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AS-61874

INSTRUCTION MANUAL

FOR

AQ-4303B WHITE LIGHT SOURCE

ANDO ELECTRIC CO., LTD.

Tokyo, Japan

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Outside View ASD61874-1/3 to 3/3

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SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

This instruction manual contains information required for proper operation and maintenance of 4303B WHITE LIGHT SOURCE (which will be referred to as the apparatus or by its model name in this manual).

1.2 GENERAL

This apparatus is a light source which incorporates an optical lens system designed to efficiently launch the light emitted by a tungsten halogen lamp into an optical fiber. It can output either CW light or 270 Hz chopped light. It also incorporates optical filters to remove higher-order light which may be generated when a monochromator is used together with the apparatus. This apparatus has three output wavelength bands. The apparatus allows settings to be made either manually on the front panel or by program by the use of an external controller connected via a GP-IB.

The use of this apparatus in combination with an appropriate optical spectrum analyzer, which may be one in user's possession or the one listed in Table 1-2, enables the optical loss wavelength characteristics of optical fibers and other optical devices to be measured.

1.3 SPECIFICATIONS

Table 1-1 gives the specifications and performance character-

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istics of this apparatus. The procedures for checking the performance of the apparatus against the specifications are set forth in Section 5.

1.4 COMPOSITION

This apparatus is supplied with the standard accessories listed in the table at the end of this manual.

Table 1-1 Specifications

Wavelength range:	400 ∿ 1800 nm
Output level:	-45 dBm/10 nm (For CW light with a wavelength of 850 nm and 1300 nm launched into a GI50/125 fiber)
Output level stability:	Within ±0.05 dB (20°C, 1 hour)
Light source device:	Tungsten halogen lamp
Power requirements:	AC 100~120, 200~240V , 50/60 Hz, about 160 VA
Dimensions and mass:	
Dimensions:	About 133 (H) x 212 (W) x 250 (D) mm
Mass:	About 5 kg

Table 1-2 Instrument for Combined Use

Instrument name	Rating		Qty	Ando's model
Optical spectrum analyzer	Wavelength range:	400 ∿ 1750 nm	1	AQ-6312A/B OPTICAL SPECTRUM ANALYZER
	Measurement level:	-70 ∿ +10 dBm/ resolution		
	Wavelength accuracy:	±1 nm		

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SECTION 2

PREPARATION FOR USE

2.1 INTRODUCTION

This section deals with the procedures for unpacking, acceptance inspection and repacking.

2.2 UNPACKING AND ACCEPTANCE INSPECTION

This apparatus has been factory inspected, mechanically and electrically, prior to shipment to insure that it gives satisfactory performance. When it is received, promptly unpack and check it for damage sustained in transit.

When unpacking the apparatus, save the wooden box, corrugated cardboard box, cushions, and other packing materials except consumables like steel bands and wrapping paper where possible so that they may be reused when the apparatus is to be packed again for shipment.

2.2.1 Mecahnical Inspection

Visually inspect the apparatus for damage or deformation. Check the switches, knobs, and other parts exposed to view for looseness, rough movement or other faults. Check the types and quantities of accessories and spares against the packing list.

2.2.2 Performance Test

If the apparatus is found by the mechanical inspection to be in good order externally, then test it according to the procedures described in Section 5 to check its performance for compliance with the specifications set forth in Table 1-1.

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2.3 DAMAGE OR FAULT

If the apparatus is found damaged or faulty in the acceptance inspection, immediately report the damage or fault to the nearest dealer.

2.4 REPACKING

When repacking the apparatus, use the packing materials, if saved for later use. If they have not been saved, repack the apparatus exercising care as suggested below.

(1) Wrap the apparatus in strong paper like tarpaulin paper or vinyl sheeting. Protect all the protrusions with cushions against damage.

(2) Place the wrapped apparatus in a wooden or cardboard box which is larger by about 10 cm than the apparatus on all sides.

(3) Fill all open spaces between the apparatus and the box with polyurethane foam or any other suitable cushioning material.

The apparatus may rattle and be damaged in transit, if cushioning is insufficient.

(4) Cover the wooden box and brace it up with steel bands.

If a corrugated cardboard box is used, seal it with adhesive tape.

(5) Indicate the contents and shipping marks in a legible and durable way.

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SECTION 3

OPERATION

3.1 INTRODUCTION

This section contains the procedures for operation of the apparatus.

3.2 NAMES AND FUNCTIONS OF PANEL CONTROLS

Figures 3-1-1 to 3-1-4 show the names and arrangement of controls of this apparatus, and Table 3-1 outlines the functions of the controls. It is recommended that the operator familiarize himself with the names of controls indicated therein, as they are used throughout this manual.

The letters or symbols in brackets indicate the markings (operation indicators, markings for settings, etc.) of controls of this apparatus.

