

# **MU954301A/4501A**

## **Light Source**

### **Operation Manual**

**Third Edition**

- **Read this manual before using the equipment.**
- **To ensure that the equipment is used safely, read the "For Safety" in the MT9810A Optical Test set and MT9812B Multi Channel Box Operation Manual first.**
- **Keep this manual with the equipment.**

**ANRITSU CORPORATION**

# Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Insure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following five symbols may not be used on all Anritsu equipment. In addition, there may be other labels attached to products which are not shown in the diagrams in this manual.

## Symbols used in manual

**DANGER**  This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

**WARNING**  This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

**CAUTION**  This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

## Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Insure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



This indicates warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

MU954301A/4501A  
Light Source  
Operation Manual

3 March 2002 (First Edition)  
1 January 2004 (Third Edition)

Copyright © 2002-2004, ANRITSU CORPORATION.

All rights reserved. No part of this manual may be reproduced without the prior written permission of the publisher.

The contents of this manual may be changed without prior notice.

Printed in Japan

# For Safety

## WARNING



1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

2. Measurement Categories

This instrument is designed for Measurement category I (CAT I). Don't use this instrument at the locations of measurement categories from CAT II to CAT IV.

In order to secure the safety of the user making measurements, IEC 61010 clarifies the range of use of instruments by classifying the location of measurement into measurement categories from I to IV.

The category outline is as follows:

Measurement category I (CAT I):

Secondary circuits of a device connected to an outlet via a power transformer etc.

Measurement category II (CAT II):

Primary circuits of a device with a power cord (portable tools, home appliance etc.) connected to an outlet.

Measurement category III (CAT III):

Primary circuits of a device (fixed equipment) to which power is directly supplied from the power distribution panel, and circuits from the distribution panel to outlets.

Measurement category IV (CAT IV):

All building service-line entrance circuits through the integrating wattmeter and primary circuit breaker (power distribution panel).

# For Safety

## WARNING

---

### Repair

WARNING 

### Falling Over

3. Laser radiation warning
    - NEVER look directly into the cable connector on the equipment nor into the end of a cable connected to the equipment. If laser radiation enters the eye, there is a risk of injury.
    - Laser Radiation Markings on a following page show the Laser Safety label attached to the equipment near the cable connector.
  4. This equipment cannot be repaired by the user. DO NOT attempt to open the cabinet or to disassemble internal parts. Only Anritsu-trained service personnel or staff from your sales representative with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision parts.
  5. This equipment should be used in the correct position. If the cabinet is turned on its side, etc., it will be unstable and may be damaged if it falls over as a result of receiving a slight mechanical shock. And also DO NOT use this equipment in the position where the power switch operation is difficult.
-

## For Safety

### CAUTION

---

#### Cleaning

Keep the power supply and cooling fan free of dust.

- Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
  - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.
-

# For Safety

## Laser Safety

The laser in this equipment is classified as Class 1 according to the IEC 60825-1 specifications, or as Class I according to the 21CFR 1040.10 specifications. These classes of lasers are safe under reasonably foreseeable operating conditions.

Classes are indicated on the label at the front panel of this equipment.

| Type      | IEC 60825-1 | 21CFR 1040.10 |
|-----------|-------------|---------------|
| MU954301A | Class 1     | Class I       |
| MU954501A | Class 1     | Class I       |

Class 1 indicate the danger degree of the laser radiation specified below according to IEC 60825-1.

Class 1: Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intra-beam viewing.

And, Class I indicates the degree of danger of the laser radiation outlined below as defined by 21CFR 1040.10.

Class I: Class I labels of laser radiation are not considered to be hazardous.

## Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories including the National Institute of Advanced Industrial Science and Technology, and the Communications Research Laboratory, and was found to meet the published specifications.

## Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within 1 year after shipment due to a manufacturing fault, provided that this warranty is rendered void under any or all of the following conditions.

- The fault is outside the scope of the warranty conditions described in the operation manual.
- The fault is due to mishandling, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster including fire, flooding, earthquake, etc.
- The fault is due to use of non-specified peripheral equipment, peripheral parts, consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

## Anritsu Corporation Contact

If this equipment develops a fault, contact Anritsu Service and Sales offices at the address at the end of paper-edition manual or the separate file of CD-edition manual.

