206-98366A

UV-Vis Spectrophotometer

UV-1700 series

SERVICE MANUAL

206-55401-34 for 230V CE
206-55401-91 for 100V
206-55401-92 for 120V
206-55401-93 for 220V
206-55401-94 for 240V

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Contents

Chapter 1

Introduction

This chapter explains instrument outline, intended use of service manual and warning labels.

1.1 About the Service Manual

This service manual explains the procedures for installing, performance checking, troubleshooting and adjusting for the UV-Vis Spectrophotometer UV-1700.

1.2 UV-1700 Outline

UV-1700 PharmaSpec - a spectrophotometer for ultraviolet and visible region that is the first in its class to amply clear the 1nm resolution barrier to conform to wavelength resolution regulations specified in the European Pharmacopoeia - is a sister instrument to the highly rated UV-1600.
The UV-1700 has the following features.

- Conforms to specifications and functions (wavelength accuracy, resolution and photometric accuracy, etc.) laid down in the European, USA and Japanese Pharmacopoeias.
- Provided with hardware validation functions as standard.
- Supports IQ and OQ.
- Compact, light spectrophotometer
- LCD and designated keys enhance ease of operation.

1.3 Intended Use

Receiving service training is a prerequisite for the correct use of this manual.
Note that Shimadzu will not bear responsibility for problems that may occur when a person who has not received specific service training operates the instrument according to this manual.

1.4 Warning Labels on Instrument

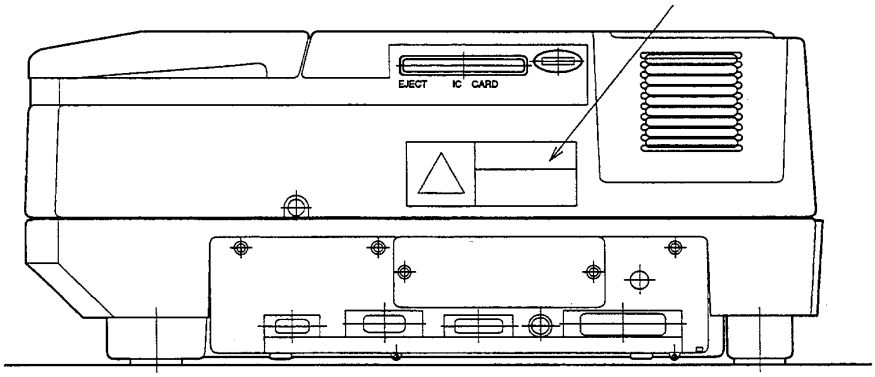
Warning labels are attached to the UV-1700 in the following two locations. Be sure to thoroughly read the instruction manual in advance and adhere to instructions provided when replacing lamps or fuses to avoid injuries such as burns and electric shocks.

WARNING

DANGER, High Temperature

The light source and light source compartment become extremely hot during operation. To replace the lamp, turn the power OFF, wait at least ten minutes for the lamp to sufficiently cool. Check that the lamp has cooled down, and then replace.

Warning label

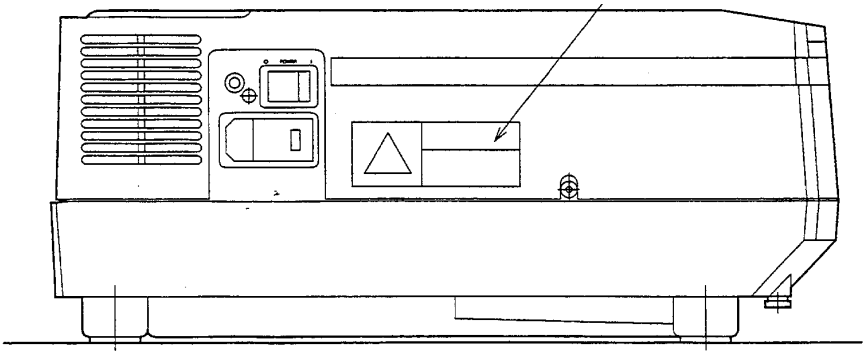


WARNING

DANGER, Electric Shock

Be sure to turn OFF power and disconnect power cable before replacing a fuse to avoid electric shock.

Warning label



Chapter 2

Installation

This chapter explains how the UV-1700 is installed. Be sure to adhere to the procedures in this chapter when performing installation work so that the instrument performs appropriately to ensure customer satisfaction.

2.1 Inspection of Parts

UV-1700 standard contents are shown in Table 2.1 and figure 2.1. Check these together with the customer to see that all parts have been delivered.

Table2-1 Standard Contents

	Description	P/N	Qty.
1	Spectrophotometer UV-1700 Main unit		1
	For 230V CE area	206-55403-34	
	For 100V area	206-55403-91	
	For 120V area	206-55403-92	
	For 220V area	206-55403-93	
	For 240V area	206-55403-94	
2	Standard Accessories (One of the following)		
	For 100V-120V area	206-67099	
	For 220V-240V area	206-67099-01	
2-1	AC Power Cable (One of the following)		1
	For 100V-120V area	071-60814-01	
	For 220V-240V area	071-60814-05	
2-2	Fuse (One of the following)		2
	4.0A (For 100V-120V) area	072-02004-22	
	2.0A (For 220V-240V) area	072-02004-19	
2-3	Grounding Adaptor (For100V-120V only)	071-60803-01	1
3	Instruction Manual (Installation & Maintenance)	206-94783	1
4	Instruction Manual (Operation)	206-94785	1
5	Certificate of Compliance	206-84934-56	1

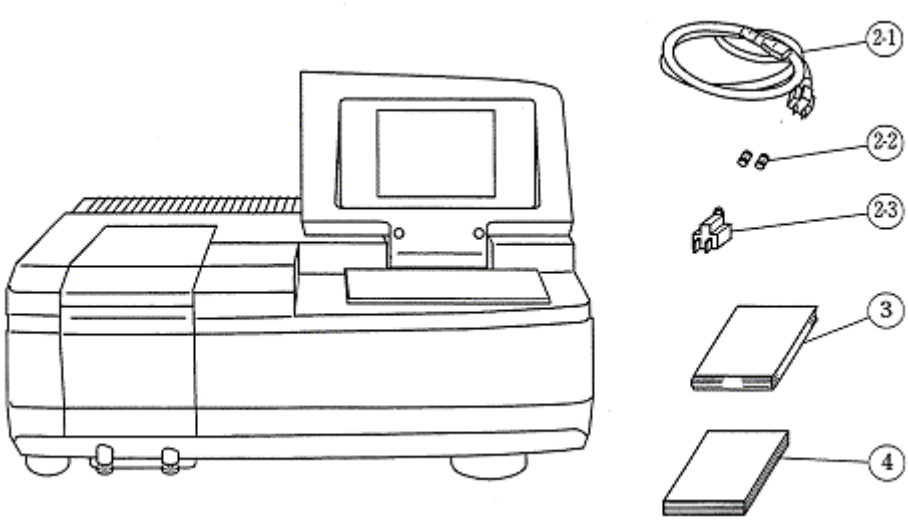


Fig.2-1 Standard contents (items 5 is not displayed)

2.2 Selection of Installation Site

Meet with the customer and decide upon a suitable installation site before commencing installation of the UV-1700. And be sure to install the instrument in a site that conforms to the following parameters to ensure that the instrument will perform appropriately and stably over a long period.

- Room temperature: 15°C to 35°C
- Out of direct sunlight
- No strong vibration or continuous weak vibration
- Away from devices emitting strong magnetic fields, electromagnetic fields or high frequencies
- Humidity: 45% to 80%
- Away from corrosive gases and organic or non-organic gases with absorbency in the ultraviolet region
- Away from dust
- Installation workbench must be able to bear the UV-1700's weight of 17kg (if a PC system is to be used, PC and printer weights must be taken into consideration as well)

Note that the dimensions of the UV-1700 are W 550 x D 470 x H 380mm (200mm high when LCD is retracted). Therefore the installation site needs to be at least W 700 x D 500mm. A power switch and cooling fan are mounted on the left side of the main unit. Install the instrument in a location where ventilation will not be hindered.

2.3 Installation of UV-1700

Once the installation site has been decided, install the UV-1700 in accordance with the following procedures.

2.3.1 Power Check

The UV-1700 uses a 130VA power supply. Be sure to use a power supply of at least 130VA (if a PC system is to be used, PC and printer power supplies must be taken into consideration as well). Also, power supply voltage fluctuation tolerance is ±10%. Use a low-voltage instrument if voltage fluctuation exceeds ±10%.

2.3.2 Grounding

The UV-1700 power cable has three wires including a ground wire. Check to see that the power outlet has a ground terminal. If the power outlet does not have ground terminal, be sure to ground the instrument using the ground terminal of the standard accessory ground adapter (071-60803-01) or the ground terminal on the left side of the instrument.

2.3.3 Instrument Installation and Power Cable Connection

1) Install UV-1700 in location that will not hinder ventilation for cooling fan situated on left side of instrument.
2) Check that the power switch on the main unit is OFF (with O pressed).
3) Check that the voltage setting of the input voltage changeover switch corresponds to the working supply voltage. If differing power voltages are displayed, open the fuse holder using a slotted screwdriver, pull out the round plug and insert it at the location displaying the used power voltage.
4) Check that a 4.0A fuse is used in the 100V system and that a 2.0A fuse is used in the 200V system.
5) Insert the provided power cable to the power connector on the left side of the main unit.
6) Insert the power cable in the power outlet.

2.4 Instrument Baseline Correction

Once installation is complete, be sure to carry out instrument baseline correction following the steps below.

1) Turn ON the power switch of the UV-1700. After checking that initialization has ended correctly, energize the instrument for at least 30 minutes to stabilize it.
2) Press the [F3] key **Mainte.** on the Mode selection screen to display the screen on the left.
3) Press the [2] key to execute instrument baseline correction.
4) Instrument baseline correction requires approximately 15 minutes. Once correction is complete, correction date and time will be displayed in the column where previous correction date and time were located.

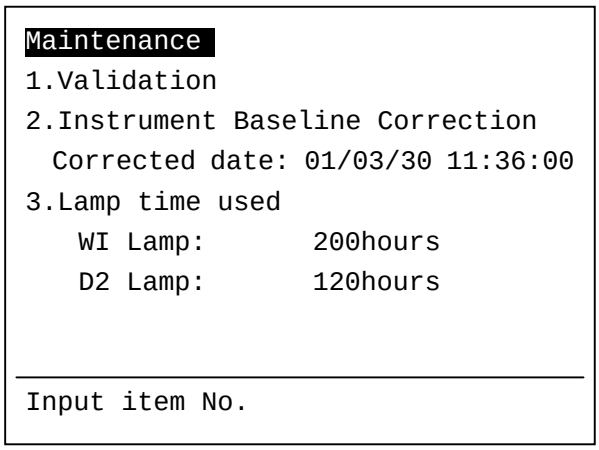


Fig.2-2 Maintenance screen

Note

Press the [START/STOP] key during instrument baseline correction to halt correction operation. If correction operation is halted, the **"Not corrected"** will be displayed in the column where previous correction date and time were located. A problem may occur if measuring is performed with instrument baseline correction in the halted status. Be sure to rerun instrument baseline correction after resolving problems whenever this operation is halted for whatever reason.

Chapter 3

Performance Checks

This chapter explains how to check basic performance of the UV-1700. Note that items accompanied by an asterisk (*) require checking as part of the acceptance procedures.

3.1 Note on the Performance Checks

3.1.1 About ROM Check

Activating the instrument while holding down the [F1] key sets the instrument validation measuring parameters and pass criteria values to the default settings, which are different to the normal parameters.

3.1.2 Checking of Baseline Stability

To implement baseline stability inspection, the instrument power supply must be turned ON for at least one hour prior to inspection. A warning message will be displayed if one hour has not elapsed from when the power was turned ON.

3.1.3 Checking of Baseline Flatness

To implement baseline flatness inspection, the instrument power supply must be turned ON for at least one hour prior to inspection. A warning message will be displayed if one hour has not elapsed from when the power was turned ON.

3.2 How to Use Instrument Validation

Use the instrument validation functions installed in the UV-1700 to check basic performance. This item explains how these functions are used.

3.2.1 How to Enter Instrument Validation Mode

1) Press [F3] key **Mainte.** at the mode selection screen to display the Maintenance screen. Next, select **"1. Validation"** to display the validation screen.
2) The check item selected for implementation is highlighted. For example, wavelength accuracy (WL Accuracy) is highlighted for implementation in figure 3-1.
3) Press the [START] key to execute inspection of the highlighted item.
4) There are two types of check available: **"Semi-Auto items"** and **"Auto items"**. Semi-automatic inspection is divided into items that require manual tasks such as filter changing. Automatic inspection is divided into items that the instrument automatically checks without any need for manual tasks.

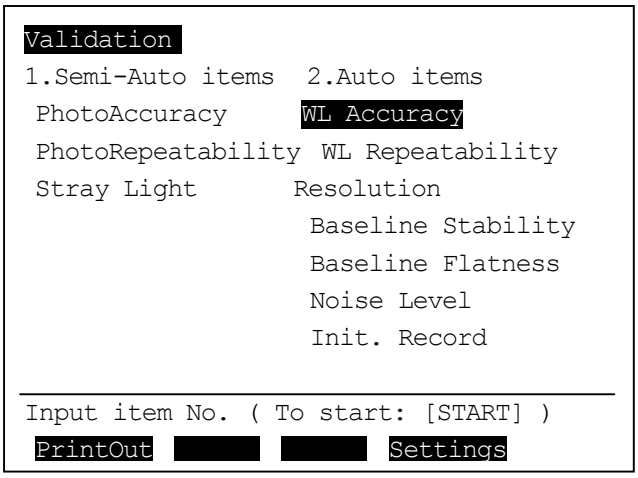


Fig.3-1 Instrument validation screen

3.2.2 Inspection Settings

1) Press the [F4] key **Settings** at the instrument validation screen to display the settings screen for inspections.
2) Press the [1] key to enable input of password. A password can be input in instrument validation to prevent unauthorized changing of validation parameters.
3) Press the [2] key to switch auto print ON and OFF. If auto print is set to ON, inspection results and data will be automatically printed out when validation inspection items are implemented. Set this to ON for performance checks.

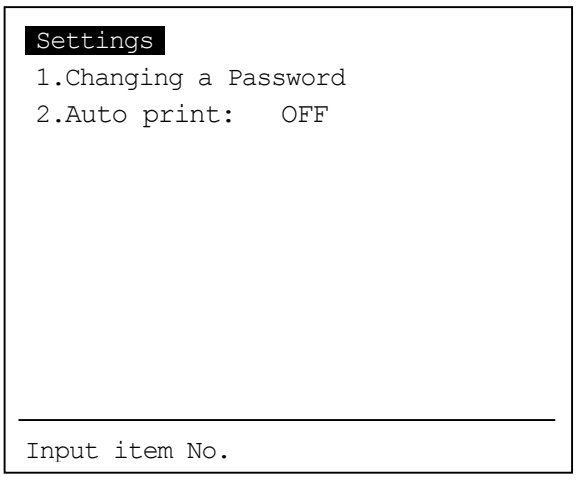


Fig.3-2 Inspection settings screen

3.2.3 Printout

Press the [F1] key **PrintOut** to printout the inspection results just obtained. Inspection results are stored in backup memory, so they will be saved even if the power is turned OFF. Note, however, that the printout function does not printout graph data such as spectrum and time course. To printout inspection results containing such graph data, set auto print to ON at the inspection settings menu (see item 3.2.2), and actually implement the inspections.

3.2.4 Semi-Auto Validations

1) Press the [1] key at the instrument validation screen (see Fig. 3-1). Now select **"1. Semi-auto items"**, the password screen will appear, so input the password (just press the [ENTER] key if a password is not required). The **"Settings of Semi-Auto items"** screen will be displayed.
2) Select one of the items (1 to 3) to enter the parameter settings screen for that inspection item. Setting changes to "Inspection: Yes/No", inspection parameters and pass criteria values can be made here (see inspection items for details).

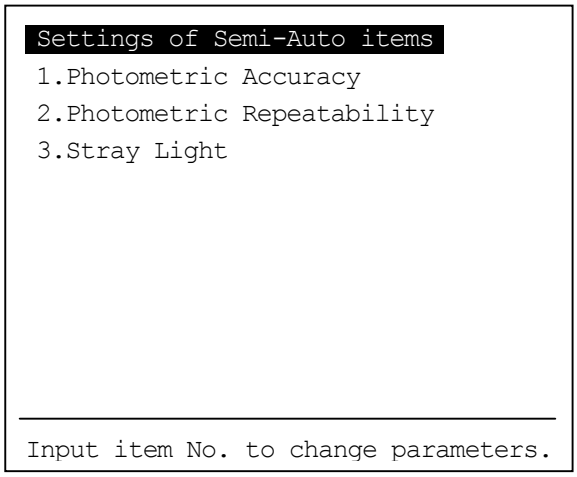


Fig.3-3 Semi-auto inspection parameter settings screen

3.2.5 Auto Validations

1) Press the [2] key in the instrument validation menu (see Fig. 3-1). Now select **"2. Auto items"**, the password screen will appear, so input the password (just press the [ENTER] key if a password is not required). The Settings of Auto items screen will be displayed.

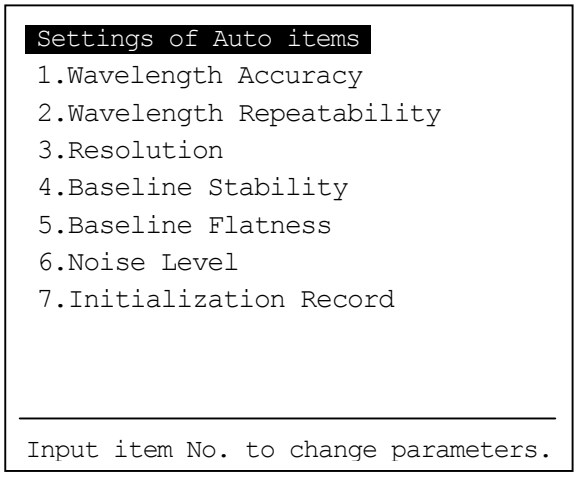


Fig.3-4 Auto inspection parameter settings screen

2) Select one of the items (1 to 7) to enter the parameter settings screen for that inspection item. Setting changes to “Inspection: Yes/No”, inspection parameters and pass criteria values can be made here (see inspection items for details).

Note

A password can be eliminated, when the administrator of UV-1700 forgets the password and does not put into the condition setting screen of Semi-Auto items / Auto items. Please perform “4.Data init. after battery change” from “3.Condition set” in the maintenance mode. However, since the following information stored in backup RAM will also be eliminated if “4.Data init. after battery change” is performed. Please be sure to acquire recognition of the administrator in advance.

* Instrument baseline correction data
* Measurement data memorized in file No.0 - 5
* Measurement parameter file memorized in No.1 - 14

3.3 ROM Check

Specification: Latest checksum value

[Checking Method]

1) Hold down the [F1] key and turn ON the power. Release the key once the buzzer beeps.
2) Initialization starts and the initialization menu will be displayed on the LCD.
3) The ROM checksum values will be displayed to the right of the ROM Check items. Check that they are the latest checksum values.
4) Press the [F1] key when initialization is complete to display the mode selection screen.

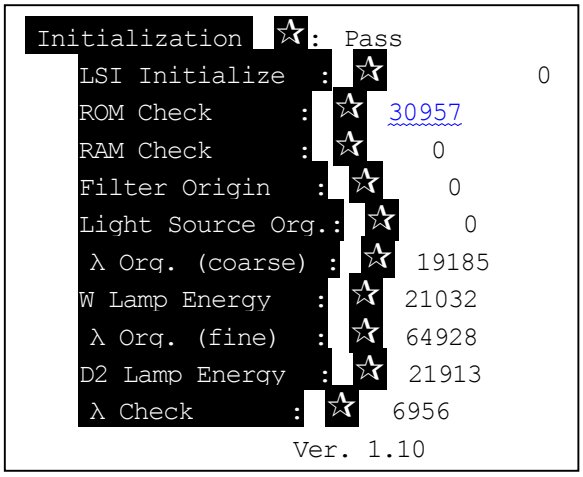


Fig.3-5 Initialization setting screen

Note

Activating the instrument while holding down the [F1] key sets the instrument validation measuring parameters and pass criteria values to the default settings, which are different to the normal parameters.

[Checksum Value]

UV-1700 Japanese		
Ver. No.	Checksum	Implementation period
1.10	16422	From 2001/3
1.20	15720	From 2001/6

UV-1700 English		
Ver. No.	Checksum	Implementation period
1.10	31765	From 2001/3
1.20	30957	From 2001/6

3.4 Wavelength Accuracy

In the case of the UV-1700, wavelength accuracy can be checked with the following two methods.

a) Method employing a D_2 lamp line (656.1nm, 486.0nm)

b) Method employing wavelength correction filter

Use method a) to check wavelength accuracy at time of installation.

Note that at time of shipping, wavelength is corrected using the Holmium oxide solution filter (NIST SRM2034, P/N 220-92917-01).This item explains the wavelength accuracy checking method using the Holmium oxide solution filter.

3.4.1 Method Employing a D_2 Lamp Line

Specification: Within ± 0.3nm

[Checking Method]

1) Press the [1] key at the auto items screen to display the wavelength accuracy parameter settings screen.
2) Set the parameters to match those shown in figure 3-6.

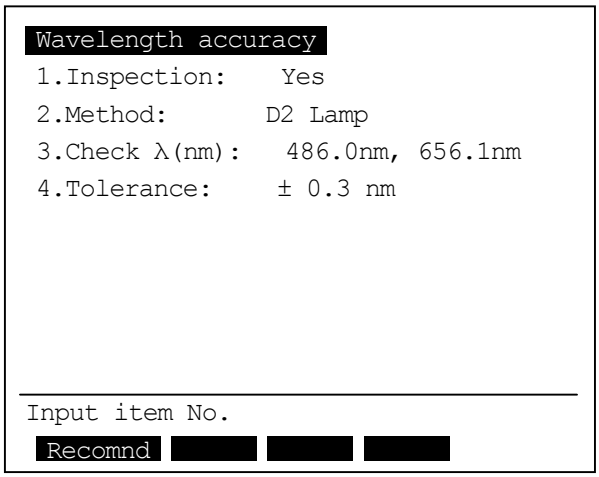


Fig. 3-6 Wavelength accuracy parameter settings screen 1

- **Inspection**

  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.

- **Method**

  Press the [2] key to open an interactive screen that enables selection of either “D2 Lamp” or “Filter”. Select “D2 Lamp”.

- **Check λ**

  The wavelength changes depending on settings for inspection method. When “D2 Lamp” is selected as the inspection method, the “486.0nm”, “656.1nm” or “Both” items can be selected by pressing the [3] key. Select the “Both” item.

- **Tolerance**

  Press the [4] key to enable input of pass criteria value. Input range is 0.1 to 0.9. Input “0.3”.

- **Recommended Value**

  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection followed by printout of results.
4) Check that wavelength accuracy is within ±0.3nm.

Note

With instrument validation, set inspection items will be automatically implemented in order. Setting (selecting "Yes" for) all of the parameters in the three items ("3.4 Wavelength Accuracy", "3.8 Baseline Flatness" and "3.9 Noise Level") in the acceptance procedures at time of installation makes inspections more convenient.

3.4.2 Method Employing Holmium Oxide Solution Filter

Specification: Within ±0.5nm (For NIST SRM2034)

Jig: Holmium oxide solution filter (NIST SRM2034, P/N 220-92917-01)

The Holmium oxide solution filter (NIST SRM2034, P/N 220-92917-01) is also used to check wavelength accuracy in addition to the Hg and D2 lamps at time of shipping of the UV-1700. This explanation is for the Holmium oxide solution filter.

Note

There are numerous Holmium oxide solution filters other than NIST SRM2034 that are used to correct the wavelength of the UV-1700. Validation accuracy varies depending on the type of Holmium filter used. Be sure to take into consideration the validation value accuracy of the filter being used.

* The validation value accuracy for NIST SRM2034 is ±0.1nm.
* Wavelength accuracy specification for NIST SRM2034(Within ±0.5nm) includes the error of peak pick function(±0.1nm).

[Checking Method]

1) Press the [1] key at the auto items screen to display the wavelength accuracy parameter settings screen.
2) Set the parameters to match those shown in figure 3-7.

- **Inspection**

  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.

- **Method**

  Press the [2] key to open an interactive screen that enables selection of either “D2 Lamp” or “Filter”. Select “Filter”.

- **Check λ**

  The wavelength changes depending on settings for inspection method. When “Filter” is selected as the inspection method, enter the wavelength in order by pressing the [3] key. Enter "0" and press the [ENTER] key to complete entry.

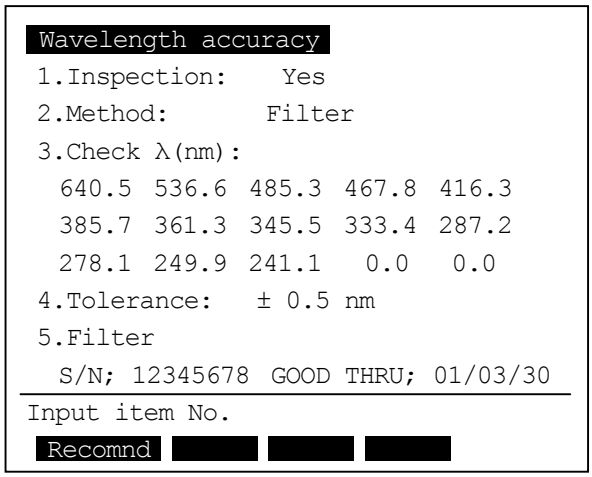


Fig. 3-7 Wavelength accuracy parameter settings screen 2

- **Tolerance**

  Press the [4] key to enable input of pass criteria value. Input range is 0.1 to 0.9. Input the “0.5” value. (±0.5nm includes the accuracy of NIST SRM2034(±0.1nm) and the accuracy of peak pick function(±0.1nm).)

