

**V-1600**  
**USER'S MANUAL**

DOMINIQUE DUTSCHER SAS

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**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 MAPADA UV/V-1600/1800 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 MAPADA UV/V-1600/1800, 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 (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 MAPADA UV/V-1600/1800 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

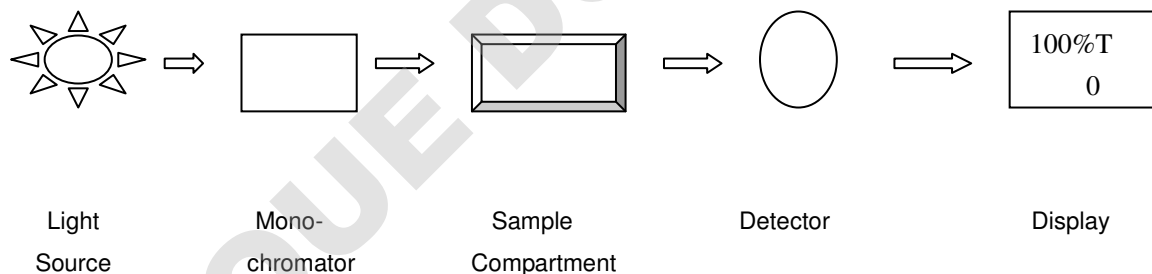


Fig1-2

In your spectrophotometer, light from the lamp is focused on the entrance slit of the monochromator 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 monochromator 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                |
| • Cuvettes.....           | Set of 4, glass  |
| .....                     | Set of 2, quartz |
| • Manual.....             | 1                |

Note: the Quartz cuvette does not come standard with the model of V1600 and v1800..

### Specifications:

| Model                     | V-1600                                                                                           | V-1800 | UV-1600              | UV-1800 |
|---------------------------|--------------------------------------------------------------------------------------------------|--------|----------------------|---------|
| Wavelength Range          | 320-1100nm                                                                                       |        | 190-1100nm           |         |
| Spectral Bandwidth        | 4nm                                                                                              | 2nm    | 4nm                  | 2nm     |
| Optical System            | Single Beam, Grating 1200lines/mm                                                                |        |                      |         |
| Wavelength Accuracy       | ±0.5nm                                                                                           |        |                      |         |
| Wavelength Repeatability  | 0.3nm                                                                                            |        |                      |         |
| Wavelength Resolution     | ±0.1nm                                                                                           |        |                      |         |
| Photometric Accuracy      | ±0.3%T                                                                                           |        |                      |         |
| Photometric Repeatability | ±0.2%T                                                                                           |        |                      |         |
| Photometric Range         | -0.3-3A, 0-200%T                                                                                 |        |                      |         |
| Stray Light               | 0.05%T@360nm                                                                                     |        | 0.05%T@220nm,340nm   |         |
| Stability                 | ±0.002A/h @500nm                                                                                 |        |                      |         |
| Display                   | Graphic LCD (128X64 dots)                                                                        |        |                      |         |
| Keyboard                  | 22 Membrane keypad                                                                               |        |                      |         |
| Photometric Mode          | T, A, E                                                                                          |        |                      |         |
| Detector                  | Si Photodiode                                                                                    |        |                      |         |
| Sample Compartment        | Standard 10mm path length cuvette<br>Accommodates 100mm path length cuvette with optional holder |        |                      |         |
| Light Source              | Tungsten lamp                                                                                    |        | Tungsten & Deuterium |         |
| Output                    | USB Port Parallel Port (printer)                                                                 |        |                      |         |
| Power Requirement         | AC 220V/50Hz or 110V/60Hz                                                                        |        |                      |         |
| Dimensions (W x D x H)    | 470 x 370 x 180mm                                                                                |        |                      |         |
| Weight                    | 12kg                                                                                             |        | 14kg                 |         |

### Installation:

1. After carefully unpacking the contents, check the materials with the packing list (page 2) to ensure that you have received everything in good condition.

- 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

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

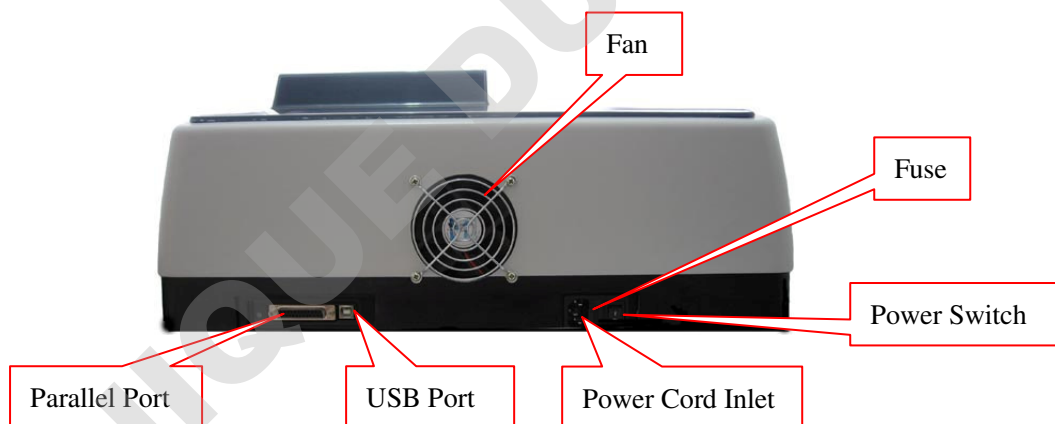


Fig.1-4

- Turn on your MAPADA UV/V-1600/1800 model spectrophotometer. Allow it to warm up for 20 minutes before taking any readings. We suggest you then do the Calibrate System with the Search 656.1nm to set the wavelength to the deuterium lamp emission line.

NOTE:



This symbol means Caution, Risk of Danger.

## Operation:

### Prepare the spectrophotometer

Fig 1-2 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.

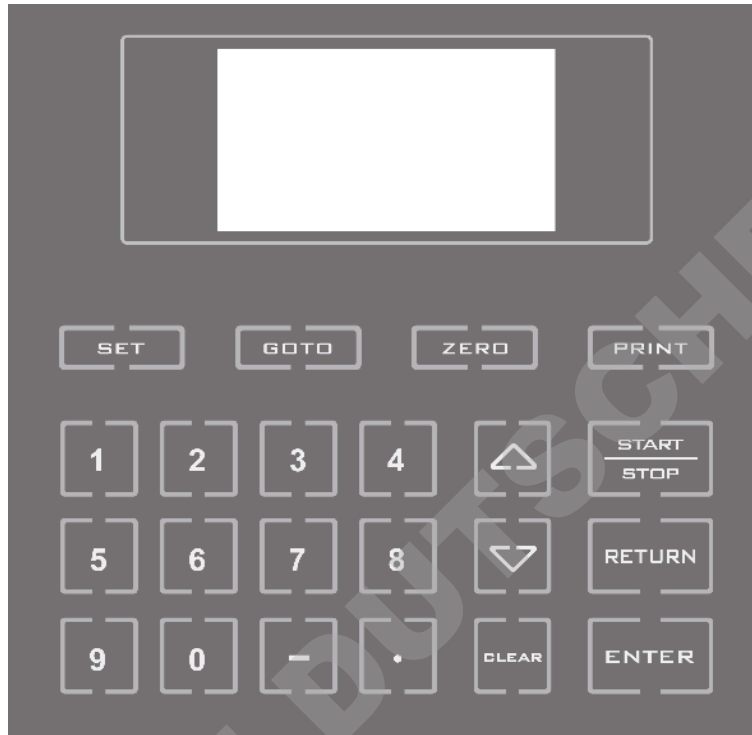


Fig 2

- Description of keys

**【START/STOP】** Start/stop testing

**【RETURN】** Exit to previous screen or cancel the operation;

**【ENTER】** Confirm the inputted data or selected item;

**【CLEAR】** Clear all characters when you are inputting or clear test results display on the screen;

**【SET】** Parameter set

**【GOTO】** Set wavelength;

**【ZERO】** Blank

|                  |                                                             |
|------------------|-------------------------------------------------------------|
| <b>[PRINT]</b>   | Print test results                                          |
| <b>[0] - [9]</b> | Input number or menu select.                                |
| <b>[.]</b>       | Input dot;                                                  |
| <b>[-]</b>       | Input minus symbol;                                         |
| <b>[◀] , [▶]</b> | Scroll items for selecting; Browse the items for selection; |

- Turn on spectrophotometer

Turn on spectrophotometer by pressing the Power Switch (I/O). The instrument starts to initiate and the steps are as below:

*1. The instrument will position filter first, then initialize lamp position and AD converter, then D2 / W lamps warm up, then Wavelength reset and get dark current, After initializing printer, checking battery and setting up system, the screen display the main menu. And the self-testing process display as fig 3.*

*2. If the data in memory has been lost, the instrument will directly calibrate system without any choice for you.*

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

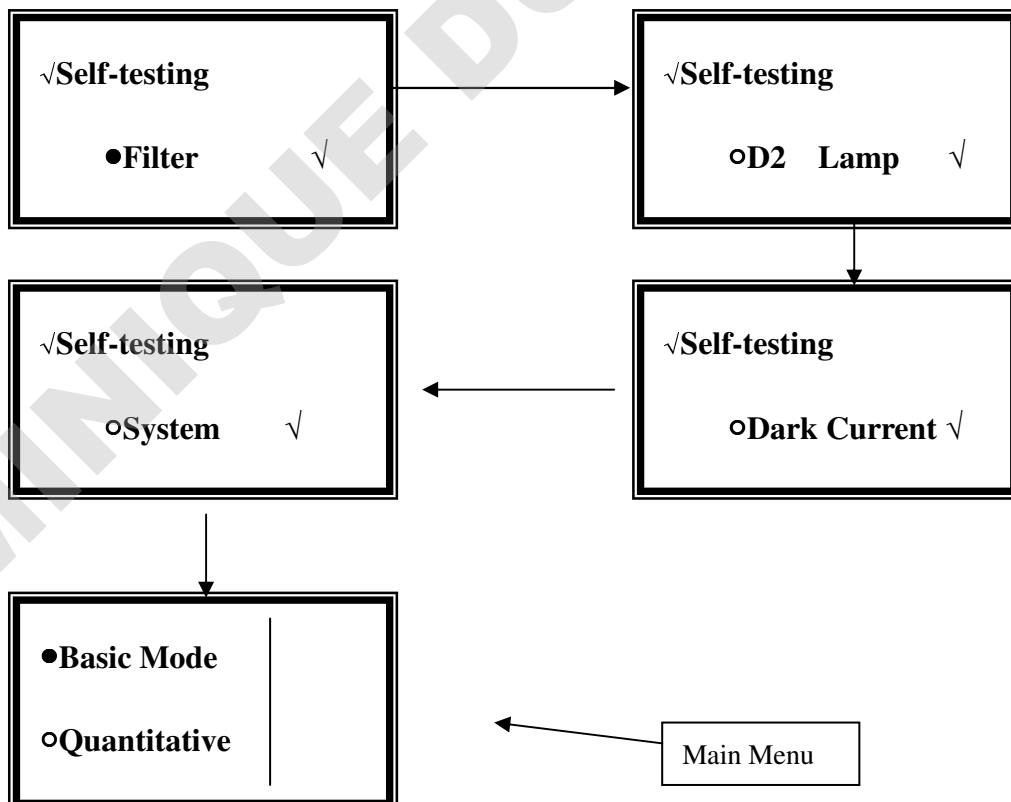


Fig 3



## • Basic operation

### Blank

- ✧ Push the blank cuvette into the light path.
- ✧ Press the key **[ZERO]** for blanking

**Note:1,** *If the reference solution is too thick, the energy will be low.*

2. *Blanking is automatic after a wavelength change.*

**DO NOT OPEN SAMPLE COMPARTMENT LID DURING BLANKING.**

**Set Wavelength** (Example: set wavelength in “Basic mode”)

- ✧ Press **[GOTOλ]** (Fig 4).