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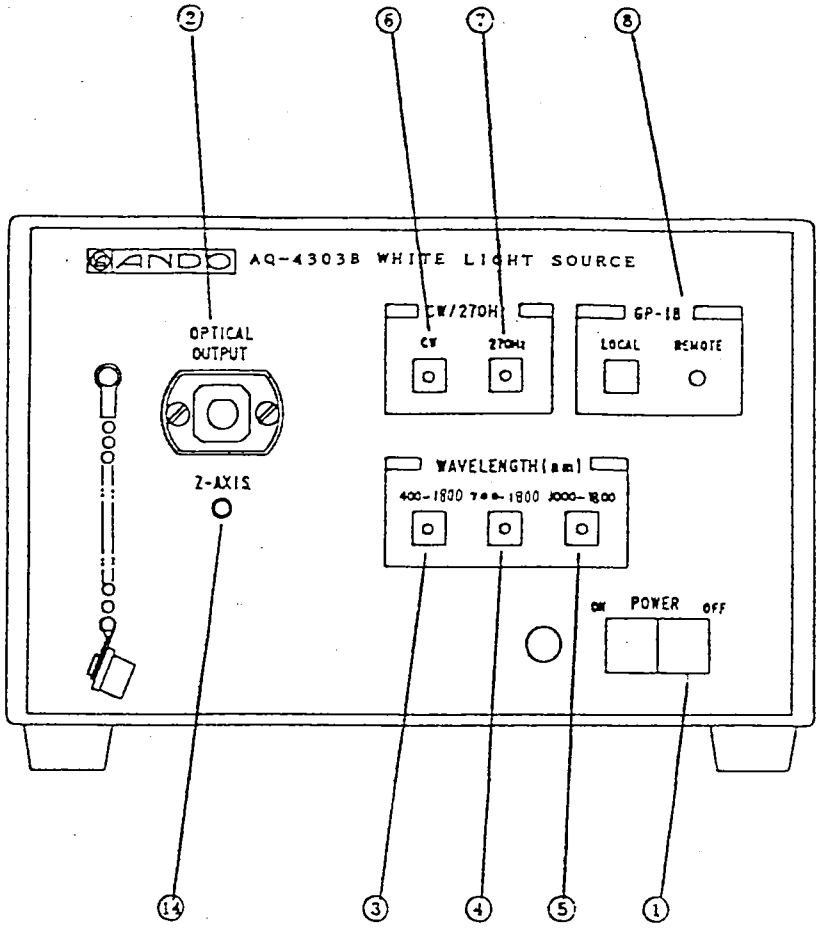


Fig. 3-1-1 Controls on Front Panel

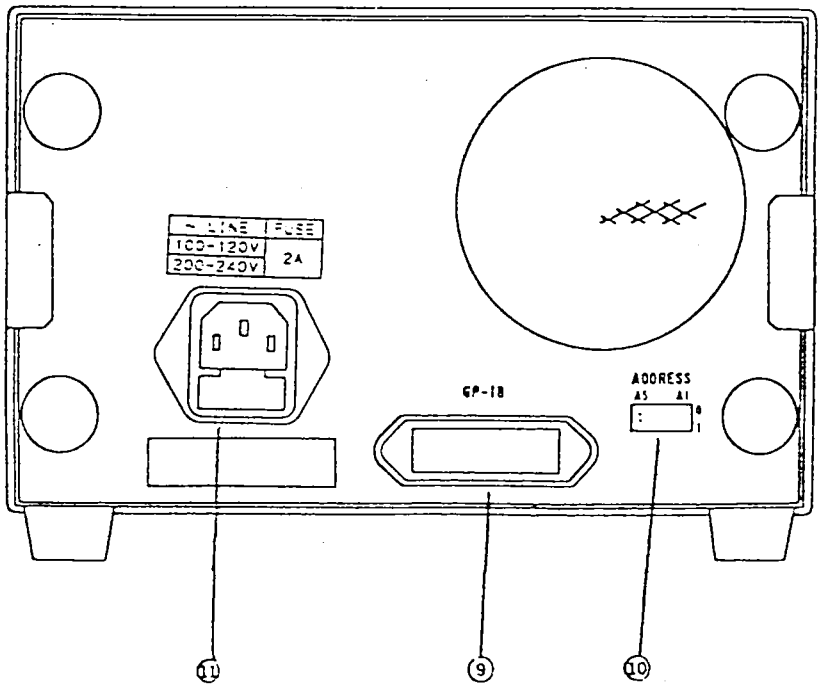


Fig. 3-1-2 Controls on Rear Panel

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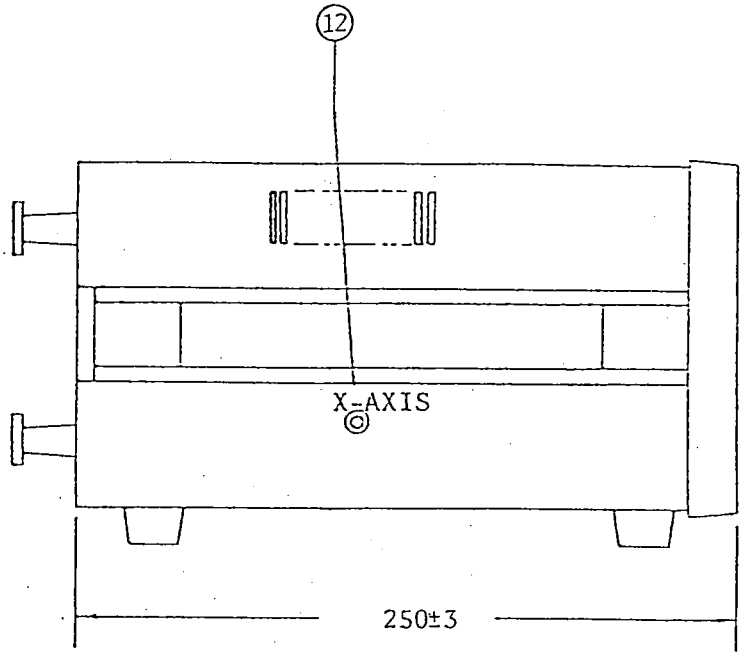