- **Filter**

  Input the serial number (S/N) and expiration date for the correction filter to be used. A filter that has passed the expiration date cannot be used for an inspection.

- **Recommended Value**

  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection followed by printout of results.
4) Check that wavelength accuracy is within ±0.5nm.

3.5 Wavelength Repeatability

This checks wavelength repeatability by measuring the D_2 lamp line (656.1nm, 486.0nm) three times, and verifying the deviation between the average value and each individual measuring value.

Specification: Within ±0.1nm

[Checking Method]

1) Press the [2] key at the auto items screen to display the wavelength repeatability parameter settings screen.
2) Set the parameters to match those shown in figure 3-8.

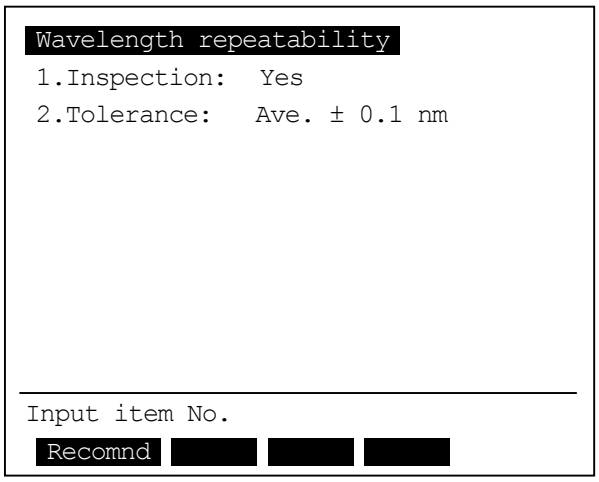


Fig.3-8 Wavelength repeatability parameter settings screen

- **Inspection**

  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.

- **Tolerance**

  Press the [2] key to enable input of pass criteria value. Input range is 0.1 to 0.9. Input “0.1”.

- **Recommended Value**

  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection followed by printout of results.
4) Check that wavelength repeatability is within ±0.1nm.

3.6 Resolution

This measures the 656.1nm line of the D_2 lamp, takes the peak half height width of the spectrum waveform, defines it as a resolution and checks that value.

Specification: 1.0nm or less

[Checking Method]

1) Press the [3] key at the auto items screen to display the resolution parameter settings screen.
2) Set the parameters to match those shown in figure 3-9.

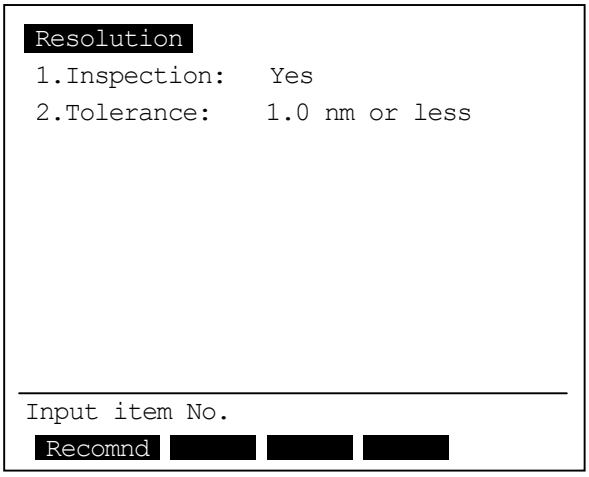


Fig.3-9 Resolution parameter settings screen

- **Inspection**

  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.

- **Tolerance**

  Press the [2] key to enable input of pass criteria value. Input range is 0.1 to 9.9. Input “1.0”.

- **Recommended Value**

  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection followed by printout of results.
4) Check that wavelength accuracy is within ±0.1nm.

3.7 Baseline Stability

This measures the time variation in the vicinity of zero absorption (0Abs) for the specified wavelength, and checks the hourly rate of variation.

Specification: Within 1.0mAbs/h (@700nm)

[Checking Method]

1) Press the [4] key at the auto items screen to display the baseline stability parameter settings screen.
2) Set the parameters to match those shown in figure 3-10.

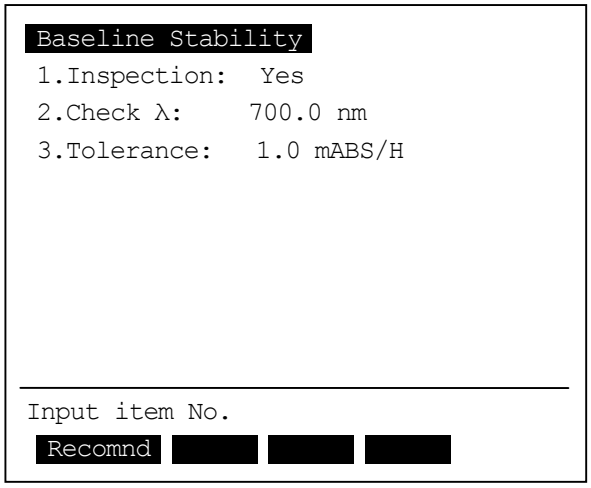


Fig.3-10 Baseline stability parameter settings screen

- **Inspection**
  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.
- **Check λ**
  Press the [2] key to enable input of wavelength to be measured for time variation. Input “700.0”.
- **Tolerance**
  Press the [3] key to enable input of pass criteria value. Input range is 0.0 to 99.9. Input the “1.0” value.
- **Recommended Value**
  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection followed by printout of results.
4) Check that baseline stability is within 1.0mAbs/h.

Note
To implement baseline stability inspection, the instrument power supply must be turned ON for at least one hour prior to inspection. A warning message will be displayed if one hour has not elapsed from when the power was turned ON.

3.8 Baseline Flatness

This corrects the baseline to a blank status at both the sample (S) and reference (R) sides of the sample compartment, measures the spectrum, and uses the amount of curve to check baseline flatness.

Specification: Within ±2mAbs (note that shock noise should be within 4mAbs)

[Checking Method]

1) Press the [5] key at the auto items screen to display the baseline flatness parameter settings screen.
2) Set the parameters to match those shown in figure 3-11.

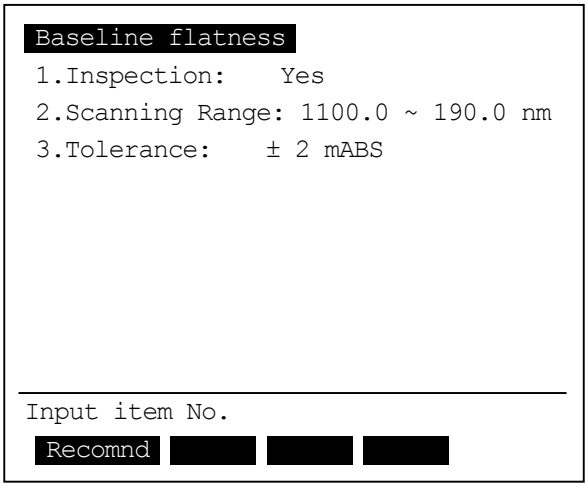


Fig.3-11 Baseline flatness parameter settings screen

- **Inspection**
  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.
- **Scanning Range**
  Press the [2] key to enable input of the wavelength scanning range to be measured for the spectrum measurement. Set to the "1100.0nm to 190.0nm" range.
- **Tolerance**
  Press the [3] key to enable input of pass criteria value. Input range is 1 to 99. Input the "2" value.
- **Recommended Value**
  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection followed by printout of results.
4) Check that baseline flatness is within ±2mAbs. Also, visually check spectrum to see that shock noise is within 4mAbs.

* Shock noise easily occurs at the following stray light cut filter switching wavelengths and light source switching wavelengths: 760nm, 536nm, 416nm, 365nm, 305nm, 340.8nm.

Note

To implement baseline flatness inspection, the instrument power supply must be turned ON for at least one hour prior to inspection. A warning message will be displayed if one hour has not elapsed from when the power was turned ON.

3.9 Noise Level

This measures for one minute the time variation in the vicinity of zero absorption (0Abs) for the specified wavelength, and checks the P-P noise from that amplitude. It also calculates the RMS value from the one-minute data.

Specification: P-P Within 2mAbs (same for each wavelength)
RMS 0.2mAbs or less (@700nm)
0.3mAbs or less (@500nm)
0.4mAbs or less (@250nm)

[Checking Method]

1) Press the [6] key at the auto items screen to display the noise level parameter settings screen.
2) Set the parameters to match those shown in figure 3-12.

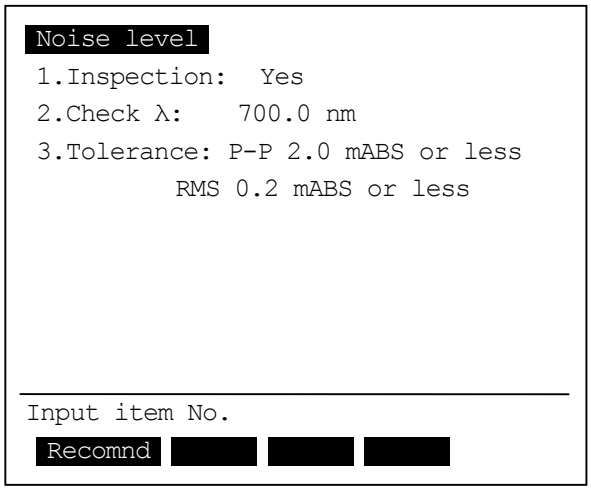


Fig.3-12 Noise level parameter settings screen

- **Inspection**
  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.
- **Check λ**
  Press the [2] key to enable input of wavelength to be measured for time variation. Input “700.0”.
- **Tolerance**
  Press the [3] key to enable input of pass criteria value. Input range is 0.0 to 99.9. Input “2” as the P-P value and “0.2” as the RMS value.
- **Recommended Value**
  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection followed by printout of results.
4) Set the inspection wavelength to 500nm and the RMS value of the pass criteria to within 0.3mAbs. And inspect the noise level.

5) Set the inspection wavelength to 250nm and the RMS value of the pass criteria value to within 0.4mAbs. And inspect the noise level.
6) Check that each inspection result conforms to the specification.

3.10 Photometric Accuracy

This measures the optic filter for transmittance correction, checks the deviation against the validation value and makes the result the photometric accuracy.
Check photometric accuracy using the semi-automatic inspection item in the instrument validation functions.

Specification: Within ±0.002Abs (vicinity of 0.5Abs)
Within ±0.004Abs (vicinity of 1.0Abs)

Jig: NIST substandard filter (P/N 755-03576)
CPS-240A (P/N 204-05837-01)

[Pre-inspection Preparation]

Bring the NIST substandard filter to a constant temperature.

1) Turn ON the power for the CPS-240A. Set temperature to 23.5°C.
2) Set the NIST substandard filter in the cell holder of the CPS-240A. Maintain the filter at a constant temperature.
   Cell position 1: None
   Cell position 2: 10%T (vicinity of 1Abs) filter
   Cell position 3: 30%T (vicinity of 0.5Abs) filter

Note
The NIST substandard filter must be maintained at 23.5°C during inspection because the measuring value varies with the temperature of the filter.

[Checking Method]

1) Press the [1] key at the semi-auto items screen to display the photometric accuracy parameter settings screen.
2) Set the parameters using those shown in figure 3-13 as reference.

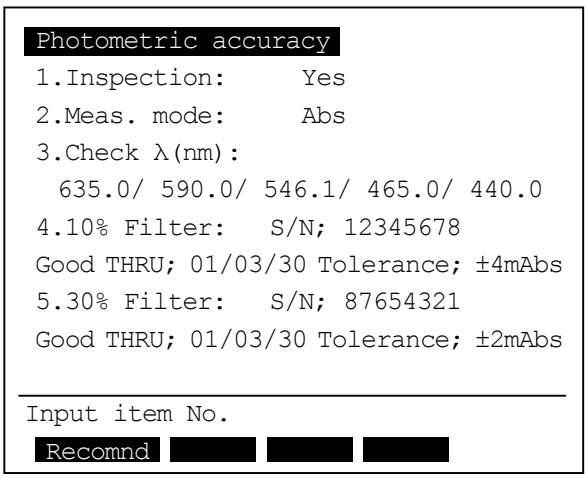


Fig.3-13 Photometric accuracy parameter settings screen

- **Inspection**

  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.

- **Meas. Mode**

  Each time the [2] key is pressed the " Abs/%T" will change together with validation value for the inspection filter and the pass criteria value. Use the "Abs" mode.

- **Check λ**

  Specify the inspection wavelength for measuring the photometric value. Input the inspection wavelength for the filter to be used in the inspection. Here, five wavelengths (635.0nm, 590.0nm, 546.1nm, 465.0nm and 440.0nm) can be used.

- **10% Filter and 30% Filter**

  Set the serial number (S/N), expiration date, pass criteria value and validation value for each inspection wavelength for the inspection filter to be used. A detailed explanation is given in the next item.

- **Recommended Value**

  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [4] key and [5] key to display each inspection filter parameter settings screen. This explanation takes the 10% filter as the example. (The setting contents for the 30% filter are the same.)

- **Serial No.**

  Input the serial number for the inspection filter. The digits 0 to 9 can be used and a number of up to eight digits can be composed.

- **Good THRU**

  Set the expiration date of the inspection filter. A filter that has passed the expiration date cannot be used for an inspection.

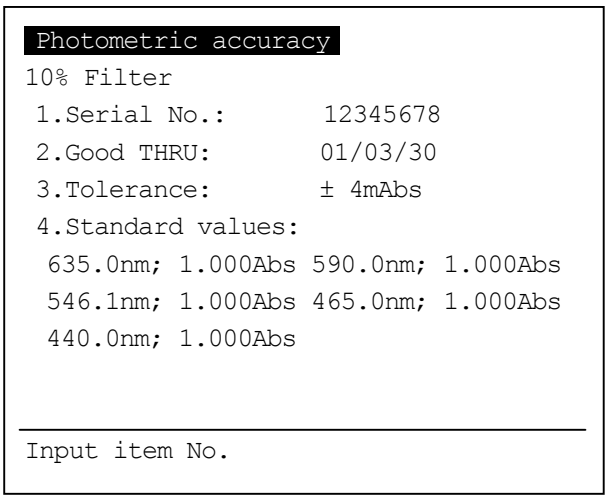


Fig.3-14 10% filter parameter settings screen

- **Tolerance**

  Set the pass criteria value. With the Abs (absorbance) mode, the setting range is "1 to 99mAbs". With the %T (transmittance) mode, the setting range is "0 to 99%T".

- **Standard Values**

  Input the validation value attached to each inspection filter.

4) Return to the instrument validation screen.
5) With the filter set, load the CPS-240A (kept at a constant temperature) into the sample compartment.
6) Check that the CPS-240A cell position is “Cell 1”, and press the [START] key to start inspection.
7) The semi-automatic photometric accuracy inspection will start and the baseline will be corrected. When the message asking for the 10% filter to be set is displayed on screen, use the CPS-240A controller to set cell position to “Cell 2”. Press the [START] key and measure the 10% filter.
8) When the message asking for the 30% filter to be set is displayed on screen, set cell position to “Cell 3”. Press the [START] key and measure the 30% filter.
9) Check that inspection result conforms to the specification.

3.11 Photometric Repeatability

This repeatedly measures three times the photometric value that occurs in the specified wavelength of the optic filter for transmittance correction, and determines the deviation between the average value and each individual measuring value to check photometric repeatability.

Specification: Within ±0.001Abs (vicinity of 0.5Abs)
Within ±0.002Abs (vicinity of 1.0Abs)

Jig: NIST substandard filter (P/N 775-03576)

[Checking Method]

1) Press the [2] key at the semi-auto items screen to display the photometric repeatability parameter settings screen.
2) Set the parameters using those shown in figure 3-15 as reference.

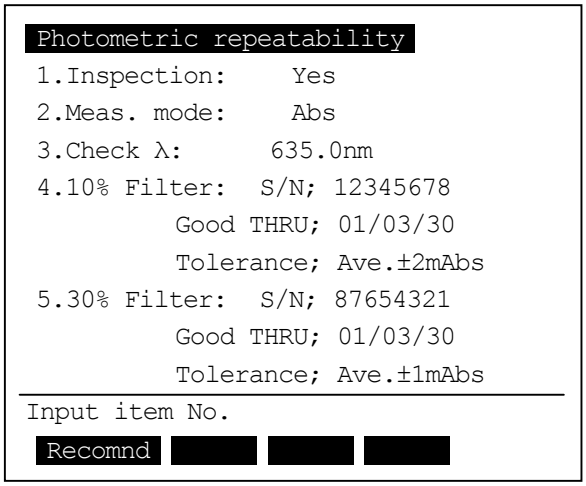


Fig.3-15 Photometric repeatability parameter settings screen

- **Inspection**
  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.
- **Meas. Mode**
  Each time the [2] key is pressed the " Abs/%T" will change together with pass criteria value for the inspection filter. Use the “Abs” mode.
- **Check λ**
  Specify the inspection wavelength for measuring the photometric value. Use the 635.0nm wavelength.
- **10% Filter and 30% Filter**
  Set the serial number (S/N), expiration date, pass criteria standard value.
- **Recommended Value**
  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection. Take out and put in inspection filters in accordance with screen instructions. Results will be printed out when the inspection is completed.
4) Check that the results conform to the specifications.

3.12 Stray Light

Stray light is defined as (light intensity of a wavelength other than the set wavelength)/(light intensity of set wavelength). Here, the transmittances at 220nm of sodium iodide aqueous solution (10g/l) and at 340nm of sodium nitrite aqueous solution (50g/l) or a UV-39 filter are determined, and the amount of stray light in each wavelength checked.

Specification: Less than 0.04% (for both 220nm and 340nm)

Jig: Shutter block (P/N 202-30338)

Cell containing sodium iodide aqueous solution (NaI)

Cell containing sodium nitrite aqueous solution ($NaNo_2$)

[Checking Method]

1) Press the [3] key at the semi-auto items screen to display the stray light parameter settings screen.
2) Set the parameters using those shown in figure 3-16 as reference.

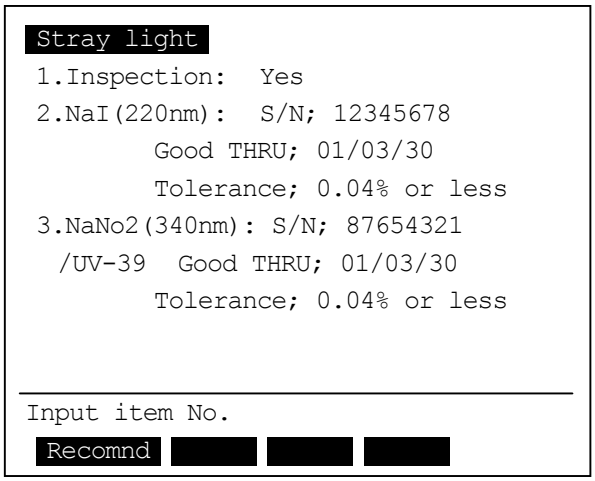


Fig.3-16 Stray light parameter settings screen

- **Inspection**

  Each press of the [1] key selects (Yes) or deselects (No) the inspection. Set inspection to the "Yes" item.

- **NaI (220nm)**

  Set the serial number (S/N) and expiration date for the sodium iodide aqueous solution, and set the pass criteria value for the amount of stray light at the 220nm wavelength.

- **NaNo2 (340nm) / UV-39**

  Set the serial number (S/N) and expiration date for the sodium nitrite aqueous solution, and set the pass criteria value for the amount of stray light at the 340nm wavelength.

- **Recommended Value**

  The pass criteria value can be set to a recommended value. Do not use this item at this point.

3) Press the [RETURN] key twice to return to the instrument validation screen. Now press the [START] key to implement inspection. Take out and put in inspection samples in accordance with screen instructions. Results will be printed out when the inspection is completed.
4) Check that the results conform to the specifications.

Chapter 4

Acceptance Procedures

This chapter details the acceptance procedures for the UV-1700.

4.1 Acceptance Procedures

4.1 Acceptance Procedures

Check these together with the customer to see that the specifications are fulfilled for the following items after installing the UV-1700.

<table>
<tr><th>Item</th><th>Inspection Method and Results</th><th>Specification</th><th>Check</th></tr>
<tr><td>1.Installation</td><td>Main unit installation site conditions must be fulfilled.</td><td>See “2.2 Selection of Installation Site”.</td><td>☐</td></tr>
<tr><td>2.External appearance check</td><td>Check to see whether or not damage has occurred.</td><td>Make sure that there are no defects that might impair functions.</td><td>☐</td></tr>
<tr><td>3.Inspection of standard contents</td><td>Inspect parts.</td><td>See “2.1 Inspection of Parts” .</td><td>☐</td></tr>
<tr><td>4.Check of adjustment functions and operation</td><td>Check the following functions and operations.
1) Check ROM.
2) Check that LCD brightness can be adjusted using the Contrast knob on the right side of the main unit.
3) Turn ON the power switch and check that initialization ends correctly.
4) Check that each key of the keyboard operates correctly.</td><td>Make sure that these are correct.</td><td>☐</td></tr>
<tr><td>5.Wavelength accuracy</td><td>Use the validation check functions to check wavelength accuracy in the spectral line wavelength of a D_2 lamp.
<table><tr><th>D_2 bright line</th><th>Measuring value (nm)</th><th>Error (nm)</th></tr><tr><td>486.0nm</td><td></td><td></td></tr><tr><td>656.1nm</td><td></td><td></td></tr></table></td><td>Within ±0.3nm</td><td>☐</td></tr>
</table>

<table>
<tr><td>6.Baseline flatness</td><td>Use the validation check functions to determine baseline flatness.</td><td>Baseline flatness:
Within ±0.002Abs

Shock noise:
Within 0.004Abs</td><td>☐</td></tr>
<tr><td>7.Noise level</td><td>Use the validation check functions to determine noise level.<table><tr><td>700nm</td><td>500nm</td><td>250nm</td></tr><tr><td>P-P</td><td>P-P</td><td>P-P</td></tr></table></td><td>P-P: Within 0.002Abs</td><td>☐</td></tr>
<tr><td>8.Handling explanation</td><td>Explain how the instrument is used in accordance with the instruction manual. (Provide operation training.)</td><td>Explain the basic operations</td><td>☐</td></tr>
</table>

Chapter 5

Periodical Check

This chapter explains the periodical checks for the UV-1700. Recommend these periodical checks to customers for safe, prolonged use of the instrument.

5.1 Daily Checks

5.1.1 Cooling Fan Operation Check

Check that the cooling fan on the left side of the main unit is operating. If the cooling fan is not working, the light source compartment will overheat, the safety unit (temperature switch) will activate and the WI lamp will not light up. Note, also, that instrument overheating may cause a breakdown.

5.1.2 Sample Compartment Floor Check

If liquid samples are frequently handled, remove spilt samples from the floor of the sample compartment before and after analysis. Gas evaporation from spilt samples corrodes the inside of the sample compartment and may cause errors in measuring results.

5.2 Monthly Checks

5.2.1 Performance Checks

- **Baseline Flatness Check**

  Use the validation functions (see item 3.8) to check baseline flatness. If the baseline is abnormal (the curve is greater than ±0.002Abs), correct the baseline (see item 2.4).

- **Wavelength Accuracy Check**

  Use the validation functions (see item 3.4.1) to check wavelength accuracy. If the wavelength accuracy does not conform to the specification (within ±0.3nm), the wavelength must be re-corrected.

5.2.2 Light Source Check

The average lifespan of the WI lamp is 2000 hours and the D_2 lamp is 500 hours. As a lamp nears the end of its lifespan, brightness decreases and signal noise increases. The remaining lamp lifespan can be checked at the maintenance screen. If a lamp has exceeded its average lifespan, replace it. After replacing a lamp, go to the maintenance screen, press the [3] key to display the interaction screen and reset the lighting time.

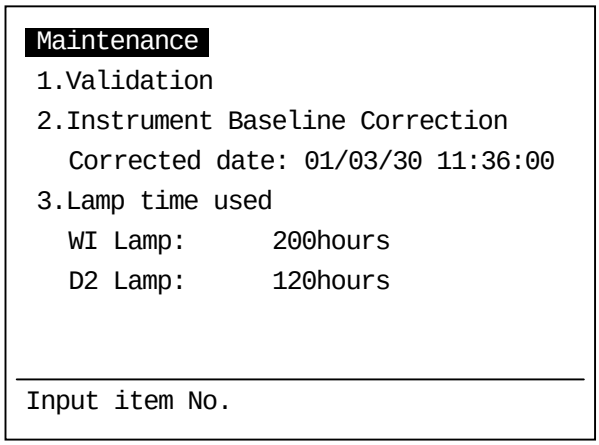


Fig.5-1 Maintenance screen

Chapter 6

Troubleshooting

This chapter explains the troubleshooting method for the UV-1700.