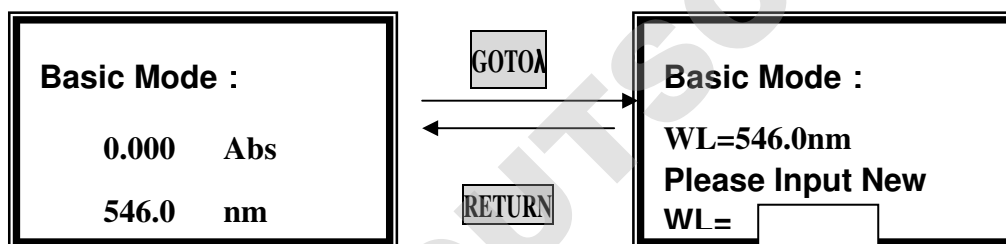


Fig 4

Use numeric keypad to input wavelength (e.g. 500nm).

- ✧ Press **[ENTER]** to change the wavelength, and then blank; After blanking, the screen displays as the left one of Fig 5.

**Note:1.** If you don't want to change the wavelength, you can press **[RETURN]** .

2. the wavelength range is 190-1100, other figure is invalid.

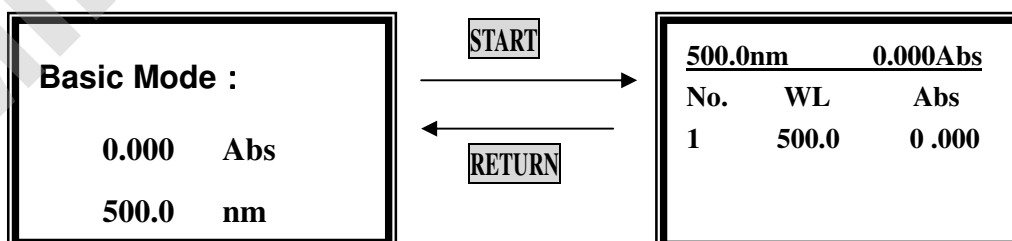


Fig. 5

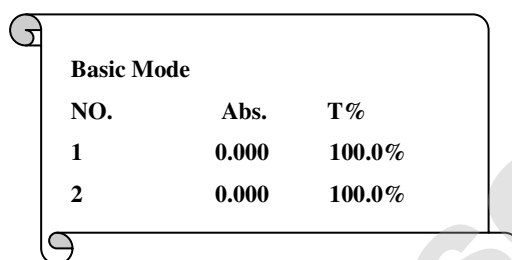
**Measurement** (Example: set wavelength in “Basic mode”)

- ✧ Push the blank cuvette into the light path. Then press **[ZERO]** .

- ✧ Press **【START/STOP】** in the left one of Fig. 5 to go into testing interface.(The right one of Fig 5)
- ✧ Press **【START/STOP】** again in the right one of Fig. 5, the testing result displays on the screen, repeat this step, the results will display on the screen one by one.

**Print test report** (For example: Print the report in “Basic mode”, the right one of Fig. 5)

- ✧ Press **【PRINT】** in the right one of Fig.5 to print the report (Fig. 6)



| Basic Mode |       |        |
|------------|-------|--------|
| NO.        | Abs.  | T%     |
| 1          | 0.000 | 100.0% |
| 2          | 0.000 | 100.0% |

Fig 6

**Note: After printing, all the data displayed on the screen will disappear. Before measurement**

- Make a blank reference solution by filling a clean cuvette (or test tube) 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 MAPADA UV/V-1600/1800, push the changer so that the cuvette is in the light path (Push the rod in). Close the lid.

## Analyze Sample

We provide three test methods in uv-16/18 series, they are basic mode test, quantitative and kinetics.

### 1. Basic Mode

Push the blank cuvette into the light path. In main menu (the last one of Fig. 3), move the cursor on “Basic mode”, then press **【ENTER】** to go into basic mode test. After automatically blanking, it will display as the left one of Fig. 4 and wait for the operator.

**【RETURN】** to exit.

### ● **Select Test Mode**

There are three test modes (T%, Abs, Conc. / factor) for you to select by pressing

**【SET】** to make choice.

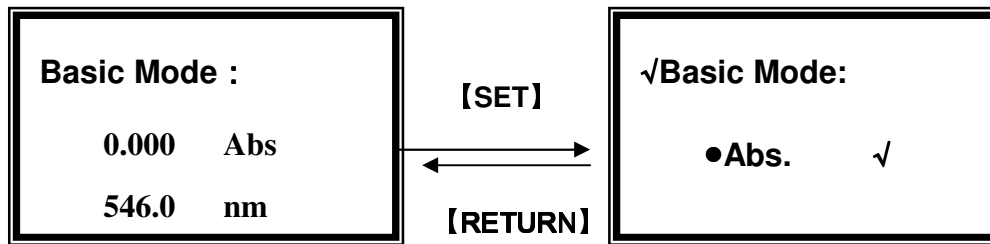


Fig.7

Use **【□】** and **【□】** to move the cursor on **•Abs.** , then press **【ENTER】** ,If the icon “**✓**” appears at the end of **•Abs.** , you have selected successfully. Press

**【RETURN】** to exit to the left of Fig.4, blank at the same time. (Fig. 7)

The operation is the same as **Abs** test mode to select **T%** mode and **Energy** mode.

## ● Begin to Test

Push the sample into light path, press **【START】** to go into basic mode test interface.(Fig. 8)

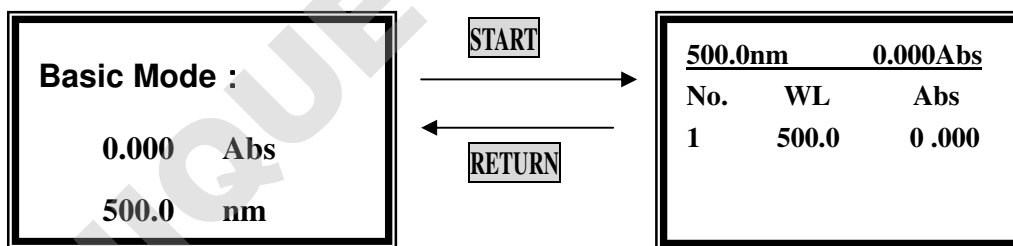


Fig. 8

Press **【START】** again, the test result will display on the screen. The operation is the same if you change your samples.

### Note:

- ① 5 groups of test data can display per screen, total 200 groups of data can be saved.
- ② In the right one of Fig. 8, you can change your test wavelength, blank, change test mode and print by press **【GOTO λ】**, **【ZERO】**, **【SET】** and **【PRINT】** respectively.

You can also clear the test data by press **【CLEAR】** .

## 2. Quantitative Mode

It includes two test methods, one is Standard curve, the other is Coefficient method. In the former method, you can establish a standard curve using standard samples known concentration. If you have known a curve equation, you can select the latter method.

### ● Enter Quantitative Mode

Move the cursor on the **Quantitative Mode**, Press **【ENTER】** to go into the method choosing interface.(Fig. 9)

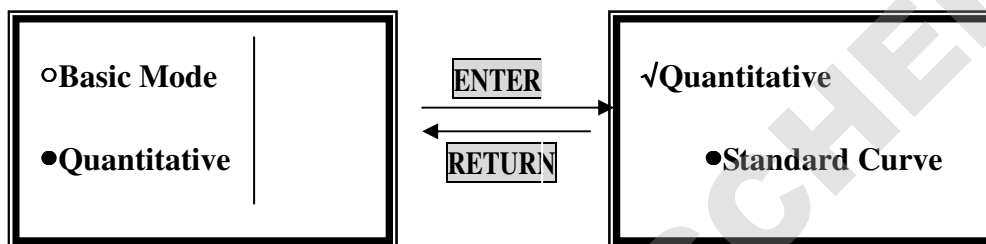


Fig.9

### 2-1. Standard Curve Method

It's a method to establish a standard curve by measuring a group of standard samples.

Move the cursor on the **Standard Curve**, after **【ENTER】** being expressed, it goes into the pre-testing interface. ( Fig.10 )

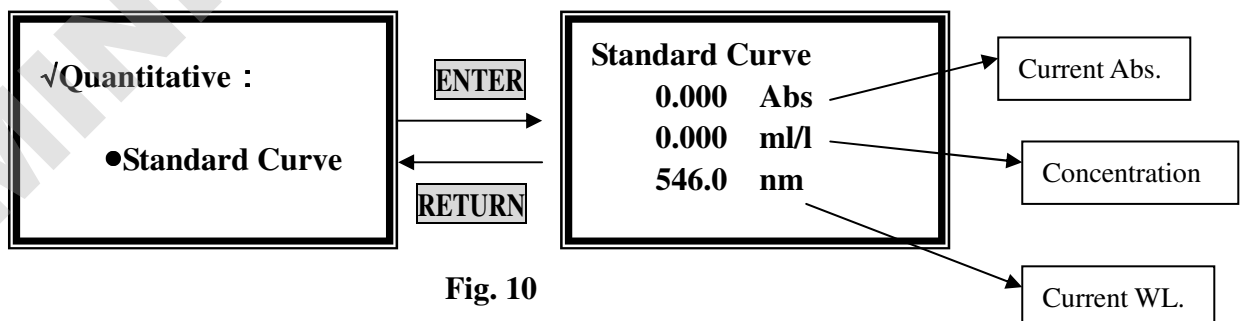


Fig. 10

### ● Set Wavelength

Press **【GOTO  $\lambda$ 】** in the pre-testing interface, input the testing wavelength by pressing the numeric keypad. (Fig.11). Reference Page

7, you'll get a detailed instruction.