Fig. 3-1-3 Control on Side Panel

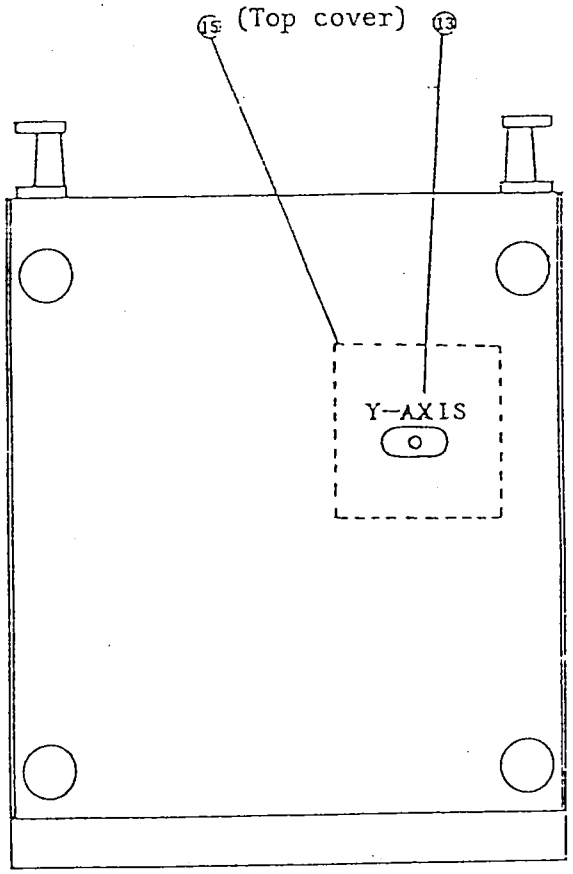


Fig. 3-1-4 Control on Bottom Plate

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Table 3-1 Names and Functions of Controls

No.	Marking	Control name	Function
①	[POWER] [ON] [OFF]	Power switch	When this switch is set to [ON], the power supply circuit of the apparatus closes, and the lamp to the left of the switch lights. Setting this switch to [OFF] switches off the apparatus.
②	[OPTICAL OUTPUT]	Optical connector	Connector for optical output
③	[WAVELENGTH(nm)] [400∿1800]	Wavelength selection switch	Switches used to select the wavelength band for optical output. The internal status corresponding to the wavelength selection is as follows: [400 ∿1800] No optical filter is used. [700 ∿ 1800] Filter to cut off light whose wavelength is shorter than 700 nm is used. [1000 ∿ 1800] Filter to cut off light whose wavelength is shorter than 900 nm is used.
④	[700 ∿ 1800]		
⑤	[1000 ∿ 1800]		
⑥	[CW/270 Hz] [CW]	CW switch	Switch used to output CW light.
⑦	[270 Hz]	270 Hz switch	Switch used to output 270 Hz chopped light.

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No.	Marking	Control name	Function
⑧	[GP-IB] [LOCAL] [REMOTE]	GP-IB LOCAL switch REMOTE lamp	While the [REMOTE] lamp is on, panel operations are ineffective. Pressing the [LOCAL] switch releases the REMOTE status to enable LOCAL control. During LOCAL LOCK OUT, the [LOCAL] switch is inoperative.
⑨	[GP-IB]	GP-IB connector	GP-IB connector used to connect an external controller.
⑩	[ADDRESS] [A5 A1] [$^{0}_{1}$]	Address switch	GP-IB address switch
⑪	~ LINE / FUSE 100-120V / 2A 200-240V	Power connector	Connector to which the power cord is to be connected.
⑫	[X-AXIS]	Fine adjustment X axis	Fine adjusters for the internal optical system. These adjusters are used to maximize the optical output.
⑬	[Y-AXIS]	Fine adjustment Y axis	
⑭	[Z-AXIS]	Fine adjustment Z axis	
⑮		Cover	Cover to be opened for lamp replacement

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3.3 OPERATION

3.3.1 Fine Adjustment

When the tungsten halogen lamp is replaced, the optical axis of the internal optical system is shifted to result in a lower optical output level. To maximize the optical output after lamp replacement, readjust the fine adjustment axis ⑫ ~ ⑭ as follows:

Connect this apparatus and an optical power meter [short-wavelength sensor] with an appropriate optical fiber, and adjust ⑫ and ⑬ alternately with a standard screwdriver to raise the optical output level of the apparatus. After they are adjusted, adjust ⑭ ; then finally fine-adjust ⑫ and ⑬.

3.3.2 Wavelength Setting

This apparatus has three output wavelength bands. To output the light emitted by the tungsten halogen lamp as it is, press the switch ③.