6.1 An Error Occurs During Initialization

Error Items	Probable Cause	Action
ROM Check	- ROM chip defective - ROM content destroyed	Replace ROM
	- ROM pin broken	Repair pin
	- ROM socket defective - ROM socket solder defective	Replace CPU PCB
RAM Check	- Insufficient backup battery voltage	Replace battery
	- RAM chip defective	Replace CPU PCB
Light Source Org.	- Contact failure of origin detection photosensor connector - Light source motor connector connection defective	Repair connector
	- Photosensor for origin detection defective	Replace photosensor
	- Light source motor defective	Replace motor
	- Motor drive circuit defective	Replace CPU PCB
λ Org. (coarse)	- Origin detection photosensor connector connection defective - Wavelength motor connector connection defective	Repair connector
	- Origin detection photosensor defective	Replace photosensor
	- Wavelength motor defective	Replace motor
	- Motor drive circuit defective	Replace CPU PCB

Error Items	Probable Cause	Action
W Lamp Energy	When WI lamp does not light up - WI lamp defective	Replace lamp
	- WI lamp lighting circuit defective	Replace power PCB (PCB ASSY, POWER) or CPU PCB
	- Cable broken	Replace cable
	When WI lamp lights up - Lamp energy loss	Replace lamp
	- Light source position defective	Adjust light source mirror and lamp positions
	- Preamplifier defective	Replace preamplifier PCB
	- A/D converter defective	Replace CPU PCB
λ Org. (fine)	WI lamp's zero-order light energy counter indicates below 1,000 - Lamp energy loss	Replace lamp
	- Light source position defective	Adjust light source mirror and lamp positions
	- Preamplifier defective	Replace preamplifier PCB
	- Stray light cut filter defective	Replace filter ASSY, check for cable breaks and connector contact
D2 Lamp Energy	When D_2 lamp does not light up - D_2 lamp defective	Replace lamp
	- D_2 lamp lighting circuit defective	Replace power PCB (PCB ASSY, POWER) or CPU PCB
	- Cable broken	Replace cable
	When D_2 lamp lights up - Lamp energy loss	Replace lamp
	- Light source position defective	Adjust light source and mirror positions
	- Preamplifier defective	Adjust preamplifier PCB
	- A/D converter defective	Replace CPU PCB

Error Items	Probable Cause	Action
λ Check	The 656.1nm line cannot be detected (energy value is 425 or less) - Lamp energy loss	Replace lamp
	- Light source position defective	Adjust light source mirror and lamp positions
	- Preamplifier defective	Replace preamplifier PCB
	- Stray light cut filter defective	Replace filter ASSY, check for cable breaks and connector contact

6.2 Baseline Flatness Exceeds Specification

Probable Cause	Action
- Instrument baseline correction has not been performed.	Correct instrument baseline
- Baseline correction has not been performed.	Correct baseline
- Status has changed since instrument baseline was corrected. Or instrument baseline has not been corrected for a long time.	Correct instrument baseline
- Sample compartment floor is littered with spilt sample solution.	Clean interior of sample compartment
- Sample compartment windowpane is dirty (finger prints, etc.).	Clean windowpane
- Stray light cut filter function defective	Replace or adjust filter ASSY
- Optical axis defective	Readjust optical axis
- CPU PCB defective	Replace CPU PCB

6.3 Noise Level Exceeds Specification

Probable Cause	Action
- Light is not passing through slit correctly.	Repair light source switching unit
- Light source lifespan expiration.	Replace lamp
- Light source mirror deterioration	Replace light source mirror
- Optical system is dirty.	Clean or replace parts
- Stray light cut filter deterioration	Replace filter
- Optical axis defective	Readjust optical axis
- Preamplifier defective	Replace preamplifier PCB
- CPU PCB defective	Replace CPU PCB
- Mobile phone being used near instrument.	Refrain from using mobile phone
- Charged body on left side of instrument (vicinity of preamplifier)	Move away charged body

6.4 Wavelength Accuracy Exceeds Specification

Probable Cause	Action
- Sample, etc., is set in cell holder.	Empty sample compartment
- Wavelength drive motor defective	Replace or readjust motor
- CPU PCB defective	Replace CPU PCB

6.5 Wavelength Repeatability Exceeds Specification

Probable Cause	Action
- Wavelength drive motor defective	Replace or readjust motor
- Optical system loose	Readjust

Chapter 7

Parts Replacement

This chapter explains the parts replacement of UV-1700.

7.1 Main Unit Cover Removal

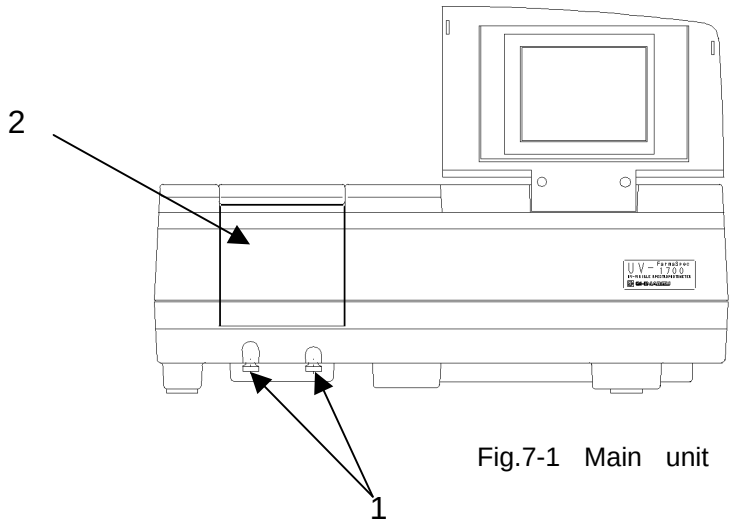


Fig.7-1 Main unit

1) Loosen screws (1), and remove sample compartment unit.

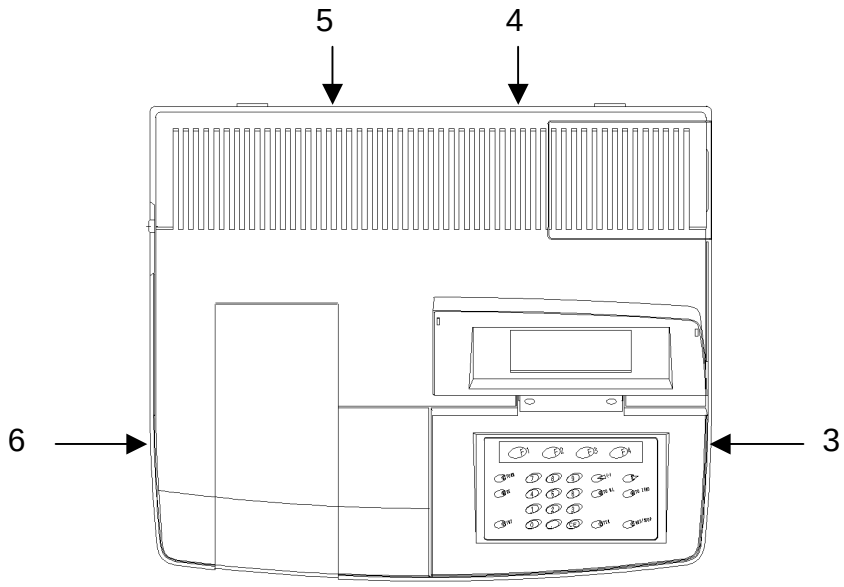


Fig. 7-2 Main unit (top)

2) Remove cover screws (3 to 6).

3) Slightly raise the rear of the cover, slide the entire cover forward and lift up to remove.

Note

A console PCB is mounted to the cover. This board is connected to the main unit, so be careful about the cable when removing the cover.

7.2 Console PCB Removal

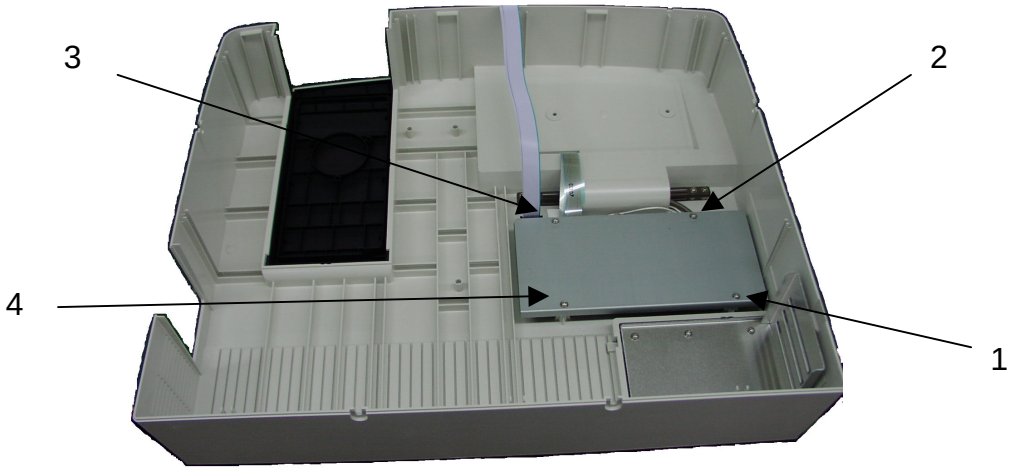


Fig.7-3 Inside of cover unit

1) Remove the main unit cover and place on the workbench with the inside of the cover showing.
2) Remove the four screws (1-4) holding the console PCB.
3) Disconnect the three wiring connectors connected to the console PCB. And remove the board.

7.3 Preamplifier PCB Removal

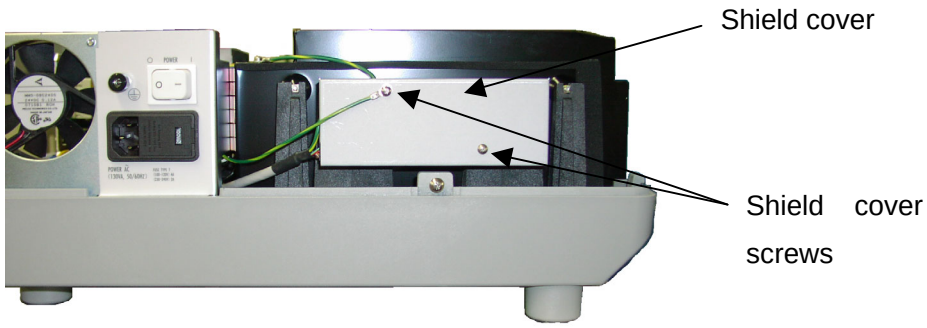


Fig.7-4 Preamp PCB Removal

1) Remove main unit cover.
2) Remove preamplifier PCB shield cover.
3) Disconnect wiring connectors connected to preamplifier PCB.
4) Remove the two screws holding the preamplifier PCB. And remove PCB.

7.4 Power PCB Removal

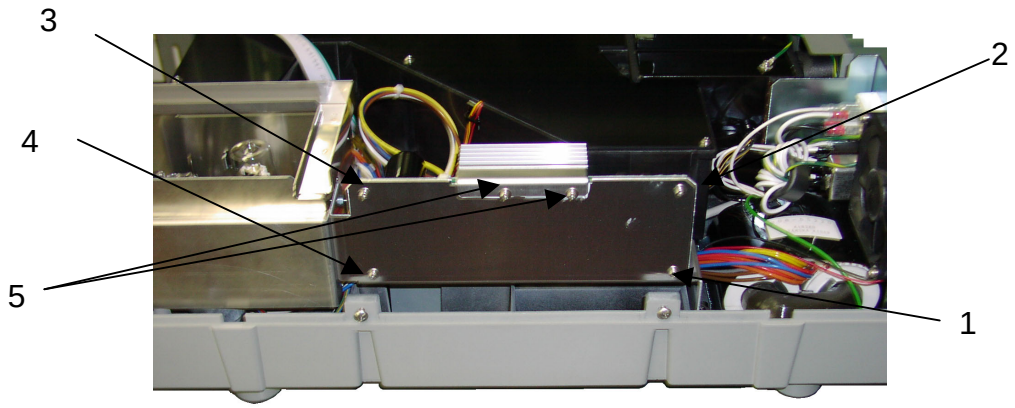


Fig.7-5 Power PCB Removal

1) Remove main unit cover.

2) Remove screws in locations 1 to 4. Loosen screws 5 and 6, and remove power PCB.

7.5 CPU PCB Removal

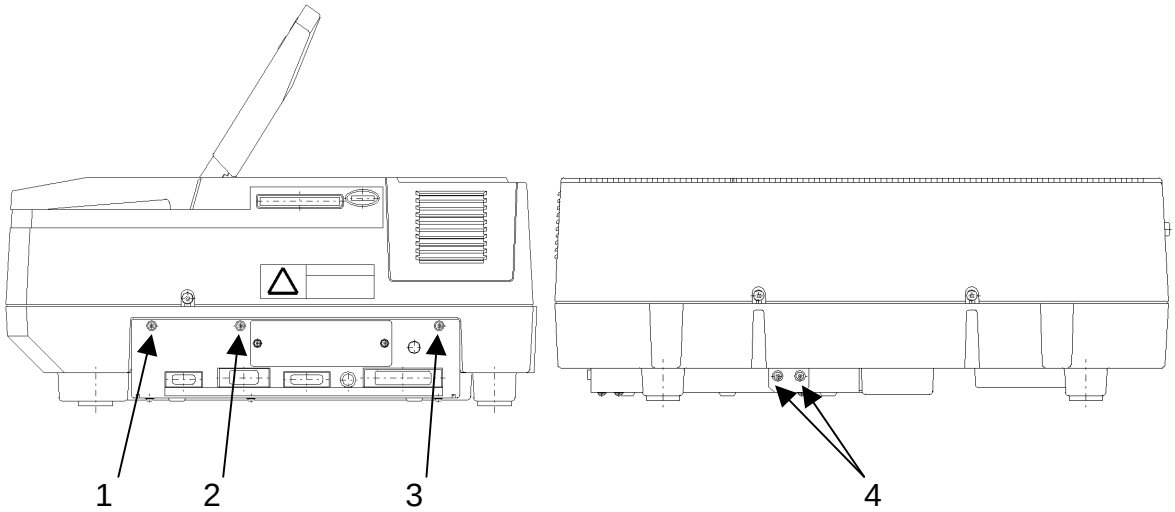


Fig.7-6 CPU PCB Removal

1) Remove screws in locations 1 to 4. Pull out unit with CPU PCB from the right side of the main unit.

2) Disconnect all connectors connected to the CPU PCB.

3) Remove the screws holding the CPU PCB. And remove the CPU PCB.

7.6 ROM Replacement

1) Pull out CPU PCB from right side of main unit (see item 1 of 7.5).
2) Remove and replace ROM OB 1700 (P/N 206-55221-92), ROM MODE 1700 (P/N 206-55222-92).

Note

With the UV-1700, ROM MODE 1700 contains adjusting information such as wavelength tables (this is contained on a separate EEPROM in the case of the UV-1600). There is a copy of this information in the backup RAM, which is written to the new ROM when instrument power is turned ON after ROM replacement. Therefore, instrument readjustment is not needed after ROM replacement.

Note, however, that backup battery problems, etc., may lead to incorrectly stored data in the backup RAM, so data renewal may be incorrect. Check that the backup RAM data is correct before replacing ROM.

7.7 Battery Replacement

Backup RAM stores data using a battery (CR2032, P/N 074-73307-01) even when the instrument power is OFF. Replace the battery using the following procedure if it is exhausted.

1) Pull out CPU PCB from right side of main unit (see item 1 of 7.5).
2) Remove old battery. And load new one.
3) Correctly replace CPU PCB.
4) Hold down the [START] key and turn ON instrument power. Release the [START] key when the buzzer beeps.
5) The instrument starts up in maintenance mode (see Fig. 7-7). Select **"3. Condition set"** at this screen.
6) Select **"4. Data init. after battery change"** at the condition set screen.

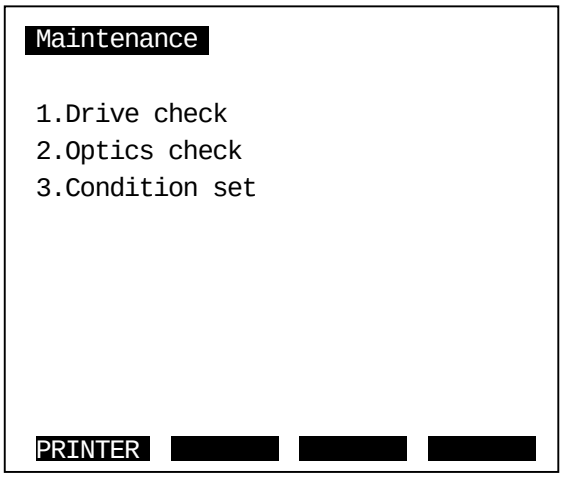


Fig.7-7 Maintenance mode screen

7) A message will ask you if you really want to rewrite. Press the [START] key to select the “Yes” item. Press any other key to select the “No” item. Here, press the [START] key to initialize the RAM.1)

8) Turn OFF instrument power.

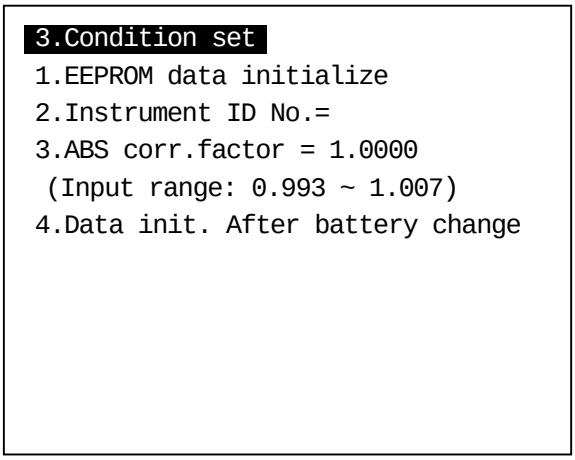


Fig.7-8 Condition set screen

Chapter 8

Adjustment Procedures

This chapter explains adjustment methods mainly for the optical system of the UV-1700.

8.1 Jigs and Tools Required

8.1.1 Jigs

1) Target ruling (H = 39.8mm) P/N 775-05135
2) Adjusting jig mirror (for S side) P/N 775-06865-02
3) Optical axis adjustment plate P/N 775-06116
4) Adjusting jig (H = 40mm) P/N 775-04313-11
   *Optical axis adjustment plate included
5) Mercury lamp holder P/N 206-55895-92
   * ASSY with lamp (see No. 6) P/N 206-55895-91
6) Mercury lamp, L5630 P/N 062-65048
7) Adjusting jig slit P/N 206-55408
8) Holmium oxide solution filter P/N220-92917-01 * NIST FILTER SRM2034
9) Multicell (6-cells) sample compartment P/N206-69160 * Not a necessity

8.1.2 Tools

1) Phillips screwdriver
2) L-type hexagonal wrench (for M4 setscrews)
3) L-type hexagonal wrench (for M3 setscrews)
4) Nut driver (for M3 nuts)
5) Nut driver (for M4 nuts)
6) UV protective goggles
7) White gloves
8) White card like a business card, etc.
9) Blackout curtain

8.2 Before Starting Adjustment

8.2.1 Launching Maintenance Mode

Launch the maintenance mode using the following operation.

1) Hold down the [START] key and turn ON the main unit power. Release the [START] key when the buzzer beeps.
2) The sound of stray light cut filter origin detection can be heard after approximately five seconds. And the top menu of the maintenance mode will be displayed.
3) Turn OFF the main unit power after using the maintenance mode.
4) To perform normal measuring, turn ON the power again and wait for initialization to end.

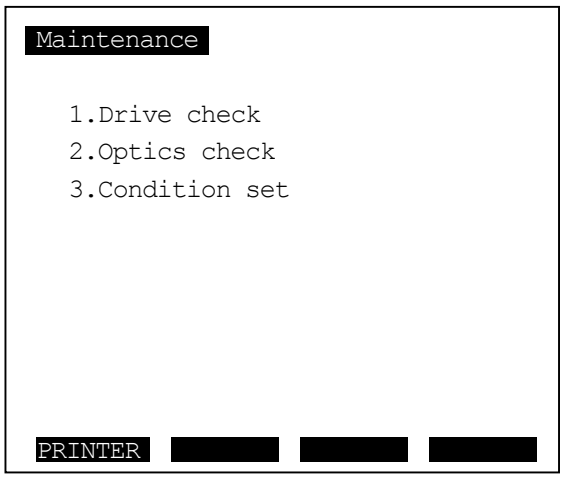


Fig.8-1 Maintenance mode screen

- **PRINTER [F1] key**

  Select the printer type connected to the UV-1700. And set the “Yes”/”NO” items for date inclusion and function key inclusion settings.

8.2.2 Outline of Drive System Check

Select **“1. Drive check”** at the top menu screen to display the menu shown in Fig. 8-2. Each motor’s operation can be checked and stray light cut filter offset input can be done at this screen.

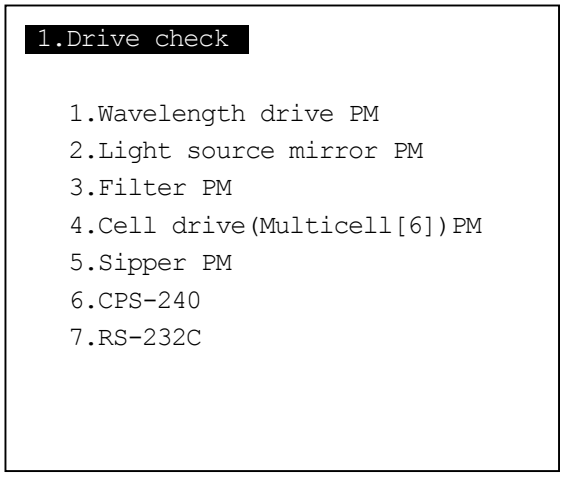


Fig.8-2 Drive check screen

(1) Wavelength Drive PM

Select this item to rotate the grating. This is used to adjust the grating unit and move the line on the exit slit. It cannot be used to set special wavelengths.

Press the [1] key to select wavelength drive PM. Function keys will be displayed at the bottom of the screen.

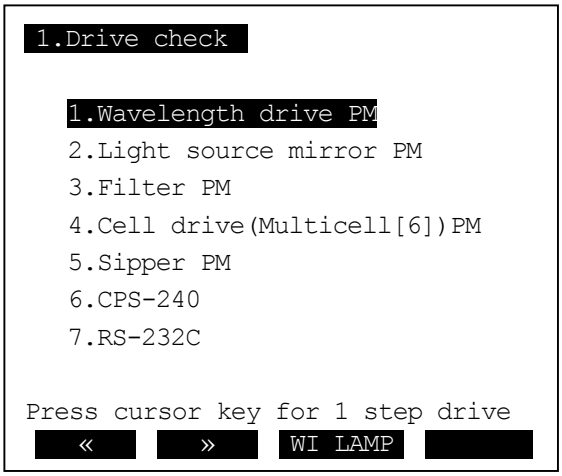


Fig.8-3 Wavelength drive PM screen

- **<< [F1] key**

  Press this to move the grating at high speed in the direction of short wavelength. Press this again to halt the movement.

- **>> [F2] key**

  Press this to move the grating at high speed in the direction of long wavelength. Press this again to halt the movement.

- **WI LAMP [F3] key**

  Press this to light up the WI lamp. Press this again to extinguish the lamp.

Press the [RETURN] key to return to the drive check screen.

(2) Light Source Mirror PM

Use this to operate the light source switching mirror of the light source unit.

Press the [2] key to select light source mirror PM. Function keys will be displayed at the bottom of the screen.

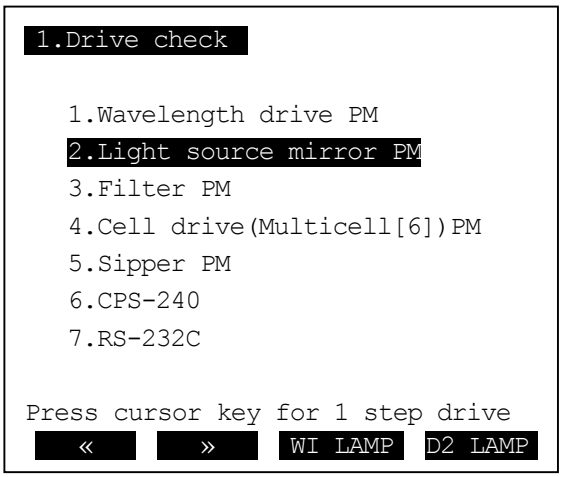


Fig.8-3 Light source mirror PM screen

- **<< [F1] key**
  Press this to move the grating at high speed in the direction of short wavelength. Press this again to halt the movement.
- **>> [F2] key**
  Press this to move the grating at high speed in the direction of long wavelength. Press this again to halt the movement.
- **WI LAMP [F3] key**
  Press this to light up the WI lamp. Press this again to extinguish the lamp.
- **D2 LAMP [F4] key**
  Press this to light up the D2 lamp. Press this again to extinguish the lamp.

Press the [RETURN] key to return to the drive check screen.

(3) Filter PM

Use this to operate the stray light cut filter and memorize filter positions.

Press the [3] key to select the "Filter PM." Function keys will be displayed at the bottom of the screen.

