

MODEL 7800  
SPECTROPHOTOMETER  
(LCD TYPE)  
INSTRUCTION MANUAL

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TOKYO, JAPAN

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## *WARRANTY*

*Products sold by Jasco, unless otherwise specified, are warranted for a period of one year to be free of defects in materials and workmanship. If any defects should occur in the products during this period of warranty, Jasco will repair or replace the defective parts free of charge. However, this warranty does not cover following cases;*

- 1) Defects caused by misoperation.*
- 2) Repair or modification done by other than Jasco or authorized agent.*
- 3) Use of fittings or other spare parts supplied by other than Jasco.*
- 4) Accident beyond our responsibility.*
- 5) Disaster*
- 6) Corrosion due to use of improper solvent or sample.*

*This warranty does not cover parts listed below.*

- 1) Tungsten iodine lamp, deuterium lamp, light source mirrors, etc.*
- 2) Fuse*

*For any inquiry or request for repair service, contact your JASCO agent after confirming the model and serial number of your instrument.*

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1. UNPACKING & INSTALLATION

1-1 Unpacking

1-1-1 Unpacking the main unit

Take out the main unit from the carton and check that the serial number inscribed on the nameplate on the right side of the main unit and that on the inspection record are in agreement. Also check the line voltage.

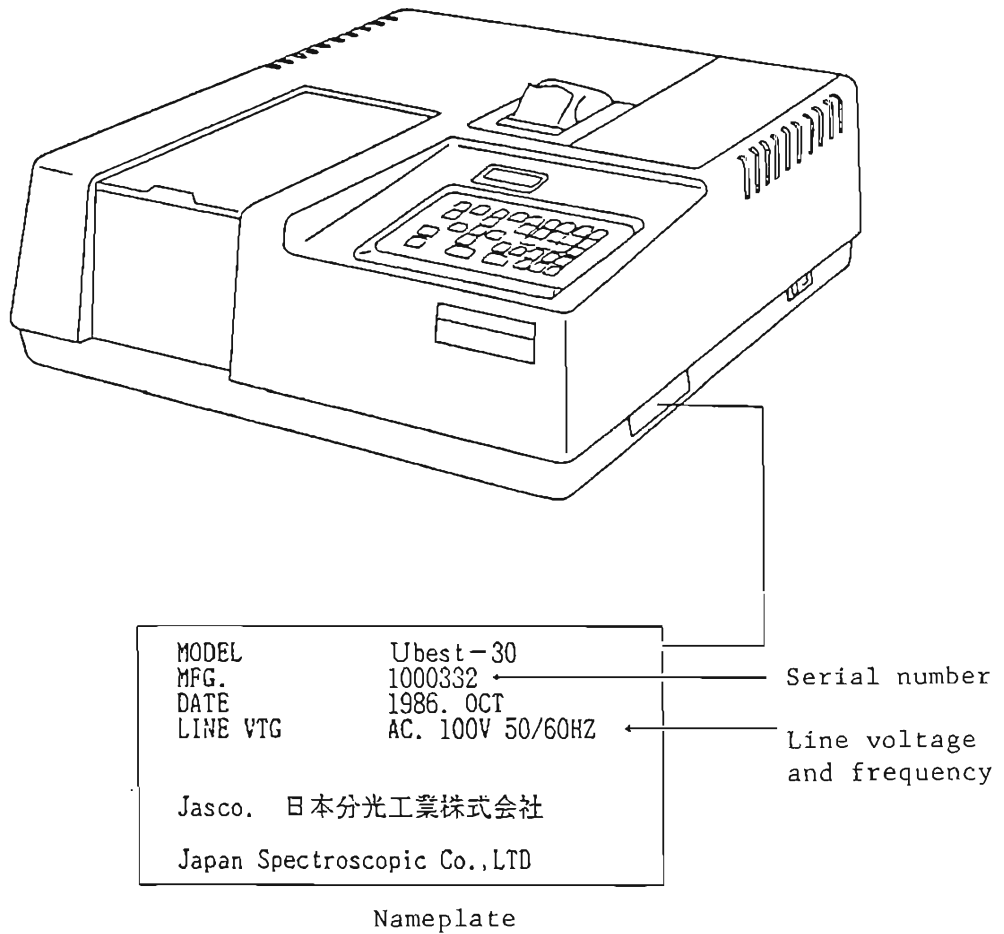


Fig. 1-1 Main unit and nameplate.

### 1-1-2 Unpacking and checking accessories

Take out accessories from the carton and check them against Table 1-1. If any part is found missing or damaged, please contact your local JASCO distributor.

Table 1-1 List of Components

Component	Q'ty	Remarks
Holumium glass	1 pc	
Fuse	1 pc	2-ampere slow blow fuse
AC input cord	1 pc	
Allen wrench	1 pc	2.5 mm
Dust cover	1 sheet	
Instruction manual	1 copy	

NOTE: If the printer (option) is ordered, the following will be supplied with the printer, which will be incorporated in the main unit.

- ° Heat sensitive chart paper      1 roll
- ° Chart paper bobbin                1 pc

### 1-2 Installation

#### 1-2-1 Installation requirements

In installing the unit, observe the following conditions. If the unit is installed in a place that does not meet with these conditions, the performance may not be guaranteed. Also note that such an

installation may cause failure of the instrument.

(1) Small line voltage variation

The line voltage variation is preferably within  $\pm 5\%$  of the line voltage. The instrument will not operate normally if it is more than  $\pm 10\%$  of your line voltage.

(2) Use a 3-pin grounded outlet (or with a grounding terminal).

If a 2-pin outlet is used, use the supplied 3P-

(3) Small temperature variation

The temperature variation is preferably  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . The operating temperature range is  $10^{\circ}\text{C}$  to  $35^{\circ}\text{C}$ .

(4) Humidity must be within the range of 35% to 85%.

High humidity will accelerate the deterioration of optical elements. It is therefore recommended to install the instrument in a place where humidity is lower than 60%.

(5) The atmospheric pressure must be 750 to 1060 millibar.

(6) No intense magnetism or source of high frequency

The instrument may not operate normally in the vicinity of intense lines of magnetic force or a source of high frequency.

(7) Small mechanical vibration

- (8) Avoid installation in a dusty place or a place where harmful gas such as corrosive gas or the like is present.
- (9) Install the instrument in a place not exposed to direct sunlight.
- (10) Install the instrument in a place not directly blown with air from an air conditioner.

#### 1-2-2 Installation and connecting connectors

Install the instrument on a bench or table measuring 600 mm wide and 550 mm deep, which withstands a weight of 15 kg.

Ideally, provide a space behind the instrument to allow access for inspection and maintenance. Fig. 1-2 shows the dimensions of the instrument.



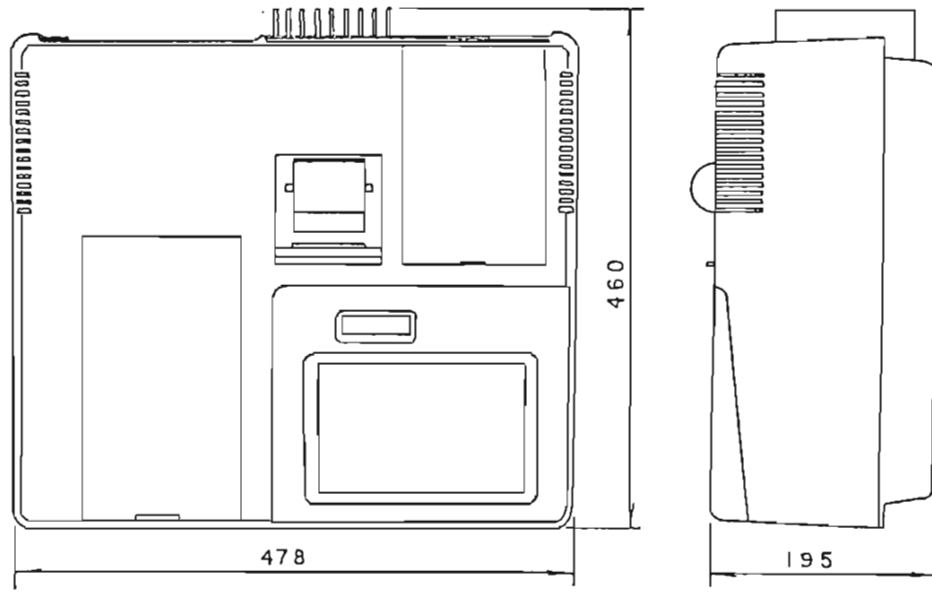


Fig. 1-2 Dimensional drawing.

After making sure the "POWER" switch at the bottom of the right-hand side panel of the main unit is in the "OFF" position, connect connectors. Connect one end of the AC input cord to "AC 100V INLET" on the rear of the main unit and the other end to your outlet. The instrument can be grounded by plugging the cable to a 3-pin outlet with a grounding terminal. If your outlet has no grounding terminal, ground the grounding terminal on the rear of the main unit



3-pin connector with  
grounding terminal

Fig. 1-3

**WARNING**

- (1) Make sure that the grounding wire of the 3-pin outlet is grounded.
- (2) Do not use a water supply pipe for grounding because it is often made of non-metal materials. Correctly ground the instrument using the grounding terminal on your power distribution board. If it is not grounded, you may receive an electric shock in case insulation failure.

1-2-3 Loading heat-sensitive chart paper

CAUTIONS:

- (1) The heat-sensitive chart paper has its face and back. Be sure to load it so that print is made on the face.
- (2) Be sure to load the chart paper before using the printer. Operation without loading chart paper may damage the thermal head.

<Cautions in handling heat sensitive chart paper>

The heat sensitive chart paper will develop color by heat. Color development is noticeable from about 75°C. Use the following care in handling the chart paper.

- (1) Do not store it in a place where temperature and/or humidity is high. Store it in a dark place where temperature is lower than 30°C and humidity lower than 60%.
- (2) Use care not to wet the chart paper. If the recording area is wetted with water, do not rub the surface with force, but lightly press it with tissue paper or the like and allow it to dry.
- (3) Do not rub chart paper with a hard object. If rubbed, it may develop color by friction heat.
- (4) Exposure to intense light for an extended time after color has developed may fade it. Keep it in a file, as and if necessary.
- (5) For pasting, do not use a solvent-based paste. Use of organic solvent may develop color. Appropriate adhesives include starch-based paste, gum arabic, and poval-based or CMC-based adhesive.
- (6) Plasticizer may fade the recording area. Do not

stick cellophane tape directly to the recording area or do not allow plastic film containing much plasticizer to be in direct contact with it for an extended time.

## 2. SPECIFICATIONS

Optical system	: Concave diffraction grating Double-beam single monochromator
Light source	: Deuterium discharge tube (200 nm to 350 nm) Tungsten iodine lamp (330 to 1100 nm)
Light source changeover wavelength	: Wavelength can be selected at 330 or 350 nm.
Wavelength range	: 200 nm to 1100 nm
Wavelength repeatability	: $\pm 0.1$ nm
Wavelength accuracy	: $\pm 0.5$ nm
Spectrum band width	: 3 nm, fixed
Wavelength display	: 1000.0 nm (0.1 nm)
Measurement range	: 0 to 2 Abs
Measurement display	: 0.0 to 200.0%T 0.000 to 2.000 Abs Can be displayed up to 000.00%T, 0.0000 Abs by changeover.
Measurement reproducibility	: $\pm 0.001$ Abs (0 to 0.5 Abs) $\pm 0.002$ Abs 0.5 to 1 Abs) $\pm 0.15\%T$

Measurement accuracy :  $\pm 0.005$  Abs  
(0 to 1 Abs)  
 $\pm 0.3\%T$   
Checked by NBS SRM930D.

Scan speed : 240, 480, 1200,  
2400 nm/min

Stray light : 0.1%  
(220, 340 nm)

Baseline flatness :  $\pm 0.001$  Abs (200 to 1000 nm)

Baseline stability :  $\pm 0.001$  Abs/day

Clock function : Provided

Detector : Two silicon photocells

Line voltage : 100, 115, 200, 220, 230,  
240 volts

Dimensions and weight: 478 mm wide x 460 mm deep x  
195 mm high, 15 kg.

### 3. GENERAL DESCRIPTION OF INSTRUMENT

#### 3-1 Optical System

This instrument measures the absorption of a sample in the ultraviolet/visible/near infrared region of 200 to 1100 nm wavelengths to make quantitative analysis. It can also measure the absorption spectrum, as a matter of course.

Fig. 3-1 shows the optical system of this instrument. It uses a deuterium lamp in the ultraviolet region and a tungsten iodine lamp in the visible-to-near infrared region as the light source. The light from the light source, after passing through a high order light cut-off filter, goes to the monochromator that uses a concave diffraction grating. The light is monochromated by the monochromator and is split into two beams by the beam splitter. One of the beams pass through the sample and the other the reference sample such as a solvent or other and is incident on the silicon photocell detector.

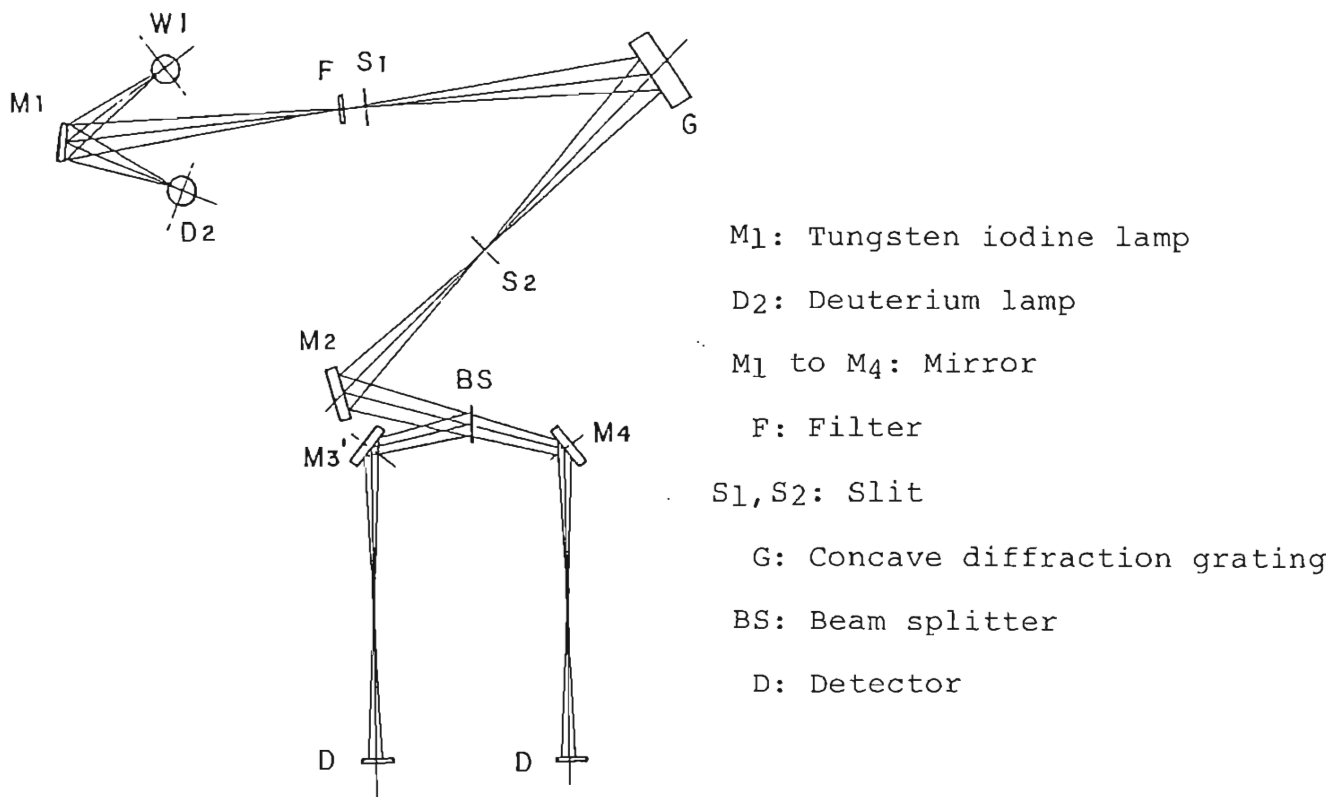


Fig. 3-1 Optical system.

### 3-2 System

Fig. 3-2 shows the block diagram of this system. After the light signal is converted into an electrical signal by the detector and amplified, it is subjected to A-D conversion. The data thus converted is subjected to necessary processing by a microcomputer and is output.



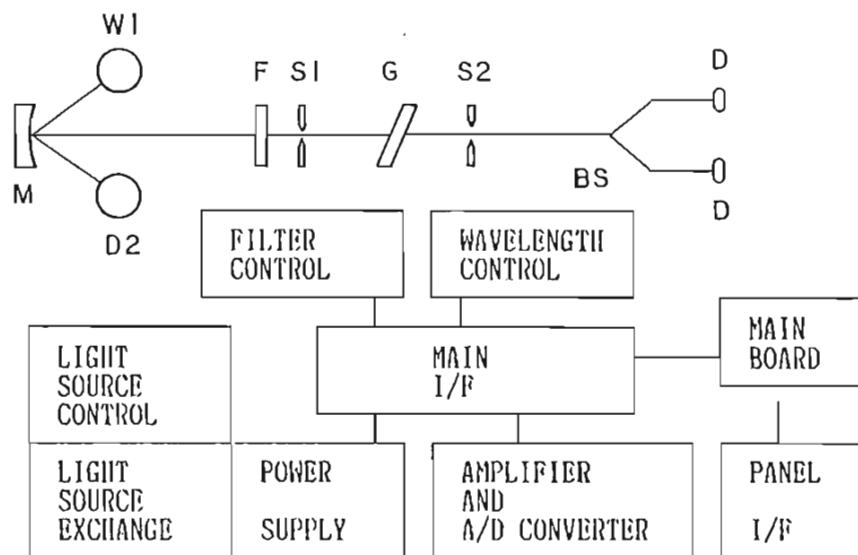


Fig. 3-2 Block diagram of the system.

### 3-3 Program Structure

The programs include the following four.

#### (1) Standard measurement program

This program is supplied with the instrument as standard and includes Methods 1 through 5.

Method 1 : Measurement at fixed wavelength  
(%T, Abs)

Method 2 : Measurement of change with time at  
fixed wavelength (stored in memory)

Method 3 : Quantitative analysis

Method 4 : Measurement of spectrum data

Method 5 : Measurement of change with time at  
fixed wavelength (not stored in memory)

(2) Data processing program

This program comes with CRT. The following methods are included.

Method 11: Spectrum data processing

Addition, subtraction, multiplication, division; differential processing; smoothing processing; peak detection; mode conversion; expansion and reduction of scale; etc.

Method 15: Comment function

Method 16: Command link function (simple program function)

NOTE: If CRT is not supplied, the memory program will be supplied instead. This program permits move of the memory contents, addition, subtraction, multiplication, division, and data printout.

