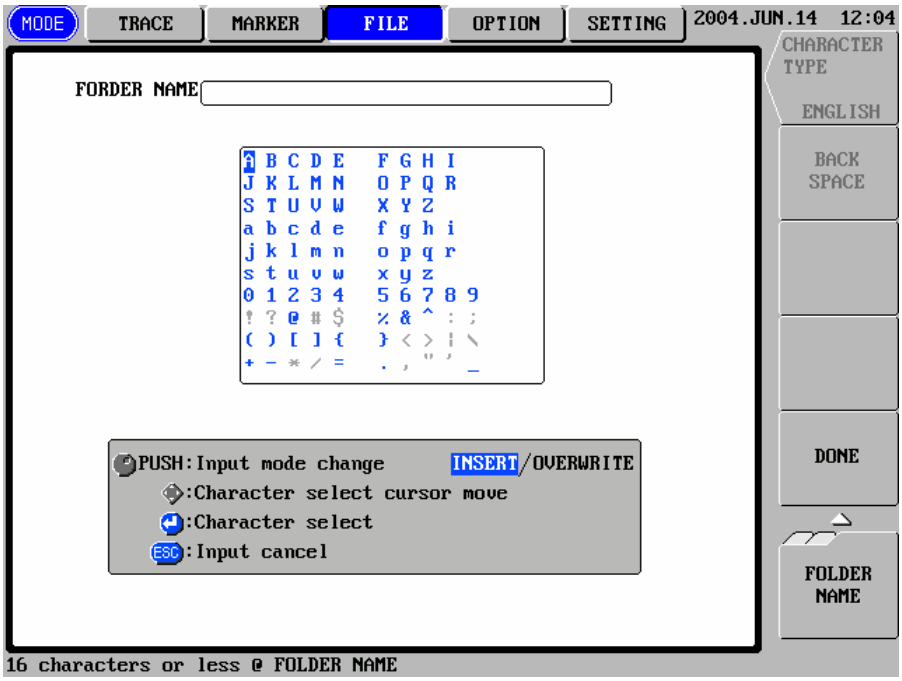
**5. Select the desired folder.**

**TIP** A new folder will be created as a sub folder of the selected folder.

**Refer** For the method of specifying a folder, refer to page 3-92.

**6. Press [F1] (FOLDER NAME).**

A window allowing you to enter a folder name will appear.



**7. Enter the desired folder name.**

**Caution**

The folder name can consist of up to 16 characters.

**Refer**

For the method of entering a folder name, refer to Chapter 4.

**8. Press [F5] (DONE).**

The folder name is fixed.

**9. Press [F5] (EXECUTE).**

The folder is made.

**Caution**

If the specified folder has a sub folder with the same name as the one you are going to create, the folder cannot be created. In this case, a message will appear, so take necessary steps according the message.

## Copying a Folder

This section explains how to copy a folder.

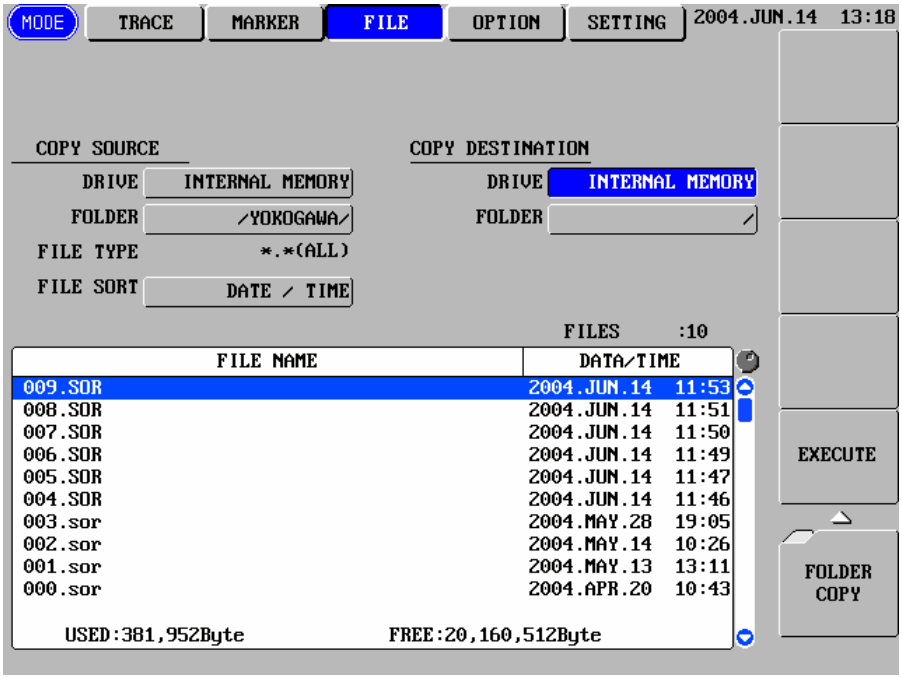
**1. Press [FILE].**

Refer For details on the file operation window, refer to page 3-89.

**2. Press [F5] (UTILITY).**

**3. Press [F3] (FOLDER COPY).**

The following window will appear.



**4. Select the drive that contains the folder to be copied.**

Refer

For the method of selecting a drive, refer to page 3-91.

**5. Select the folder to be copied.**

Refer

For the method of specifying a folder, refer to page 3-92.

**6. Select the drive to which the folder is to be copied.**

Refer

For the method of selecting a drive, refer to page 3-91.

**7. Select the copy destination folder.**

TIP

The copy source folder will be copied as a sub folder of the selected folder.

Refer

For the method of specifying a folder, refer to page 3-92.

**8. Press [F5] (EXECUTE) to create the specified folder.**

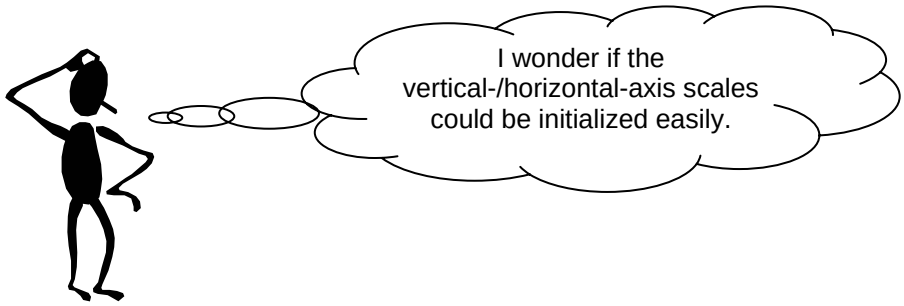
Caution

If the copy destination folder has a folder with the same name as the copy source folder, copy will not be performed. In this case, a message will appear, so take necessary steps according the message.

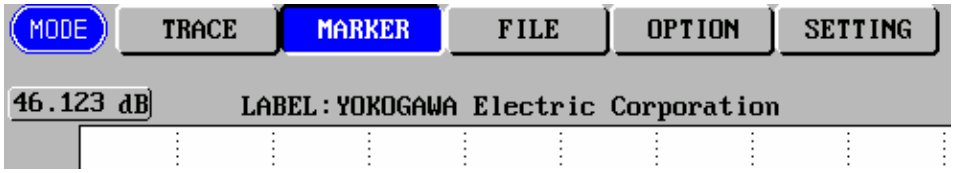
# Chapter 7
# USING USEFUL FUNCTIONS

# 7.1 Initializing the Vertical-/Horizontal-Axis Scales

This section explains how to restore the original scale of the trace that has been enlarged, reduced or shifted.




**1. Press [MODE] to locate the cursor to “MARKER”.**




**2. Press [F5] (NEXT PAGE).**

**3. Press [F5] (AUXILIARY FUNCTION).**

**4. Press [F1] (SCALE INITIALIZE).**

The scales will be initialized.

**TIP**

Both the vertical-axis and horizontal-axis scales will be initialized at the same time.

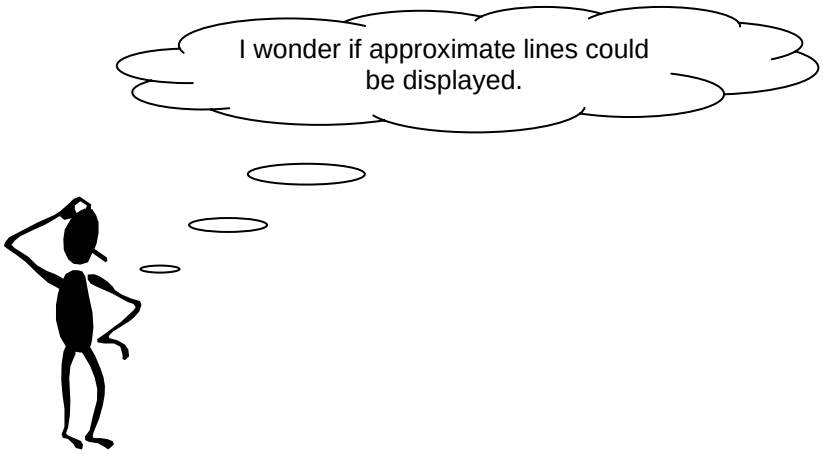
# 7.2 Displaying Approximate Lines

This section explains how to change the approximate line display setting.

♦ Example: “NonDISPLAY” → “DISPLAY”

**Refer**

For details on approximate method and approximate line, refer to page 3-37.



## For Traces that Have Been Auto Searched

**Refer**

For the window that shows auto search results at the end of measurement, refer to page 3-68.

**1. Press [F1](SCREEN).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**2. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**3. Press [ENTER].**

A new window will appear.

**Refer**

For details on the window, refer to page 5-4.

**4. Press [F2] (EVENT EDIT).**

**5. Press [F3] (EVENT MARKER EDIT).**

**6. Press [F5] (AUXILIARY FUNCTION).**

**7. Press [F4] (APPROX. LINE).**

A selection window will appear.

**TIP**

| Selectable approximate line setting | *NonDISPLAY |
|---|---|
| | DISPLAY |

*: Indicates the default setting.

**8. Locate the cursor to "DISPLAY" by using the rotary knob or [▲] / [▼].**

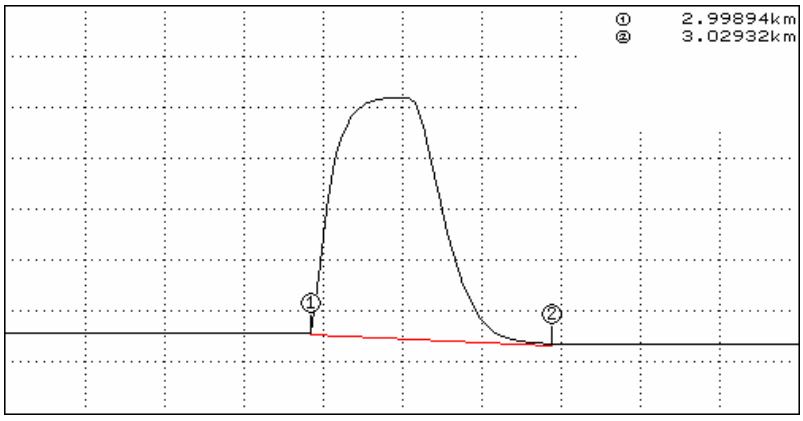
**9. Press [ENTER].**

An approximate line will appear.

**Caution**

No approximate line will appear if no markers have been set.

**TIP**

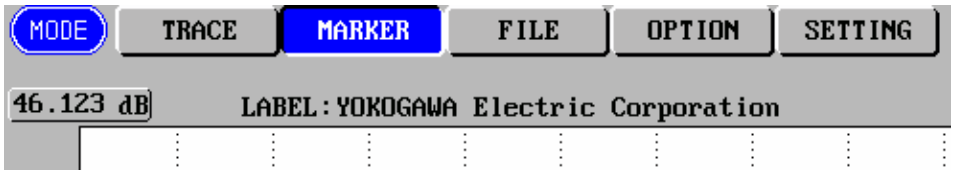


## For Traces that Have Not Been Auto Searched

**Refer**

For the window that is displayed just after measurement is finished (without auto search), refer to page 3-71.

**1. Press [MODE] to locate the cursor to “MARKER”.**




**2. Press [F5] (NEXT PAGE).**

**3. Press [F5] (AUXILIARY FUNCTION).**

**4. Press [F3] (APPROX. LINE).**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable approximate line setting | *NonDISPLAY | Hides the approximate line. |
| | DISPLAY | Shows the approximate line. |

*: Indicates the default setting.

**5. Locate the cursor to “DISPLAY” by using the rotary knob or [▲] / [▼].**

**6. Press [ENTER].**

An approximate line will appear.

**Caution**

No approximate line will appear if no markers have been set.

# 7.3 Using the Cursor Link Function

The cursor link function keeps a certain distance among markers (① to ③, Y1 to Y3). For instance, when the cursor is moved 1km, all the markers will be moved 1km in the same direction as the cursor.

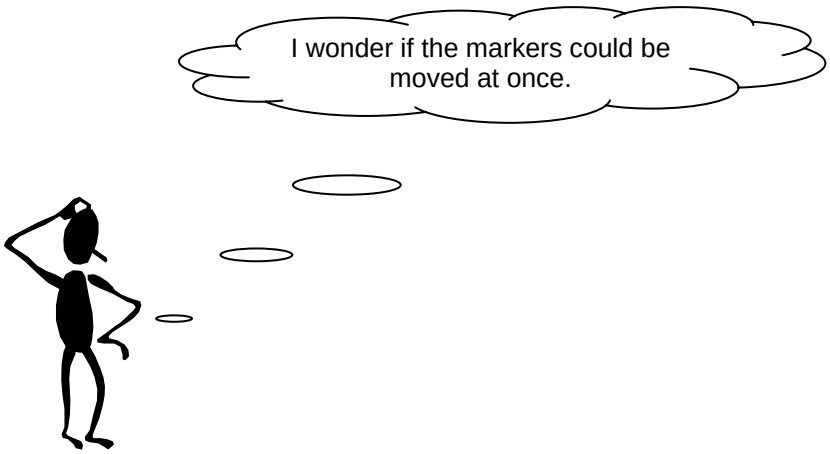
The method of changing the cursor link setting is given below.

♦ Example: “OFF” → “ON”

**TIP**

•The cursor link function must be used when you want to change marker positions without changing the distances among the markers.

•The cursor link setting will be retained in the internal memory even if the instrument is turned OFF. So, when the instrument is turned ON, the cursor link setting in effect just before the instrument was turned OFF last time will be restored.



## For Traces that Have Been Auto Searched

Refer

For the window that shows auto search results at the end of measurement, refer to page 3-68.

**1. Press [F1](SCREEN).**

A selection window will appear.

TIP

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**2. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**3. Press [ENTER].**

A new window will appear.

Refer

For details on the window, refer to page 5-4.

**4. Press [F2] (EVENT EDIT).**

**5. Press [F3] (EVENT MARKER EDIT).**

**6. Press [F5] (AUXILIARY FUNCTION).**

**7. Press [F5] (CURSOR LINK).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable cursor link | *OFF |
| | ON |

*: Indicates the default setting.

**8. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**9. Press [ENTER].**

The cursor link function will be enabled and “LNK” will be displayed at the left edge of the window.

**Refer**

For details on “LNK”, refer to page 1-36.

**10. Turn the rotary knob to move the cursor.**

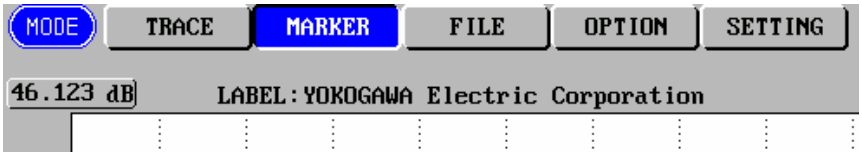
As the cursor moves, all the markers will move accordingly.

## For Traces that Have Not Been Auto Searched

Refer

For the window that is displayed just after measurement is finished (without auto search), refer to page 3-71.

**1. Press [MODE] to locate the cursor to “MARKER”.**




**2. Press [F5] (NEXT PAGE).**

**3. Press [F5] (AUXILIARY FUNCTION).**

**4. Press [F5] (CURSOR LINK).**

A selection window will appear.

TIP

| | |
|---|---|
| Selectable cursor link | *OFF |
| | ON |

*: Indicates the default setting.

**5. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**6. Press [ENTER].**

The cursor link function will be enabled and “LNK” will be displayed at the left edge of the window.

Refer

For details on “LNK”, refer to page 1-36.

**7. Turn the rotary knob to move the cursor.**

As the cursor moves, all the markers will move accordingly.

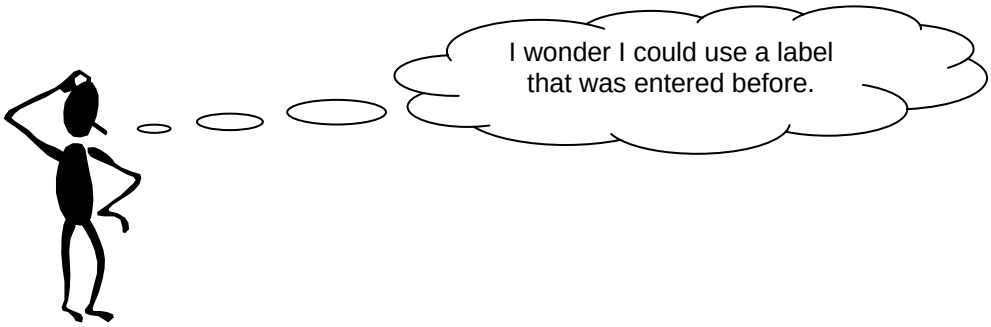
# 7.4 Using the Label Fixed Form Input Function

When labels are added to traces, they will be stored in the internal memory automatically.

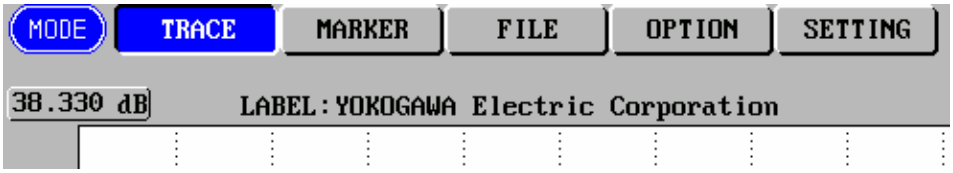
The label fixed form input function allows you to import a label from the memory (edit it if necessary) and add it to the current trace.

This section explains how to select a label that has been entered before.

**TIP** Up to 100 labels can be stored in the internal memory.




**1. Press [MODE] to locate the cursor to “TRACE”.**




**2. Press [F2] (LABEL).**

A window allowing you to enter a label will appear.

**3. Press [F3] (FIXED FORM INPUT).**

A list of labels that were entered before will appear.

**TIP** The list shows labels in order, with the latest label at the top of the list.

**4. Locate the cursor to the desired label by using the rotary knob or [▲] / [▼].**

**5. Press [F1] (SELECT).**

A character input window will appear, with the selected label displayed in the label field.

If necessary, edit the label.

**Refer**

For the method of editing a label, refer to page 4-7.

**6. Press [F5] (DONE) to confirm the label.**

**TIP**

•The internal memory can accommodate up to 100 labels. So, the 101st label will be deleted automatically. However, labels you do not want deleted can be protected.

1.Locate the cursor to the label to be protected.

2.Press [F2] (RESERVE) to protect it.

"*" will appear in front of the label indicating that it is protected.

•The label list can be saved to a storage media in TXT format.

1.Press [F5] (LABEL LIST SAVE/RECALL) to switch [F1] (FILE OPERATION) to "SAVE".

2.For the method of saving the label list, refer to page 3-88.

•A label list can be created using a personal computer and recalled to the instrument.

1.Press [F5] (LABEL LIST SAVE/RECALL) to switch [F1] (FILE OPERATION) to "RECALL".

2.For the method of recalling a label list, refer to page 6-3.

**Caution**

•Up to 50 labels can be protected.

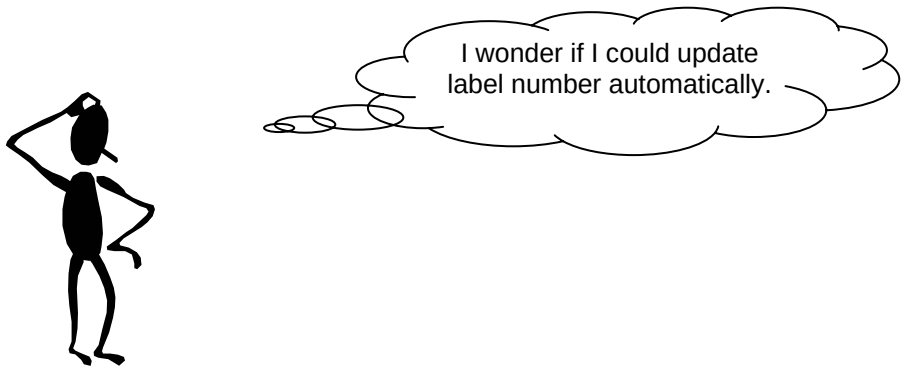
•When creating a label list using a personal computer, the following must be observed.

| | |
|---|---|
| Number of characters | : Max. 36 characters |
| Number of labels | : Max. 100 labels |
| File format | : txt (text) format |

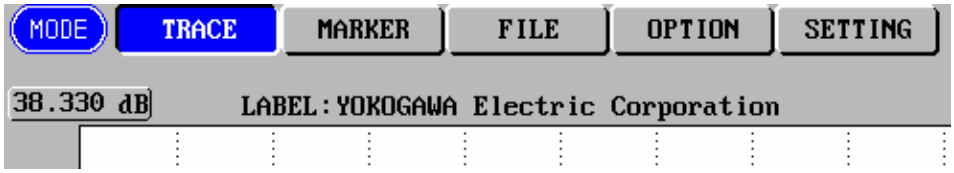
# 7.5 Using the Label Auto Increment Function

The label auto increment function allows you to add a number at the end of the label and increase the number by one automatically. This function is useful when measuring a multi-fiber cable.

This section explains how to set the label auto increment function.




**1. Press [MODE] to locate the cursor to “TRACE”.**




**2. Press [F2] (LABEL).**

A character input window will appear.

**3. Press [F3] (FIXED FORM INPUT).**

**4. Press [F3] (LABEL NUMBER).**

A selection window will appear.

**TIP**

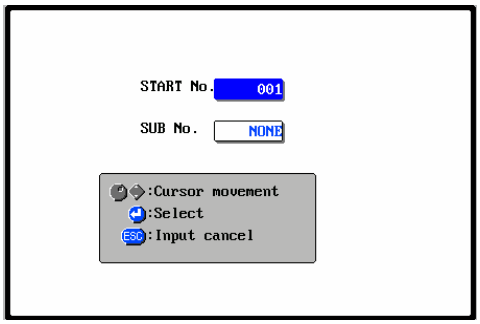
| | |
|---|---|
| Selectable settings | *OFF |
| | ON |

*: Indicates the default setting.

**5. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**6. Press [ENTER].**

The following window will appear.




**7. Locate the cursor to "START No." by using the rotary knob or [▲] / [▼].**

**TIP**

"START No." is already highlighted when this window appears.

**8. Press [ENTER].**

A selection window will appear.

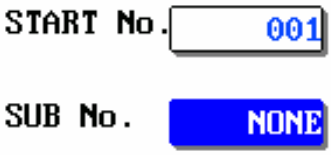
**TIP**

| | |
|---|---|
| Selectable start No. | *001<br>to<br>999<br>(1 step) |

*: Indicates the default setting.

**9. Enter the desired start No.**

**10. Locate the cursor to "SUB No." by using the rotary knob or [▲] / [▼].**



**11. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable sub No. | *NONE |
| | a-b |
| | a-c |
| | a-d |
| | a-e |
| | a-f |
| | a-g |
| | a-h |

*: Indicates the default setting.

The label No. will increase as follows when “NONE” or “a-c” is selected.

NONE: 001→002→003→004→…

a-c: 001a→001b→001c→002a→002b→002c→…

(When the start No. is set to “001”)

**12. Select “SUB No.” by using the rotary knob or [▲] / [▼].**

**13. Press [ENTER] to confirm the sub No.**

**14. Press [F1] (DONE) to confirm the label No.**

A character input window will appear, with the specified label No. shown in the label field.

**15. Press [F5] (DONE) to confirm the label.**

**TIP**

The label No. will be increased by one when the next measurement is started after the measured data is saved.

# 7.6 Entering Various Information for the Measured Trace

In addition to a label, this instrument allows you to enter various pieces of information regarding the measured trace.

The items that can be entered are shown below.

- Company name
- Name
- Cable ID
- Fiber ID
- Fiber type
- Cable code
- Originating location
- Terminating location
- Current data flag

The section explains how to enter these items.

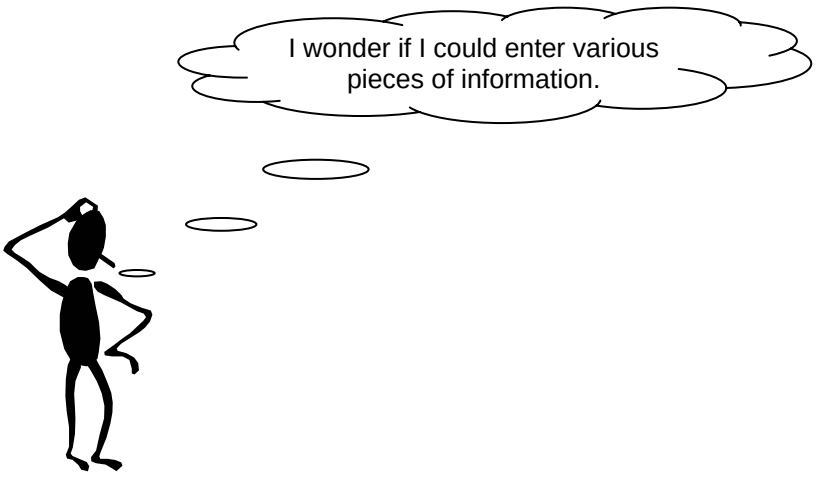
**TIP**

•Once information is entered, it will be retained until new information is entered.

•The entered information will be saved together with the measured data (in SOR and TRD format).

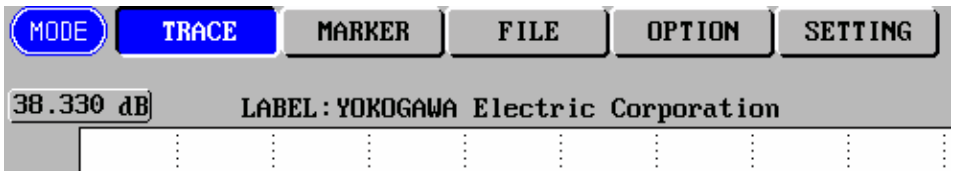
**Refer**

For the method of entering a label, refer to Chapter 4 and page 7-11.