If the switch ④ is pressed, an optical filter which cuts off light whose wavelength is shorter than 700 nm is put in operation [about 2 seconds after the switch is pressed] ; as a result, light ranging in wavelength from 700 to 1800 nm becomes usable.

If the switch ⑤ is pressed, an optical filter which cuts off light whose wavelength is below 900 nm is put in operation [about 2 seconds after the switch is pressed] ; as a result, light ranging in wavelength from 1000 to 1800 nm becomes usable.

3.3.3 Other Settings

Select CW light or 270 Hz chopped light depending on the other optical instruments to be used.

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3.3.4 Remote Control

To remote-control the apparatus, connect an external controller to the [GP-IB] connector ⑨ on the rear panel of the apparatus via a GP-IB cable. The GP-IB address can be set on the [ADDRESS] switch ⑩ located on the rear panel ofthe apparatus. The address of the apparatus has been factoryset to 6 [A2 and A3 set to 1 and others set to 0] prior to shipment. The setting commands usable to control the apparatus from an external controller are as follows:

Setting	Command
Switch ⑥ for CW light	A
Switch ⑦ for 270 Hz chopped light	B
Switch ③ for 400 ~ 1800 nm	C
Switch ④ for 700 ~ 1800 nm	D
Switch ⑤ for 1000 ~ 1800 nm	E

・Example program [for external controller, HP's 9836]

```
10 OUTPUT 706; "AD"
20 END
```

The above program selects CW light and the [700 ~ 1800] nm wavelength band.

3.3.5 Application Example

Figure 3-2 shows an example of system, which includes this apparatus, for measuring the optical loss wavelength characteristics of optical fibers. The other instrument included in the system is the AQ-6312A/B optical Spectrum Analyzer listed in Table 1-2.

Set this apparatus to output CW light in the wavelength band

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of 700 to 1800 nm. Please refer to instruction manual of AQ-6312A/B Optical Spectrum Anaryzer [section 8.2.3 Loss Wavelength Characteristic Measurement] for operation of AQ-6312A/B.

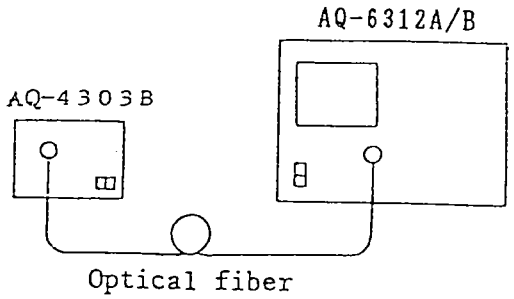


Fig. 3-2 Example Configuration for the Measurement of Optical Loss Wavelength Characteristics of Optical Fibers

NOTE

(1) When the [POWER] switch is set to [ON], the tungsten halogen lamp lights. Avoid directly looking at the lamp; it is extremely dazzling and is harmful to the eye.

(2) The tungsten halogen lamp that has been on is very hot. When replacing it, let it cool down after setting the [POWER] switch to [OFF].

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SECTION 4

CIRCUITRY AND CONSTRUCTION

4.1 INTRODUCTION

This section contains general information on the circuitry and construction of the apparatus.

4.2 CIRCUITRY

The circuit composition is shown in Figure 4-1.

The motor for optical chopping at 270 Hz and that for optical filter switching are controlled based on the settings. The former is attached with a disk which has holes; so that CW light is output with the motor stopped, and 270 Hz chopped light is output with the motor running. The latter controls the optical filter selection according to the wavelength band setting as follows:

400 ∿ 1800 nm:	No optical filter is put in use.
700 ∿ 1800 nm:	An optical filter to cut off light whose wavelength is shorter than 700nm is put in use.
1000 ∿ 1800 nm:	An optical filter to cut off light whose wavelength is shorter than 900 nm is put in use.

4.3 CONSTRUCTION

The external view and shape of the apparatus are shown in Drawing ASD-61874,and the internal layout is shown in Figure 4-2.

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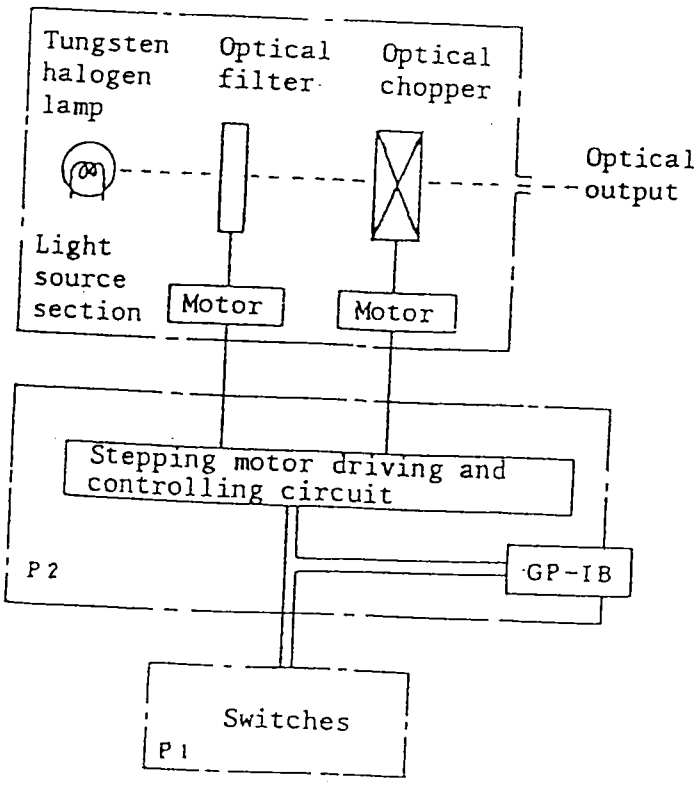


