

**UV-1100  
SPECTROPHOTOMETER  
USER'S MANUAL**

# Contents

<b>Safety</b> .....	1
<b>General</b> .....	1
<b>Electrical</b> .....	1
<b>Warning</b> .....	2
<b>Working Principle</b> .....	2
<b>Unpacking Instructions</b> .....	3
<b>Specifications</b> .....	3
<b>Installation</b> .....	3
<b>Operation</b> .....	4
<b>Prepare the Spectrophotometer</b> .....	4
Description of keys .....	5
Turn on spectrophotometer ... ..	5
Basic operation.....	6
<b>Analyse Sample</b> .....	9
Basic Mode .....	9
Quantitative-A (Only For UVV-1200) .....	10
Coefficient.....	11
Standard Curve.....	13
Quantitative-B(Only For UV-1100).....	17
<b>Maintenance</b> .....	19
Lamp Replacement.....	19
Replace W lamp.....	19
Replace D2 lamp.....	20
Battery Replacement.....	21
Troubleshooting.....	22

**Safety:**

The safety statements in this manual comply with the requirements of the HEALTH AND SAFETY AT WORK ACT, 1974.

Read the following before installing and using the instrument and its accessories. The UV-1100 and 12 Series should be operated by appropriate laboratory technicians.

**General:**

The apparatus described in this manual is designed to be used by properly trained personnel in a suitable equipped laboratory. For the correct and safe use of this apparatus it is essential that laboratory personnel follow generally accepted safe procedures in addition to the safety precautions called for in this manual.

The covers on this instrument may be removed for servicing. However, the inside of the power supply unit is a hazardous area and its cover should not be removed under any circumstances. There are no serviceable components inside this power supply unit. For UV-1100 and 12 Series, avoid touching the high voltage power supply at all times.

Some of the chemicals used in spectrophotometer are corrosive and/or inflammable and samples may be radioactive, toxic, or potentially infective. Care should be taken to follow the normal laboratory procedures for handling chemicals and samples.

**Electrical:**

Before switching on the apparatus, make sure it is set to the voltage of the local power supply. (The Voltage Switch is in the rear of the instrument, if you want to change the voltage, you must remove the cover of the instrument first) . See Fig. 1-1.

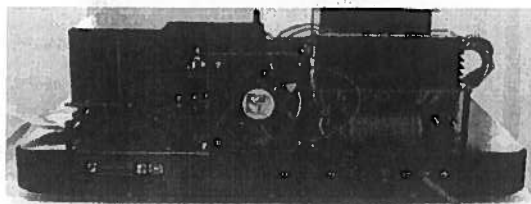


Fig. 1-1

Voltage Switch

The power cord shall be inserted in a socket provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective conductor.

**Warning:**

Any interruption of the protective conductor inside or outside the apparatus or

disconnection of the protective earth terminal is likely to make the apparatus dangerous. Intentional interruption is prohibited.

Whenever it is likely that the protection has been impaired, the apparatus shall be made inoperative and be secured against any unintended operation.

NEVER touch or handle the power supply on UV-1100 and 12 Series due to the high voltage.

The protection is likely to be impaired if, for example, the apparatus

- Shows visible damage
- Fails to perform the intended measurements
- Has been subjected to prolonged storage under unfavorable conditions
- Has been subjected to severe transport stresses

### Working Principle:

The spectrophotometer consists of five parts: 1) Halogen or deuterium lamps to supply the light; 2) A Mono-chromator to isolate the wavelength of interest and eliminate the unwanted second order radiation; 3) A sample compartment to accommodate the sample solution; 4) A detector to receive the transmitted light and convert it to an electrical signal; and 5) A digital display to indicate absorbance or transmittance. The block diagram (Fig 1-2) below illustrates the relationship between these parts.

Block diagram for the Spectrophotometer

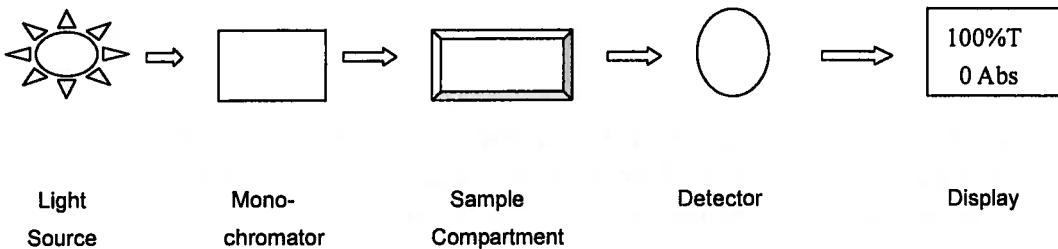


Fig1-2

In your spectrophotometer, light from the lamp is focused on the entrance slit of the mono-chromator where the collimating mirror directs the beam onto the grating. The grating disperses the light beam to produce the spectrum, a portion of which is focused on the exit slit of the mono-chromator by a collimating mirror. From here the beam is passed to a sample compartment through one of the filters, which helps to eliminate unwanted second order radiation from the diffraction grating. Upon leaving the sample compartment, the beam is passed to the silicon photodiode detector and causes the detector to produce an electrical signal that is displayed on the digital display.

### Unpacking Instructions:

Carefully unpack the contents and check the materials against the following packing list to

ensure that you have received everything in good condition.

### Packing List

Description	Quantity
• Spectrophotometer .....	1
• Mains Lead .....	1
• Cuvette .....	Set of 4, glass
• .....	Set of 2, quartz
• Manual .....	1

**Note: V-1200 includes only glass cuvette, no quartz cuvette.**

### Specifications:

### Installation:

1. After carefully unpacking the contents, check the materials with the packing list

Model	UV-1100	V-1200	UV-1200
Wavelength Range	200-1000nm	325-1000nm	200-1000nm
Spectral Bandwidth	4nm		
Optical System	Single Beam, Grating 1200lines/mm		
Wavelength Accuracy	±2nm	±1nm	
Wavelength Repeatability	1nm	0.5nm	
Wavelength Resolution	0.1nm		
Photometric Accuracy	±0.5%T		
Photometric Repeatability	±0.3%T		
Photometric Range	-0.097-1.999A 0-125%T	-0.097-2.5A, 0-125%T	
Stray Light	≤0.3%T		
Stability	±0.004A/h @500nm	±0.002A/h @500nm	
Display	Graphic LCD (128X64 dots)		
Keyboard	Membrane keypad		
Photometric Mode	T, A, E		
Detector	Si Photodiode		
Sample Compartment	Standard 10mm path length cuvette Accommodates 100mm path length cuvette with optional holder		
Light Source	Tungsten & Deuterium	Tungsten lamp	Tungsten & Deuterium
Output	USB Port Parallel Port (printer)		
Power Requirement	AC 220V/50Hz or 110V/60Hz		
Dimensions (W x D x H)	480 x 360 x 160mm		
Weight	12kg	11kg	12kg

(page 4) to ensure that you have received everything in good condition.

2. Place the instrument (Fig.1-3) in a suitable location away from direct sunlight. In order to have the best performance from your instrument, keep it as far as

possible from any strong magnetic or electrical fields or any electrical device that may generate high-frequency fields. Set the unit up in an area that is free of dust, corrosive gases and strong vibrations.

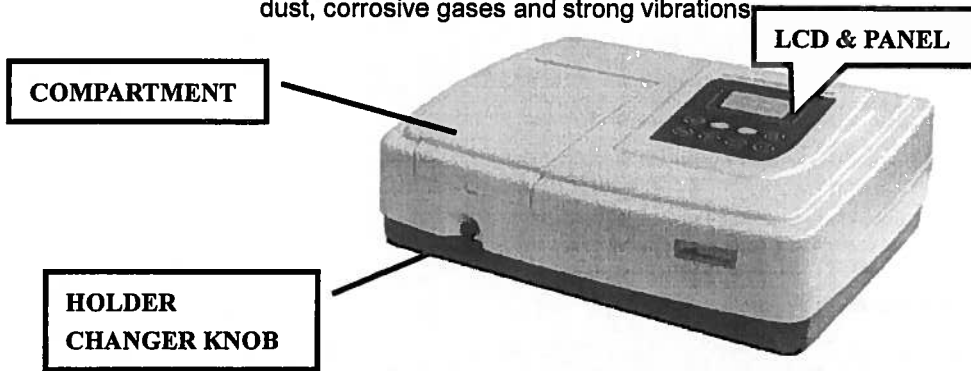


Fig.1-3

3. Remove any obstructions or materials that could hinder the flow of air under and around the instrument.
4. Use the appropriate power cord and plug into a grounded outlet.