## Displaying the Detailed Information Input Window

**1. Press [MODE] to locate the cursor to “TRACE”.**

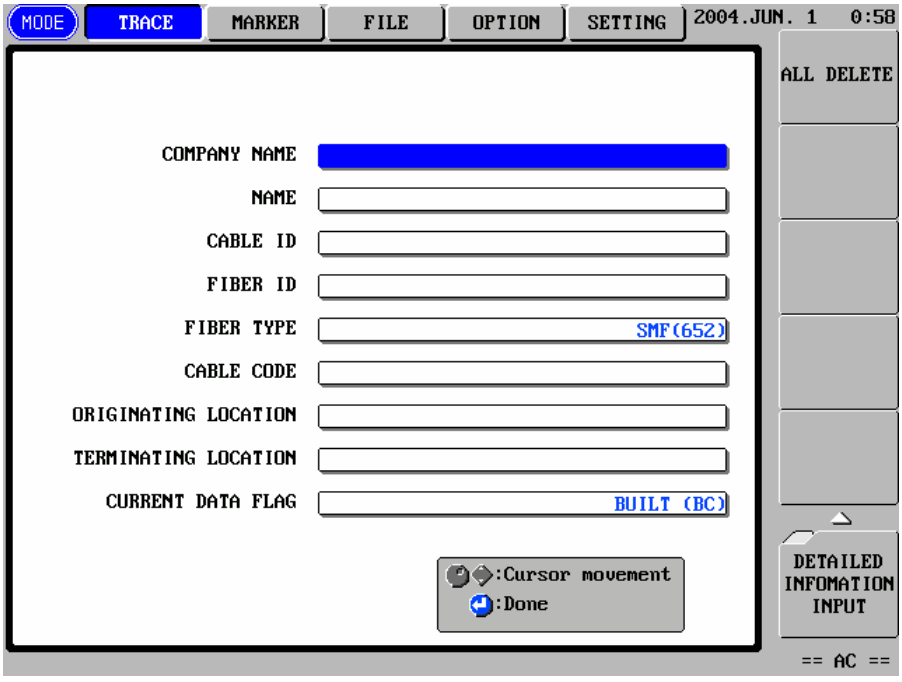



**2. Press [F2] (LABEL).**

A window allowing you to enter a label will appear.

**3. Press [F4] (DETAILED INFORMATION INPUT).**

A window allowing you to enter detailed information will appear.



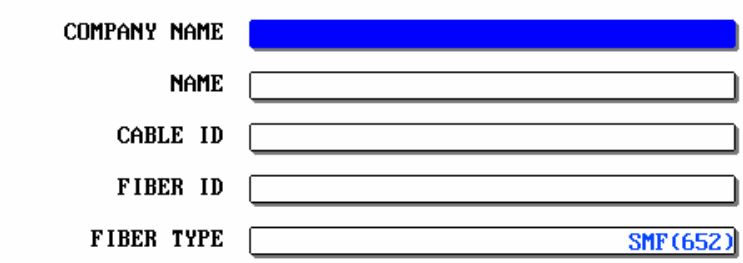

**TIP**

If [F1] (ALL DELETE) is pressed, all the currently entered characters will be deleted.

# Entering Detailed Information

## Entering the Company Name

**1. Locate the cursor to “COMPANY NAME” by using the rotary knob or [▲] / [▼].**




**TIP**

The cursor is already located at “COMPANY NAME” when the detailed information input window appears.

**2. Press [ENTER].**

A character input window will appear.

**Caution**

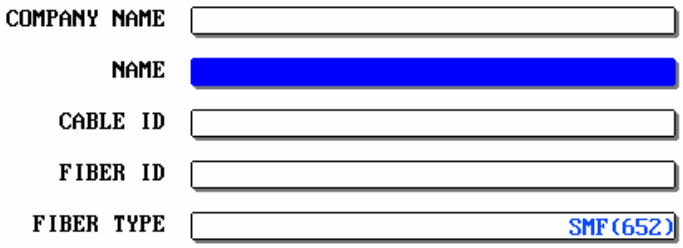
The company name can consist of up to 36 characters.

**Refer**

For the method of entering characters, refer to Chapter 4.

## Entering the Name

**1. Locate the cursor to “NAME” by using the rotary knob or [▲] / [▼].**




**2. Press [ENTER].**

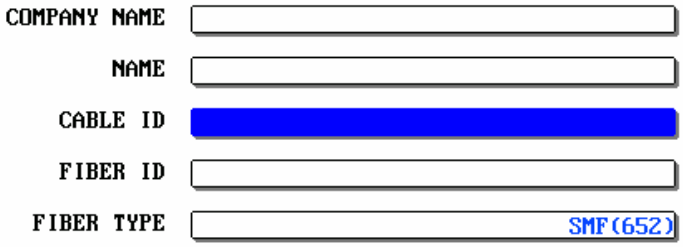
A character input window will appear.

**Caution** The name can consist of up to 36 characters.

**Refer** For the method of entering characters, refer to Chapter 4.

## Entering the Cable ID

**1. Locate the cursor to “CABLE ID” by using the rotary knob or [▲] / [▼].**




**2. Press [ENTER].**

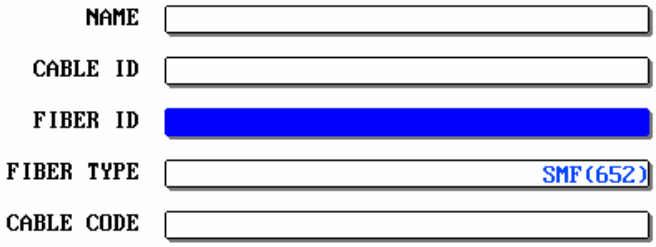
A character input window will appear.

**Caution** The cable ID can consist of up to 36 characters.

**Refer** For the method of entering characters, refer to Chapter 4.

## Entering the Fiber ID

**1. Locate the cursor to “FIBER ID” by using the rotary knob or [▲] / [▼].**




**2. Press [ENTER].**

A character input window will appear.

**Caution** The fiber ID can consist of up to 36 characters.

**Refer** For the method of entering characters, refer to Chapter 4.

## Entering the Fiber Type

**1. Locate the cursor to “FIBER TYPE” by using the rotary knob or [▲] / [▼].**


**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable fiber types | *SMF(652) | Single mode fiber |
| | DSF(653) | Dispersion-shifted fiber |
| | NZ-DSF (655) | Non-zero dispersion shifted single mode fiber |
| | MMF(651) | Multi mode fiber |

*: Indicates the default setting.

**3. Locate the cursor to the type of currently measured optical fiber by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the fiber type.**

## Entering the Cable Code

**1. Locate the cursor to “CABLE CODE” by using the rotary knob or [▲] / [▼].**


**2. Press [ENTER].**

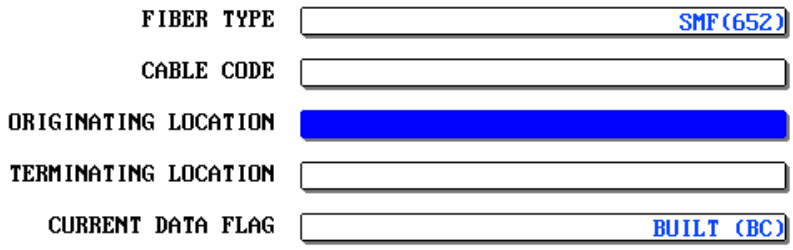
A character input window will appear.

**Caution** The cable code can consist of up to 36 characters.

**Refer** For the method of entering characters, refer to Chapter 4.

## Entering the Originating Location

**1. Locate the cursor to “ORIGINATING LOCATION” by using the rotary knob or [▲] / [▼].**




**2. Press [ENTER].**

A character input window will appear.

**Caution** The originating location can consist of up to 36 characters.

**Refer** For the method of entering characters, refer to Chapter 4.

## Entering the Terminating Location

**1. Locate the cursor to "TERMINATING LOCATION" by using the rotary knob or [▲] / [▼].**


**2. Press [ENTER].**

A character input window will appear.

**Caution** The terminating location can consist of up to 36 characters.

**Refer** For the method of entering characters, refer to Chapter 4.

## Changing the Current Data Flag

**1. Locate the cursor to “CURRENT DATA FLAG” by using the rotary knob or [▲] / [▼].**


**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable current data flags | *BUILT (BC) |
| | REPAIRED (RC) |
| | OTHER (OT) |

*: Indicates the default setting.

**3. Locate the cursor to the desired current data flag by using the rotary knob or [▲] / [▼].**

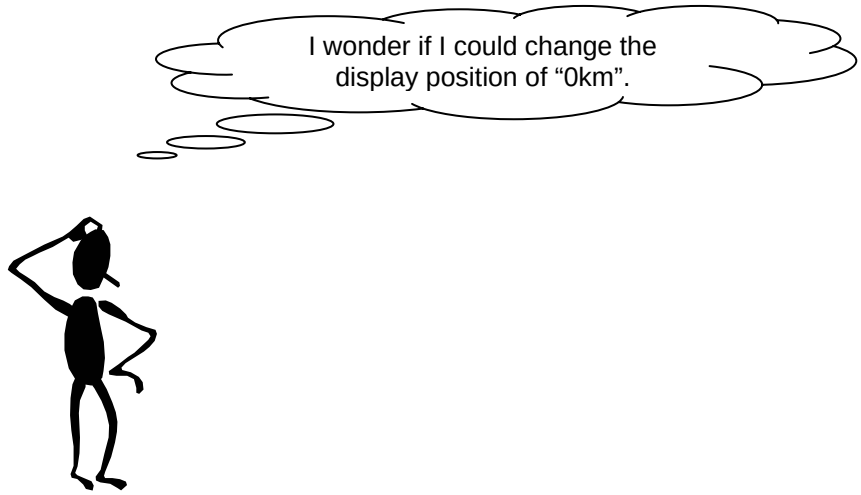
**4. Press [ENTER] to register the change made to the data flag setting.**

# 7.7 Changing the Distance Reference

Normally, the instrument considers the distance reference to be the connection point between the instrument and the optical fiber to be measured, and calculates all the distance data, such as cursor position and marker positions, based on the distance reference.

This instrument allows you to change the distance reference freely. The distance reference is always displayed as “0km”.

This section explains how to change the distance reference.



## For Traces that Have Been Auto Searched

Refer

For the window that shows auto search results at the end of measurement, refer to page 3-68.

**1. Press [F1](SCREEN).**

A selection window will appear.

TIP

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**2. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**3. Press [ENTER].**

A new window will appear.

Refer

For details on the window, refer to page 5-4.

**4. Press [F2] (EVENT EDIT).**

**5. Press [F3] (EVENT MARKER EDIT).**

**6. Press [F5] (AUXILIARY FUNCTION).**

**7. Locate the cursor to the point to which the distance reference is to be set, by turning the rotary knob.**

**TIP**

To display the cursor at an accurate position, enlarge the trace.

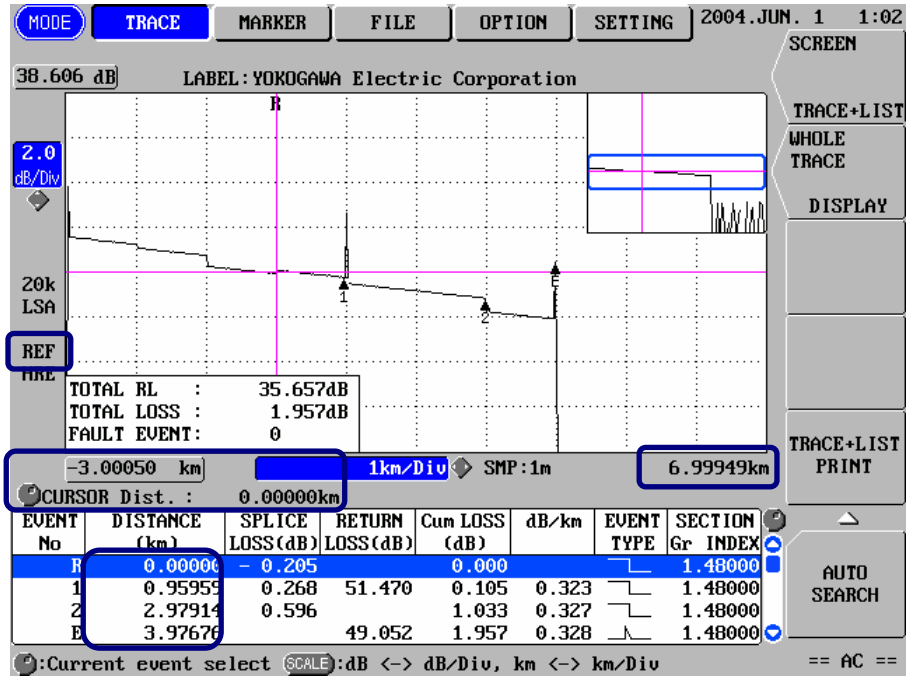
**Refer**

For the method of enlarging the trace, refer to page 3-66.

**8. Press [F3] (DISTANCE REFERENCE SET).**

The cursor position will be set as the distance reference.

"REF" will be displayed at the left edge of the window.




**Caution**

- All the distance data will be re-calculated based on the new distance reference.
- Only the events present after the distance reference will be displayed.
- When distance reference is changed, other operation for event edit are canceled.

**TIP**

- Carrying out step 7 with the distance reference set will restore the connection point between the instrument and optical fiber as the distance reference.
- The mark shape of the distance reference can be changed.

**Refer**

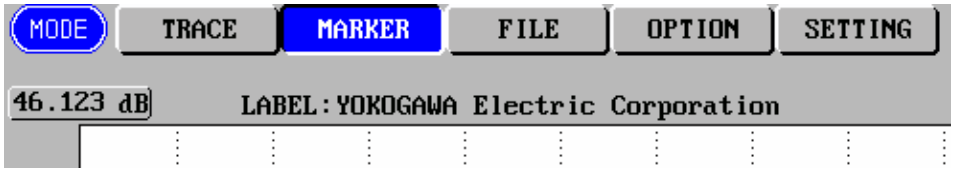
For the method of changing the distance reference mark, refer to page 2-19.

## For Traces that Have Not Been Auto Searched

Refer

For the window that is displayed just after measurement is finished (without auto search), refer to page 3-71.

1. **Press [MODE] to locate the cursor to “MARKER”.**




2. **Press [F5] (NEXT PAGE).**

3. **Press [F5] (AUXILIARY FUNCTION).**

4. **Locate the cursor to the point to which the distance reference is to be set, by turning the rotary knob.**

TIP

To display the cursor at an accurate position, enlarge the trace.

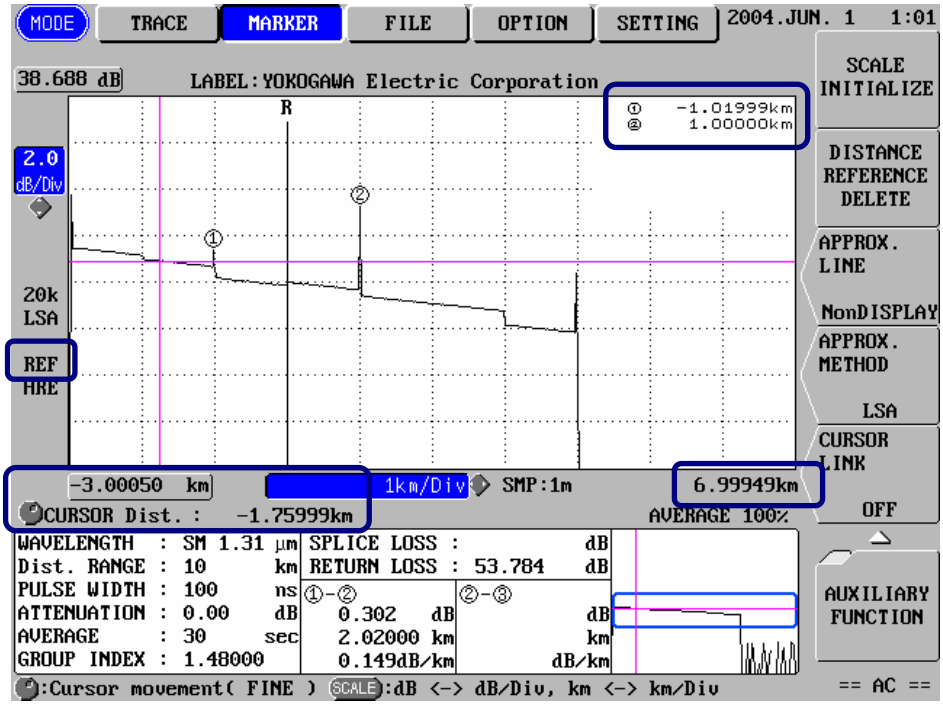
Refer

For the method of enlarging the trace, refer to page 3-66.

**5. Press [F2] (DISTANCE REFERENCE SET).**

The cursor position will be set as the distance reference.

“REF” will be displayed at the left edge of the window.




**Caution**

- All the distance data will be re-calculated based on the new distance reference.

**TIP**

- Carrying out step 4 with the distance reference set will restore the connection point between the instrument and optical fiber as the distance reference.
- The mark shape of the distance reference can be changed.
- If auto search is executed with the distance reference set, events present after the distance reference will be detected.

**Refer**

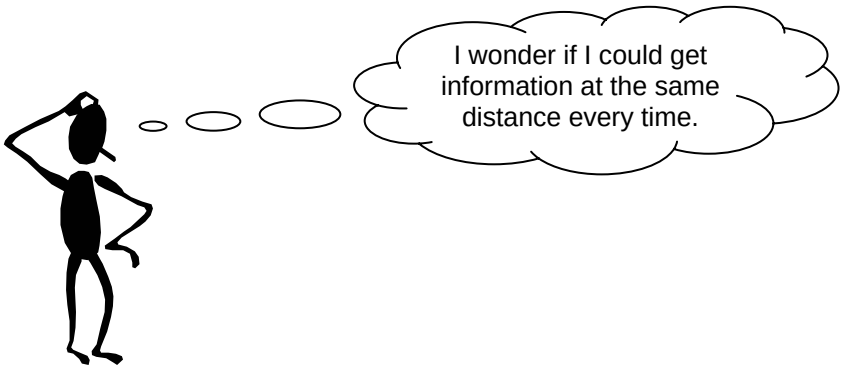
For the method of changing the distance reference mark, refer to page 2-19.

# 7.8 Using the Event Fix Function

When a master event is created and auto search is performed for the measured trace, this event fix function displays the information for the same distance as the master event.

This function is useful for measurements like measurement of multi-fiber cables, in which the distances to the events occurring in each fiber are expected to be the same.

This section explains how to create a master event and how to use it.




**1. Measure the optical fiber and perform auto search.**

**Refer**

•For the method of measuring an optical fiber and performing auto search, refer to page 3-56.

•For the window that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “LIST” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

A new window will appear.

**Refer**

For details on the window, refer to page 3-106.

**5. Press [F3] (LIST EDIT).**

A new window will appear.

**Refer**

For details on the window, refer to page 5-17.

**6. Press [F2] (EVENT FIX).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable event fix settings | *OFF |
| | ON |

*: Indicates the default setting.

**7. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**8. Press [ENTER].**

The currently displayed event will be set as the master event.

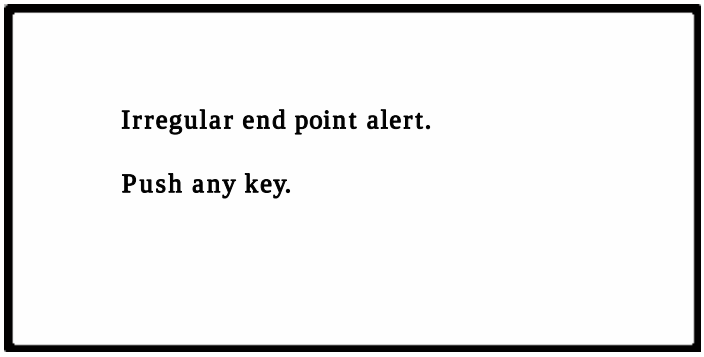
**9. Measure a new optical fiber and perform auto search. The information at the position at the same distance as the master event will be displayed.**

Caution

• The event fix function will be turned OFF (disabled) if measurement conditions (wavelength, distance range, pulse width, data size) are changed. It will also be turned OFF if the horizontal-axis scale is increased/decreased during real-time measurement.

•If an event other than the master event is found when another optical fiber is measured and an event search is executed, the event is also displayed.

• If end point shorter than end point of master event is found when another optical fiber measured and event search is executed, bellow message is displayed. And comment as “EVENT SEARCH detect as END point” is displayed in Event note.

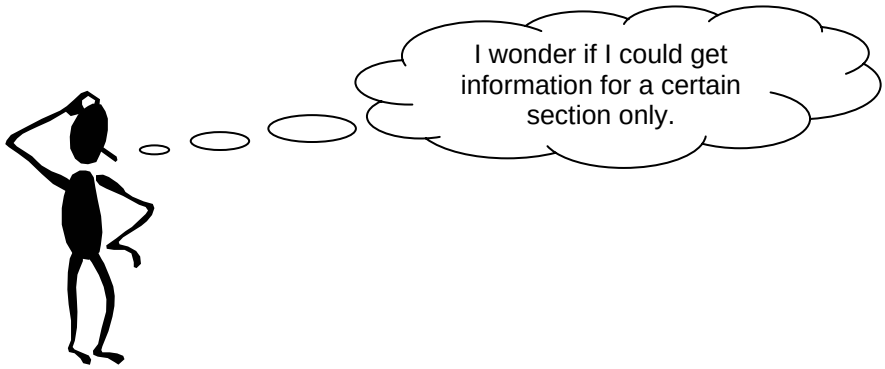



| EVENT No. | DISTANCE (km) | SPLICE LOSS(dB) | RETURN LOSS(dB) | Cum LOSS (dB) | dB/km | EVENT TYPE | SECTION Gr INDEX |
|---|---|---|---|---|---|---|---|
| 1 | 0.98040 | 0.159 | | 0.321 | 0.338 | | 1.48000 |
| 2 | 1.97498 | 0.469 | | 0.820 | 0.342 | | 1.48000 |
| 3 | 2.98172 | -0.115 | | 1.630 | 0.338 | | 1.48000 |
| *4 | 3.97630 | 4.605 | <16.593 | 1.741 | 0.227 | | 1.48000 |
| 5 | 4.02289 | 0.817 | | 6.947 | 12.906 | | 1.48000 |
| 6 | 4.97696 | -0.150 | | 15.392 | 7.995 | | 1.48000 |
| 7 | 5.93406 | 0.086 | 60.717 | 16.218 | 1.020 | | 1.48000 |
| EVENT SEARCH detect as END point. | | | | | | | |
| E | 6.96916 | | 57.445 | 16.789 | 0.469 | | 1.48000 |

# 7.9 Using the Section Analysis Function

The section analysis function allows you to calculate total return loss and total loss within the specified section.

This section explains how to specify a section.




**1. Measure the optical fiber and perform auto search.**

**Refer**

•For the method of measuring an optical fiber and performing auto search, refer to page 3-56.

•For the window that shows auto search results at the end of measurement, refer to page 3-68.

**2. Press [F1] (SCREEN).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable screens | *TRACE + LIST |
| | LIST |
| | TRACE |

*: Indicates the default setting.

**3. Locate the cursor to “TRACE” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

A new window will appear.

Refer — For details on the window, refer to page 5-4.

**5. Press [F3] (SECTION ANALYSIS).**

**6. Locate the cursor to the point from which section analysis is to be started, and then press [F1] (START POINT SET).**

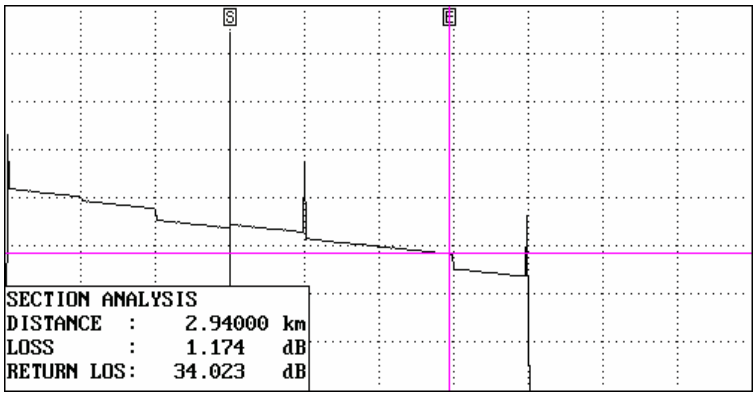
The S marker will appear at the cursor position.

Refer — For the method of moving the cursor, refer to page 3-64.

**7. Locate the cursor to the point at which section analysis is to be stopped, and then press [F2] (STOP POINT SET).**

Marker E will appear at the cursor position.

The total return loss and total loss within the specified section (between the specified two points) will be displayed.



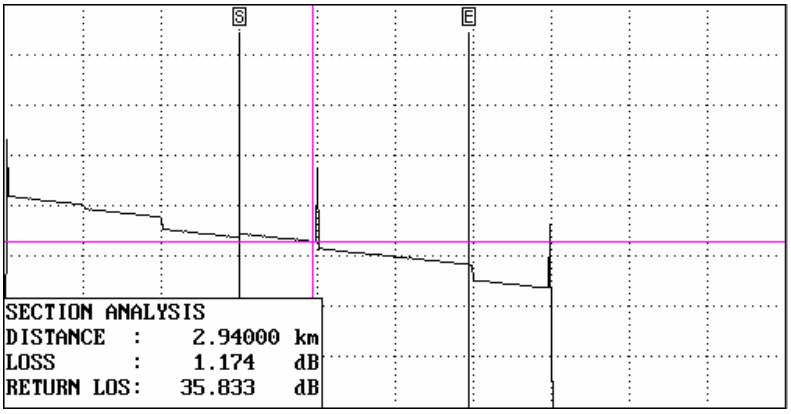
**TIP**

The total return loss is calculated based on the back scatter level at the near end. However, it can be re-calculated based on the back scatter level at the desired position (e.g. section analysis start point) instead of the near end.
The method of changing the reference level is explained below.

1.Move the cursor to the point whose back scatter level is to be set as the reference level.

2.Press [F3] (REFERENCE LEVEL ADJUST).

A new reference level will be set, and the total return loss will be re-calculated based on this reference level.




**Refer**

For the method of moving the cursor, refer to page 3-64.