(3) Program for setting the spectrophotometer and control of the input/output unit.

1) Program for setting the spectrophotometer

Method 21: Setting of spectrophotometer

Method 22: Self-diagnosis

Method 23: Baseline correction and wavelength correction

2) Program related to input/output unit

Method 31: Control of interface with options

Method 32: Positional adjustment of thermal  
plotter head

(4) Application program (option)

Application programs are all included in Method 50.

One program is stored on a piece of ROM cartridge  
or floppy disk. The following programs are available.

- Wavelength program (spread sheet system)
- Printout of measurement data at fixed wave-  
length intervals
- Kinetics (for enzyme routine)
- Kinetics (for enzyme study)
- Color difference calculation program
- Multi-component analysis program
- Differential quantitative analysis program
- Saving data and measurement parameters onto  
floppy disk
- Dissolution test program

#### 4. COMPONENTS & FUNCTIONS

##### 4-1 External View

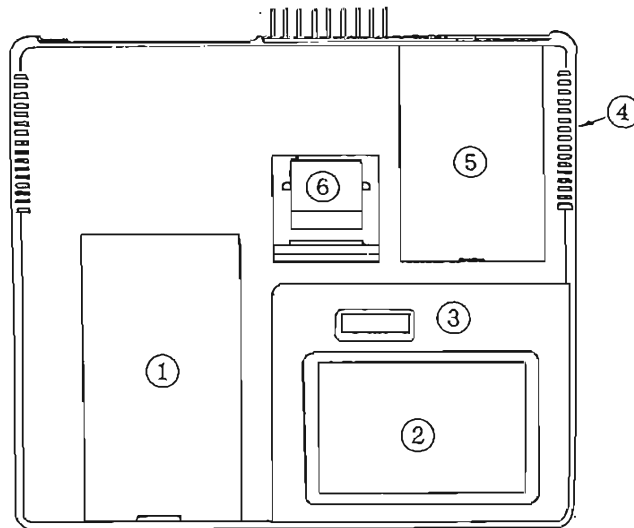


Fig. 4-1

Component	Function
① Sample chamber	<p>Open the lid by sliding it, and a cell holder will be in sight.</p> <p>The beam on your side is the sample beam and the one on the back side is the reference beam.</p>
② Operation panel	<p>All operations are performed by operating the keys on this panel.</p> <p>(See 4-2.)</p>
③ LCD indicator	<p>The wavelength, absorbance, input of parameters, etc. are displayed on this indicator.</p>

Component	Function
④ "Power" switch	Located at the bottom of the right-hand side panel of the instrument.
⑤ Light source unit	The light source is located here.
⑥ Printer	Option. The printer prints out parameters and measurement results if supplied.

#### 4-2 Operation Panel

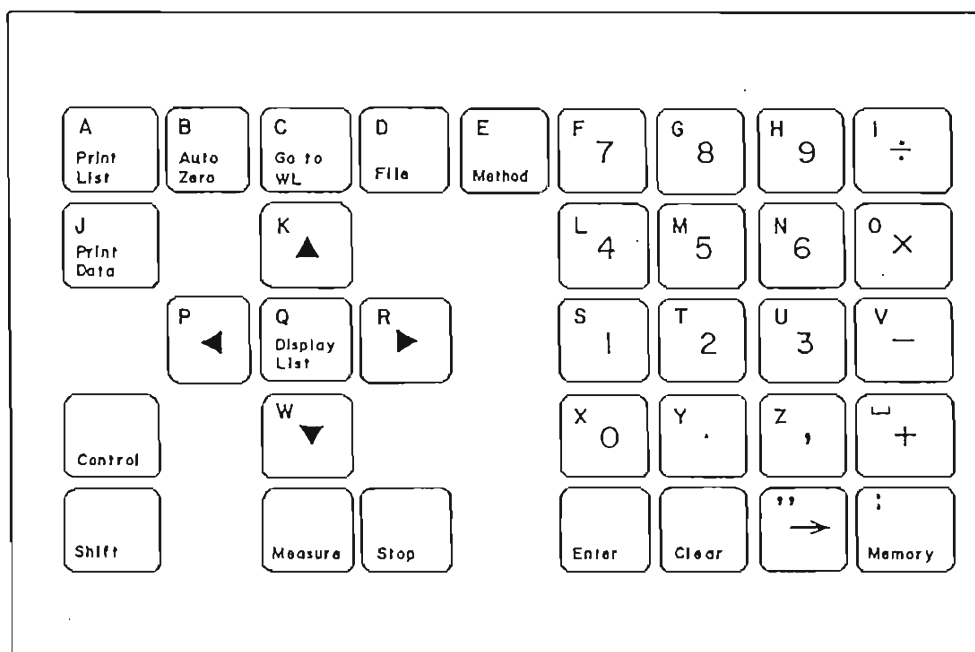


Fig. 4-2 Operation panel.

Key	Function
"Method"	This key selects the measurement method. Pressing it causes the menu selection mode.

Key	Function
"File"	This key is used for storing parameters in the C-MOS RAM or calling them from it.
"Go to WL"	A wavelength setting key. (Ex.) 400 nm [Go to WL] [4] [0][0][Enter]
"Auto Zero"	A key for automatic setting of 100%T or Abs0. Pressing this key starts execution immediately.
"Print List"	A key for printing out the measurement parameters of the method now selected. Pressing the key starts execution immediately.
"Print Data"	A key for printing out the currently displayed wavelength and measurement value on the printer. Pressing the key starts execution immediately.
"Δ, ∇, ◀, ▶"	A cursor key.
"Display List"	A key for changing the measurement mode of each method to the parameter setting mode or, conversely, the parameter setting mode to the measurement mode.
"Control"	Pressing another key with this key held down changes the functions of the key.
[Control] [▶] [Control] [◀]	} This key is used for shifting the wavelength to the shorter wavelength side

Key	Function
	or the longer wavelength side.
[Control][Δ]	} These keys are used in feeding or
[Control][∇]	
"Shift"	A key for options.
"Measure"	A measurement start key. Pressing this key starts execution.
"Stop"	Measurement suspension key. Pressing this key during measurement suspends measurement. It is also used for suspending parameter setting and program run.
"0..., 9, ."	Numerical keys, which are used for keying in numerals.
"+, -, *, 1"	Keys for arithmetic operation such as addition, subtraction, multiplication, and division. (option)
","	Used as a delimiter in entering parameters.
"Enter"	Key for executing the inputting of numericals values.
"Clear"	Used for cancelling an entered numerical value.
"→"	Used for moving the memory contents to another memory.
"Memory"	Used for specifying a memory number.

4-3 Rear Panel

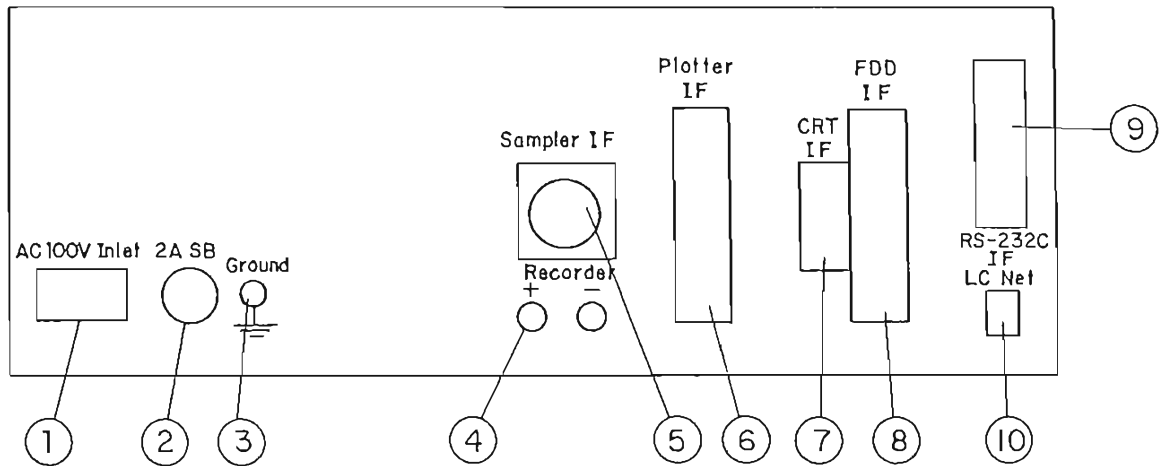


Fig. 4-3 Rear panel.

Component	Function
① "AC Inlet"	Connect it to your outlet.
② "SB Fuse:	Slow blow fuse for the main unit.
③ "Ground"	A grounding terminal.
④ "Recorder"	An output terminal of the recorder.
⑤ "Sampler IF"	A connector to be connected to the auto sampler, quick flow sampler, etc.
⑥ "Plotter IF"	A connector to be connected to the plotter.
⑦ "CRT IF"	A connector to be connected to the CRT.
⑧ "FDD IF"	A connector to be connected to the floppy disk driver.
⑨ "RS-232C IF"	A connector to be connected to the RS-232C interface.
⑩ "LC-Net:	A connector for options.



## 5. TURNING ON "POWER" & STOP OF OPERATION

### 5-1 Turning on "Power" Switch

(1) Turn ON the "Power" switch at the bottom of the right-hand side panel of the 7800. The LCD displays "Under Initialization", and automatic check of the instrument is started, and the following items are checked. Upon completion, the parameter setting mode of "Method 1" (Fig. 5-1) is caused.

- Wavelength (Wavelength is checked)
- Lamp (Light source lights up)
- Lamp exchange (The light source mirror is changed over.)
- Filter (Filter is changed over)
- Parameter (Measurement parameter is initialized)

# 1 : Photo Mode 1. (2) Abs
--------------------------------

Fig. 5-1 Parameter setting mode of "Method 1".

NOTE (1): If a parameter has been stored in the parameter file 1, the "Method" in file 1 will be called.

NOTE (2): During initial check, LCD displays its progress in sequence. If "Error" is displayed, operation stops at "Method 99". In such a case, turn on the "Power" switch again, locate the error, and decide whether measurement is possible or not referring to Table 5-1. If measurement is possible, proceed to the next step.

NOTE (3): If the Model 7800 is equipped with a plotter and the plotter output of the parameter file 1 is set at "ON" (see "Method 31"), turn on the "Power" switch on the plotter before turning on the "Power" switch on the 7800. Otherwise, a parameter error will be displayed and the operation will stop at "Method 99".

Table 5-1 Error Message and Criteria of Measurement Feasibility

Filter error	Measurement not feasible
Lamp Error	Check the light source.  W lamp is lit: Measurement is feasible on the wavelength side longer than 330 nm.

	<p>D<sub>2</sub> lamp is lit: Measurement is feasible  on the wavelength side  shorter than 350 nm.</p> <p>Both W and D<sub>2</sub> lamps off: Measurement  not feasible</p>
Lamp Exchange Error	Measurement not feasible.
Wavelength Error	Measurement not feasible.
Parameter Error	Measurement is feasible if the parameter setting can be done by key input.

(2) Call the desired method by the following key operation.

- ① Press the [Method] key. LCD displays the menu selection mode (Fig. 5-2).
- ② On the display shown in Fig. 5-2, the method display can be changed in sequence with the cursor keys ([V], [Δ]).
- ③ When the desired method is displayed, press the [Enter] key.

NOTE: The method is affixed with a number. The desired method can be called also by entering that number, instead of pressing the cursor key.

[Number] [Enter]

The method display and its meaning are given in Table 5-2.

Table 5-2 Method Display and its Meaning

Method	LCD display	Meaning
# 1	1. Fix WL Meas	Measurement at fixed wavelength (%T, Abs)
# 2	2. Time Scan 1	Measurement of change with time at fixed wavelength (The result is stored in memory.)
# 3	3. Quanti Analy	Quantitative analysis
# 4	4. Spectrum	Spectrum measurement
# 5	5. Time Scan 2	Measurement of change with time at fixed wavelength
#21	21. Internal	Initial control
#22	22. Self Diagnos	Self-diagnosis
#23	23. Correction	Baseline correction, wavelength correction
#31	31. Output	Control of external devices (option)
#32	32. Zero, Span	Zero and span adjustment of the plotter
#50	50. Application	Application program

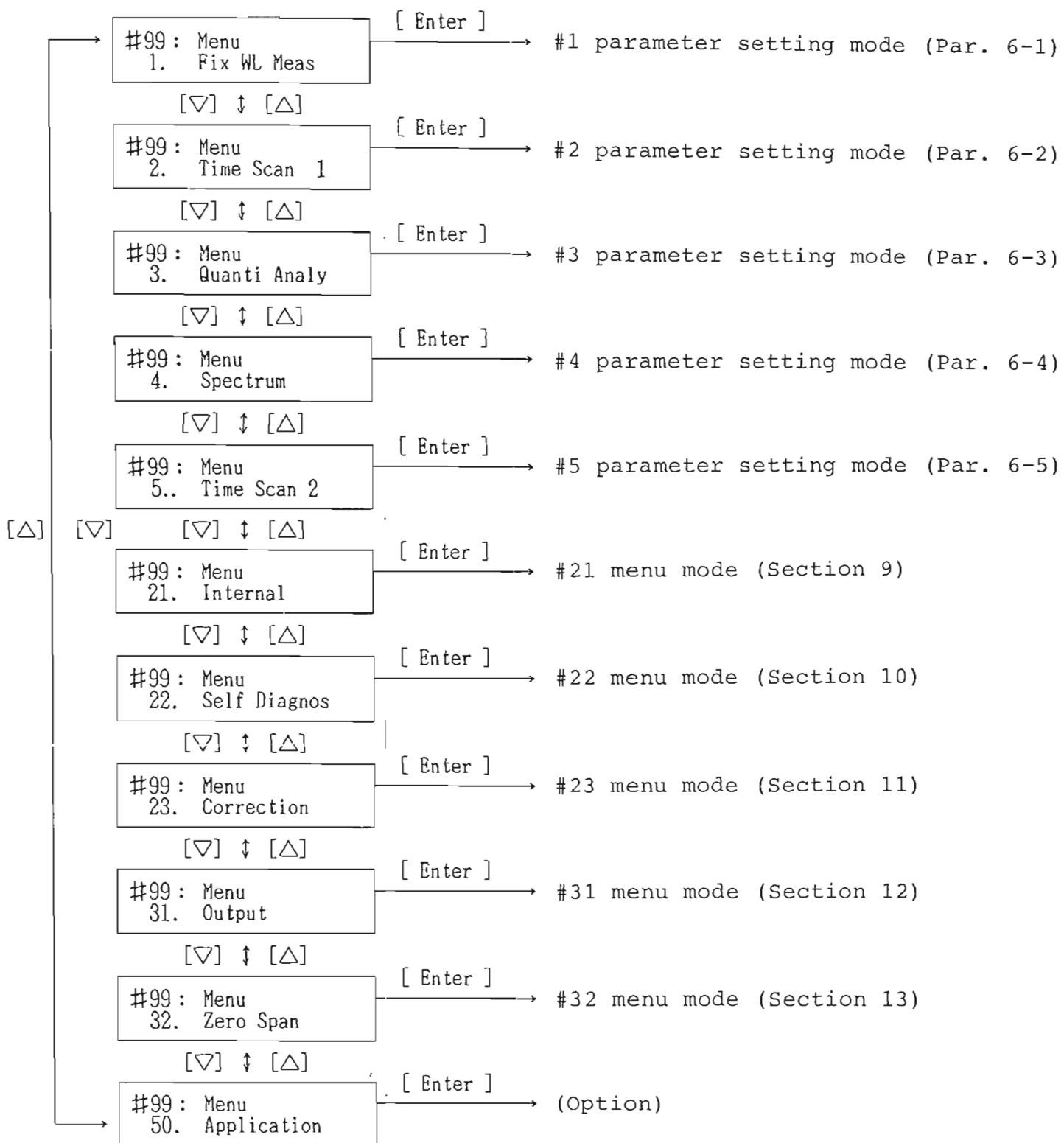


Fig. 5-2 Menu selection mode and key operation.

## 5-2 Stop of Operation

After making sure there is nothing in the sample chamber, turn OFF the "Power" switch. About 5 five minutes later when the light source unit has cooled down, put on the dust cover.

6. MEASUREMENT METHOD

6-1 "1. Fix WL Meas" Measurement of Transmittance and Absorbance

(1) Call Method 1.

Pressing keys [Method] [1] [Enter] causes the parameter setting mode of Method 1. Fig. 6-1 shows the LCD display and key operation in Method 1.

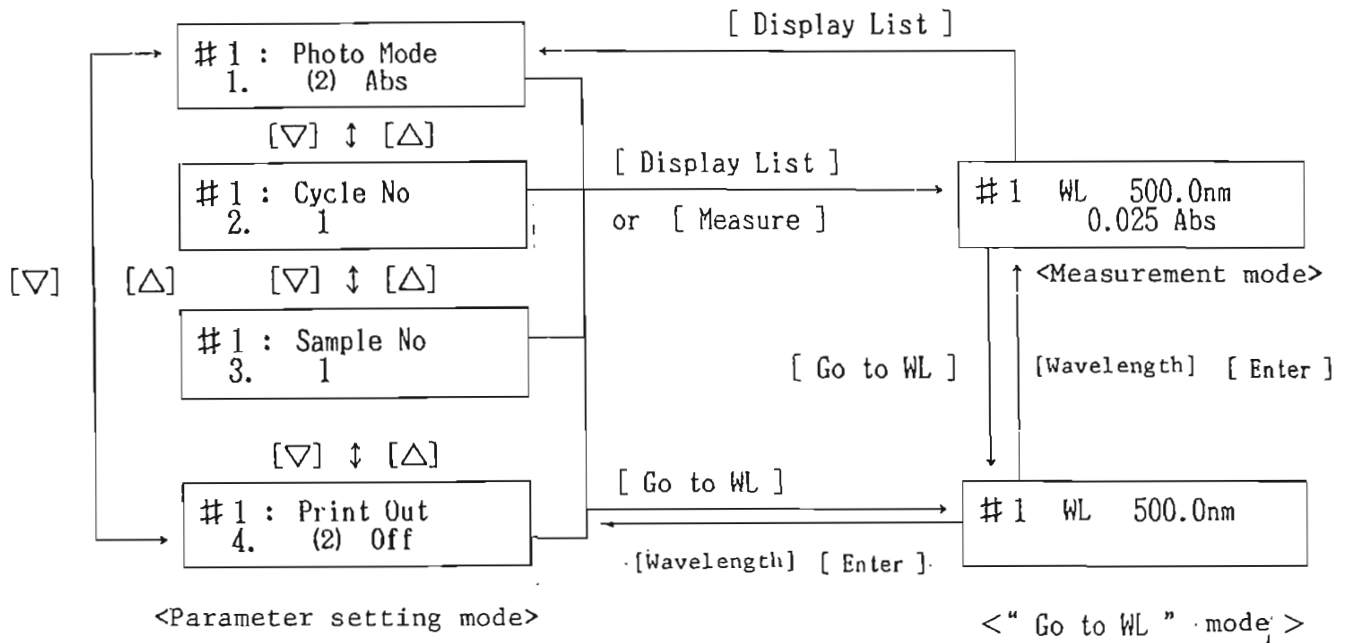


Fig. 6-1 LCD display and key operation in Method 1.

