



Spectrophotometer

Operational Manual

V1.0  
Revision 1

for Alpha-1106/1506

Laxco, Inc.

[www.laxcoinc.com](http://www.laxcoinc.com)

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## **General information**

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 all instruments, avoid touching the high voltage power supply at all times.

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

## **Safety**

Read the following before installing and using the instrument and its accessories. The instruments mentioned in this manual should be operated by appropriate laboratory technicians.

## **Electrical**

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 the instruments 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

## **Performance**

To ensure that the instrument is working within its specification, please verify proper operation

before making important measurements. You should carry out these performance checks with particular reference to wavelength and absorbance accuracy.

## Radio Interference

For compliance with the EMC standards referred to in the EC Declaration of Conformity, it is necessary that only shielded cables supplied by the factory are used when connecting the instrument to computers and accessories.

## Introduction

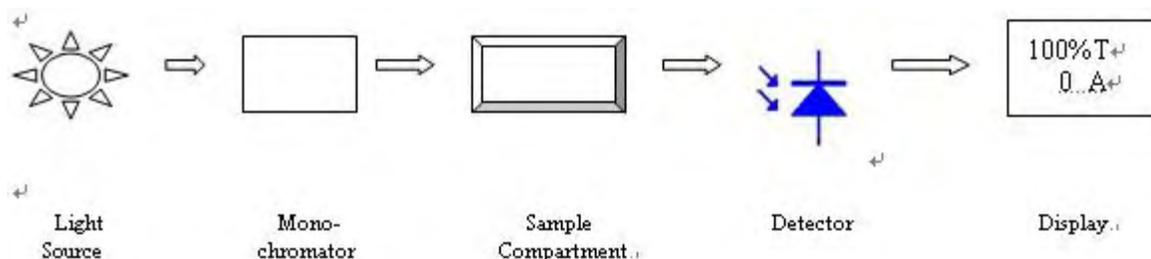
The Model's Alpha-1106/1506 are split beam, general purpose instruments designed to meet the needs of the Conventional Laboratory, They are ideal for various applications, such as: Clinical Chemistry, Biochemistry, Petro chemistry, Environmental Protection, Food and Beverage Labs, Water and Waste Water Labs and other fields of quality control and research.

The Alpha-1106/1506 features a digital display of photometric result, easy operation and wavelength range of 190 nm to 1100nm (Alpha-1506) and 325-1100nm (Alpha-1106), these instruments are ideal for measurements in the visible wavelength region of the electromagnetic spectrum.

## Working Principle

The spectrophotometer consists of five parts: 1) Halogen or deuterium (Alpha-1506) lamp to supply the light; 2) A Monochromator 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 below illustrates the relationship between these parts.

Block diagram for the Spectrophotometer



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.

The Alpha-1106 /506 incorporates an USB1.0 for connecting to a PC via the Application Software, also design a RS232 port for built-in thermal printer

## 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
Power Cord.....	1
Sample Holder.....	4-cell stage, manual
Cuvettes.....	Set of 4, glass Set of 2, quartz (Alpha-1506 only)
Manual.....	1
Built-in Printer (Optional)...	1
* Application Software .....	1
* Application Software Manual .....	1
* USB Cable .....	1
* Software doddle.....	1

Note: 1. Items with “\*” for the PC running Application Software  
2. Built-in Printer is not included in standard supplement

## Specifications:

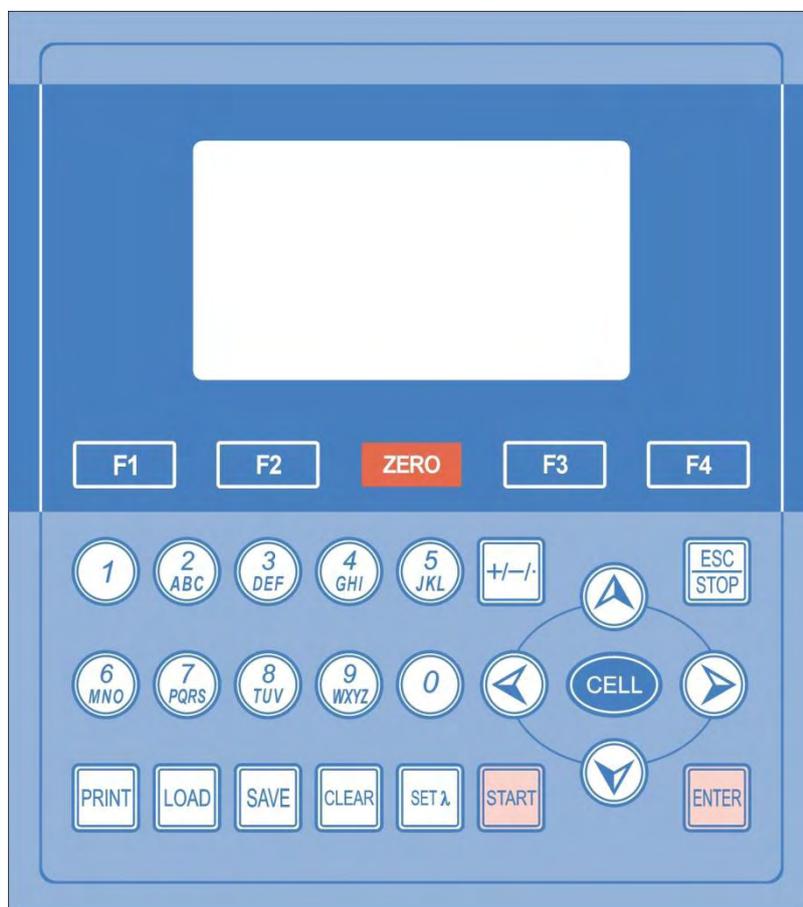
	Alpha-1106	Alpha -1506
Wavelength Range	325-1100nm	190-1100nm
Spectral Band pass	2nm/4nm (Optional)	
Optical System	Single beam or Split beam, Littrow, Grating 1200 Line/mm	
Wavelength Accuracy	±0.8nm	±0.5nm
Wavelength Repeatability	±0.3nm	±0.2nm
Wavelength Resolution	0.1nm	
Photometric Range	0-200%T, -0.3-3A, -9999-9999C	
Photometric Accuracy	±0.002A(0~0.5A), ±0.004A(0.5~1A) ±0.008A(1~2A), ±0.3%T(0~100%T)	
Photometric Repeatability	±0.001A(0~0.5A), ±0.002A(0.5~1A) ±0.004A(1~2A), ±0.15%T(0~100%T)	
Stray Light	≤0.05%T@340nm	≤0.05%T@220nm&340nm
Stability	±0.002A/hr @500nm,0A	
Data Output	128X64 Dots Array Graphic LCD	
	Built-in Printer (Optional)	
	USB1.1 Connecting to computer	
Size(mm)	570×460×230	
Weight	13.5kg	14.5kg