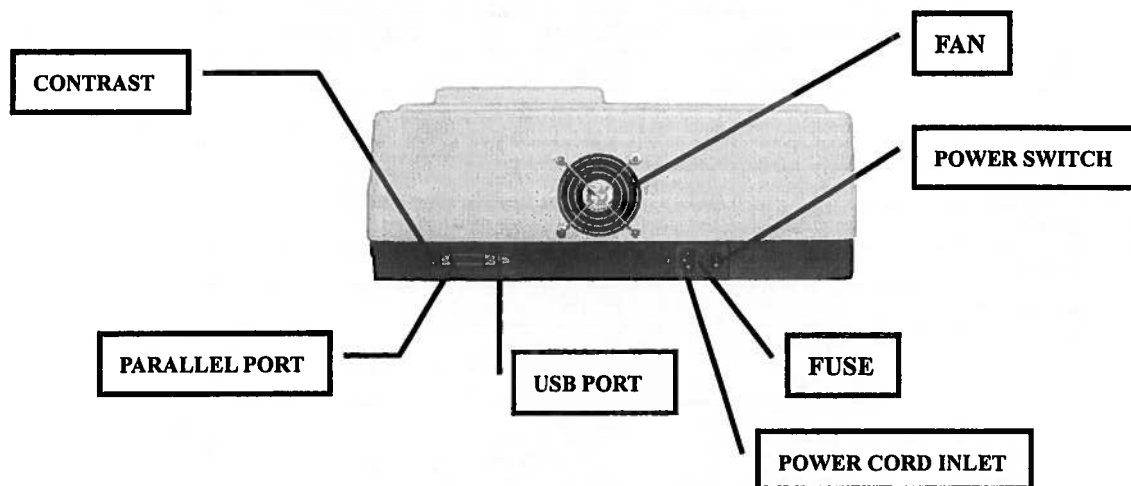


Fig.1-4 Rear panel

5. Turn on your UV-1100 and 12 Series model spectrophotometer. Allow it to warm up for at least 20 minutes before taking any readings.

## Operation:

### Prepare the spectrophotometer

Fig 1-5 is the control panel. User can perform all operations by pressing the keys and all the results and operation information are displayed on the LCD.

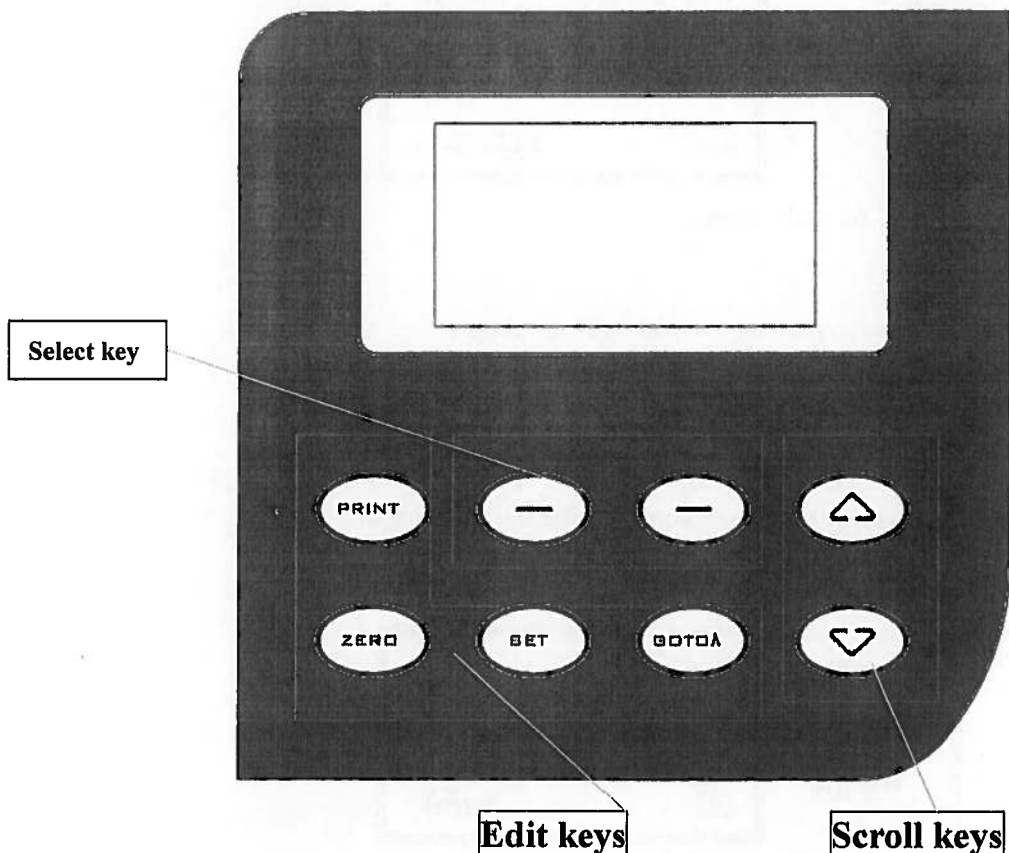


Fig 1-5

- Description of keys

【GOTO λ】	Set wavelength;
【ZERO】	Blank
【SET】	System function
【PRINT】	Print or delete the test results
【--】	Instruction selection keys, the instruction will display on the bottom of the screen. The position of the keys is corresponding to the position of the instructions listed on the screen.
	<b>Note: To describe conveniently, we call the left key of 【-】 as "F1", and the right key of 【-】 as "F2" in this manual.</b>
【^】 , 【v】	Scroll items for selecting; Browse the items for selection;

- Turn on spectrophotometer

- 1) Turn on spectrophotometer by pressing the Power Switch (I/O).
- 2) A welcome interface will display on the screen. Then the instrument starts to self-test.
- 3) When self-testing ended, it goes into the main menu. (Fig. 1-6)

**Note: DO NOT OPEN SAMPLE COMPARTMENT LID DURING SELF-TESTING.**

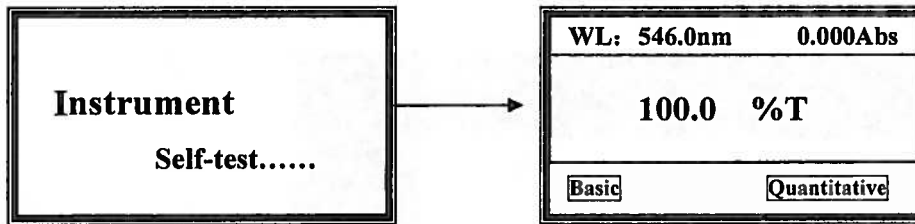


Fig. 1-6 Main menu

## Basic Operation

The display interface is user-friendly, always you can complete all the operation according to the clues on the screen.

### 1) Set Wavelength

Press **[GOTO λ]** to go into wavelength setting interface. Then press **[^]** or **[v]** to select the wavelength you want, then press **OK** (F1) to confirm. After the wavelength being changed, it returns to main menu automatically. If you don't want to change the wavelength, press **Return** (F2) to go back to main menu. (Fig. 2-1)

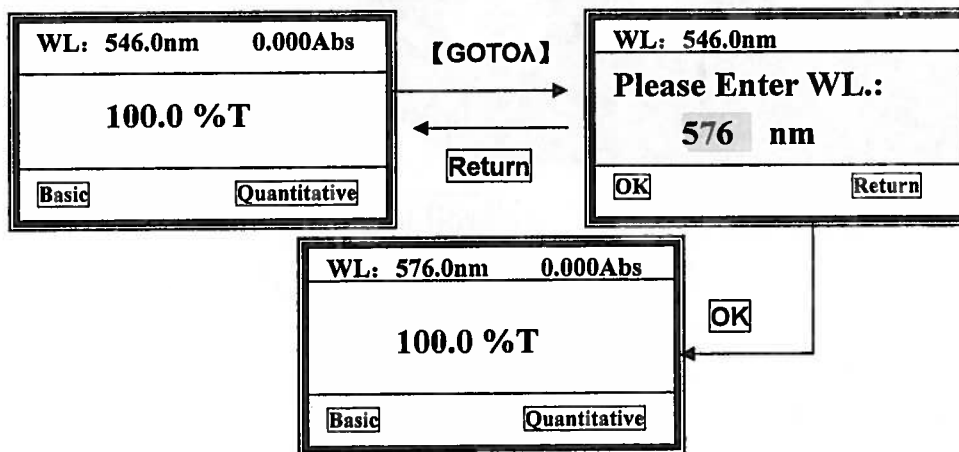


Fig.2-1

### 2) Blank

Pull the reference cuvette into the light path, Press **[zero]** to blank. (Fig.2-2)