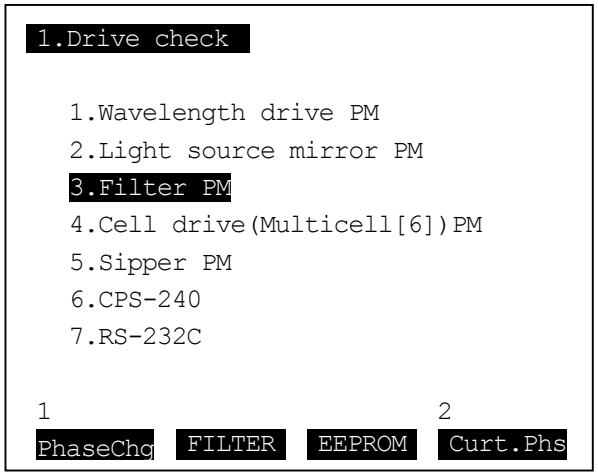


Fig.8-5 Filter PM screen

- **PhaseChg [F1] key**
  Use this to select the phase (1 to 7) for stepping motor. (Fig. 8-5 shows phase 1 as being selected.)
- **FILTER [F2] key**
  Use this to select filters (filters are displayed in order).
- **EEPROM [F3] key**
  Use this to memorize the currently selected stepping motor phase in EEPROM.
- **Curt. Phs [F4] key**
  The stepping motor phase currently memorized in EEPROM is displayed above.

Press the [RETURN] key to return to the drive check screen.

(4) Cell Drive (Multicell [6] PM)

Use this to operate the special accessory multicell holder.

Press the [4] key to select the cell drive (multicell [6]) PM. Function keys will be displayed at the bottom of the screen.

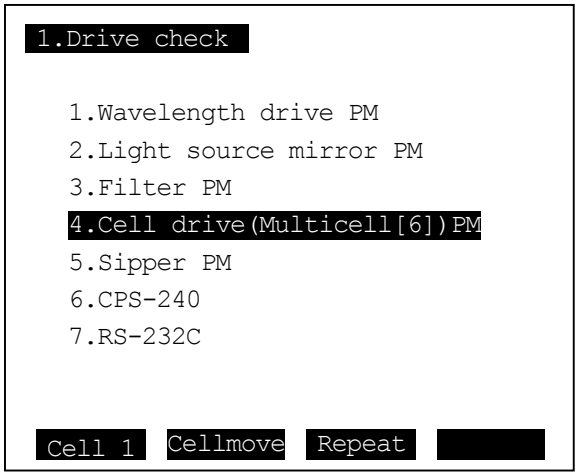


Fig.8-6 Cell drive PM screen

- **Cell 1 [F1] key**

  Use this to move the 1st cell holder over the beam on the sample side.

- **Cellmove [F2] key**

  Use this to move cell holders in order.

- **Repeat [F3] key**

  Use this to repeat the cell movement operation.

Press the [RETURN] key to return to the drive check screen.

(5) Sipper PM

Use this to operate the special accessory sipper.

Press the [5] key to select sipper PM. Function keys will be displayed at the bottom of the screen.

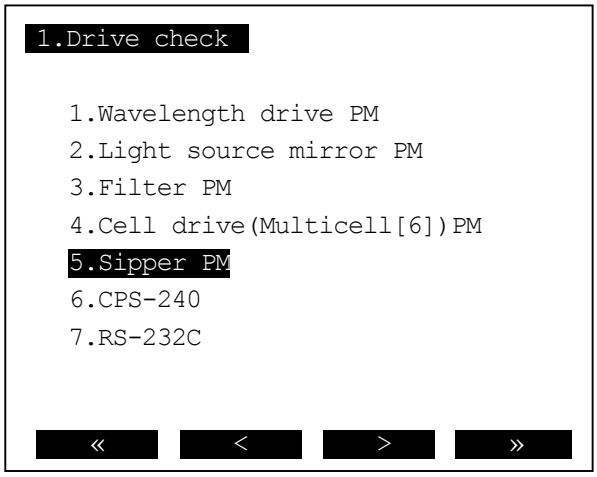


Fig.8-7 Sipper PM screen

- **<< [F1] key**

  Use this to rotate sipper at high speed in the forward direction.

- **< [F2] key**

  Use this to rotate sipper at slow speed in the forward direction.

- **> [F3]key**

  Use this to rotate sipper at slow speed in the reverse direction.

- **>> [F4] key**

  Use this to rotate sipper at high speed in the reverse direction.

Press the [RETURN] key to return to the drive check screen.

(6) CPS-240

Use this to move the cell holder of the special accessory CPS-240 and check the cell position utilizing zero-order light.

Press the [6] key to select CPS-240. Function keys will be displayed at the bottom of the screen.

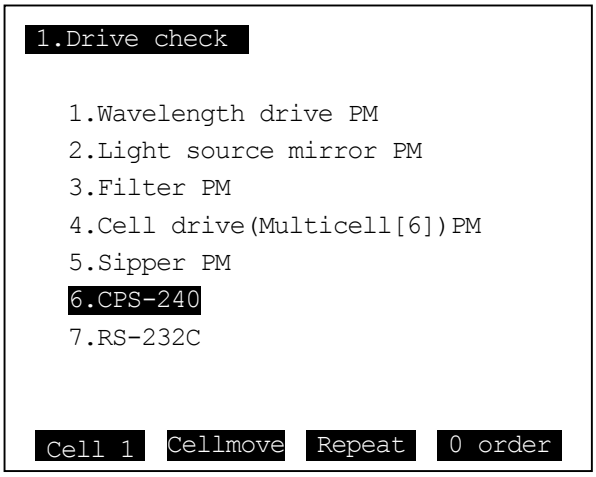


Fig.8-8 CPS-240 PM screen

- **Cell 1 [F1] key**
  Use this to move the 1st cell holder over the beam of the sample side.
- **Cellmove [F2] key**
  Use this to move the cell holders in order.
- **Repeat [F3] key**
  Use this to repeat cell movement.
- **0 order [F4] key**
  Use this to detect zero-order light.

Press the [RETURN] key to return to the drive check screen.

(7) RS-232C

This function tests the RS-232C port. (This function was added from ROM Ver. 1.20.)
It is not used in adjustment.

8.2.3 Outline of Optical System Check

Select **"2. Optics check"** at the top menu screen to display the screen shown in Fig. 8-9. Use this to check zero-order light search point and D_2/Hg line wavelengths as well as for inputting offset values and checking resolution.

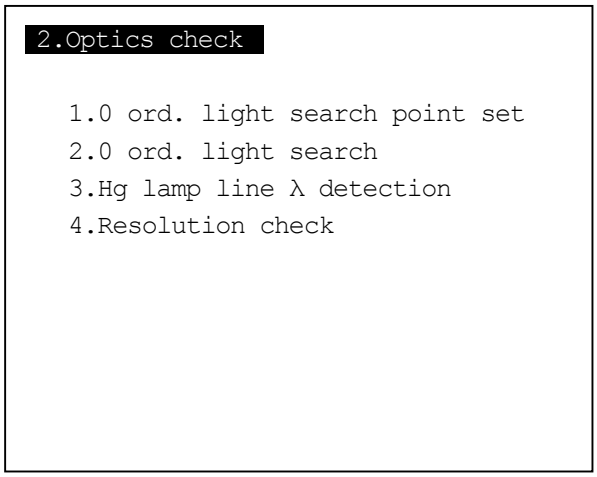


Fig. 8-9 Optics check screen

(1) 0 Ord. light search point set

With the UV-1700, zero-order light position is detected automatically. Note, however, that 0 ord. light search point must be set in order for a correct use of "2. 0 ord. light search". Use this item to set the search point using the zero-order light of the WI lamp. This position will be saved in EEPROM.

1) Press the [1] key to select zero-order light search point set.
2) After the WI lamp lights up, the grating will rotate, and after approximately two minutes function keys will be displayed at the bottom of the screen.

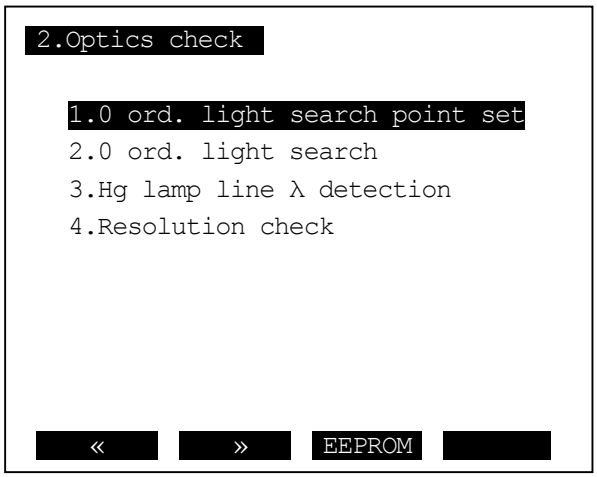


Fig. 8-10 Zero-order light search point set

- **<< [F1] key**

  Press this to move the grating at high speed in the direction of short wavelength. Press this again to halt the movement.

- **>> [F2] key**

  Press this to move the grating at high speed in the direction of long wavelength. Press this again to halt the movement.

- **EEPROM [F3] key**

  Press this to save zero-order light search point.

Press the [RETURN] key to return to the optic check screen.

(2) Zero-Order Light Search

Use this to check that the zero-order light is correctly detected for both the WI and D_2 lamps.

After setting the first item “1. 0 ord. light search point set”, check that the settings have been saved correctly. After setting, this item can be used to check the optical axis and the cell position when the sipper is mounted.

1) Place a blackout curtain over the entire optical system or mount the sample compartment unit and cover it.
2) Press the [2] key to select zero-order light search. The grating will rotate and zero-order light will be detected.
3) Once zero-order light is detected, function keys will be displayed at the bottom of the screen in approximately two minutes.

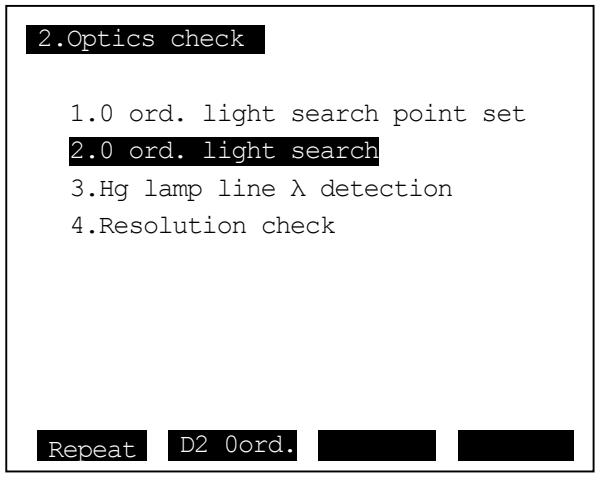


Fig. 8-11 Zero-order light search screen

- **Repeat [F1] key**
  Press this to repeat zero-order detection.
- **D2 0 ord. [F2] key**
  Press this to extinguish the WI lamp and light the D_2 lamp. Now zero-order light detection can be performed on the D_2 lamp.

Press the [RETURN] key to return to the optic check screen.

(3) Hg lamp line λ detection

The Hg and D_2 lamps are used to correct wavelength in addition to the Holmium oxide solution in UV-1700. Use this to check wavelength correction.

1) Press the [3] key at the optic check screen to select **"3. Hg lamp line λ detection"** (see Fig. 8-11).
2) "Hg lamp line λ detection" screen will be displayed. (see Fig.8-12)

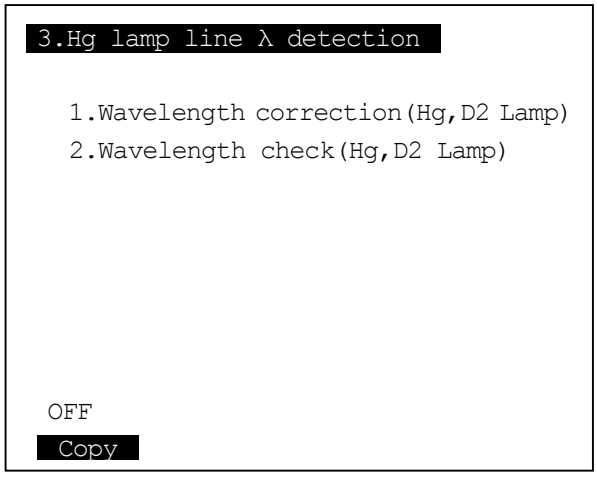


Fig. 8-12 Hg/D2 lamp line wavelength detection screen

- **1. Wavelength correction (Hg/D2)**
  This uses the Hg/D_2 lamp lines to consecutively perform first and second corrections.
- **2. Wavelength check (Hg/D2)**
  This measures the Hg/D_2 lamp lines and displays the margin of error.

- **Copy [F1] key**
  Each press of the [F1] key switches the display above the Copy function key between "ON" and "OFF". Select "ON" to printout data of each wavelength.

Press the [RETURN] key to return to the optic check screen.

(4) Resolution Check

Use this to check the peak half height width of the D_2 lamp line.

1) Press the [4] key at the optic check screen to select **"4. Resolution check"**.
2) The spectrometer is automatically initialized and gain adjusted (required time: approximately two minutes).
3) The D_2 lamp will light up.
4) The resolution check result will be displayed after approximately two minutes as shown in Fig. 8-13. In this example, the resolution is 0.7nm.

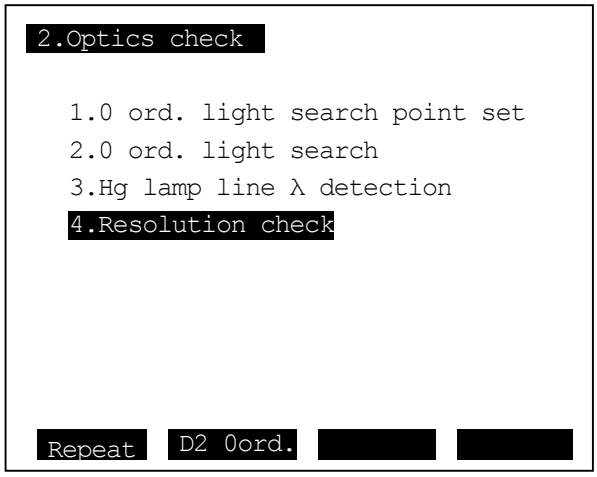


Fig. 8-13 Resolution check

8.2.4 Outline of Condition Setting

Select **"3. Condition set"** at the top menu screen to display the menu shown in Fig. 8-14. Use this to initialize data saved in FlashROM and input instrument ID number and absorbance correction factors.

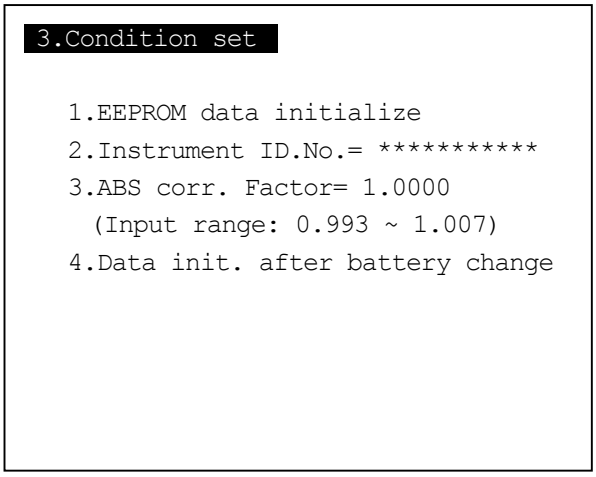


Fig. 8-14 Condition set screen

(1) EEPROM data initialize

Use this to initialize data in EEPROM. In the case of the UV-1700, adjustment data such as wavelength tables (stored in a designated EEPROM chip for the UV-1600) are concentrated in a mode ROM (FlashROM, 29F040). The functions explained here are related to adjustment data domains in the FlashROM. Note that when power is turned ON after replacing ROM, the adjustment data copied in RAM will be automatically written into the new ROM. Therefore EEPROM data initialize need not be executed.

1) Press the [1] key at the condition set screen to select **"1. EEPROM data initialize"** (see Fig. 8-15).
2) Press the data number for initialization. A message will ask you if you really want to initialize data. Press the [START] key to initialize.

- **TBL prt. [F1] key**
  Press this to printout data for the table containing 80 wavelengths.

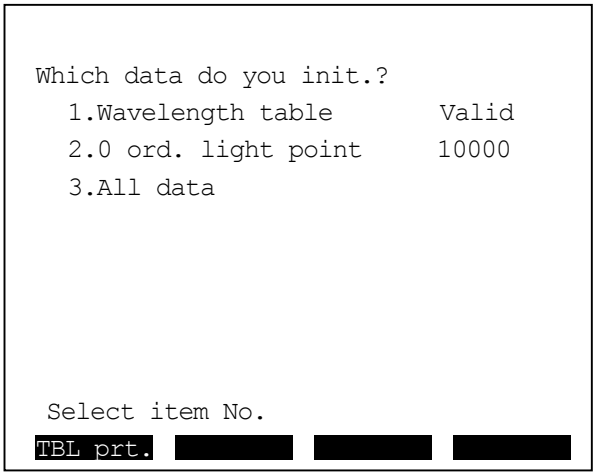


Fig. 8-15 EEPROM data initialize

Press the [RETURN] key to return to the condition set screen.

*** The following items are contained in the adjustment data domain.**

- Wavelength table: Table with values corrected using Hg/D_2 lamp lines
- Zero-order light detection origin: Origin offset value for zero-order light detection
- Stray light cut filter position: Phase setting value for filter motor
- Instrument ID No. (serial No.):
- Absorption correction factor: Coefficient determined using standard filter (normally 1,000)

(2) Instrument ID. No. Setting

Use this to check and input instrument ID number (serial number).

1) Press the [2] key to select **"Instrument ID. No."** (see Fig. 8-16).
2) Input the instrument ID number and press the [ENTER] key. If a mistake is made, press the [CE] key, and delete the digits one by one.

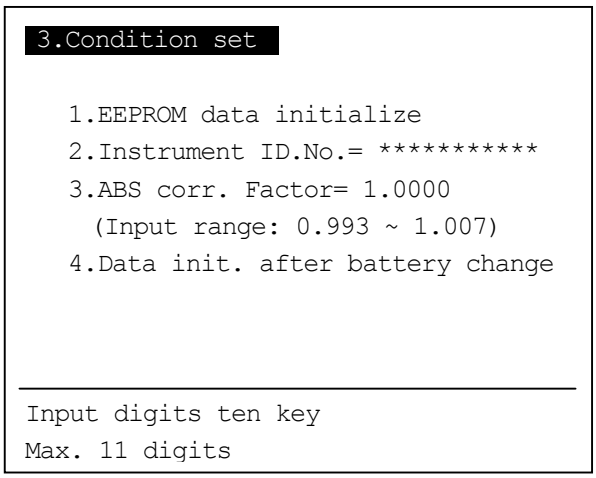


Fig. 8-16 Instrument ID. No. screen

(3) Absorbance correction factor

Use this to check and input the absorbance correction factor.

1) Press the [3] key to select **"ABS corr. factor"** (see Fig. 8-17).
2) Determine and input the correction factor using the following method.

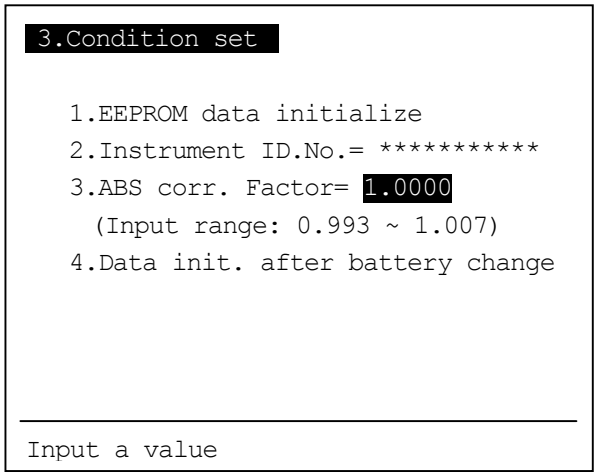


Fig. 8-17 ABS Corr. factor screen

a) Measure the absorbance that occurs in the standard wavelength of a substandard filter in photometric mode.
b) Determine the factor using the calculating formula:

Standard value (Abs) / Measuring value (Abs) = [Correction Factor]

(4) Initializing After Battery Change

Use this to initialize data written in RAM when changing the battery.

Press the [4] key to select **"Data init. after battery change"**. A message will ask you if you really want to initialize data. Press the [START] key to initialize.

*** The following data items are contained in backup RAM.**

- Instrument baseline correction data
- Measuring data saved in files 0 to 5
- Condition files saved files 1 to 14
- Password for instrument validation

8.3 Adjustments

1. Adjustment of light source optical axis

Use the D_2 lamp beam to adjust light source switch mirror and WI lamp height.

- Adjustment of light source switch mirror position (perpendicularly to entrance slit)
- Adjustment of WI lamp holder position (perpendicularly to entrance slit)

2. Adjustment of grating

Adjust the grating until spectrum light hits at the slit.

- Adjustment of ruling (rotate toward exit slit)
- Adjustment of inclination (perpendicularly to exit slit)

3. Adjustment of toroidal mirror

Align light that has passed through the slit with center of sample side mirror.

- Adjustment of toroidal mirror ASSY position (horizontally to sample side mirror)
- Adjustment of inclination (horizontally to sample side mirror)

4. Adjustment of sample side mirror

Adjust the light that has passed through half mirror so that it passes through the center of sample side cell.

- Adjustment of sample side mirror ASSY position (horizontally to the center of sample side cell)
- Adjustment of inclination (perpendicularly to the center of sample side cell)

5. Adjustment of reference side mirror

Adjust the light that has passed through half mirror so that it passes through the center of reference side cell.

- Adjustment of reference side mirror ASSY position (horizontally to the center of reference side cell)
- Adjustment of inclination (perpendicularly to the center of reference side cell)

6. Focus adjustment of exit slit

Use the 546.1nm spectral line of the mercury lamp to adjust the focusing position of slit/filter ASSY.

- Use the adjusting jig to read off the scale position where the exit slit image is sharpest.
- Secure the slit/filter ASSY at a position 1mm less than the scale reading.

7. Wavelength correction

Correct wavelength (create and save wavelength table).

8. Performance check

Turn OFF and then ON again main unit power, and check the following.

- Initialization correctly finishes.
- Performance check of Condition set mode correctly finishes.
- After instrument baseline correction, Abs zero flatness and noise level are within specifications.

8.3.1 Optical Axis Adjustment Procedure

1) Remove the sample compartment cover, sample compartment assembly and light source cover from the main unit.
2) Remove main unit cover. Lay it on its right side (as seen from the front). Do not remove the console PCB connection cable at this time.
3) Remove the monochromator case cover.
4) Connect the AC cable. Hold down the [START] key and turn ON main unit power. Release the [START] key when the buzzer beeps.
5) The sound of stray light cut filter origin detection can be heard after approximately five seconds. And the top menu of the maintenance mode will be displayed.
6) When making first adjustments to instrument after assembly of the main unit, select **"3. Condition set"** followed by **"1. EEPROM data initialize"**, and then initialize **"3. All data"**.
7) In the same way select **"3. Condition set"** followed by **"4. Data init. after battery change"**, and then initialize data in RAM.

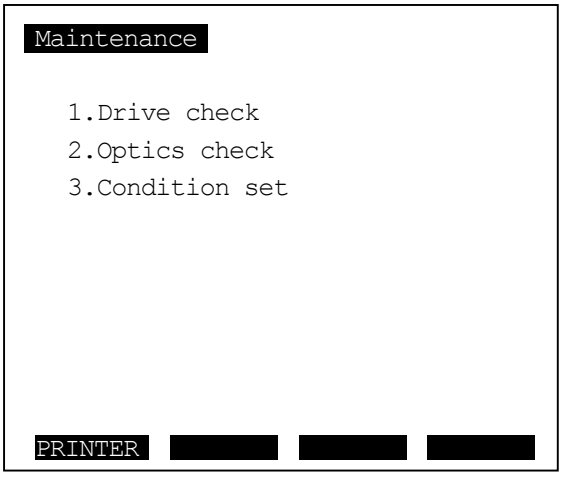


Fig.8-18 Maintenance mode screen

8.3.2 Adjustment of Light Source Optical Axis

Adjustment of the light source optical axis is performed by adjusting the height of the light source switch mirror and WI lamp based on the height of the D_2 lamp beam.

(1) Adjustment of Light Source Switch Mirror

1) Select **"1. Drive check"** from the maintenance mode top menu, and then select **"2. Light source mirror PM"**.
2) Press the [3] key to extinguish the WI lamp.
3) Press the [4] key to light up the D_2 lamp (always wear UV protective goggles when D_2 lamp is lit).
4) Temporarily secure the mirror using the setscrew so that the origin detection pin mounted at the lower part of the light source mirror is parallel with the mirror face.
5) Put the light source motor to the D2 lamp beam over the entrance slit.
   (Press either the [F1] or [F2] key once to start light source motor rotation and press again to halt. Press the cursor key for one-step drive.)
6) Adjust the height of the light source mirror by loosening the set screw so that the D_2 lamp image center is aligned with the entrance slit and retighten the set screw of the holder. Be sure to double check the following two items.
   - The light beam is irradiating over the entire grating.
   - The origin detection pin is parallel with the mirror face.

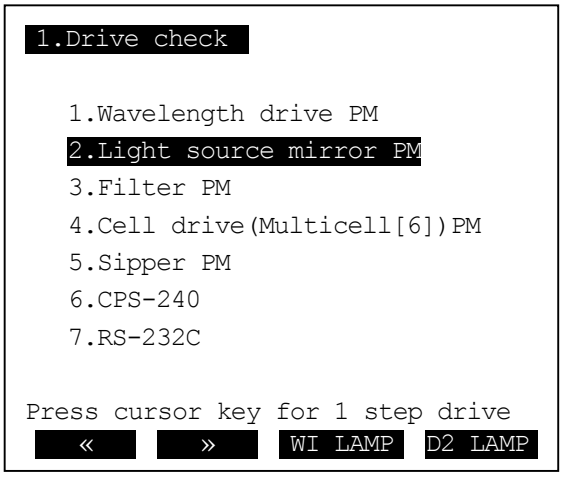


Fig.8-19 Light source mirror PM screen

(2) Adjustment of WI Lamp Holder Height

1) Press the [F4] key at the **"2. Light source mirror PM"** screen to extinguish the D_2 lamp.
2) Press the [F3] key to light up the WI lamp. Put the light source mirror motor into drive and align the WI lamp beam over the entrance slit.
   Press the [F1] key to quickly rotate the light source mirror in the anticlockwise direction and press the [F2] key to quickly rotate it in the clockwise direction. Press either the [F1] key or [F2] key once to start light source motor rotation and press again to halt. Press the cursor key for one-step drive.
3) Loosen the fixing screw of the WI lamp holder. Adjust the height of the WI lamp holder to align the WI lamp beam center with the entrance slit. And tighten holder fixing screw. Take care not leave fingerprints on the lamp during this task.