## Installation:

1. After carefully unpacking the contents, check the materials with the packing list (page 5) to ensure that you have received everything in good condition.
2. Place the instrument 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.
3. Remove any obstructions or materials that could hinder the flow of air under and around the instrument.
4. Turn on the instrument and allow it to warm up for at least 15 minutes before taking any readings.

## Operational Panel

User can perform all operations by pressing the keys and all the results and operation information are displayed on the LCD.



## Description of Keys

<b>【LOAD】</b>	Load data or curve saved before;
<b>【SAVE】</b>	Save data or curve;
<b>【SET λ】</b>	Set wavelength;
<b>【0Abs/100%T】</b>	Blank or scan the baseline;
<b>【PRINT】</b>	Print test results or screen
<b>【START】</b>	Start testing or scanning sample;
<b>【ESC/STOP】</b>	Exit to previous screen or cancel the operation;
<b>【ENTER】</b>	Confirm the inputted data or selected item; Go into next setup or screen;
<b>【F2】 【F3】</b>	Function based on the information on the screen;

<b>【F1】 【F4】</b>	No definition
<b>【0】 - 【9】</b>	Input number or letter, consecutively press a numeric key to select a character;
<b>【+/-/.】</b>	Input +, - or dot;
<b>【CLEAR】</b>	Clear all characters when you are inputting or clear curve displays on the screen;
<b>【&lt;】 【&gt;】</b>	Change “x” scale; Search point after scan; 【<】 clear a character;
<b>【^】 【v】</b>	Change “y” scale; Search peak after scan; Scroll items for selecting; Change capital/small letter last typed in; Browse the items for selection;
<b>【CELL】</b>	No definition.

## **Operation Instructions:**

### **Prepare the spectrophotometer**

Turn on the spectrophotometer by pressing the Power Switch (IO). The instrument executes the initializing procedure. The screen displays sequentially “initiate printer”, “check the system clock”, “checking the file system”, “initializing the A/D converter”, “locating filter”, “Start Kernel” as Fig 4, and then “Warm up 15 minutes” displays as Fig 5. After 15 minutes warm up or press EXIT to skip, the instrument executes the calibration procedure, “check the dark current”, “calibrate wavelength”, “establish system baseline” and “adjust system” as Fig 6 are sequentially displayed. Finally the initiation procedure finish, the main menu appears on the screen as Fig 7.

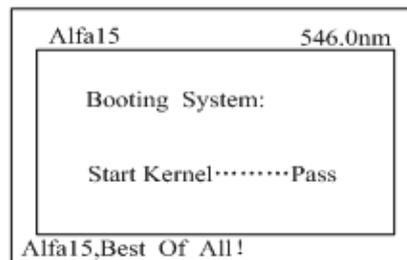


Fig 4

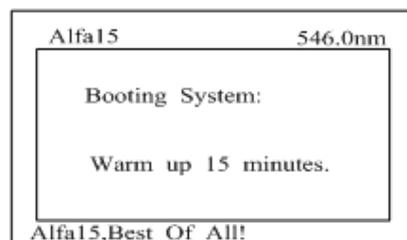


Fig5

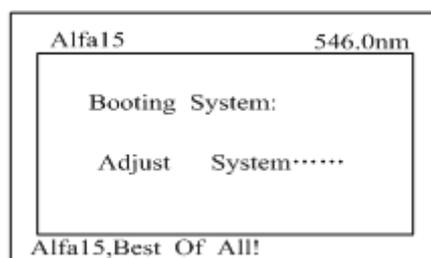


Fig 6

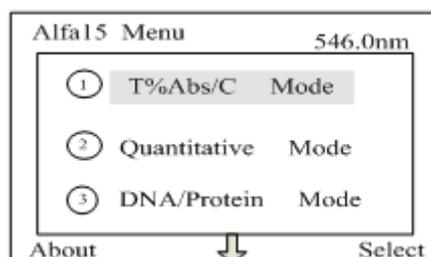


Fig 7

## Basic Operation

### A. Blank

- ✧ Push the blank cuvette into the light path.
- ✧ Press **【ZERO】** for blanking at the certain mode, such as T%/Abs/C mode. As Fig 8



Fig 8

### B. Set wavelength (for example: set wavelength in "Basic mode")

- ✧ Press **【SET λ】** (Fig. 9).
- ✧ Use numeric keypad to input wavelength 450 nm.