To cancel the section analysis setting

**1. Press [F4] (SET CLEAR).**

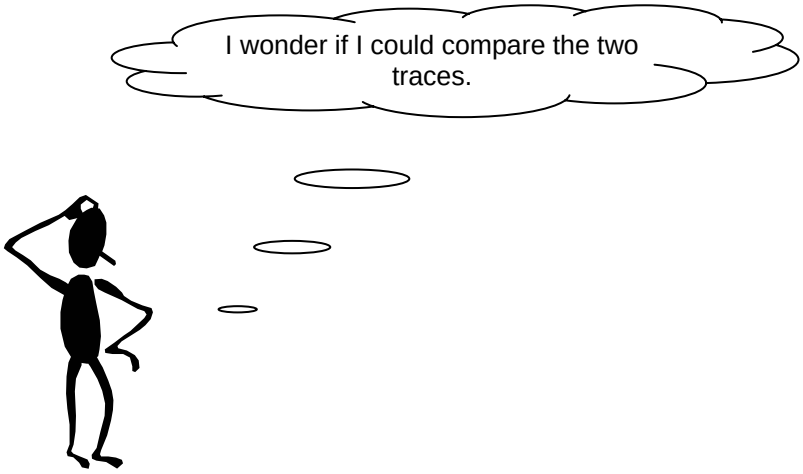
**TIP**

Also section analysis setting is canceled, to get out this window (Press [ESC]).

# 7.10 Manipulating Two or More Traces

This section explains the following functions.

- Displaying multiple traces
- Displaying the subtract trace of two traces
- Merging two traces



## Displaying Multiple Traces

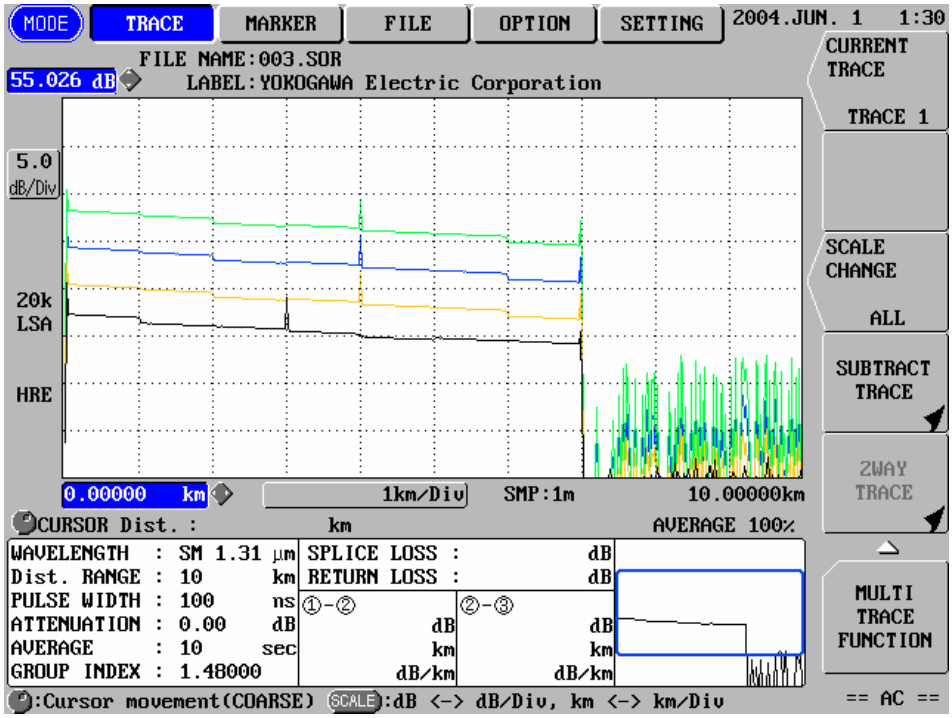
The following two methods are available to display multiple traces.

- By recalling multiple files
- By displaying a new trace while displaying the current trace
- By making a measurement continuously on multiple wavelengths

This section explains how to display a new trace while displaying the current trace.

**TIP**

• Display example (Four traces display)




Displayed information (file name, measurement conditions, etc) is for current trace.

• When [F3] (SCALE CHANGE) is selected current trace, operations for enlarge/reduce and sift of trace are as follows.

| | |
|---|---|
| Enlargement/reduction (horizontal) | : Takes effect on the multi traces |
| Shift (horizontal) | : Takes effect on the multi traces. |
| Enlargement/reduction (vertical) | : Takes effect on the multi traces. |
| Shift (vertical) | : Takes effect on the current traces. |

**Refer**

- For the method of recalling multiple files, refer to page 6-3.
- For the method to make a measurement continuously on multiple wavelengths, refer to page 7-52.

**1. Display a trace.**

Perform measurement or recall one file to display the window that is displayed before Auto search.

**Refer**

For details on the window, refer to page 3-71.

**2. Press [F4] (TRACE FIX).**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable trace fix settings | *OFF |
| | ON |

*: Indicates the default setting.

**3. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

The current trace will be fixed.

**TIP**

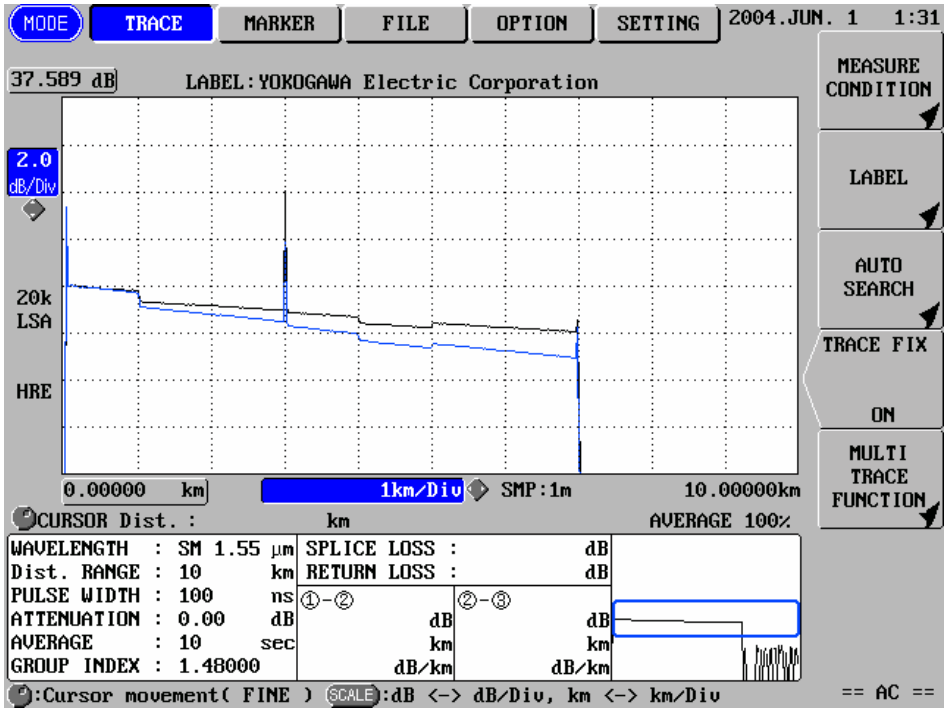
The color of the trace will change if the display color is not currently set to “B&W”.

**Refer**

For the method of changing the display color, refer to page 2-22.

**5. Change measurement conditions and start measurement.**

A new trace will be displayed.




**Caution**

The fixed trace will be discarded if the distance range is changed.

# Displaying the Subtract Trace of Two Traces

## Displaying the Subtract Trace

This section explains how to display the subtract trace of two traces (reference trace, target trace).

**Caution**

The subtract trace cannot be displayed unless the following measurement conditions are the same for both the reference and target traces.

- Distance range
- Sampling resolution
- Actual data size

### 1. Display the traces.

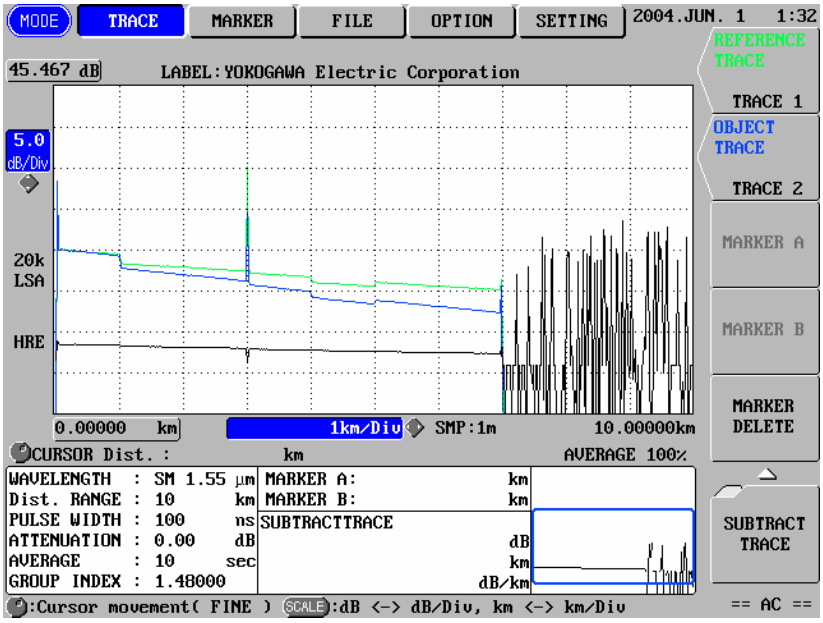
**Refer**

For the method of displaying two or more traces, refer to page 6-3.

### 2. Press [F4] (SUBTRACT TRACE)*1.

The subtract trace will be displayed.

*1: If the window (page 3-71) is currently displayed, the subtract trace can be displayed by pressing [F5] (MULTI TRACE FUNCTION) instead of [F4] (SUBTRACT TRACE).




**TIP**

The reference and object traces can be changed by pressing [F1] and [F2].

## Analyzing the Subtract Trace

This section explains how to set markers A and B on the subtract trace and calculate the loss occurring between those marker points.

**1. Locate the cursor to the position to which marker A is to be set.**

**2. Press [F3] (MARKER A).**

Marker A will appear at the cursor position.

**3. Locate the cursor to the position to which marker B is to be set.**

**4. Press [F4] (MARKER B).**

Marker B and analysis results will appear at the cursor position.

| | | |
|---|---|---|
| Marker A: | ① | km |
| Marker B: | ② | km |
| Subtract trace | | |
| | ③ | dB |
| | ④ | dB/km |
| | ⑤ | dB |

| | |
|---|---|
| ① | Distance from distance reference to marker A |
| ② | Distance from distance reference to marker B |
| ③ | Loss between points A and B on the target trace |
| ④ | Loss per km between points A and B on the target trace |
| ⑤ | Return loss between points A and B on the target trace |

**TIP**

Analyzed by approximate method of reference trace.

It is not possible to save the subtract trace and analysis results.

**Refer**

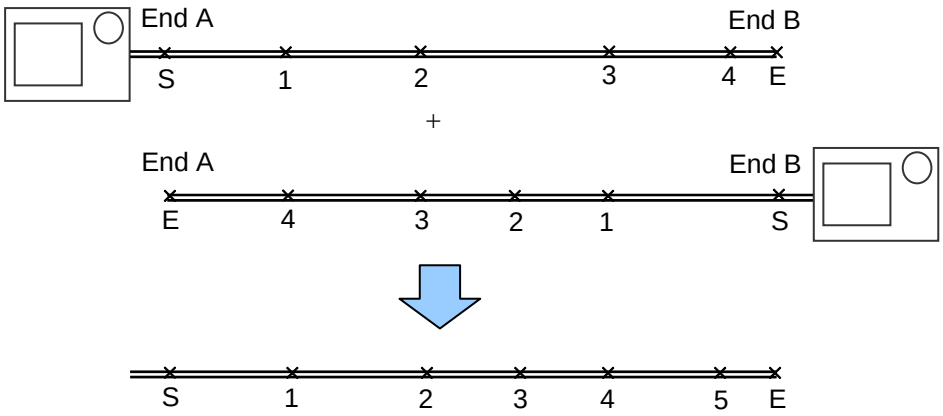
For details on approximate method, refer to page 3-37.

To clear the markers

**1. Press [F5] (MARKER DELETE).**

## Merging Two Traces

The 2-way trace function allows you to merge the events detected on an optical fiber in the direction from end A to end B with those detected in the direction from end B to end A.




### Merging Events

This section explains how to merge events of two traces.

**1. Recall two files.**

**Caution**

- The 2-way trace function can be used only when two files are recalled (same file type). It cannot be used if three or more files are recalled.
- The 2-way trace function cannot be used unless the following measurement conditions are the same for both the two recalled traces.

  Wavelength

  Distance range

  Pulse width

  Sampling resolution

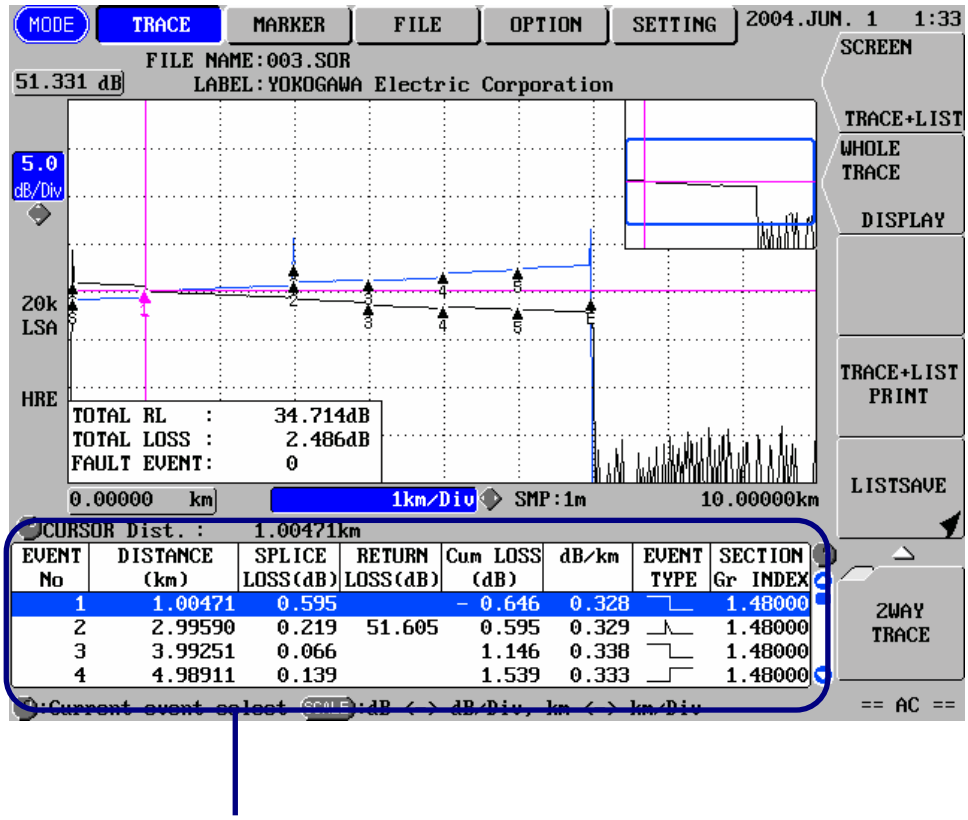
  Actual data size

**Refer**

For the method of recalling two files, refer to page 6-3.

**2. Press [F5] (2WAY TRACE).**

The following window will appear.




A list of merged events will be shown.

**TIP**

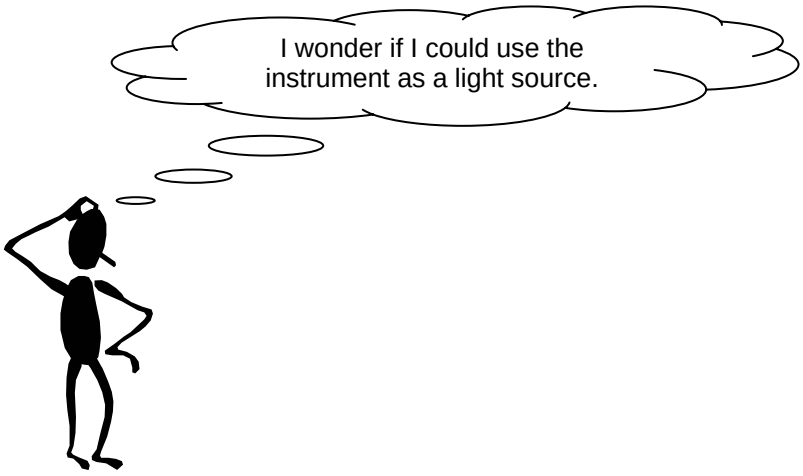
- The merged trace of the two traces will not be displayed. But all of event maker displayed on the original direction trace.
- The merged event list can be saved.
- The merged event list can be printed.
- A comment can be added to the merged event list.

**Refer**

- For the method of saving the event list, refer to page 3-88.
- For the method of printing the event list, refer to page 3-104.
- For the method of adding a comment to the event list, refer to page 5-23.

# 7.11 Using the Light Source Function

The light source function allows use of the instrument as a light source, not as an OTDR. This section explains how to use the instrument as a light source.




**Caution**

The instrument cannot be used as a light source if an optical module (AQ7261) is installed.

**TIP**

The light source wavelength and modulation frequency that can be used vary with the optical module installed.
They are shown below per available optical module.

| Optical module | Wavelength | Modulation frequency |
|---|---|---|
| AQ7261 | ---------- | ---------- |
| AQ7264 | 1310nm, 1550nm | CW, CHOP (270Hz, 1kHz, 2kHz) |
| AQ7265 | 1310nm, 1550nm | CW, CHOP (270Hz, 1kHz, 2kHz) |

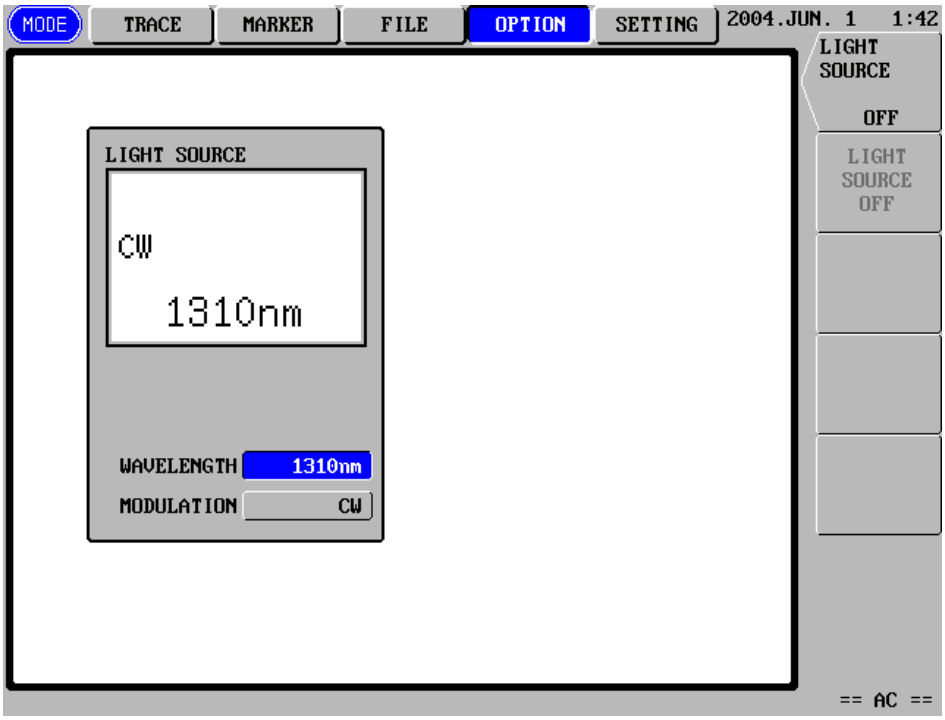
**Refer**

For detail on output level, refer to Chapter 9.

## Displaying the Light Source Function Window

**1. Press [MODE] to locate the cursor to “OPTION”.**

The following window will appear.




**Caution**

“OPTION” cannot be selected if an optical module (AQ7261) is installed.

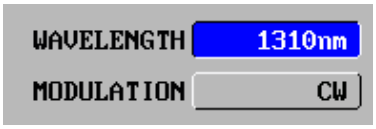
# Changing the Wavelength and Modulation Frequency

## Changing the Wavelength

The wavelength can be changed as explained below.

♦ Example: “1310nm” → “1550nm”

**1. Locate the cursor to “WAVELENGTH” by using the rotary knob or [▲] / [▼].**




**TIP**

“WAVELENGTH” is already highlighted when the source function appears.

**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable wavelengths | *1310nm |
| | 1550nm |

*: Indicates the default setting.

**3. Locate the cursor to “1550nm” by using the rotary knob or [▲] / [▼].**

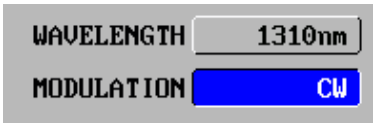
**4. Press [ENTER] to register the change made to the wavelength setting.**

## Changing the Modulation Frequency

The modulation frequency can be changed as explained below.

♦ Example: “CW” → “1kHz”

**1. Locate the cursor to “MODULATION” by using the rotary knob or [▲] / [▼].**




**2. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable modulation frequencies | *CW |
| | 270Hz |
| | 1kHz |
| | 2kHz |

*: Indicates the default setting.

**3. Locate the cursor to “1kHz” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER] to register the change made to the modulation frequency setting.**

## Emitting a Laser

**1. Connect an optical fiber to the instrument.**

**2. Press [F1] (LIGHT SOURCE).**

A selection window will appear.

TIP

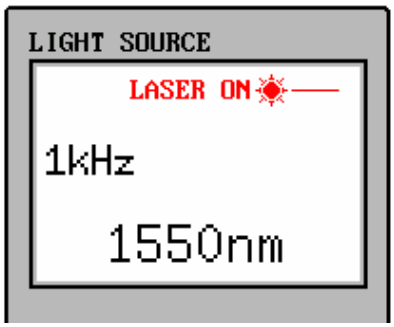
| Selectable light source | *OFF |
|---|---|
| | ON |

*: Indicates the default setting.

**3. Locate the cursor to “ON” by using the rotary knob or [▲] / [▼].**

**4. Press [ENTER].**

A laser will be emitted and “LASER ON” will appear.




| WARNING | |
|---|---|
| | Do not disconnect the optical fiber from the instrument while laser is emitted , and do not stare into the end of the connected optical fiber.<br>Laser beams are invisible to the naked eye, but if they enter the eyes, they may cause impaired eyesight. |

## Turn off a Laser

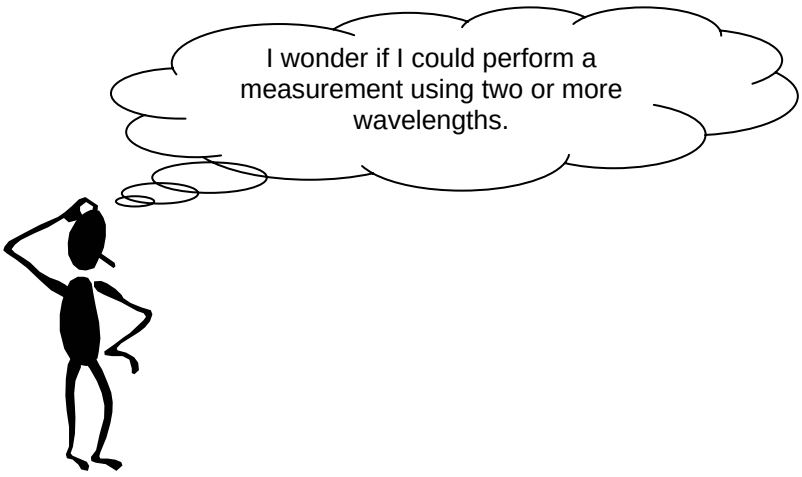
**1. Press [F2] (LIGHT SOURCE OFF).**

# 7.12 Making a Measurement Continuously Changing the Wavelengths

The characteristics of an optical fiber can be obtained more correctly by measuring the fiber using two or more wavelengths. This function increases the efficiency of measurement by saving the work to change the wavelength manually after a measurement was made on one wavelength.

This section explains the method to make a measurement continuously on one optical fiber changing the wavelength.

- Example: "Single-wavelength measurement with 1.31µm" → "Multi-wavelength measurement with 1.31µm and 1.55µm""




**1. Select file name type including “wavelength”.**

**Refer** For the method to enable the file name type, refer to page 3-96.

**2. Display the measurement condition change window.**

**Refer** For the method of displaying the window, refer to page 3-11.

**3. Press [F3] (MULTI WL MEASURE).**

A selection window will appear.

TIP

| | |
|---|---|
| Selectable light source | *OFF |
| | ON |

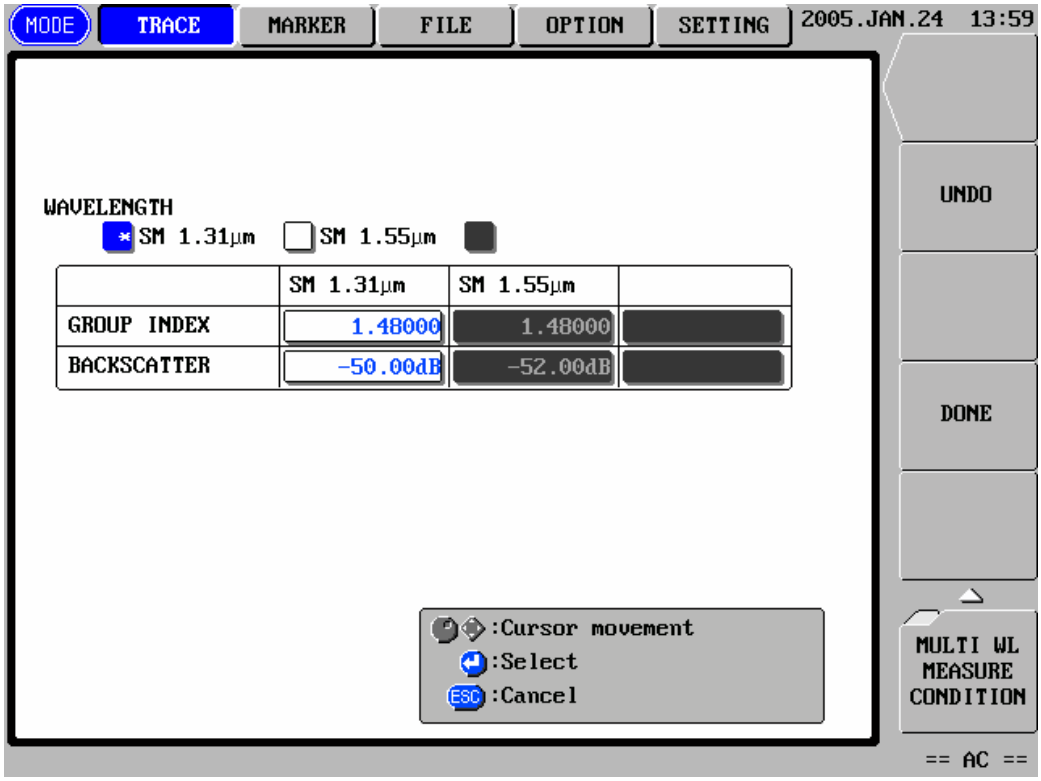
*: Indicates the default setting.