## Notes On Export Management

---

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals are needed to be broken/shredded so as not to be unlawfully used for military purpose.

# CE Conformity marking

Anritsu affixes the CE Conformity marking on the following product (s) in accordance with the Council Directive 93/68/EEC to indicate that they conform with the EMC and LVD directive of the European Union (EU).

## CE marking



### 1. Product Model

Plug-in Units: MU954301A/MU954501A Light Source

### 2. Applied Directive and Standards

When the MU954301A/4501A Light Source is installed in the MT9810A and MT9812B, the applied directive and standards of this Unit are conformed to those of the MT9810A and MT9812B main frame.

PS: About main frame

The kind of main frame (a measuring apparatus) will be to increase.  
Please, contact us about the newest information of the main frame.

# C-tick Conformity marking

Anritsu affixes the C-tick marking on the following product (s) in accordance with the regulation to indicate that they conform with the EMC framework of Australia/New Zealand.

## C-tick marking



### 1. Product Model

Plug-in Units: MU954301A/MU954501A Light Source

### 2. Applied Directive and Standards

When the MU954301A/4501A Light Source is installed in the MT9810A and MT9812B, the applied directive and standards of this Unit are conformed to those of the MT9810A and MT9812B main frame.

PS: About main frame

The kind of main frame (a measuring apparatus) will be to increase.  
Please, contact us about the newest information of the main frame.

# About This Manual

This Operation Manual explains operations and maintenance methods for MU954301A/4501A Light Source.

MU954301A/4501A Light Source is a plug-in unit mounted and used on MT9810A Optical Test Set and MT9812B Multi Channel Box. To operate MU954301A/4501A Light Source from the main unit, refer to the operation manual for the main unit.

**MT9810A Operation Manual (M-W1482AE)**

**MT9812B Operation Manual (M-W1555AE)**

# Table of Contents

|                                                              |                |
|--------------------------------------------------------------|----------------|
| <b>For Safety .....</b>                                      | <b>iii</b>     |
| <b>About This Manual.....</b>                                | <b>I</b>       |
| <b>Section 1 General.....</b>                                | <b>1-1</b>     |
| 1.1 General .....                                            | 1-2            |
| <b>Section 2 Specifications.....</b>                         | <b>2-1</b>     |
| 2.1 Product Configuration .....                              | 2-2            |
| 2.2 Specifications .....                                     | 2-2            |
| 2.3 Ordering Information.....                                | 2-4            |
| <b>Section 3 Operation .....</b>                             | <b>3-1</b>     |
| 3.1 Part Names and Functions .....                           | 3-2            |
| 3.2 Operation .....                                          | 3-2            |
| <b>Section 4 Performance Test.....</b>                       | <b>4-1</b>     |
| 4.1 Performance Test .....                                   | 4-2            |
| 4.2 Performance Test Results .....                           | 4-4            |
| 4.3 Repair Work.....                                         | 4-7            |
| <b>Section 5 Maintenance and<br/>Re-transportation .....</b> | <b>5-1</b>     |
| 5.1 Daily Maintenance .....                                  | 5-2            |
| 5.2 Notes on Storage .....                                   | 5-4            |
| 5.3 Re-transportation .....                                  | 5-4            |
| <b>Appendix A.....</b>                                       | <b>A-1</b>     |
| <b>Index .....</b>                                           | <b>Index-1</b> |

|          |
|----------|
| 1        |
| 2        |
| 3        |
| 4        |
| 5        |
| Appendix |
| Index    |



# *Section 1 General*

---

1.1 General ..... 1-2

## **1.1 General**

MU954301A/4501A Light Source is a plug-in unit mounted and used on MT9810A/B Optical Test Set and MT9812B Multi Channel Box.

MU954301A/4501A uses SLD (Super Luminescent Diode) for a light emitting element. It is useful in the evaluation of optical devices since its optical output is as high as  $-3$  dBm and its spectrum half bandwidth is more than 40 nm (MU954501A), 30 nm (MU954301A). The wavelength is 1310 nm (MU954301A) or 1550 nm (MU954501A).

The Optical connector can be replaced by the user since a replaceable connector is adopted.