Fig. 4-1 Circuit Composition

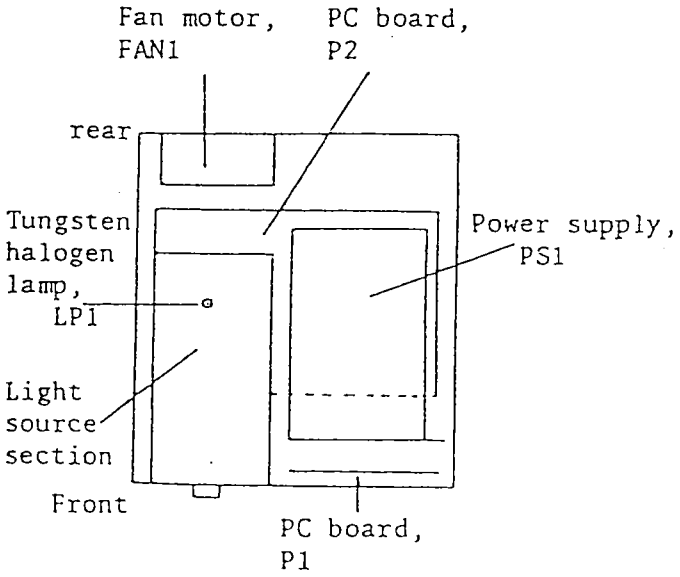


Fig. 4-2 Internal Layout

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SECTION 5

MAINTENANCE

5.1 INTRODUCTION

This section deals with the procedures for periodical inspection, performance test, and maintenance required to obtain optimum performance from the apparatus throughout its life.

5.2 TESTING INSTRUMENTS

The testing instruments required for the testing of the apparatus are listed in Table 5-1. The performance characteristics listed in the table represent the minimum requirements with which the testing instruments are expected to comply.

5.3 PERIODICAL INSPECTION

The apparatus is designed and constructed to give long periods of stable and reliable service. It is however recommended that periodical inspection be performed about once a year (follow the procedures for the performance test explained in Section 5.5).

5.4 LAMP REPLACEMENT

The life of the high-intensity tungsten halogen lamp used in this apparatus is about 50 hours. When the lamp has burnt out, open the top cover of the apparatus and replace the lamp. Before replacing the lamp, switch off the apparatus and make sure that the lamp is not hot. Replacing the lamp results in a shifted optical axis; readjust the optical axis following

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the procedure explained in Section 3.3.1.

5.5 PERFORMANCE TEST

The performance test is carried out to check the performance of the apparatus against the specifications. It should be performed at the time of acceptance inspection, periodical inspection or inspection after lamp replacement or apparatus repair.

5.5.1 Wavelength Range

Connect an optical spectrum analyzer to the apparatus with an optical fiber. Press the [CW] and [400 ∿1800]nm switches of the apparatus, and ascertain that the optical output ranges in wavelength from 400 to 1750 nm. (See Figure 5-1.)

Next, press the [700 ∿ 1800]nm switch, and ascertain that the optical output starts at around 660 nm in wavelength, and that it is at an adequate level at a wavelength of 700 nm. (See Figure 5-2.)

Next, press the [1000 ∿ 1800]nm switch, and ascertain that the optical output starts at around 850 nm in wavelength, and that it is at an adequate level at a wavelength of 1000 nm. (See Figure 5-3.)

5.5.2 Output Level

After adjusting the apparatus for the maximum output level by following the procedure explained in Section 3.3.1, connect an optical spectrum analyzer to this apparatus with a GI50/125 optical fiber. Press the [CW] switch of this apparatus, and set the resolution of the optical spectrum analyzer to 10 nm. Measure the output level at 850 nm,

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1300 nm in wavelength, and check the measurements against the specification.

5.5.3 Output Level Stability

Connect an optical power meter to this apparatus with an optical fiber, measure the output level for 1 hour at 20°C, and check the measurements against the specification. Also ascertain that the optical power level of 270 Hz chopped light is 3 dB lower than that of CW light.

5.5.4 Repair

If it is found as a result of the performance test that the apparatus does not comply with the specifications, contact the nearest dealer immediately.