(2) Check and change the parameter in the parameter setting mode shown in Fig. 6-1. Pressing the

cursor key ([Δ], [∇]) to change the LCD display as shown in the figure, and check the displayed value. For how to change, refer to Section 7.

NOTE: Measurement parameters are set as shown in Fig. 6-1 as standard.

(3) Select the measurement wavelength by the following key operation. Fig. 6-1 shows the change in the LCD display when the key is operated.

[Go to WL] [Wavelength] [Enter] (Input range 200.0 to 1,100.0 nm)

After this operation, control immediately proceeds to the selected wavelength.

NOTE (1): If the wavelength has already been set at the desired wavelength, press [Display List] to proceed to the measurement mode.

NOTE (2): Press [Auto Zero], as and if necessary. Execution of "Auto Zero" takes several seconds.

(4) Mount the sample in the sample chamber. The beam on your side is the sample beam.

(5) Press the [Measure] key. If the printer or plotter is supplied, the result is printed out on it.

(6) If measurement is to be repeated under the same conditions, repeat the steps in (4) and (5).

NOTE: To change the measurement parameter, press



[Display List].

The parameter setting mode is caused.

6-2 "2. Time Scan 1" Measurement of Change With Time  
at Fixed Wavelength

NOTE: The result obtained by measurement in this  
method is stored in memory 1.

(1) Call Method 2.

Pressing keys [Method] [2] [Enter] causes the  
parameter setting mode of Method 1. Fig. 6-2  
shows the LCD display and key operation in Method  
2.

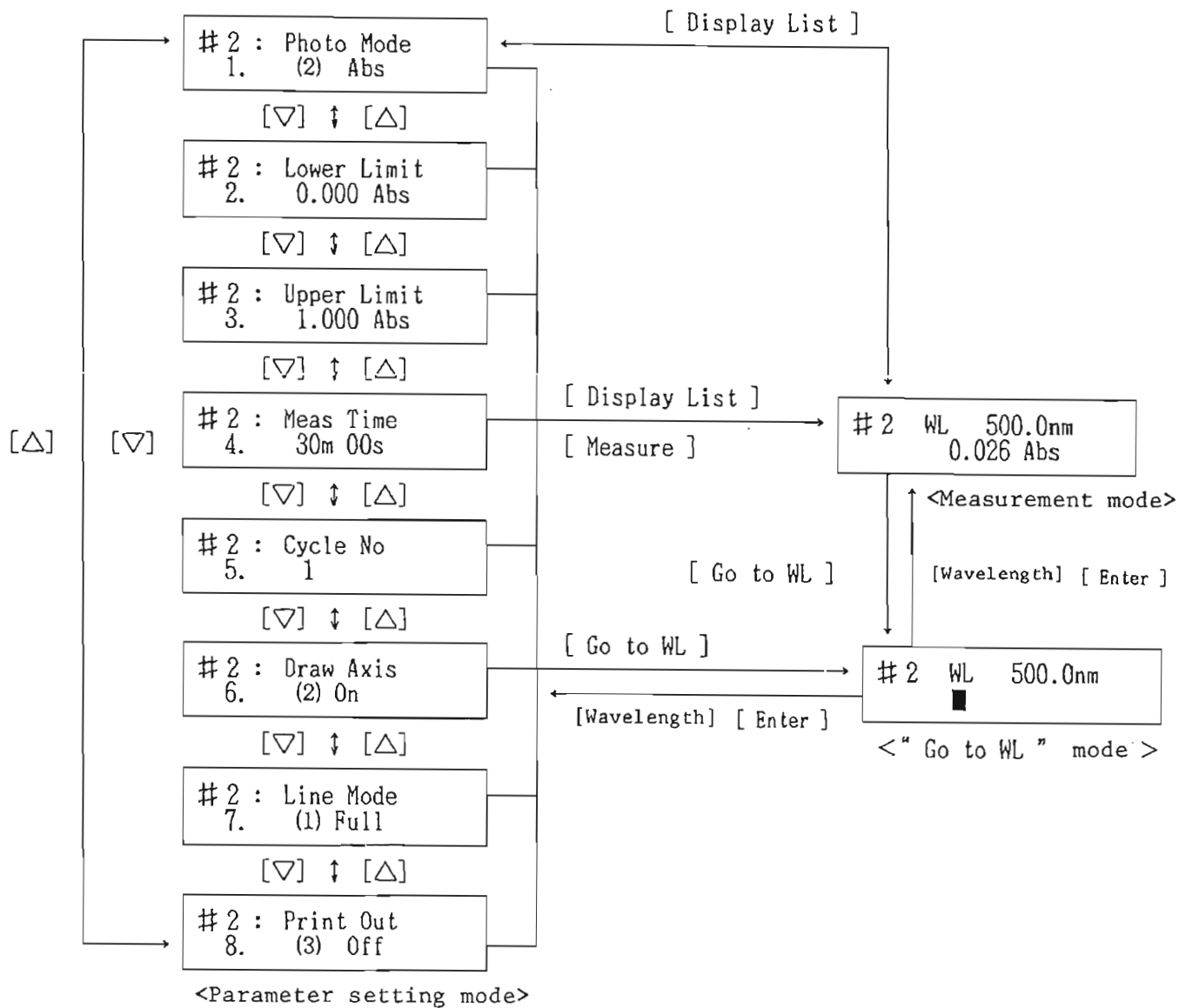


Fig. 6-2 LCD display and key operation in Method 2.

(2) Check and change parameters in the parameter setting mode shown in Fig. 6-2. Press the cursor key ([ $\Delta$ ], [ $\nabla$ ]) to change the LCD display as shown in the figure and check the displayed value. For how to change, refer to Section 7.

NOTE: The measurement parameters are set as shown in Fig. 6-2 as standard.

(3) Select the measurement wavelength by the following key operation. Fig. 6-2 shows the change in the LCD display when the key is operated.

[Go to WL] [Wavelength] [Enter] (Input range: 200.0 to 1,100.0 nm)

NOTE (1): If the wavelength has already been set at the desired wavelength, press [Display List] to proceed to the measurement mode.

NOTE (2): Press [Auto Zero], as and if necessary. Execution of "Auto Zero" takes several seconds.

(4) Mount the sample in the sample chamber. The beam on your side is the sample beam.

(5) Press the [Measure] key. The result is stored in memory 1. If the plotter is supplied, the result is recorded on the plotter.

NOTE (1): To suspend operation during measurement, press the [Stop] key.

NOTE (2): If the data in memory 1 is needed, move data to another memory in accordance with 8-1.

NOTE (3): The chart speed when the plotter is interfaced depends on the "Measure Time".

Table 6-1 shows the relation.

Table 6-3 Relation between "Measure Time" and Chart Speed

"Measure Time" (min, sec)	"Chart Speed" (mm/min)	sec/Data
166 m 41 s to 333 m 20 s	1.2	10
66 m 41 s to 166 m 40 s	2.4	5
33 m 21 s to 66 m 40 s	6	2
16 m 41 s to 33 m 20 s	12	1
6 m 41 s to 16 m 40 s	24	0.5
3 m 21 s to 6 m 40 s	60	0.2
1 m 41 s to 3 m 20 s	120	0.1
0 m 01 s to 1 m 40 s	240	0.05

(6) To make measurement under the same conditions, repeat the steps in (4) and (5).

NOTE: To change the measurement parameters, press the [Display List]. The parameter setting mode is caused.

### 6-3 "3. Quanti Analy" Quantitative Analysis

This method is a mode for making quantitative analysis.

It permits two-wavelength processing and three-wave

processing, in addition to one-wavelength processing. Quantitative analysis can be made with high accuracy by selecting a method suited to the sample condition out of these three processing methods.

In preparing calibration curves, calibration points up to maximum 20 points are plotted and a calibration curve suited to the purpose can be selected out of the straight line passing through the zero point, regression straight line and polygonal approximation curve. If the slope of the calibration curve is known, calculation of coefficients can be made by entering the value.

Fig. 6-3 shows the flow of quantitative analysis.

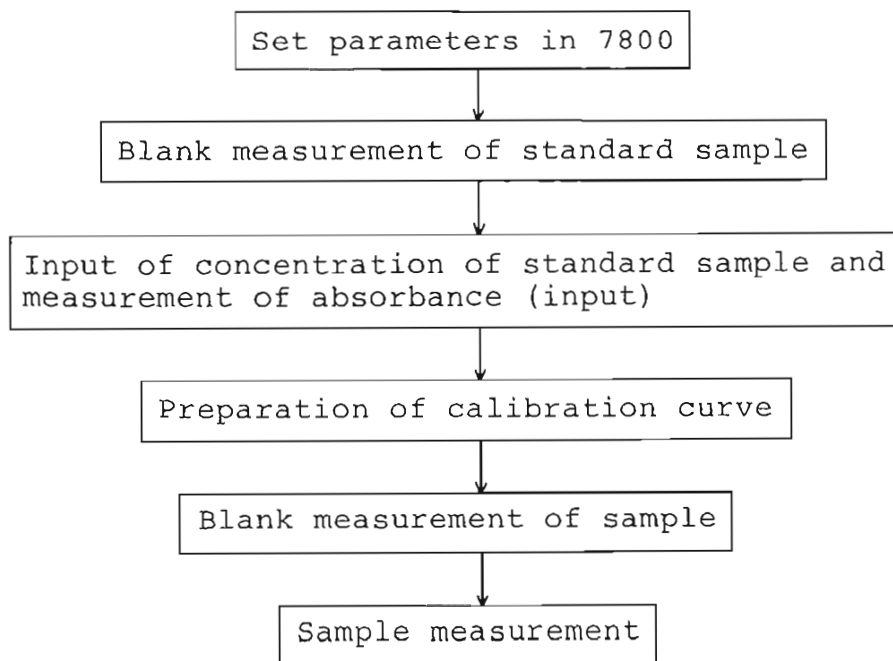


Fig. 6-3 Flow of quantitative analysis.

The structure of the mode of Method 3 is shown in Fig. 6-4. In this method, the desired mode including the menu mode can be called, as necessary. To perform operation in sequence, press the [+] key, and control proceeds to the next mode. To return to the preceding mode, press the [-] key.

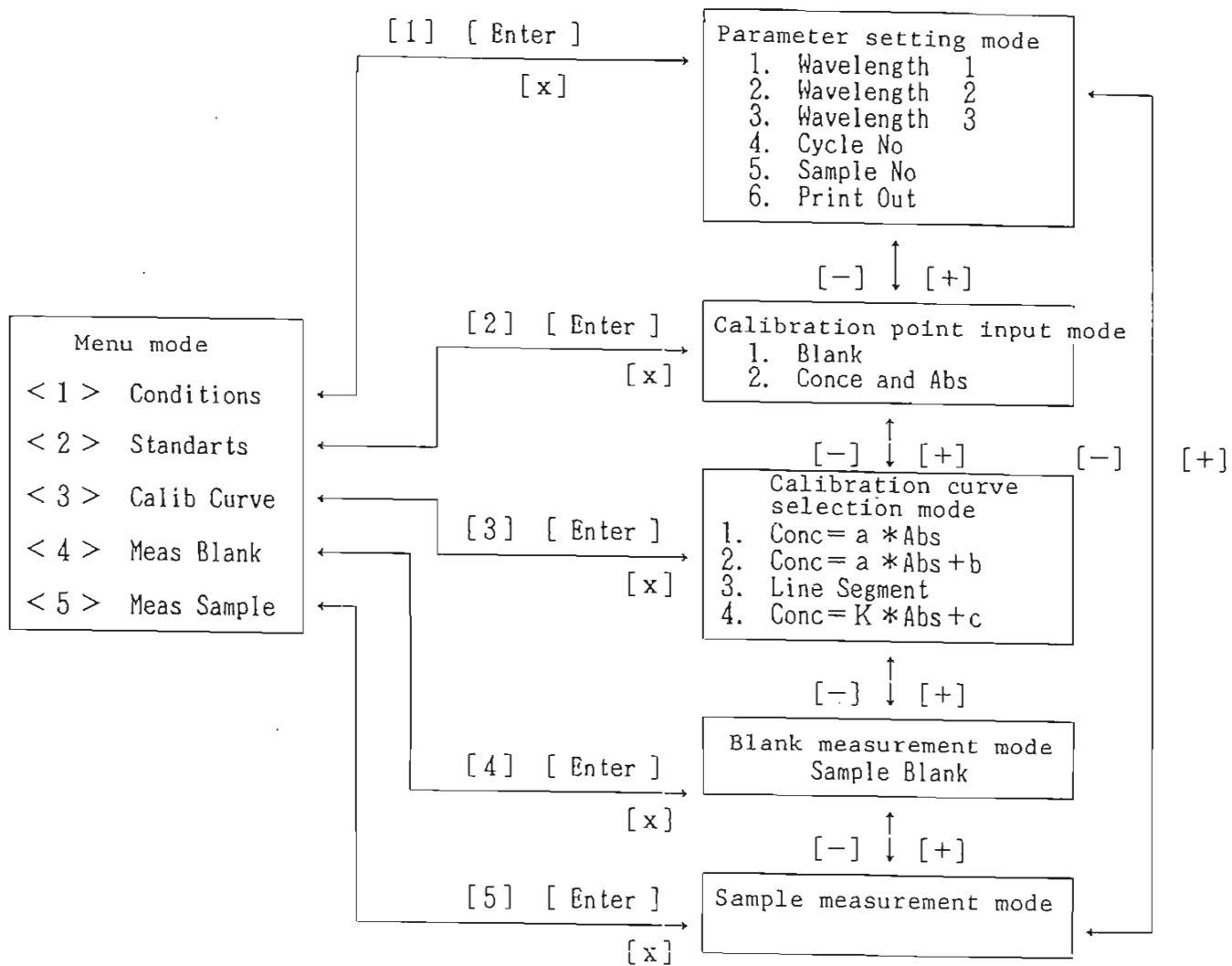


Fig. 6-4 Structure of mode and key operation in Method 3.

The key operating sequence is given below for each mode.

Call Method 3.

Pressing keys [Method] [3] [Enter] causes the menu mode in Method 3. Fig. 6-5 shows the LCD display and key operation in the menu mode.

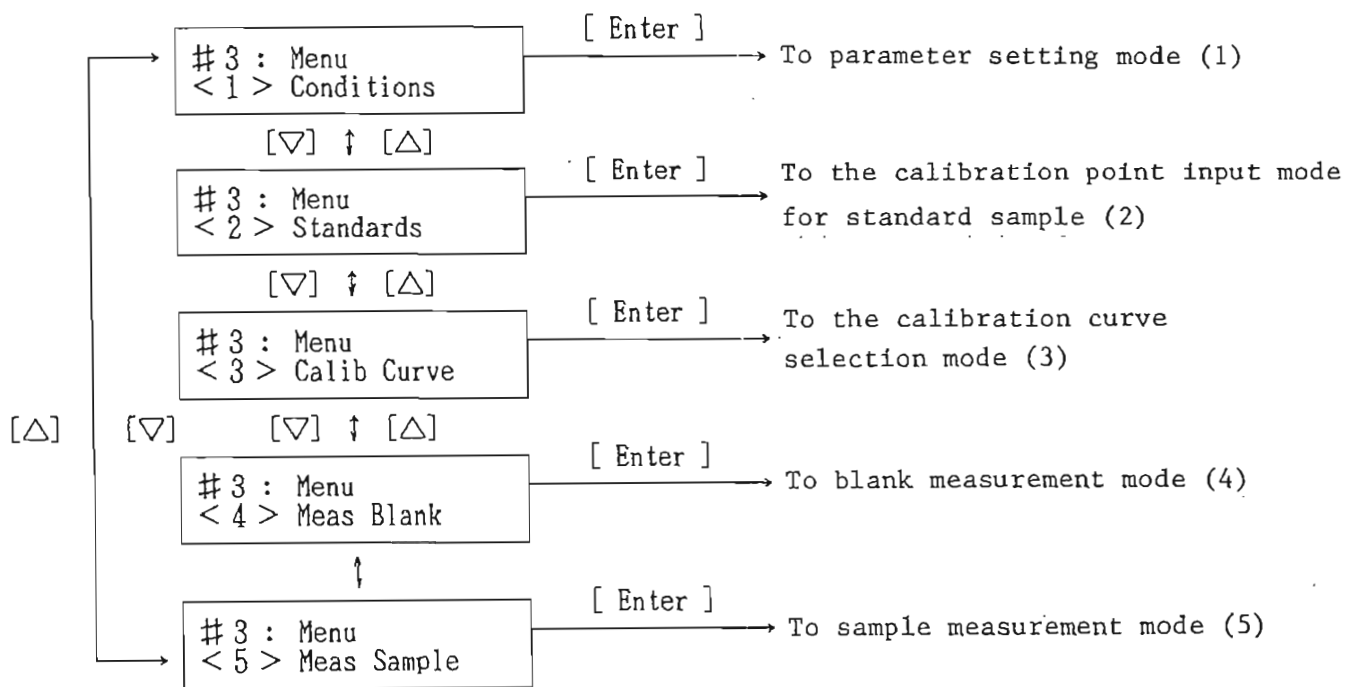


Fig. 6-5 LCD display and key operation in the menu mode.

Display the desired mode with the cursor keys ([▽], [△]) in the menu mode in Fig. 6-5, and press [Enter]. The display changes to the desired mode.



NOTE (1): The display can be changed to the desired mode also by entering a number (<1> to <5>) in Fig. 6-5, instead of using the cursor keys.

NOTE (2): Press the [Print List] key in the menu mode in Fig. 6-5 or in the sample measurement mode in Fig. 6-10, and all quantitative analysis parameters including the calibration curves can be presented on the plotter or printer. In other modes, the parameters of that mode can be printed out.  
( Calibration curve can not be printed out on the MTP-397.)

(1) Parameter setting mode

Pressing keys [1] [Enter] on the display in Fig.

6-5 causes the parameter setting mode in Fig. 6-6.