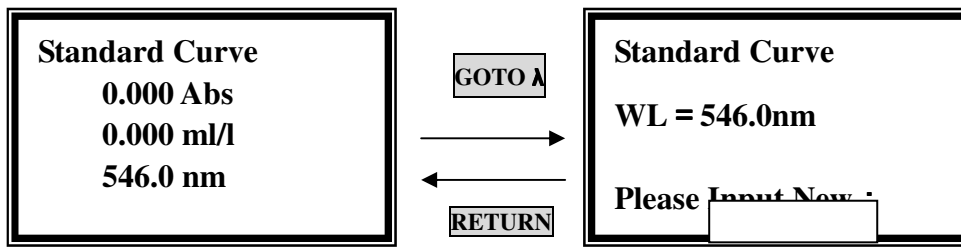


Fig. 11

- **Blank**

Pull the blank solution in the light path, then press **[ZERO]**.

- **Set parameters**

Press **[SET]** in the pre-testing interface. It goes into parameters setting interface. (Fig.12). You should set **Unit**, the **Number** of standard samples, **Concentration** of standard samples before testing.

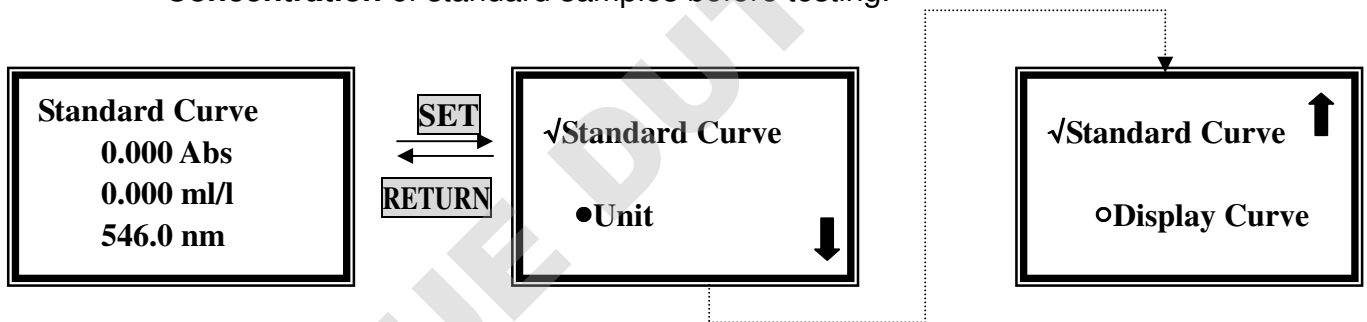


Fig. 12

- **Choose unit of standard samples**

Move the cursor on "Unit" by pressing **[□]** and **[□]**, followed by pressing

**[ENTER]**, 8 units are under your selection. (Fig 13)

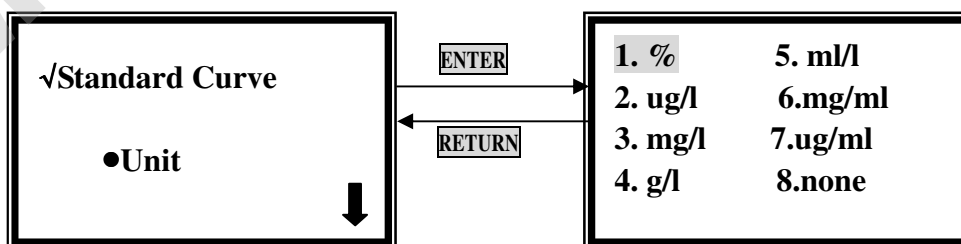


Fig.13

Move the cursor on the unit you need, then press **[ENTER]**. You can also

press the number ahead of the unit directly by the numeric keypad.

If you don't want to select any item, press **【RETURN】** to go back to last interface.

## ● Set Quantity of Standard Samples

Move the cursor on “**Number**” by pressing **【□】** and **【□】**, followed by pressing **【ENTER】**. (Fig. 14)

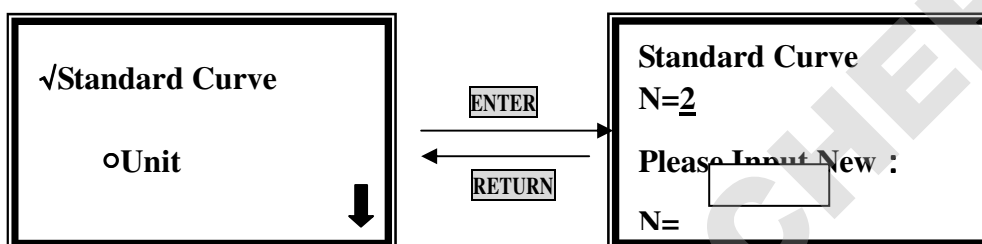


Fig. 14

Input the number of your standard samples by numeric keypad. After pressing **【ENTER】**, it returns to the setting interface.

Note : the number range is 1-9 , other number is invalid.

## ● Set Concentration of Standards

Before this step, you must blank first. Pull the blank cuvette in the light path in the pre-testing interface, press **【ZERO】**.

Move the cursor in “**Concentration**”, following press **【ENTER】**. (Fig. 15)

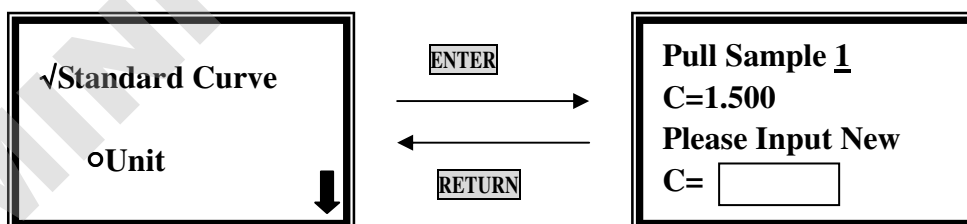


Fig.15

Pull sample 1 in the light path, input the concentration of sample 1 by numeric keypads, then press **【ENTER】**. It goes into the next setting interface of sample 2, the operation is the same as sample 1. Repeat the operation one by one till the last sample finished, and it goes back to the setting interface.

**Note:** ① The Abs. or T% of the samples will not display on the screen, they were saved in the RAM.

□ The range or concentration is 0-9999 , other number is invalid.

③ The sequence of concentration is from low to high.

## ● Display Standard Curve

Move the cursor on “**Display Curve**” by pressing **↑** and **←**, followed by pressing **ENTER**, the standard curve you just established will display on the screen. The equation displays on the bottom of the screen. (Fig. 16), and it will also be saved in the system.

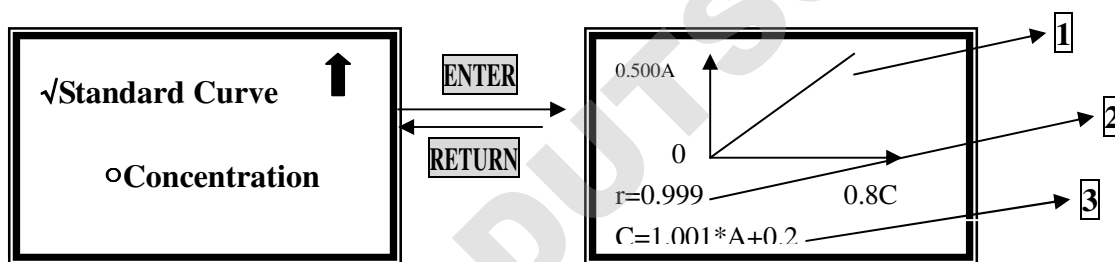


Fig. 16

1、 Standard Curve

2、 Relative Coefficient.

3、 Curve Equation

$$C=1.001*A+0.2,$$

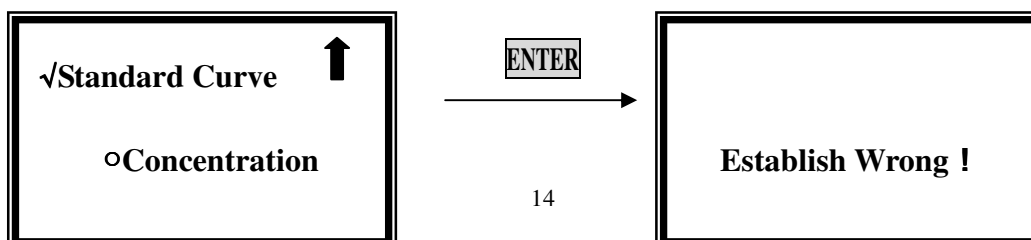
C: Concentration

A: Value of Abs.

The slop value of the curve is 1.001.

The intercept of the curve is 0.2.

If the system gives a fault hint, check the standard sample and your inputting, press any key to return and repeat your performance. (Fig. 17)



←  
Any key

Fig. 17

### ● Select Curve

Move the cursor on "Select Curve" by pressing **【□】** and **【□】**, then press

**【ENTER】** to confirm. (Fig. 18)

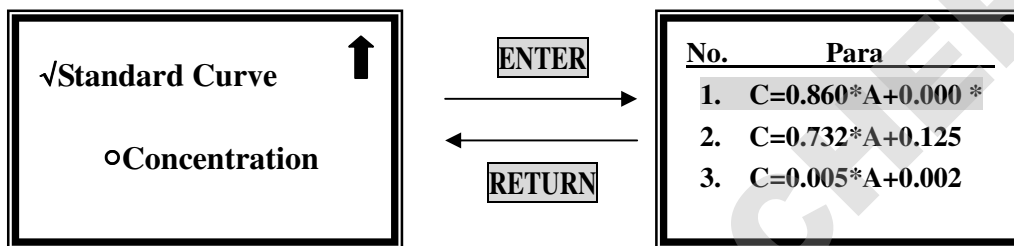


Fig. 18

The newly established curve equation will be displayed at the end of the group. Total 200 curve equations can be saved.