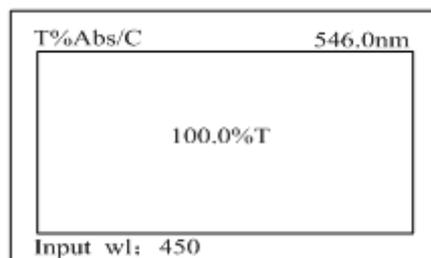


Fig 9

- ✧ Press **【ENTER】** to change the wavelength from 546.0 nm to 450.0 nm, and then blank; after blanking, the screen displays as Fig 10.

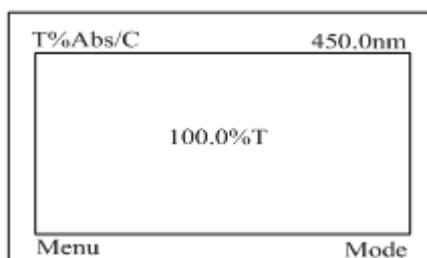


Fig 10

## Before measurement

- Make a blank reference solution by filling a clean cuvette 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 Alpha Series, push the changer so that the cuvette is in the light path (Push the rod in). Close the lid.

## %T/Abs/C Mode

### %T/Abs measurement

1. In main menu (Fig7), press **【1】** to Select basic T/Abs mode. Then blanking is showed as Fig 11. There are four modes (T%, Abs, conc/factor and energy) for you to select by pressing **【F3】** to make choice. Of course, you can press **【ESC/STOP】** to exit.

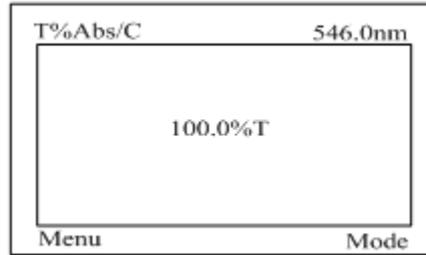


Fig 11 Basic Mode

2. Select the desired wavelength by pressing the appropriate key. After the wavelength is changed, press **【ZERO】** to blank.
3. Make a blank reference solution by filling a clean cuvette with distilled or de-ionized water or other specified solvent. Wipe the cuvette with tissue to remove the fingerprints and droplets of liquid.
4. Put the blank cuvette into the 4-cell position holder's slot nearest you. Move the rod to make the blank cuvette into the light path length. Close the lid.
5. Pressing the **【F3】** and **【^】** or **【v】** to select the needed mode, then Pressed the **【ENTER】** to confirm.
- 6 Set 0.000A/100%T by pressing **【ZERO】** .
- 7 Remove the blank cuvette if you are testing more than 3 samples. Set it aside .Suggestion for this case is that you may need to adjust **【ZERO】** control key later (i.e. change the wavelength).
- 8 Rinse a second cuvette (or more) with a small amount of the sample solution to be tested. Fill the cuvette half full and wipe it.
- 9 Put the sample cuvette(s) in the sample compartment. Close the lid.
- 10 Read the % Transmittance and Absorbance from the LCD readout window. If you are reading more than one cuvette, be sure to carefully move the stage to the next position by pulling on the sample holder knob until you feel the holder "click" into place. Be sure to make note of the readout (or print) for each sample. Remove the sample cuvette(s).
11. Print report  
Press **【PRINT】** to print test results (Fig 12).

```

Basic Mode Test Report
Wavelength: 546.0nm
Result: 0.201 Abs
Date and Time: 25-06-2010 13:55:53

```

Fig 12

## Concentration Measurement

1. Press **【F2】** to display the Fig 13.change Mode to <conc.> by pressing **【ENTER】** .Then move the reverse display stripe to line 2 or press **【2】** to select the needed concentration unit ,then press **【ENTER】** (Fig 14). You can select the "Other" to input the needed Unit then Press **【ENTER】** to confirm (Fig 15).

T%/Abs/C		546.0nm
①	Mode	<Conc.>
②	Unit	<ppm>
③	K Factor	1.000
Return		Select

Fig 13

Select Unit		546.0nm
	%	
✓	ppm	
	ppb	
Return		Select

Fig 14

Select Unit		546.0nm
	Mm/L	
	IU	
✓	Other	
Input Unit: %		

Fig 15

2. After, put the blank reference solution into light path and pressing the **【ZERO】** , there are two methods to measure the concentration:
  - 2.1. Move the reverse display stripe to line 3 or press **【3】** in Fig 13 to select the K Factor.(Fig 16) , Input known K factor of concentration, press the **【ENTER】** to confirm, press **【F2】** to return to test screen. Push the sample cuvette in the light path and take the readings (Fig. 17).

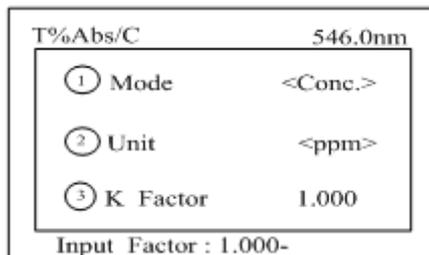


Fig 16

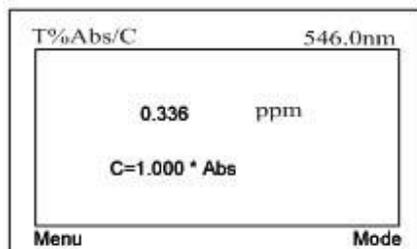


Fig 17

- 2.2. Move the reverse display stripe to line 4 or press **【F4】** in Fig 12 to select Standard.(Fig 18) , input the standard concentration ,press the **【ENTER】** to confirm, push the standard concentration into the light path and press **【START】** to take measurement.(Fig 19). Press **【F2】** to return to test screen. (Fig 20)