**4. Locate the cursor to "ON" by using the rotary knob or [▲] / [▼].**

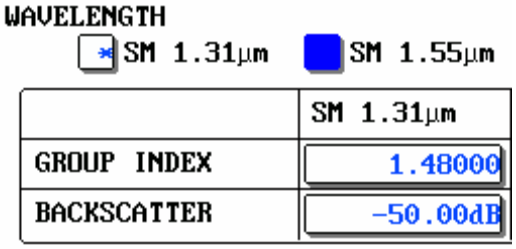
**5. Press [ENTER].**

**6. Press [F5] (MULTI WL MEASURE CONDITION).**

The following window will appear.



**7. Locate the cursor to “SM 1.55µm” by using the rotary knob or arrow key.**




**8. Press [ENTER] .**

" * " is displayed.

**TIP**

- Check to make sure that "*" is added to the traces 1.31µm and 1.55µm.
- Please set group index and back scatter level of each wavelength as the need arises.

**9. Press [F4] (DONE) to register the changes made to the multi wl measurement conditions.**

**10. Press [F4] (DONE) to register the changes made to the measurement conditions.**

**11. Press [AVE]**

Measurements are made sequentially starting from the shorter one.

**TIP**

- Sample measurement sequence

1. Measurement with the wavelength 1.31µm
2. Event search performed after measurement completed*
3. Measurement data saved*
4. Measurement with the wavelength 1.55µm
5. Event search performed after measurement completed*
6. Measurement data saved*

*: Performed only when the event search and auto saving functions have been set to ON.

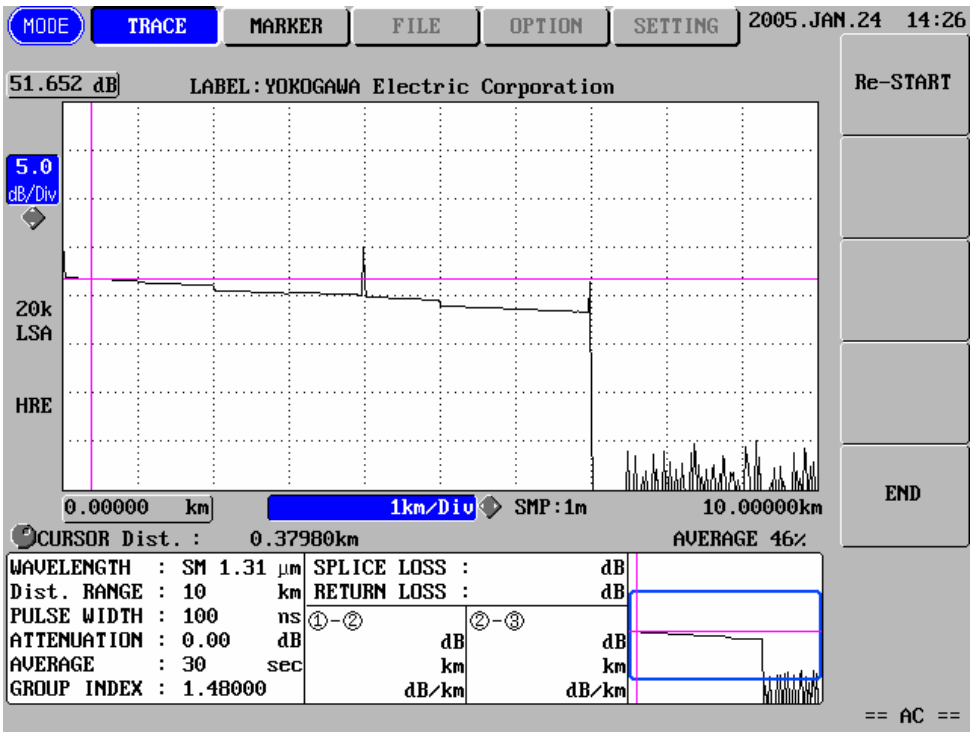
- The number of the file name is used commonly for two wavelength.

**Refer**

- For the method to enable the event search function, refer to page 3-35.
- For the method to enable the auto saving function, refer to page 3-33.

**TIP**

- If [AVE] is pressed during a continuous measurement, the following window will appear.




- Pressing [F1] (Re-START) restarts the measurement. The measurement starts from the wavelength at which the measurement was previously stopped. The file number is not incremented.
- Pressing [F5] (END) stops the continuous measurement. Pressing [AVE] again restarts the measurement from the wavelength 1310nm. The file number is not incremented.

# Chapter 8
# USING OPTIONS AND EXTERNAL DEVICES

# 8.1 Using Options

This section explains how to connect and remove the following options to the instrument.

- Printer/FDD unit
- Printer unit

# Option Unit

## Connecting

This section explains procedure of mounted options to take printer/FDD unit for example.

**1. Make sure that the power to the instrument is turned OFF.**

| WARNING | |
|---|---|
| | Do not connect the printer/FDD unit while the power to the instrument is ON.<br>Failure to observe this may result in an electric shock. |

**Refer** For the method of turning OFF the power, refer to page 3-107.

**2. Remove the cover from the expansion port located on the rear panel of the instrument.**

**Caution** Keep the removed cover in a safe place to prevent it being lost.

**3. Place the projecting part on the unit between those on the instrument.**

**4. Insert the unit's connector into the expansion port.**

| ⚠ CAUTION | |
|---|---|
|  | When inserting the connector, hold the unit gently with the palms of your hands.<br>Take care to hold the unit in such a way that pressure is not exerted on one point only or that it is held too strongly.<br>Failure to observe this may result in damage. |

**5. Secure the unit to the instrument.**

Hook the unit's tab (located on the side of the unit as shown below) to the instrument.

Caution Make sure that the unit's tab is hooked to the instrument.

## Removing

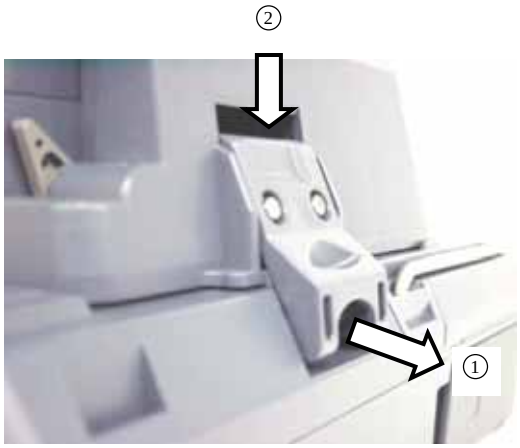
This section explains procedure of removed options to take printer/FDD unit for example.

**1. Make sure that the power to the instrument is turned OFF.**

| WARNING | |
|---|---|
| | Do not remove the printer/FDD unit while the power to the instrument is ON.<br>Failure to observe this may result in an electric shock. |

Refer For the method of turning OFF the power, refer to page 3-107.

**2. Release the tab from the instrument.**




Caution When releasing the tab, take care not to trap your finger.

**3. Lift the unit straight to remove it.**

**4. Attach the cover to the expansion port.**

Caution Make sure that the cover is attached.

## Setting Up the Printer

The instrument allows both optional printer unit and USB printer to be connected at the same time. In this case, the destination printer (the printer to which you want to print out) must be set up.

In this section, the method of changing the destination printer from one to the other is explained below.

♦ Example: “HP” → “EXTENSION UNIT”

**Caution** Make sure an option printer is connected to the instrument.

**1. Press [MODE] to locate the cursor to “SETTING”.**


**2. Press [F2] (EXTERNAL INSTRUMENT SET).**

**3. Locate the cursor to “MAKER” by using the rotary knob or the arrow key.**


**TIP** The cursor is already located at “PRINTER” when this window appears.

**4. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable printer makers | *EXTENSION UNIT | Prints out to the optional printer unit. |
| | HP | Prints out to the HP printer connected to a USB connector. |
| | EPSON | Prints out to the EPSON printer connected to a USB connector. |

*: Indicates the default setting.

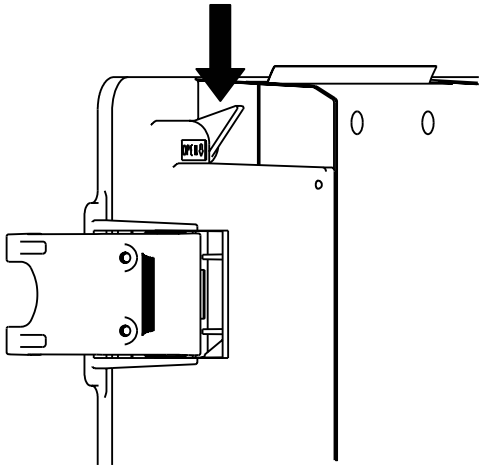
**5. Locate the cursor to "EXTENSION UNIT" by using the rotary knob or the [▲] / [▼] .**

**6. Press [ENTER] to register the change made to the printer maker setting.**

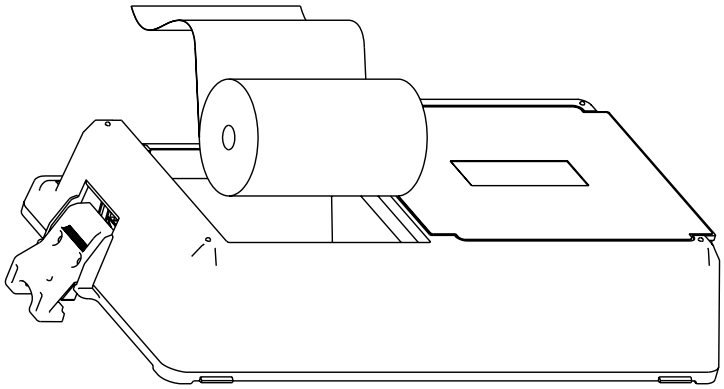
## Setting the Recording Paper in the Printer

The recording paper can be set in the printer as explained below.

**1. Press down the lever to remove the printer cover.**



**2. Set the recording paper in the unit.**



**3. Attach the printer cover.**

# 8.2 Using External Devices

This instrument allows use of the following external devices by connecting them to USB ports.

- USB keyboard
- PCMCIA memory card
- USB printer
- USB storage medium (FDD, memory)

This section explains how to connect the above external devices to the instrument and remove them.

# USB Keyboard

## Connecting

A USB keyboard can be connected to the instrument as explained below.

**TIP**

A USB keyboard can be connected even if the power to the instrument is currently ON.

**1. Open the cover on the top of the instrument.**

**2. Connect a USB keyboard to a USB connector (host side).**

**TIP**

Two USB connectors (host side) are available, and the keyboard can be connected to either of these.

## Using

Using a keyboard makes entry of characters easy.

This section explains points to be observed when using a USB keyboard.

**Caution** The keyboard can be used in character input windows only.

Basically, characters can be entered in the same way as you normally do with a personal computer.

The following keys on the keyboard have the same effects as those provided on the instrument.

- F1 → Has the same effect as that when [F1] is pressed.
- F2 → Has the same effect as that when [F2] is pressed.
- F3 → Has the same effect as that when [F3] is pressed.
- F4 → Has the same effect as that when [F4] is pressed.
- F5 → Has the same effect as that when [F5] is pressed.
- F8 → Has the same effect as that when [MODE] is pressed.
- F11 → Has the same effect as that when the rotary knob is turned counter-clockwise.
- F12 → Has the same effect as that when the rotary knob is turned clockwise.
- Arrow → Has the same effect as that when the arrow key is pressed.
- Home → Has the same effect as that when [SCALE] is pressed.
- Insert → Has the same effect as that when the rotary knob is pressed.
- Enter → Has the same effect as that when [ENTER] is pressed.
- Esc → Has the same effect as that when [ESC] is pressed.

## Removing

The USB keyboard can be removed from the instrument as explained below.

**TIP** The USB keyboard can be removed even if the power to the instrument is currently ON.

**1. Hold the keyboard cable's connector and lift it straight to remove the keyboard.**

| ⚠ CAUTION | |
|---|---|
|  | When removing the keyboard, do not pull it by the cable.<br>Failure to observe this may result in damage. |

**2. Close the cover on the top of the instrument.**

# PCMCIA Memory Card

## Connecting

A PCMCIA memory card can be connected to the instrument as explained below.

**TIP**

A PCMCIA memory card can be connected even if the power to the instrument is currently ON.

1. **Open the cover on the top of the instrument.**

2. **Insert the memory card into the PCMCIA slot on the instrument.**

**Caution**

- When inserting the memory card, make sure it is inserted in the correct direction.
- Also make sure that the memory card's label side faces the front of the instrument.

## Removing

The PCMCIA memory card can be removed from the instrument as explained below.

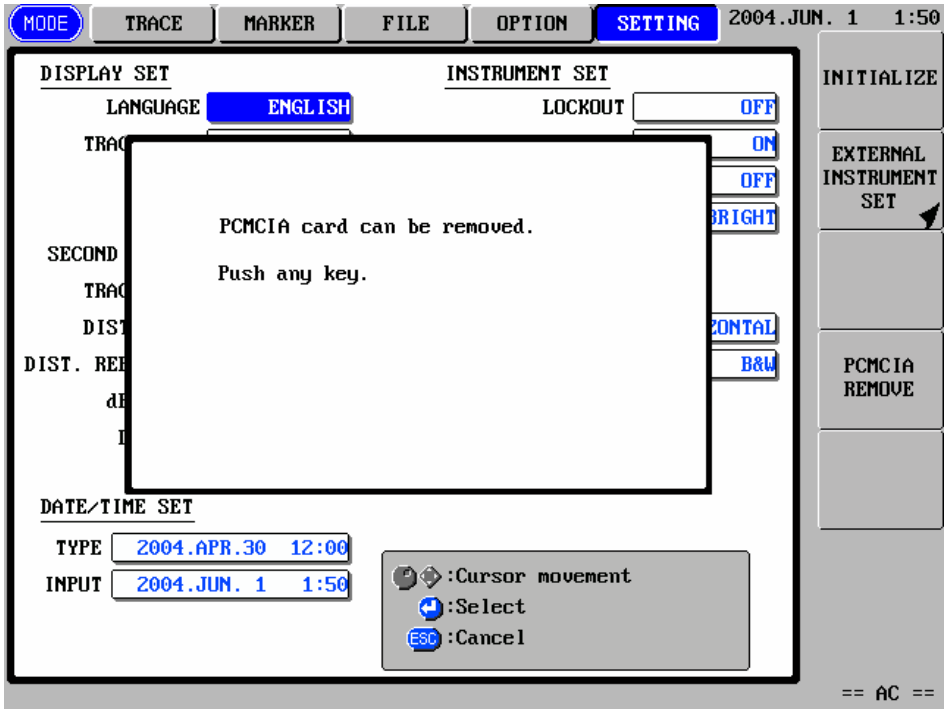
**TIP**

The PCMCIA memory card can be removed even if the power to the instrument is currently ON.

**1. Press [MODE] to locate the cursor to “SETTING”.**


**2. Press [F4] (PCMCIA REMOVE).**

The following window will appear.



**3. Press the card eject button.**

The memory card will pop out.

**4. Lift the memory card straight to remove it.**

**Caution**

Before removing the memory card, make sure that a message stating that the card can be removed safely is displayed.

**5. Close the cover on the top of the instrument.**

## USB Printer

Caution

The following USB printers available to use this instrument at present.

Hewlett Packard

- Deskjet5160
- Deskjet5740

EPSON

- PX-V500
- Stylus C45

### Connecting

A USB printer can be connected to the instrument as explained below.

Caution

The instrument allows two USB printers to be connected, but it cannot recognize them together. So only one USB printer must be connected. If two USB printers are connected, their operation will not be guaranteed.

TIP

A USB printer can be connected even if the power to the instrument is currently ON.

**1. Open the cover on the top of the instrument.**

**2. Connect a USB printer to a USB connector (host side).**

**TIP**

Two USB connectors (host side) are available, and the printer can be connected to either of these.

## Setting Up the Printer

The instrument allows both optional printer unit and USB printer to be connected at the same time. In this case, the destination printer (the printer to which you want to print out) must be set up.

In this section, the method of changing the destination printer from one to the other is explained below.

♦ Example: “EXTENSION UNIT” → “HP”

**Caution** Make sure a USB printer is connected to the instrument.

**1. Press [MODE] to locate the cursor to “SETTING”.**


**2. Press [F2] (EXTERNAL INSTRUMENT SET).**

**3. Locate the cursor to “MAKER” by using the rotary knob or the arrow key.**


**TIP** The cursor is already located at “PRINTER” when this window appears.

**4. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable printer makers | *EXTENSION UNIT | Prints out to the optional printer unit. |
| | HP | Prints out to the HP printer connected to a USB connector. |
| | EPSON | Prints out to the EPSON printer connected to a USB connector. |

*: Indicates the default setting.

**5. Locate the cursor to “HP” by using the rotary knob or the [▲] / [▼] .**

**6. Press [ENTER] to register the change made to the printer maker setting.**

## Removing

The USB printer can be removed from the instrument as explained below.

**TIP** The USB printer can be removed even if the power to the instrument is currently ON.

**1. Hold the printer cable's connector and lift it straight to remove the printer.**

| ⚠ CAUTION | |
|---|---|
|  | When removing the printer, do not pull it by the cable.<br>Failure to observe this may result in damage. |

**2. Close the cover on the top of the instrument.**

# USB Storage Medium

## Connecting

A USB storage medium (FDD, memory) can be connected to the instrument as explained below.

**Caution** The instrument allows two USB storage mediums to be connected, but it cannot recognize them together. So only one USB storage medium must be connected. If two USB storage mediums are connected, their operation will not be guaranteed.

**TIP** USB storage mediums can be connected even if the power to the instrument is currently ON.

The method of connecting USB storage mediums is the same as that for USB printers.

**Refer** For the method of connecting USB printers, refer to page 8-16.

## Removing

The method of removing USB storage mediums is the same as that for USB printers.

**Refer** For the method of removing USB printers, refer to page 8-20.

# 8.3 Operating the Instrument from a Personal Computer

By connecting the instrument to a personal computer, the instrument can be operated from the computer (by sending commands from the computer).

This instrument controlled by following method.

- RS-232C
- GP-IB

# Operation by using RS-232C

## Connecting the Instrument to a Personal Computer

**Caution**

The instrument can be connected to a personal computer using a RS-232C cross cable. Since the instrument has no RS-232C interface, a USB-to-Serial adapter must be provided by the user.

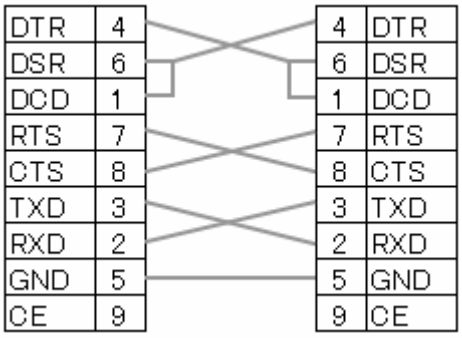
**TIP**

•The following USB-to-Serial adapter must be used.

Manufacturer: I-O Data Device, Inc.

Model Name: USB-RSAQ2 or later.

• The wiring diagram of cross cable is as follows.




**1. Make sure that the power to both the instrument and computer is turned OFF.**

| WARNING | |
|---|---|
| | Do not connect the computer while the power to the instrument is ON.<br>Failure to observe this may result in an electric shock. |

**Refer**

For the method of turning OFF the power, refer to page 3-107.

**2. Open the cover on the top of the instrument.**

**3. Connect the USB connector of the connecting cable to a USB connector (host side) on the instrument.**

TIP

Two USB connectors (host side) are available, and the personal computer can be connected to either of these.

**4. Connect the RS-232C connector of the cable to the personal computer.**

## Setting the Instrument

This section explains how to change the communication settings to allow the instrument to communicate with the personal computer.

**1. Turn ON the power to both the instrument and personal computer.**

Refer For the method of turning ON the power to the instrument, refer to page 3-3.

### Changing the Baud Rate

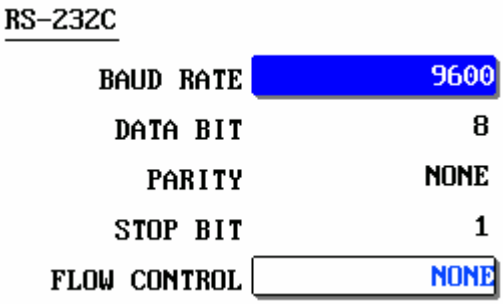
The baud rate can be changed as explained below.

♦ Example: “9600” → “38400”

**2. Press [MODE] to locate the cursor to “SETTING”.**


**3. Press [F2] (EXTERNAL INSTRUMENT SET).**

**4. Locate the cursor to “BAUD RATE” by using the rotary knob or the arrow key.**



**5. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable baud rates | 2400 |
| | 4800 |
| | *9600 |
| | 19200 |
| | 38400 |
| | 57600 |
| | 115200 |

*: Indicates the default setting.

**6. Locate the cursor to “38400” by using the rotary knob or [▲] / [▼].**

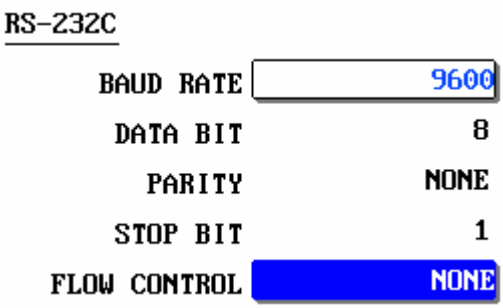
**7. Press [ENTER] to register the change made to the baud rate setting.**

Changing the Flow Control Setting

The flow control can be changed as explained below.

♦ Example: “NONE” → ”HARDWARE”

**8. Locate the cursor to “FLOW CONTROL” by using the rotary knob or the arrow key.**



**9. Press [ENTER].**

A selection window will appear.

**TIP**

| | | |
|---|---|---|
| Selectable flow control settings | *NONE | Disables flow control. |
| | HARDWARE | Uses the flow control setting made on the device (personal computer) connected to the instrument. |

*: Indicates the default setting.

**10. Locate the cursor to "HARDWARE" by using the rotary knob or [▲] / [▼].**

**11. Press [ENTER] to register the change made to the flow control setting.**

Other Settings

| Item | Setting |
|---|---|
| Data bits | 8 bits (fixed) |
| Parity | None (fixed) |
| Stop bits | 1 bit (fixed) |

## Operating the Instrument

The instrument can be operated by entering commands using the personal computer's communication software.

This section explains how to operate the instrument using HyperTerminal of Microsoft Windows2000.

### 1. Start HyperTerminal.

From the [Start] menu of Windows2000, select [Programs] - [Accessories] - [Communications] - [HyperTerminal] to start HyperTerminal.

### 2. Set up HyperTerminal.

**Caution**

- The same settings as those for RS-232C of the instrument must be made for HyperTerminal.
- The following functions in ASCII Setup must be enabled.

  Send line ends with line feeds.

  Echo typed characters locally

### 3. Enter an appropriate command.

# Operation by using GP-IB

## Interface function

This unit has the interface functions shown in Table of the GP-IB interface functions specified IEEE488.1.

| Code | Interface function |
|---|---|
| SH1 | All send handshake function |
| AH1 | All receive handshake function |
| T6 | Basic talker and serial pole functions |
| L4 | Basic listener function |
| SR1 | All service request function |
| RL1 | All remote and local function |
| PP0 | Parallel pole function is not provided |
| DC1 | All device clear function |
| DT1 | All device trigger function |
| C0 | Controller function is not provided |

### Local Lock Out function

When the universal command “LLO” is received in the REMOTE mode, this unit enters the LLO (local lock out) status. To cancel this status, you must reset the REN (remote enable) and power OFF instrument, and power it ON again.

### Device Clear function

This instrument stops measurement and deletes the displayed trace via “DCL” and “SDC”.

### Device Trigger function

This instrument starts average measurement using “GET”.

### Service Request function

When the service request is valid, the service request signal is transmitted according to the table below.

| Bit | Explanation |
|---|---|
| D8 | Always：0 |
| D7 | Service request (0:None / 1: exist) |
| D6 | Hardware information (0: normal / 1: abnormal) |
| D5 | Always：0 |
| D4 | Always：0 |
| D3 | Plug check information (0: normal / 1: abnormal) |
| D2 | Command check (0: Normal / 1: error) |
| D1 | Status of instrument (0: On measurement / 1: No measurement) |

### Control command and sent data format

Several control command can be sent in connected form by using “,” for connection. However, the receive buffer capacity of this equipment is 512 bytes.

## Connecting the Instrument to a Personal Computer

**Caution** The instrument can be connected to a personal computer using a GP-IB PC card (PCMCIA) and cable.

**TIP** Please use following GP-IB cards.

Manufacturer: CONTEC CO., LTD.

Model Name: GP-IB (CB) F

**1. Make sure that the power to both the instrument and computer is turned OFF.**

**Refer** For the method of turning OFF the power, refer to page 3-107.

**2. Open the cover on the top of the instrument.**

**3. Attach GP-IB PC card to this instrument.**

**Refer** For the procedure of attaching GP-IB card, refer to page 8-13.

**4. Connect cable to personal computer.**

## Setting the Instrument

This section explains how to change the communication settings to allow the instrument to communicate with the personal computer.

**1. Turn ON the power to both the instrument and personal computer.**

Refer For the method of turning ON the power to the instrument, refer to page 3-3.

### Change the GP-IB address setting.

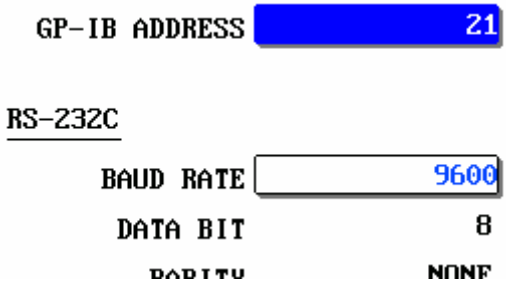
GP-IB address can be changed as explained bellow.

- Example: “21” → “7”

**2. Press [MODE] to locate the cursor to “SETTING”.**


**3. Press [F2] (EXTERNAL INSTRUMENT SET).**

**4. Locate the cursor to “GP-IB ADDRESS” by using the rotary knob or the arrow key.**



**5. Press [ENTER].**

A selection window will appear.

**TIP**

| | |
|---|---|
| Selectable GP-IB address | 0 to 30 (1step) |

Default setting: 21

**6. Locate the cursor to “7” by using the rotary knob or [▲] / [▼].**

**7. Press [ENTER] to register the change made to the GP-IB address setting.**

## Operating the Instrument

This instrument can be controlled by entering commands using GP-IB control software of PC.