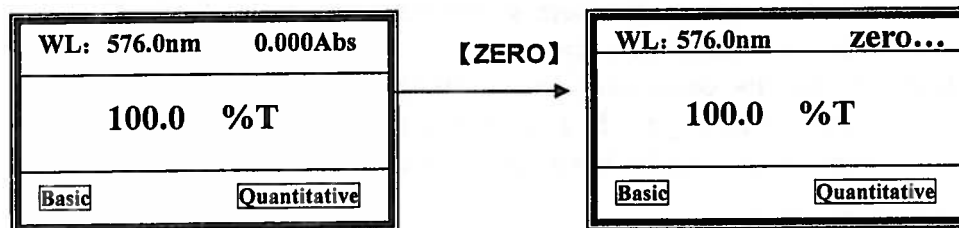


Fig.2-2 Blank

### 3)Utility

Press **[SET]** to go into system functions interface, use **[^]** or **[v]** to select, then press



**ok**(F1) to go into the corresponding item. (Fig.2-3)

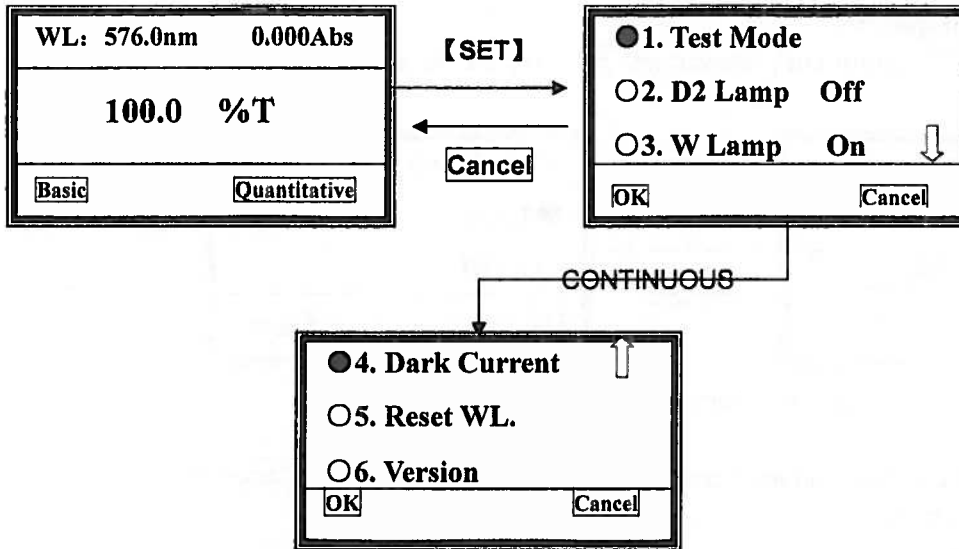


Fig.2-3 go into utility setting interface

### 3.1 Test Mode

Move the cursor on "Test Mode", followed with **ok**(F1) pressed, it goes into the mode selection interface. (Fig.2-4)

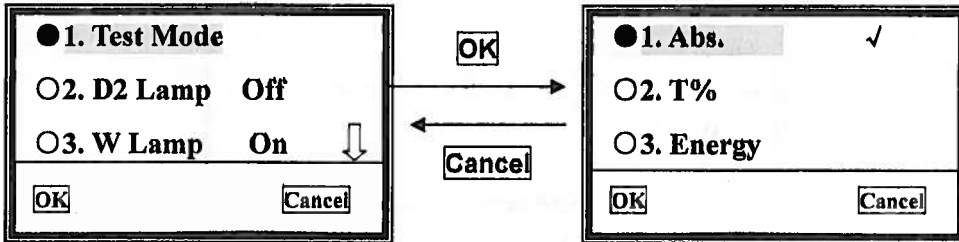


Fig. 2-4 select test mode

Move the cursor on the photometric mode you want by pressing **[^]** or **[v]**, then press **ok**(F1) to confirm. Once the symbol "✓" appears at the end of the item, you can press **Cancel**(F2) to return to the upper interface.

### 3.2 Deuterium Lamp Management (only for uv-1100 and uv-1200)

Move the cursor on "D2 Lamp Off", followed with **ok**(F1) pressed, it goes into another interface. (Fig. 2-5)

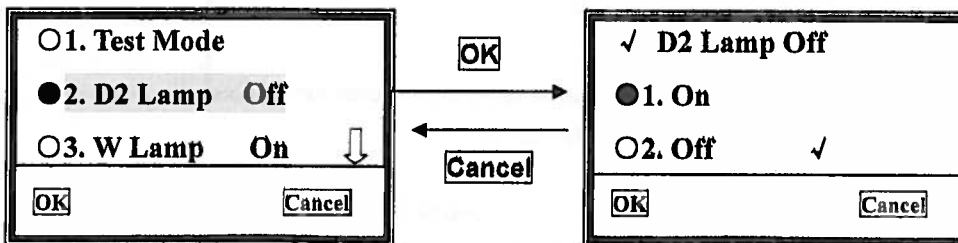


Fig. 2-5 Deuterium lamp management

Choose the deuterium lamp condition you want, press **ok**(F1) to confirm, then press

**Cancel** (F2) to return to upper interface.

Note: When the D2 is from "off" to "on", it will cost a few minutes to warm up.

### 3.3 W Lamp Management

Move the cursor on "W Lamp On", followed with **ok** (F1) pressed, it goes into another interface. (Fig. 2-6)

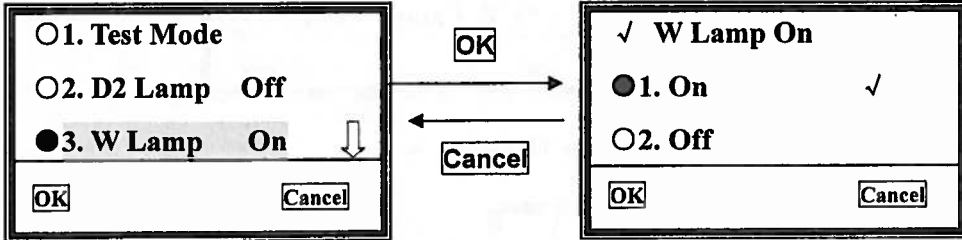


Fig. 2-6 D2 lamp manage

Choose the W lamp condition you want, press **ok** (F1) to confirm, then press **Cancel** to return to upper interface.

### 3.4 Dark Current

Move the cursor on "Dark Current", followed with **ok** (F1) pressed to get dark current. (Fig.2-7) Once the environment changed, such as temperature, instrument's station, etc, you should going this operation.

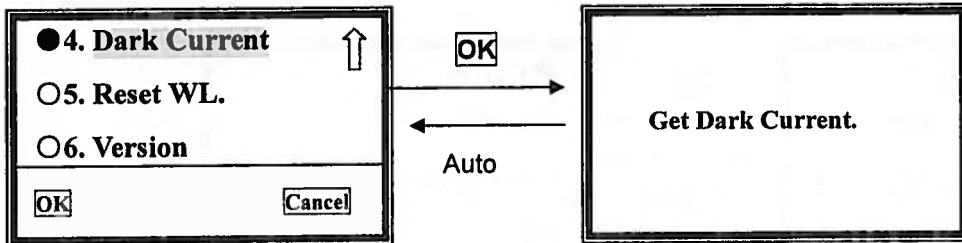


Fig. 2-7 Get dark current

### 3.5 Reset WL.

Move the cursor on "Reset WL.", then press **OK** (F1), system begins to reset wavelength. (Fig.2-8)

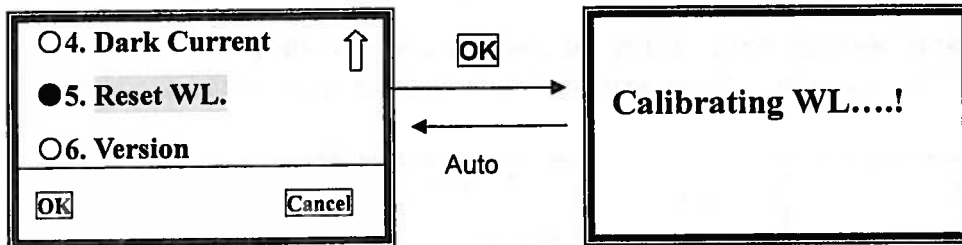


Fig. 2-8 Calibrate Wavelength

### 3.6 See the version

Move the cursor on "Version", then press **OK**(F1), you'll find the version of this instrument's hardware and software. (Fig.2-9) Press any key to return.