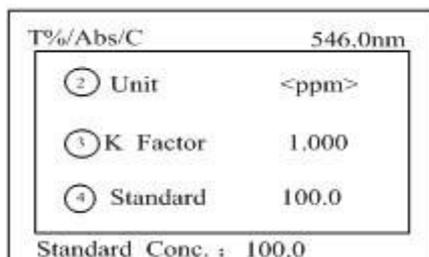


Fig 18

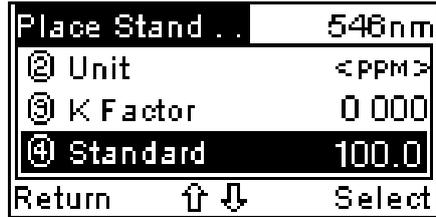


Fig 19

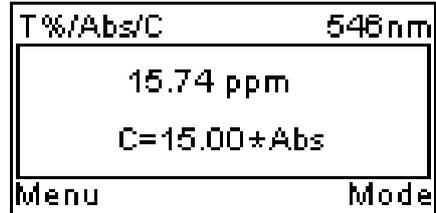


Fig 20

Note:

- a. You can set wavelength at any time by pressing **【SET λ】** and then press **【ENTER】**. After the wavelength change, press **【ZERO】** to blank is if necessary.
- b. If K Factor is more than 9999, the “out of range” will display on the screen.
- c. You can also measure the concentration by pressing Mode in Fig 11; follow the instruction on the bottom line of screen, it is easier for you to operation this way.

## Quantitative Mode

Press **【2】** in Main Menu for “Quantitative Mode”. (Fig. 21) Press the **【ESC/STOP】** button to exit.

If press **【1】** in the Fig 21 to load saved file.

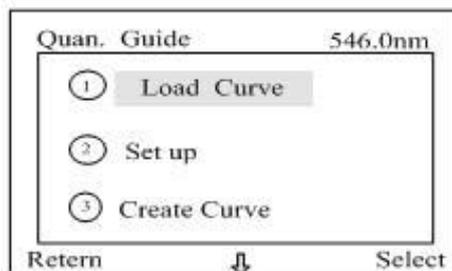


Fig 21

Note: If no file saved in the memory, no data saved will display on the top line.

## Setup

Press **【2】** in Fig. 21 to go to Setup screen Fig. 22, for more descriptions about correction method, please refer to Appendix B.

Fig 22

Press **【1】** in Fig 22 to make choice. We have Single WL, Iso absorb and Tri-point for you to select.

After you finish all setup (method, Wavelength, Unit of concentration, sample times), press **【2】** to return to Fig 21.

## Create curve

Press the **【3】** in the Fig. 21 to go to Quantitative. Curve screen Fig 23

Fig 23

Press the **【1】** button or press the **【ENTER】** button continuously in Fig 23 to change different correction. There are Ratio, Linear, Square and Cubic for you to select. If you have a known curve, you can press **【2】** in Fig 23 to input the curve, table1 show the relationship between Abs and Concentration with different correction curve. If not, you can select **【3】** in Fig 23 to establish the curve by inputting and measuring the standard concentration, Fig 24.

Table1

Correction Curve	Standard Curve Equation	factors
Ratio	$C=K1 \times A$	$K1, r^*$
Linear	$C=K0+K1 \times A$	$K0, K1, r^*$
Square	$C=K0+K1 \times A+K2 \times A^2$	$K0, K1, K2$

Cubic	$C=K_0+K_1 \times A+K_2 \times A^2+K_3 \times A^3$	$K_0, K_1, K_2, K_3$
-------	--	----------------------

Linear regression related coefficient

Standard		546.0nm
NO.	mg/L	Abs
Return	↓	Select

Fig 24

Now let us input 3 standard concentrations to take the example. Press **【V】** in Fig 24 to get Fig 25

Standard		546nm
NO.	mg/L	Abs
* 1	0.000	
Standard Conc.:		

Fig 25

Input 100 then press **【ENTER】** to get Fig. 26.

Standard		546nm
NO.	mg/L	Abs
1	100.0	
* 2		
Standard Conc.:		

Fig 26

Repeat inputting the second and third standard concentration then move the star to the No.1 Fig 27

Standard		548nm
NO.	mg/L	Abs
* 1	100.0	
2	200.0	
Return	↓	Select

Fig 27

Put the reference solution into the light path, press **【ZERO】** to Blank , then push the first standard concentration into the light path, press **【START】** to get Fig 28.

Standard #1		548nm
NO.	mg/L	Abs
* 1	100.0	
2	200.0	
Return	↓	Select

Fig 28

Sequentially measuring the all 3 standard concentration then get Fig 29

Standard		548nm
NO.	mg/L	Abs
* 1	100.0	0.504
2	200.0	0.796
Return	↓	Select

Fig 29

Now you may press **【SAVE】** to save the measured data or press **【F2】** to return to Fig 23 .select **【4】** in Fig23 to draw the curve Fig 30.

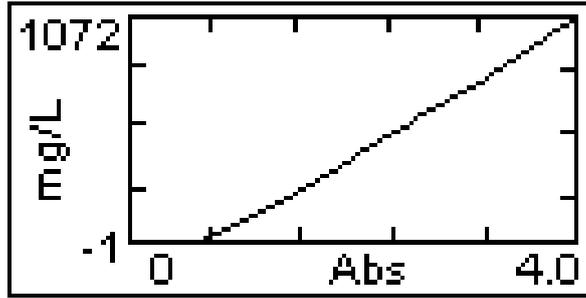


Fig 30

### Run test

Press **【4】** to run test in Fig 21. Blank first by pressing **【ZERO】** and push the sample to light path and press **【START】** to take measure, Fig 31.