**1. Start control software.**

**2. Set the GP-IB address.**

**Caution** GP-IB address of setting is necessary to set same GP-IB address of instrument.

**3. Input commands.**

## Control Commands

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 1-1 | OTDR measurement start/stop | ST | m | Starts/stops OTDR measurement.<br>m= 0: Stops measurement.<br>1: Starts real-time measurement.<br>2: Starts average measurement (continued).<br>3: Starts average measurement (new). |
| 1-2 | Current average time | | | No control command |
| 1-3 | Cursor position | CU | m | Places the cursor at point “m”.<br>m= SXXXX.XXXXX<br>“S” indicates a sign. It can be omitted in the case of “+”.<br>The distance unit set by command 11-5 will be applied. |
| 1-4 | Magnification ratio for horizontal axis<br>(During real-time) | H | m | Sets the magnification ratio for horizontal axis.<br>m= –1: 640km 12: (50m)<br>0: 240km 13: (25m)<br>1: 160 km 14: 320km<br>2: 80 km 15: 2 km<br>3: 40 km 16: 400 m<br>4: 20 km 17: 200 m<br>5: 10 km 18: -<br>6: 5 km 19: -<br>7: 2.5 km 20: (100m)<br>8: 1 km 21: (10m)<br>9: 500 m 22: (5m)<br>10: 250 m 23: (2.5m)<br>11: - 24: -<br>The values that can be set vary with the distance range. |
| 1-5 | Magnification ratio for horizontal axis<br>(Not during real-time) | HSE | m | Sets the magnification ratio for horizontal axis.<br>m= 0: x1 9: 1km<br>1: 500km 10: 500m<br>2: 250km 11: 250m<br>3: 100km 12: 100m<br>4: 50km 13: 50m<br>5: 25km 14: 25m<br>6: 10km 15: 10m<br>7: 5km 16: 5m<br>8: 2.5km 17: 2.5m<br>The values that can be set vary with the distance range. |
| 1-6 | Resolution | | | No control command |
| 1-7 | Magnification ratio for vertical axis | V | m | Sets the magnification ratio for vertical axis.<br>m= 0: 5 dB/div<br>1: 2 dB/div<br>2: 1 dB/div<br>3: 0.5 dB/div<br>4: 0.2 dB/div<br>5: 7.5 dB/div |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 1-8 | Display start distance | HPOS | m | Sets the display start position for horizontal axis.<br>m= SXXXX.XXXXX<br>"S" indicates a sign. It can be omitted in the case of "+".<br>The distance unit set by command 11-5 will be applied.<br>The settable range varies with the settings made by commands 1-4 and 1-5. |
| 1-9 | Distance from the origin | | | No control command |
| 1-10 | Display start level | VPOS | m | Sets the display start level.<br>m= SXX.XXX<br>Reference: 48.160dB (when average method is selected HI-SPEED)<br>"S" indicates a sign. It can be omitted in the case of "+". |
| 1-11 | Trace information acquisition | | | No control command |
| 1-12 | Display scale Initialization | I | | Initializes the display scale. |
| 1-13 | Display screen print | CPY | | Prints the currently displayed screen.<br>Printing will be stopped if this command is executed during printing. |
| 1-14 | Paper feed | FED | m | Feeds the paper by "m" lines (expansion printer unit).<br>1 ≤ m ≤ 999:1step |
| 1-15 | Magnification ratio for horizontal axis<br>(Not during real-time)<br>Conventional method | HSP | m | Sets the magnification ratio for horizontal axis.<br>m= 0: x1 5: x40 (x50)<br>1: x2 6: x80 (x100)<br>2: x4 (x5) 7: x200<br>3: x8 (x10) 8: x400<br>refer to page 8-58.<br>The above values may not be applicable if a value given in ( ) is set by command 1-4. |
| 2-1 | Marker setting | M | m | Sets a marker at the cursor position.<br>m= 1: ①<br>2: ②<br>3: ③ |
| 2-2 | Auxiliary marker | Y | m | Sets a Y marker at the cursor position.<br>m= 1: Y1<br>2: Y2<br>3: Y3 |
| 2-3 | Marker delete | C | | Deletes all the markers. |
| 2-4 | Cursor delete | CC | | Deletes the cursor. |
| 2-5 | Distance reference setting | REF | | Sets the distance reference at the cursor position. |
| 2-6 | Distance reference delete | REC | | Deletes the distance reference. |
| 2-7 | Approximate straight line | SF | m | Shows/hides the approximate straight lines.<br>m= 0: Hides the approximate straight lines.<br>1: Shows the approximate straight lines. |
| 2-8 | Cursor link | CL | m | Enables (ON)/disables (OFF) the cursor link function.<br>m= 0: OFF<br>1: ON |
| 3-1 | Label | L | | Enters the label. Up to 36 characters can be entered.<br>The device message must be separated from the label using a comma ",". |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 3-2 | Company name | CORP | | Enters the company name. Up to 36 characters can be entered.<br>The device message must be separated from the company name using a comma ",". |
| 3-3 | Name | OP | | Enters the name. Up to 36 characters can be entered.<br>The device message must be separated from the company name using a comma ",". |
| 3-4 | Cable ID | LCID | | Enters the cable ID. Up to 36 characters can be entered.<br>The device message must be separated from the company name using a comma ",". |
| 3-5 | Fiber ID | LFID | | Enters the fiber ID. Up to 36 characters can be entered.<br>The device message must be separated from the company name using a comma ",". |
| 3-6 | Fiber type | FT | m | Sets the fiber type.<br>m= 0: SMF<br>1: DSF<br>2: NZ-DSF<br>3: MMF |
| 3-7 | Cable code | LCCD | | Enters the cable code. Up to 36 characters can be entered.<br>The device message must be separated from the company name using a comma ",". |
| 3-8 | Originating location | LOL | | Enters the originating location. Up to 36 characters can be entered.<br>The device message must be separated from the originating location using a comma ",". |
| 3-9 | Terminating location | LTL | | Enter the terminating location. Up to 36 characters can be entered.<br>The device message must be separated from the terminating location using a comma ",". |
| 3-10 | Data flag | LCDF | m | Sets the data flag.<br>m= 0: -<br>1: BC (as-Built Condition)<br>2: RC (as-Repaired Condition)<br>3: OT (Other) |
| 3-11 | Auto increment | AI | m | Enables (ON)/disables (OFF) the LABEL auto increment function.<br>m= 0: ON<br>1: OFF |
| 4-1 | Wavelength | LAM | m | Sets the measurement wavelength.<br>m= 0: Unit's first wavelength<br>1: Unit's second wavelength<br>2: Unit's third wavelength<br>3: Unit's fourth wavelength<br>The wavelengths that can be set vary with the optical module used. |
| 4-2 | Filter | FIL | m | Enables (ON)/disables (OFF) the filter.<br>m= 0: OFF<br>1: ON |
| 4-3 | Approximate method | LSA | m | Sets the approximate method.<br>m= 0: Two point approximate (TPA)<br>1: Least squares approximate (LSA) |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 4-4 | Plug check | PC | m | Enables (ON)/disables (OFF) the optical plug connection check.<br>m= 0: OFF<br>1: ON |
| 4-5 | Measurement condition automation / event detection | ASU | m | Sets the measurement condition automation / event detection function.<br>m= 0: Manual<br>1: Auto range<br>2: Auto attenuation<br>3: Auto range + Auto search<br>4: Auto search<br>5: Auto attenuation + Auto search |
| 4-6 | Distance range | R | m | Sets the distance range.<br>m= 0: 10 km 5: 240 km<br>1: 20 km 6: 5 km<br>2: 40 km 7: 2 km<br>3: 80 km 8: 320 km<br>4: 160 km 9: 640 km<br>The distance range that can be set varies with the wavelength to be used. |
| 4-7 | Pulse width | PW | m | Sets the pulse width.<br>m= 0: - 6: 1 µs<br>1: 10 ns 7: 4 µs<br>2: 20 ns 8: 10 µs<br>3: 100 ns 9: 20 µs<br>4: 200 ns 10: 50 ns<br>5: 500 ns 11: 50 µs<br>The pulse width that can be set varies with the optical module and distance range to be used. |
| 4-8 | Attenuation | AT | m | Set the attenuation.<br>m= 0: 0.00 dB 11: 13.75 dB<br>1: 1.25 dB 12: 15.00 dB<br>2: 2.50 dB 13: 16.25 dB<br>3: 3.75 dB 14: 17.50 dB<br>4: 5.00 dB 15: 18.75 dB<br>5: 6.25 dB 16: 20.00 dB<br>6: 7.50 dB 17: 21.25 dB<br>7: 8.75 dB 18: 22.50 dB<br>8: 10.00 dB 19: 23.75 dB<br>9: 11.25 dB 20: 25.00 dB<br>10: 12.50 dB 21: 26.25 dB<br>The attenuation that can be set varies with the pulse width. |
| 4-9 | Average condition | AVD | m | Sets the type of average measurement.<br>m= 0: Average time (2^*)<br>1: Average interval<br>2: Average time (*k) |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 4-10 | Average time /average interval setting | NUM | m | Sets the time (interval) for average processing.<br>m= –2: 2^10 3: 2^15<br>–1: 2^11 4: 2^16<br>0: 2^12 5: 2^17<br>1: 2^13 6: 2^18<br>2: 2^14<br><br>m= –2: 1k 3: 32 k<br>–1: 2k 4: 65 k<br>0: 4k 5: 131k<br>1: 8k 6: 262k<br>2: 16k<br><br>m= 0: 10sec 5: 3min<br>1: 20sec 6: 5min<br>2: 30sec 7: 10min<br>3: 1min 8: 20min<br>4: - 9: 30min<br>The average count set by command 4-9 will be applied. |
| 4-11 | Average method | AVE | m | Sets the average method.<br>m= 0: Hi-SPEED<br>1: NORMAL<br>2: Hi-RETURN |
| 4-12 | Data size | DS | m | Sets the data size.<br>m= 0: 5k data<br>1: 20k data<br>2: 60k data |
| 4-13 | Group index | IOR | m | Sets the group index.<br>1.00000 ≤ m ≤ 1.99999:0.00001step<br>The group index varies with each wavelength.<br>If this setting is changed after the interval group index is set by command 5-11, the interval group index that is set by command 5-11 will be invalidated. |
| 4-14 | Back scattering ray | BS (RL) | m, n | Sets the back scatter level.<br>m= 0: Unit's first wavelength<br>1: Unit's second wavelength<br>2: Unit's third wavelength<br>3: Unit's fourth wavelength<br>10.00 ≤ n ≤ 64.99:1step<br>The wavelengths that can be set vary with the optical module used. |
| 4-15 | Measurement condition output | | | No control command |
| 4-16 | Multi wavelength measurement setting | NWAVESET | m | Sets the multi wavelength measurement.<br>m= 0 : OFF<br>1 : ON |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 4-17 | Wavelength setting (for multi wavelength measurement) | MWAVE | m,n,o,p | Sets the wavelength.<br>m= 0 : The first wavelength of the unit is OFF<br>1 : The first wavelength og the unit is ON<br>n= 0 : The second wavelength of the unit is OFF<br>1 : The second wavelength of the unit is ON<br>o= 0 : The third wavelength of the unit is OFF<br>1 : The third wavelength of the unit is ON<br>p= 0 : The fourth wavelength of the unit is OFF<br>1 : The fourth wavelength of the unit is ON |
| 4-18 | Auto saving | ASAVE | m | Sets the auto saving<br>m= 0 : OFF<br>1 : ON |
| 5-1 | Auto search execution | ASE | | Executes auto search. |
| 5-2 | Next event | NEX | (m) | Moves the current event to the next event.<br>When sets the number at m, the current event moves specified number event.<br>m = 001 to 100 (Sets S point and R point = -1, End point = 0) |
| 5-3 | Previous event | PRE | (m) | Moves the current event to the previous event.<br>When sets the number at m, the current event moves specified number event.<br>m = 001 to 100 (Sets S point and R point = -1, End point = 0) |
| 5-4 | Event insert | IE | | Inserts an event at the cursor position. |
| 5-5 | Event delete | DE | (m) | Deletes current event.<br>When sets the number at m, the specified number event is deleted.<br>m = 001 to 100 (Sets S point and R point = -1, End point = 0) |
| 5-6 | Event marker move (① to ③) | EM | m, n | Moves the marker to the cursor position.<br>m: Set an event No.<br>(S, R and E point can be set only ②)<br>m=000 to 100 (-1 for S or R point, 0 for E point)<br>n: Marker.<br>n= 1: ①<br>2: ②<br>3: ③ |
| 5-7 | Event auxiliary marker move (Y2) | EY | m | Moves marker Y2 to the cursor position.<br>m: Set an event No.<br>m= 000 to 100 |
| 5-8 | Event data acquisition | | | No control command |
| 5-9 | Event note | EN | m, n | Enters a comment for an event.<br>m= Event No. (-1 for R point, 0 for E point)<br>n= Comment (up to 36 characters) |
| 5-10 | Event list print | PL | m | Sets the item to be printed.<br>m= 0: List<br>1: Trace + List |
| 5-11 | Section group index setting | SIORS | m, n | Sets the section group index.<br>m= Event No. (0 for E point)<br>1.00000 ≤ n ≤ 1.99999:0.00001step<br>The settings made here will be discarded if the group index set by command 4-13 is changed. |
| 5-12 | Splice loss threshold | SPL | m | Sets the splice loss threshold.<br>0.01 ≤ m ≤ 9.99:0.01step |
| 5-13 | Return loss threshold | BSL (RSL) | m | Sets the return loss threshold.<br>20 ≤ m ≤ 70:1step |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 5-14 | Fiber end threshold | EFL (BPL) | m | Sets the fiber end threshold.<br>3 ≤ m ≤ 10:1step |
| 5-15 | Fault event show/hide setting | DFE | m | Shows/hides fault events.<br>m= 0: Shows fault events.<br>1: Hides fault events. |
| 5-16 | Fault event threshold (Splice loss) | FESL | m | Sets the splice loss threshold for fault events.<br>0.01 ≤ m ≤ 9.99:0.01step |
| 5-17 | Fault event threshold (Return loss) | FERL | m | Sets the return loss threshold for fault events.<br>20 ≤ m ≤ 70:1step |
| 5-18 | Auto search event count output | | | No control command |
| 5-19 | Auto search result output | | | No control command |
| 5-20 | Section analysis start point setting | SSPOS | | Sets the start point at the cursor position. |
| 5-21 | Section analysis end point setting | SEPOS | | Sets the end point at the cursor position. |
| 5-22 | Reference return loss setting | AJPOS | | Sets the cursor position as the reference return loss. |
| 5-23 | Section data acquisition | | | No control command |
| 6-1 | Drive setting | FDA | m, n | Sets the drive and file No.<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: USB<br>n= File name (excluding file extension) |
| 6-2 | Folder setting | DIR | m | Sets the folder name.<br>The device message must be separated from the originating location using a comma ","<br>m= Folder name (root folder sets "/")<br>example:/aaa/bbb/ccc/ddd/ |
| 6-3 | File type setting | FF | m | Sets the file type.<br>m= 0: .TRB 6: .LST<br>1: - 7: .SOR(Telcordia)<br>2: .SET 8: .CSV<br>3: .SOR(Bellcore) 9: .TRD<br>4: .TIF 10: .TRA<br>5: .BMP 11: .4<br>(In file saveing, 3 and 7 will be not made distinction) |
| 6-4 | Recorded capacity | | | No control command |
| 6-5 | Recorded file name | | | No control command |
| 6-6 | Sub folder check | | | No control command |
| 6-7 | Acquisition of file list of current folder | | | No control command |
| 7-1 | File recall | FRC | | Recalls a file.<br>.BMP, .TIF, .LST, and .CSV files cannot be recalled.<br>Drive (6-1), folder (6-2) and file type (6-3) must be specified in advance. |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 7-2 | File list print | FP | m, n | Prints a list of files.<br>m: Set the drive.<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: USB<br>n: Set the folder name.<br>n= Folder name(root folder sets "/")<br>example:/aaa/bbb/ccc/ddd/ |
| 8-1 | Data save | FST | | Saves the data (without overwriting).<br>Drive (6-1), folder (6-2) and file type (6-3) must be specified in advance. |
| 8-2 | Data overwriting | RFS | | Overwrites the data.<br>Drive (6-1), folder (6-2) and file type (6-3) must be specified in advance. |
| 9-1 | File delete | DEL | | Deletes the file.<br>Drive (6-1), folder (6-2) and file type (6-3) must be specified in advance. |
| 10-1 | Drive initialize | FIN | m | Set the drive.<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: -<br>6: USB |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 10-2 | Copy | COPY | m, n, o, p, q | Sets the copy source file.<br>If "o" is not specified, copy will be made for each folder.<br>m: Set the copy source drive.<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: -<br>6: USB<br>n: Set the copy source folder.<br>n= Folder name(root folder sets "/")<br>example:/aaa/bbb/ccc/ddd/<br>o: Set the name of the file to be copied.<br>o= File name<br>If "*.SOR" is selected, all the SOR files present in the copy source folder will be copied.<br>P: Set the copy destination drive.<br>P= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: -<br>6: USB<br>q: Set the copy destination folder.<br>q= Folder name(root folder sets "/")<br>example:/aaa/bbb/ccc/ddd/ |
| 10-3 | Folder make | DRM | m, n | Creates a folder.<br>m: Set the drive.<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: USB<br>n: Set the folder.<br>n= Folder name(root folder sets "/")<br>example:/aaa/bbb/ccc/ddd/ |
| 10-4 | Folder delete | DRD | m, n | Deletes a folder.<br>m: Set the drive.<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: USB<br>n: Set the folder.<br>n= Folder name(root folder sets "/")<br>example:/aaa/bbb/ccc/ddd/ |
| 10-5 | Storage media state | | | No control command |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 11-1 | Trace type | TRC | m | Sets the trace display method.<br>m= 0: Dot<br>1: Line |
| 11-2 | Cursor type<br>Second cursor | CSR | m | Sets the cursor display method.<br>m= 0: "+" (Second cursor OFF)<br>1: "\|" (Second cursor OFF)<br>2: "+" (Second cursor ON)<br>3: "\|" (Second cursor ON) |
| 11-3 | Grid show/hide setting | GD | m | Shows/hides the grid.<br>m= 0: Hides the grid.<br>1: Shows the grid. |
| 11-4 | Trace display | DOT | m | Sets the trace display dot method.<br>m= 0: Decimation<br>1: Mean<br>2: Maximum<br>3: Envelope |
| 11-5 | Distance unit | DM | m | Sets the distance unit.<br>m= 0: km<br>1: mile<br>2: kf<br>This setting is effective for all the distance related items. |
| 11-6 | Distance reference marker | DUO | m | Sets the type of the distance origin marker.<br>m= 0: Line<br>1: Arrow |
| 11-7 | dB digit | FIG | m | Sets the number of display digits for intensity level.<br>m= 0: **.***<br>1: **.**<br>2: **.* |
| 11-8 | Display color | DIS | m | Sets the display color.<br>m= 0: Color 1<br>1: Color 2<br>2: Color 3<br>3: B&W |
| 11-9 | Date display format | DTE | m | Sets the date display format.<br>m= 0: Not displayed<br>1: APR. 30. 2004<br>2: 30. APR. 2004<br>3: 2004. APR. 30<br>4: 4. 30. 2004<br>5: 30. 4. 2004<br>6: 2004. 4. 30 |
| 11-10 | Year correction | YEA | m | Corrects the year (4-digit).<br>1970 ≤ m ≤ 2037:1step |
| 11-11 | Month correction | MTH | m | Corrects the month.<br>01 ≤ m ≤ 12:1step |
| 11-12 | Day correction | DAY | m | Corrects the day.<br>m=01 to 31:1step |
| 11-13 | Hour correction | HOU | m | Corrects the hour.<br>m=00 to 23:1step |
| 11-14 | Minute correction | MIN | m | Corrects the minute.<br>m=00 to 59:1step |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 11-15 | Alarm sound setting | BEEP | m | Enables/disables the alarm.<br>m= 0: Disables the alarm.<br>1: Enables the alarm. |
| 11-16 | Power save setting | POW | m | Sets the power save function.<br>m= 0: OFF<br>1: 30sec<br>2: 1min<br>3: 3min<br>4: 5min<br>5: 10min<br>6: 20min |
| 11-17 | LCD brightness setting | BRI | m | Sets the LCD brightness.<br>m= 0: Bright<br>1: Normal<br>2: Dark |
| 11-18 | PCMCIA cancel | PCME | | Shuts off the power to the PCMCIA card. |
| 11-19 | Print direction setting | PRD | m | Sets the print direction.<br>m= 0: Horizontal<br>1: Vertical<br>2: Screen |
| 11-20 | Print color setting | PRIC | m | Sets the print color.<br>m= 0: Display<br>1: B&W<br>This setting is effective only if “USB” is set by command 13-1. |
| 12-1 | Printer setting | PRO | m | Sets the printer port.<br>m= 0: Expansion unit<br>1: -<br>2: -<br>3: -<br>4: -<br>5: USB(HP)<br>6: USB(EPSON) |
| 12-2 | Printer status check | | | No control command |
| 12-3 | RS-232C setting | | | No control command |
| 13-1 | Trace data quantity | | | No control command |
| 13-2 | Trace data (ASCII) | | | No control command |
| 13-3 | Trace data (binary) | | | No control command |
| 13-4 | Displayed trace data (ASCII) | | | No control command |
| 13-5 | Displayed trace data (binary) | | | No control command |
| 13-6 | Acquisition of file size | | | No control command |
| 13-7 | Acquisition of file | | | No control command |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 13-8 | Sends file PC to OTDR | FILESEND | m,n,o,p | m received drive.<br>m= 0 : FD (EXTENSION UNIT)<br>1 : INTERNAL MEMORY<br>2 : —<br>3 : PCMCIA<br>4 : —<br>5 : USB<br>n received folder<br>o file name<br>p byte number of send file<br><br>After send this command, sent binary data is stored specified file.<br>example<br>FILESEND1,/,test.trb,1000 |
| 14-1 | Instrument status | | | No control command |
| 14-2 | Instrument information | | | No control command |
| 14-3 | Initialization | SETINI | | Resets all the settings to the default settings. |
| 14-4 | Device clear | DCL | | Stops measurement and deletes displayed trace. |
| 15-1 | Service request setting | SRQ | m | Sets the service request<br>m= 0 : OFF<br>1 : ON |
| 16-1 | OTDR/Light source mode select | OPMOD | m | Selects OTDR mode or light source mode<br>m= 0 : OTDR<br>1 : Light source<br>When using the optical module does not support light source function, Light source mode can not be selected.<br>When changing the mode, optical output is stopped. |
| 16-2 | Light source setting | ILS | m | Sets the light ON/OFF<br>m= 0 : OFF<br>1 : ON<br>This command is valid at light source mode. |
| 16-3 | Modulated frequency of light source | ILM | m | Selects modulated frequency of light source<br>m= 0 : CW<br>1 : 270Hz<br>2 : 1kHz<br>3 : 2kHz<br>This command is valid at light source mode. |
| 16-4 | Light source wavelength | LSWL | m | Selects light source wavelength<br>m= 0 : The first wavelength of the first<br>1 : The second wavelength of the unit<br>2 : The third wavelength of the unit<br>3 : The fourth wavelength of the unit<br>Number of wavelength depends on the unit.<br>This command is valid at light source mode. |