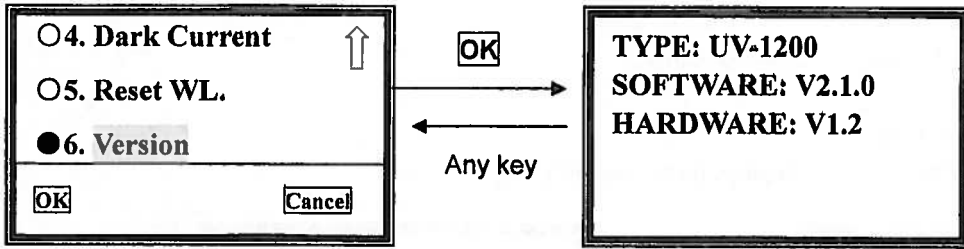


Fig. 2-9 Version

## Analyze Sample

### Before measurement

Make a blank reference solution by filling a clean cuvette half full with distilled or de-ionized water or other specified solvent. Wipe the cuvette with tissue to remove the fingerprints and droplets of liquid. Fit the blank cuvette into the 4-cell linear changer and place the cuvette in the slot nearest you. For the UV-1100 and 12 Series, push the changer so that the cuvette is in the light path (Push the rod in). Close the lid.

We provide two test methods in UV-1100 and 12 Series, they are basic mode and quantitative mode.

### 1. Basic Mode

Firstly, set the wavelength you need (Ref. Page 7).

#### 1) Go into basic test mode

Pull the blank cuvette into the light path, then press **Basic** (F1). After automatic blanking, it goes into Basic test interface. (Fig. 3-1)

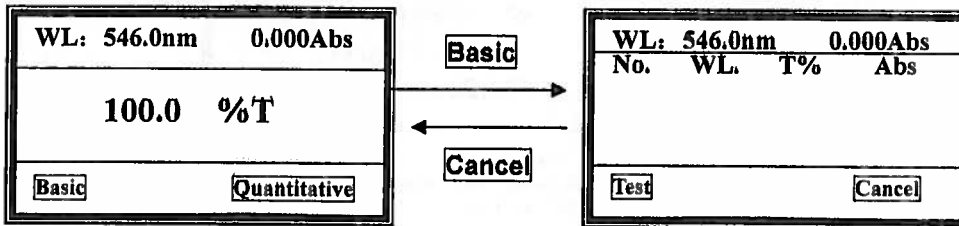


Fig.3-1 go into Basic test Interface

#### 2) Begin to test

Pull the sample into the light path, then press **Test** (F1) to measure. The test result displays on the screen. And it will be numbered automatically. (Fig.3-2)

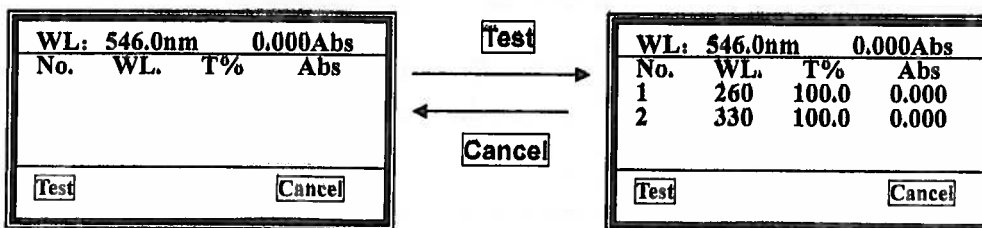


Fig.3-2 Basic test

Repeat step 2) to measure other samples, the results will be numbered orderly. Total 200 groups of test data can be saved in the RAM, 3 groups per screen. Use **【^】**, **【v】** keys to scroll.

Press **Cancel** **【F2】** to return to the main menu.

### 3) Clear or Print the data

Press the key of **【PRINT】**, it displays as follow: (Fig.3-3)

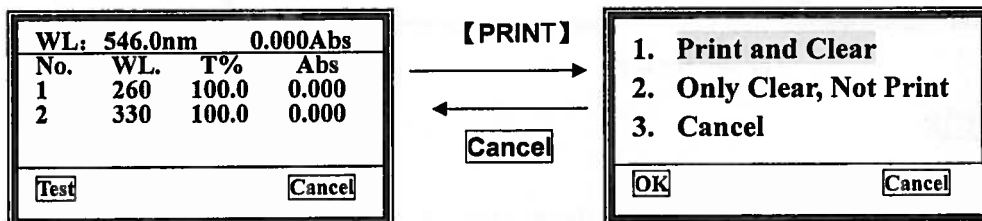


Fig.3-3 print or clear

Move the cursor on the item you want, then press **OK** (F1) to confirm.

Item 1 means all the data will be deleted after printing.

Item 2 means all the data will be deleted from screen and RAM without printing.

Item 3 means returning to upper interface without any choice, also you can press **Cancel** (F2) to return

Note: You can also **Set wavelength** and **Blank** by pressing **【GOTO λ】** and **【ZERO】** individually in the Interface of Basic Test.

## 2.Quantitative-A (Only for UV/V-1200)

Press **Quantitative** (F2) to go into quantitative test main menu. Three items are under your choice. (Fig.3-4) You can create, load and delete curves.

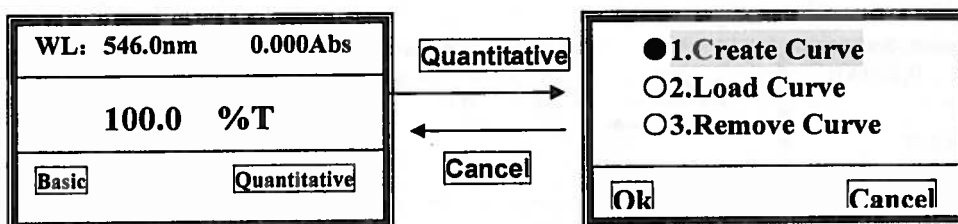


Fig.3-4 go into quantitative Interface

### 2.1 Create curve

Use **【^】** and **【v】** to move the cursor on the first item, then press **OK** (F1) to confirm.

You have two methods to choose. (Fig.3-5)

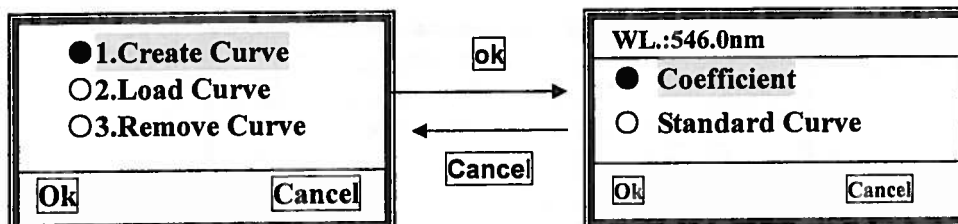


Fig.3-5 go into method choice Interface

If you have known a curve's equation, you can choose "Coefficient" method. Input all the coefficients to complete the equation, then to measure unknown samples.

If you don't know the equation, you'll have to create a standard curve by standard samples. At most 9 samples can be used.

### 2.1.1 Coefficient

- 1) Move the cursor on "Coefficient", then press **ok**(F1), it goes into the wavelength setting interface automatically.(Fig.3-6),

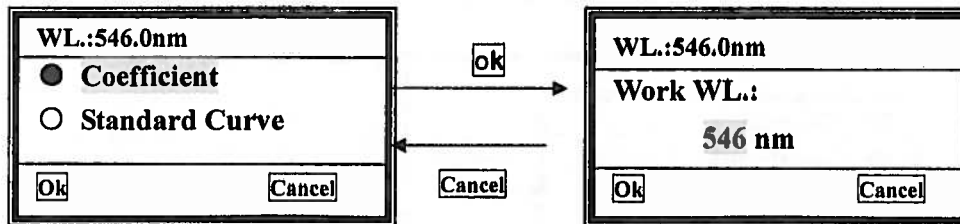


Fig.3-6

- 2) choose the wavelength you need by pressing **【^】** and **【v】**, followed with **ok**(F1) pressed. It goes into the coefficient setting interface. (Fig. 3-7)

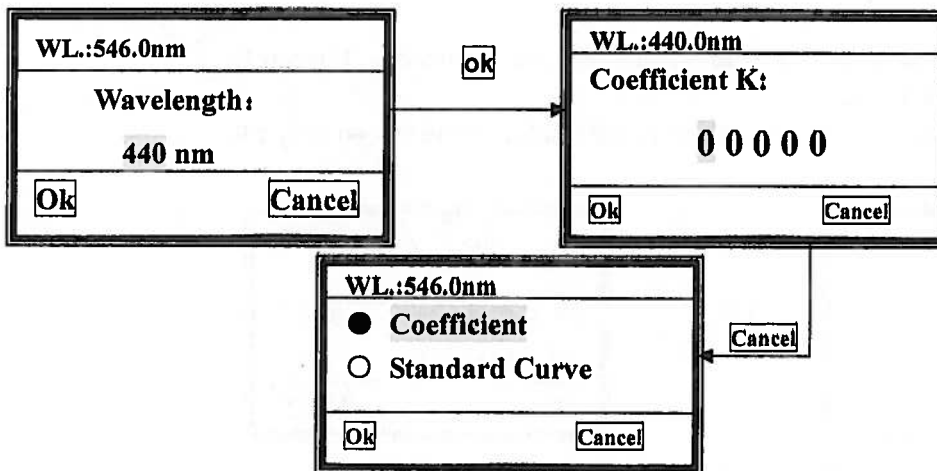


Fig.3-7

### 3) Input the coefficient K

There are five zeros on the screen, the cursor is on the first one at first.