Move the cursor on the equation you need by pressing **【□】** and **【□】**, then it returns to setting interface after **【ENTER】** being pressed. Press **【RETURN】** to go back to pre-testing interface.

**Note: If you want to delete a equation, move the cursor on it, just press **【CLEAR】**.**

### ● Test and Print

When you have selected the equation, press **【START/STOP】** to go into testing interface in pre-testing interface.(Fig. 19)

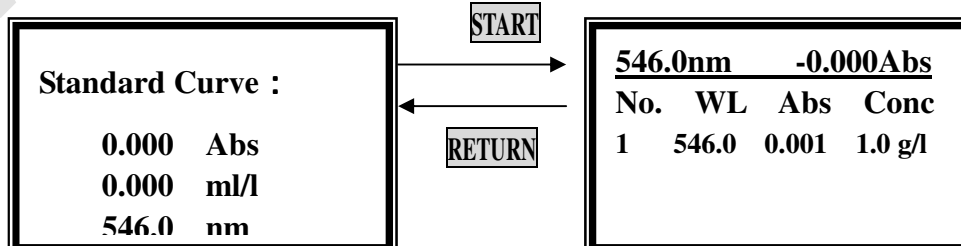


Fig. 19

After blanking, pull the unknown sample cuvette in the light path, then press



**【ENTER】** , the testing result will be displayed on the screen. Operation is the same if you want to test other samples.

Press **【PRINT】** to print testing results. ( Fig. 20 )

| Standard Curve |       |        |        |
|----------------|-------|--------|--------|
| NO.            | Abs.  | T%     | Conc.  |
| 1              | 0.000 | 100.0% | 0.0g/l |
| 2              | 0.000 | 100.0% | 0.0g/l |

Fig. 20

## **2-2. Coefficient Method**

If you have known the standard curve equation, you can use this method to test.

Move the cursor on the **Coefficient** by pressing **【↑】** and **【←】** , after **【ENTER】**

being expressed, it goes into the formula selecting interface. ( Fig.21 )

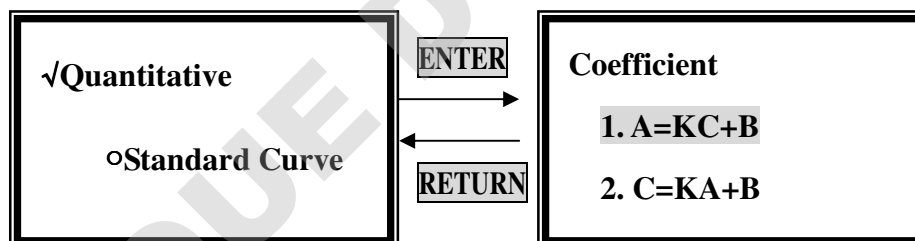
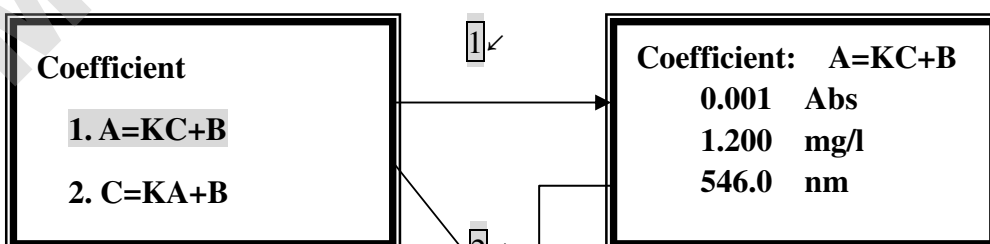


Fig. 21

Choose the formula you need by pressing "1" or "2" of the numeric keypad, you'll enter the coefficient method pre-testing interface.(Fig.22)

You can also select by pressing **【↑】** and **【←】** followed by **【ENTER】** .



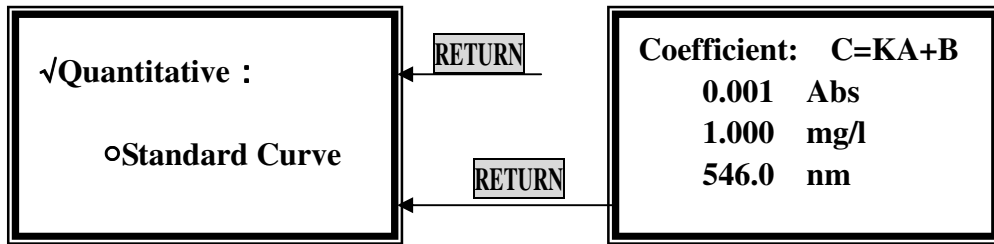


Fig. 22

**Note:** The two formulas can be converted each other, it's up to your habit to choose anyone of them, but the operation is the same.  $C=KA+B$  is an example.

### ● Set Wavelength

Press **[GOTO λ]** in the pre-testing interface, input the testing wavelength by pressing the numeric keypad. (Fig.23). Reference Page 7, you'll get a detailed instruction.

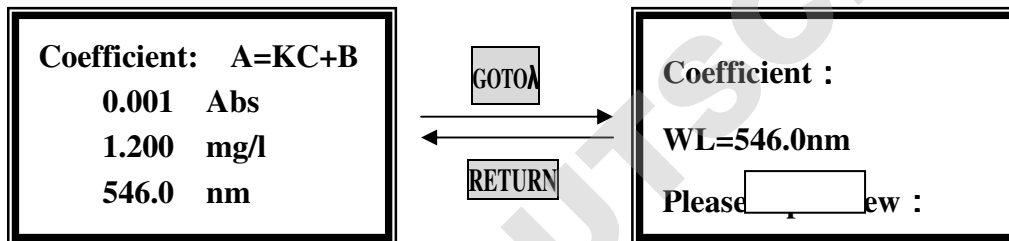


Fig. 23

### ● Set Parameters

Press **[SET]** in the coefficient method pre-testing interface, 3 parameters should be set before testing.(Fig. 24)

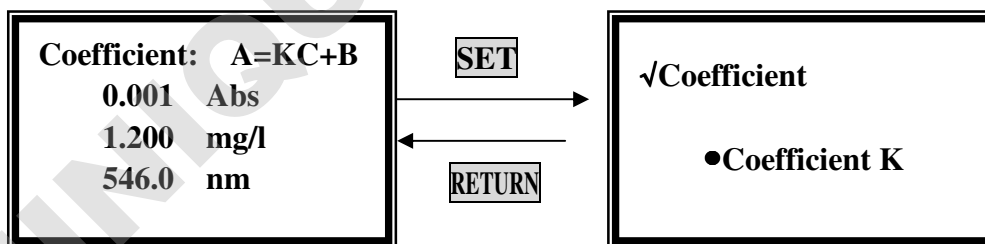
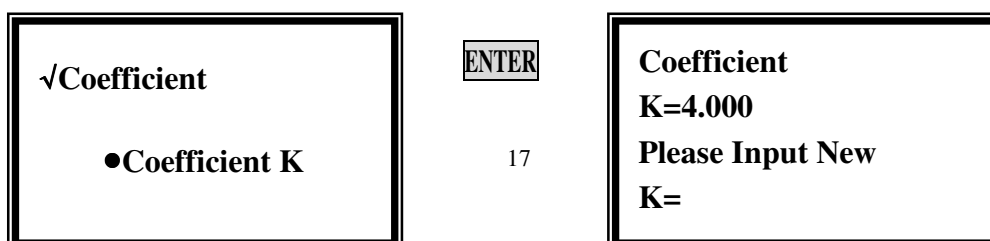


Fig. 24

### ● Set Coefficient K

Move the cursor on **"Coefficient K"** by pressing **[λ]** and **[v]**, followed by

**[ENTER]** .(Fig. 25)



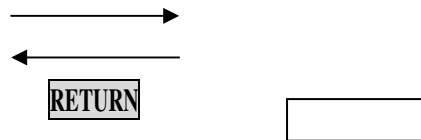


Fig. 25

Input the new value of K by pressing the numeric keypad followed by **[ENTER]** , it will return the setting interface.

**Note: the range of K is 0-9999, other value is invalid.**

### ● Set Coefficient B

Move the cursor on “**Coefficient B**” by pressing **[▲]** and **[▼]** , followed by **[ENTER]** .(Fig. 26)

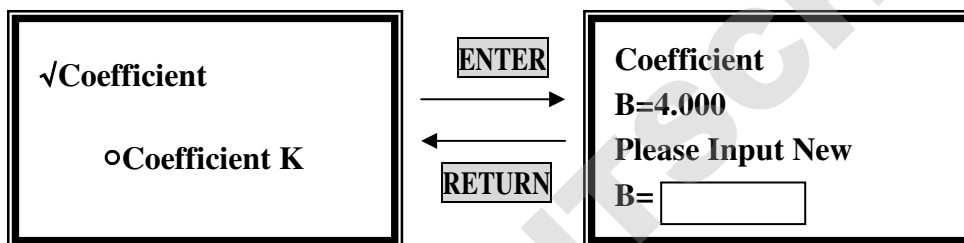


Fig. 26

Input the new value of K by pressing the numeric keypad followed by **[ENTER]** , it will return the setting interface.

**Note: the range of B is -9999-9999, other value is invalid.**

### ● Set Concentration Unit

Move the cursor on “**Conc. Unit**” by pressing **[▲]** and **[▼]** , followed by **[ENTER]** . (Fig. 27)

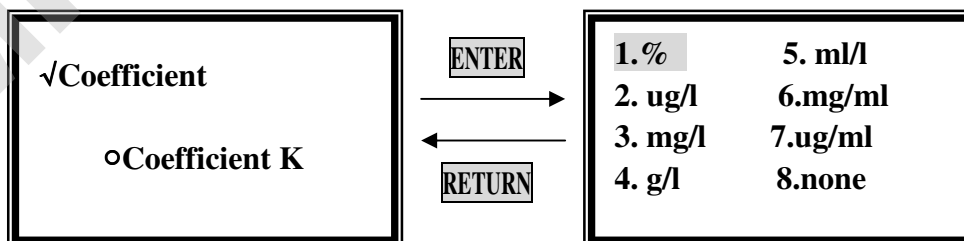


Fig. 27

Move the cursor on the unit you need, then press **[ENTER]** . You can also press the number ahead of the unit directly by the numeric keypad.

Press **[RETURN]** to go back to pre-testing interface.

- **Blank**

Pull the blank solution cuvette into the light path, then press **[ZERO]** .