Quantitative		546nm
NO.	mg/L	Abs
1	100.0	0.504
* 2	200.0	0.796
Menu	↓	Detail

Fig 31

Note: If built-in printer is installed, press **【PRINT】** to print the test results.

### DNA/Protein Mode

Press the **【3】** button in Main Menu for "DNA/Protein" Test, (Fig 32). Press **【ESC/STOP】** to exit.

DNA/Protein		546nm
NO.	Unit:mg/L	
C-DNA	C-Pro	Ratio
Setup	Detail	

Fig 32

- Note:* a. Only Alpha -1506 has this function.  
b. Please refer to the Appendix A for detail about the algorithm of the DNA/Protein test

## Parameter Setup

Press the **【F2】** button to set test parameters, as in Fig 33.

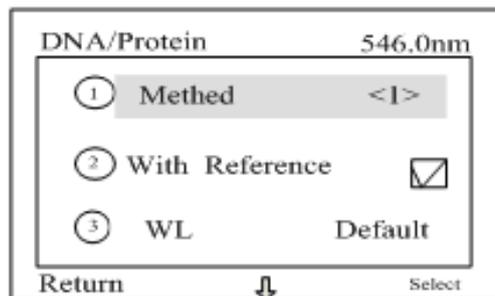


Fig 33

Base on the algorithm described in Appendix A, all test parameters are programmed in software, you can change the test parameter by your experience or restore to defaults by press **【7】** (Default Settings) in Fig 33.

## Change parameter

There are six items listed below for selecting:

- 【1】** Select "Method", we have 2 methods for selecting.
- 【2】** Select test with reference or not.
- 【3】** Select which wavelength will be used for test, defaults are 260nm,280nm and 320nm
- 【4】** Select the unit of concentration.
- 【5】** Select the coefficients from algorithm of the DNA/Protein test
- 【6】** Select the replicating times of measurement
- 【7】** Press the **【7】** button to restore defaults.

## Take measurement

After all parameters are selected, press **【F2】** to return to Fig. 32, put the reference solution into light path and press **【ZERO】** for blanking

Put the sample solution into light path and press **【START】** to start measurement, Fig 34

DNA/Protein		320nm
NO. 1		Unit:mg/L
C-DNA	C-Pro	Ratio
7.153	16.70	1.810
Setup	↓	Detail

Fig 34

Now you can:

- 【1】** press **【SAVE】** to save the test result;
- 【2】** press **【PRINT】** to get the report, if built-in printer installed, Fig 36
- 【3】** press **【CLEAR】** to delete the data on the screen
- 【4】** press **【F3】** to view Absorbance or Transmittance at selected wavelength,

Fig 35

DNA/Protein		320nm
NO. 1		16:21:03
A1	A2	Aref
1.185	1.111	1.019
Return		Mode:Abs

Fig 35

DNA / Protein Test Report

File Name:  
Date and Time: 25-06-2010 09:16:33

No	260.0nm	280.0nm	320.0nm	C-DNA	C-Pro	Ratio
1	0.226	0.212	0.102	3.825	76.60	1.127
2	0.226	0.213	0.102	3.803	79.32	1.113

Unit:ug/mL

Fig 36

## Kinetics Analysis

Press **【4】** in the main menu for “Kinetics”, Fig. 37. **【ESC/STOP】** to exit.

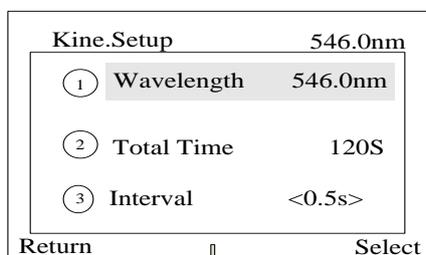


Fig 37

## Parameter Setup

There are seven items need to be setup before test. They are:

- 【1】** Select wavelength for test
- 【2】** Select total time for test
- 【3】** Select time interval of sample and display
- 【4】** Select the delay time,
- 【5】** Select Data Mode, Absorbance or Transmittance
- 【6】** Set minimum Y axis
- 【7】** Set maximum Y axis

## Start Test

After finish the setup all 7 items above, press **【8】** to go to test page Fig. 38, press

**【ZERO】** for blanking first and then press **【START】** to start the time scan, Fig. 39, after finish the time scan. Screen display is shown, Fig 40.

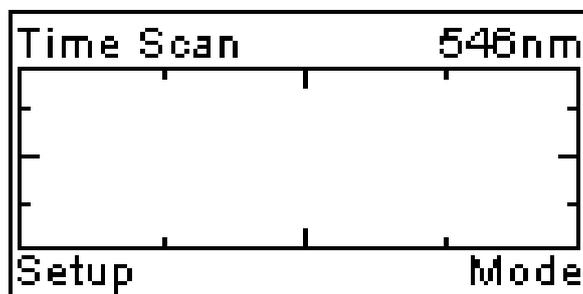


Fig 38

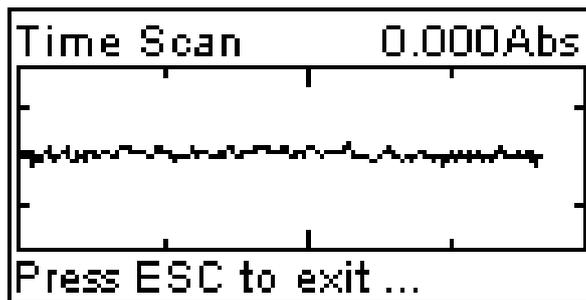


Fig 39

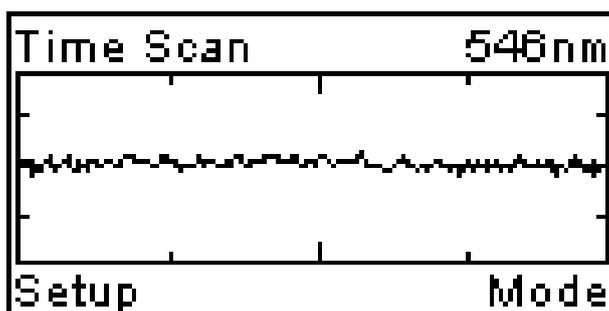


Fig 40

Now you can:

- 【1】 press **【SAVE】** to save the test result;
- 【2】 press **【PRINT】** to get the report, if built-in printer installed
- 【3】 press **【CLEAR】** to delete the data on the screen
- 【4】 press **【>】** or **【<】** to change X axis
- 【5】 press **【^】** or **【v】** to change Y axis
- 【6】 press **【LOAD】** to load saved data before

## Instrument Setup

Press **【5】** in main menu for “Instrument Setup” (Fig 41). press **【ESC/STOP】** to exit and back to the main menu.

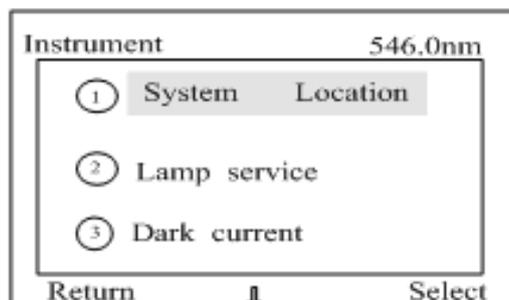


Fig 41

There are six lines listed on the page:

- 【1】** When you select “System Location” and go into Fig 42, we have got four options, only first one (Calibrate Wavelength) is for user, the other three options are used for maintenance by technician, it is not recommended for user to select this three options.

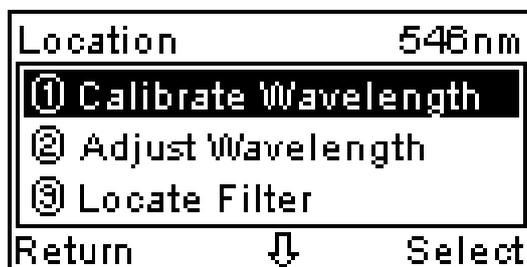


Fig 42

If you select “Calibrate Wavelength”, the instrument will re-calibrate the wavelength and always stop at 656.1nm after calibration finish.

- 【2】** The option “Lamp Service” is designed for the user to find out about Lamp. There are six options, Fig 43.

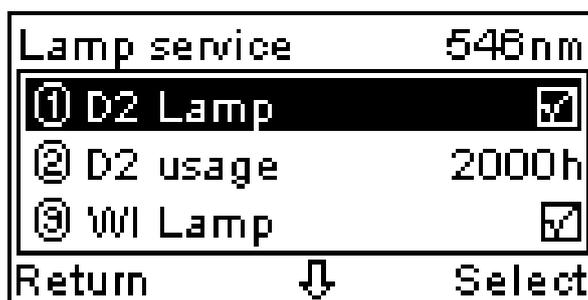


Fig 43

- ① D2 Lamp :you can turn on or off the Deuterium lamp with this option by pressing **【ENTER】** .
- ② D2 usage: The service lifetime of Deuterium lamp, countdown expression
- ③ W1 Lamp: you can turn on or off the Halogen lamp with this option by pressing **【ENTER】**
- ④ W1 usage: The service lifetime of Halogen lamp, countdown expression
- ⑤ Switch WL: You can change the wavelength at which the UV zone and Visible zone exchange. The default is 339.0nm.It is not recommended for user to change the wavelength.
- ⑥ Select Lamp: You can exchange the work zone between UV and Visible by selecting this option.

- 【3】** The dark current may behave drafting, especially within 30 minutes after

power on. It will bring a little measurement error with the measurement of dark sample solution. It is helpful to refresh the dark current by selecting this option to eliminate the measurement error.

- 【4】** Only for manufacturer
- 【5】** System baseline: Balance the energy all over the range of wavelength by selecting this option.
- 【6】** Only for manufacturer

## System Setup

Press the **【 6 】** button in the main menu for “System Setup”, fig 44. Press **【ESC/STOP】** to exit.



Fig 44

There are nine lines listed on the page:

- 【1】** Serial: It is only for the manufacturer's record.
- 【2】** The option “Clock Setup “ is for operator to modify the date and time, Fig 45

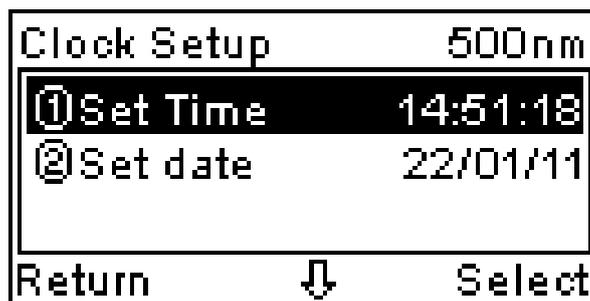


Fig 45

- ① If you select “Set time”, the screen change to Fig 46

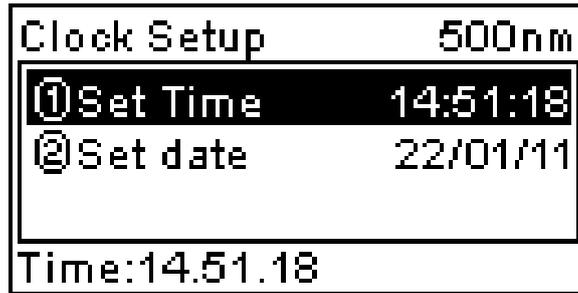


Fig 46

Use the numeric key to input new time and then press **【ENTER】**, the screen return to Fig. 45 but with new time display.