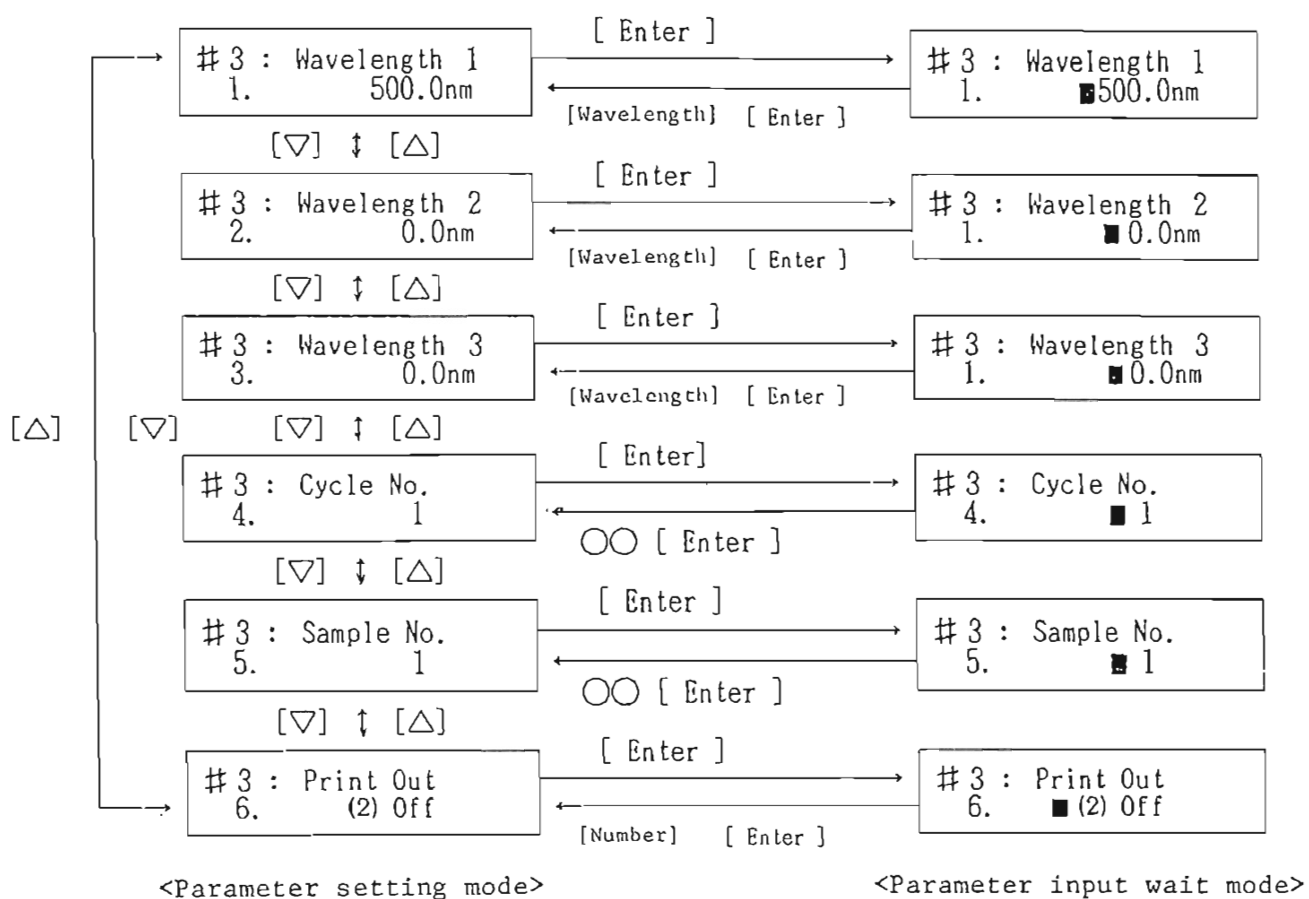


Fig. 6-6 LCD display and key operation in parameter setting mode.

On the display in Fig. 6-9, set parameters for the 7800, including the quantitative analysis wavelength. There are 3 quantitative analysis wavelengths ("Wavelength") 1, 2 and 3. Up to what number the wavelength is to be set, 1, 2 or 3, depends on the method of calculation. Make setting as follows. Set unnecessary wavelengths to zero.

1-wavelength processing: wavelength 1

2-wavelength processing: wavelengths 1 and 2

3-wavelength processing: wavelengths 1, 2 and 3

For the input method, refer to Section 7. After the input, proceed to the desired mode by the following key operation.

- ° Standard sample calibration point input mode (2) [+]
- ° Sample measurement mode (5) [-]
- ° Menu mode [X]

(2) Standard sample calibration point input mode

Pressing keys [2] [Enter] on the display in Fig. 6-5 or pressing the [+] key on the display in Fig. 6-6 causes the standard sample calibration point input mode in Fig. 6-7.

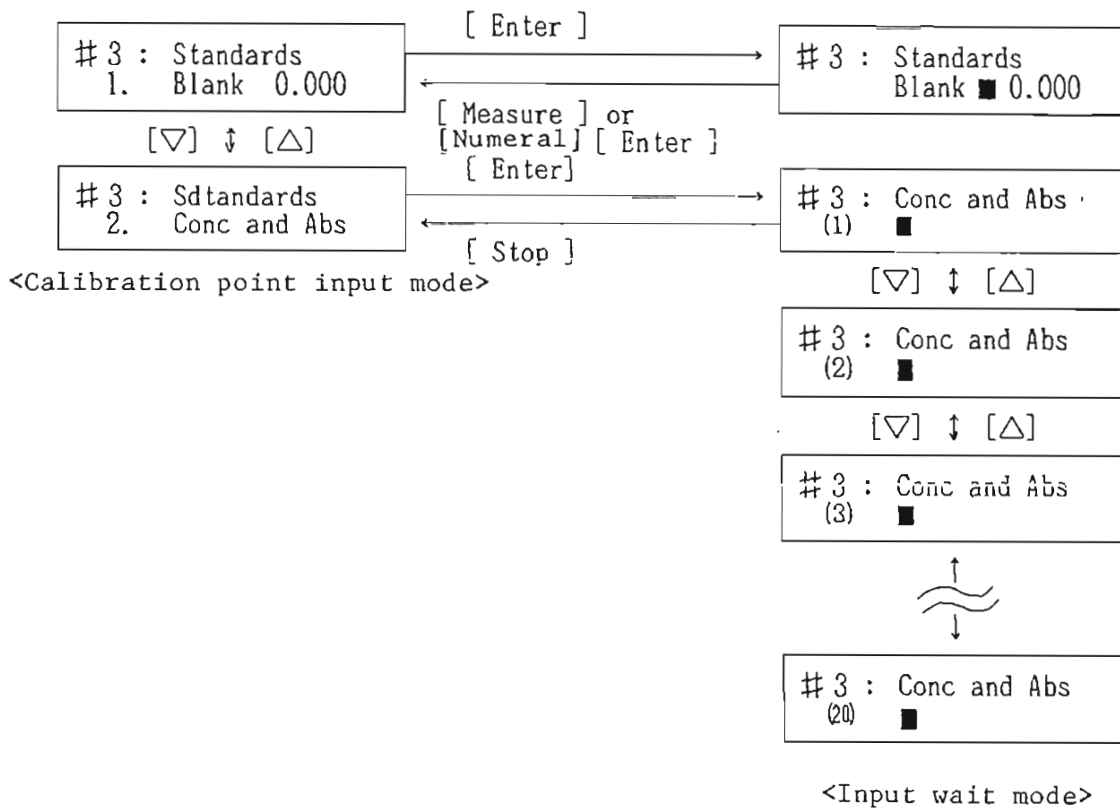


Fig. 6-7 LCD display and key operation in calibration point input mode.

This mode permits the following operation.

1. Input and measurement of standard sample blank
2. Input of standard sample concentration or input of absorbance

1. Blank

- a) Press the [Enter] key when "1. Blank" is displayed on the LCD. The input wait mode in Fig. 6-7 will be selected.

- b) Mount the standard sample blank in the sample chamber and press the [Measure] key. Measurement is carried out and the initial display is resumed.

NOTE: When the blank is known, input can be made through the numeric keypad.

## 2. Conc and Abs

- a) Pressing the [Enter] key when "Conc and Abs" is displayed on the LCD causes the input wait mode in Fig. 6-7.
- b) Key in the standard sample concentration sequentially from (1). Press the (V) key to advance the number or the (Δ) key to reverse it.

Example: (1) 0.5, (2) 1.0, (3) 1.5

<Key operation>

[0][.][5][Enter]

[V][1][.][0][Enter]

[V][1][.][5][Enter]

NOTE: A maximum of 20 items can be entered.

- c) After the concentration has been entered, press keys [→] [1] or the [Δ] cursor key to resume (1).
- d) Mount the standard sample with concentration (1) in the sample chamber and press the [Measure] key. Measurement results will be displayed in

the Abs column. Advance the number to (2) with a cursor key and make measurement in the same manner.

e) After all standard samples are measured, press the [Stop] key. "2. Conc and Abs" display will be resumed.

a) through e) describe the standard key operation procedure. If the absorbance of the standard sample is known, input can be made through the numeric keypad or changed in case of erroneous input or measurement. Operational rules for this procedure are given below.

- ① Moving the display number  
[Δ] or [▽]: moves one by one  
[→][Number](1-20): moves to the desired number
- ② Entering concentration and absorbance through numeric keypad  
[Concentration][,][Absorbance][Enter]
- ③ Entering only absorbance through numeric keypad  
[,][Absorbance][Enter]
- ④ Measuring only absorbance  
[Measure]
- ⑤ Input of only concentration  
[Concentration][Enter]

⑥ Input of concentration and measurement of absorbance

[Concentration][,][Measure]

⑦ Conversion between calibration point input mode and input wait mode

[Enter]: From the input mode to the input wait mode

[Stop]: From the input wait mode to the input mode

NOTE: Operate the keys in ② to ⑥ when the desired number is displayed.

After all inputs in the calibration point input mode in Fig. 6-7 have been completed, select the desired mode by the following key operation.

° Calibration curve selection mode (3)	[+]
° Parameter setting mode (1)	[-]
° Menu mode	[×]

(3) Calibration curve selection mode

Pressing keys [3][Enter] on the display in Fig. 6-5 or the key [+] in Fig. 6-7 causes the calibration curve selection mode in Fig. 6-8.

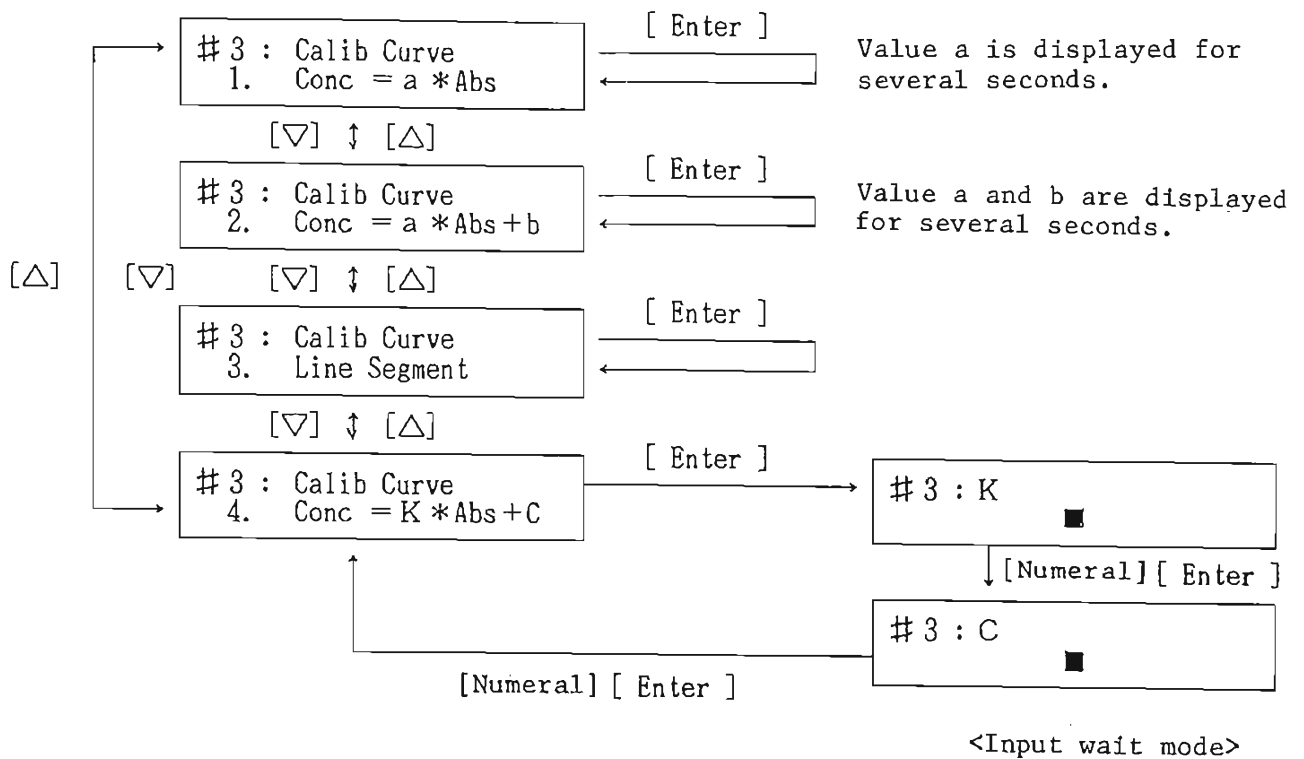


Fig. 6-8 LCD display and key operation in calibration curve selection mode.

In the calibration curve selection mode in Fig. 6-8, select a calibration curve out of 1 to 4 below.

1. Conc=a\*Abs: straight line which passes the point of origin
2. Conc=a\*Abs+b: regression straight line
3. Line segment: polygonal approximation curve
4. Conc=K\*Abs+C: preparing calibration curve by keying in K and C



- ° To select any of 1 to 3, display the desired item by keying [Number][Enter] or by pressing cursor key [Δ] or [∇], and press the [Enter] key. Then a calibration curve will be prepared.
- ° Selecting 4 ([4][Enter], or [∇] or [Δ][Enter]) causes the K and C input wait mode. Key in K and C according to the LCD display.

After the input has been completed, proceed to the desired mode by the following key operation.

- ° Blank measurement mode (4)                   [+]
- ° Calibration point input mode (2)           [-]
- ° Menu mode                                   [X]

(4) Blank measurement mode

Pressing keys [4][Enter] on the display in Fig. 6-5 or pressing keys [Control][+] in Fig. 6-8 causes the blank measurement mode in Fig. 6-9.

# 3 : Sample Blank  
0.000 Abs

Fig. 6-9 Blank measurement mode.

In Fig. 6-9, mount the sample blank in the sample chamber and press the [Measure] key. Measurement will be performed and the results displayed.

Upon completion of measurement, proceed to the desired mode by the following key operation.

- ° Sample measurement mode (5)                   [+]
- ° Calibration curve selection mode (3)       [-]
- ° Menu mode                                       [\*]

(5) Sample measurement mode

Pressing keys [5][Enter] on the display in Fig. 6-5 or pressing the [+] key in Fig. 6-9 causes the sample measurement mode in Fig. 6-10.

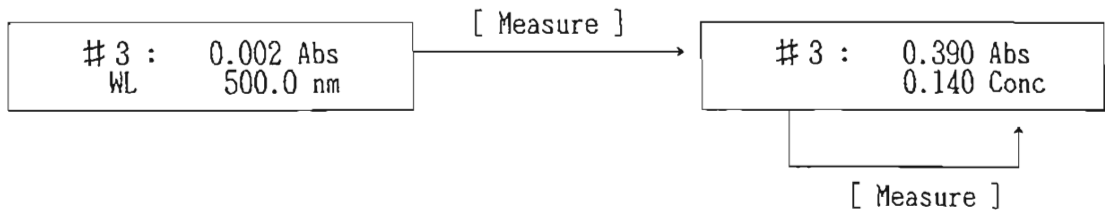


Fig. 6-10 Sample measurement mode.

In the sample measurement mode in Fig. 6-10, mount a sample with unknown concentration in the sample chamber and press the [Measure] key. Measurement results will be displayed on the LCD. Repeat the operation in the same manner to start measurement successively.

NOTE: To change the sample number on the display in Fig. 6-10, press the [+] key. Control returns to the parameter setting mode in Fig. 6-6.

6-4 "4. Spectrum" Absorption Spectrum Measurement

(1) Call Method 4

Pressing keys [Method][4][Enter] causes the parameter setting mode in Method 4. Fig. 6-11 shows the LCD display and key operation in Method 4.

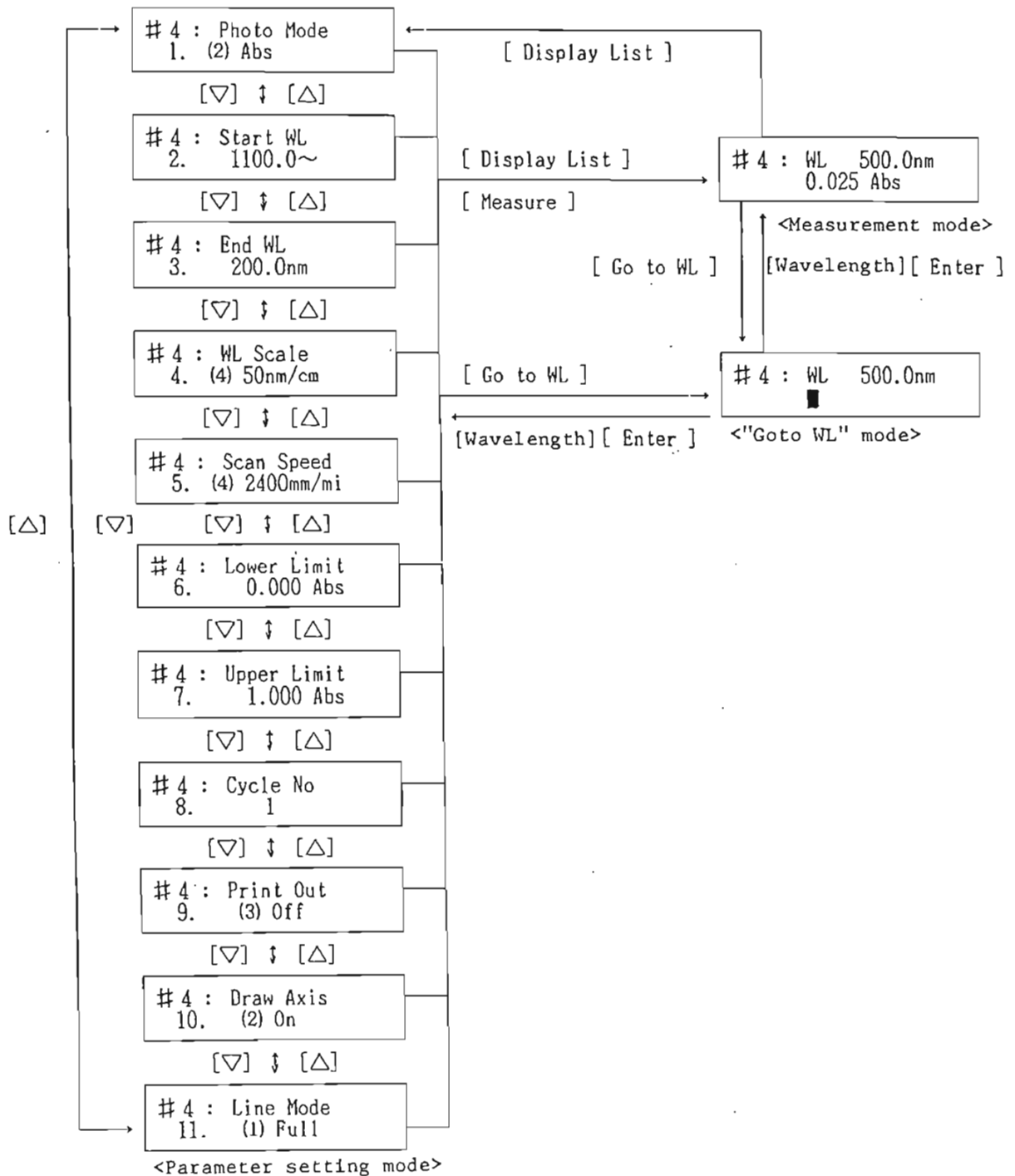


Fig. 6-11 LCD display and key operation in Method 4.