- **Test and Print**

Pull the unknown concentration sample in the light path, then press **[START]** , now it enters the testing interface. Press **[START]** again, you'll get the concentration of the sample.(Fig. 28)

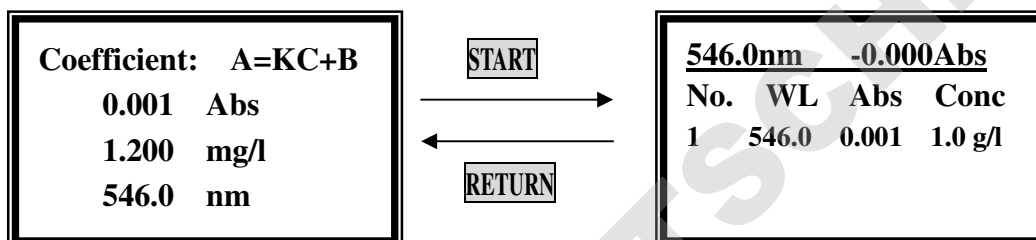


Fig. 28

The operation is the same if you have more samples to test.

Press **[PRINT]** to print the test results. All the data will be deleted after printing.

You can also delete the test results by pressing **[CLEAR]** .

### 3. Kinetics Mode

Move the cursor on “**Kinetics**” by pressing **[^]** and **[v]** in the main menu, then press **[ENTER]** to go into kinetics pre-testing interface. ( Fig.29 )

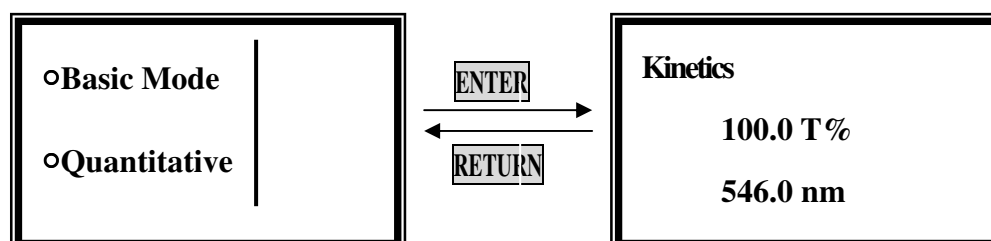


Fig. 29

## ● Set Wavelength

Press **[GOTO λ]** in the kinetics pre-testing interface, input the testing wavelength by pressing the numeric keypad. (Fig.30). Reference Page 7, you'll get a detailed instruction.

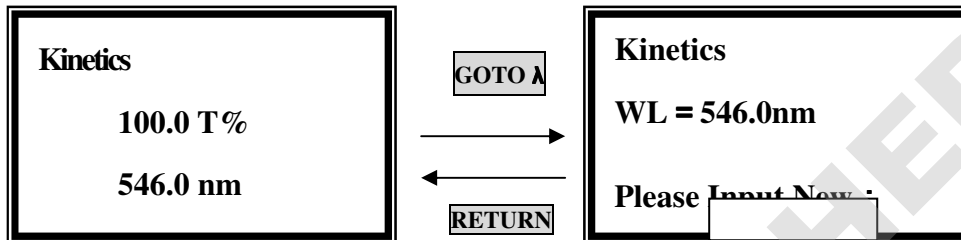


Fig. 30

## ● Set Parameters

Press **[SET]** in the kinetics pre-testing interface, 5 parameters should be set before testing.(Fig. 31)

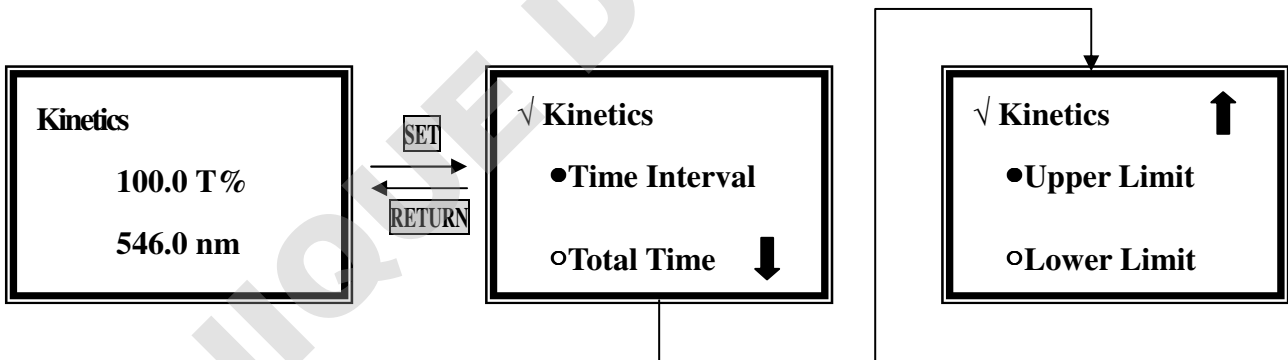
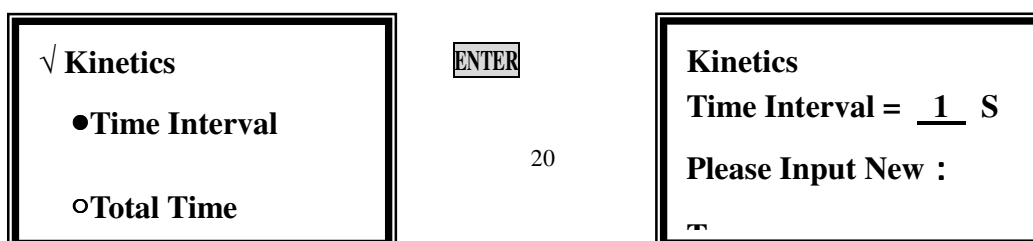


Fig. 31

## ● Set Time Interval

Move the cursor on “Time Interval” by pressing **[λ]** and **[v]**, followed by **[ENTER]**. (Fig.32)



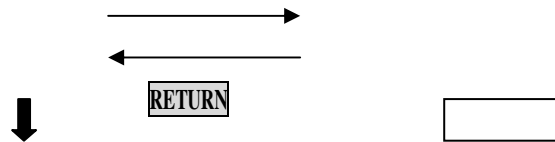


Fig. 32

Input the new interval time by pressing the numeric keypad followed by **[ENTER]** , it will return the kinetics setting interface.

**Note: 1. The range of time interval is 1-200, other value is invalid.**

**2. If you don't want to change the value, press [RETURN] directly.**

### ● Set Total Time

Move the cursor on **"Total Time"** by pressing **[▲]** and **[▼]** , followed by **[ENTER]** . (Fig.33)

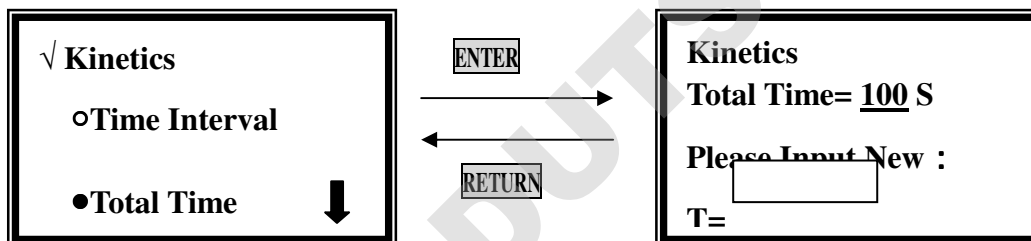


Fig. 33

Input the new total test time by pressing the numeric keypad followed by **[ENTER]** , it will return to the kinetics setting interface.

**Note:**

- 1. The range of total test time is 1-120,000, other value is invalid.**
- 2. The maximum value of total time is correlative to the interval time, because system only permits 1000 dots be adopted at most. For example:**

if the interval time is 1s, then the maximum total test time is:

$$1 \times 1000 = 1000s;$$

if the interval time is 20s, the maximum total test time is:

$$20 \times 1000 = 20,000s;$$

if the interval time is 200s, the maximum total test time is **NOT:**

$$200 \times 1000 = 200,000s$$

Because the range of total time is 1-120,000, when the interval time is 200s, the maximum test time is 120,000!

- 3. If you don't want to change the value, press [RETURN] directly.**

## ● Set Test Mode

Move the cursor on “**Test Mode**” by pressing **【Λ】** and **【v】** in setting interface, followed by **【ENTER】** .(Fig. 34)

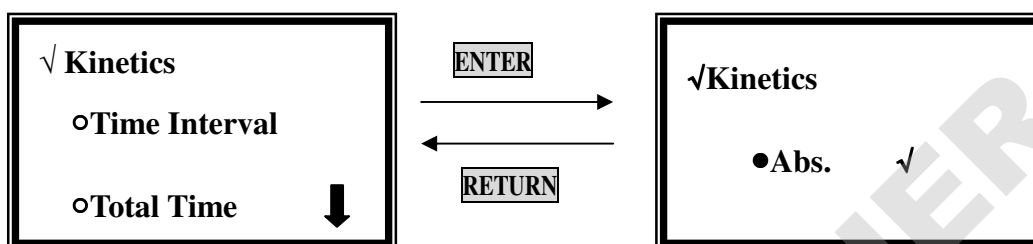


Fig. 34

Move the cursor on the test mode by pressing **【Λ】** and **【v】** , then press **【ENTER】** to select. Press **【RETURN】** to go back to the kinetics setting interface.

## ● Set Upper Limit

Move the cursor on “**Upper Limit**” by pressing **【Λ】** and **【v】** in setting interface, followed by **【ENTER】** .(Fig. 35)

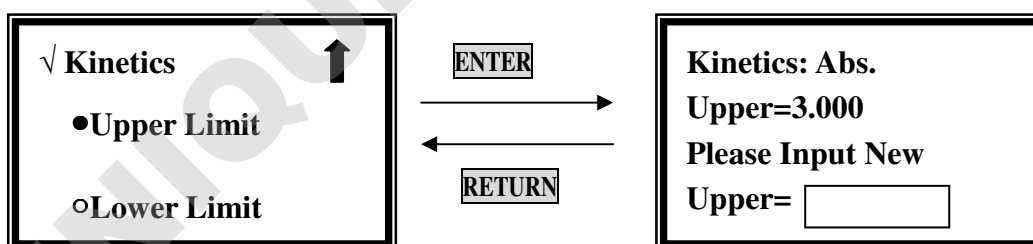


Fig. 35

Input the new upper value by pressing the numeric keypad followed by **【ENTER】** , it will return to the kinetics setting interface.