Press **【^】** or **【v】**, the first zero will vary between "0~9". Choose the number or symbol you need, then press **ok**(F1) to confirm, the cursor then moves to the next zero automatically.

The second to the fifth bits vary between "0~9" and decimal point.

Complete other bits of Coefficient K in the same way.

**4) Input the coefficient B**

When the last bit of K value being confirmed and **Ok** (F1) pressed, the interface goes into the Coefficient B setting interface. (Fig. 3-8)

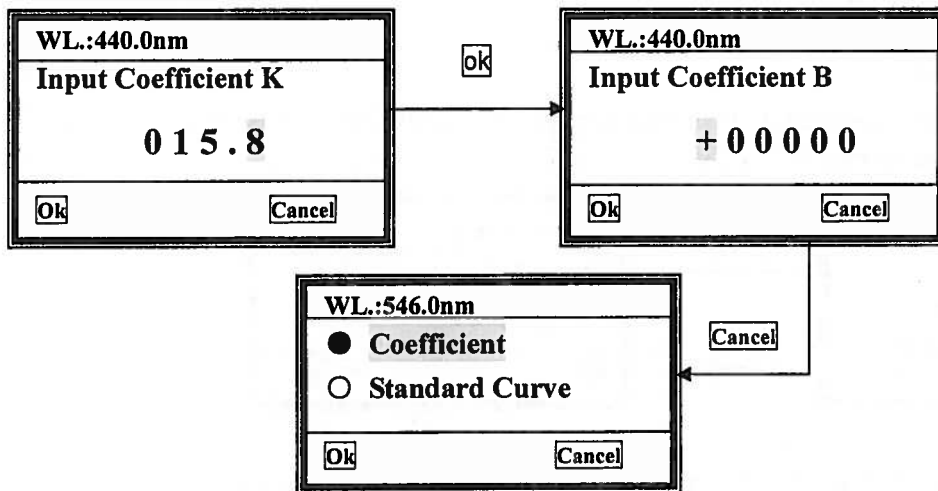


Fig.3-8

The first bit is symbol bit, vary from "+" to "-", other bits are number bits. The way to Input B is the same as K does.

After the last bit of B being confirmed, the curve will display on the screen. (Fig.3-9)

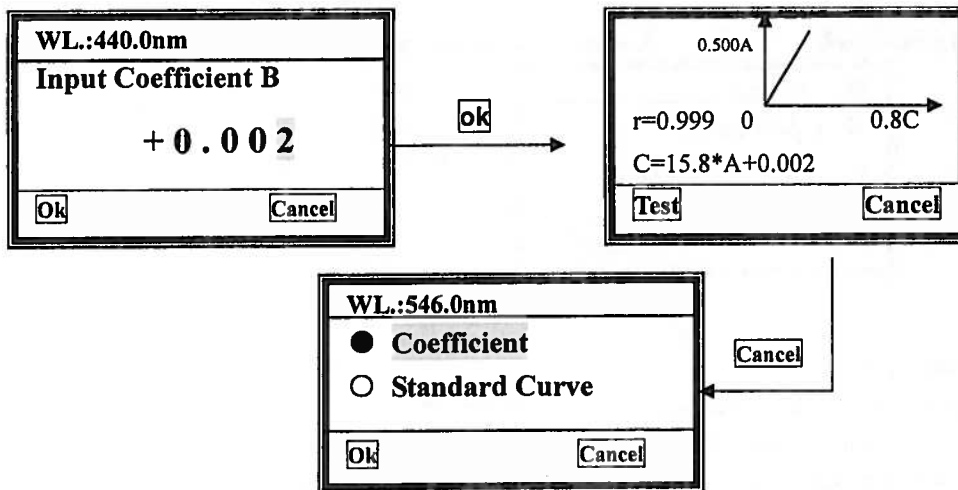


Fig.3-9

**5) Begin to test**

When the curve displays on the screen, you can use it to test the unknown samples' concentration. Just Press **Test** to do it. (Fig.3-10)

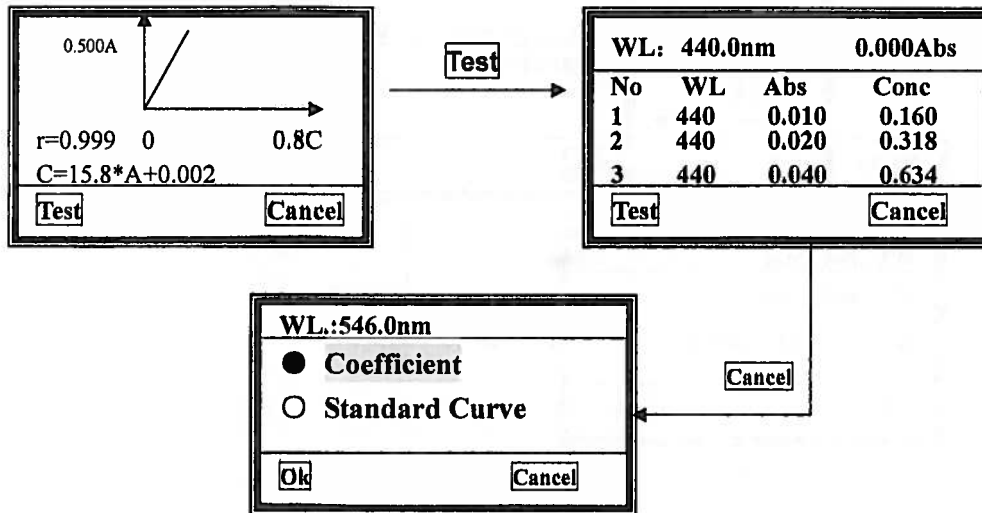


Fig.3-10

**6) Print**

Press **Print** in the concentration measure interface, the test results will be printed. (Ref. P.10)

**2.1.2 Standard Curve**

**1) Insert Blank Reference**

Move the cursor on "Standard Curve", then press **ok** (F1). The system will ask you to insert the blank reference. (Fig.3-11),

- a. Pull the blank cuvette in the light path, then close the compartment lid.
- b. Press **GOTO λ** to set wavelength, Ref. Page 6.
- c. Press **Ok** (F1) to blank.

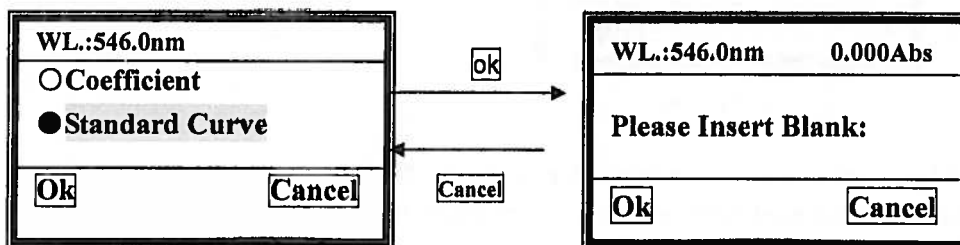


Fig.3-11

**2) Input the number of standards**

After blanking, the system will ask you to input the number of the standards.

Use **▲** or **▼** to choose the number you need, then press **Ok** (F1) to confirm.

Note: At most 9 standards are permitted. Other number is invalid. (Fig. 3-12)

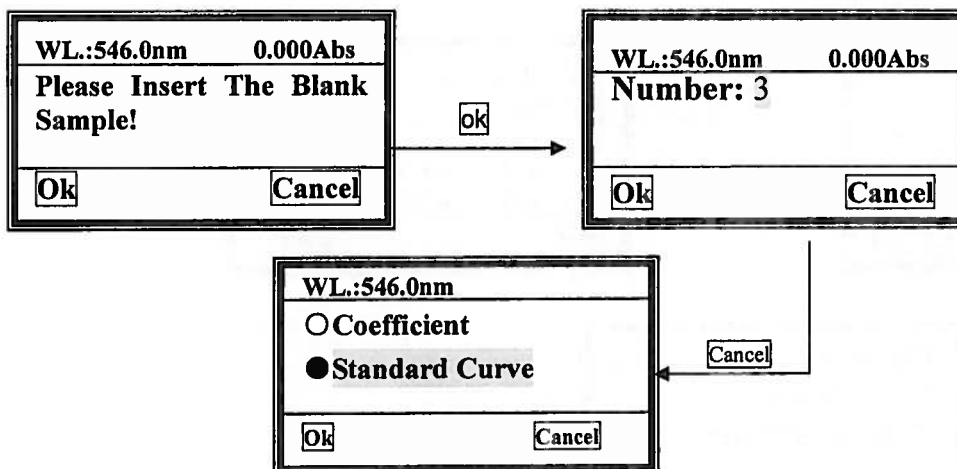


Fig.3-12

**3) Input the concentration of standards**

When you have finished the last step, the system will ask you to input the standards' concentration one by one. See the below figure 3-13.