- (2) Check and change the parameters in the parameter setting mode in Fig. 6-11. Press the cursor key [ $\Delta$ ] or [ $\nabla$ ] to change the LCD display as shown in the figure and check the displayed value. For how to change, refer to Section 7.

NOTE: The measurement parameters are set as shown in Fig. 6-11 as standard.

- (3) Press the [Display List] key to proceed to the measurement mode.
- (4) Mount a sample in the sample chamber. The beam on your side is the sample beam.
- (5) Press the [Measure] key. The results will be stored in memory 1 and printed out on a plotter, if provided.

NOTE (1): To suspend the measurement, press the [Stop] key.

NOTE (2): If data in memory 1 is necessary, move the data to another memory referring to 8-1.

- (6) To continue measurement under the same conditions, repeat steps (4) and (5).

#### 6-5 "5. Time Scan 2" Measurement of Change with Time at Fixed Wavelength

NOTE: Results obtained by measurement in this method are not stored in memory.

(1) Call Method 5.

Pressing keys [Method][5][Enter] causes the parameter setting mode of Method 5. Fig. 6-12 shows the LCD display and key operation in Method 5.

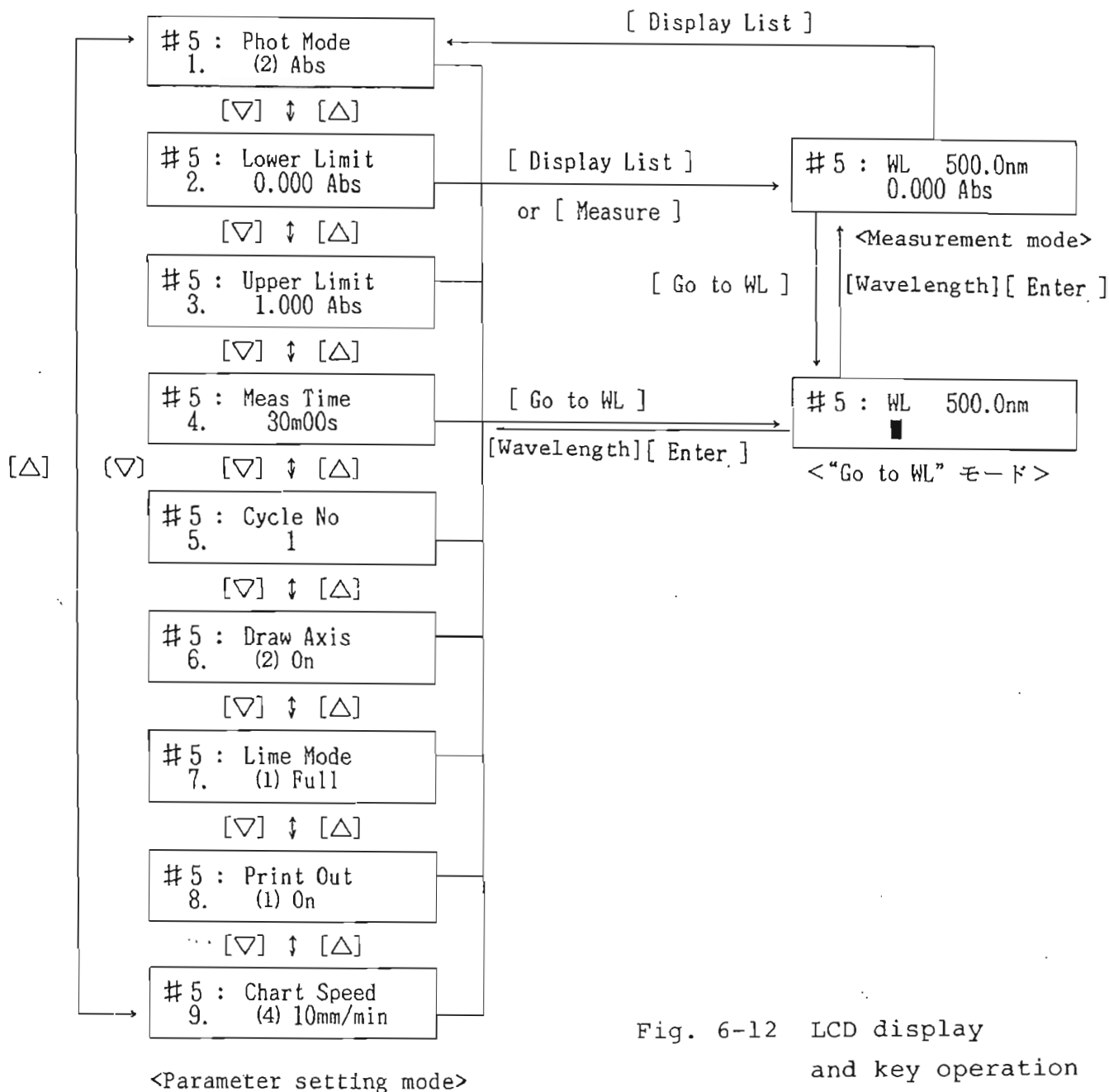


Fig. 6-12 LCD display and key operation in Method 5.

- (2) In the parameter setting mode in Fig. 6-12, check and change the parameters. Press the cursor key [ $\Delta$ ] or [ $\nabla$ ] to change the LCD display as shown in the figure, and check the displayed value. For how to change, refer to Section 7.

NOTE: The measurement parameters are set as shown in Fig. 6-12 as standard.

- (3) Set the measurement wavelength by the following key operation. Fig. 6-12 shows how the LCD display changes when keys are operated.

[Goto WL][Wavelength][Enter] (Input range: 200.0 to 1,100.0 nm)

The set wavelength is valid immediately after the operation.

NOTE (1): If the desired wavelength has already been set, press the [Display List] key to proceed to the measurement mode.

NOTE (2): Press the [Auto Zero] key, as necessary. It takes several seconds to execute "Auto Zero".

- (4) Mount a sample in the sample chamber. The beam on your side is the sample beam.
- (5) Press the [Measure] key. The result will be recorded on a plotter, if provided.

(6) To make measurement under the same conditions,  
repeat steps (4) and (5).

NOTE: To change the measurement parameters, press  
the [Display List] key. The parameter  
setting mode will be caused.

## 7. METHOD OF SETTING PARAMETERS

Parameters for this instrument are set in the parameter setting mode in respective methods.

Calling a method causes the parameter setting mode for that method.

If, for example, keys [Method][1][Enter] are pressed to call Method 1, the parameter setting mode in Fig. 7-1 will be displayed.

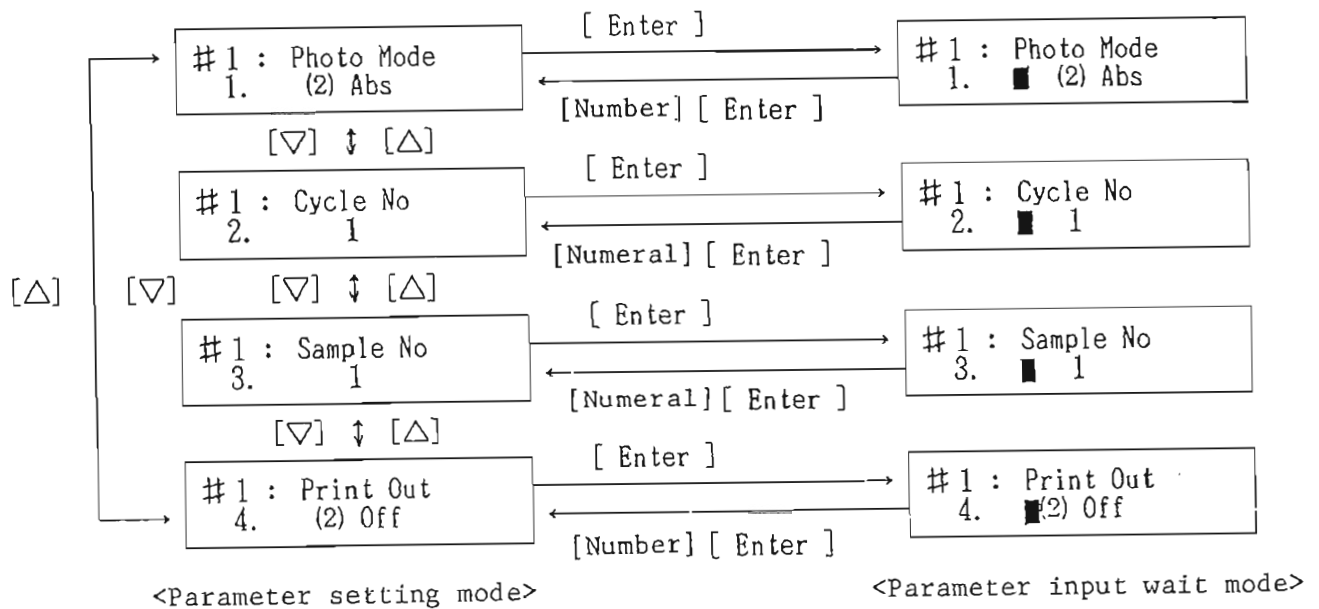


Fig. 7-1 LCD display and key operation in setting parameters in Method 1.



Basic rules in setting parameters are given below.

- (1) Pressing the cursor key ( $\Delta$ ) or ( $\nabla$ ) in the parameter setting mode changes the contents of LCD display (see Fig. 7-1).

NOTE: Each parameter is affixed with a number.

The desired parameters can also be displayed by pressing keys [Number][Enter].

- (2) Pressing the [Enter] key when the desired parameter is displayed causes the parameter input wait mode.
- (3) Pressing the [Enter] key after entering a numerical value or number in the parameter input wait mode resumes the parameter setting mode, and the parameters can be changed.
- (4) If a number (the number is affixed in a parenthesis in the case of "Photo Mode" below, for example,) is to be entered in the parameter input wait mode, operate the cursor key ([ $\triangleright$ ], [ $\triangleleft$ ]) to change the parameter. When the desired parameter is displayed, press the [Enter] key.  
Example: "1. Photo Mode"

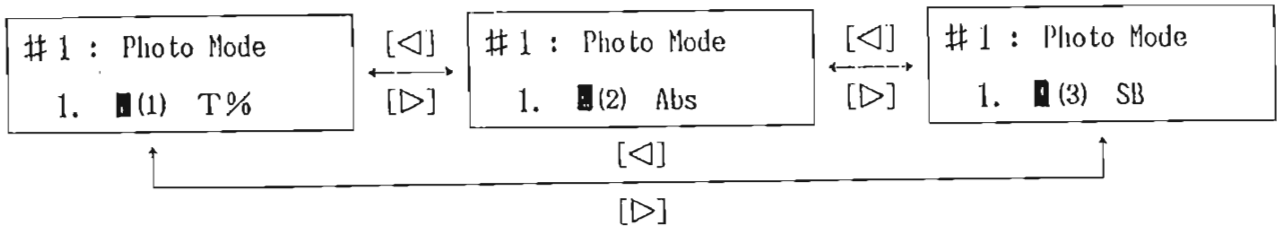


Fig. 7-2 Change of parameter input wait mode for "Photo Mode".

(5) When entering a numerical value, key in a value within the input range referring to Table 7-1.

For details of parameter contents, refer to Table 7-1.

Examples of change are given below.

[Example 1] Change "1. Photo mode" to "T%"

Key in as shown in Fig. 7-3.

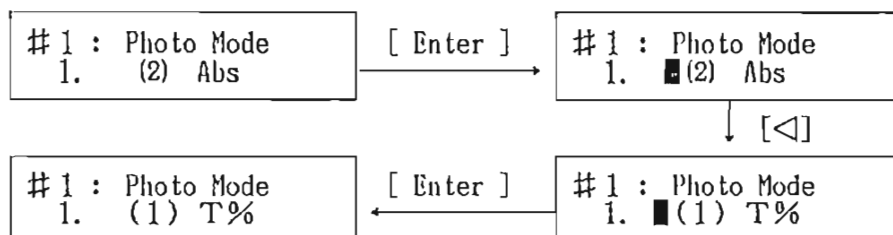


Fig. 7-3 LCD display and key operation when changing "1. Photo Mode".

[Example 2] Setting "2. Cycle No." to 3 and  
 "Cycle time" to 2 minutes 30 seconds  
 Key in as shown in Fig. 7-4.

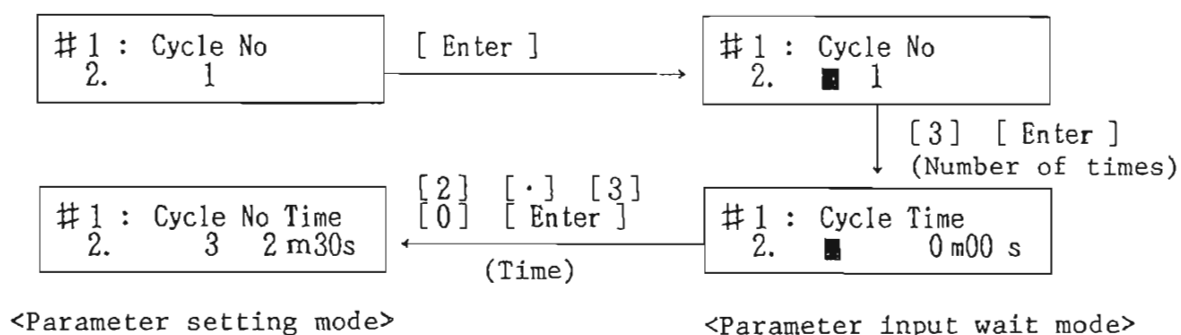


Fig. 7-4 LCD display and key operation when changing "2. Cycle No. Time".

NOTE: As a delimiter between minutes and seconds in "Cycle Time", "." is used. When "Cycle No." is one, "Cycle Time" is unnecessary and, therefore, pressing keys [1][Enter] resumes the parameter setting mode.

The method of changing other parameters is the same as shown in the above examples. Table 7-1 shows the parameter functions, input range, input method, etc. The input range of some parameters is limited by the set values of other parameters. (See Tables 7-2 and 7-3) Points to be noted in entering parameters are given in Notes 1 through 8.

Table 7-1

Display	Function	Initial value	Input range	Input method	Remarks
Photo Mode	Measurement mode	(2) Abs	(1) Transmittance %T, (2) Absorbance Abs, (3) Single beam SB	Number	
Start WL	Start wavelength (longer wavelength side)	1100 nm	200.0 to 1100.0 nm	Numerical value	See Note (1).
End WL	End wavelength (shorter wavelength side)	200 nm			
WL Scale	Wavelength scale	(4) 50 nm/cm	(1) 5, (2) 10, (3) 25, (4) 50 nm/cm	Number	See Notes (1) and (2).
Scan Speed	Scan speed	(4) 2400 nm/min	(1) 240, (2) 480, (3) 1200, (4) 2400 nm/min	Number	See Note (2).
Lower Limit	Measurement range (minimum value)	0.000 Abs or 0.0%T	(%T) -500.0 to 500.0 (ABS) -5.000 to 5.000	Numerical value	
Upper Limit	Measurement range (maximum value)	1.000 Abs or 100.0%T	(S.B) -500.0 to 500.0		
Meas Time	Measurement time	999 min 59 sec	1 sec to 999 min 59 sec	Numerical value	
Cycle No. and Time	Repeated measurement and time	1, 0 min 00 sec	Number of cycles 1 to 999, Time 1 sec to 999 min 59 sec	Numerical value	See Note (3).
Chart Speed	Chart speed	(4) 10 mm/min	(1) 1, (2) 2, (3) 5, (4) 10, (5) 20, (6) 50, (7) 100, (8) 200 mm/min	Number	"Method 2" only
Draw Axis	Writing frame when recorded on plotter	(1) On	(1) On, (2) Off, (3) Draw	Number	See Note (4).
Line Mode	Line drawing mode	(1) Full	(1) Full (full line); (2) Dotted (dotted line); (3) Broken (broken line); (4) Chain (one-point chain line); (5) Change ((1) to (4) are displayed sequentially)	Number	
Sample No.	Sample number	1	0 to 999	Numerical value	See Note (5).
Print out	Printer and plotter outputs	(1) On	(1) On, (2) Off	Number	
		(1) Seq	(1) Seq (one writing); (2) Overlay (overlaid writing), (3) Off	Number	"Method 2", "Method 4"
Auto Zero	Setting of 100%T and Abs 0		Press the [ Auto Zero ] key, as necessary.		See Note (6).
Go to WL	Wavelength setting	500 nm	200.0 to 1100.0 nm	Numerical value	Setting with the [ Go to WL ]key. See Note (7).

NOTE (1): The input range of the measurement wavelength is 200.0 to 1,100.0 nm which, however, is limited by the WL scale as shown in Table 7-2. If setting is made beyond the restriction in Table 7-2, an error will be displayed when the [Measure] key is pressed.

Table 7-2 "WL Scale" and Settable Wavelength Range

Wavelength Scale [nm/cm]	Settable wavelength range [nm]
5	200 or lower
10	200.1 to 400
25	400.1 to 900
50	400.1 to 900

NOTE (2): "WL Scale" is limited by "Scan Speed" as shown in Table 7-3.

Table 7-3 Relation between "Scan Speed" and "WL Scale"

Scan Speed (nm/min)	240	480	1200	2400	Data acquisition interval in nm/data
Wavelength Scale (nm/cm)					
5	○	×	×	×	0.1
10	○	○	×	×	0.2
25	○	○	○	×	0.5
50	○	○	○	○	1.0

NOTE (3): Enter the number of cycles and press the [Enter] key, and then key in time. Use "." as a delimiter between min and sec (see Example 2).

NOTE (4): Selecting "(3) Draw" immediately draws a frame on the plotter.

NOTE (5): Sample number 999 is followed by 0. The sample number is incremented by 1 in each measurement.

NOTE (6): Pressing the [Auto Zero] key lights up the "Measure" lamp and starts execution immediately. When it ends, the [Stop] lamp lights up. It takes several seconds for execution.