## *Section 2 Specifications*

---

|     |                             |     |
|-----|-----------------------------|-----|
| 2.1 | Product Configuration ..... | 2-2 |
| 2.2 | Specifications.....         | 2-2 |
| 2.3 | Ordering Information.....   | 2-4 |

## 2.1 Product Configuration

| Components                        |          |                      |
|-----------------------------------|----------|----------------------|
| Product Name                      | Quantity | Model Name/Order No. |
| Main unit                         |          |                      |
| Light source                      | 1        | MU954301A            |
| Light source                      | 1        | MU954501A            |
| Standard accessories              |          |                      |
| Operation manual<br>(this manual) | 1        | W2023AE              |

## 2.2 Specifications

| Model Name                      | MU954301A                                     | MU954501A                                            |
|---------------------------------|-----------------------------------------------|------------------------------------------------------|
| Light emitting element          | SLD                                           |                                                      |
| Conforming fiber                | SM fiber (ITU-T G.652)                        |                                                      |
| Central wavelength              | *1<br>1310 ±20 nm                             | 1550 ±20 nm                                          |
| Spectrum half bandwidth         | *1<br>≥30 nm                                  | ≥40 nm                                               |
| Optical output                  | *1                                            | -3±1 dBm                                             |
| Optical output stability        |                                               |                                                      |
| Time stability (short period)   | *1,*2,*3                                      | ±0.01 dB                                             |
| Time stability (long period)    | *1,*2,*4                                      | ±0.1 dB                                              |
| Temperature stability           | *1,*2,*5                                      | ±0.5 dB                                              |
| Optical attenuation function    |                                               |                                                      |
| Attenuation, step               | 0.00 to 6.00 dB, 0.01 dB step                 |                                                      |
| Accuracy                        | ±0.5 dB (Attenuation: 6.00 dB, 25°C)          |                                                      |
| Internal modulation function    |                                               |                                                      |
| Modulation frequency            | 270 Hz/ 1 kHz/ 2 kHz ±0.1%                    |                                                      |
| Duty                            | 50% ±5%                                       |                                                      |
| Extinction ratio                | ≥13 dB                                        |                                                      |
| Warm-up time                    | One hour after optical output turned on       |                                                      |
| Optical connector               | *6                                            | Supports FC, ST, DIN, HMS-10/A and SC (all PC types) |
| Laser products safety standards | IEC60825-1: Class 1<br>21CFR1040, 10: Class I |                                                      |
| Environment conditions          |                                               |                                                      |
| Operation temperature, humidity | 0 to +50°C, ≤ 90%(no condensation)            |                                                      |
| Storage temperature             | -40 to +71°C                                  |                                                      |
| Size, mass                      | 78(H)×41(W)×335(D) mm, ≤ 700 g                |                                                      |

**Note:**

All the wavelength values are those in vacuo

\*1: Continuous light and optical attenuation are set to 0.00 dB. SM fiber (ITU-T G.652) and FC-PC connector are used.

\*2: When the return loss for the optical source side is 40 dB or more.

\*3: For 15 minutes at constant temperature (a point between +20 to +30°C)

\*4: For 6 hours at constant temperature

\*5: For 8 hours, between 0 to +50°C

\*6: A connector specified by the optical connector option is provided as a standard accessory. If nothing is specified, FC-PC connector is provided as a standard accessory.

## 2.3 Ordering Information

Specify the model name/symbol, product name and quantity on the contract.

| Model Name      | Product name                                                                             | Remarks                  |
|-----------------|------------------------------------------------------------------------------------------|--------------------------|
| MU954301A       | Light source                                                                             | 1310 nm                  |
| MU954501A       | Light source                                                                             | 1550 nm                  |
| W2023AE         | Standard accessories<br>Optical connector adapter *1<br>MU954301A/4501A Operation Manual |                          |
| <Model name>-37 | Optical connector option<br>FC-PCconnector                                               | User replaceable         |
| <Model name>-38 | STconnector                                                                              | User replaceable         |
| <Model name>-39 | DINconnector                                                                             | User replaceable         |
| <Model name>-40 | SCconnector                                                                              | User replaceable         |
| <Model name>-43 | HMS-10/Aconnector                                                                        | User replaceable         |
| JO617B          | Application parts<br>Replaceable optical connector (FC)                                  | User replaceable         |
| JO618B          | Replaceable optical connector (ST)                                                       | User replaceable         |
| JO618E          | Replaceable optical connector (DIN)                                                      | User replaceable         |
| JO618F          | Replaceable optical connector (SC)                                                       | User replaceable         |
| JO619B          | Replaceable optical connector (HMS-10/A)                                                 | User replaceable         |
| Z0282           | Ferrule cleaner                                                                          |                          |
| Z0283           | Ferrule cleaner replacing tape                                                           | 6 pc/set                 |
| Z0284           | Adapter cleaner                                                                          | Stic type,<br>200 pc/set |