## Request Commands

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 1-1 | OTDR measurement start/stop | STR | | Requests the measurement status.<br>0: Stops measurement.<br>1: Starts real-time measurement.<br>2: Starts average measurement (continued).<br>3: Starts average measurement (new).<br>4: Starts multi wavelength measurement |
| 1-2 | Current average time | TIMR | | |
| 1-3 | Cursor position | CUR | | Requests the cursor position.<br>SXXXX.XXXXXTT<br>"S" indicates a sign.<br>"TT" indicates the distance unit. |
| 1-4 | Magnification ratio for horizontal axis (During real-time) | HR | | Requests the magnification ratio for horizontal axis.<br>–1:640km 12: (50m)<br>0: 240km 13: (25m)<br>1: 160 km 14: 320km<br>2: 80 km 15: 2 km<br>3: 40 km 16: 400 m<br>4: 20 km 17: 200 m<br>5: 10 km 18: -<br>6: 5 km 19: -<br>7: 2.5 km 20: (100m)<br>8: 1 km 21: (10m)<br>9: 500 m 22: (5m)<br>10: 250 m 23: (2.5m)<br>11: - 24: - |
| 1-5 | Magnification ratio for horizontal axis (Not during real-time) | HSER | | Requests the magnification ratio for horizontal axis.<br>m= 0: x1 9: 1km<br>1: 500km 10: 500m<br>2: 250km 11: 250m<br>3: 100km 12: 100m<br>4: 50km 13: 50m<br>5: 25km 14: 25m<br>6: 10km 15: 10m<br>7: 5km 16: 5m<br>8: 2.5km 17: 2.5m |
| 1-6 | Resolution | RESR | | Requests the sampling resolution.<br>XXXXTT<br>"TT" indicates the distance unit. |
| 1-7 | Magnification ratio for vertical axis | VR | | Requests the magnification ratio for vertical axis.<br>0: 5 dB/div<br>1: 2 dB/div<br>2: 1 dB/div<br>3: 0.5 dB/div<br>4: 0.2 dB/div<br>5: 7.5 dB/div |
| 1-8 | Display start distance | HPOSR | | Sets the display start position for horizontal axis.<br>SXXXX.XXXXXTT<br>"S" indicates a sign.<br>"TT" indicates the distance unit. |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 1-9 | Distance from the origin | DU | | Requests the distance from the origin.<br>SXXXX.XXXXXTT<br>"S" indicates a sign.<br>"TT" indicates the distance unit. |
| 1-10 | Display start level | VPOSR | | Requests the display start level.<br>SXX.XXX |
| 1-11 | Trace information acquisition | MD | | Requests the trace information.<br>For the return value format, refer to page 8-59. |
| 1-12 | Display scale Initialization | | | No request command |
| 1-13 | Display screen print | | | No request command |
| 1-14 | Paper feed | | | No request command |
| 1-15 | Magnification ratio for horizontal axis (Not during real-time) Conventional method | HSPR | | Requests the magnification ratio for horizontal axis.<br>0: x1 5: x40 (x50)<br>1: x2 6: x80 (x100)<br>2: x4 (x5) 7: x200<br>3: x8 (x10) 8: x400 |
| 2-1 | Marker position | MR | m | Requests the marker position.<br>m= 1: ①<br>2: ②<br>3: ③<br>For the return value format, refer to page 8-59. |
| 2-2 | Auxiliary marker position | YR | m | Requests the Y marker position.<br>m= 1: Y1<br>2: Y2<br>3: Y3<br>For the return value format, refer to page 8-59. |
| 2-3 | Marker delete | | | No request command |
| 2-4 | Cursor delete | | | No request command |
| 2-5 | Distance origin setting | REFR | | Requests the distance origin position.<br>SXXXX.XXXXXTT<br>"S" indicates a sign.<br>"TT" indicates the distance unit. |
| 2-6 | Distance origin delete | | | No request command |
| 2-7 | Approximate straight line | SFR | | Requests the approximate straight line display status.<br>0: Not displayed<br>1: Displayed |
| 2-8 | Cursor link | CLR | | Requests the cursor link status.<br>0: OFF<br>1: ON |
| 3-1 | Label | LR | | Requests the label. |
| 3-2 | Company name | CORPR | | Requests the company name. |
| 3-3 | Name | OPR | | Requests the name. |
| 3-4 | Cable ID | LCIDR | | Requests the cable ID. |
| 3-5 | Fiber ID | LFIDR | | Requests the fiber ID. |
| 3-6 | Fiber type | FTR | | Requests the fiber type.<br>0: SMF<br>1: DSF<br>2: NZ-DSF<br>3: MMF |
| 3-7 | Cable code | LCCDR | | Requests the cable code. |
| 3-8 | Originating location | LOLR | | Requests the originating location. |
| 3-9 | Terminating location | LTLR | | Requests the terminating location |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 3-10 | Data flag | LCDFR | | Requests the data flag.<br>0: -<br>1: BC (as-Built Condition)<br>2: RC (as-Repaired Condition)<br>3: OT (Other) |
| 3-11 | Auto increment | AIR | | Requests the LABEL auto increment status.<br>0: ON<br>1: OFF |
| 3-12 | Sub No. | SLNR | | Requests the start No. (m) and sub No. range (n).<br>Return value format: m,n<br>m= 001 to 999<br>n= 0: OFF 4: a to e<br>1: a to b 5: a to f<br>2: a to c 6: a to g<br>3: a to d 7: a to h |
| 4-1 | Wavelength | LAMR | | Requests the measurement wavelength.<br>0: Unit's first wavelength<br>1: Unit's second wavelength<br>2: Unit's third wavelength<br>3: Unit's fourth wavelength |
| 4-2 | Filter | FILR | | Requests the filter status.<br>0: OFF<br>1: ON |
| 4-3 | Approximate method | LSAR | | Requests the currently used approximate method.<br>0: Two point approximate (TPA)<br>1: Least squares approximate (LSA) |
| 4-4 | Plug check | PCR | | Requests the optical plug status.<br>0: OFF<br>1: ON |
| 4-5 | Measurement condition automation / event detection | ASUR | | Requests the measurement condition automation / event detection function.<br>0: Manual<br>1: Auto range<br>2: Auto attenuation<br>3: Auto range + Auto search<br>4: Auto search<br>5: Auto attenuation + Auto search |
| 4-6 | Distance range | RR | | Requests the distance range.<br>0: 10 km 5: 240 km<br>1: 20 km 6: 5 km<br>2: 40 km 7: 2 km<br>3: 80 km 8: 320 km<br>4: 160 km 9: 640 km |
| 4-7 | Pulse width | PWR | | Requests the pulse width.<br>0: - 6: 1 µs<br>1: 10 ns 7: 4 µs<br>2: 20 ns 8: 10 µs<br>3: 100 ns 9: 20 µs<br>4: 200 ns 10: 50 ns<br>5: 500 ns 11: 50 µs |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 4-8 | Attenuation | ATR | | Requests the attenuation.<br>0: 0.00 dB 11: 13.75 dB<br>1: 1.25 dB 12: 15.00 dB<br>2: 2.50 dB 13: 16.25 dB<br>3: 3.75 dB 14: 17.50 dB<br>4: 5.00 dB 15: 18.75 dB<br>5: 6.25 dB 16: 20.00 dB<br>6: 7.50 dB 17: 21.25 dB<br>7: 8.75 dB 18: 22.50 dB<br>8: 10.00 dB 19: 23.75 dB<br>9: 11.25 dB 20: 25.00 dB<br>10: 12.50 dB 21: 26.25 dB |
| 4-9 | Average condition | AVDR | | Requests the type of average measurement.<br>0: Average time (2^*)<br>1: Average interval<br>2: Average time (*k) |
| 4-10 | Average time /average interval setting | NUMR | | Requests the time (interval) for average processing.<br>–2: 2^10 3: 2^15<br>–1: 2^11 4: 2^16<br>0: 2^12 5: 2^17<br>1: 2^13 6: 2^18<br>2: 2^14<br><br>–2: 1k 3: 32 k<br>–1: 2k 4: 65 k<br>0: 4k 5: 131k<br>1: 8k 6: 262k<br>2: 16k<br><br>0: 10sec 5: 3min<br>1: 20sec 6: 5min<br>2: 30sec 7: 10min<br>3: 1min 8: 20min<br>4: - 9: 30min |
| 4-11 | Average method | AVER | | Requests the average method.<br>0: Hi-SPEED<br>1: NORMAL<br>2: Hi-RETURN |
| 4-12 | Data size | DSR | | Requests the data size.<br>0: 5k data<br>1: 20k data<br>2: 60k data |
| 4-13 | Group index | IORR | | Requests the group index.<br>1.XXXXX |
| 4-14 | Back scattering ray | BSR (RLR) | m | Requests the back scatter level.<br>m= 0: Unit's first wavelength<br>1: Unit's second wavelength<br>2: Unit's third wavelength<br>3: Unit's fourth wavelength<br>XX.XX |
| 4-15 | Measurement condition output | U | | Requests the measurement conditions.<br>For the return value format, refer to page 8-59. |
| 4-16 | Multi wavelength measurement setting | MWAVESET R | | Requires multi wavelength measurement setting<br>m= 0 : OFF<br>1 : ON |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 4-17 | Multi wavelength measurement setting | MWAVER | | Requires wavelength setting.<br>Return value formant : m,n,o,p<br>m= 0 : The first wavelength of the unit is OFF<br>1 : The first wavelength og the unit is ON<br>n= 0 : The second wavelength of the unit is OFF<br>1 : The second wavelength of the unit is ON<br>o= 0 : The third wavelength of the unit is OFF<br>1 : The third wavelength of the unit is ON<br>p= 0 : The fourth wavelength of the unit is OFF<br>1 : The fourth wavelength of the unit is ON |
| 4-18 | Auto saving condition | ASAVER | | Requires auto saving condition.<br>m= 0 : OFF<br>1 : ON |
| 5-1 | Auto search execution | | | No request command |
| 5-2 | Next event | | | No request command |
| 5-3 | Previous event | | | No request command |
| 5-4 | Event insert | | | No request command |
| 5-5 | Event delete | | | No request command |
| 5-6 | Event marker position (① to ③) | EMR | m, n | Requests the event marker position.<br>m: Set the event No.<br>(-1 for S or R point, 0 for E point)<br>n: Set the marker:<br>(S, R and E point can be set only ②)<br>n= 1: ①<br>2: ②<br>3: ③<br>For the return value format, refer to page 8-59. |
| 5-7 | Event auxiliary maker position (Y2) | EYR | m | Requests the event marker Y2 position.<br>m: Set an event No.<br>For the return value format, refer to page 8-59. |
| 5-8 | Event data acquisition | EDR | m | Acquires event data.<br>m: Set an event No. (-1 for R point, 0 for E point).<br>For the return value format, refer to page 8-59. |
| 5-9 | Event note | ENR | m | Requests the event comment.<br>m: Set an event No. (-1 for R point, 0 for E point). |
| 5-10 | Event list print | | | No request command |
| 5-11 | Section group index setting | SIORSR | m | Requests the group index for each section.<br>m: Set an event No. (R for R point).<br>1.XXXXX |
| 5-12 | Splice loss threshold | SPLR | | Requests the splice loss threshold.<br>X.XX |
| 5-13 | Return loss threshold | BSLR (RSLR) | | Requests the return loss threshold.<br>XX |
| 5-14 | Fiber end threshold | EFLR (BPLR) | | Requests the fiber end threshold.<br>XX<br>(XX.X) |
| 5-15 | Fault event show/hide setting | DFER | | Requests the fault event display setting.<br>0: Displayed<br>1: Not displayed |
| 5-16 | Fault event threshold (Splice loss) | FESLR | | Requests the splice loss threshold for fault events.<br>X.XX |
| 5-17 | Fault event threshold (Return loss) | FERLR | | Requests the return loss threshold for fault events.<br>XX |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 5-18 | Auto search event count output | SPPR | | Requests the number of events detected by auto search.<br>(R point is included, END point is not included)<br>XXX |
| 5-19 | Auto search result output | SPDR | | Requests the auto search results.<br>For the return value format, refer to page 8-60. |
| 5-20 | Section analysis start point setting | SSPOSR | | Requests the section start position.<br>SXXXX.XXXXXTT<br>"S" indicates a sign.<br>"TT" indicates the distance unit. |
| 5-21 | Section analysis end point setting | SEPOSR | | Requests the section end position.<br>SXXXX.XXXXXTT<br>"S" indicates a sign.<br>"TT" indicates the distance unit. |
| 5-22 | Reference return loss setting | AJPOSR | | Requests the reference value.<br>SXXXX.XXXXXTT<br>"S" indicates a sign.<br>"TT" indicates the distance unit. |
| 5-23 | Section data acquisition | SDR | | Requests the section loss and section return loss.<br>For the return value format, refer to page 8-60. |
| 6-1 | Drive setting | FDAR | | Requests the drive name (m) and file name (n).<br>Return value format: m,n<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: USB<br>n= File name |
| 6-2 | Folder setting | DIRR | | Requests the folder name. |
| 6-3 | File type setting | FFR | | Requests the file type.<br>m= 0: .TRB 6: .LST<br>1: - 7: .SOR(Telcordia)<br>2: .SET 8: .CSV<br>3: .SOR(Bellcore) 9: .TRD<br>4: .TIF 10: .TRA<br>5: .BMP 11: .4 |
| 6-4 | Recorded capacity | FSR | m | Requests the used capacity of the drive.<br>m: Specify the drive.<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: USB<br>XXXXXXXXXXbyte |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 6-5 | Recorded file name | FAR | m, n, o | Request the names of recorded files.<br>Return value format:<br>XXXXXXX,XXXXXXX, ···<br>m: Specify the drive.<br>m= 0: FD (expansion unit)<br>1: Built-in memory<br>2: -<br>3: PCMCIA<br>4: -<br>5: USB<br>n: Specify the folder.<br>o: Specify the file type.<br>o= 0: .TRB 6: .LST<br>1: - 7: .SOR(Telcordia)<br>2: .SET 8: .CSV<br>3: .SOR(Bellcore) 9: .TRD<br>4: .TIF 10: .TRA<br>5: .BMP 11: .4 |
| 6-6 | Sub folder check | SDIRR | | Requests the sub folders of the current folder.<br>Return value format: XXXXXXX,XXXXXXX,···<br>None will be returned if no sub folders exist. |
| 6-7 | Acquisition of file list of current folder | CUDIR | | Requires file list of folder selected FDA or DIR.<br>Each file names which separated by "," are output.<br>Example<br>001.SOR,abc/ |
| 7-1 | File recall | | | No request command |
| 7-2 | File list print | | | No request command |
| 8-1 | Data save | | | No request command |
| 8-2 | Data overwriting | | | No request command |
| 9-1 | File delete | | | No request command |
| 10-1 | Drive initialize | | | No request command |
| 10-3 | Folder make | | | No request command |
| 10-4 | Folder delete | | | No request command |
| 10-5 | Storage media state | RERR | | Requests the storage media status.<br>0: Normal<br>1: -<br>2: No storage media is installed.<br>3: Not initialized<br>4: Writing inhibited<br>5: Selected not stored file<br>6: Selected stored file<br>7: Not enough media capacity<br>8: Other error |
| 11-1 | Trace type | TRCR | | Requests the trace display method.<br>0: Dot<br>1: Line |
| 11-2 | Cursor type<br>Second cursor | CSRR | | Requests the cursor display method.<br>0: "+" (Second cursor OFF)<br>1: "\|" (Second cursor OFF)<br>2: "+" (Second cursor ON)<br>3: "\|" (Second cursor ON) |
| 11-3 | Grid show/hide setting | GDR | | Requests to show/hide the grid.<br>0: Hides the grid.<br>1: Shows the grid. |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 11-4 | Trace display | DOTR | | Requests the trace display dot method.<br>0: Decimation<br>1: Mean<br>2: Maximum<br>3: Envelope |
| 11-5 | Distance unit | DMR | | Requests the distance unit.<br>0: km<br>1: mile<br>2: kf |
| 11-6 | Distance reference marker | DUOR | | Requests the type of the distance reference marker.<br>0: Line<br>1: Arrow |
| 11-7 | dB digit | FIGR | | Requests the number of display digits for intensity level.<br>0: **.***<br>1: **.**<br>2: **.* |
| 11-8 | Display color | DISR | | Requests the display color.<br>0: Color 1<br>1: Color 2<br>2: Color 3<br>3: B&W |
| 11-9 | Date display format | DTER | | Requests the date display format.<br>0: Not displayed<br>1: Apr. 30. 2004<br>2: 30. Apr. 2004<br>3: 2004. Apr. 30<br>4: 4. 30. 2004<br>5: 30. 4. 2004<br>6: 2004. 4. 30 |
| 11-10 | Year correction | YEAR | | Requests the year. |
| 11-11 | Month correction | MTHR | | Requests the month. |
| 11-12 | Day correction | DAYR | | Requests the day. |
| 11-13 | Hour correction | HOUR | | Requests the hour. |
| 11-14 | Minute correction | MINR | | Requests the minute. |
| 11-15 | Alarm sound setting | BEEPR | | Requests to enable.disable the alarm.<br>0: Disables the alarm.<br>1: Enables the alarm. |
| 11-16 | Power save setting | POWR | | Requests the power save function.<br>0: OFF<br>1: 30sec<br>2: 1min<br>3: 3min<br>4: 5min<br>5: 10min<br>6: 20min |
| 11-17 | LCD brightness setting | BRIR | | Requests the LCD brightness.<br>0: Bright<br>1: Normal<br>2: Dark |
| 11-18 | PCMCIA cancel | PCMER | | No request command |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 11-19 | Print direction setting | PRDR | | Requests the print direction.<br>0: Horizontal<br>1: Vertical<br>2: Screen |
| 11-20 | Print color setting | PRICR | | Requests the print color.<br>0: Display<br>1: B&W |
| 12-1 | Printer setting | PROR | | Requests the printer port.<br>0: Expansion unit<br>1: -<br>2: -<br>3: -<br>4: -<br>5: USB(HP)<br>6:USB(EPSON) |
| 12-2 | Printer status check | PRSR<br>(CPYR) | | Requests the printer status.<br>0: Print ready<br>1: Print in progress<br>2: No paper<br>3: Head up<br>4: Abnormal temperature<br>This command cannot be used in the case of USB printer. |
| 12-3 | RS-232C setting | RSR | | Requests the RS-232C parameters.<br>Return value format: m,n,o,p,q<br>m: Baud rate<br>0: 300 5: 9600<br>1: 600 6: 19200<br>2: 1200 7: 38400<br>3: 2400 8: 57600<br>4: 4800 9: 115200<br>n: Data bits<br>o: Parity<br>0: None<br>p: Stop bits<br>q: Flow control<br>0:-<br>1: Hardware<br>2: None |
| 13-1 | Trace data quantity | DNR | | |
| 13-2 | Trace data (ASCII) | DR | | Requests all the trace data (ASCII).<br>Return value format XX.XXX, XX.XXX, ・・・<br>Unit is dB. |
| 13-3 | Trace data (Binary) | DBIR | | Requests all the trace data (binary).<br>As the return values, the upper and lower bytes of the integral part (data × 1000) will be output alternately.(0.001dB unit)<br>Return value format: D0D1D2・・・DnEOI |
| 13-4 | Display trace data (ASCII) | WR | | Requests the trace data (ASCII) for each displayed trace.<br>Return value format XX.XXX,XX.XXX,...<br>Return value example 45.000dB is 45000 |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 13-5 | Display trace data (Binary) | WBIR | | Requests the trace data (binary) for each displayed trace.<br>As the return values, the upper and lower bytes of the integral part (data × 1000) will be output alternately.(0.001dB unit)<br>Return value format: D0D1D2…DnEOI |
| 13-6 | File size acquisition | FILESR | | The file size specified by control commands 6-1, 6-2 and 6-3 will be requested. |
| 13-7 | File acquisition | FILER | | The file size specified by control commands 6-1, 6-2 and 6-3 will be requested.<br>Binary data will be output continuously as the return values.<br>OTDR data file can be created by storing the returned values in the order they are received.<br>This command must be used in conjunction with command 13-6 (File size acquisition). |
| 13-8 | Send file | | | No request command |
| 13-9 | Trace data (binary) | DBIR | | Requests all the trace data (binary).<br>As the return values, the upper and lower bytes of the integral part (data × 1000) will be output alternately.(0.004dB unit)<br>Return value format: D0D1D2…DnEOI |
| 13-10 | Displayed trace data (binary) | WBIR | | Requests the trace data (binary) for each displayed trace.<br>As the return values, the upper and lower bytes of the integral part (data × 1000) will be output alternately.(0.004dB unit)<br>Return value format: D0D1D2…DnEOI |
| 14-1 | Instrument status | INFR | | Requests the instrument status.<br>0: Instrument is in standby.<br>1: Pulse light is currently emitted.<br>2: -<br>3: -<br>4: No printer paper<br>5: -<br>6: No optical fiber connected<br>7: Plug check error<br>Priority order: 7>6>4>1>0 |
| 14-2 | Instrument information | IDER | | Requests the instrument information.<br>For the return value format, refer to page 8-60. |
| 14-3 | Device clear | | | No request command |
| 14-4 | Initialization | | | No request command |
| 15-1 | SRQ setting | SRQR | | Requires service request setting<br>0 : OFF<br>1 : ON |
| 16-1 | OTDR/Light source mode select | OPMODR | | Requires measurement mode<br>0 : OTDR<br>1 : Light source |
| 16-2 | Light source status | ILSR | | Requires light source status<br>0 : OFF<br>1 : ON<br>This command is valid at light source mode. |

| No. | Function | Device Message | | Description |
|---|---|---|---|---|
| | | Header | Numeric Part | |
| 16-3 | Modulated frequency of light source | ILMR | | Requires modulated frequency of light source<br>0 : CW<br>1 : 270Hz<br>2 : 1kHz<br>3 : 2kHz<br>This command is valid at light source mode. |
| 16-4 | Light source wavelength | LSWLR | | Requires wavelength of light source.<br>m= 0 : The first wavelength of the first<br>1 : The second wavelength of the unit<br>2 : The third wavelength of the unit<br>3 : The fourth wavelength of the unit<br>Number of wavelength depends on the unit.<br>This command is valid at light source mode. |

## HSP command

・Data size: 20k mode / 60k mode

| | Range of data acquisition | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 640km | | 320km | | 240km | | 160km | |
| | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 |
| HSP0 | 640km | | 320km | 320km | 240km | 240km | 160km | 160km |
| HSP1 | 500km | | 250km | 160km | 100km | 120km | 100km | 80km |
| HSP2 | 250km | | 100km | 80km | 50km | 60km | 50km | 40km |
| HSP3 | 100km | | 50km | 40km | 25km | 30km | 25km | 20km |
| HSP4 | 50km | | 25km | 16km | 10km | 12km | 10km | 8km |
| HSP5 | 25km | | 10km | 8km | 5km | 6km | 5km | 4km |
| HSP6 | 10km | | 5km | 4km | 2.5km | 3km | 2.5km | 2km |
| HSP7 | 5km | | 2.5km | 1.6km | 1km | 1.2km | 1km | 800m |
| HSP8 | 2.5km | | 1km | 800m | 500m | 600m | 500m | 400m |

| | Range of data acquisition | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 80km | | 40km | | 20km | | 10km | |
| | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 |
| HSP0 | 80km | 80km | 40km | 40km | 20km | 20km | 10km | 10km |
| HSP1 | 50km | 40km | 25km | 20km | 10km | 10km | 5km | 5km |
| HSP2 | 25km | 20km | 10km | 10km | 5km | 5km | 2.5km | 2.5km |
| HSP3 | 10km | 10km | 5km | 5km | 2.5km | 2.5km | 1km | 1.25km |
| HSP4 | 5km | 4km | 2.5km | 2km | 1km | 1km | 500m | 500m |
| HSP5 | 2.5km | 2km | 1km | 1km | 500m | 500m | 250m | 250m |
| HSP6 | 1km | 1km | 500m | 500m | 250m | 250m | 100m | 125m |
| HSP7 | 500m | 400m | 250m | 200m | 100m | 100m | 50m | 50m |
| HSP8 | 250m | 200m | 100m | 100m | 50m | 50m | | |

・Data size: 5k mode

| | Range of data acquisition | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 640km | | 320km | | 240km | | 160km | | 80km | |
| | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 |
| HSP0 | 640km | | 320km | 320km | 240km | 240km | 160km | 160km | 80km | 80km |
| HSP1 | 500km | | 250km | 160km | 100km | 120km | 100km | 80km | 50km | 40km |
| HSP2 | 250km | | 100km | 62km | 50km | 48km | 50km | 32km | 25km | 16km |
| HSP3 | 100km | | 50km | 32km | 25km | 24km | 25km | 16km | 11km | 8km |
| HSP4 | 50km | | 25km | 16km | 10km | 12km | 11km | 8km | 5km | 4km |
| HSP5 | 25km | | 10km | 6.2km | 5km | 4.8km | 5km | 3.2km | 2.5km | 1.6km |
| HSP6 | 10km | | 5km | 3.2km | 2.5km | 2.4km | 2.5km | 1.6km | 1km | 800m |

| | Range of data acquisition | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 40km | | 20km | | 10km | | 5km | | 2.5km | |
| | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 |
| HSP0 | 40km | 40km | 20km | 20km | 10km | 10km | 5km | 5km | 2.5km | 2.5km |
| HSP1 | 25km | 20km | 10km | 10km | 5km | 5km | 2.5km | 2.5km | 1km | 1.25km |
| HSP2 | 10km | 8km | 5km | 4km | 2.5km | 2km | 1km | 1km | 500m | 500m |
| HSP3 | 5km | 4km | 2.5km | 2km | 1km | 1km | 500m | 500m | 250m | 250m |
| HSP4 | 2.5km | 2km | 1km | 1km | 500m | 500m | 250m | 250m | 100m | 125m |
| HSP5 | 1km | 800m | 500m | 400m | 250m | 200m | 100m | 100m | 50m | 50m |
| HSP6 | 500m | 400m | 250m | 200m | 100m | 100m | 50m | 50m | 25m | 25m |

・Dist. Range: 2km

| | Range of data acquisition | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2km | | 1km | | 400m | | 200m | | 100m | |
| | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 | AQ7260 | AQ7250 |
| HSP0 | 2km | 2km | 1km | 1km | 400m | 400m | 200m | 200m | 100m | 100m |
| HSP1 | 1km | 1km | 500m | 500m | 250m | 200m | 100m | 100m | 50m | 50m |
| HSP2 | 500m | 500m | 250m | 250m | 100m | 100m | 50m | 50m | 25m | 25m |
| HSP3 | 250m | 250m | 100m | 125m | 50m | 50m | 25m | 25m | 10m | 12.5m |
| HSP4 | 100m | 100m | 50m | 50m | 25m | 20m | 10m | 10m | 5m | 5m |
| HSP5 | 50m | 50m | 25m | 25m | 10m | 10m | 5m | 5m | 2.5m | 2.5m |

# Return Value Format

## MD

Return values are separated by a delimiter for each item.

In the case of RS-232C: Output for all the items at once (separated by "," for each item).
So, a delimiter (CRLF) is provided only at the end.

In the case of GP-IB: Created by dividing the return value for each item using the delimiters (CR and LF), and outputting the items one after another.

| 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 | Remarks: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | U | R | S | O | R | | | | | S | X | X | X | X | . | X | X | X | X | X | T | T | CR | LF | Cursor position |
| P | O | S | I | T | I | O | N | | | S | X | X | X | X | . | X | X | X | X | X | T | T | CR | LF | Left-end position on screen |
| S | P | L | I | C | E | | L | O | S | S | | S | X | X | . | X | X | X | D | B | | | CR | LF | Insertion loss |
| 1 | - | 2 | | L | O | S | S | | | | | S | X | X | . | X | X | X | D | B | | | CR | LF | TPA loss between 1 and 2 (*1) |
| U | N | I | T | | L | O | S | S | | A | S | X | X | . | X | X | X | D | B | / | T | T | CR | LF | |
| L | O | S | S | | A | | | | | | | S | X | X | . | X | X | X | D | B | | | CR | LF | |
| D | I | S | T | A | N | C | E | | A | | X | X | X | X | . | X | X | X | X | X | T | T | CR | LF | |
| U | N | I | T | | L | O | S | S | | B | S | X | X | . | X | X | X | D | B | / | T | T | CR | LF | |
| L | O | S | S | | B | | | | | | | S | X | X | . | X | X | X | D | B | | | CR | LF | |
| D | I | S | T | A | N | C | E | | B | | X | X | X | X | . | X | X | X | X | X | T | T | CR | LF | |
| I | O | R | | | | | | | | | | | | 1 | | X | X | X | X | X | | | CR | LF | |
| R | E | F | | | | | | | | | X | X | X | X | . | X | X | X | X | X | T | T | CR | LF | |
| A | P | P | R | O | X | I | M | A | T | I | O | N | | | | X | X | X | | | | | CR | LF | |
| R | E | T | U | R | N | | L | O | S | S | | S | X | X | . | X | X | X | D | B | | | CR | LF | |

*1: If markers 1, 2, and 3 have been set, "1-3 LOSS" is displayed.

## MR, YR, EMR, EYR

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MR | M | A | R | K | E | R | | M | , | S | X | X | X | X | . | X | X | X | X | X | T | T | S | X | X | . | X | X | X | D | B | CR | LF | |
| YR | Y | m | | | | | | | , | S | X | X | X | X | . | X | X | X | X | X | T | T | S | X | X | . | X | X | X | D | B | CR | LF | |
| EMR | M | A | R | K | E | R | | M | , | S | X | X | X | X | . | X | X | X | X | X | T | T | , | S | X | X | . | X | X | X | D | B | CR | LF |
| EYR | Y | m | | | | | | | | S | X | X | X | X | . | X | X | X | X | X | T | T | , | S | X | X | . | X | X | X | D | B | CR | LF |

## U

The numeric part for each item is right aligned and displayed.

In the case of multi-mode fiber, "SM" will be replaced by "MM".

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | M | | X | . | X | X | U | M | , | R | A | N | G | E | | X | X | X | T | T | , | P | U | L | S | E | | W | I |
| 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 |
| D | T | H | | X | X | X | X | X | X | , | A | T | T | | X | X | . | X | X | D | B | , | R | E | S | | X | X | X |
| 61 | 62 | 63 | 64 | 65 | 66 | | | | | | | | | | | | | | | | | | | | | | | | |
| X | X | T | T | CR | LF | | | | | | | | | | | | | | | | | | | | | | | | |

## EDR

The numeric part for each item is left aligned and displayed, with the unit part at the fixed position.

Items are displayed in the order “event No.”, “distance”, “splice loss”, “return loss”, “cumulative loss”, “dB/km” and “event type”.