If you don't want to change the value being set last time, press **【ENTER】** or **【RETURN】** directly .

**Note:** the range or A is -0.3-3, the range or T is 0-200, other value is invalid.

## ● Set Lower Limit

Move the cursor on “**Lower Limit**” by pressing **▲** and **▼** in setting interface, followed by **ENTER** (Fig.36)

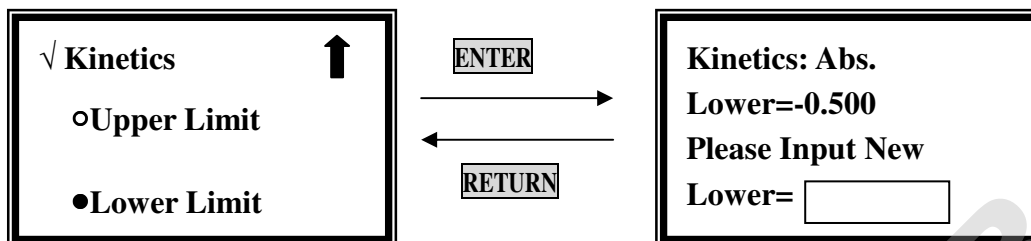


Fig. 36

Input the new lower value by pressing the numeric keypad followed by **ENTER** , it will return to the kinetics setting interface.

If you don't want to change the value being set last time, press **ENTER** or **RETURN** directly .

**Note: the range of A is -0.3-3, the range of T is 0-200, other value is invalid.**

## Sample Test

After you have finished setting “Time Interval”, “Total Test Time”, “Test Mode”, “Upper Limit” and “Lower Limit”, press **RETURN** to go back to kinetics pre-testing interface. (The left interface of Fig. 37)

Pull the blank cuvette in the light path, press **ZERO** for blanking.

Pull the sample cuvette in the light path, press **START** to go into testing interface.

Press **START** again to began your test. (Fig. 37)

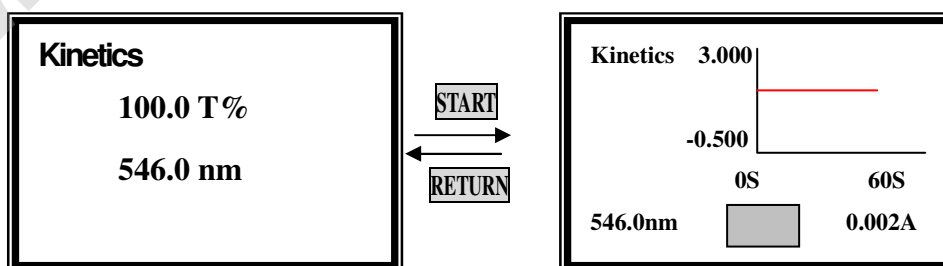


Fig. 37

When the testing begins, the curve will be drawn on the screen in real



time. And the time will also be displayed in the middle of the bottom screen in real time.

Press **【STOP】** can interrupt the test. When **【START】** being pressed again, the test will start again from the very beginning.

**Note: the curve can not be printed, if you want to check the data of every dot, you can choose “Display Data” in the parameter setting interface.**

## ● Display Data

Move the cursor on “**Display Data**” by pressing **【▲】** and **【▼】** in setting interface, followed by **【ENTER】** .(Fig. 38)

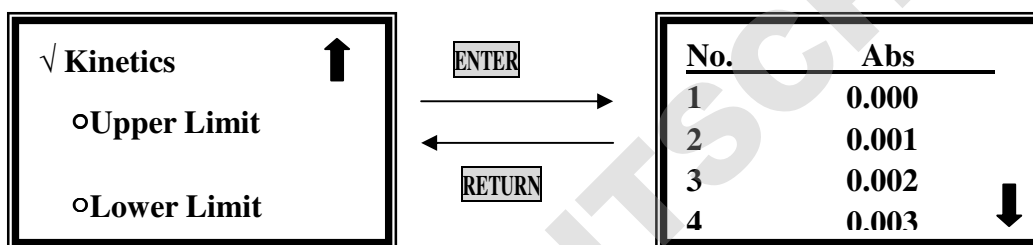


Fig. 38

5 lines of data be displayed every screen. press **【▲】** and **【▼】** to scroll.

## ● Data Print

Press **【PRINT】** in the right interface of Fig.38, the data will be printed. After printing, the data will be deleted from the screen and RAM.

Press **【CLEAR】** can also delete the data.(Fig. 39)

Kinetics :

Wavelength: 546.0nm

| NO. | Abs.  | T%     |
|-----|-------|--------|
| 1   | 0.000 | 100.0% |

Fig. 39

## 4. Utility

Move the cursor on “**Utility**” by pressing **【▲】** and **【▼】** in main menu, followed

by **[ENTER]** .10 items will be set. (Fig. 40)

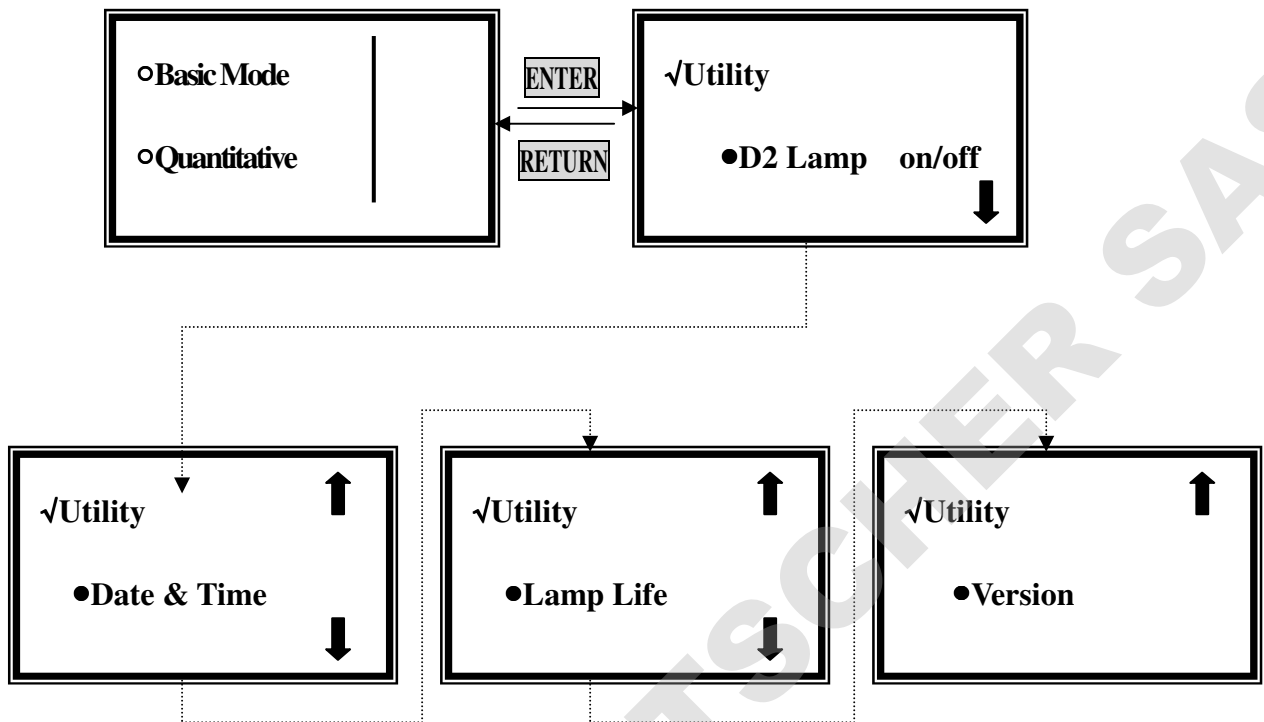


Fig. 40

### ● Set Deuterium Lamp

Move the cursor on “D2 Lamp on/off” by pressing **[▲]** and **[▼]** in utility setting interface, then press **[ENTER]** to go into D2 controlling interface.(Fig. 41)

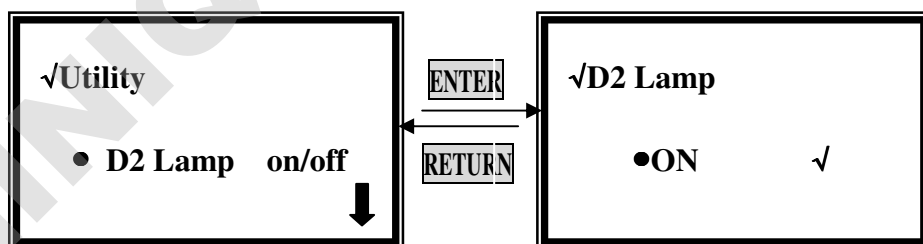


Fig. 41

Move the cursor on “OFF” to shut off the D2 lamp by pressing **[▲]** and **[▼]** followed by **[ENTER]** . Press **[RETURN]** to exit.

Move the cursor on “On” to lighten the D2 lamp by pressing **[▲]** and **[▼]** followed by **[ENTER]** . Press **[RETURN]** to exit.

**Note: The D2 lamp needs about 20 seconds to warm up before being lightened! (Fig. 42)**

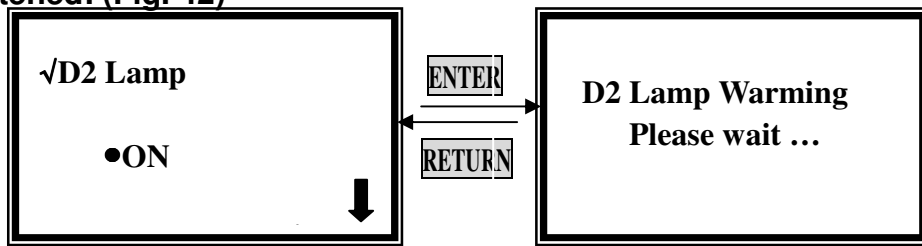


Fig. 42

**Shutting off D2 lamp is strongly recommended when you don't use it after self-testing.**

- **Set W Lamp**

Move the cursor on “**W Lamp on/off**” by pressing **【▲】** and **【▼】** in utility setting interface, then press **【ENTER】** to go into W lamp controlling interface.(Fig. 43)

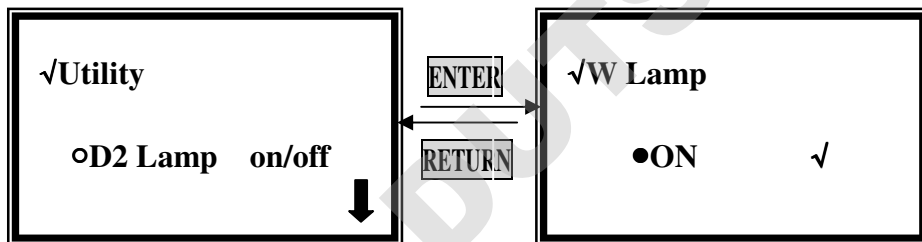


Fig. 43

Move the cursor on “**OFF**” to shut off the W lamp by pressing **【▲】** and **【▼】** followed by **【ENTER】** . The icon “√” also displays at the end of “**OFF**” . Press **【RETURN】** to exit.