\*1: A connector specified by the optical connector option shown above is provided as a standard accessory when the contract is made.

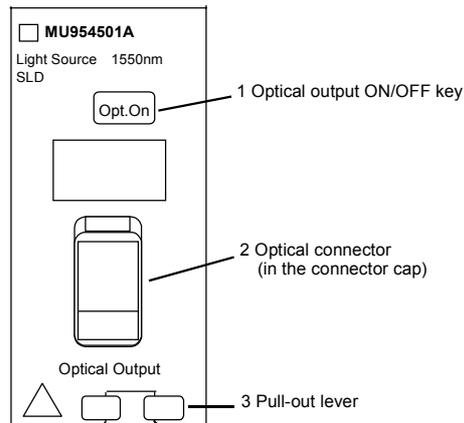
If nothing is specified, FC-PC connector (Option 37) is provided as a standard accessory.

## Section 3 Operation

---

|     |                                   |     |
|-----|-----------------------------------|-----|
| 3.1 | Part Names and Functions .....    | 3-2 |
| 3.2 | Operation .....                   | 3-2 |
|     | 3.2.1 Optical Output ON/OFF ..... | 3-2 |

## 3.1 Part Names and Functions



- 1 Optical output ON/OFF key  
Used to switch optical output between ON/OFF.
- 2 Optical connector  
Connected with the optical fiber to derive the output light.
- 3 Pull-out lever  
Provides the lock structure when the unit is attached to the main unit.  
Detach the unit by grasping the lever and pulling it out.

## 3.2 Operation

### 3.2.1 Optical Output ON/OFF



Sets optical output to ON/OFF.  
The key lights up automatically.

| Operation                | Remarks |
|--------------------------|---------|
| Pressing the Opt. On key |         |

Switches between ON or OFF every time the key is pressed.  
Opt. On key is continuously illuminated while light is output.  
Opt. On key blinks if the safety apparatus is working and light is shut out even when it is set to ON.  
Opt. On key is turned off when it is set to OFF.

## Section 4 Performance Test

---

|       |                                                          |     |
|-------|----------------------------------------------------------|-----|
| 4.1   | Performance Test .....                                   | 4-2 |
| 4.1.1 | Optical Output Level .....                               | 4-3 |
| 4.1.2 | Central Wavelength .....                                 | 4-3 |
| 4.2   | Performance Test Results .....                           | 4-4 |
| 4.2.1 | Relation between Reference Value and<br>Guard Band ..... | 4-4 |
| 4.2.2 | How to Obtain Measurement Uncertainty .....              | 4-4 |
| 4.3   | Repair Work .....                                        | 4-7 |

## 4.1 Performance Test

To check performance, the following two items are examined.

- Optical output level
- Central wavelength

Clean the optical connector before starting the test.

Also, perform the test after allowing sufficient time to warm-up following power activation.

### Point

---

To record test results, it is recommended to copy “Appendix A: Performance Test Result Record Table” at the end of this manual or prepare a similar list.