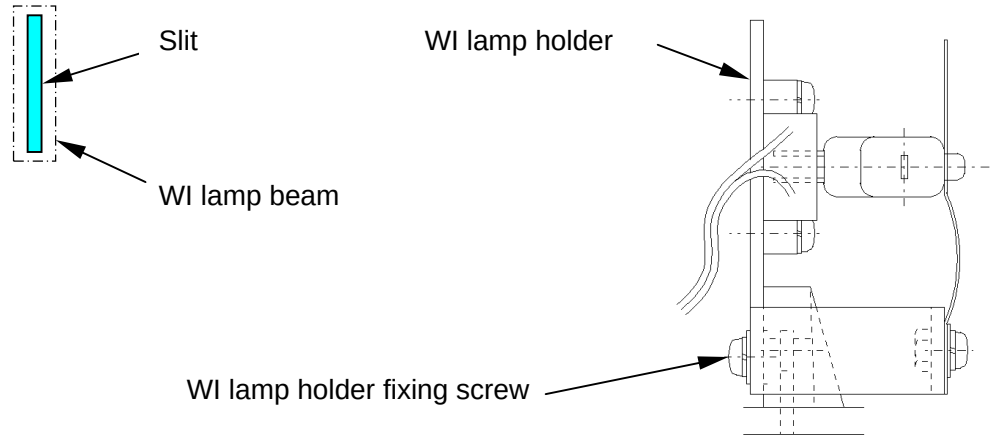


Fig.8-20 WI lamp holder height adjustment

4) Place a ruling adjusting jig (jig and ruling) between entrance slit and grating.
5) Check that the beam center is aligned with the adjusting jib center in the height direction.

8.3.3 Adjustment of Grating

The spectral band created by the grating is used to adjust ruling and inclination of grating.

1) Follow steps 1 to 3 of item 8.3.2 (2) to align the WI lamp beam over the entrance slit.
2) Select **"1. Drive check"** from maintenance mode top menu followed by **"1. Wavelength drive PM"**.
3) Press the [F3] key to light up the WI lamp.

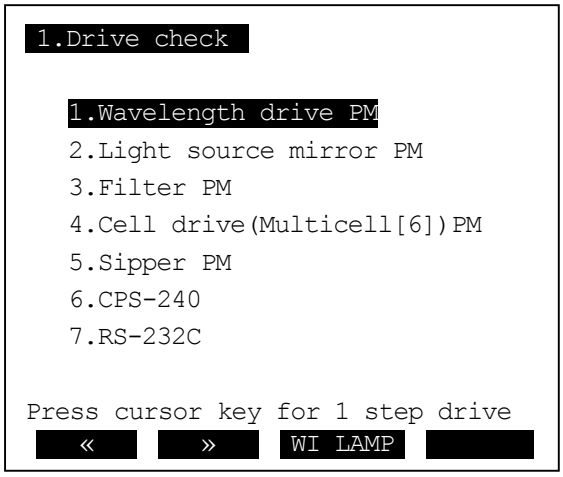


Fig.8-21 Wavelength drive PM screen

(1) Aligning with Adjusting Jig

1) Place the adjusting jig and ruling in front of exit slit (height of jig centerline: 40mm). Temporarily remove grating mask.
2) Put the grating motor into drive and direct the diffracted light band (primary light) on the right side of the zero-order light onto the adjusting jig. Halt grating motor drive at the point when red and green beam bands hit the adjusting jig.
   Use the [F1] key and [F2] key to move the grating motor at high speed towards either the short wavelength side or long wavelength side. Press either [F1] or [F2] key once to start drive and press again to halt. Use the cursor key for one-step drive.
3) Loosen the B fixing screw and tilt adjustment bolts.

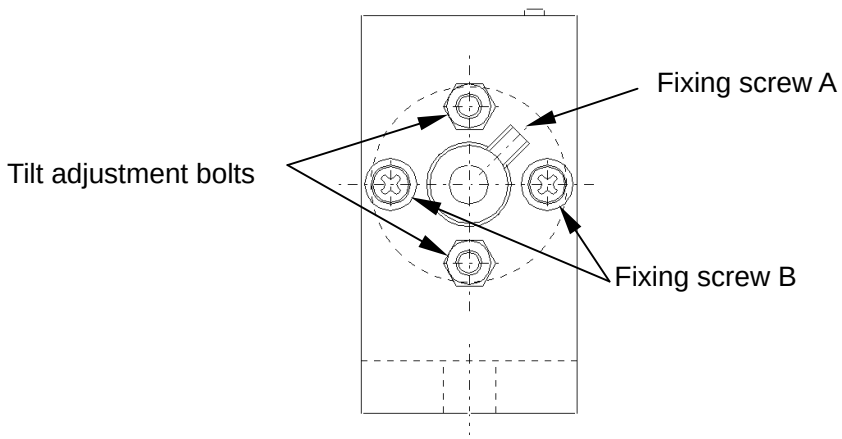


Fig.8-22 Grating holder rear view

4) Retighten the fixing screw B. Next, tighten the tilt adjustment bolts until they lightly touch the flange of the plate.

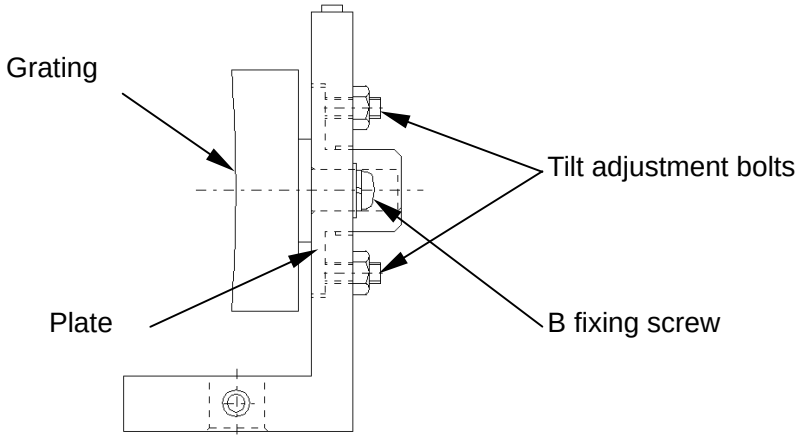


Fig.8-23 Grating holder side view

5) Loosen the fixing screw A holding the grating.
6) Rotate the grating until the beam band is parallel with the marking line on the adjusting jig. And retighten the fixing screw A.

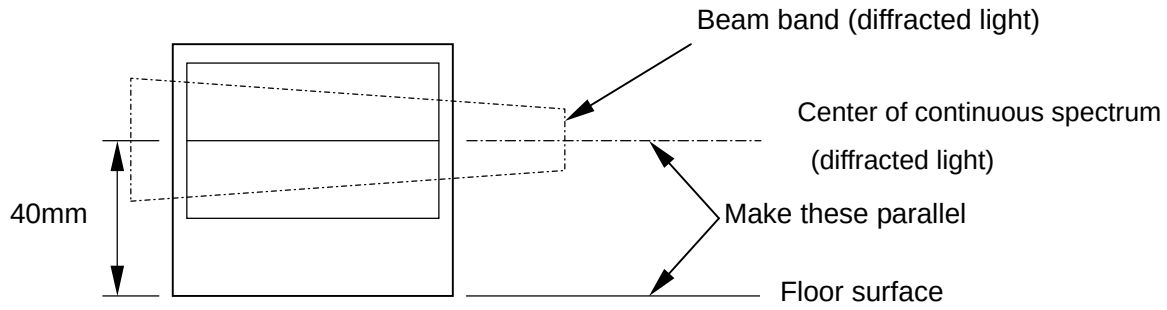


Fig.8-24 Beam on Adjusting Jig

7) Place the grating mask again.
8) Slightly loosen the fixing screw B. And align the diffracted light center with the centerline (horizontal line) of the adjusting jig using the following procedure.

*** When diffracted light center is above adjusting jig centerline (horizontal line)**

Use the topside tilt adjustment bolt to align diffracted light center with adjusting jig centerline, and tighten tilt adjustment bolt. Now retighten the fixing screw B and recheck alignment. Repeat procedure if alignment is not satisfactory.

*** When diffracted light center is below adjusting jig centerline (horizontal line)**

Use the bottom side tilt adjustment bolt to align diffracted light center with adjusting jig centerline, and tighten tilt adjustment bolt. Now retighten the fixing screw B and recheck alignment. Repeat procedure if alignment is not satisfactory.

9) Use the grating motor again to direct the zero-order, second-order and third-order lights onto the adjusting jig. And check that beam centers are aligned with the marking line. Repeat items 5 to 8 if not aligned.

(2) Aligning with Slit

1) Remove adjusting jig and ruling.
2) Put the grating motor into drive using the [F1] key or [F2] key. And check the position of the diffracted light (primary light) against the exit slit. At this time, check that the top and bottom edges of the diffracted light on both the long wavelength (red) and short wavelength (blue) sides are not broken.

*** When diffracted light and slit center are misaligned in the parallel direction**

Adjust height as shown in item 8 above. Then retighten tilt adjustment bolts and recheck alignment.

*** When diffracted light and slit center are out of parallel**

Adjust height as shown in items 5 to 8 above. Then retighten tilt adjustment bolts and recheck alignment.

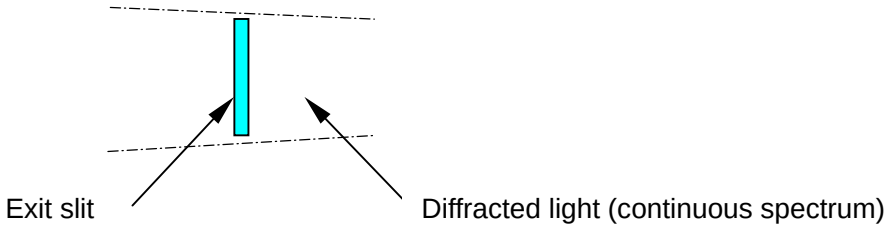


Fig.8-25 Beam over exit slit

8.3.4 Adjustment of Double Beam Optics

The light beam divided into two by the half mirror is made to pass through the sample compartment by adjusting the mirrors at the sample and reference sides.

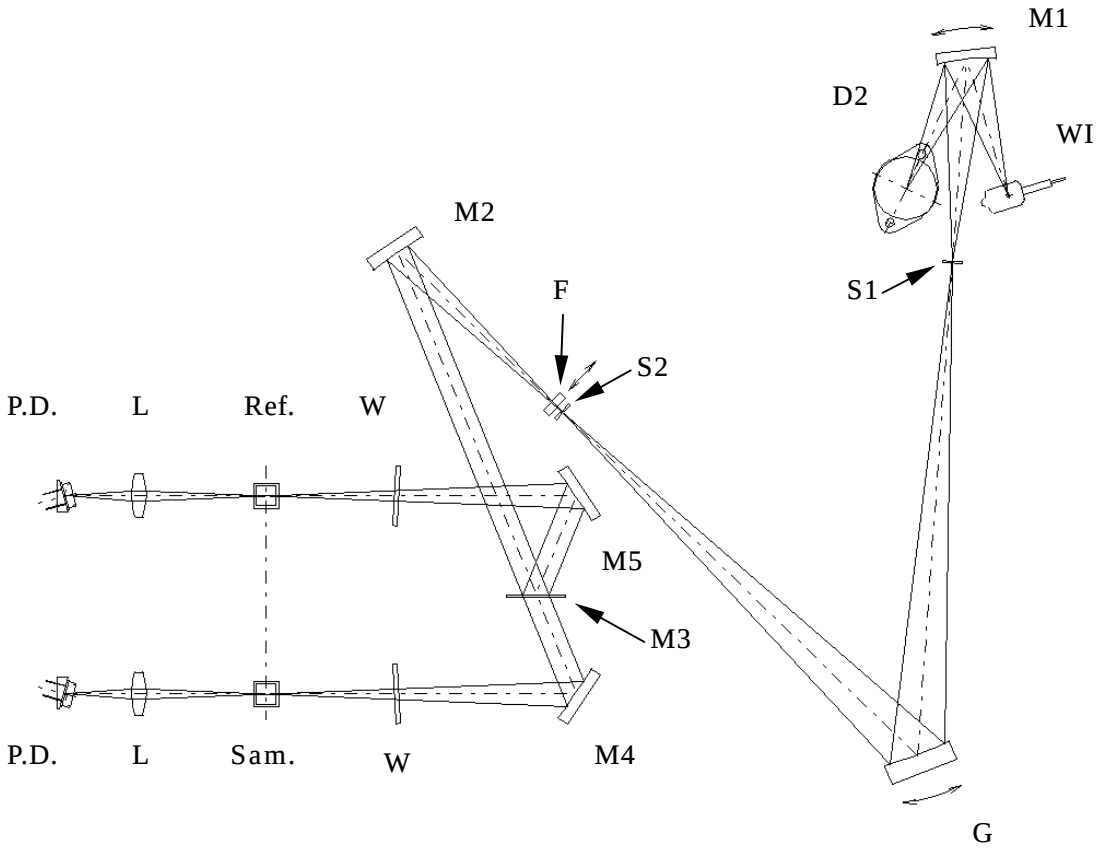


Fig.8-26 UV-1700 optical system diagram

1) Follow items 1 to 3 of procedure 8.3.2 (2) to align the WI lamp beam with the entrance slit.
2) Select **"1. Drive check"** at maintenance mode top menu followed by **"1. Wavelength drive PM"**.
3) Put the grating mode into drive and set control to make the green light pass through the exit slit.

   Press either [F1] or [F2] key once to start the grating motor rotation and press again to halt. Use the cursor key for one-step drive.
4) Check that the stray light cut filter is in the "No filter" position.
5) Check that the beam is arriving at about the center of the toroidal mirror ASSY (M2).
6) Cover the S side mirror ASSY (M4) with the S side mirror adjusting jig. And tilt adjust the toroidal mirror (M2) in the height direction.

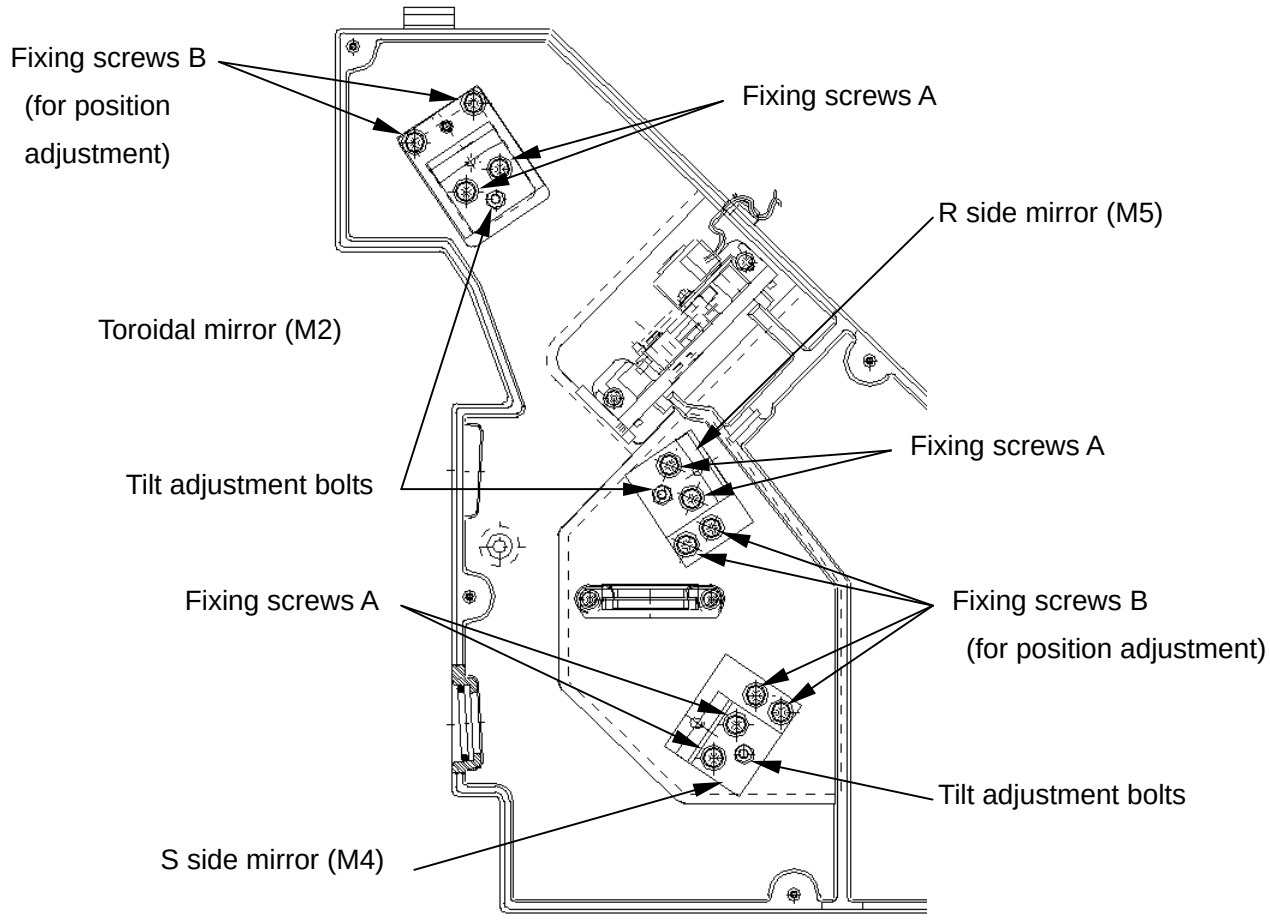


Fig.8-27 Toroidal mirror surroundings

7) Retighten the fixing screws A on the toroidal mirror (M2) to fix tilt adjustment unit after adjusting height.
8) Loosen the B fixing screws. And adjust position in the left and right directions to align with adjusting jig on the S side mirror.
9) Temporarily tighten the fixing screws B.
10) Remove adjusting jig from S side mirror (M4) and set the optical axis adjustment plate in the sample compartment.
11) Place the adjusting jig (H = 40mm) over the S side (beam nearest you) marking line of the optical axis adjustment plate. And tilt adjust the S side mirror (M4) in the height direction. Align beam with adjusting jig center.
12) Retighten the fixing screws A on the S side mirror (M4) to secure mirror.
13) Place the adjusting jig (H = 40mm) in front (left side) of sample compartment lens over the marking line of the optical axis adjustment plate. And adjust the S side mirror (M4) in the left and right directions so that the beam comes to the center in the horizontal direction of the adjusting jig.

14) Place the adjusting jig (H = 40mm) in front (right side) of the sample compartment quartz windowpane over the marking line of the optical axis adjustment plate. And adjust the toroidal mirror (M2) in the left and right directions so that the beam comes to the center in the horizontal direction of the adjusting jig.

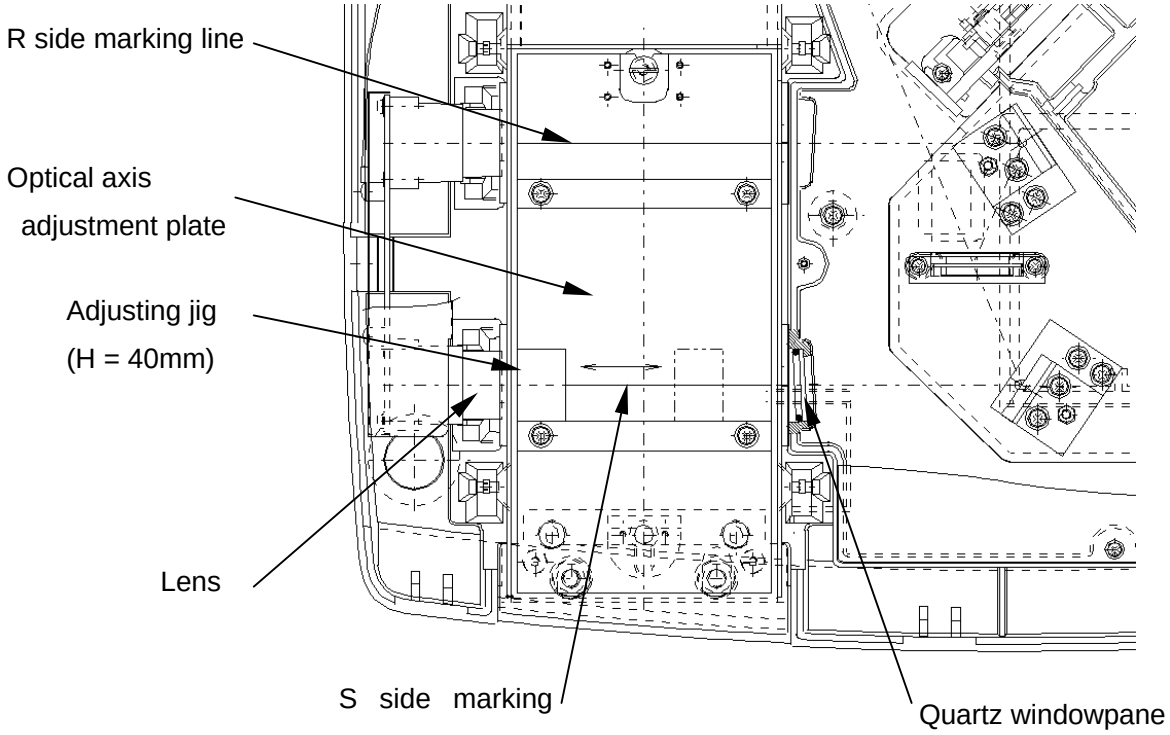


Fig.8-28 Sample compartment surroundings

15) Repeat items 13 and 14 above to make adjustments so that the beam will be centrally aligned on the adjusting jig at any position over the marking line. And retighten the fixing screws B.

* Place pieces of card (like a business card) over the toroidal mirror (M2) and S side mirror (M4) and check that the beam is not escaping over the edges of the mirrors. If the beam is escaping, repeat procedure from item 5.

16) Place the adjusting jig (H = 40mm) over the R side (beam furthest away from you) marking line of the optical axis adjustment plate. And tilt adjust the R side mirror (M5) in the height direction.
17) Retighten the fixing screws A on the R side mirror (M5) to secure mirror.
18) Place the adjusting jig (H = 40mm) in front (left side) of sample compartment lens over the marking line of the optical axis adjustment plate. And adjust the R side mirror (M5) in the left and right directions so that the beam comes to the center in the horizontal direction of the adjusting jig.
19) Retighten the fixing screws B on the R side mirror (M5).

20) Change the position of the adjusting jig (H = 40mm) and check that the beam is in the center of the adjusting jig whatever the position of the adjusting jig over the marking line.

* Place pieces of card (like a business card) over the R side mirror (M5) and check that the beam is not escaping over the edges of the mirrors. If there is beam escape, repeat procedure from item 16.

21) Check that there is a beam in the center of the detector (P.D.) on the left side surface of the sample compartment.
22) Check that all screws and bolts have been tightened.
23) Check that no fingerprints and contamination are left on any mirror, lens or windowpane. And reattach the covers and sample compartment unit.

8.3.5 Writing Constants into EEPROM

(1) Setting Filter Position

1) Select **"1. Drive check"** from maintenance mode top menu followed by **"3. Filter PM"** to rotate the stray light unit filter. Function keys will be displayed at the bottom of the screen.
2) The "No filter" part of the stray light cut filter is moved to the exit slit position with filter rotation. Check that the exit slit is aligned with the center of the opening of the "No filter" position.

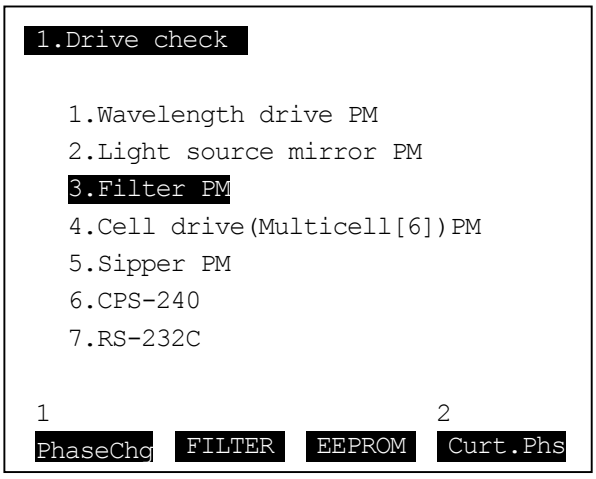


Fig.8-29 Filter PM screen

3) If it is not centrally aligned, press the [F1] key to change phase. The filter will rotate and the "No filter" position will move. Check that the exit slit is aligned with the center of the opening of this "No filter" position. Repeat this operation until alignment is achieved.
4) When the position is aligned, press the [F3] key to save position in EEPROM.

* The EEPROM item will be highlighted if the position is saved.