NOTE (7): The wavelength is set with the [Goto WL] key. To set it at 310 nm, for example, key in as follows. When the input is completed, execution starts immediately.  
[Goto WL][3][1][0][Enter]

NOTE (8): Parameters include those in "Method 3" quantitative analysis, in addition to those shown in Table 7-1. They are described in 6-3.

## 8. DATA FILE AND PARAMETER FILE

### 8-1 Data File

Data obtained by measurement in "Method 2" or "Method 4" is stored in memory 1. If the next measurement is made with the previous data stored in memory 1, the previous data in memory 1 will be destroyed. If necessary, move the data in memory 1 to another memory by the following operation. There are 6 memories in total and 6 pieces of data can be stored. 4-rule arithmetic operation can be made between a memory and constant or between memories.

#### (1) Moving memory contents

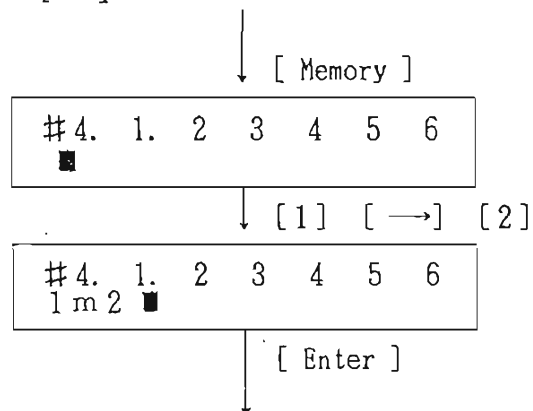
[Memory] [m1] [→] [m2] [Enter]

m1, and m2: Memory numbers Input range: 1 to 6

Contents of memory m1 are moved to memory m2.

The LCD display changes with key operation as shown in Fig. 8-1.

(Display in "Methods 1 to 5")



(Display in "Methods 1 to 5")

Fig. 8-1 LCD display when the (Memory) key is operated.

NOTE: The number of the memory in which data is stored is affixed with a period ".". In Fig. 8-1, the number is affixed to memory 1.

(2) Presenting memory contents on plotter

[Memory] [m] [Measure]

m: Memory number Input range: 1 to 6

Contents of memory m are presented to the plotter.

(3) 4-rule arithmetic operation between memory and constant

[Memory] [m1] [+] ([-], [x] or [/]) [N] [→] [m2] [Enter]

m1 and m2: Memory numbers Input range: 1 to 6

N: Constant Input range: 0 to 999.99

Calculation (addition, subtraction, multiplication or division) is made between the contents of memory m1 and constant N, and the result is stored in memory m2.

(4) 4-rule arithmetic operation between memories

[Memory] [m1] [+] [Memory] [m2] [→] [m3] [Enter]

[-]

[x]

[/]

m1, m2 and m3: Memory numbers Input range: 1 to 6

Calculation (addition, subtraction, multiplication or division) is made between contents of memories m1 and m2, and the result is stored in m3.



NOTE (1): The same parameter may be specified in m1, m2 and m3. In that event, contents stored in m1 will be destroyed.

NOTE (2): If the attribute differs when making calculation between memories, an error message will be displayed.

NOTE (3): If division is made by zero or if the result of calculation has overflowed, an error message will be displayed.

## 8-2 Parameter File

This instrument permits the selected parameters in Methods 1 through 5, Method 21 and Method 31 to be stored in one parameter file. Parameters are stored in the C-MOS RAM backed up by battery. There are 5 parameter files in total, so that 5 different parameters can be stored.

NOTE: If the RAM card (option) is provided, the number of the parameter files will be 25. No.1 through No.5 are the files provided in the main unit as standard and No.6 through No.25 are the files for the RAM card.

### (1) Storing parameters in file

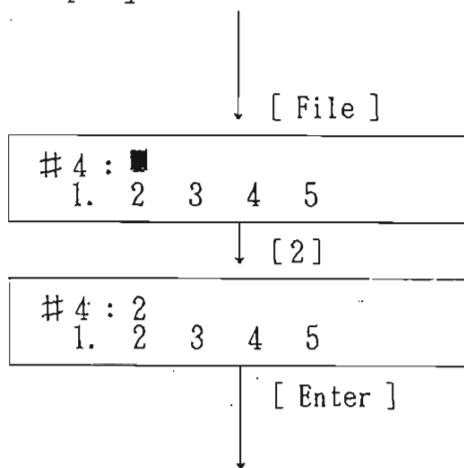
Perform the following key operation in the desired "Method".

[File] [n] [Enter]

n: File number    Input range: 1 to 5

The LCD display changes with key operation as shown in Fig. 8-2.

(Display of "Methods 1-5")



(Display of "Methods 1-5")

Fig. 8-2 LCD display when (File) key is pressed.

NOTE (1): The number of the file in which parameters are stored is affixed with a period ".".

If the file is affixed with a period, "E29" will be displayed and, after a while, the display of "Methods 1 to 5" will be resumed.

NOTE (2): If the RAM card is provided, files of 6 through 25 are displayed by pressing the [∇] or [Δ] key.

(2) Calling parameter from file

Perform the following key operation in "Method 1-5".

[File][n][Measure]

n: File number Input range: 1 to 5

The parameter setting mode for the "Method" corresponding to the entered file number is selected.

(3) Transferring file contents

Perform the following key operation in "Methods 1-5".

[File] [n1] [→] [n2] [Enter]

n1 and n2: File numbers Input range: 1 to 5

Contents of file n1 are transferred to n2. After making sure n2 is affixed with a period ".", press the [Stop] key.

(4) Deleting file contents

Perform the following key operation in "Methods 1-5".

[File] [0] [→] [n] [Enter]

n: File number Input range: 1 to 5

The period "." affixed to the number disappears simultaneously with deletion of the contents of file n. After making sure of it, press the [Stop] key.

9. "METHOD 21" SETTING OF SPECTROPHOTOMETER

"Method 21" permits selection of the light source, setting of the light source changeover wavelength and displayed data; change of the number of digits and setting of date and hour.

Press keys [Method][2][1][Enter] to call "Method 21".

The menu mode in "Method 21" (Fig. 9-1) is caused.

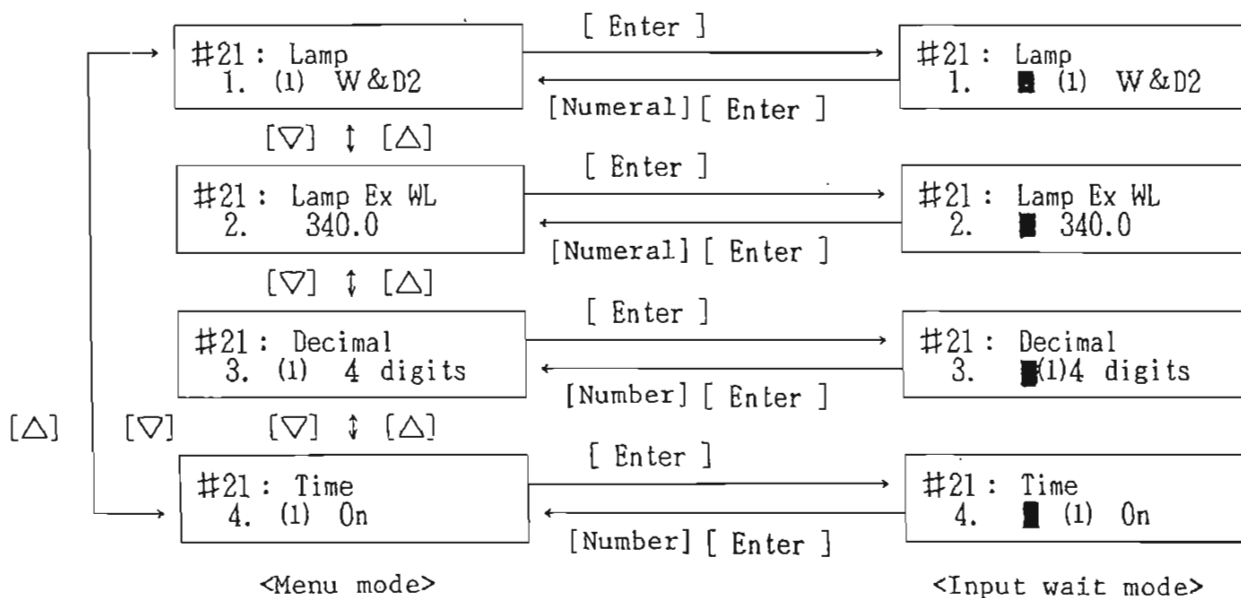


Fig. 9-1 LCD display and key operation in "Method 21".

Parameters in the menu mode in Fig. 9-1 mean:

1. Selection of light source
2. Light source changeover wavelength

3. Number of digits of displayed data

4. Setting of built-in clock

These parameters can be changed in the same manner as ordinary measurement parameters (see Section 7).

The parameter input range and input method are briefly described below.

(1) "Lamp" Selection of light source

Input range: (1) W & D<sub>2</sub> (both W and D<sub>2</sub> on);  
(2) W (only W on); (3) D<sub>2</sub> (only D<sub>2</sub> on); (4) No Lamp (both W and D<sub>2</sub> off)

Input method: In numbers

Initial value: (1) W & D<sub>2</sub>

(2) "Lamp Ex WL": Light source changeover wavelength

Input range: 330.0 to 350.0 nm

Input method: In numerical values

Initial value: 340 nm

(3) "Decimal" Number of digits of displayed data

Input range: (1) 4 digits; (2) 5 digits

Input method: In numbers

Initial value: (1) 4 digits

(4) "Time" Setting of built-in clock

Input range: (1) On; (2) Off; (3) Set

Input method: In numbers

Initial value: (1) On

Selecting "(3) Set" changes the display as shown in Fig. 9-2.

#21: Time Set 4. ■87
-------------------------

Fig. 9-2 Time input wait mode.

Enter the year, month, date, hours and minutes in 2-digit value each, with commas "," as delimiters. The display changes with the input.

Example: 15 hours 30 minutes on April 10, 1987

[8][7][,][0][4][,][1][0][,][1][5][,][3][0][Enter]

With completion of input, the display changes to " ■ (1) On". Pressing the [Enter] key again changes the display to "(1) On".

NOTE: Be sure to follow the specified format in entry. If "(3) Set" has been erroneously selected, press the [Stop] key.

## 10. "METHOD 22" SELF-DIAGNOSIS

"Method 22" makes self-diagnosis of the instrument.

Press keys [Method][2][2][Enter] to call "Method 22".

The menu mode in "Method 22" in Fig. 10-1 is caused.

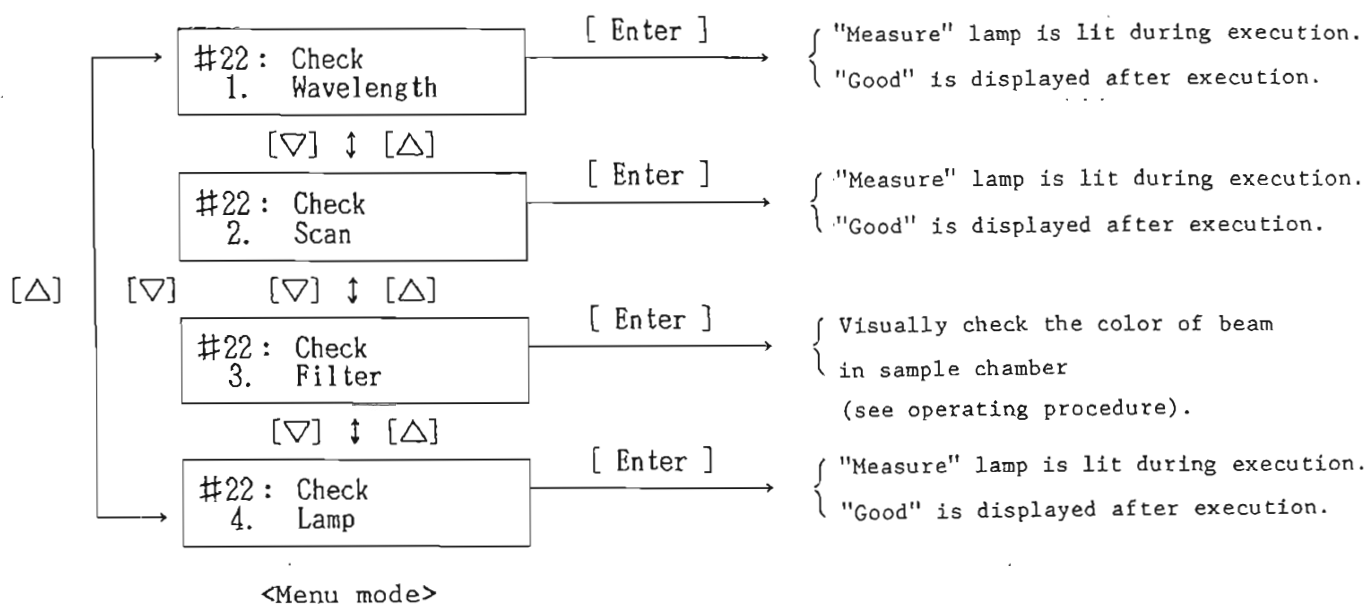


Fig. 10-1 LCD display and key operation in "Method 22".

The parameters in the menu mode in Fig. 10-1 mean:

1. Wavelength check
2. Wavelength drive check
3. Filter check
4. Light source check

Press the [Enter] key when a parameter to be checked

is displayed. The "Measure" lamp lights when 1, 2 or 4 is being executed, and "Good" or "Error" is displayed at the end. If "Error" is displayed, take actions according to Section 14. To check "3. Filter", proceed as follows.

["3. Filter" check]

- (1) Press the [Enter] key when "3. Filter" is displayed.
- (2) Open the sample chamber lid, place a piece of white paper in the sample beam, and visually check that red light is there.

NOTE: It takes some time for the filter to move after the [Enter] key is pressed.

- (3) Press the [Enter] key. Make sure the beam color changes to light blue.
- (4) Thereafter, make sure each press on the [Enter] key changes the beam color to violet, colorless (invisible because it is ultraviolet light), white and red again.
- (5) Press the [Stop] key. After a while, LCD indicates "Good".

NOTE: The "Measure" lamp is lit while the operation in (2), (3) and (4) is being performed.



11. "METHOD 23" BASELINE CORRECTION AND WAVELENGTH  
CORRECTION

"Method 23" corrects the baseline or wavelength.  
Press keys [Method][2][3][Enter] to call "Method 23".  
The menu mode of "Method 23" in Fig. 11-1 is caused.

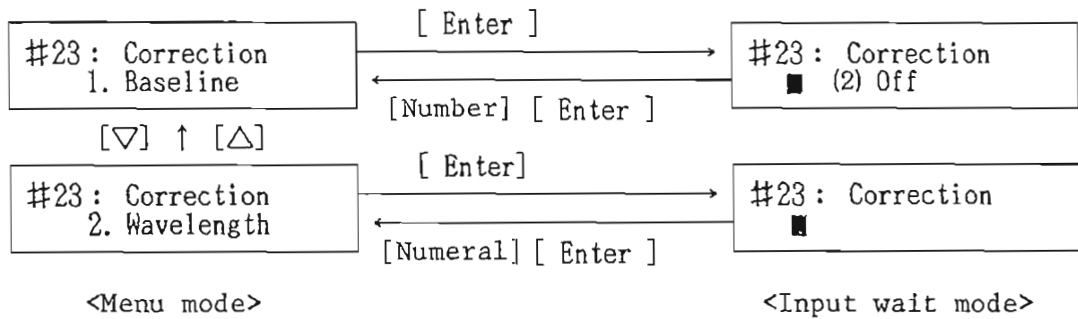


Fig. 11-1 LCD display and key operation in  
"Method 23".

The parameters in Fig. 11-1 mean:

1. Baseline correction
2. Wavelength correction

The key operation is given below.

(1) "Baseline" Baseline correction

- ① Press the [Enter] key when a baseline is displayed. The display changes to the input wait mode in Fig. 11-1. The cursor [▷] or [◁] changes the display as follows.

→ "(1) On" ↔ "(2) Off" ↔ "(3) Measure" ←

(1) to (3) mean:

- (1) Baseline correction is made using the baseline stored in memory.
- (2) Baseline correction is not made.
- (3) The baseline is measured. In this case, "(1) 'On" is set after measurement.

- ② Press the [Enter] key when the desired item is displayed.

NOTE: Selecting "3. Measure" displays the measurement state of the baseline in real time, and the menu mode is resumed at the end.

(2) "2. Wavelength" Wavelength correction

CAUTION: Since the wavelength has been corrected before shipment from the factory, do not make this operation unless the wavelength is deviated. For wavelength correction, prepare a sample with a known wavelength and proceed as follows.

- ① Measure the known sample in "Method 4".
- ② Set the wavelength to the known peak position by pressing keys [Control] [D] or [CONTROL] [L].
- ③ Call "Method 23" and select "2. Wavelength" to cause the wavelength input wait mode in Fig. 11-1.
- ④ Enter the known peak wavelength (true value). With the input the menu mode is resumed.

12. "METHOD 31" SETTING INPUT/OUTPUT DEVICES

This method controls the thermal plotter, printer, quick flow sampler or other external input/output devices.

Press keys [Method][3][1][Enter] to call "Method 31".

The menu mode of "Method 31" in Fig. 12-1 is caused.