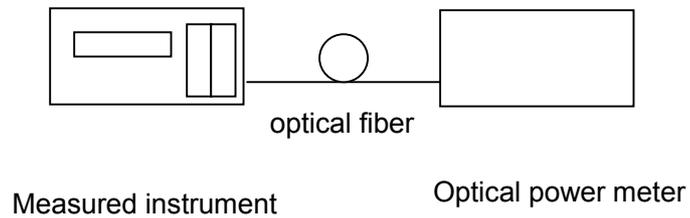
---

#### The main measurement instrument necessary for each test:

| Measurement Instrument    | Required Performance        | Remarks                 |
|---------------------------|-----------------------------|-------------------------|
| Optical power meter       | Wavelength : 750 to 1700 nm | MT9810A/B+<br>MU931421A |
|                           | Range : 0 to -70 dBm        |                         |
|                           | Uncertainty : ±3.5%         |                         |
| Optical spectrum analyzer | Wavelength : 600 to 1750 nm | MS9710B/C               |
|                           | Resolution : 0.1 nm         |                         |

### 4.1.1 Optical Output Level

<Measurement System>



<Measurement Procedure>

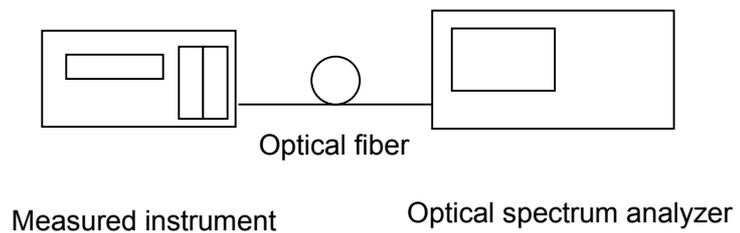
- 1 Set up the measurement system as shown above.
- 2 Set the optical output mode for the measured instrument to CW and ATT = 0.00 dB.
- 3 Measure the optical output using the optical power meter.
- 4 Check that the measured value is within standards.

4

Performance Test

### 4.1.2 Central Wavelength

<Measurement System>



<Measurement Procedure>

- 1 Set up the measurement system as shown above.
- 2 Set the optical output mode for the measured instrument to CW and ATT = 0.00 dB.
- 3 Measure the central wavelength using the optical spectrum analyzer.
- 4 Check that the measured value is within standards.

## 4.2 Performance Test Results

### 4.2.1 Relation between Reference Value and Guard Band

The guard band is based on the belief that “the calibration value is insufficient in judging whether standards are met.” Because measurement uncertainty always accompanies the calibration value, the standard value should include the uncertainty of the calibration value.

Therefore, the guard band should be set to a strict value taking into consideration the amount of uncertainty; this value should then be the reference for comparison with the calibration value.

### 4.2.2 How to Obtain Measurement Uncertainty

There are two types of measurement uncertainties.

- (1) Type A uncertainty ( $u_a$ ): Uncertainty evaluated by statistical method
- (2) Type B uncertainty ( $u_b$ ): Uncertainty evaluated by a method other than the statistical method

Therefore, make a list of all the elements of uncertainty in the measurement work, decide which type (A or B) they are and evaluate them.

Evaluation of type A uncertainty:

A series of measurement data are input into the next expression, and the uncertainty of the targeted element is evaluated. These are used to evaluate the variance and other factors, etc. of the measurement system. Measure  $n$  times, and the value is obtained from the data of  $n$  pieces with Expression (1).

$$u_a = \frac{1}{n} \sqrt{\frac{\sum_{i=1}^n (X_i - X_m)^2}{n-1}} \quad (1)$$

$n$ : Number of measurements

$X_i$ :  $i$ -th Measurement value

$X_m$ : Average of measurement values

$u_a$  shows the standard deviation of the difference between  $X_m$  and the true value. The larger the number of measurement times  $n$ , the smaller the uncertainty is.

Evaluation of type B uncertainty:

For an element of uncertainty that cannot be evaluated by a statistical technique like that of type A uncertainty, an individual element is substituted for Equation (2) and is assumed to be the evaluation of the type B uncertainty.

$$u_b = \sqrt{u_1^2 + u_2^2 + \cdots + u_n^2} \quad (2)$$

$u_i$ : **Uncertainty element evaluated by method other than statistical**

In the performance test for MU954501A, optical output stability for the light source and other elements are included in the type B uncertainty.