Move the cursor on “**On**” to lighten the W lamp by pressing **【▲】** and **【▼】** followed by **【ENTER】** . The icon “√” also displays at the end of “**ON**” . Press **【RETURN】** to exit.

**Shutting off W lamp is strongly recommended when you don't use it after self-testing.**

- **Set Printer**

Move the cursor on “**Printer**” by pressing **【▲】** and **【▼】** in utility setting interface,

then press **【ENTER】** to go into printer setting interface.(Fig. 44)

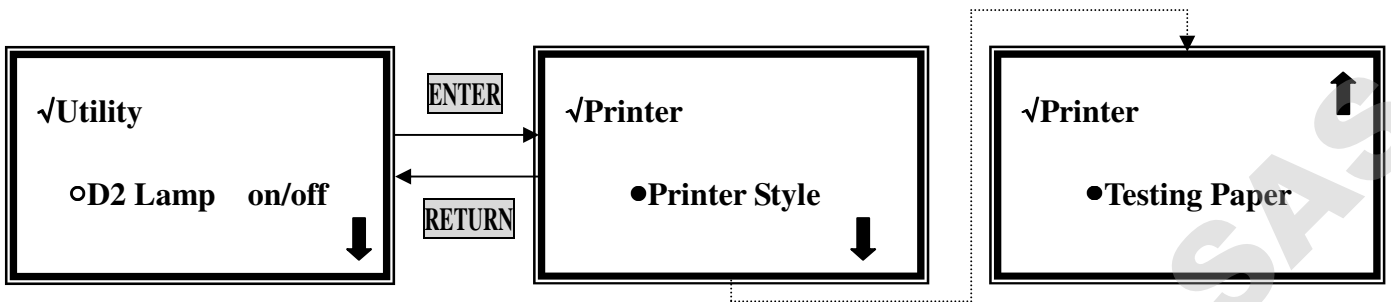


Fig. 44

Move the cursor on “**Printer Style**” by pressing **【▲】** and **【▼】** in printer setting interface, then press **【ENTER】** . (Fig. 45)

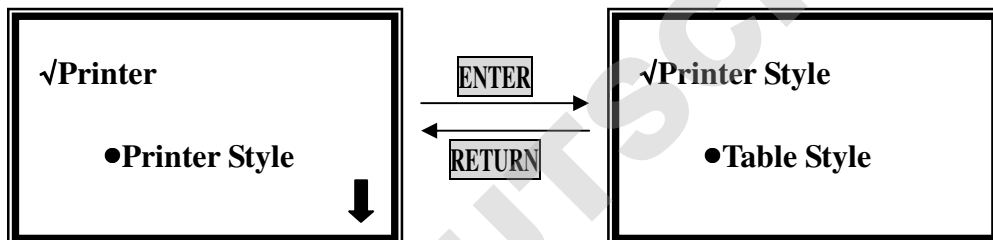


Fig. 45

If your printer is outside of the instrument, choose “Table Style” in the right of Fig. 45; if your printer is inside of your instrument, choose “Panel Style” in the right interface of Fig.45.

Move the cursor on “**Scroll Paper**” by pressing **【▲】** and **【▼】** in printer setting interface followed by **【ENTER】** . Repeat the operation, till the new changed paper spread out.

Move the cursor on “**Reset**” by pressing **【▲】** and **【▼】** in printer setting interface followed by **【ENTER】** , then the printer will be reset.

If you want to check your printer, Move the cursor on “**Reset**” by pressing **【▲】** and **【▼】** in printer setting interface, then press **【ENTER】** , the printing content is as follows.(Fig. 46)

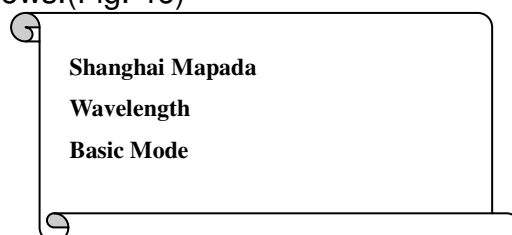


Fig. 46

- **Set Time and Date**

Move the cursor on “**Time and Date**” by pressing **[▲]** and **[▼]** in utility setting interface, then press **[ENTER]** to go into time and date setting interface. (Fig. 47)

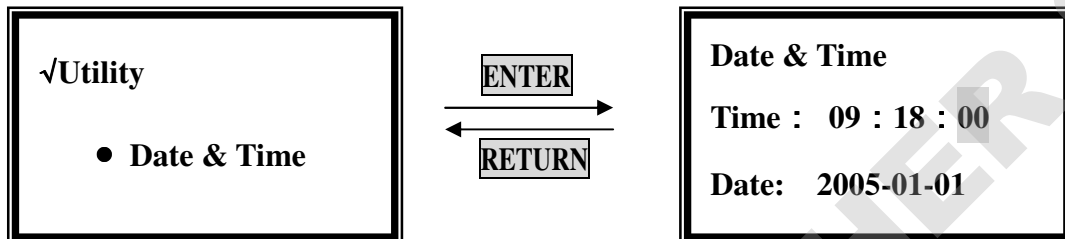


Fig. 47

In the time and date setting interface, press **[▲]** and **[▼]** to move the cursor. You can set them by pressing the numeric keypad followed by **[ENTER]** .

The range of year is 0-99, month is 0-12, day is 1-31, hour is 0-24, minute is 0-59, week is 1-7, other number is invalid.

- **Get Dark Current**

When the ambient circumstance changed, such as temperature, voltage or the environment lightness, you should get dark current before testing.

Move the cursor on “**Dark Current**” by pressing **[▲]** and **[▼]** in utility setting interface, then press **[ENTER]** to get dark current. (Fig. 48)

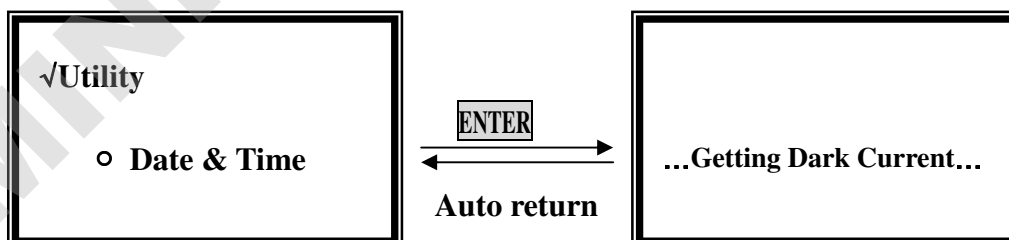


Fig. 48

It returns to the utility setting interface when the dark current got finished.

- **Reset Wavelength**

When you are suspicious of your wavelength, you can reset your wavelength.

Move the cursor on “**Reset WL.**” by pressing **▲** and **▼** in utility setting interface, then press **ENTER** to reset wavelength. (Fig. 49)

The calibrating time is about 1.5 minutes.

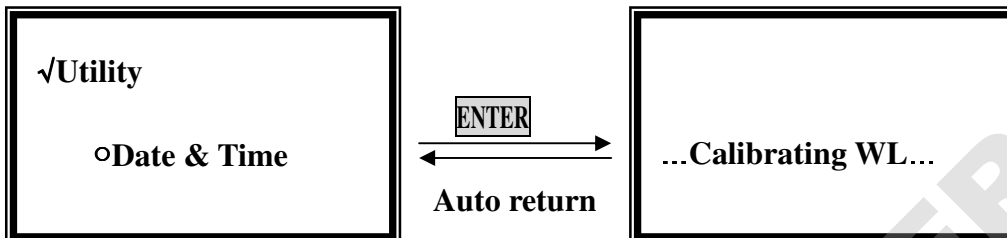


Fig. 49

### ● Lamp Life Management

Move the cursor on “**Lamp Life**” by pressing **▲** and **▼** in utility setting interface, then press **ENTER** . (Fig. 50)

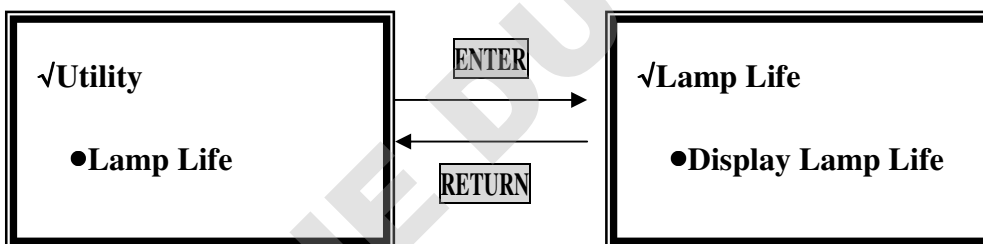


Fig. 50

Move the cursor on “**Display Lamp Life**” by pressing **▲** and **▼** in lamp life setting interface, then press **ENTER** ,you’ll find the used time of D2 and W lamp. (Fig. 51)

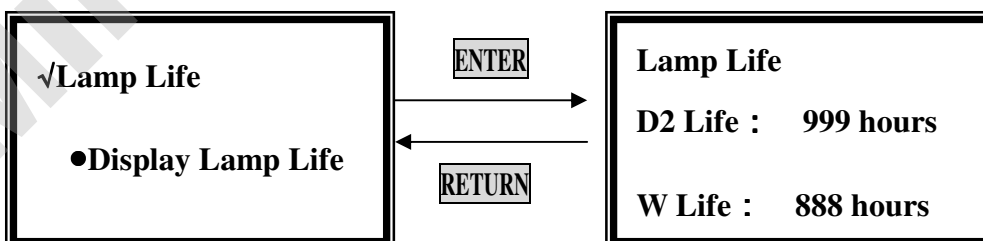


Fig. 51

When the used time of D2 lamp is more than 1000 hours, replacing a new one is strongly recommended.

When the used time of W lamp is more than 1000 hours, replacing a new lamp is strongly recommended.