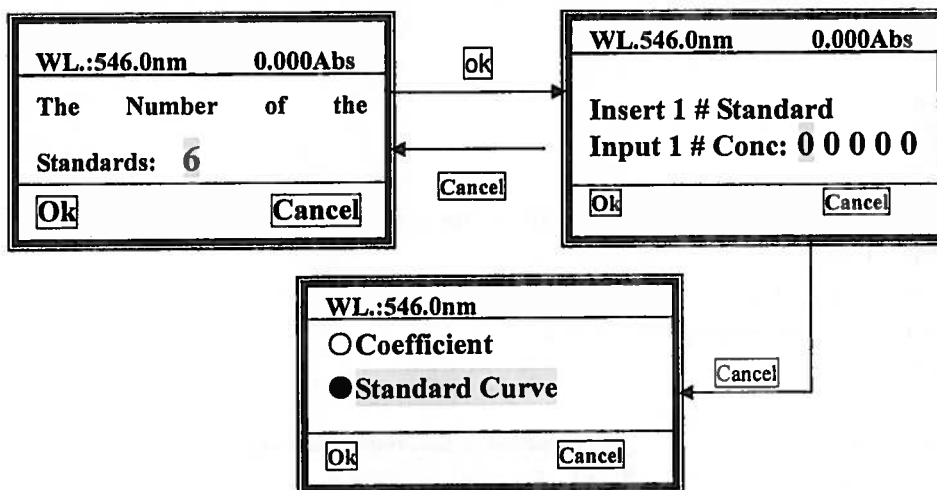


Fig. 3-13

You should input the No.1 standard sample's concentration first as the screen indicates. Please Ref. Page 12- Input the coefficient B, the inputting way is the same.

**4) See the curve**

When the last one is finished, for example total 6 standards are used, the curve will be drawn on the screen, and the curve equation will also display on the screen. (Fig.3-14)



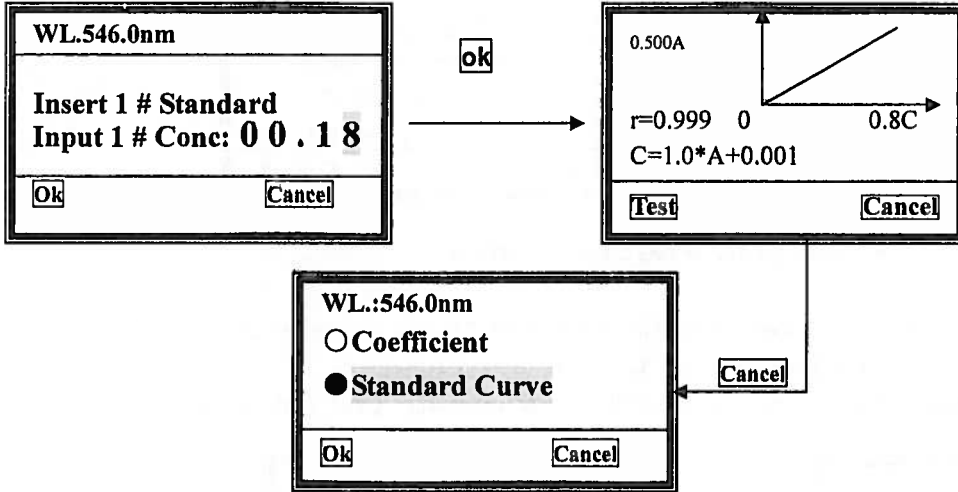


Fig.3-14

The curve and the curve equation will be saved in the RAM automatically, total 200 curves can be saved, and they'll be numbered orderly.

5) Test

Insert the unknown concentration sample in the holder, then close the compartment lid and pull the sample in the light path. Press **Test** (F1) to measure. The results will display on the screen. (Fig. 3-15)

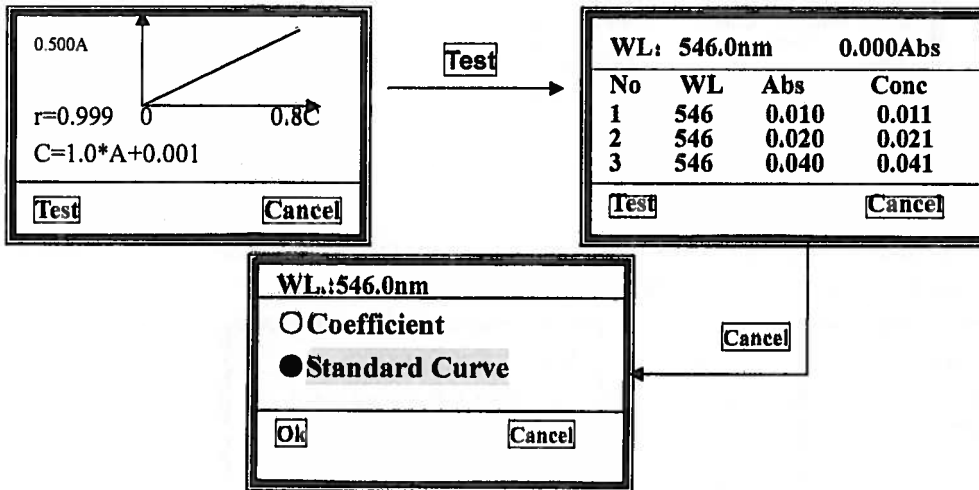


Fig. 3-15

6) Print

You can print the test results and the curve, just press **Print** . Please Ref. Page 11.

2.2 Load Curve

Use **^** and **v** to move the cursor on the second item, then press **OK** (F1) to confirm. (Fig.3-16), you'll go into the curve choice Interface.

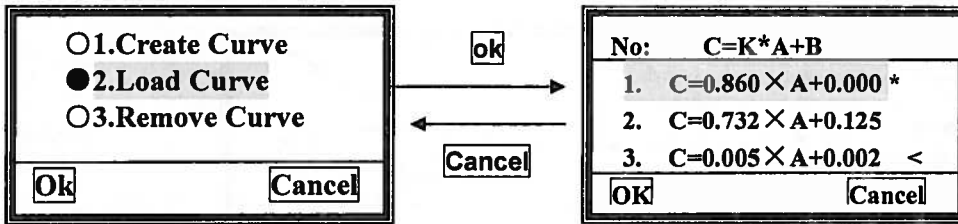


Fig.3-16 go into curve choice Interface

All the curves you create will be saved in the RAM automatically, you can select the one you want using **【^】** and **【v】** followed with **OK** (F1) pressed.

Note: Total 200 curves can be saved, you can find them by pressing **【^】** and **【v】**.

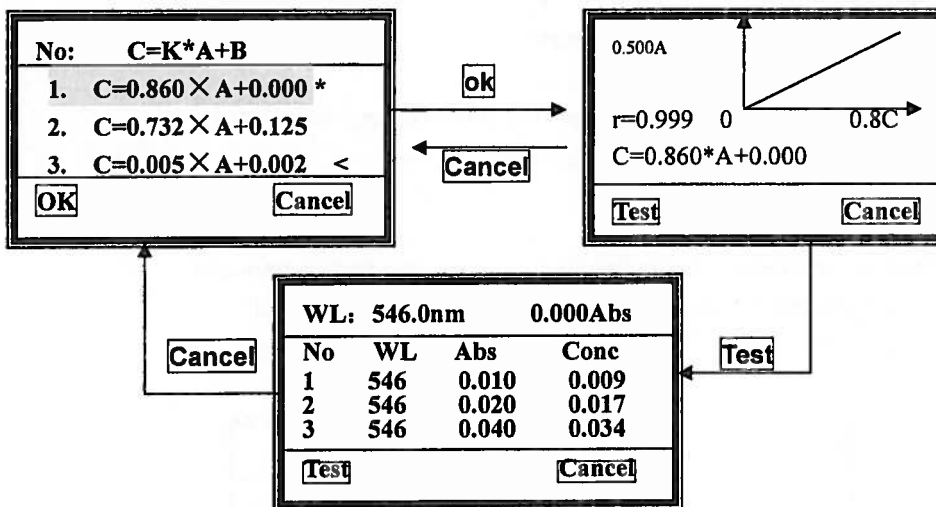


Fig.3-17

### 2.3 Delete Curve

Use **【^】** and **【v】** to move the cursor on the third item, then press **OK** (F1) to confirm. (Fig.3-18), you'll go into the curve deleting interface.