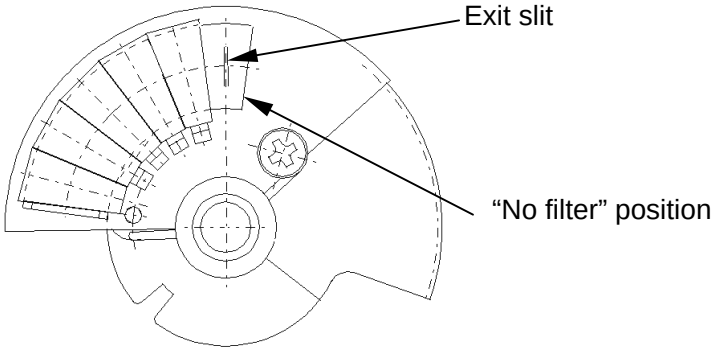


Fig.8-30 Stray light cut filter

(2) Zero-Order Light Search Point Set

1) Select **"2. Optics check"** from maintenance mode top menu followed by **"1. 0 ord. light search point set"**.
2) The WI lamp will light up. And the optimum position for the light source will be automatically determined.
3) Press either the [F1] key or the [F2] key to move the zero-order light to a position approximately 5mm away from the left side of the exit slit.
4) Press the [F3] key to save the zero-order light search point set.

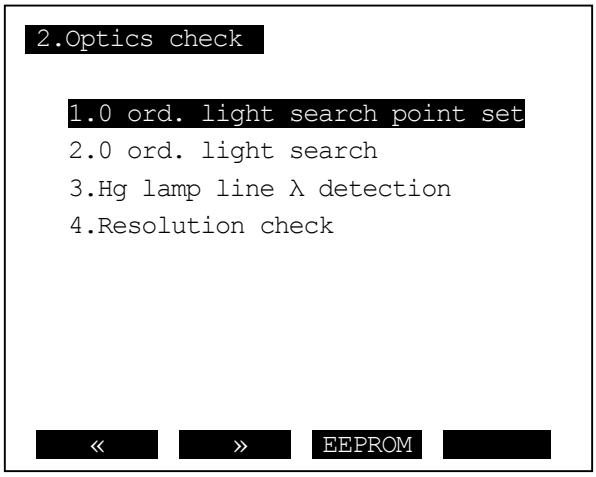


Fig. 8-31 Zero-order light search point set

*The EEPROM item will be highlighted if the data is saved.

5) Press the [RETURN] key to return to the **"2. Optics check"** screen.
6) Select **"2. 0 ord. light search"** and check that the zero-order light is automatically set at the exit slit position.

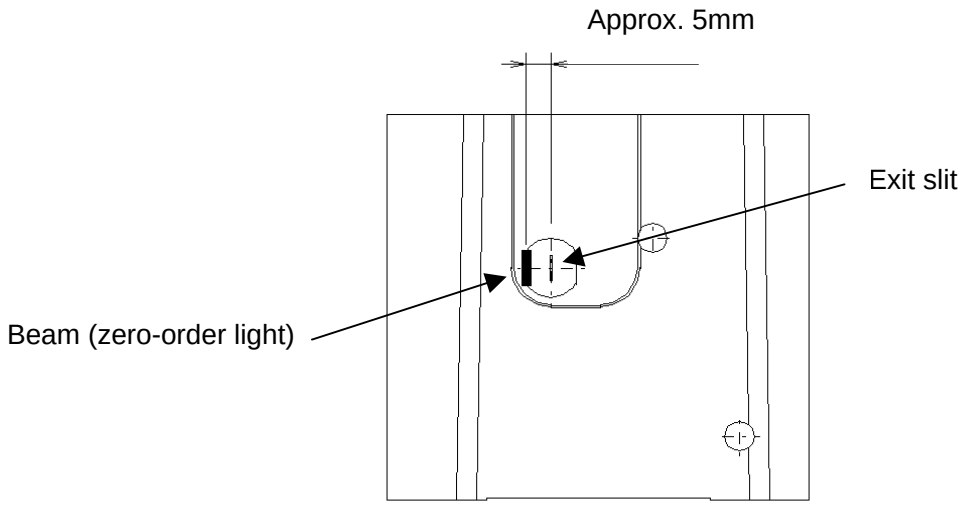


Fig.8-32 Exit slit

8.3.6 Exit Slit Focusing Adjustment

● **Preparation for Focus Adjustment**

i) Turn OFF main unit power. Place blackout curtain on the sample compartment. And close monochromator case cover (screws need not be tightened).

ii) Next, screw the stanchion of the bottom half of the mercury lamp holder with a mercury lamp to the position for the third light source in the UV-1700 light source compartment, and then secure the upper mercury lamp holder (securing the lamp) to the top of the stanchion using the knurled screw provided. Insert the cable attached to this unit into the connector "I/O-2" on the bottom right side of the main unit.

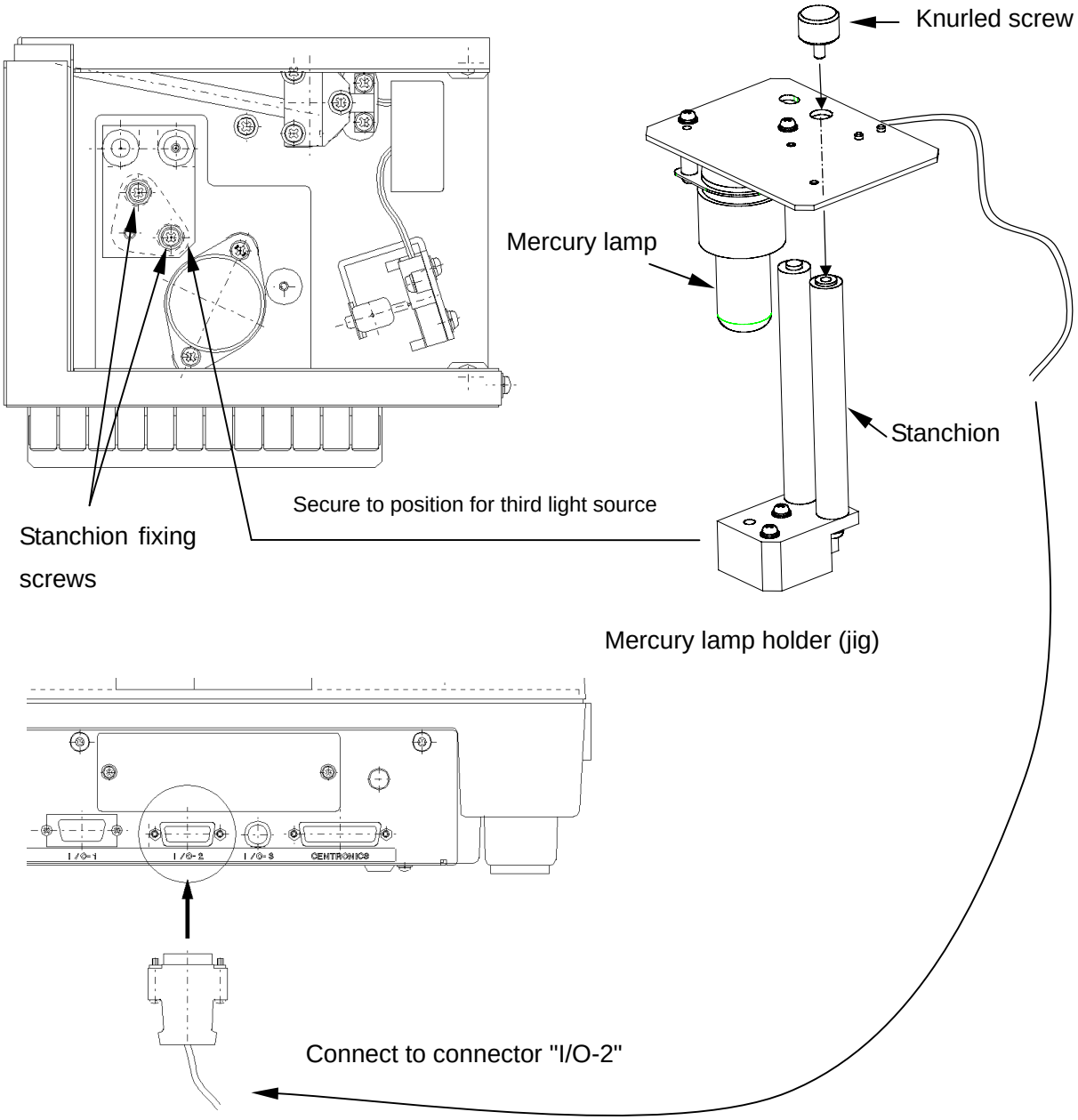
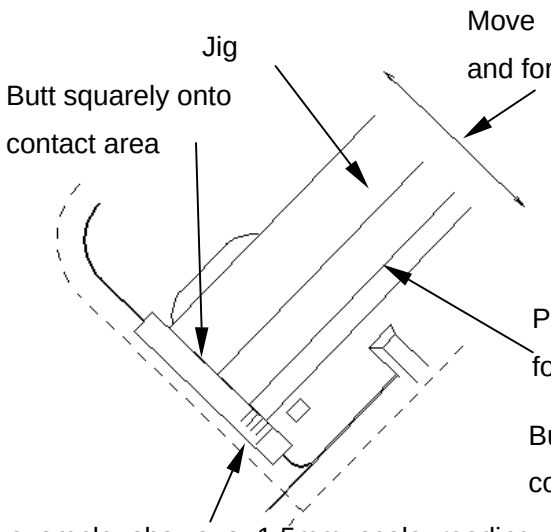


Fig.8-33 Focusing adjustment preparations

1) Turn ON UV-1700 power and wait for normal initialization to finish.
2) Enter spectrum mode and set the following parameters.

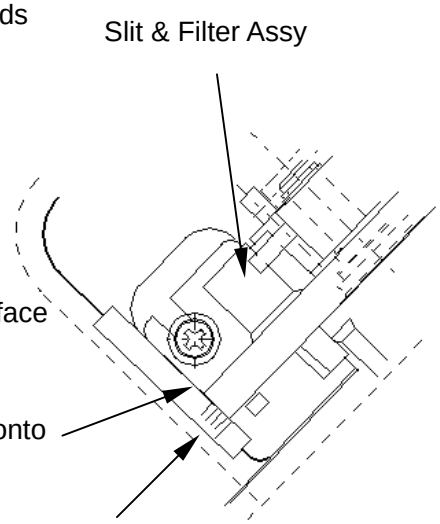
1. Meas. mode:	E
2. Scanning range:	548nm ~ 544nm
3. Rec. range:	0E ~ 150E
4. Scan speed:	Medium
5. No. of scans:	1
6. Display mode:	Sequential
7: Gain:	1
8. Light Source:	OFF

3) Press the [START] key to execute measuring.
4) Use the cursor to record the position of Hg lamp line (546.1nm) that appears on screen.
5) Use the GOTO λ key to set the wavelength recorded in item 4).
6) Remove the monochromator case cover. Remove the fixing screws for the Slit & Filter Assy. And place the Slit & Filter Assy outside of the monochromator case.
7) Now place the adjusting jig for exit slit position adjustment in the exit slit position of the monochromator case in place of the Slit & Filter Assy (see Fig. 8-34).
8) Move the jig backwards and forwards in relation to the grating over the optical axis. And set the adjusting jig at the position where the 546.1nm green image is sharpest on the surface of the jig.
9) The scale reading at this time is read off with the longest scale line as the starting point (1.5mm from starting point in Fig. 8-34).
10) Remove adjusting jig.
11) Set the Slit & Filter Assy at a position 1mm less than the recorded scale in item 9) above. For example, the Slit & Filter Assy is secured at the 0.5mm position (Fig. 8-34 position 1.5mm – 1mm = 0.5mm) in Fig. 8-35. At this time, check that the Slit & Filter Assy is properly in contact with the contact area of the scale. If the Slit & Filter Assy is only in contact with part of the contact area, it will be at an angle when secured, which may cause problems with the resolution specification.
12) Turn OFF main unit power.



This example shows a 1.5mm scale reading from the long start-point scale line.

Fig.8-34 Focus position check using jig



This example shows the Slit & Filter Assy secured at the 0.5mm position when the jig reading is 1.5mm.

Fig.8-35 Fixing slit/filter ASSY

8.3.7 Wavelength Correction Procedure

● **Preparation for Wavelength Correction**

i) Turn OFF main unit power. Remove mercury lamp holder (jig) after it has cooled down (or use heatproof gloves).

ii) Fasten the monochromator case cover using the screws. Put the main unit cover on and tighten screws.

iii) Mount the sample compartment cover and the standard sample compartment (leave off the light source compartment cover).

* If the multicell (6-cells) sample compartment is to be used, mount this instead of the standard sample compartment.

iv) Next, screw the stanchion of the bottom half of the mercury lamp holder to the position for the third light source in the UV-1700 light source compartment, and then secure the upper mercury lamp holder (securing the lamp) to the top of the stanchion using the knurled screw provided. Insert the cable attached to this unit into the connector "I/O-2" on the bottom right side of the main unit.

1) Hold down the [START] key and turn ON the main unit power. Release the [START] key when the buzzer beeps. The sound of stray light cut filter origin detection can be heard after approximately five seconds. And the top menu of the maintenance mode will be displayed.
2) Select **"2. Optics check"** from maintenance mode top menu followed by **"3. Hg lamp line λ detection"** (see Fig. 8-36).
3) Press the [F1] key to select **"1. Wavelength correction (Hg, D2 Lamp)"**. The WI lamp will light up. The spectrometer will initialize. And the D_2 lamp will light up.

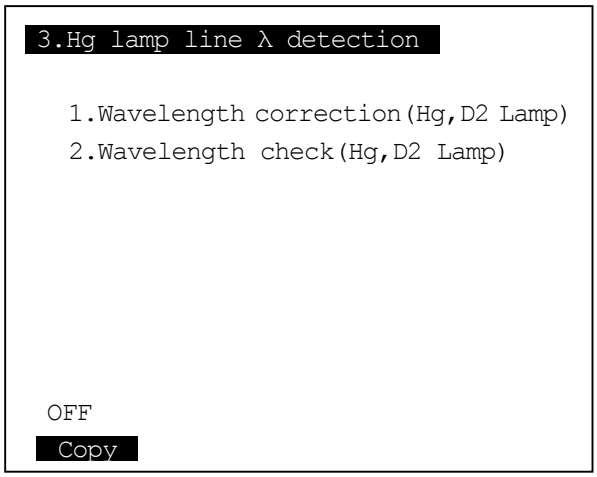


Fig. 8-36 Hg/D2 lamp line wavelength detection screen

4) After approximately two minutes, a message will request you to set the mercury lamp, align positions and press the [ENTER] key.
   * If the multicell (6-cells) sample compartment is to be used, insert a Holmium oxide solution filter in cell 2.
5) Press the [ENTER] key. A message requesting you to wait will be displayed. After this the Hg and D_2 wavelength lines will be measured. The data displayed on screen is the peak data for the wavelength lines.
   * If the standard sample compartment is used, follow the screen message by inserting the Holmium oxide solution filter in the cell holder after the D_2 line has been measured, and press the [ENTER] key. After the Holmium oxide solution filter has been measured, follow the screen message by removing the Holmium oxide solution filter.
6) Wavelengths will be corrected after measuring and measured again. Each wavelength will be automatically corrected over approximately 25 minutes. When this finishes, a wavelength table of the Hg and D_2 spectral line will be displayed. An example of such a wavelength table is shown in Fig. 8-37.

Example of Wavelength Table with Correction Results for Hg Lamp and D2 Lamp

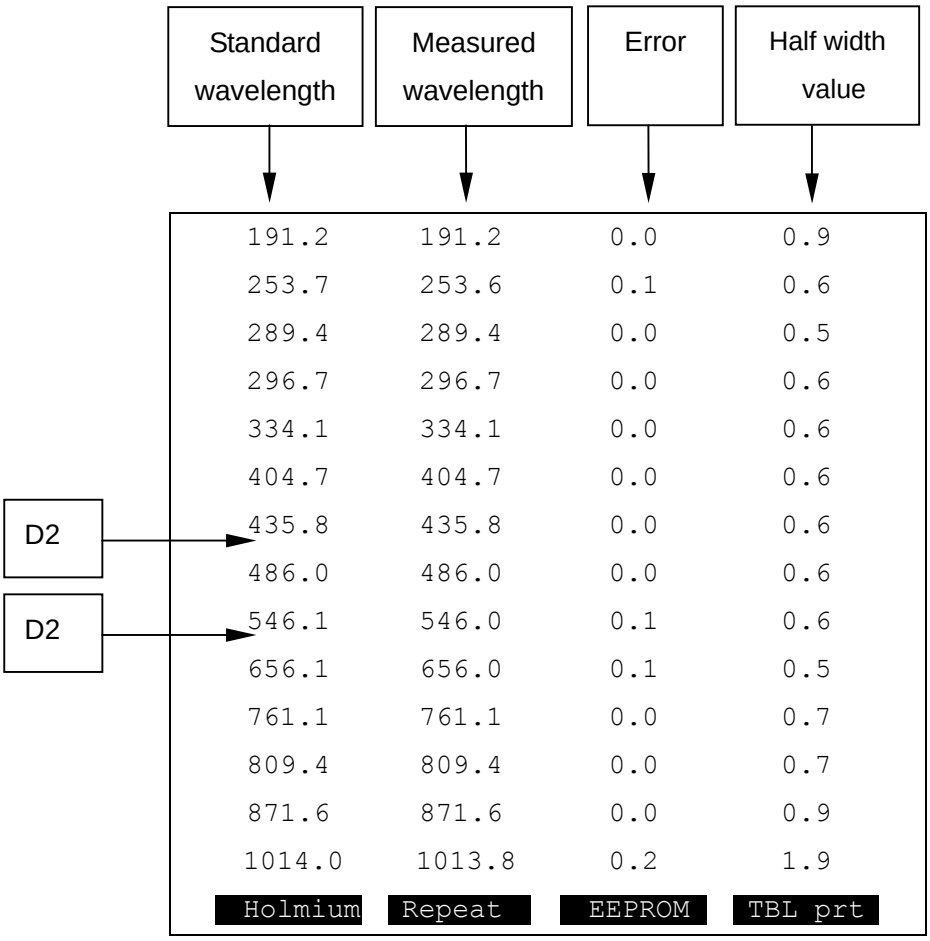


Fig.8-37 Wavelength correction results

7) Check that the measured wavelength's amount of error from the standard wavelength is within the specification (±0.3nm).
8) Press the [F1] key to display the wavelength table with correction results for the Holmium oxide solution filter (see Fig. 8-35 for example).

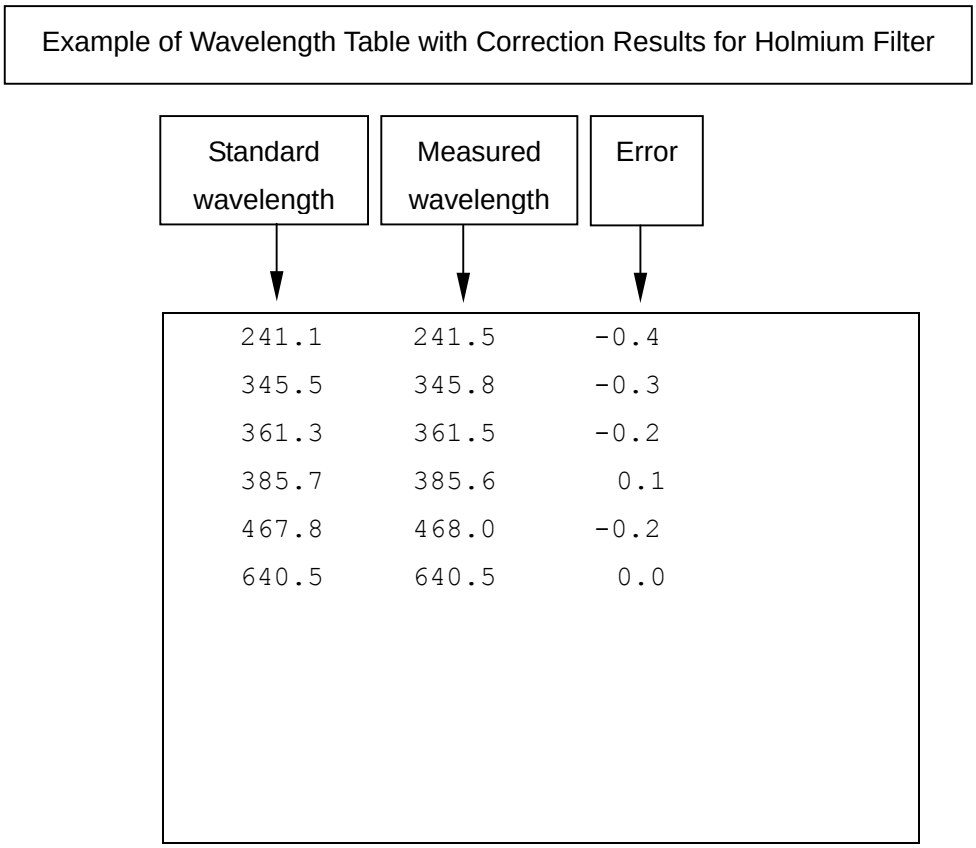


Fig.8-37 Wavelength correction results (Holmium)

9) Check that the measured wavelength's amount of error from the standard wavelength is within the specification (±0.5nm).
10) Press the [RETURN] key once to return to the Hg and D2 wavelength table screen. Press the [F3] key to save the table in EEPROM (if the data is saved, the characters [EEPROM] are highlighted).
11) Press the [RETURN] key again to return to "3. Hg lamp line λ detection" screen.

● **Finishing up after Wavelength Correction**

i) Turn OFF main unit power. Remove mercury lamp holder (jig) after it has cooled down (or use heatproof gloves).
ii) Remove jig cable from connector "I/O-2."
iii) Finally, mount light source compartment cover.

Chapter 9

Configuration

This chapter explains the configuration of the UV-1700.

9.1 Optical System

Fig. 9-1 shows the optical system diagram for the UV-1700.

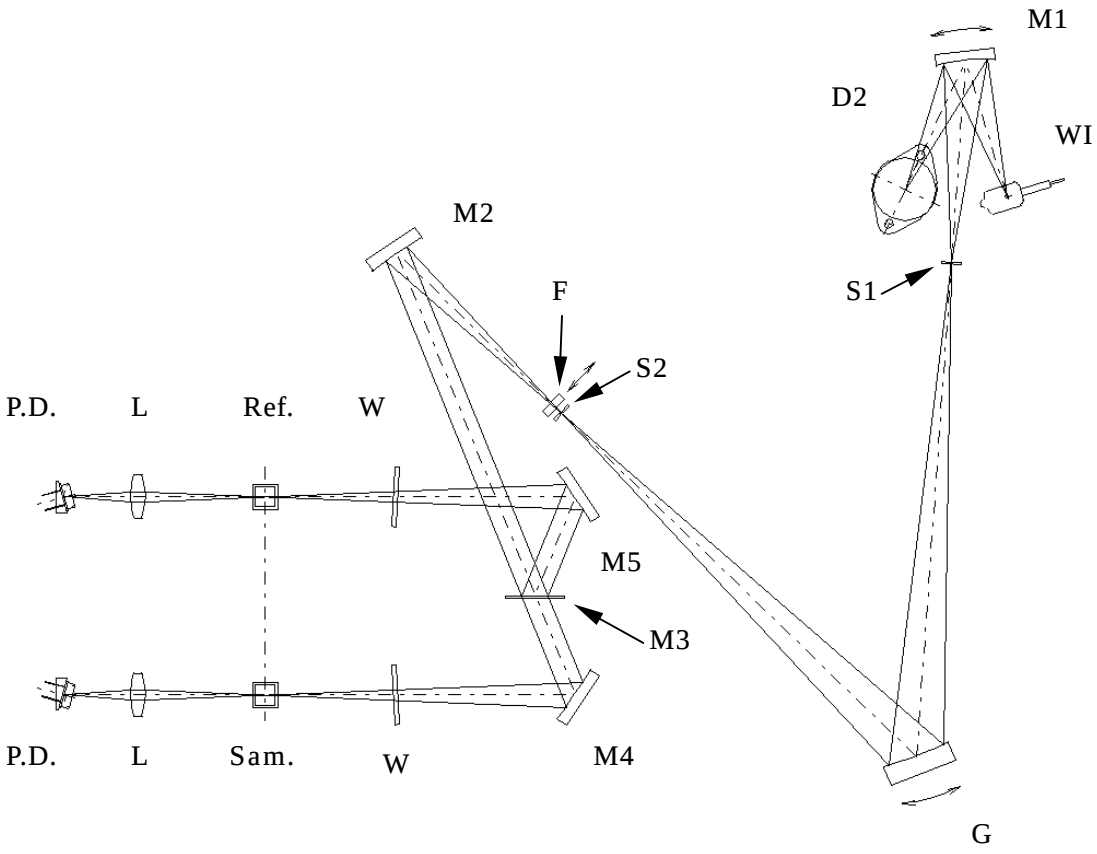


Fig.9-1 UV-1700 optical system diagram

Codes in Diagram	Part Name	Codes in Diagram	Part Name
WI	Halogen lamp	M1	Light source switch mirror
D2	D_2 lamp	M2	Toroidal mirror
S1	Entrance slit	M3	Beam splitter
S2	Exit slit	M4	Sample side mirror
G	Diffraction grating	M5	Reference side mirror
F	Stray light cut filter	W	Windowpane
L	Lens	P.D.	Photodiode
Sam.	Sample side cell holder	Ref.	Reference side cell holder

[Explanation of Optical System]

Light emitted by the light source (WI or D2) is reflected by the light source switch mirror (M1) to pass through the entrance slit (S1) and enter the spectrometer. The light source switch mirror (M1) rotates automatically in response to the set wavelength of the light source. (The D2 lamp is used for the UV region and the WI lamp for the visible and near UV region.)