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | X | X | , | S | X | X | X | X | . | X | X | X | X | X | T | T | , | S | X | X | . | X | X | X | D | B | , | S | X |
| 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 |
| X | . | X | X | X | D | B | , | S | X | X | . | X | X | X | D | B | , | S | X | X | . | X | X | X | D | B | / | T | T |
| 61 | 62 | 63 | 64 | 65 | 66 | | | | | | | | | | | | | | | | | | | | | | | | |
| , | S | X | | CR | LF | | | | | | | | | | | | | | | | | | | | | | | | |

## SPDR

EDR is output in the event order, separated by a delimiter.

It is output for each event sequentially, finally followed by the END event. The format for END event is given below.

For the format for each event, refer to “EDR” since it is the same as that for EDR.

In the case of RS-232C: All the events are output at once, with each event separated by a comma (,).

In the case of GP-IB: Created by dividing the return value for each item using the delimiters (CR and LF), and outputting the items one after another.

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | N | D | , | S | X | X | X | X | . | X | X | X | X | X | T | T | , | | | | | | | | | | | S | X |
| 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 |
| X | . | X | X | X | D | B | , | S | X | X | . | X | X | X | D | B | , | S | X | X | . | X | X | X | D | B | / | T | T |
| 61 | 62 | 63 | 64 | 65 | 66 | | | | | | | | | | | | | | | | | | | | | | | | |
| , | S | X | | CR | LF | | | | | | | | | | | | | | | | | | | | | | | | |

## SDR

Data is output in the order of “interval distance”, “interval loss” and “interval return loss”.

The numeric part is left aligned and displayed, with the unit part at the fixed position.

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | X | X | X | X | . | X | X | X | X | X | T | T | , | S | X | X | . | X | X | X | D | B | , | S | X | X | . | X | X |
| 31 | 32 | 33 | 34 | 35 | | | | | | | | | | | | | | | | | | | | | | | | | |
| X | D | B | CR | LF | | | | | | | | | | | | | | | | | | | | | | | | | |

## IDER

Data is output in the order of “company name”, “instrument’s model name (S/N)”, “optical module’s model name (S/N)” and “software version”, with each item separated by a comma (,).

## Command Input Examples (RS-232C)

This section explains how to enter commands to operate the instrument using HyperTerminal of Microsoft Windows2000.

**Caution**

When sending commands using HyperTerminal, command codes are sent from the personal computer to the instrument, one key input at a time. As a result, the device message cannot be recognized correctly if two or more seconds are spaced between key inputs.

Setting measurement conditions

- Set “80km” distance range. :R3ENTER
- Set “100ns” pulse width. :PW3ENTER
- Set “3min” average interval. :NUM5ENTER
- Set “High return loss average”. :AVE2ENTER
- Set “80km” distance range. :R3ENTER

Starting measurement

- Real-time measurement :ST1ENTER
- Average measurement (new) :ST3ENTER

Checking measurement status

:STR1ENTER

Return value :0 (measurement halted), 1 to 3 (measurement in progress)

Saving measured data

- Set storage media “USB” and file name “Fiber”. :FDA5,FiberENTER
- Set file type “.SOR (Telcordia)”. :FF6ENTER
- Save the data. :FSTENTER

# Chapter 9
# SPECIFICATIONS

# 9.1 Specifications of main frame

| | | |
|---|---|---|
| Display | | 8.4 inch color TFT (640dots X 480 dots) |
| Horizontal axis | Scale | 25m, 50m, 100m, 250m, 500m, 1km, 2km, 2.5km, 5km, 10km, 20km, 40km, 80km, 160km, 240km, 320km, 640km<br>( Depend on the optical modules) |
| | Shift | 0 to distance range |
| | Readout resolution | Min. 1cm |
| | Sample data count | Max. 60,000 points |
| | Group index setting | 1.00000 to 1.99999 (0.00001 step) |
| | Distance unit | km, mile, kf |
| | Distance measurement | Display the relative one-way distance between any two given points, in digits. |
| Vertical axis | Scale | 0.2 dB/div, 0.5 dB/div, 1.0 dB/div, 2.0dB/div, 5.0dB/div, 7.5 dB/div |
| | Shift | 1.600 to 70.000dB |
| | Readout resolution | Min. 0.001 dB |
| | Loss measurement | Displays one-way losses in steps of 0.001dB to a maximum of 5 digits.<br>Displays the relative one-way loss, loss per unit length, and splice loss between any two given points on the waveform. |
| Return-loss measurement function | | Return loss at mechanical connectors can be measured.<br>Total return loss of a fiber cable or between any two points can be measured. |
| Memory | Internal memory | Users area : 20MB |
| | PCMCIA | For stored measurement waveforms and measurement conditions |
| Interface | USB (host interface)(note1) | 2 ports, confirms USB Rev1.0 |
| | FDD | Option |
| Power requirement | Battery pack | Li-Ion<br>Operating time : Approx. 6 hours(note2)<br>Charging time : 5 hours or less(note3) |
| | AC adapter | AC100 to 240V, 50/60Hz, Max. 60W |
| Environment condition | Operating temperature | -10 to 50 °C(note4) |
| | Storage temperature | -20 to＋60 °C |
| | Humidity | 95%RH or less (no condensation) |
| Dimensions and mass | | Approx. 299(W) X 225(H) X 62(D)mm<br>Approx. 3kg with AQ7264 mounted |
| Accessories | | Battery pack : 1, Shoulder strap : 1, Instruction manual : 1 |

(Note1) For connected memory, FDD, keyboard or printer

(Note2) The conditions are below;

Mounted module: AQ7261

Options: Not mounted

Setting for instrument: LCD brightness dark and Power save 30sec

Measurement condition: measurement each 3 minutes at 30 seconds average

(Note3) Environment temperature: 23, at power off

(Note4) Operating FD drive or printer : 5 to 40 °C, Charging battery pack : 5 to 35 °C

# 9.2 Specifications of optical modules

| Model name | | AQ7261 | AQ7264 |
|---|---|---|---|
| Unit type | | SMF module | |
| Center wavelength (μm) | | 1.31±0.025<br>1.55±0.025 | 1.31±0.020<br>1.55±0.020 |
| Measured fiber | | SM (ITU-T G.652) | |
| Distance range (km) | | 2, 5, 10, 20, 40, 80, 160, 240, 320, 640 | |
| Pulse width (sec) | | 10n, 20n, 50n, 100n, 200n, 500n,<br>1μ, 4μ, 10μ, 20μ, 50μ(Note 4) | |
| Sampling resolution | | Max. 5cm | |
| Distance accuracy(m) | Error of offset | ±1 | |
| | Error of scale | Measurement distance X 2 X 10^-5 | |
| | Error of sampling | ±1 sampling resolution | |
| Dynamic range (dB) (SNR = 1) (Note 1) | | 34(35typ.)@1.31μm<br>32(33typ.)@1.55μm | 40(42typ.)@1.31μm<br>38(40typ.)@1.55μm |
| Event dead zone (m)(Note 2) | | 2typ. | 2typ. |
| Attenuation dead zone (m)(Note 3) | | 15typ.@1.31μm<br>20typ.@1.55μm | 7typ. @1.31μm<br>8typ. @1.55μm |
| Loss measurement accuracy (dB/dB) | | ±0.05 | |
| Stabilized Light source | Wavelength (μm) | ------ | 1.31/1.55 |
| | Max. output (dBm) | | -3±2 |
| | Stability (dB)(Note5) | | ±0.1 |
| Optical connector | | AQ9441(*) Universal connector : Option | |
| Environment condition | Operating temperature | -10 to 50°C | |
| | Storage temperature | -20 to +60°C | |
| | Humidity | 95%RH or less (no condensation) | |

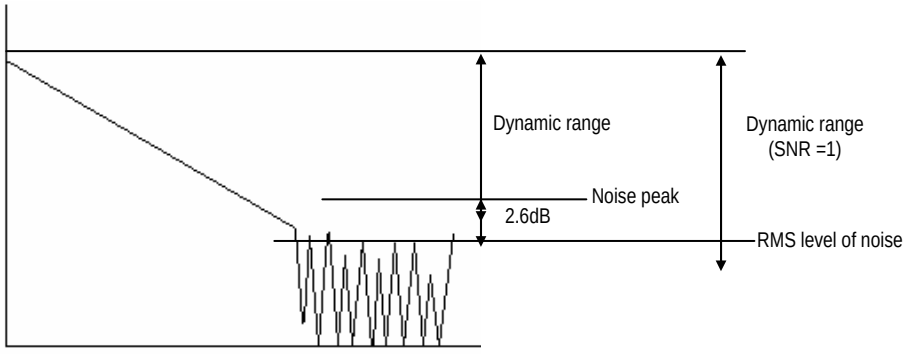
Specifications without any special remarks, assured at 23±2°C.

| | | |
|---|---|---|
| Model name | | AQ7265 |
| Unit type | | SMF module |
| Center wavelength (μm) | | 1.31±0.02<br>1.55±0.02 |
| Measured fiber | | SM (ITU-T G.652) |
| Distance range (km) | | 2, 5, 10, 20, 40, 80, 160, 240, 320, 640 |
| Pulse width (sec) | | 10n, 20n, 50n, 100n, 200n, 500n,<br>1μ, 4μ, 10μ, 20μ, 50μ(Note 4) |
| Sampling resolution | | Max. 5cm |
| Distance accuracy(m) | Error of offset | ±1 |
| | Error of scale | Measurement distance X 2 X 10^-5 |
| | Error of sampling | ±1 sampling resolution |
| Dynamic range (dB) (SNR = 1) (Note 1) | | 43(45typ.)@1.31μm<br>41(43typ.)@1.55μm |
| Event dead zone (m)(Note 2) | | 2typ. |
| Attenuation dead zone (m)(Note 3) | | 7typ.@1.31μm<br>8typ.@1.55μm |
| Loss measurement accuracy (dB/dB) | | ±0.05 |
| Stabilized Light source | Wavelength (μm) | 1.31/1.55 |
| | Max. output (dBm) | -3±2 |
| | Stability (dB)(Note5) | ±0.1 |
| Optical connector | | AQ9441(*) Universal connector : Option |
| Environment condition | Operating temperature | -10 to 50°C |
| | Storage temperature | -20 to +60°C |
| | Humidity | 95%RH or less (no condensation) |

Specifications without any special remarks, assured at 23±2°C.

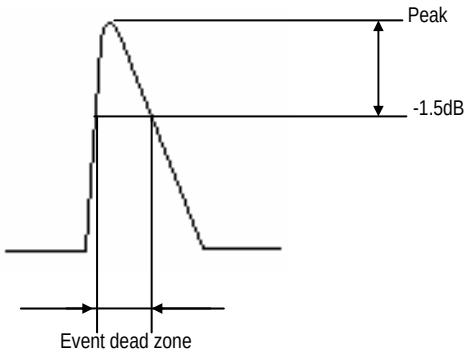
(Note1) The loss from the connection end of measured fiber to the point at which the back scattering ray level equals the RMS level of noise is expressed dynamic range (SNR =1).

At measurement time : 3 minutes, pulse width : 20 μs, Filter : ON.



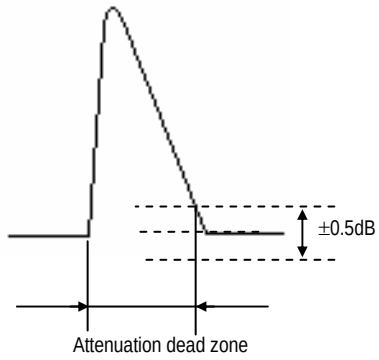
(Note2) Distance width between the event peak point, where the return loss is 40 dB or higher (event is not saturated), and the point where the level is 1.5 dB smaller than the event peak.

At pulse width : 10ns




(Note3) Distance width at points where the optical connector's return loss is 45 dB or higher and the back scatter level is within ±0.5 dB of the normal level.

At pulse width : 10ns




(Note4) 50μ is only AQ7264, AQ7265 module.

(Note5) 5 minutes measurement at constant temperature after 30 minutes warm-up.

# 9.3 Specifications of optional units

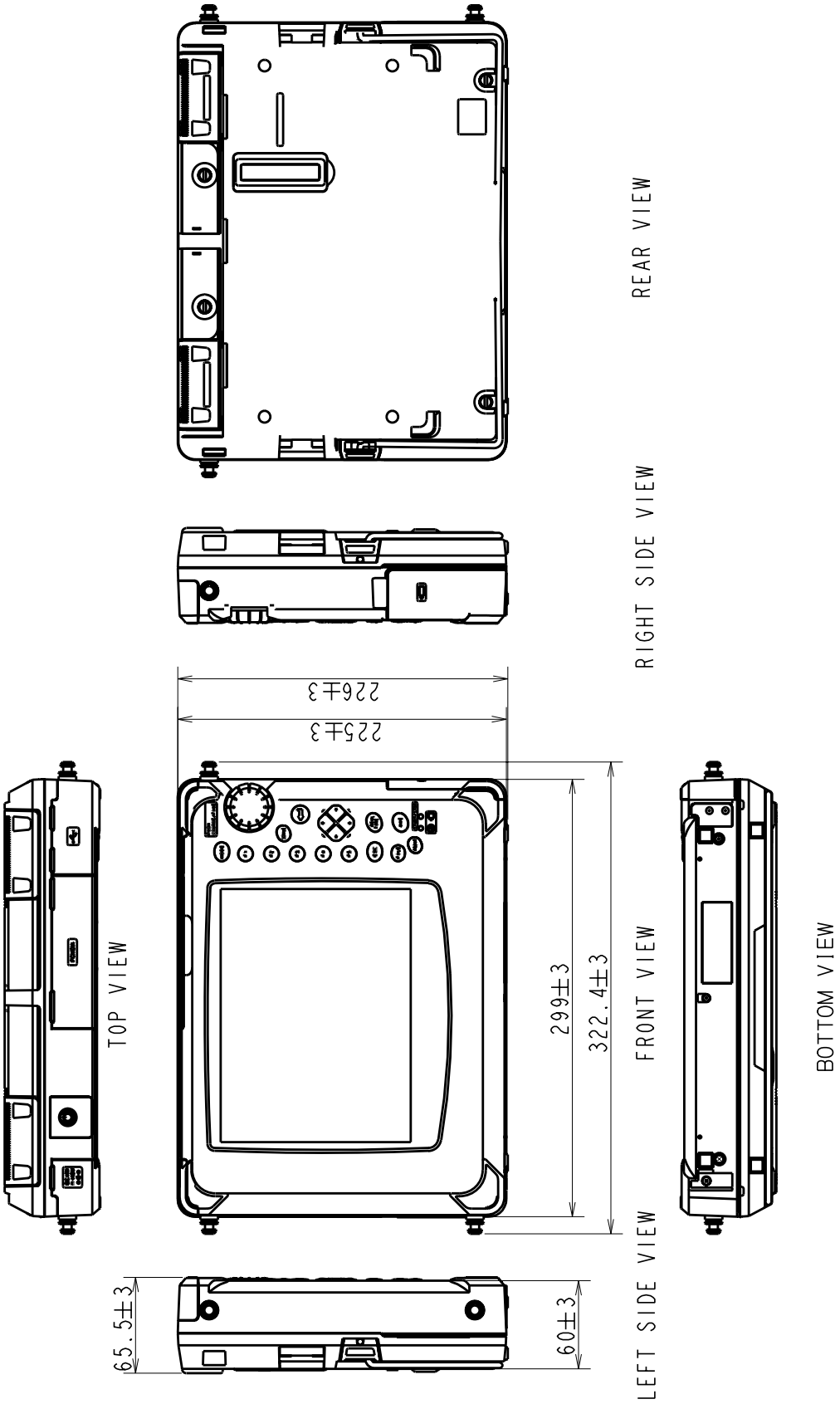
| Model name | | FDD/Printer unit for AQ7260 |
|---|---|---|
| Printer | | 576dots/LINE<br>Thermal printer<br>Record paper : 80mm width |
| FDD | | 3.5inch FD, 2HD |
| Environment conditions | Operating temperature | 5 to 40°C |
| | Storage temperature | -20 to 60°C |
| | Humidity | 85% or less (no condensation) |

# 9.4 Outside view drawings

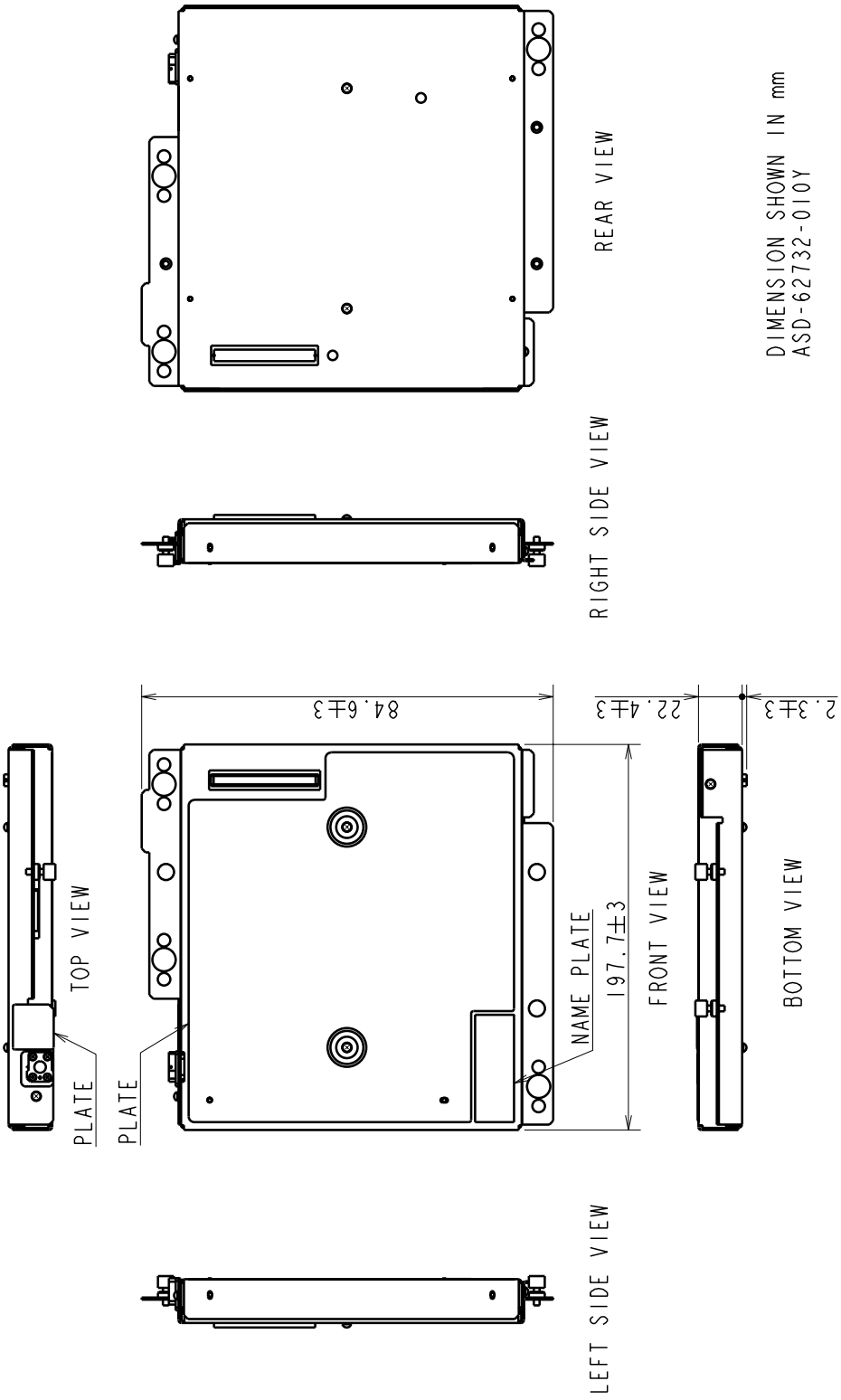
The Outside view drawings of the following units are attached.

- AQ7260 OTDR
- AQ7261 SMF MODULE
- AQ7264 SMF MODULE
- AQ7265 SMF MODULE
- PRINTER/FDD UNIT
- PRINTER UNIT

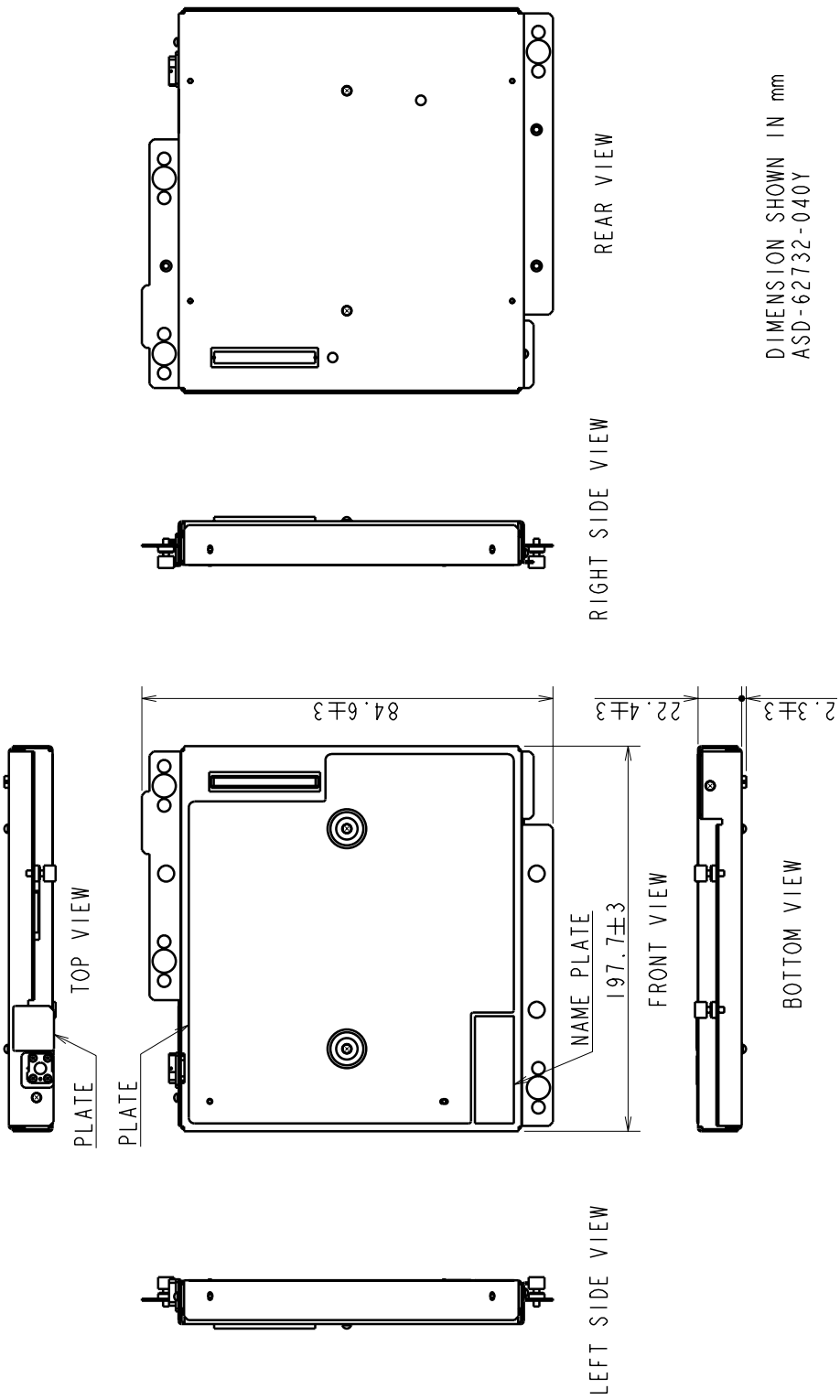
## AQ7260 OTDR


OUTSIDE VIEW OF AQ7260 OTDR
DIMENSIONS SHOWN IN mm
ASD-62732-001Y
REAR VIEW
RIGHT SIDE VIEW
FRONT VIEW
LEFT SIDE VIEW
TOP VIEW
BOTTOM VIEW
226±3
225±3
299±3
322.4±3
65.5±3
60±3