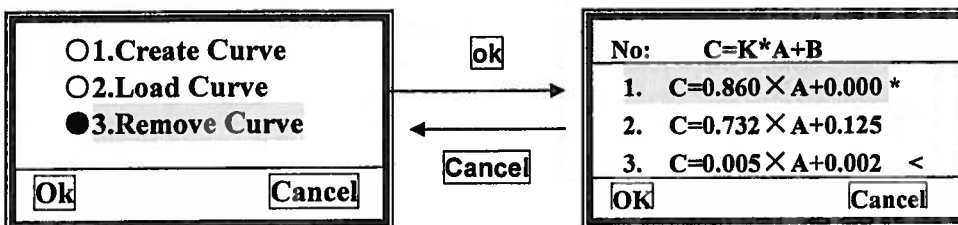


Fig.3-18 Go into curve choice Interface

Move the cursor on the equation you want to remove, then press **OK** (F1), the curve will be deleted from the screen and RAM.

## 2.Quantitative-B (Only for UV-1100)

This is a simple quantitative method, always is called **Single Point Standard Curve Method**. If you have a standard sample, and it's Absorbance can be measured, then a curve can be created through zero. And you can use the curve to measure other samples.

For UV-1100, the curve will not display on the screen, but you can use it to measure.

Once the **Quantitative** (F2) be pressed, system will ask you to insert the blank first. (Fig.3-19)

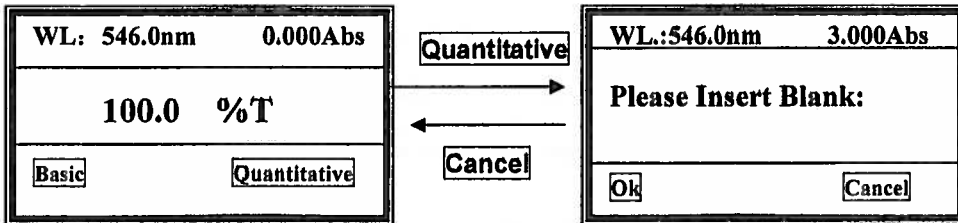


Fig.3-19 go into quantitative Interface

**You should operate as the follow steps:**

- 1) Insert the Blank Reference, standard sample and unknown sample cuvettes into the changer slots, then close the compartment lid.
- 2) Pull the blank cuvette in the light path, Press **【GOTO λ】** to set wavelength, please Ref. Page7.
- 3) Press **Ok** (F1) to blank. Then system asks you to input the standard's concentration. (Fig. 3-20)

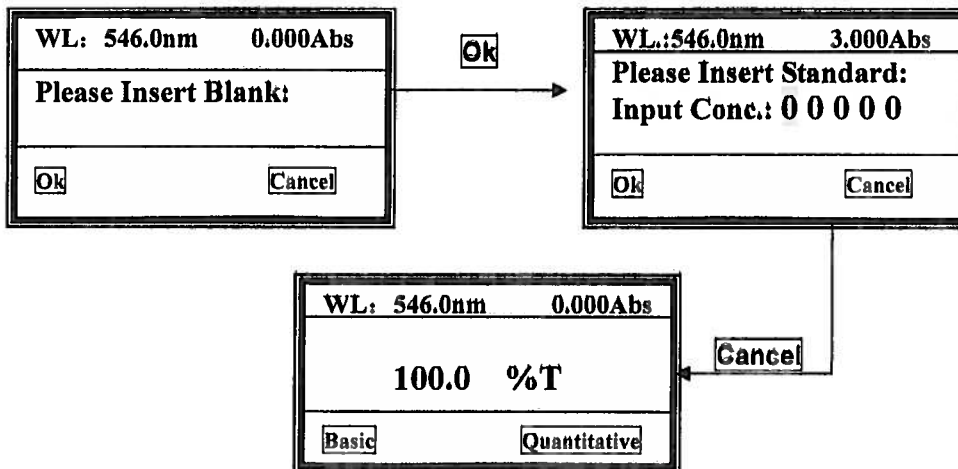


Fig. 3-20

- 4) Pull the standard cuvette in the light path, then input the value of the concentration.

There are five zeros on the screen, the cursor is on the first one at first.  
 Press **【^】** or **【v】**, the first zero will vary between "0~9". Choose the number you need, then press **ok** (F1) to confirm, the cursor then moves to the next zero automatically.

The 2<sup>nd</sup> ~5<sup>th</sup> bits vary between "0~9" and decimal point.  
 Complete other bits of the concentration value in the same way.

5) When you have finished the 5<sup>th</sup> bit, press **Ok** (F1) to go into the test interface. (Fig. 3-21)

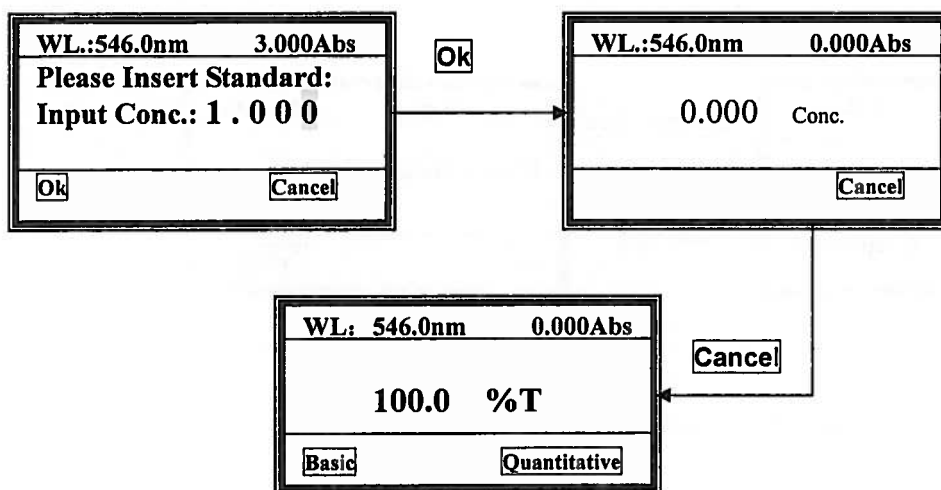


Fig. 3-21 Go into test interface

6) Push the blank cuvette into the light path, press **【ZERO】** to blank. Then pull the unknown sample cuvette into the light path, its concentration will display on the screen.

## Maintenance

### Inside Structure

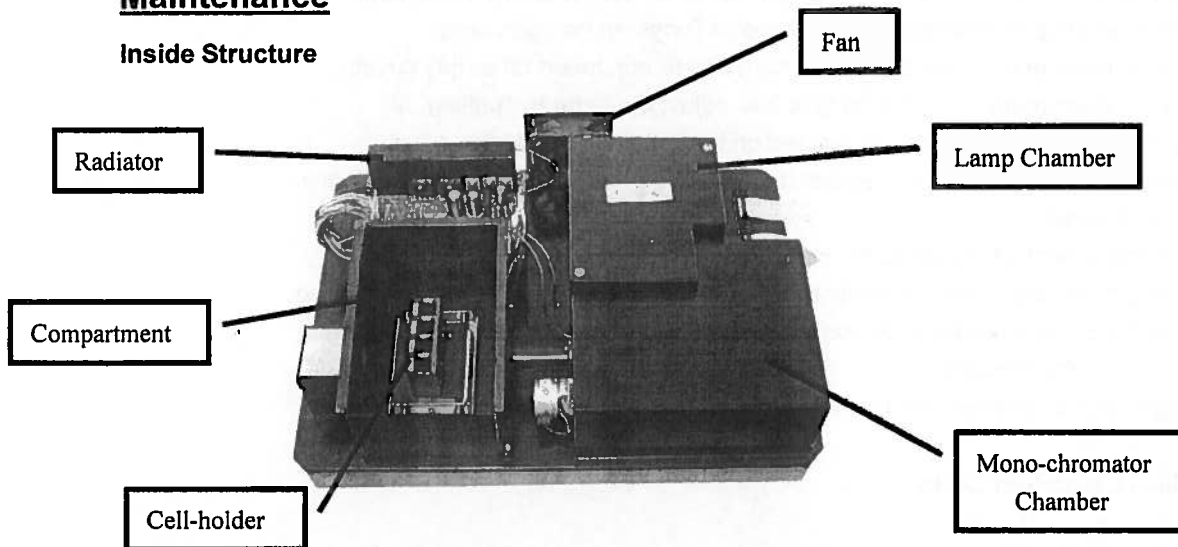


Fig.4-1 Inside Planform

### 1. Lamp Replacement

#### A. Replace Tungsten-Halogen Lamp

1. Turn off and unplug the instrument.
2. Remove the four screws on the sides of the spectrophotometer.
3. Remove the **Cuvette Holder Control Knob** by unscrewing the rod counterclockwise.
4. Remove the cover of the instrument very carefully and place it in the right of the instrument.