Table 5-1 Testing Instruments

Instrument name	Performance requirement	Ando's model
Optical spectrum analyzer	Wavelength range: 400∿1750nm Input level: -70 dBm or higher	AQ-6312A/B Optical Spectrum Analyzer
High-sensitivity power meter and optical sensor	Wavelength range: 400∿1700nm Input level: -40 dBm or higher	AQ-1135E High-Sensitivity Optical Power Meter AQ-2708 Sensor AQ-1966 Sensor

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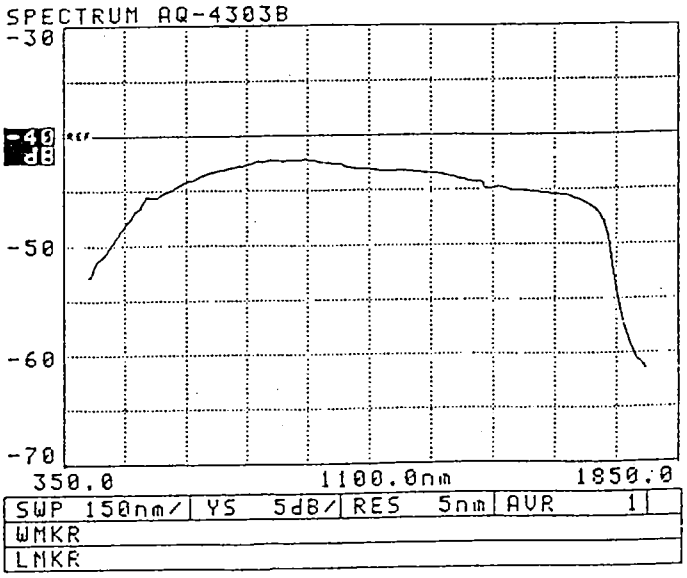


Fig.5-1 Optical Output Level Characteristic (400～1800nm)
(TYPICAL) 50/125GI Fiber

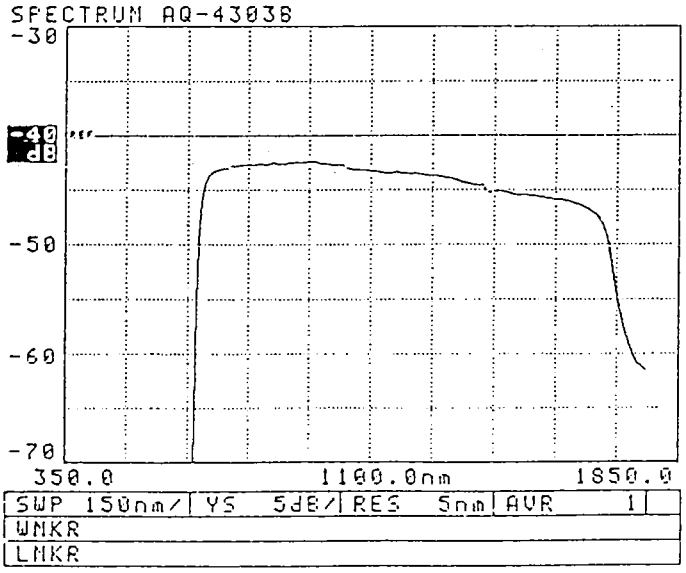


Fig.5-2 Optical Output Level Characteristic (700～1800nm)
(TYPICAL) 50/125GI Fiber

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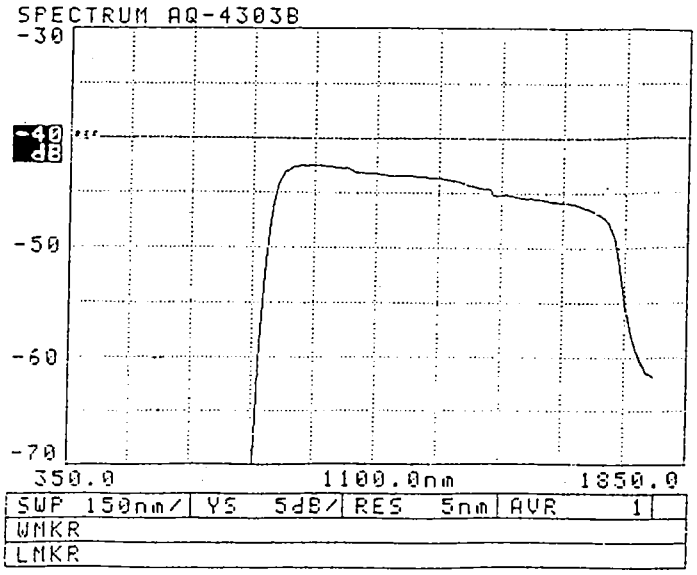


Fig.5-3 Optical Output Level Characteristic (1000～1800nm)
(TYPICAL) 50/125GI Fiber

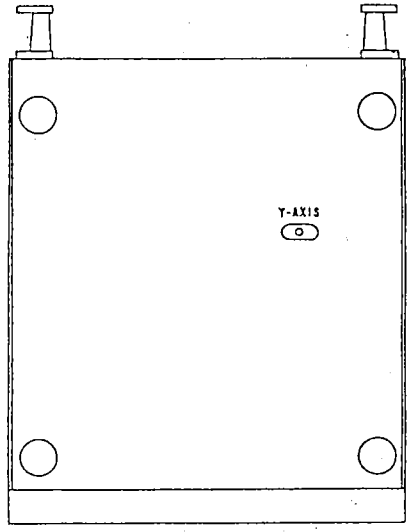
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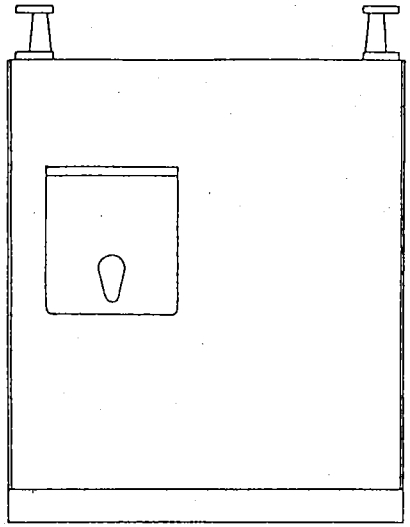
Standard accessories