The light irradiated from the entrance slit (S1) is diffracted by the diffraction grating (G). Rotating the diffraction grating (G) enables selection of wavelength. And the selected wavelength passes through the exit slit (S2).

Grating diffracted light contains wavelength light such as half or one third (known as second-order and third-order light) of the selected wavelength, so light that passes through the exit slit (S2) is passed through the stray light cut filter (F) to remove such surplus light. The stray light cut filter automatically switches to the filter (six options) appropriate to the selected wavelength (see Fig. 9-2 for configuration details).

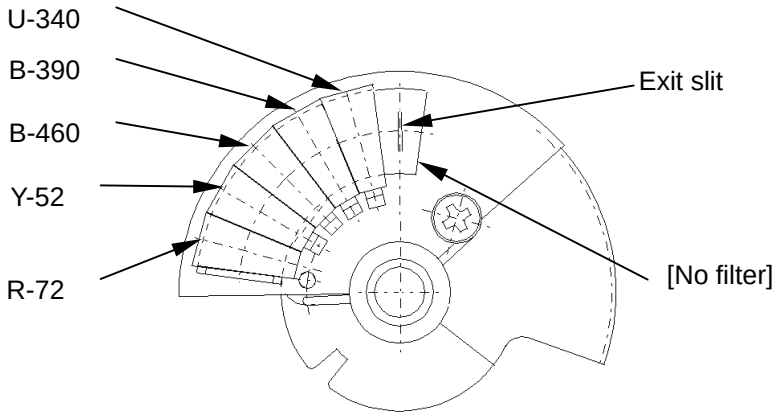


Fig.9-2 Stray light cut filter

Filter	Wavelength Range	Filter	Wavelength Range
No filter	190nm ~ 305nm	B-460	417nm ~ 536nm
U-340	306nm ~ 364nm	Y-52	537nm ~ 760nm
B-390	365nm ~ 416nm	R-72	761nm ~ 1100nm

Light that has passed through the stray light cut filter (F) is reflected off of the toroidal mirror (M2) onto the beam splitter (M3) where it is split into a sample side beam and reference side beam. The sample side beam is reflected off of M4 and the reference side beam is reflected off of M5. Both beams pass through quartz windowpanes (W) and converge on the center of the cell holders. The beams pass through the cell holders, are converged by the lenses (L) and irradiated onto the Si photodiode (P.D.) detectors.

9.2 Beam Position in Sample Compartment

Beam position in the UV-1700 sample compartments is the same for both the sample side and the reference side (see Fig. 9-3). Also, the beam size at the center of the cell holder is as follows.

Beam size: H 9mm x W 0.5mm

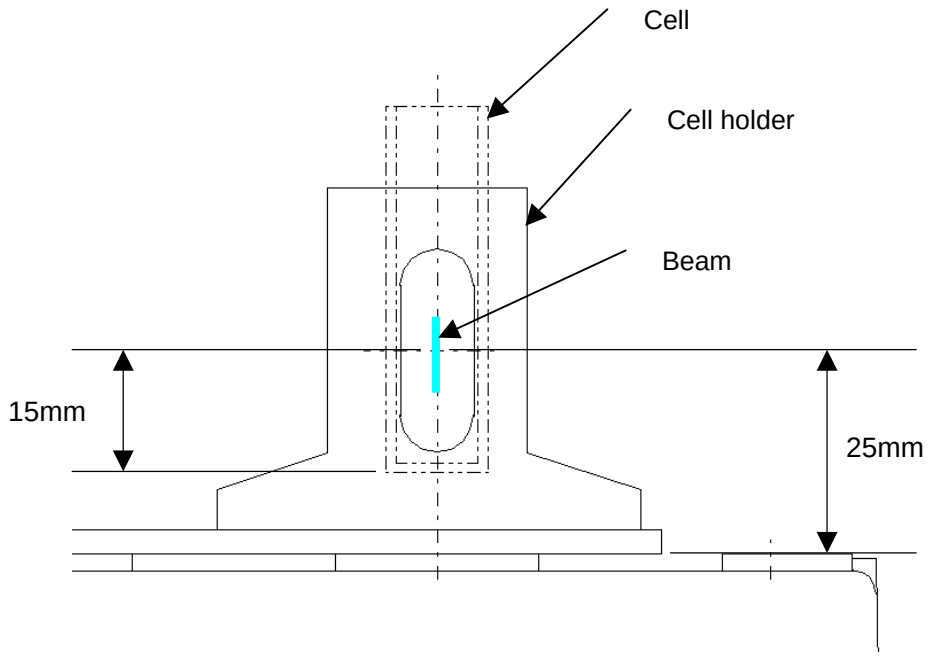


Fig.9-3 Beam position

9.3 Electric System

Fig. 9-4 shows the UV-1700 electric system diagram.

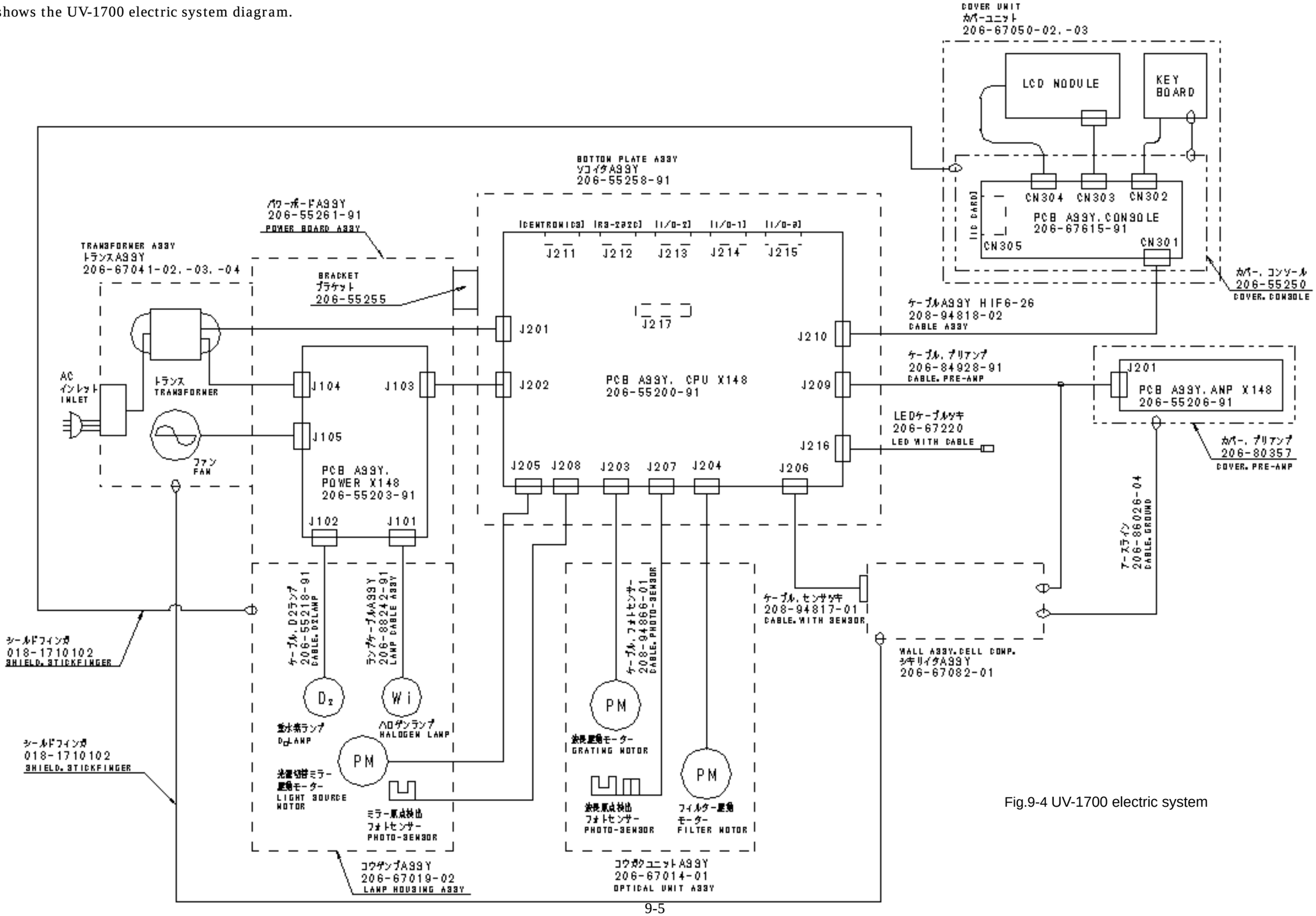


Fig.9-4 UV-1700 electric system

[Explanation of Each Unit's Function]

Name	P/N	Function
PCB ASSY, CPU X148	206-55200-91	CPU PCB that controls entire UV-1700 system. It also performs A/D conversion of photometric signals and processes signals.
PCB ASSY, POWER X148	206-55203-91	Supplies the system with power. Also supplies the halogen lamp and D_2 lamp with power.
PCB ASSY, AMP X148	206-55206-91	Converts light detected at the detector (Photodiode) into electric signals and sends them to the CPU.
PCB ASSY, CONSOLE	206-67615-91	LCD module, keyboard, IC card, etc., are connected to this.

9.4 Instrument Assignment Explanation

9.4.1 Function Block

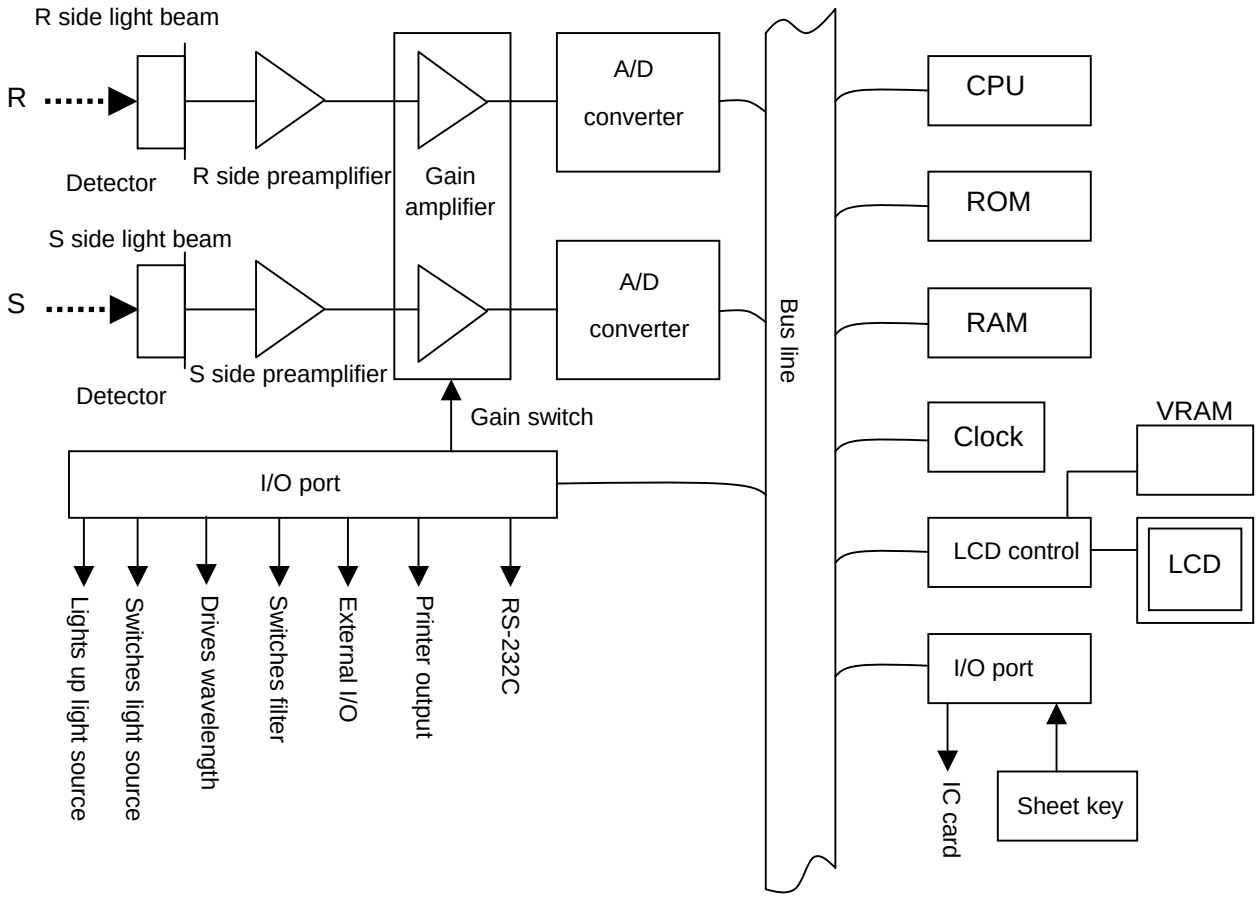


Fig.9-5 Function block diagram

Fig. 9-5 shows the UV-1700 function block diagram. The CPU controls many of the operations such as light source light up, light source switching, wavelength drive, filter switching, key input, LCD screen displays, printout and communications via the RS-232C I/F. The sample and reference beams enter the detector (Si photodiode) and converted into signal voltage by the preamplifier. Next, the gain amplifier adjusts the signals. And these enter the A/D converter to be converted into digital signals. The digitized photometric signals are processed by the CPU to become photometric values such as transmittance and absorbance.

9.4.2 Setting Instrument Initialization

The CPU implements the initialization settings when the UV-1700 is turned ON. The following explains each initialization setting. Also, the meanings of numeric values that appear on the right side of the initialization settings when the instrument is launched using the [F1] key are explained.

Initialization Setting Items	Contents	Initialization Results
LSI initialization	Initialization of each I/O device	Normally 0
ROM check	Calculation of ROM checksum and collation against previously calculated sum **Error:** When checksums do not agree	Checksum value
RAM check	Data read/write check against external RAM (backup available) and internal RAM Protection check of baseline data in external RAM	Number of errors 65535 if baseline data is damaged
Filter initialization	Initialization of stray light cut filter (set to “No filter” position after initialization)	Normally 0
Light source motor initialization	Detection of light source motor origin by photosensor **Error:** Origin detection defective	Normally 0
λ org. (coarse)	Detection of wavelength motor origin by photosensor Detection of multicell origin if connected **Error:** Origin detection defective	Stepping motor step count value during detection **Pass:** Count of 30,000 or less

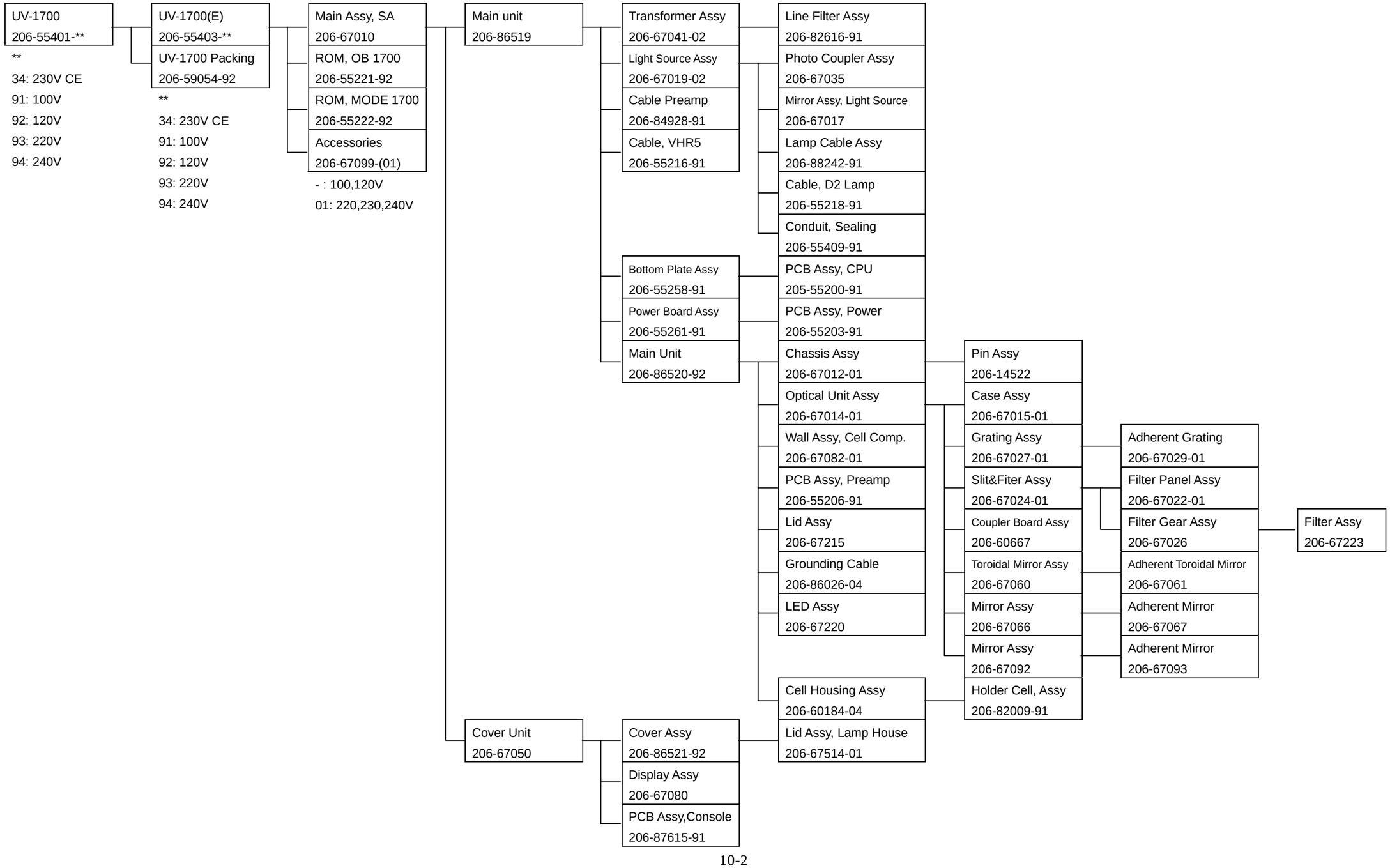
W Lamp energy	Detection of optimum position of light source switch mirror after it has been scanned by WI lamp side **Error:** Insufficient energy	Energy count value **Pass:** Count of 1,000 or more **Error:** 0
λ Org. (fine)	WIZero-order light search using WI lamp **Error:** Insufficient energy	Energy count value **Pass:** Count of 1,000 or more
D2 energy	Detection of optimum position of light source switch mirror after it has been scanned by D_2 lamp side **Error:** Insufficient energy	Energy count value **Pass:** Count of 1,000 or more **Error:** 0
λ check	Detection of D2 lamp 656.1nm line for use as wavelength origin **Error:** Insufficient energy	656.1nm energy count value **Pass:** Count of 425 or more

Chapter 10

Parts List

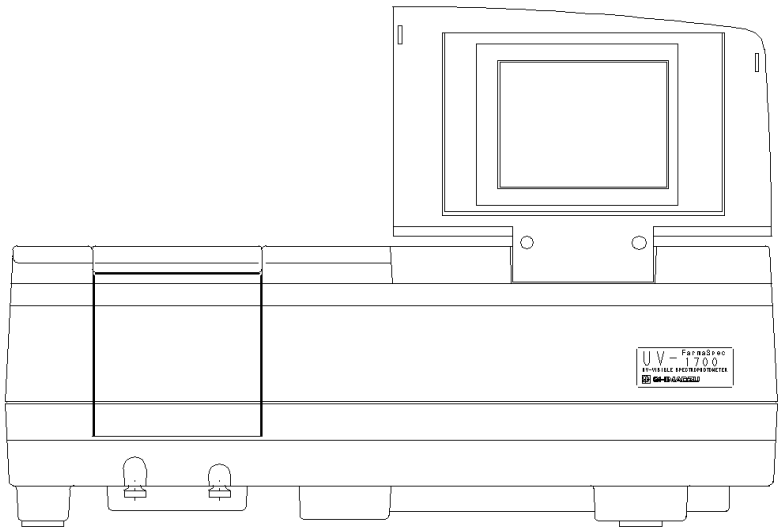
This chapter lists the parts configured in the UV-1700.

10.1 Instrument Configuration List



10.2 UV-1700 Main Unit

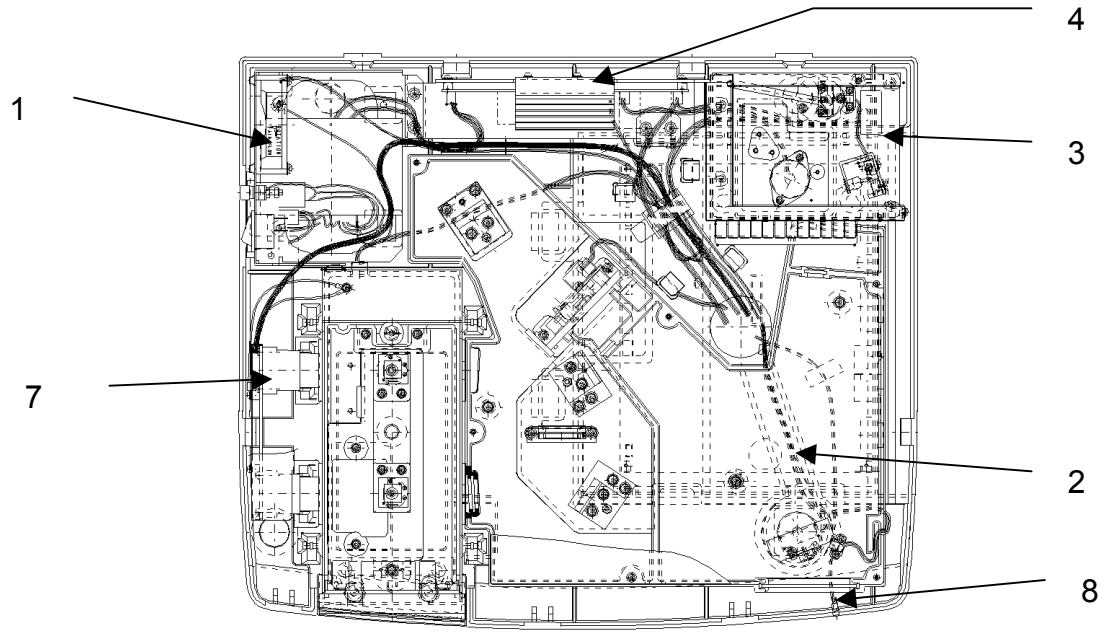
P/N 206-55403



ITEM No.	P/N	DESCRIPTION	REMARK
1	206-67010-02	Main Assy, SA	
2	206-55259	Name Plate, UV-1700	
3	206-55221-92	ROM, OB 1700	
4	206-55222-92	ROM, MODE 1700	FlashROM
5	206-67099-(01)	Accessories	-01: 220V,230,240V
6	206-94783	Instruction manual (installation and maintenance edition)	
7	206-94785	Instruction manual (operation edition)	
8	037-72522-20	Label, Warning SB100-522P	
9	037-72417-01	Label, Warning SB60-417P	

10.3 Main Unit

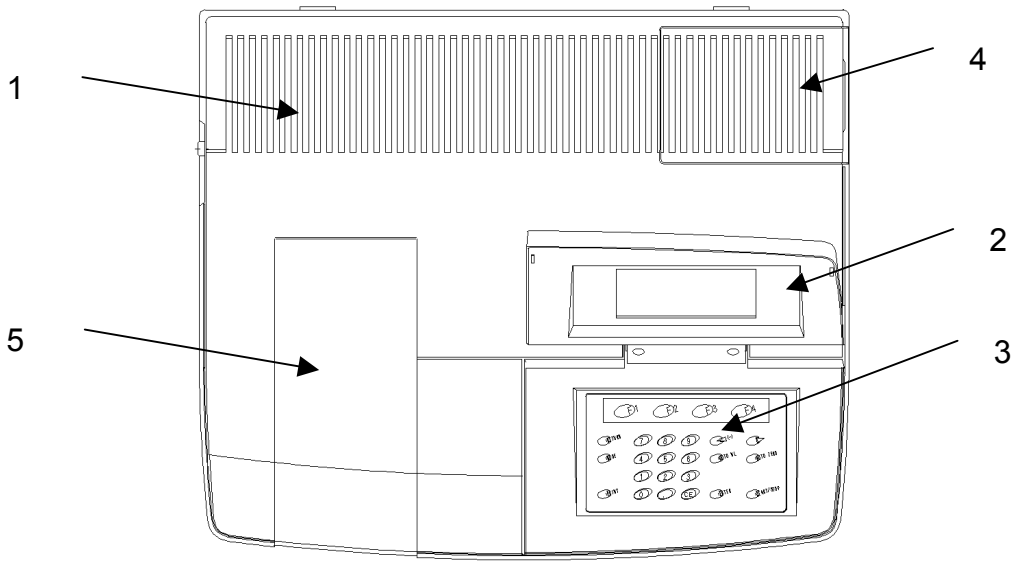
P/N 206-86519



ITEM No.	P/N	DESCRIPTION	REMARK
1	206-67041-02	Transformer Assy	
2	206-67014-01	Optical Unit Assy	
3	206-67019-02	Light Source Assy	
4	206-55261-91	Power Board Assy	With Holder plate
5	206-55200-91	PCB Assy, CPU	
6	206-55203-91	PCB Assy, Power	
7	206-55206-91	PCB Assy, Preamp	
8	206-67220	LED Assy	