② “Set date” is the same as the “Set time”

- 【3】** Beeper: press **【ENTER】** to enable or disable the beeper.
- 【4】** Language: You can change the display language by selecting this option.
- 【5】** Comm. Port: Manufacturer remains
- 【6】** Printer Setup: Select this option to go to Fig 47

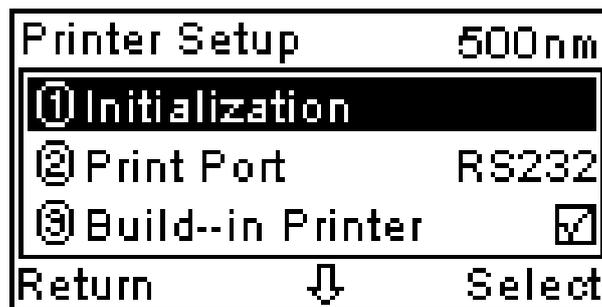


Fig 47

- ① Initialization: Initiate printer by selecting “Initialization”
- ② Print Port: Only RS232 port is available.
- ③ Build-in Printer: If built-in printer is installed, you must enable it by selecting this option, otherwise the printer doesn’t work.
- ④ Printer: Select printer’s model, you have two options, one is Sprint TP, another is Pos76.
- ⑤ Screen Copy: You can select print out with report or screen copy by this option..
- ⑥ Restore default: if you select this option, printer setup to build-in printer is installed, printer’s model is Sprint TP and Screen Copy disable.

- 【7】** Flash firmware: Manufacturer remains
- 【8】** Delete all files: You can delete all saved files by selecting this option. Please take care before take this action.
- 【9】** Restore default: If you select this option, the instrument will restore the defaults of all test modes and methods, they are:

The change wavelength of UV zone and Visible zone: 339 nm;  
 Concentration factor: 1;

Quantitative Mode:

Method: Single WL  
WL: 546nm  
Unit: mg/L  
Sample Time: 1  
Curve: Ratio  
Coeff.: 1  
Edit Standard: 0

DNA/Protein Mode:

Measure wavelength: 280nm, 260nm  
Reference wavelength: 320nm,  
Calculate factor: f1=62.90, f2=36, f3=1552, f4=757.3,  
Concentration unit: ug/ml,

Kinetics Analysis:

Scan time: 120s  
Interval time: 0.5s  
Delay time: 5s  
Test mode: Absorbance  
Display range: 0-3A;

**Connect to PC**

Press **【7】** in the main menu to go into the PC-link mode, Fig. 48. The instrument is controlled by the PC running Application Software. For more detail, please refer to the Application Software Manual for Alpha-1106/1506

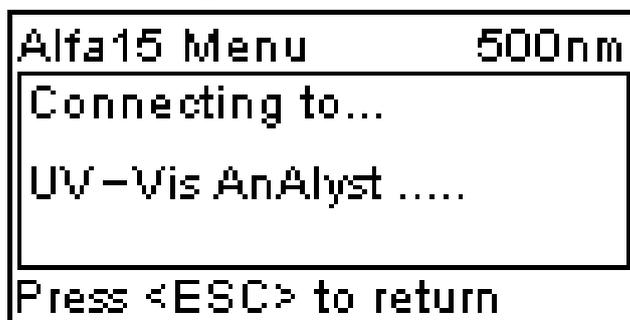


Fig48

If the instrument has handshaked successfully with the computer by the application software, Fig. 48 will change to Fig. 49.

```
Alfa15 Menu      500nm
SmartUV Station
UV-Vis Analyst ..
Press <ESC> to return
```

Fig 49

## System Information

Press **【8】** in the main menu to view something about software.

```
LSI™  
Version 1.0
```

## Appendix A

### DNA/Protein Test Algorithm

Test Name	Method	Wavelength (s)	Calculations	Parameters	Displayed Units
DNA MEASUREMENT					
DNA/Protein Concentration and DNA purity	Absorbance difference (260,280)	A1=A260nm A2=A280nm Aref=A320nm (optional)	DNA concentration: (A1-Aref)f1- (A2-Aref)f2 Protein concentration: (A2-Aref)f3- (A1-Aref)f4	f1=62.9 f2=36.0 f3=1552 f4=757.3	DNA: $\mu$ g/ml Protein: $\mu$ g/ml
	Absorbance difference (260,230)	A1=A260nm A2=A230nm Aref=A320nm (optional)	DNA concentration: (A1-Aref)f1- (A2-Aref)f2 Protein concentration: (A2-Aref)f3- (A1-Aref)f4	f1=49.1 f2=3.48 f3=183 f4=75.8	
	Absorbance ratio	A1=A260nm A2=A280nm or A2=A230nm Aref=A320nm (optional)	Ratio= A1-Aref / A2-Aref	None	No units(ratio)

## Appendix B

A number of correction techniques can be used to eliminate or reduce interference errors. In general, if the source of the error is known and is consistent from sample to sample, the error can be eliminated. On the other hand, if the source is unknown and varies from sample to sample, the error can be reduced but not eliminated. Correction techniques can always require data from at least two wavelengths. The more sophisticated correction techniques require multiple wavelengths or spectral data.

### A.1 Iso absorbance

When a known interfering component with a known spectrum is present, the error introduced by this component at the analytical wavelength for the target analysis can be eliminated by selecting a reference wavelength at which the interfering compound exhibits the same absorbance as it does at the analytical wavelength. The absorbance at this reference wavelength is subtracted from the absorbance at the analytical wavelength, as shown in Figure A1. The residual absorbance is the true absorbance of that being analyzed.