Accessory name	Qty	Remarks
Power cord	1	3 m long
Tungsten halogen lamp	6	12 V, 50 W. 1 for use + 5 spares
Fuse	2	2 for use
Instruction manual	1	

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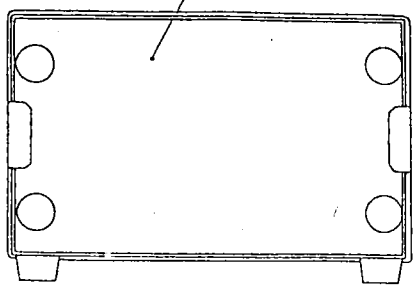


BOTTOM VIEW



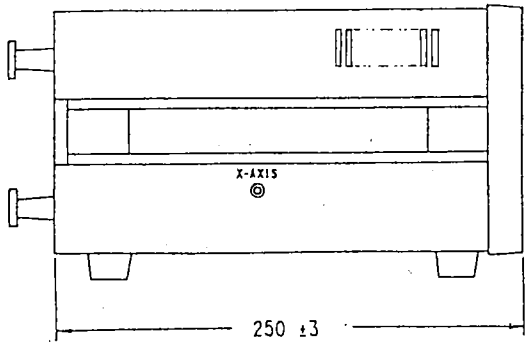
TOP VIEW

SEE ASD-61874-3/3

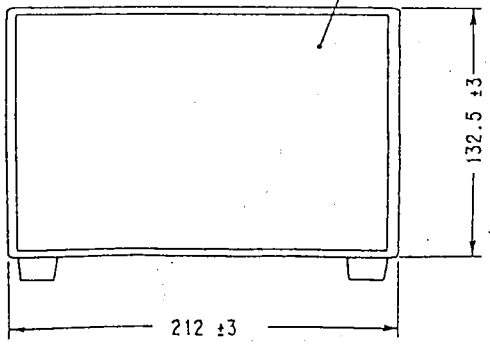