When you have replaced a new lamp, you'll have to go into the lamp life setting interface, move the cursor on the "Reset W Life" or "Reset D2 Life" by pressing **[▲]** and **[▼]** followed by **[ENTER]** to reset them into zero.

### ● Load Default

Move the cursor on "Load Default" by pressing **[▲]** and **[▼]** in utility setting interface, then press **[ENTER]** (Fig. 52)

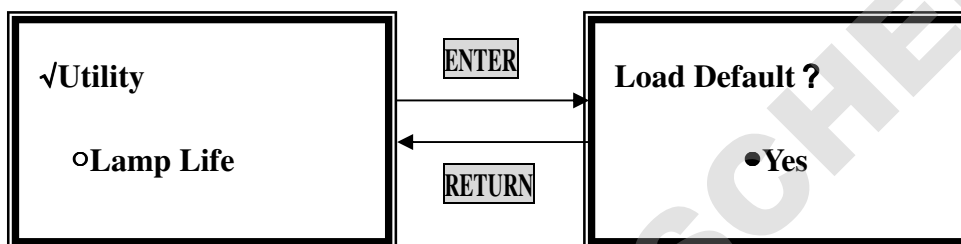


Fig. 52

If you want to default the parameters, choose "Yes" in the right interface of Fig. 52, or you should choose "No".

Press **[RETURN]** to exit without any choice.

### ● Lamp Change

Move the cursor on "Lamp Change" by pressing **[▲]** and **[▼]** in utility setting interface, then press **[ENTER]** (Fig. 53)

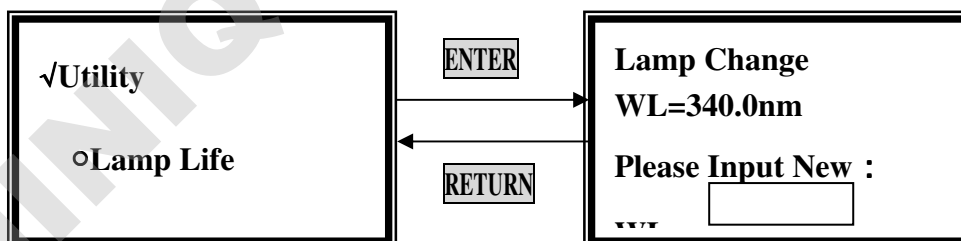


Fig. 53

Input the new wavelength you want by pressing the numeric keypad followed by **[ENTER]** .

Lamp change wavelength means the point at which W lamp and D2 lamp exchange. The range of it is 300-400, other value is invalid.

### ● Version of Instrument

Move the cursor on “**Version**” by pressing **[Λ]** and **[v]** in utility setting interface, then press **[ENTER]** , you will find the detailed messages of the instrument. (Fig. 54)

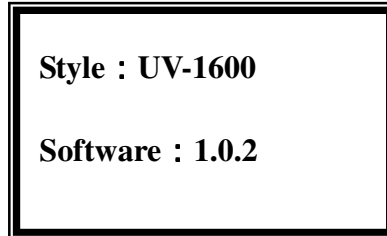
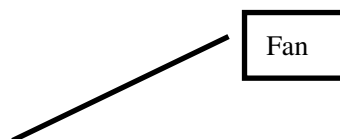


Fig. 54

## Maintenance

Inside Structure





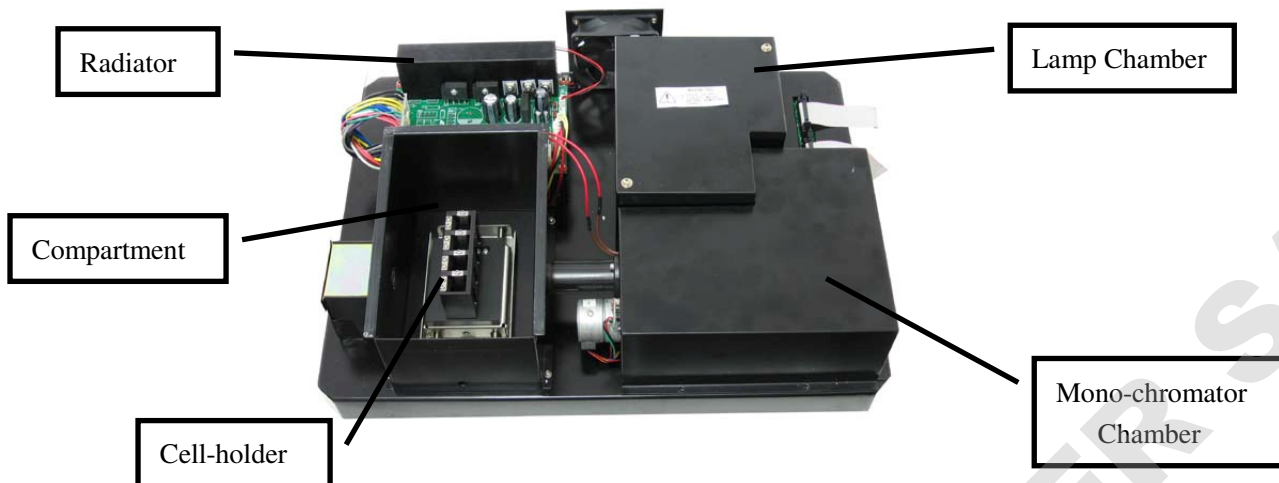


Fig.4-1 Inside Planform

## 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.

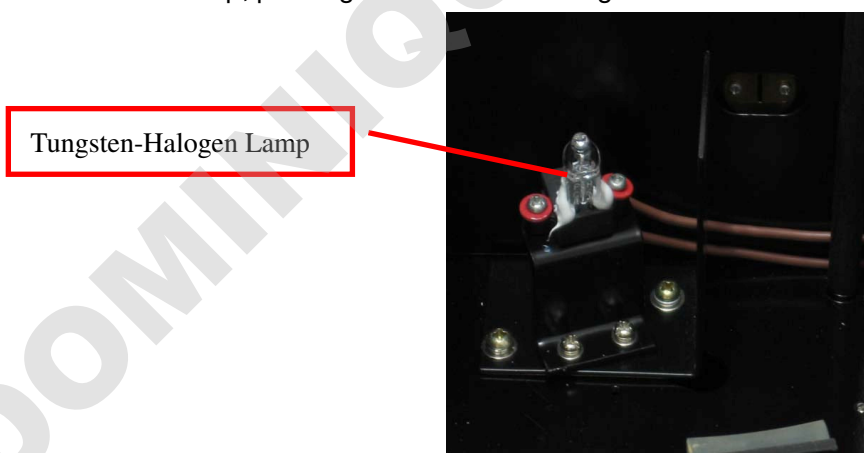


Fig.4-2

### CAUTION:

- do not handle the lamp with bare fingers. Use tissue or cloth when handling lamp.

- 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!**

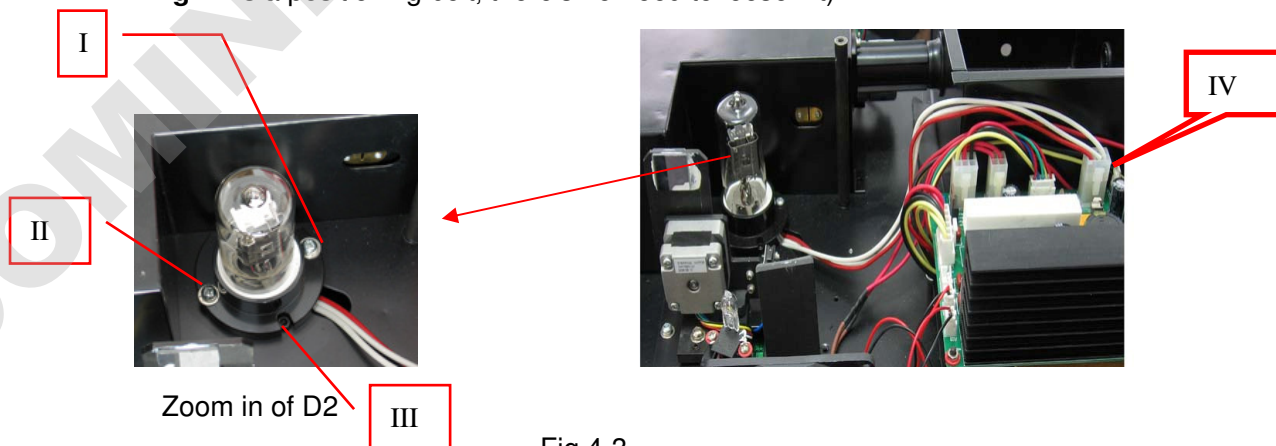
- 1) Turn off and unplug the instrument (VERY IMPORTANT: **HIGH VOLTAGE**).
- 2) Remove the four screws on the sides of the spectrophotometer.
- 3) Remove the **Cuvette Holder Control Knob** by unscrewing the rod counterclockwise.
- 4) Remove the cover of the instrument very carefully and place it in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

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

- 5) Unscrew the two screws from the **Lamp Chamber** (Fig.4-1) 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. (**Figure. IV** in the following Fig.4-3))
- 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)



- 8) Replace a new pre-aligned lamp provided by **MAPADA** or an authorized MAPADA

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

Mapada 1600/1800 series can save many data in the RAM, so a battery must be used in the main board. 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)

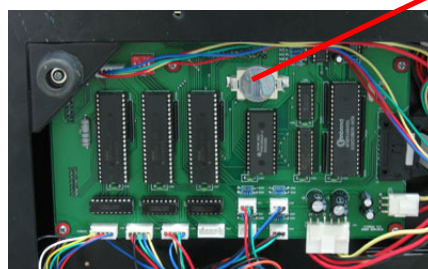


Fig. 4-5 Main Board

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

## Troubleshooting

| PROBLEM                                             | Possible Cause                                                | Solution                                                                                                                                |
|-----------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Instrument Inoperative after switch power on</b> | 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                                                                                                     |
| <b>Instrument cannot set 100%T (0.000A)</b>         | Light beam blocked:<br>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                                                                                                     |
| <b>Instrument drift and noise</b>                   | 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<br>Lamp not adjusted properly  | Check lamp if has been properly installed.<br>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                                                                                                     |
| <b>Incorrect readings obtained</b>                  | Insufficient sample volume                                    | Fill cuvette with more samples                                                                                                          |
|                                                     | Wrong wavelength setting<br>Failed to blank (0A/100%T)        | Check analytical procedure and wavelength setting.<br>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                                                                                                     |