This technique is less reliable when the spectra of the analyte and the interfere are highly similar. Moreover, it can be corrected for only one interference.

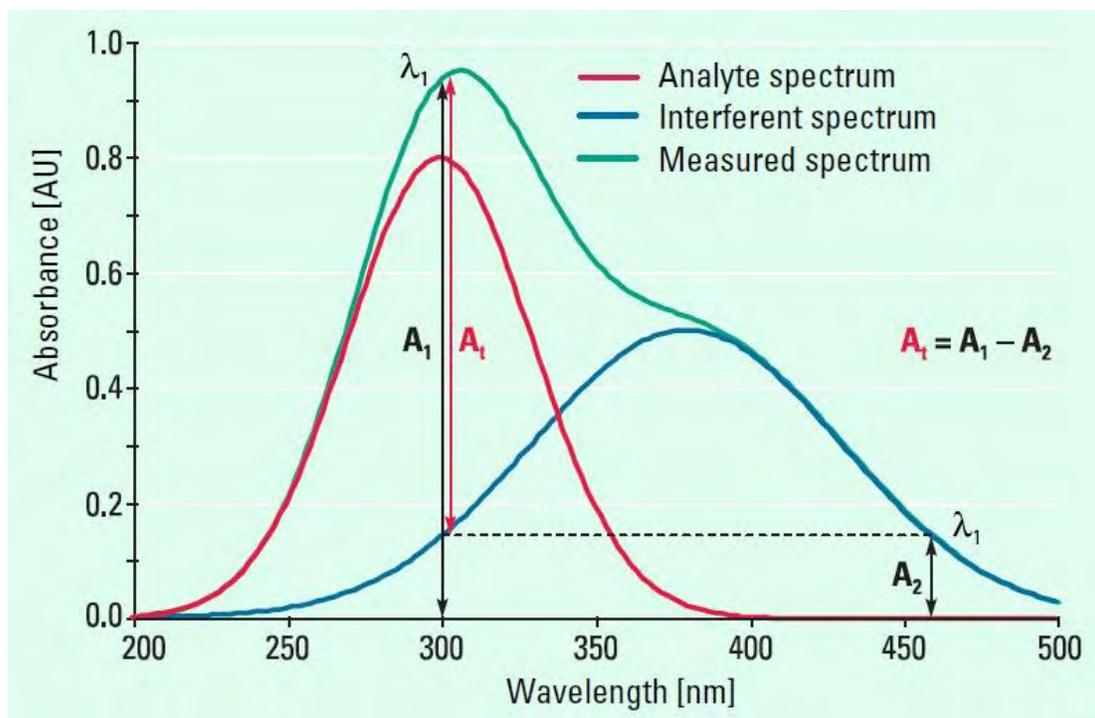


Fig A1 Iso absorbance correction

### A.2 Three-point correction

The three-point, or Morton-Stubbs, correction uses two reference wavelengths, usually those on either side of the analytical wavelength.

The background interfering absorbance at the analytical wavelength is then estimated using

linear interpolation (see Figure A2). This method represents an improvement over the single-wavelength reference technique because it corrects for any background absorbance that exhibits a linear relationship to the wavelength. In many cases, if the wavelength range is narrow, it will be a reasonable correction for nonlinear background absorbance such as that resulting from scattering of from a complex matrix.

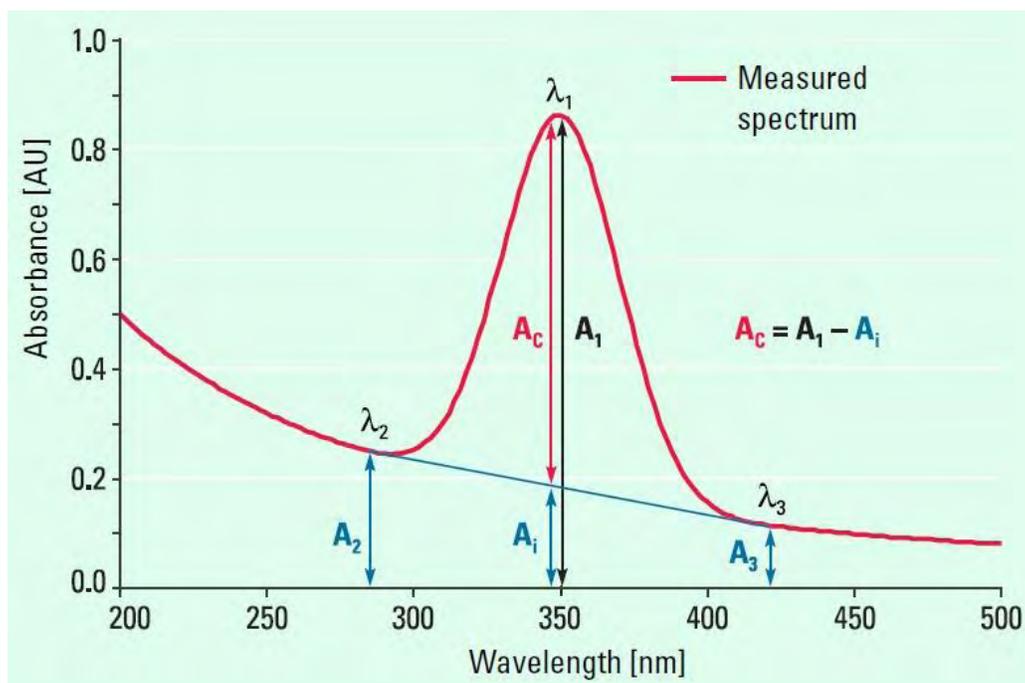


Fig A2