Evaluation of synthetic standard uncertainty:

The type A and B uncertainties obtained by Equations (1) and (2) are synthesized by the RSS (square root of sum of squares) method, and the uncertainty of synthetic standard ( $u_c$ ) is obtained.

$$u_c = \sqrt{u_a^2 + u_b^2} \quad (3)$$

$u_a$ : **Type A uncertainty**

$u_b$ : **Type B uncertainty**

$u_c$ : **Synthetic standard uncertainty**

Evaluation of enhancement uncertainty:

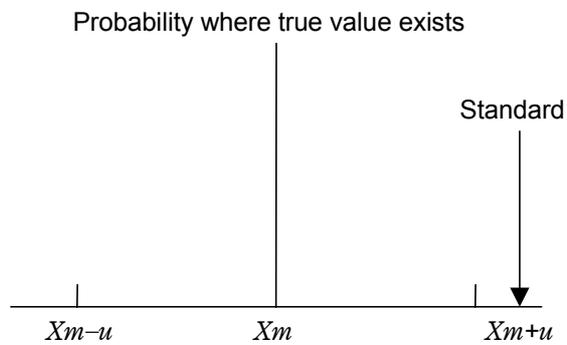
The enhancement uncertainty ( $u$ ) is an amount to define the range expected to include most parts where the values that originate in the measurement objects, for the measurement results, are distributed.

It is obtained by multiplying inclusion coefficient ( $k$ ) by the synthetic standard uncertainty ( $u_c$ ).

$$u = k \times u_c \tag{4}$$

**$k$  : Inclusion coefficient (when  $k = 2$ , reliability = 95%)**

From  $X_m$  and  $u$  obtained from the measurement value of  $n$  pieces, it is 95% probable that true value exists in the range of  $X_m - u$  and  $X_m + u$ . If the difference between the standard of the measurement item and  $X_m$  is  $u$  or more, the probability that it is off the standard is 2.5% or less.



## 4.3 Repair Work

If the results of the performance test reveal that the value does not satisfy the standard, repair work is required. Contact your nearest Anritsu office, branch, sales office or one of our agents immediately.

Have the following information at hand when asking for repair work.

- (1) Instrument name, machine number (described on the chassis)
- (2) Failure status
- (3) Name and contact address/number of the person in charge to confirm details on the failure or to notify upon completion.



## Section 5 Maintenance and Re-transportation

|     |                         |     |
|-----|-------------------------|-----|
| 5.1 | Daily Maintenance ..... | 5-2 |
| 5.2 | Notes on Storage .....  | 5-4 |
| 5.3 | Re-transportation ..... | 5-4 |

## 5.1 Daily Maintenance

### Daily Maintenance

When used in a dusty area, when the front panel is dirty or before long-term storage; wipe dirt off lightly with a cloth soaked in soapy water. Using thinner or benzine may hurt the coating.

---

### CAUTION

---

**Before wiping dirt off with a cloth soaked in soapy water, turn off the power to the main unit and pull out the power cord. Cleaning without unplugging the power cord from the outlet may cause electric shock.**

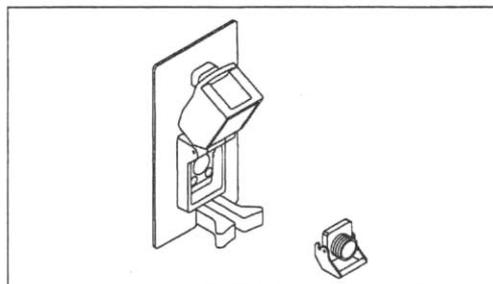
**In addition, do not wipe off dirt on the sides with a cloth soaked in soapy water as there are holes on the surface. Water may drop inside the instrument and damage electric circuits when the power is turned on.**

---

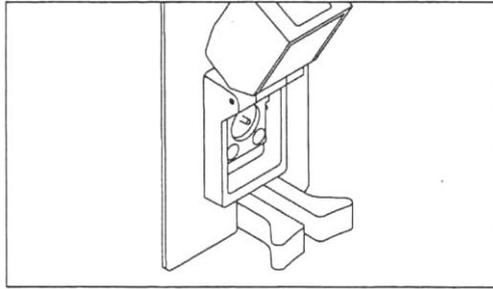
### Cleaning the ferrule inside the unit

Clean the ferrule inside the optical connector by removing the optical connector according to the following procedures. To maintain performance of the equipment, clean regularly.

- (1) Remove the connector cap.
- (2) Pull the lever on the connector toward you. After confirming that the latch is released, carefully pull out the connector straight forward.