REAR VIEW

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SIDE VIEW

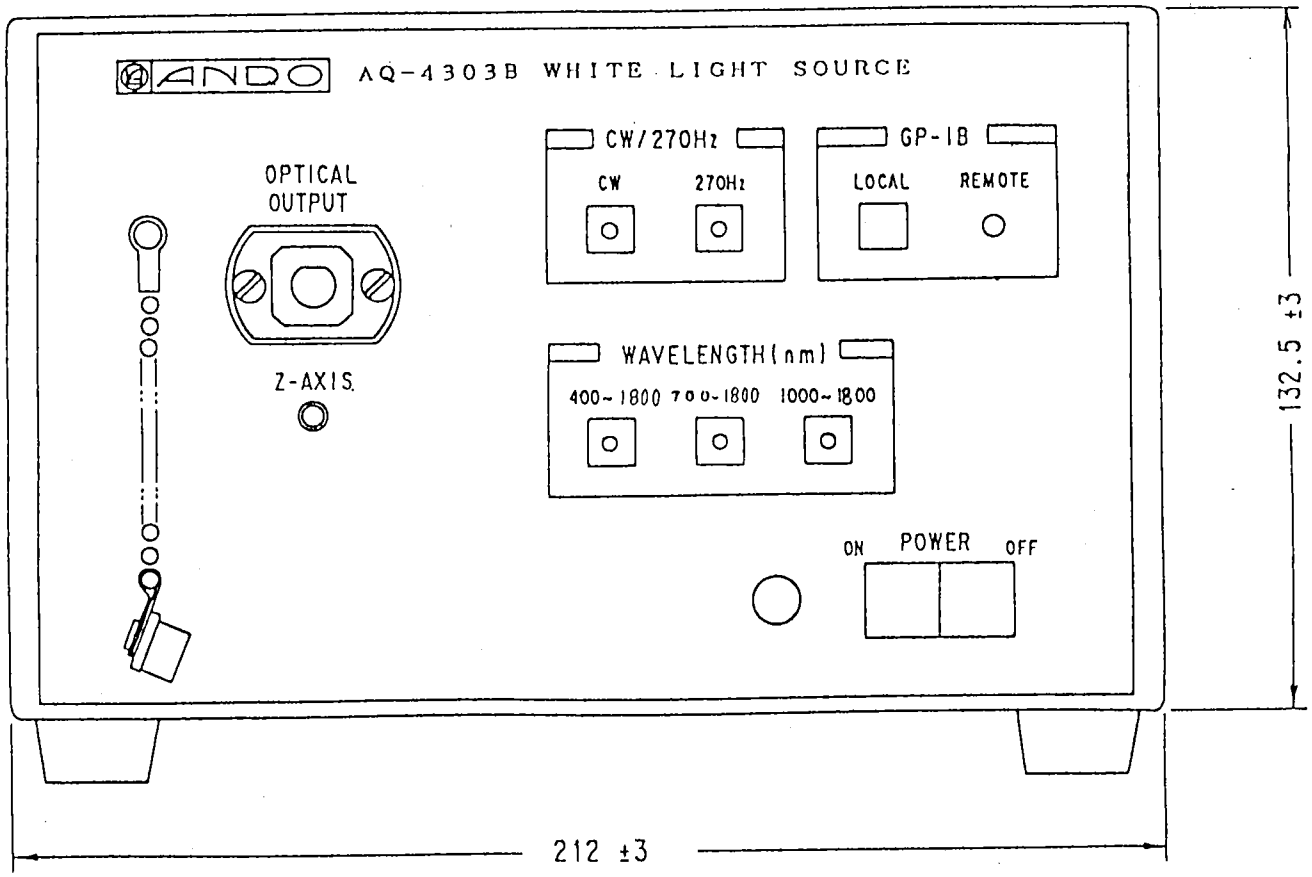


FRONT VIEW

EXTERNAL VIEW ASD-61874-1/3

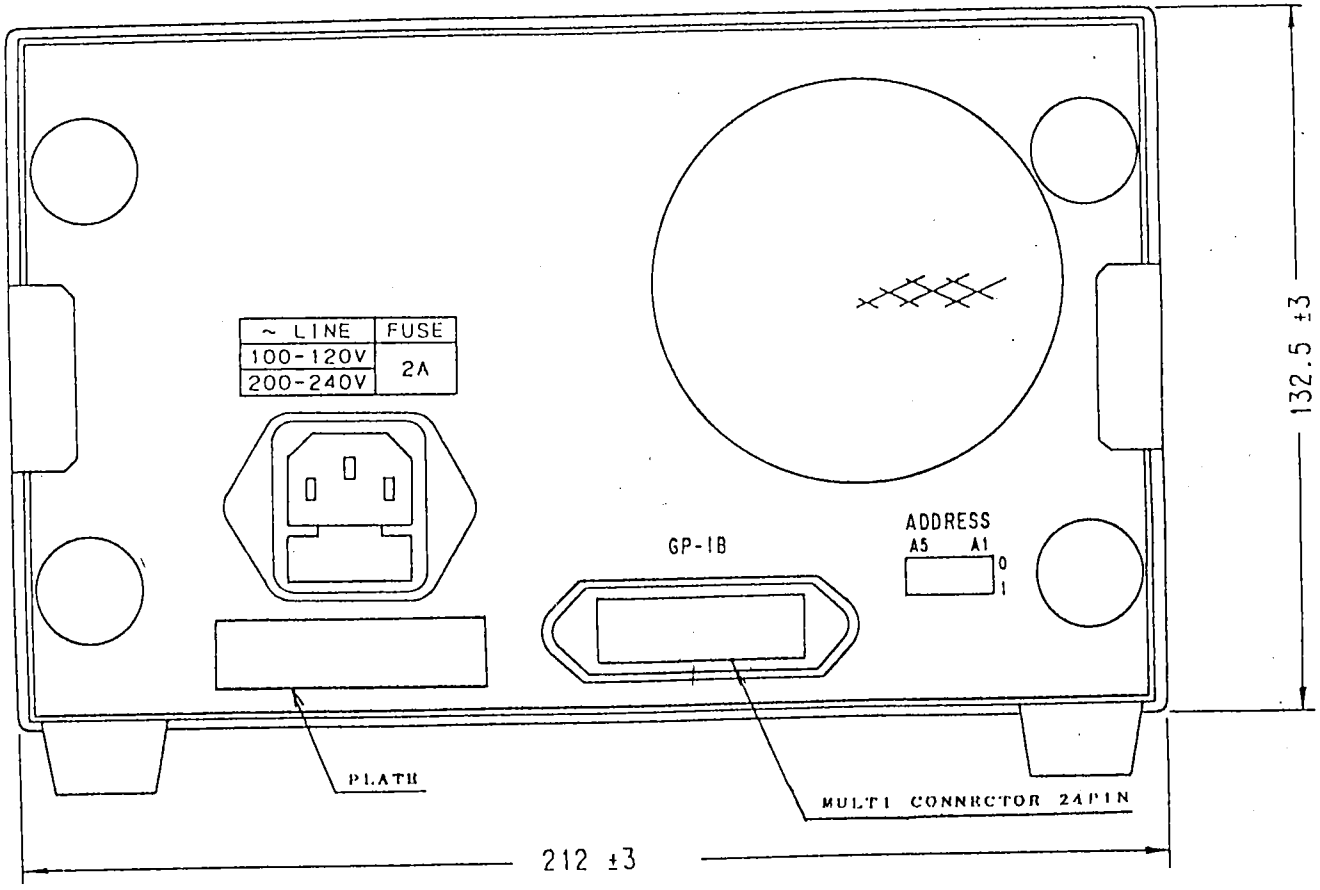
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FRONT PANEL VIEW ASD-61874-2/3

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