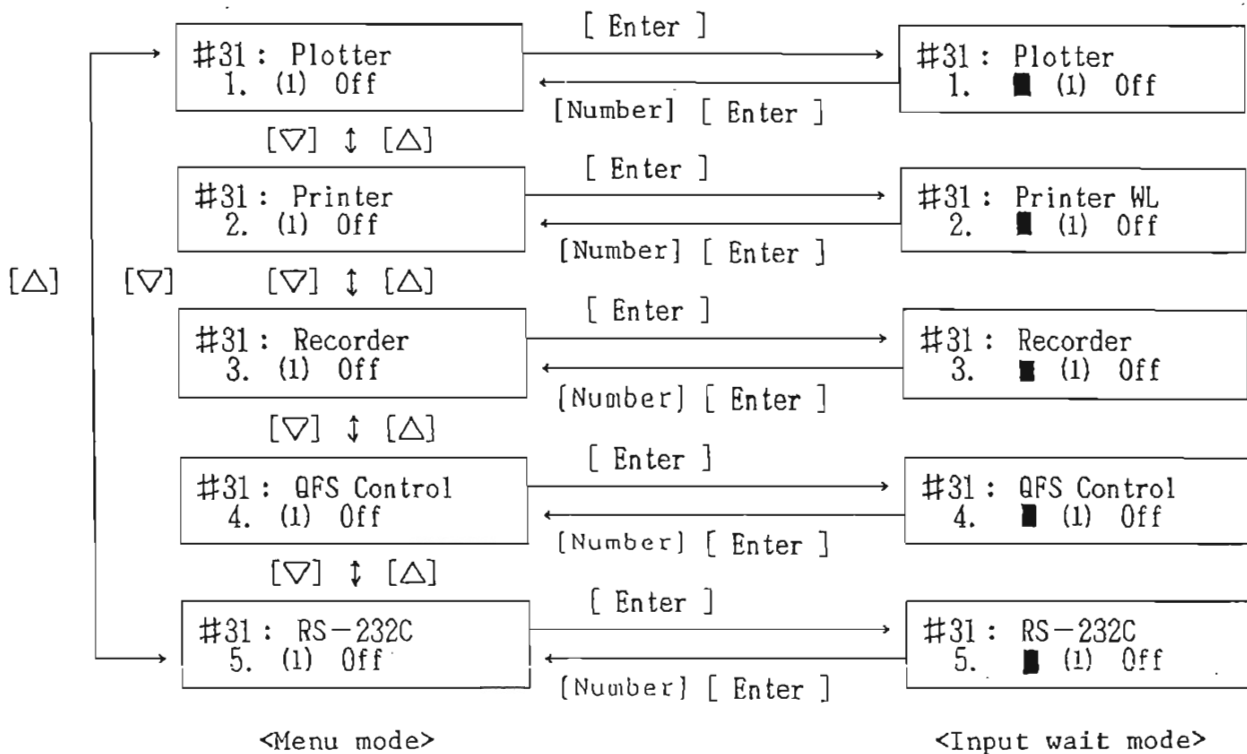


Fig. 12-1 LCD display and key operation is "Method 31".

The parameters in the menu mode in Fig. 12-1 mean:

1. Setting thermal plotter output
2. Setting printer output
3. Setting recorder output
4. Controlling quick flow sampler
5. Controlling RS-232C interface

These parameters can be changed in the same manner as ordinary measurement parameters (see Section 7).

Here, the parameter input range and input method are briefly described.

(1) "Plotter" Setting thermal plotter output

Input range: (1) Off; (2) On

Input method: In numbers

Initial value: (1) Off

(2) "Printer" Setting printer output

Input range: (1) Off; (2) On

Input method: In numbers

Initial value: (1) Off

(3) "Recorder" Setting recorder output

Input range: (1) Off; (2) On

Input method: In numbers

Initial value: (1) Off

(4) "QFS Control" Controlling quick flow sampler

Input range: (1) Off; (2) On

Input method: In numbers

Initial value: (1) Off

NOTE: If "(2) On" is selected, the spectrophotometer starts measurement by a start signal from the quick flow sampler. Upon completion of measurement, an end signal is issued to the quick flow sampler.

CAUTION: Be sure to set the input range at "(1) Off" when the quick flow sampler is not used. Otherwise, normal measurement may be impossible.

(5) "RS-232C IF" Control of RS-232C interface

Input range: (1) Off; (2) On; (3) Set

Input method: In numbers

Initial value: (1) Off

(1) Off: RS-232C interface communication channel is closed.

(2) On: RS-232C interface communication channel is open. In this state, communication with external devices is possible through the RS-232C interface. In this state, keys on the 7800 are not valid.

(3) Set: Selected when changing the parameters of the RS-232C interface. If this is selected, the menu mode for parameter input for the RS-232C interface shown in Fig. 12-2 will be caused.

## 12-1 Setting Parameters for RS-232C Interface

Select "5. RS-232C" in Fig. 12-1 and then "(3) Set", and the menu mode in Fig. 12-2 will be caused.

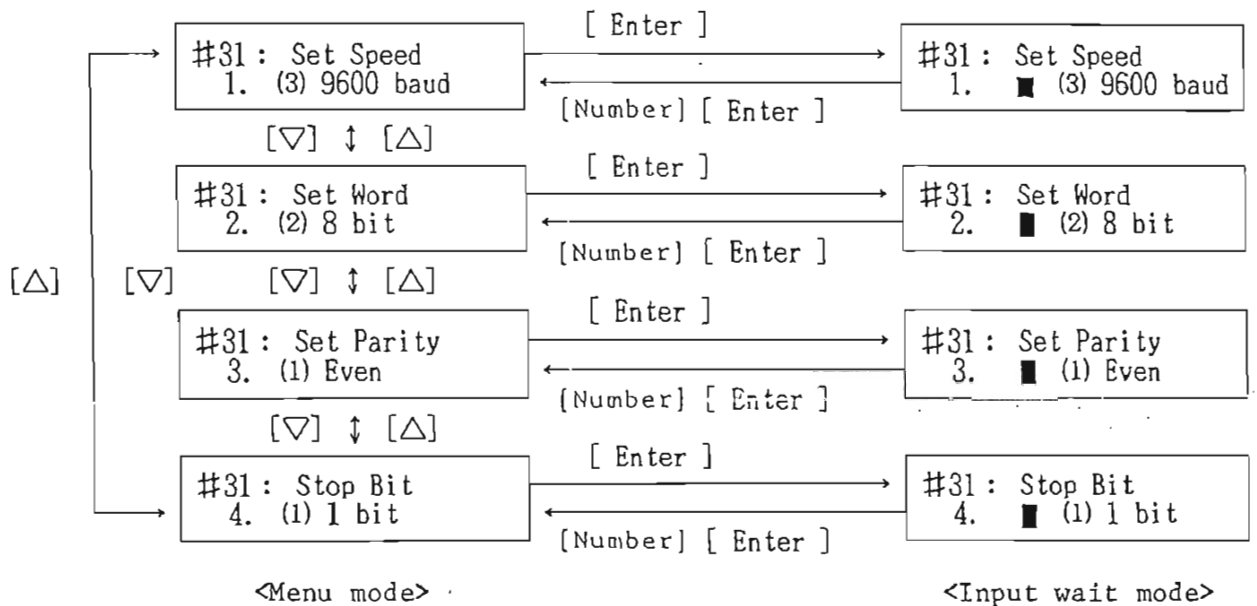


Fig. 12-2 LCD display when entering parameters for RS-232C interface.

The parameters in the menu mode in Fig. 12-2 mean:

1. Transfer speed
2. Word length
3. Parity
4. Stop bit

These parameters can be changed in the same manner as ordinary measuring parameters (see Section 7). Here,

the parameter input range and input method are briefly described. With all inputs being completed, press the [Method] key to resume the display in Fig. 12-1.

(1) "Speed" Transfer speed

Input range: (1) 38400, (2) 19200, (3) 9600,  
(4) 4800, (5) 2400, (6) 1200,  
(7) 600, (8) 300, (9) 150 baud

Input method: In numbers

Initial value: (3) 9600 bauds

(2) "Word Length"

Input range: (1) 7 bits, (2) 8 bits

Input method: In numbers

Initial value: (2) 8 bits

(3) "Parity" Parity

Input range: (1) Even; (2) Odd; (3) Non

Input method: In numbers

Initial value: (1) Even

(4) "Stop bit" Stop bit

Input range: (1) 1 bit; (2) 2 bits

Input method: In numbers

Initial value: (1) 1 bit

NOTE: Pressing the [Method] key on the display in Fig. 12-2 resumes the display in Fig. 12-1.

13. "METHOD 32" POSITIONAL ADJUSTMENT OF THERMAL PLOTTER HEAD

Press keys [Method][3][2][Enter] to call "Method 32".  
The menu mode in "Method 32" in Fig. 13-1 is caused.

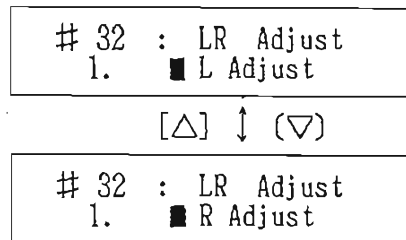


Fig. 13-1 LCD display in "Method 32".

- (1) Press the [Enter] key on the display in Fig. 13-1 when "1. ■ L Adjust" is displayed. The "Measure" lamp lights up, the thermal plotter head moves to the extreme left, recording starts, and the "PEN ADJ" button becomes valid. In this state, adjust the "PEN ADJ" button so that the plotter head is positioned on the ruled line on the extreme left in Fig. 13-2.

After the adjustment, press the [Stop] key.

- (2) To adjust the head position at the extreme right, display "2. ■ R Adjust" and press the [Enter] key. "PEN ADJ" button becomes valid. Make adjustment in the same manner as (1).



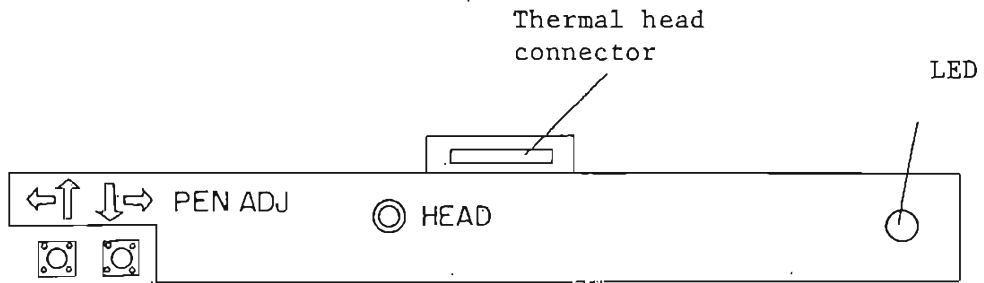


Fig. 13-2 Switch position.

Left-side button : moves the head to left

Right-side button: moves the head to right

## APPENDIX 1 REPLACEMENT AND POSITIONAL ADJUSTMENT OF LIGHT SOURCE

The life expectancy of the light source is approximately 1,000 hours for both the deuterium ( $D_2$ ) lamp and tungsten iodine (WI) lamp. After prolonged use of the lamp, increased noise will appear on the data because of reduced light quantity.

### (1) Replacement of lamp

<Cautions in replacing light source>

- 1) The lamp is heated to a high temperature while it is lit. Replace the lamp more than ten minutes after turning OFF the light source.
- 2) Before replacing the lamp, turn OFF the "POWER" switch and disconnect the AC power cord from the outlet.
- 3) In replacing the lamp, never loosen any screws except the one to be loosened.
- 4) Wear clean cloth gloves when handling the lamp.
- 5) Never touch the mirror
- 6) If the lamp is contaminated, wipe it with gauze or the like wetted with ethyl alcohol and then wipe with clean dry gauze.

[Replacement of tungsten iodine (WI) lamp]

- 1) Slide the outer lid of the light source to remove it and then remove the inner lid.

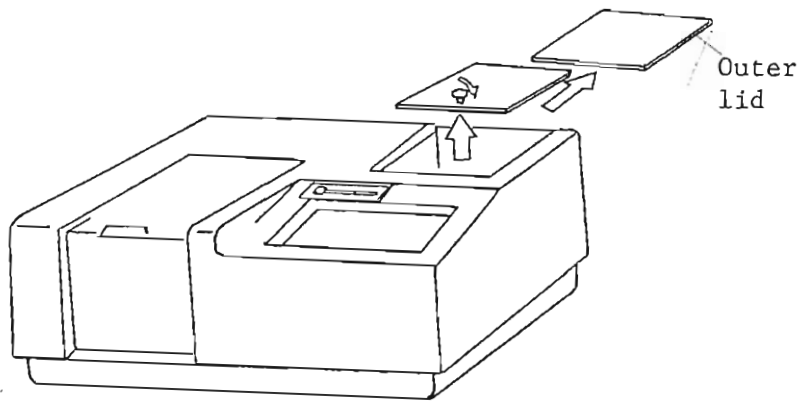


Fig. 1

- 2) Pull out the WI lamp from the lamp connector.
- 3) Insert a new WI lamp into the connector. (Fig. 2)

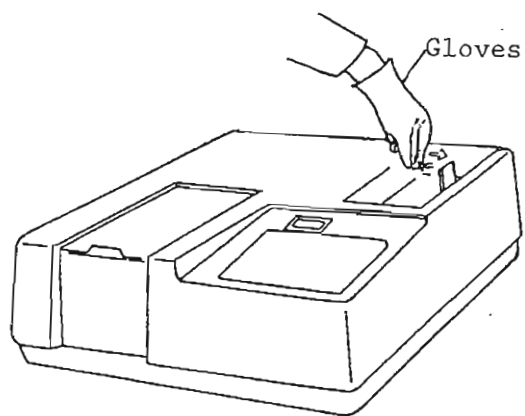


Fig. 2 Mounting WI lamp.

[Replacement of deuterium ( $D_2$ ) lamp]

- 1) Slide the outer lid of the light source to remove it and then remove the inner lid. (Refer to Fig. 1.)
- 2) Disconnect the  $D_2$  lamp from the connector.
- 3) Insert a new  $D_2$  lamp into the connector. (Fig. 3)

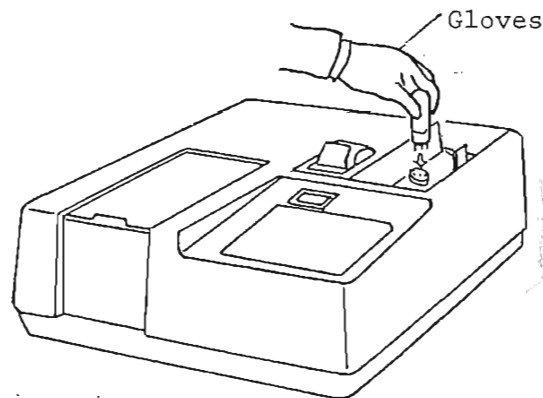


Fig. 3 Mounting  $D_2$  lamp.

(2) Positional adjustment of lamp

If the beam from the light source is not accurately incident on the entrance slit, problems will occur such as insufficient light quantity, curved baseline and variations of the measurement values at the time of changing over the light source. The light source condenser mirror and light source need adjustment when the light source is replaced.

**WARNING**

(1) Never touch a lit lamp with naked hand.

(2) During adjustment, wear ordinary eyeglasses or sunglasses to protect your eyes from ultraviolet rays.

(3) Never touch the lead wire by hand or with a screwdriver. Contact with the lead wire will cause an electric shock.

CAUTION: Never loosen any screws except the one to be loosened in adjustment.

[Angular adjustment of light source mirror with respect to tungsten iodine (WI) lamp]

(1) Set the controls on the instrument in the following position.

"POWER" switch	: ON
"Method (#)"	: 1
"Photometric Mode (Photo Mode)	: SB
"Go to WL"	: 500 nm

(2) Remove the rear panel of the light source unit.

(3) Press the [Display List] key. (With the LCD type)

(4) Slightly loosen the lock screw on the WI lamp side by turning it counterclockwise with an Allen wrench, search for a position where the data value (displayed on CRT or LCD) becomes maximum by turning the stopper screw on the WI lamp side, and tighten the lock screw. (Fig. 4)

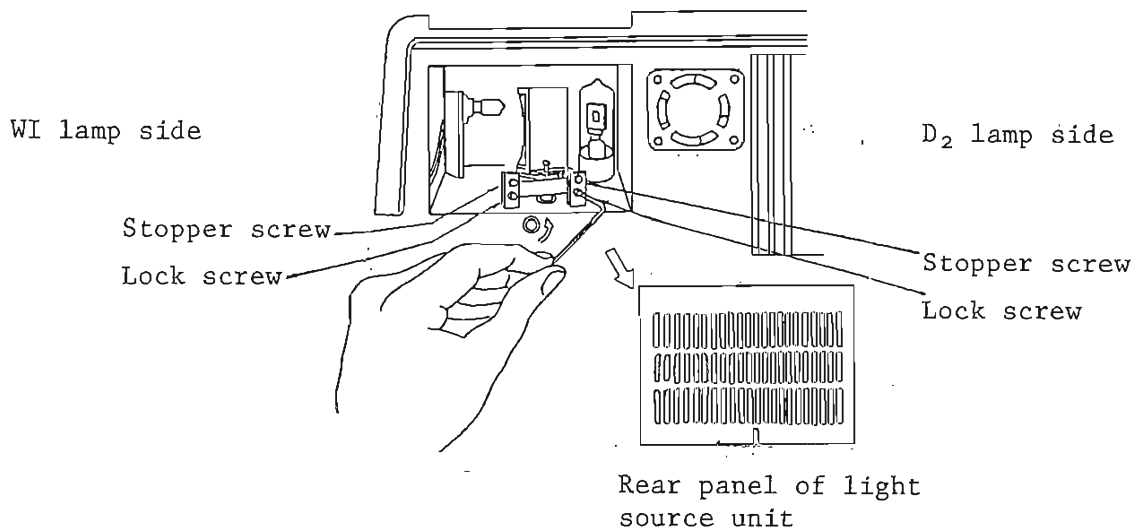


Fig. 4 Rear panel of light source unit.

(5) Install the rear panel and the inner and outer lids of the light source unit in the original position.

This completes the adjustment of the WI lamp.

[Angular adjustment of light source condenser mirror with respect to D<sub>2</sub> lamp]

(1) Set the controls on the instrument in the following position.

"POWER" switch : ON

"Method (#)" : 1

"Photometric Mode : SB (HT 400 V)  
(Photo Mode)

"Go to WL" : 300 nm

- (2) Remove the rear panel of the light source unit.
- (3) Press the [Display List] key. (With the LCD type)
- (4) Slightly loosen the lock screw on the D<sub>2</sub> lamp side by turning it counterclockwise with an Allen wrench, search for a position where the data value (displayed on CRT or LCD) becomes maximum by turning the stopper screw on the D<sub>2</sub> lamp side, and tighten the lock screw. (Refer to Fig. 4.)
- (5) Install the rear panel and inner and outer lids of the light source unit in the original position.

This completes the adjustment of the D<sub>2</sub> lamp.

## APPENDIX 2 ERROR MESSAGES

Table 1 shows the error messages and their meanings. Parentheses ( ) are for the LCD type.

Table 1 Error Messages and Their Meanings.

Error message	Meaning
Lamp Control Error! (L01)	Displayed if the lamp does not come on when the lamp lighting operation is performed in "Method 21" or "Method 22".
WL Range? (E22)	Displayed if attempt is made to make measurement by reversing the setting of the start wavelength and the end wavelength.
Input Error (E)	Displayed if a value out the input range or a value inhibited to be entered is entered.
WL Scale? WL Range? (E20)	Displayed if attempt is made to make measurement by setting a wavelength scale or wavelength range out of the allowable range. (Refer to Table 7-2 in the 7800 manual.)
Upper? Lower? (E23)	Displayed if attempt is made to make measurement by reversing the setting



Error message	Meaning
WL Scale? Scan Speed? (E21)	of the "Upper Limit" and the "Lower Limit". Displayed if attempt is made to make measurement by setting a wavelength scale or scan speed out of the allowable range. (Refer to Table 7-3 in the 7800 manual.)
S01	Displayed if the wavelength is not scanned.
L99	Displayed if the lamp cannot be set in the status of the parameter in the file when the parameter file is called up.
W00	Displayed if the wavelength cannot be initialized in Method 22.