#### **BE SURE NOT TO PULL PANEL WIRING LOOSE!**

5. Unscrew the two screws from the **Lamp Chamber** and remove its cover.  
(Caution: The cover may be HOT, be sure to wear gloves when act)
6. Unplug and remove the lamp from ceramic base (the black connector). Insert the new lamp; pushing it in as far as it will go.

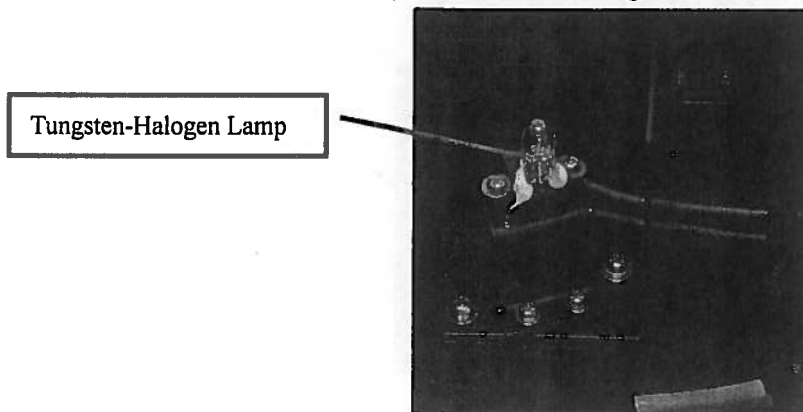


Fig.4-2

**CAUTION:**

- 1) do not handle the lamp with bare fingers. Use tissue or cloth when handling lamp.
- 2) There's no difference in polarity of the two legs of Tungsten-halogen lamp.
7. Switch the instrument on. Set the wavelength at 340 nm, insert an empty cuvette, and blank the instrument. If the energy is low, adjust the lamp by "pulling" or "pushing" it so that the light beam is focused on the entrance slot of the mono-chromator. Since the lamp socket is pre-aligned, there will be minimum, if any, adjustment required.
8. Switch the instrument off, re-cover the lamp chamber and tighten the two screws.
9. Reinstall the instrument cover by positioning the front of the cover first and then sliding the back of the cover over the backside grill plate. Be sure to prevent all wires from being pinched in the process.
10. Reinstall the four screws and the **Cuvette Holder Control Knob**.

**B. Replace Deuterium Lamp****WARNING: Wear UV protection Glasses before changing the Deuterium Lamp!**

1. Turn off and unplug the instrument (**VERY IMPORTANT: HIGH VOLTAGE**).
2. Remove the four screws on the sides of the spectrophotometer.
3. Remove the **Cuvette Holder Control Knob** by unscrewing the rod counterclockwise.
4. Remove the cover of the instrument very carefully and place it in the right of the instrument.

**BE SURE NOT TO PULL PANEL WIRING LOOSE!**

5. Unscrew the two screws from the **Lamp Chamber** and remove its cover. (**Caution: The cover may be HOT, be sure to wear gloves when act**)
6. Disconnecting the 3-wire connector by pulling it straight up. Remember the direction of the white connector. (**Fig. IV** in the following picture)
7. Loosen and remove the two white screws (**Fig. I and II** in the following picture) from the deuterium flange. Then pull the Deuterium lamp out by pinching its flange. (**Note: Fig. III** is a positioning bolt, there's no need to loosen it)

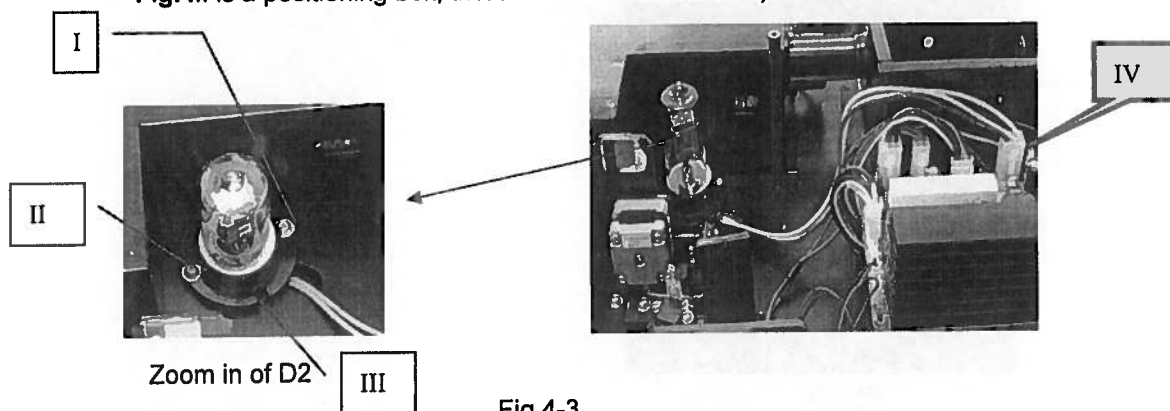


Fig.4-3

8. Replace a new pre-aligned lamp provided by or an authorized Service Provider. Be sure the socket of the lamp flange matches with the positioning bolt. Then tighten the two screws.
9. Reconnect the wire connector (make sure the wire connection orientation is the same as step 6.)
10. Turn on the instrument. After self-testing, select 300 nm and press **【ZERO】**. Check to make sure that the light beam is focused on the entrance slit of the monochromator. Since the lamp is pre-aligned, there will be minimum, if any, adjustment required.
11. Switch the instrument off, re-cover the lamp chamber and tighten the two screws.
12. Reinstall the instrument cover by positioning the front of the cover first and then sliding the back of the cover over the backside grill plate. Be sure to prevent all wires from being pinched in the process.
13. Reinstall the four screws and the **Cuvette Holder Control Knob**.

## 2. Battery Replacement

UV-1100 and 12 Series can save many data in the RAM, so a battery must be used in the mainboard. When the battery is disabled, you'll have to replace it as the following indication.

- 1) Turn off and unplug the instrument (**VERY IMPORTANT: HIGH VOLTAGE**).
- 2) Unscrew the 13 white screws from the bottom board and remove the board. (Fig.4-4)

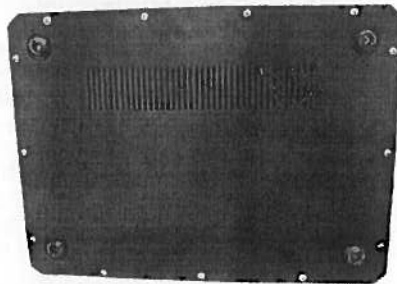


Fig.4-4 Bottom

- 3) Pick out the old battery and replace a new one. (Fig.4-6)

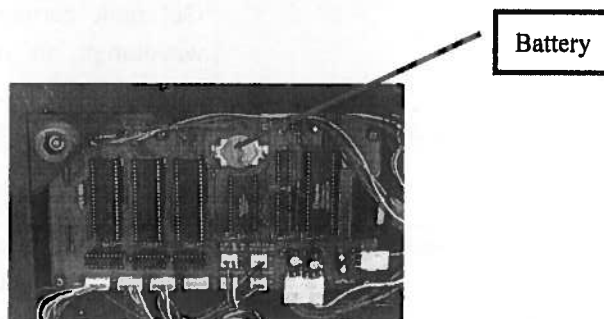


Fig. 4-5 Main Board

- 4) Recover the bottom board and tighten the 13 screws.

## Troubleshooting

PROBLEM	Possible Cause	Solution
Instrument Inoperative after switch power on	Power cord not connected to outlet	Plug instrument in
	Dead Power outlet	Change to a different outlet
	Wrong voltage setting	Switch to your local voltage or call an authorized service engineer
	Internal fuse blown or defective electronic component	Call an authorized service engineer
Instrument cannot set 100%T (0.000A)	Light beam blocked: Holder misaligned	Check sample holder
	Lamp is old or defective	Replace lamp
	Lamp is off alignment	Refer to lamp replacement instructions in this manual
	Defective electronic component	Call an authorized service engineer
Instrument drift and noise	No sufficient warm up time	warm up at least 20 minutes
	Use glass cuvette in Ultra-violet range	Change to quartz cuvette
	Significant temperature change Lamp not adjusted properly	Check lamp if has been properly installed. Refer to lamp replacement instructions in this manual
	Lamp old or defective	Replace with a new lamp
	Unstable power supply	equip a manostat to make the voltage stable
	Defective or dirty detector or defective electronic component	Call an authorized service engineer
Incorrect readings obtained	Insufficient sample volume	Fill cuvette with more samples
	Wrong wavelength setting Failed to blank (0A/100%T)	Check analytical procedure and wavelength setting. Get dark current and calibrate wavelength in utility menu by press <b>【SET】</b> .
	Stray sample preparation vapors.	Prepare sample away from instrument. Use proper ventilation
	Bubbles or particles in solution	Check sample preparation and analytical procedure
	Instrument out of electronic calibration	Call an authorized service engineer