- (3) Wipe off dirt on the terminal surface of the ferrule with the adapter cleaner (Z0284).



- (4) Reattach the optical connector in the reverse order. Be careful not to damage the terminal surface of the ferrule with the optical connector, etc.

### CAUTION

Before cleaning the ferrule inside the unit, turn off the power to the main unit and pull out the power cord. If light is output by mistake, you may be exposed to radiation by an invisible laser beam.

#### Cleaning the ferrule on the optical fiber cable

To clean the ferrule located at the end of the optical fiber cable, use the ferrule cleaner (Z0282), an application part.

### CAUTION

Using solvent such as alcohol applied on the end of the optical fiber cable with a swab stick results in cotton being left over after the solvent evaporates. To clean the optical fiber, use a ferrule cleaner that does not require a solvent such as alcohol.

## 5.2 Notes on Storage

Avoid the following places when storing this equipment

- Place that is 70°C or higher or that is –40°C or lower.
- Place exposed to the direct sunlight
- Dusty place
- Place with high humidity that may cause condensation
- Place likely to be exposed to activated gas

## 5.3 Re-transportation

Note the following points when you re-transport this equipment.

- Use the packing material used when this equipment was purchased.
- Tell the transportation agent to avoid water and improper handling as this is precise electronic equipment.

Do as follows if you no longer have the packing material used when purchased.

- 1) Use air cell mats (bubble wrap) or the equivalent cushioning sheet.
- 2) Wrap the entire equipment in the sheet.
- 3) Prepare a strong container that is either made of cardboard, wood or aluminum and that has 10 to 15 cm space on all sides for the equipment wrapped in the sheet; then pack cushion 10 to 15 cm-thick in the bottom of the box.
- 4) Put the equipment wrapped in the sheet into the box, and pack cushioning around it.
- 5) Close up the box firmly with string, tape, belt, etc.

Appendix A Performance Test Result Record Table ..... A-2



# Appendix A Performance Test Result Record Table

Light Source (SLD) Performance Test Result Record Table

Model name MU954□01A

Serial No. \_\_\_\_\_

Date (y/m/d) \_\_\_\_\_

Temperature \_\_\_\_\_ °C

Humidity \_\_\_\_\_ %

Atmospheric pressure \_\_\_\_\_ hPa

Tested by \_\_\_\_\_

## 1.Center Wavelength

| Minimum |   | Reading                 |   | Maximum |           |
|---------|---|-------------------------|---|---------|-----------|
| 1290 nm | ≤ | <input type="text"/> nm | ≤ | 1330 nm | [1310 nm] |
| 1530 nm | ≤ | <input type="text"/> nm | ≤ | 1570 nm | [1550 nm] |

## 2.Optical Output Level

| Minimum |   | Reading                  |   | Maximum |
|---------|---|--------------------------|---|---------|
| -4 dBm  | ≤ | <input type="text"/> dBm | ≤ | -2 dBm  |

**Number/Symbol**

21CFR1040 vi

**A**

Accessory 2-2

Application parts 2-3

**C**

Central wavelength 4-2

Class 1 2-2

Class I 2-2

Components 2-2

**D**

Daily maintenance 5-2

DIN connector 2-3

**F**

FC-PC connector 2-3

Ferrule 5-2

Front panel 5-2

**H**

HMS-10/A connector 2-4

**I**

IEC60825-1 2-2

**L**

Laser safety vi

**M**

Maintenance 5-4

Multi channel box I, 1-2

**O**

Opt.On 3-2

Ordering information 2-3

Optical connector 2-2, 2-3, 2-4, 5-3

Cleaning 5-2

Optical fiber cable 5-3

Optical output 1-2

ON/OFF key 3-2

Optical test set I, 1-2

**P**

Packing 5-4

Performance test A-2

Result Record Table 3-2

Pull-out lever

**R**

Repair 4-7

Replaceable optical connector 2-4

Re-transportation 5-4

**S**

SC connector 2-4

SLD 1-2, 2-2

Spectrum line width 1-2

Standard 2-2

ST connector 2-4

Storage 5-4

**T**

Transportation 5-4

**W**

Warm-up time 2-2, 4-2



MU954301A/4501A

Light Source

Operation Manual