10.4 Cover Unit

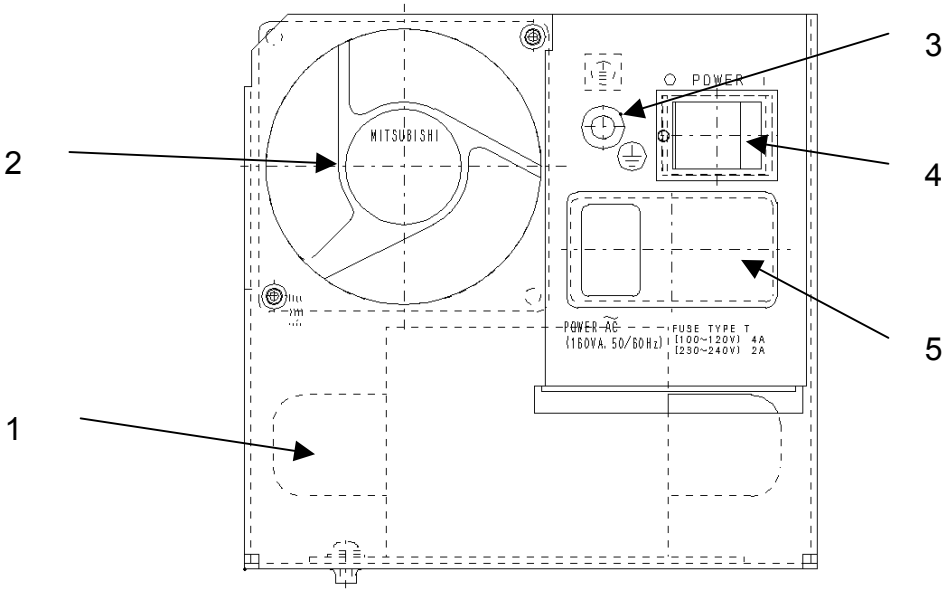
P/N 206-67050



ITEM No.	P/N	DESCRIPTION	REMARK
1	206-86521-92	Cover Assy	
2	206-67080	Display ASSY	
	├ 078-12114-11	LCD, DMF-50174NF-FW7	LCD unit
	└ 208-94869-01	Cable, LCD	
3	206-69620	Keyboard, UV-X	
4	206-67514-01	Lid Assy, Light Source	
5	206-69057	Sample compartment cover	
6	206-80372	Hinge Assy	
7	206-87615-92	PCB Assy, Console	

10.5 Transformer Assy

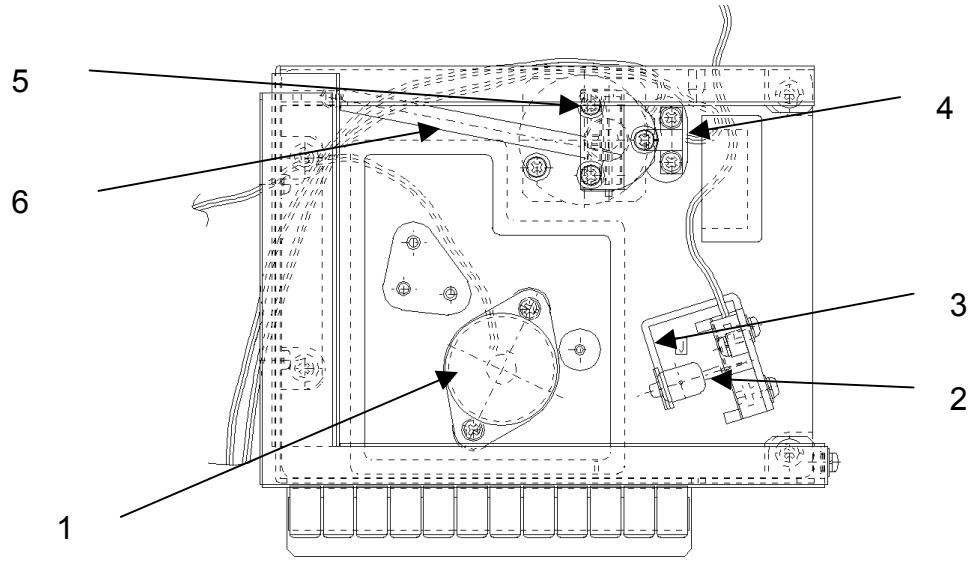
P/N 206-67041



ITEM No.	P/N	DESCRIPTION	REMARK
1	205-55220	Transformer, UV-1700	
2	208-96117	Fan, MMS-08C24DS-ROH	
3	071-21601	Terminal, T-375 Black	
4	064-28246-01	SW, 1832-3311	
5	206-82616-91	Line Filter Assy	
5	206-87700-91	Line Filter Assy for CE	CE version

10.6 Light Source Assy

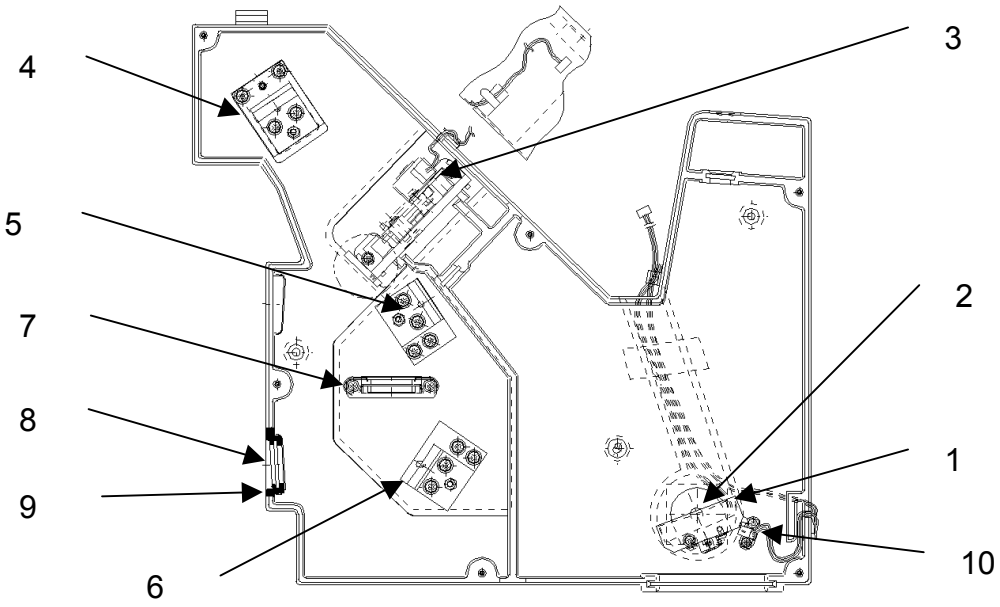
P/N 206-67019-02



ITEM No.	P/N	DESCRIPTION	REMARK
1	062-65055-05	D2 Lamp, L6380	
2	062-65005	Halogen lamp, NA55917	
3	206-67036	Leaf spring	For securing WI lamp
4	206-67035	Photo Coupler Assy	
5	206-67017	Mirror Assy, Light Source	
	└205-83032-09	Mirror, R(30*30,54)-FR	
6	034-03068-04	Spring, E-560	For light source mirror
7	206-69622	Motor, TS3214 N5015	
8	206-88242-91	Lamp Cable Assy	For WI lamp
9	206-55218-91	Cable, D2 Lamp	For D2 lamp

10.7 Optical Unit Assy

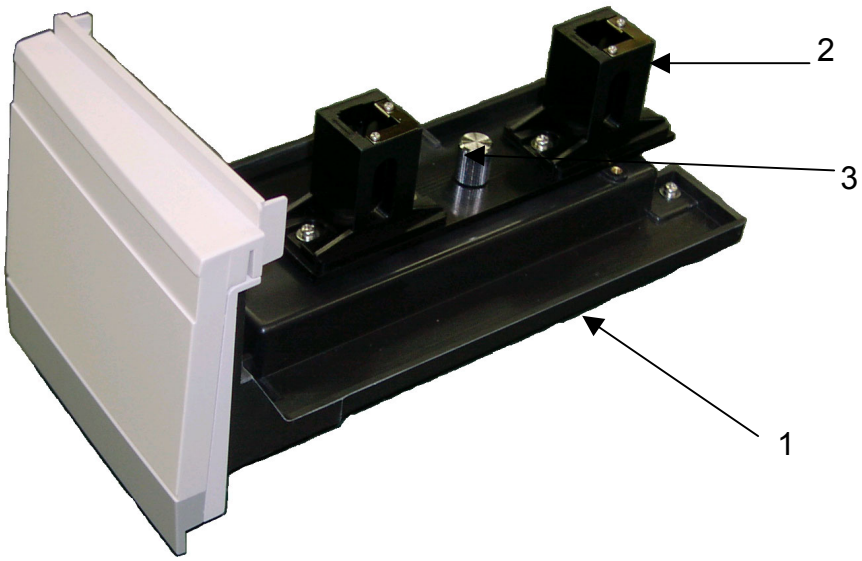
P/N 206-67014-01



ITEM No.	P/N	DESCRIPTION	REMARK
1	206-69623	Harmonic Drive, RH-8-SP	
2	206-67027-01	Grating Assy	
	└206-67029-01	Adherent Grating	Grating with fixed pin
3	206-67024-01	Slit & Filter Assy	
4	206-67060	Toroidal Mirror Assy	
5	206-67092	Mirror Assy	For R side
6	206-67066	Mirror Assy	For S side
7	206-90153	Beam Splitter, B (30*36)-F1	
8	205-82661-02	Window Plate , W(30)-Q	
9	036-15501-21	O Ring, AS568A-121 1A	
10	206-60667	Coupler Board Assy	

10.8 Cell Housing ASSY

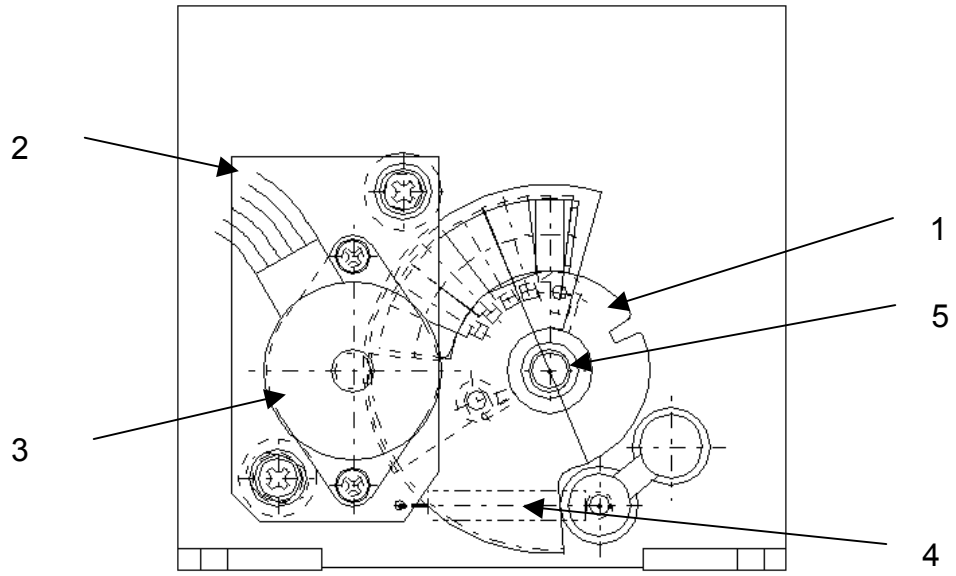
P/N 206-60184-04



ITEM No.	P/N	DESCRIPTION	REMARK
1	206-18009-01	Cell Housing	
2	202-82009-91	Holder Cell, Assy	
3	204-00570	Screw	
4	206-60165	Plate	
5	204-07348	Slide plate	
6	206-80401	Cover, sample compartment	

10.9 Slit & Filter Assy

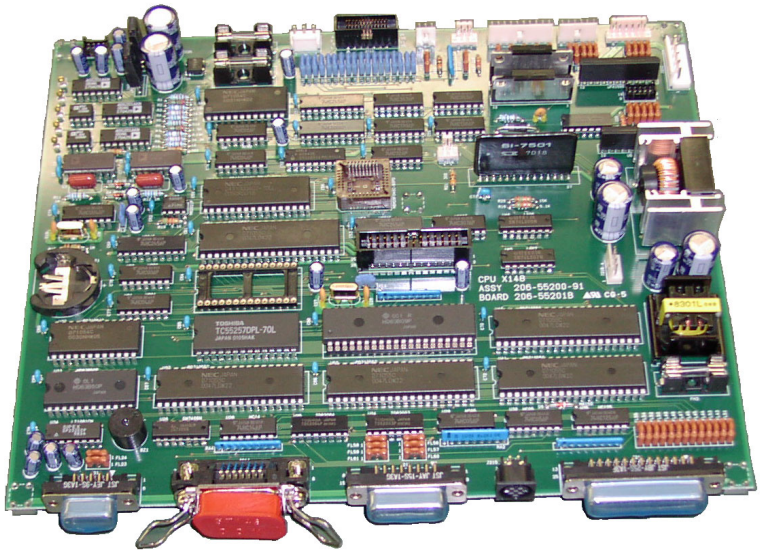
P/N 206-67024-01



ITEM No.	P/N	DESCRIPTION	REMARK
1	206-67026	Filter Gear Assy	
2	206-67087	Motor holder	
3	206-69621	Motor, PFC25-24-1	
4	034-03057-02	Spring, E-562	
5	026-66213	Snap ring, E type SUS 5	

10.10 PCB ASSY, CPU

P/N 206-55200-91



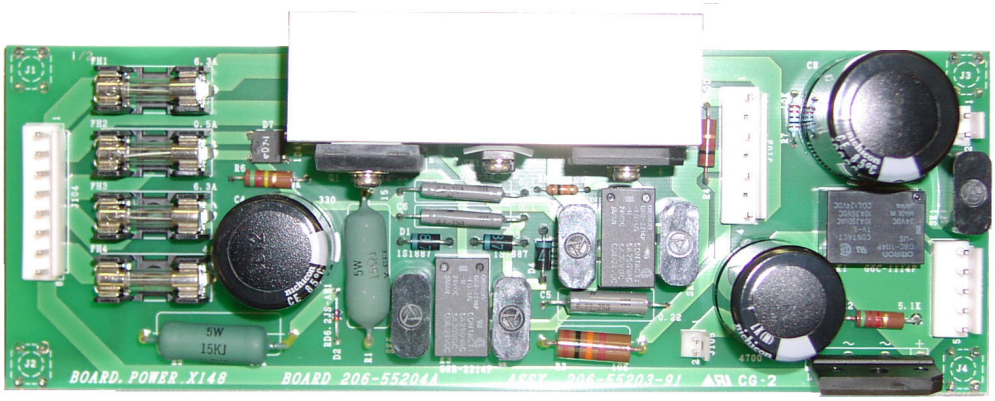
ITEM No.	P/N	DESCRIPTION	REMARK
1	074-73307-01	Battery, CR2032	BT 2
2	078-20159-01	BUZZER, TMB-05	BZ 1
3	060-15837-03	DI, RK34	D 1
4	060-15025-01	DI, 1B4B42	D 2
5	060-13923-02	DI, RD10E-B1	D 3, 4
6	060-15428-01	DI, MA150	D 5
7	072-02004-13	Fuse, 218.500	F 1, 2, 3
8	072-05648-02	Fuse Holder, 0GN0031820	FH1, 2, 3
9	070-50697-12	Connector, B3P-VH	J201
10	070-50697-14	Connector, B5P-VH	J202
11	070-50695-08	Connector, 1-171825-0	J203
12	070-51929-05	Connector, DF1-6P-2.5DSA	J204
13	070-50695-04	Connector, 171825-6	J205
14	070-51941-24	Connector, DF11-10DP-2DSA	J206
15	070-50695-01	Connector, 171825-3	J207
16	070-51929-02	Connector, DF1-3P-2.5DSA	J208
17	070-51941-23	Connector, DF11-8DP-2DSA	J209
18	070-51790-56	CN, HIF6A-26PA1.27DSA	J210
19	070-02832-21	Connector, JBY-25S-1A3F	J211
20	070-02832-11	Connector, JEY-9S-1A3G	J212

ITEM No.	P/N	DESCRIPTION	REMARK
21	070-02832-12	Connector, JAY-15S-1A3G	J213
22	206-86450-91	Connector	J214
23	070-27311-42	Connector, HR12-10R-8SDL	J215
24	070-51929-01	Connector, DF1-2P-2.5DSA	J216
25	070-52392-04	CN, HIF3F-26PA2.54DSA	J217
26	070-50695-02	Connector, 171825-4	J218
27	070-02120-97	Cap, DB-25S-DC1	JC11
28	070-02120-95	Cap, DE-9S-DC1	JC12
29	070-02120-96	Cap, DA-15S-DC1	JC13
30	070-01610	Cap, 5714S	JC14
31	075-23690-01	IC, ADG201AKN	U 1, 2, 3
32	075-28415-02	IC, OP07CP	U 4, 5
33	075-23714-03	IC, AD652AQ	U 6, 7
34	075-33487-07	IC, TC74HCU04AP	U 8
35	075-33487-02	IC, TC74HC02AP	U 9
36	075-33487-92	IC, TC74HC245AP	U 10, 15, 23
37	075-33488-16	IC, TC74HC367AP	U 11, 12, 22
38	075-30346-10	IC, M5M51008BP-55LL	U 14
39	075-33487-20	IC, TC74HC32AP	U 16
40	075-33487-46	IC, TC74HC138AP	U 17, 19
41	075-33488-65	IC, TC74HC688AP	U 18
42	075-33487-00	IC, TC74HC00AP	U 20
43	075-33487-05	IC, TC74HC04AP	U 21, 55
44	075-33999-03	IC, TD62003P	U 24, 47
45	075-33997-02	IC, TD62064P	U 25
46	075-20006	IC, SN7406N	U 26
47	075-31836-01	IC, µPD71055C	U 27
48	075-33487-15	IC, TC74HC14AP	U 28
49	075-33487-08	IC, TC74HC05AP	U 29, 30
50	075-38015-01	IC, MSM62X42BRS-A	U 31
51	075-31827-01	IC, µPD71054C	U 32
52	075-35803-11	IC, HD63B50P	U 33
53	075-38619-01	IC, LT1081CN	U 34
54	075-33487-39	IC, TC74HC125AP	U 35
55	075-35806-01	IC, HD63B09	U 36
56	075-30403-02	IC, M62021P	U 37
57	075-31289-33	IC, µPD43256BCZ-70LL	U 38

ITEM No.	P/N	DESCRIPTION	REMARK
58	075-31836-01	IC, µPD71055C	U 40, 41
59	075-39110-01	IC, SI-7501	U 42
60	075-39109-03	IC, SLA5015	U 43
61	075-39109-01	IC, SLA5011	U 44
62	075-20007-02	IC, SN74LS07N	U 45
63	075-20006-02	IC, SN74LS06N	U 46
64	075-31140-34	IC, µPC7915AHF	U 48
65	075-31134-12	IC, µPC7815AHF	U 49
66	075-31827-01	IC, µPD71054C	U 50
67	075-31836-01	IC, µPD71055C	U 51, 52
68	075-31908-02	IC, µPA1500BH	U 53, 54
69	074-88025-02	IC, YDS-212-S2	U 56
70	075-39115-05	IC, SI-8301L	U 57
71	061-86480-08	Oscillator, AT-51 8.000	X 1
72	061-86480-12	Oscillator, AT-51 4.000	X 2

10.11 PCB ASSY, Power

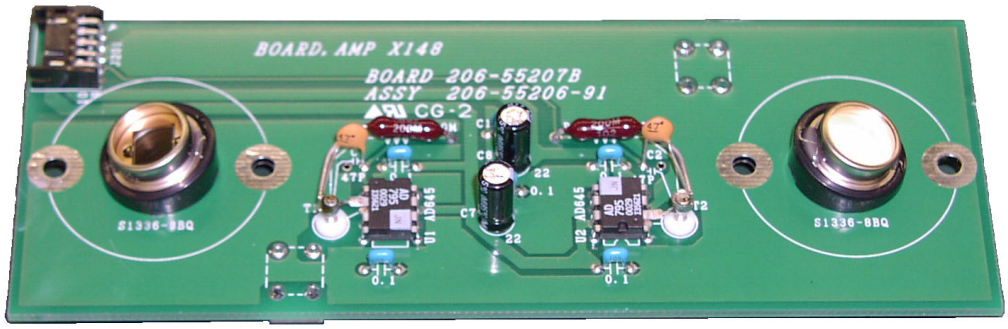
P/N 206-55203-91



ITEM No.	P/N	DESCRIPTION	REMARK
1	206-55219	Radiator	
2	060-01887	DI, 1S1887	D 1, 3, 4
3	060-13956-14	DI, RD6.2JS-AB1	D 2
4	060-15840-01	DI, RBV-406B	D 5
5	060-18924-01	DI, GBU8D	D 6
6	060-15025-02	DI, 1D4B42	D 7
7	072-02010-11	Fuse, 23706.3	F 1, 3
8	072-02004-13	Fuse, 218.500	F 2
9	072-02010-08	Fuse, 237004	F 4
10	072-05648-02	Fuse Holder, 0GN0031820	FH 1, 2, 3, 4
11	070-50697-11	Connector, B2P-VH	J101
12	070-50697-43	Connector, B4P7-VH	J102
13	070-50697-14	Connector, B5P-VH	J103
14	070-50697-17	Connector, B8P-VH	J104
15	070-50695-10	Connector, 171825-2	J105
16	065-61979-45	Relay, G6C-1114P DC24V	K 1
17	065-61982-61	Relay, G6B-2214P-FD-US*	K 2, 3
18	060-28314-02	TR, 2SD1314(SMZ)	Q 1
19	058-00001	Spark arrester, S120033	SK 1,2, 3, 4, 5
20	066-81012-74	SW, 0HD-5R-90B	SW 1

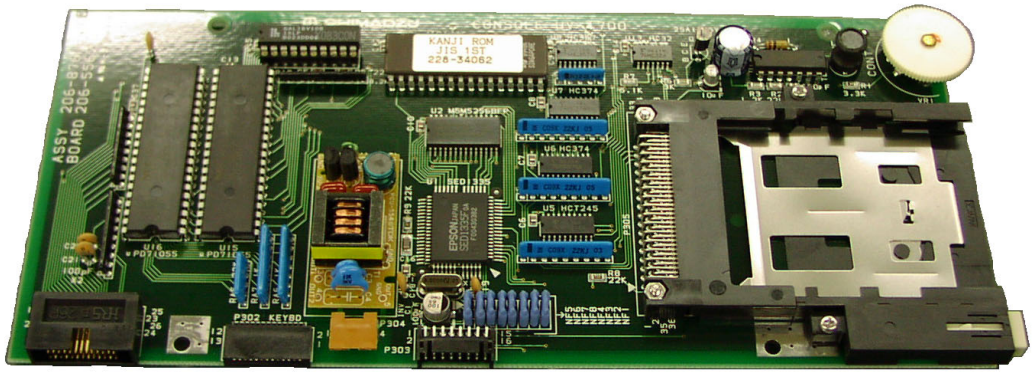
10.12 PCB ASSY, Preamp

P/N 206-55206-91



ITEM No.	P/N	DESCRIPTION	REMARK
1	061-70628-27	Photodiode, S1336-8BQ	D 1, 2
2	070-51941-44	Connector, DF11-10DP-2DS22	J201
3	050-50403-29	R, GS-1/2B 200M J	R 1, 2
4	071-06102	Terminal, PTFE VTA-3	T 1, 2
5	075-23758-05	IC, AD645KN	U 1, 2
6	016-37551	Tube, PTFE 0.60*0.25	
7	016-43211-20	PE Tube, 2*0.2CL-1M	
8	055-85830-18	C, ECCF1H470J	C1, 2

10.13PCB ASSY, Console P/N206-87615-92



ITEM No.	P/N	DESCRIPTION	REMARK
1	058-82049-05	L, 8RB187LY-221K	L 1
2	070-51790-45	Connector, HIF6A26PA1.27DS	P301
3	070-53621-07	Connector, FH3-13S-1.27DS	P302
4	070-51941-47	Connector, DF11-16DP-2DS22	P303
5	070-54122-03	Connector, IL-G-4P-S3L2-SA	P304
6	070-54201-04	Connector, FCN565P068G/C22	P305
7	060-21015	TR, 2SA1015	Q 1
8	075-39074-01	IC, SED1335F0A	U 1
9	075-30320-90	IC, M5M5256DFP-70LL	U 2
10	228-34062-91	Kanji ROM, JIS1-16DOT	U 3
11	075-33492-93	IC, TC74HCT245AF	U 5
12	075-33493-20	IC, TC74HC374AF	U 6, 7
13	075-33493-16	IC, TC74HC367AF	U 8
14	075-21211	IC, TL497ACN	U 11
15	075-82008-04	IC, CXA-L10L	H 12
16	075-33492-20	IC, TC74HC32AF	U 13
17	208-94307	IC, GAL X083CON	U 14
18	075-31836-01	IC, µPD71055C	U 15, 16
19	054-26846-01	VR, 161P-N2B10K Ω K*	VR 1
20	061-86480-08	Oscillator, AT-51 8.000	X 1

Chapter 11

Electric Circuits Diagram

11.1 Electrical Block Diagram