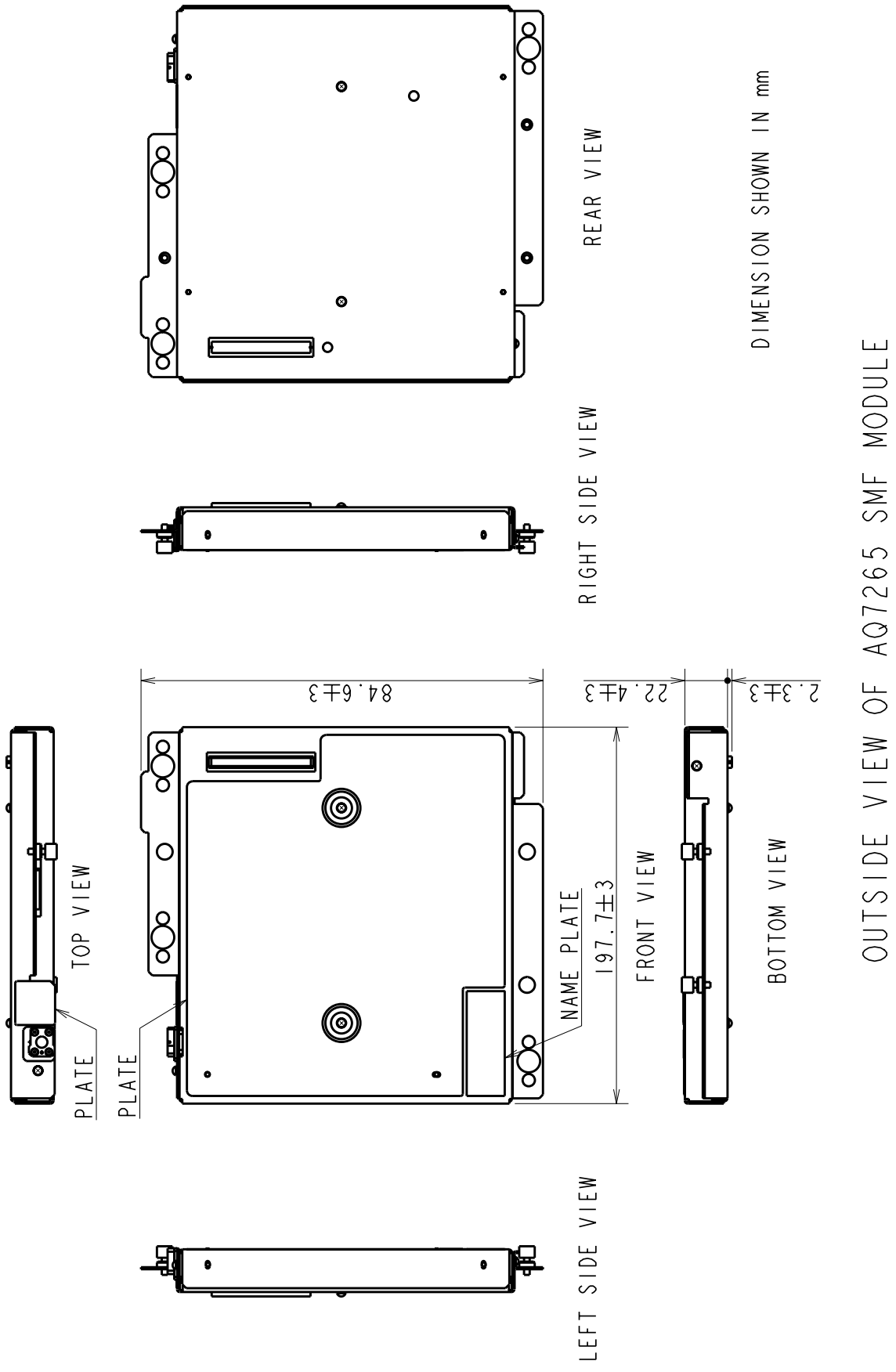
## AQ7261 SMF MODULE



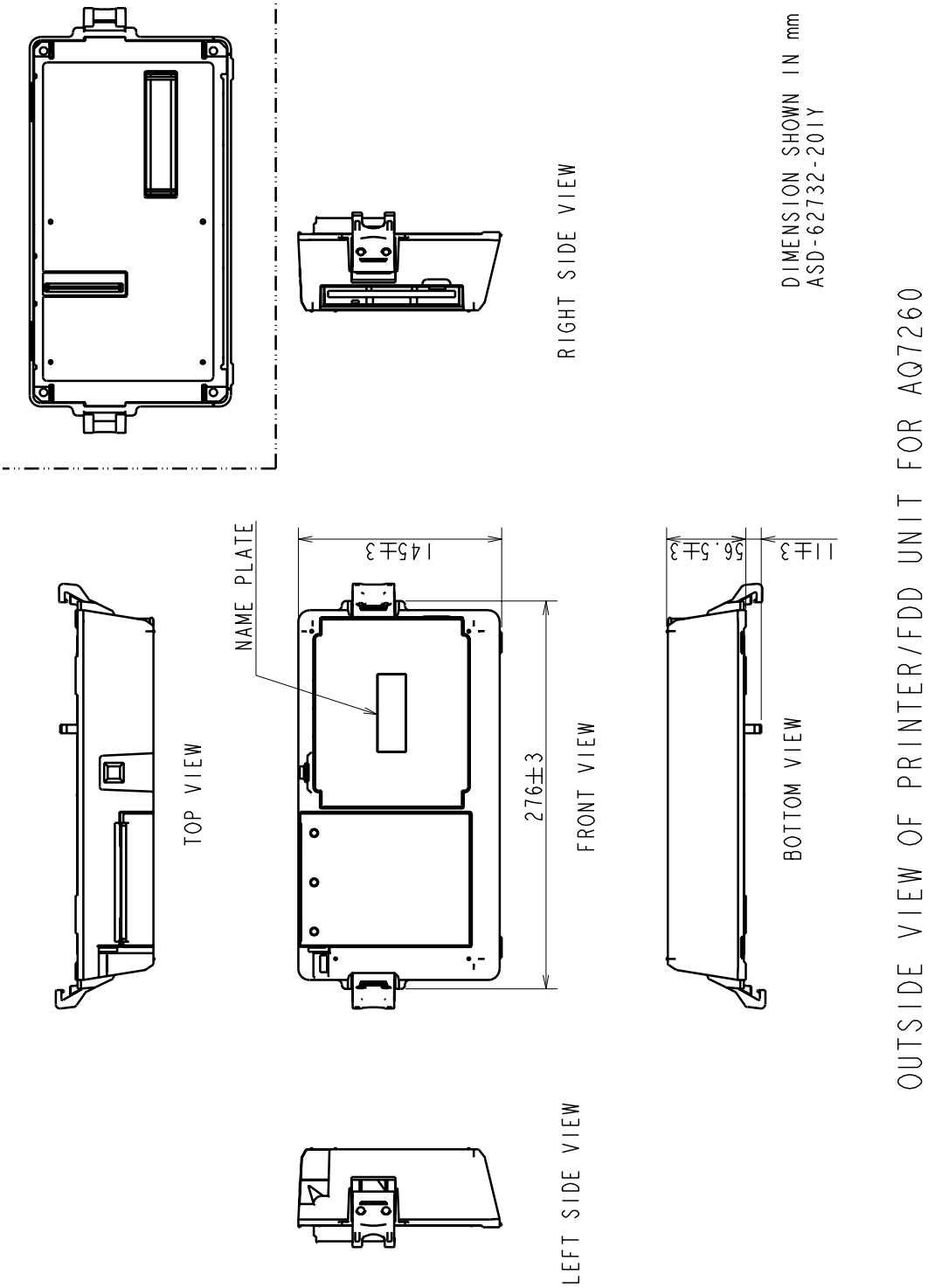
## AQ7264 SMF MODULE



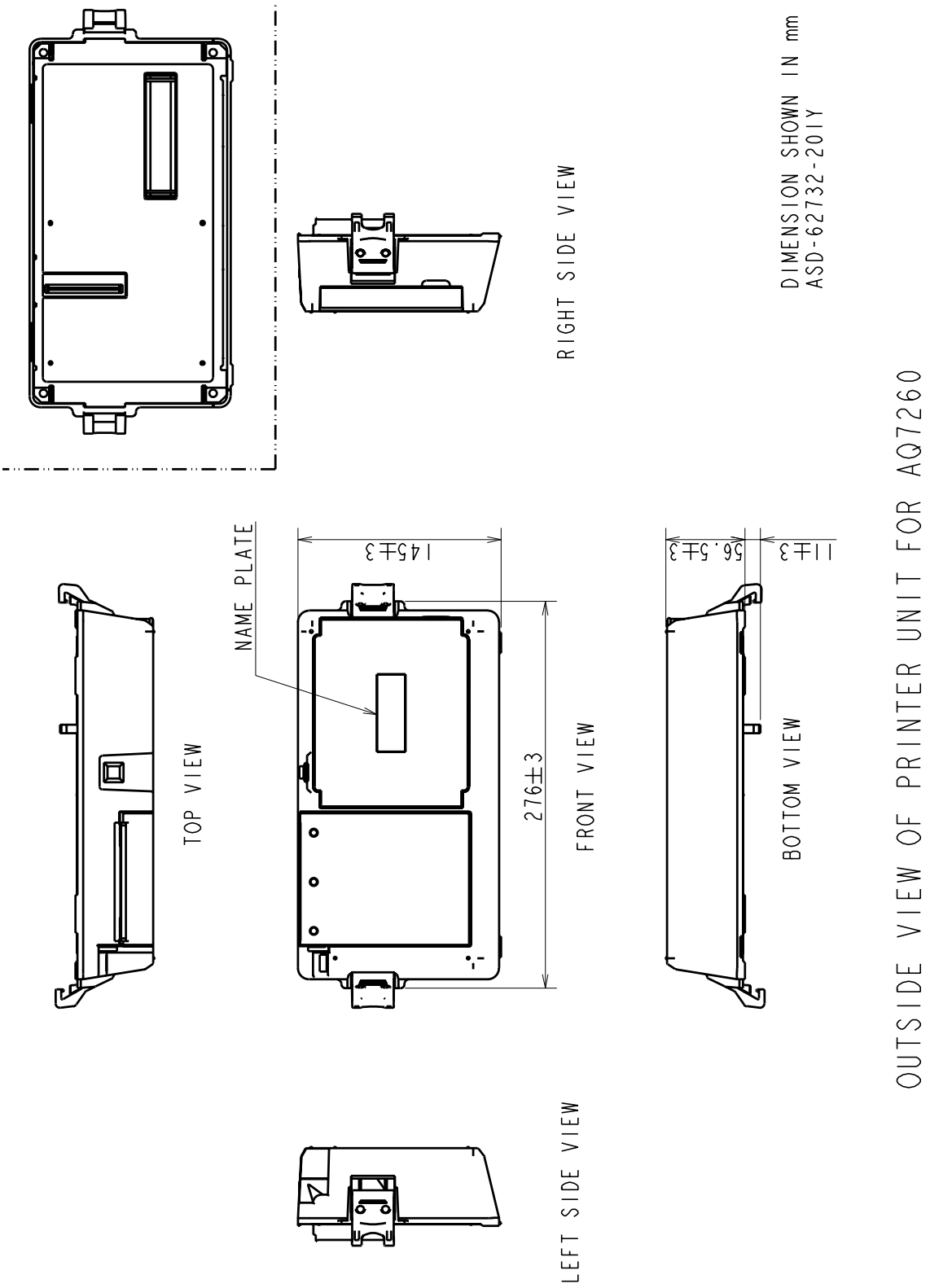
## AQ7265 SMF MODULE



## PRINTER/FDD UNIT



## PRINTER UNIT



# Chapter 10
# APPENDIX

# 10.1 Software Upgrade

To support new products or to provide new functions, this instrument allows software upgrade. The software can be upgraded by the procedure given below.

**Caution**

Software upgrade can be performed using the following storage mediums.

Floppy disk (expansion unit, USB)

USB memory

PCMCIA

**1. Make sure that the power to the instrument is turned OFF.**

**Refer**

For the method of turning OFF the power, refer to page 3-107.

**2. Connect the instrument to an AC power outlet.**

**Caution**

Software upgrade can be performed only when the instrument is running with AC power.

**3. Connect a storage medium containing the software to the instrument.**

**Caution**

Pleas save the software to root folder in storage media.

**Refer**

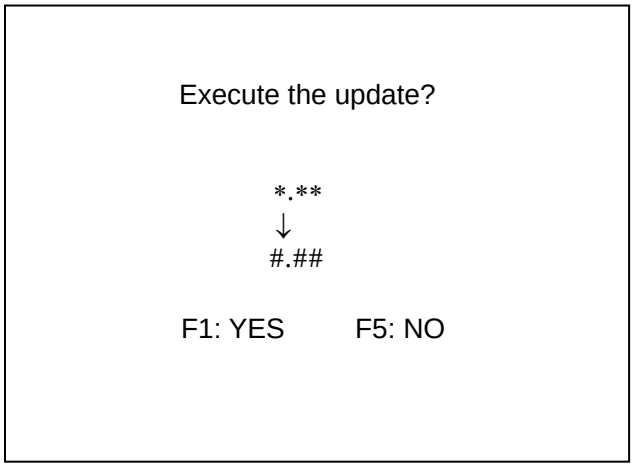
For the method of connecting a storage medium, refer to Chapter 8.

**4. Turn ON the instrument.**

**Refer** For the method of turning ON the power to the instrument, refer to page 3-3.

**5. Wait until the software upgrade screen appears.**

The following window will appear.

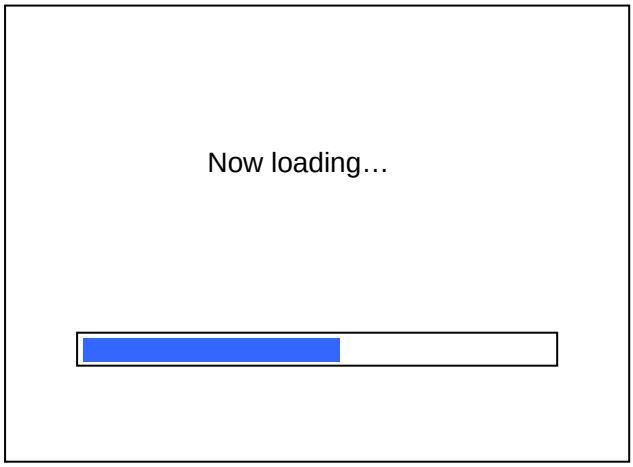



*.**: Current version

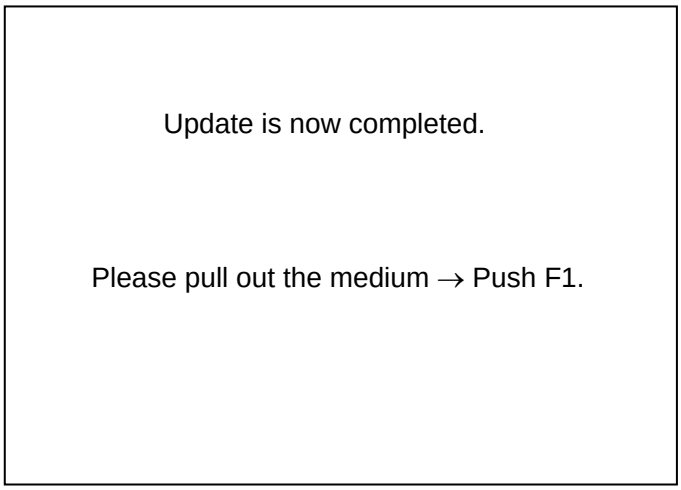
#.##: New version

**6. Press [F1] to start to upgrade the software.**

The following window is displayed while upgrade is in progress.



The following window appears when software upgrade is complete.




**7. Remove the storage medium and press [F1].**

The instrument will be restarted automatically.

**Caution**

According to the version of the current software, Procedure 6 and 7 should have to be done again.

**TIP**

The software version displays in starting screen as below..


AQ**** : Displays model name of mounted optical modules.
It does not display anything, when the instrument does not mount optical module.
#.## : Displays software version of installed.

# 10.2 Troubleshooting

## When the Instrument Appears Faulty

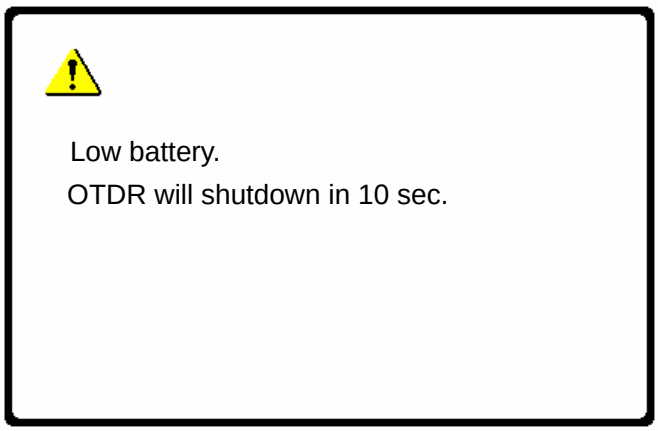
When you think that the instrument is faulty, check the following items.

| Symptoms | Check Items |
|---|---|
| Not possible to turn ON the power. | Is the power switch on the instrument turned ON?<br>Check whether the POWER LED is lit. |
| | Is the AC power cord or battery pack connected properly?<br>Check the connections. |
| | The battery has probably run out.<br>Check whether the POWER LED is lit in green. |
| Nothing is displayed on the screen. | Is the instrument operated within the specified operating temperature range?<br>The LCD becomes dark at high temperatures, and its display speed slows down at low temperatures.<br>Check the specified operating temperature range. |
| The screen becomes blank after a certain time. | The battery has probably run out.<br>The instrument will be turned OFF when the battery has run out. |
| | The power save function is probably enabled.<br>Press any key. |
| The screen is dark. | LCD brightness is probably set to “DARK”.<br>Switch to the SETTING mode, and check the preset LCD brightness. |
| | The life of the LCD has probably expired.<br>The life of the LCD is approximately three years. |
| | Temperature of the Instrument or the battery pack is probably high.<br>The instrument may change the LCD brightness to “DARK” automatically for protected instrument against damage. |
| Not possible to change measurement conditions. | The lockout function is probably enabled.<br>Enter the lockout code to disable the lockout function. |
| Power has been turned OFF. | The power was probably turned OFF automatically since an alarm was output from the instrument. *1<br>Push the power switch to turn ON the power. |
| Not possible to charge the battery pack. | The battery pack is probably extremely hot or cold. Remove the battery pack from the instrument, and let it stand to cool down to room temperature. |
| Power has been turned off while start-up. | Is the power switch turned on twice when starts this instrument? |

(*1) To prevent possible breakdowns, the instrument displays a warning message and turns OFF the power automatically when it is in a critical condition. The next page shows the symptoms that cause a message to appear.

- When the power of the battery pack is insufficient
- When the instrument's internal temperature is excessively high
- When the instrument's internal temperature is excessively low
- When the battery pack's temperature is excessively high
- When the battery pack's temperature is excessively low
- When the AC power voltage is excessively high
- When the AC power voltage is excessively low
- When the battery pack's voltage is excessively high
- When the battery pack's voltage is excessively low
- When the charging circuit is abnormal
- When the temperature monitor IC has trouble.

Massage example: When the power of the battery pack is insufficient.



## When the Problem Cannot Be Solved

If the cause of the problem cannot be identified or the problem cannot be solved, contact the agent from whom the instrument was purchased.

Do not try to disassemble or repair by yourself.

| ⚠ CAUTION | |
|---|---|
|  | Do not disassemble or modify the instrument.<br>Doing so may result in electric shock, fire or accident. |

# 10.3 Glossary

This section explains the terms used in this manual.

## Attenuation

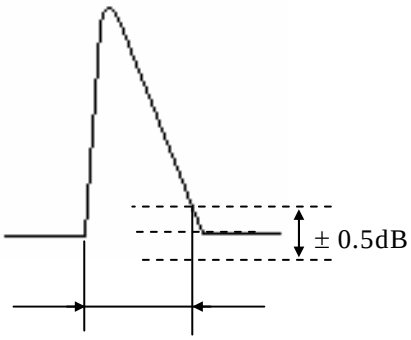
Gain of the amplifier built into this instrument. The smaller the attenuation displayed on this instrument, the larger the gain, and the better the S/N ratio of the acquired trace. However, the trace may be saturated at high reflection levels. So, it is necessary to select an appropriate gain according to the measurement object.

Refer

For the method of changing the attenuation, refer to page 3-20

## Attenuation dead zone

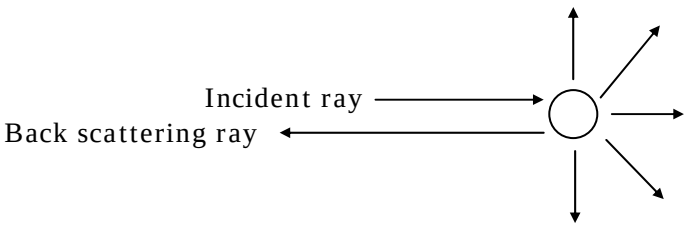
Distance width at points where the optical connector's return loss is 45dB or higher and the back scatter level is within ±0.5dB of the normal level.




Attenuation dead zone

## Back scattering ray

When light travels through an optical fiber, a symptom called "Rayleigh scattering" occurs due to uneven density or components of substances that are smaller than wavelengths. Among these scattering rays, those which travel in the opposite direction of incident rays are called back scattering rays.



## Connection point

Points at which the optical fiber is fused (including mechanical connection) or points where connectors are connected by adapter.

## Dead zone

Areas that cannot be measured due to influences by Fresnel reflection. There are two dead zone types as shown below. For details, refer to the explanation given for each type.

- Event dead zone
- Attenuation dead zone

## Distance measuring accuracy

OTDR measures the time the emitted pulse ray takes to return, and calculates the distance (L) using the following formula.

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

C: Speed of light traveling in the vacuum

T: Time spent before the pulsed ray is returned (received) after it is emitted

N: Group index

The reason why the distance is divided by “2” is to measure the time taken by the pulse ray to travel back and forth through the optical fiber.

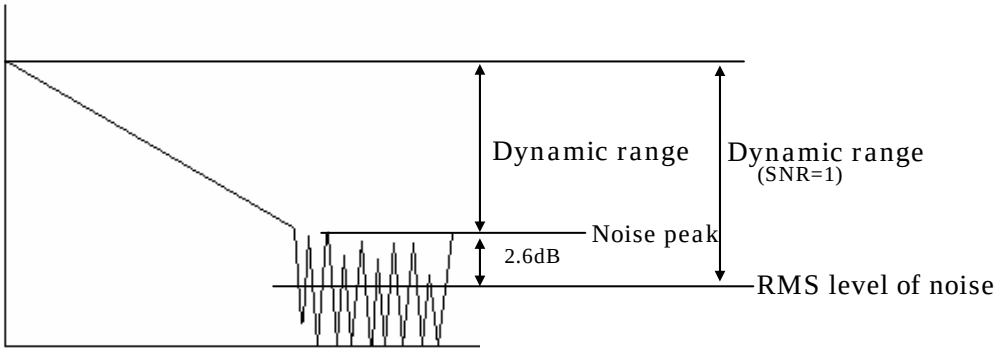
Thus, measured distance is not accurate unless the given group index is accurate.

## Distance range

Range of distance the instrument can display. Select a range that is longer than the optical fiber to be measured. However, the larger the distance range, the longer the measurement time.

## Dynamic range

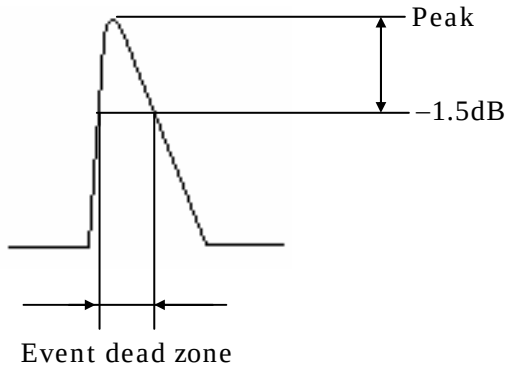
Range of back scatter level that can be measured by the instrument.




## Event dead zone

Also called spatial resolution.

Distance width between the event peak point, where the return loss is 40dB or higher (event is not saturated), and the point where the level is 1.5dB smaller than the event peak point.




## Event list

A list of information (distance, splice loss, return loss etc.) regarding events detected by auto search.

## Event note

A comment attached to each event detected by auto search.

**Refer** For the method of entering an event note, refer to page 5-23.

## Far end

The end of an optical fiber cable and its surrounding area

If the end of the optical fiber cable cannot be detected due to noise, “far end” indicates the cross point of the noise and optical fiber and its surrounding area.

Refer

For details on far end, refer to page 1-40.

## Fault location

Points where the optical fiber is cut or the end of the optical fiber.

## Filter

Used to eliminate noise from the trace displayed at the end of average measurement.

Refer

For details on filter, refer to page 3-59.

## Format

Data on a storage medium like floppy disk cannot be read unless it is saved in the format appropriate for the instrument. “Format” means to convert such data to the appropriate format.

## Fresnel reflection

Reflection that occurs at points (glass/air interface points), such as the end of the optical fiber or points where the optical fiber is cut, where the group index changes when a light enters the optical fiber. If the fiber is cut at right angles to the fiber axis, approximately 3% (–14.7 dB) of the incident optical power will be reflected.

## Group index

Expressed by the ratio of the speed of light traveling in a vacuum to that traveling in a substance, and calculated by the following formula.

N=Speed of light traveling in a vacuum / Speed of light traveling in a substance

Group index (N) for SMF is generally around 1.48000.

## Label

A comment that can be attached to the trace.

**Refer** For the method of entering a label, refer to page 4-3.

## Least squares approximate (LSA)

Least squares approximate is the method by which a loss measured between two points. Since this method uses all of the data between two point.

**Refer** For details on least squares approximate, refer to page 3-37.

## Near end

Connection point between the instrument and optical fiber and its surrounding area.

**Refer** For details on near end, refer to page 1-40.

## OTDR

Abbreviation for “Optical Time Domain Reflectometer”. OTDR emits a pulsed ray into an optical fiber and acquires its reflected ray. The acquired data is then processed to display a graph of loss distribution versus distance.

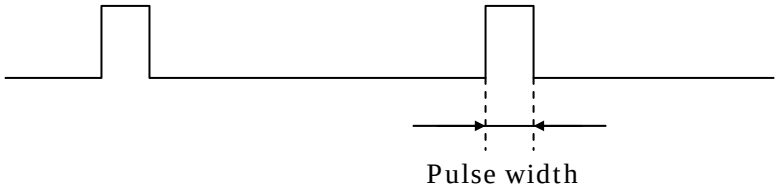
## Pulse width

Width of light pulse emitted from the instrument. Normally, pulse width is expressed by half width.

The pulse width has the following features.

Short pulse width: Enables measurement with high spatial resolution, but not measurement at long distances.

Long pulse width: Enables measurement at long distances, but not measurement with high spatial resolution.




## Real time measurement

Real time measurement uses the default average time (little number set to the instrument to perform measurement.

**Refer** For details on real time measurement, refer to page 3-54.

## Reflection point

Points where the optical fiber is connected. There are two reflection point types as shown below. For details, refer to the explanation given for each type.

- Connection point
- Fault location

## Resolution

Indicates how finely the object can be measured. With this instrument, resolution is defined mainly for distance, and the following resolution types are used. For details, refer to the explanation given for each type.

- Sampling resolution
- Spatial resolution

## Return loss

Expressed by the ratio of the total reflected optical power (Pr) from optical system or optical fiber to the incident optical power (Pi), and calculated by the following formula.

RL=–10log (Pr/Pi) [dB]

## S/N

Signal to noise ratio. “Low S/N” means that the trace contains a lot of noise.

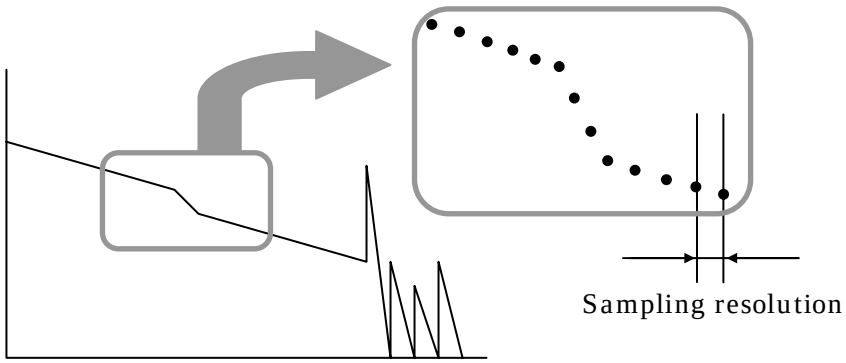
## Sampling count

Quantity of data acquired for each trace. The sampling count must be determined by the user.

**Refer** For the method of selecting a sampling count, refer to page 3-28.

## Sampling resolution

Distance interval at which data is acquired.



## Secondary reflection

If a large reflection occurs, the reflection of the point may return again and makes an event look as if it were present in places where it is actually not.

Refer For details on secondary reflection, refer to page 2-12.

## Spatial resolution

Also called event dead zone. Refer to the explanation given for “Event dead zone”.

## Splice loss

Loss that occurs at fused points.

Refer For details on splice loss, refer to page 1-41.

## Two Point Approximate (TPA)

Two point approximate is the method by which a loss measured between two points. Since this method uses the level difference of the two point.

Refer For details on two point approximate, refer to page 3-38.