APPENDIX 2

MODEL ROU-398  
RECORDER OUTPUT UNIT  
INSTRUCTION MANUAL

JAPAN SPECTROSCOPIC CO., LTD.  
2967-5, ISHIKAWA-CHO, HACHIOJI CITY  
TOKYO, JAPAN

## 1. UNPACKING & INSTALLATION

This unit has been installed in the Model 7800 before shipment from the factory. Prior to operation, make sure that it is installed in position. (check that output terminal shown in Fig. 1-1 is provided on the rear panel of the 7800.)



Fig. 1-1 Recorder output terminal.

## 2. SPECIFICATIONS

Output Power : The upper limit and lower limit values of the photometric values set by the 7800 are output from -1 to zero volt.

(Example) When the lower limit value is 0.5 Abs and the upper limit value is 1.5 Abs, the output voltage is -0.2 volt if the data obtained is 0.7 Abs.

Output speed : Output speed in memory (Methods 2 and 4)

Approx. 60 msec per piece of data

NOTE: This unit has no function to control start/stop of the chart paper or to lift and lower the pen.

Standard : One piece of recorder output cable  
Accessories P/N5590-0294

### 3. GENERAL

Measurement values obtained by the spectrophotometer can be output as analog signals by using this unit.

This function is valid in Methods 2, 4 and 5.

NOTE: Method 2: Measures data with time using memory

Method 4: Measures spectrum data using memory

Method 5: Measures data with time in real time

### 4. OPERATING PROCEDURE

#### 4-1 Setting Output Device

The output device is set in "Method 31." Set each device in the following position:

1. Plotter : (1) Off
2. Printer : Either position of (1) Off/(2) On
3. Recorder : (2) On
4. QFS : Either position of (1) Off/(2) On
5. RS-232C : Either position of (1) Off/(2) On

NOTE: If the plotter is set to (2) On, the signal will be output not to recorder but to the plotter.

Then set "Print Out" (printer output) in the following

position in each method.

Method 2:

8. Print Out : Either position of (1) Seq/(2) Overlay

Method 4: .

11. Print Out: Either position of (1) Seq/(2) Overlay

Method 5:

9. Print Out : (1) On

#### 4-2 Adjusting Zero Position and Full Scale

(1) Set the following parameters as follows in Method 5.

Photometric Mode : (1)%T

Lower Limit : 10%T

Upper Limit : 20%T

(2) Shut off the sample beam, make sure the %T indication is 10%T or less and press the "Measure" key to adjust the zero position of the recorder.

(3) Release the sample beam, make sure that the %T indication is 20%T or more, and adjust the full scale (1V output) position..

#### 4-3 Measurement in Method 2

First, set parameters in Method 2 and press the [Measure] key to store data with time into memory.

Then output the stored data to the recorder by pressing keys [Memory] [n] [Measure].

#### 4-4 Measurement in Method 4

First, set parameters in Method 4 and press the [Measure]

key to store spectrum data into memory.

Then output the stored data to the recorder by pressing keys [Memory] [n] [Measure].

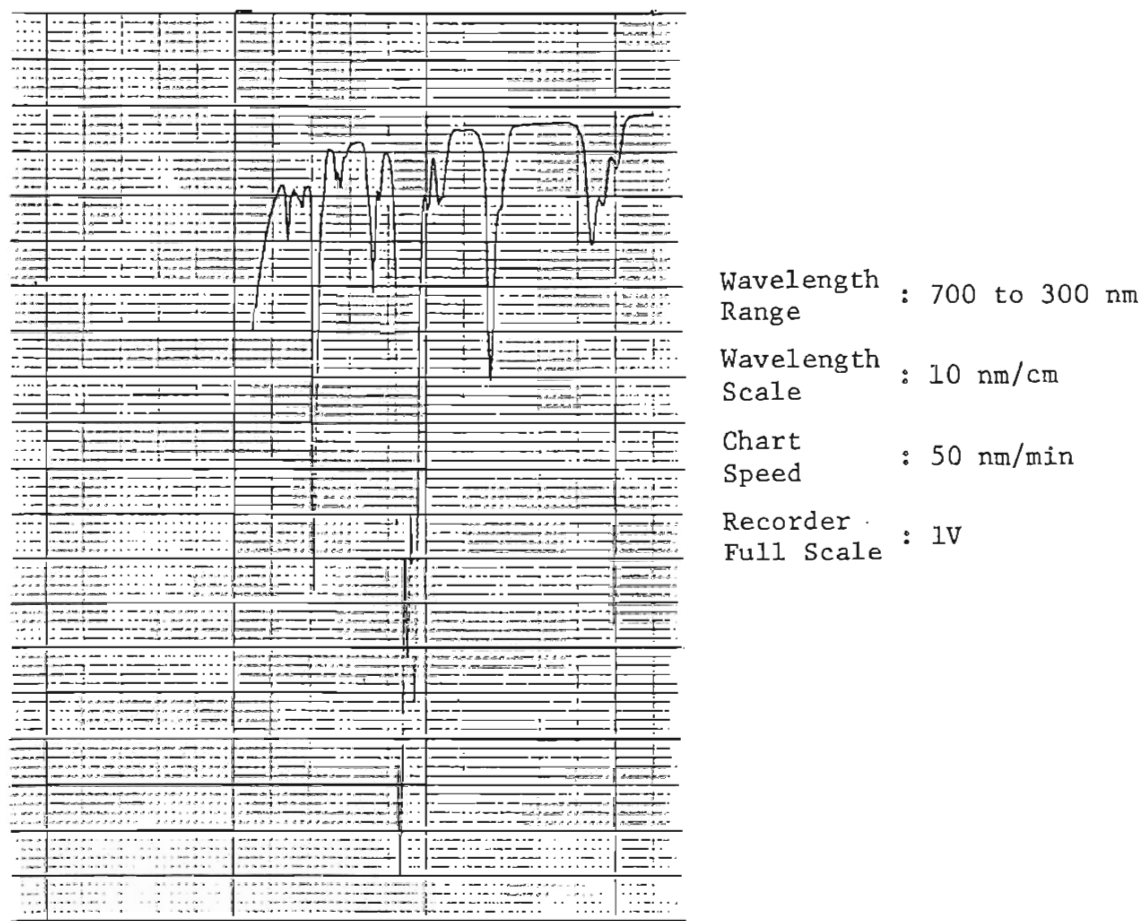


Fig. 4-1 Output example of spectrum data of holmium glass.

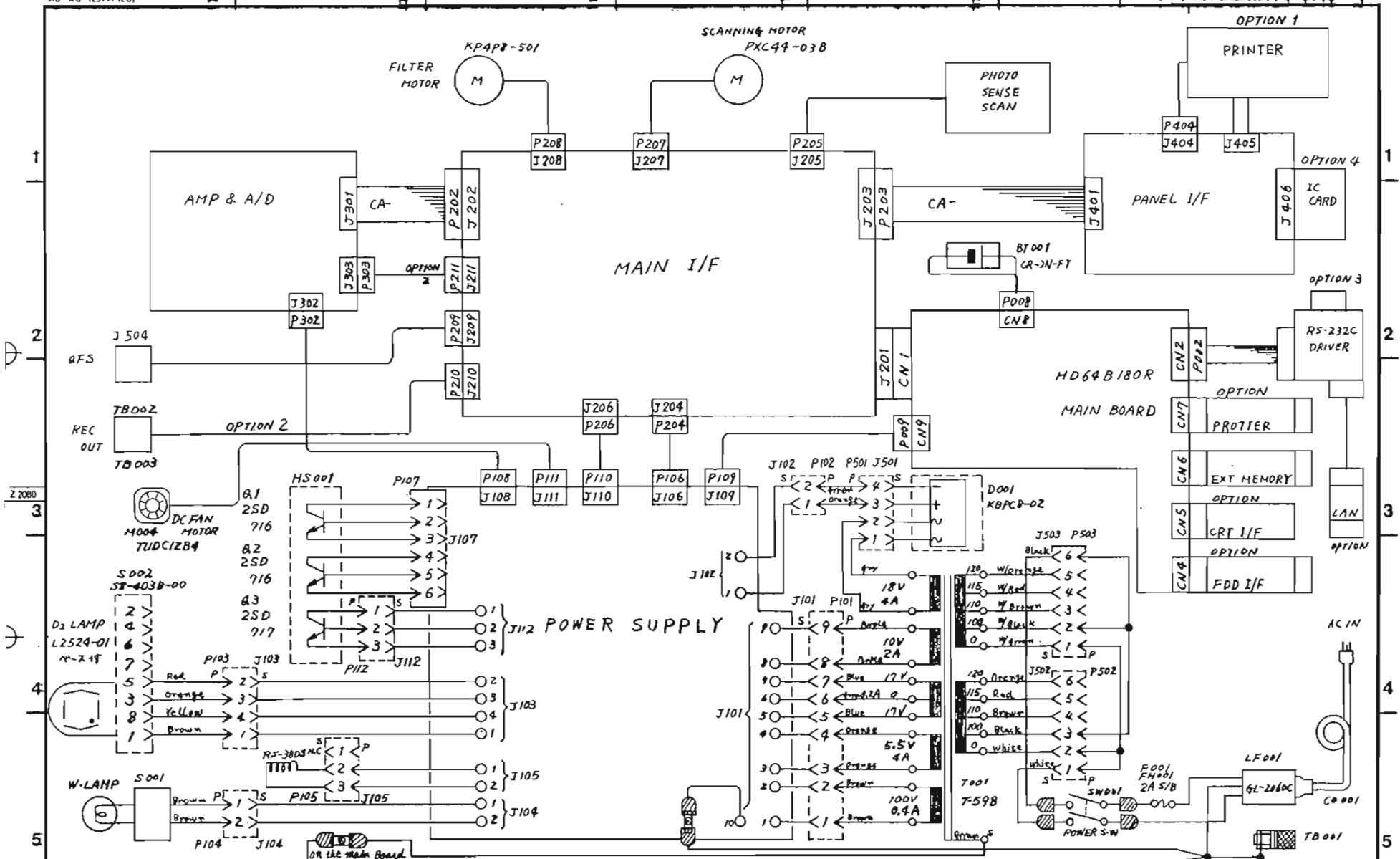
#### 4-5 Measurement in Method 5

Set parameters in Method 5 and press the [Measure] key, and the data with time will be output to the recorder in real time.

APPENDIX 3

LIST OF DRAWINGS FOR 7800

<u>Drawing No</u>	<u>Description</u>
6590-500BA	Electric wiring
6590-501CA	Power supply(2 sheets)
6590-502CA	Amp. & A/D
6590-503CA	Main I/F(2 sheets)
6590-504CA	Panel I/F(2 sheets)
6590-505CA	Photo sense scan
6541-580CB	L main board(4 sheets)
6541-574CB	60 PROM board



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19						D	~						
19						C	~						
19						B	~						
						A	~						
変更No MODIFICATION	日付 DATE	記号 SYMBOL	変更記事 LEVEL	適用 SERIAL AFFECTED	発行 ISSUER	承認 APP	プリント基板 PARTS NUMBER	5690-	適用 SERIAL AFFECTED	作成 DRAWN	検出 FACD	検出 CHECKED	承認 APPROVED
										日本分光 JASCO			6590-500BA
													図種番号 DWG NUMBER





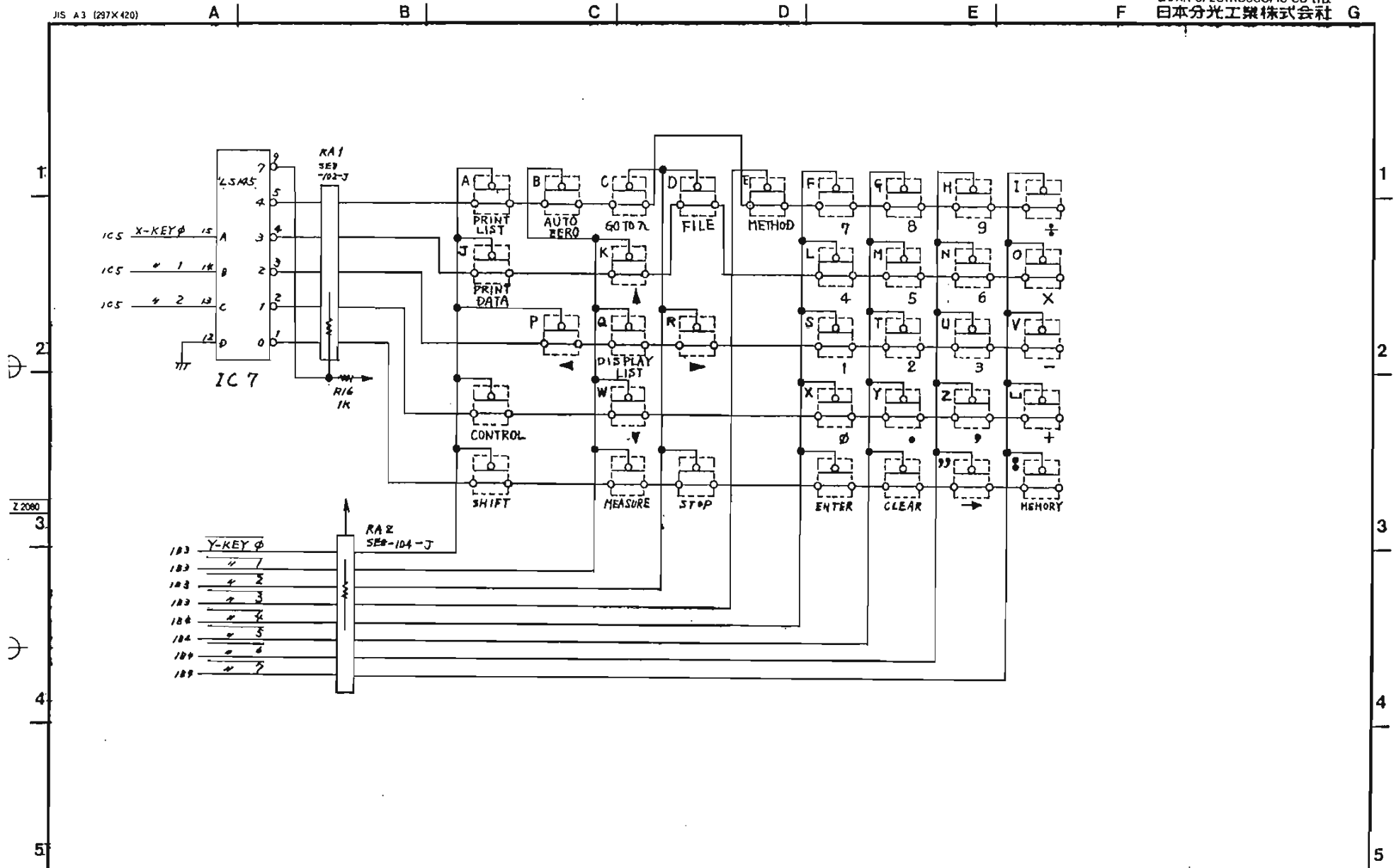












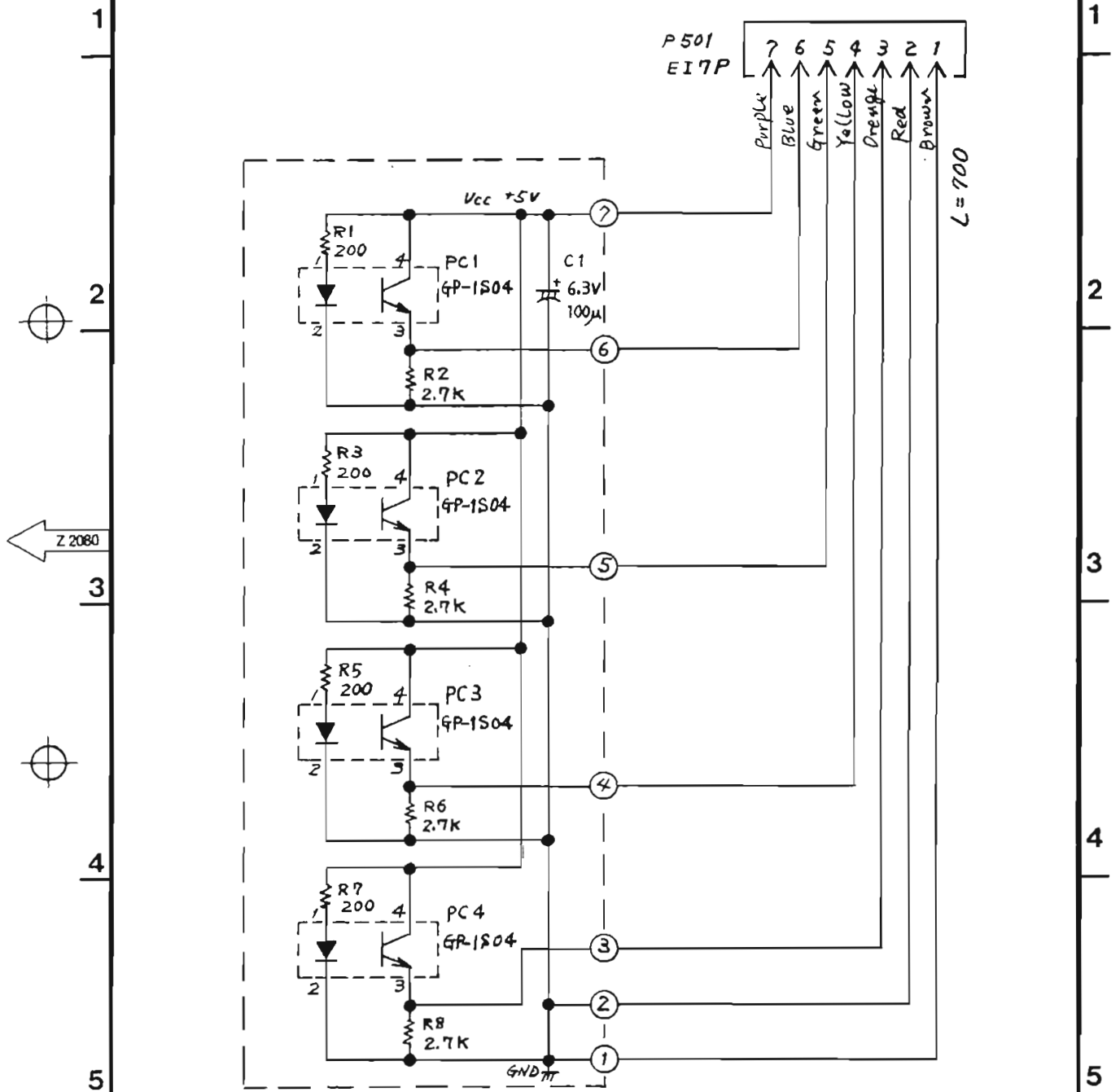
19		△		~				E	~	日付 DATE	1986.7.19	機種名 NAME	Ubest 30	図名 DESCRIPTION	PANEL I/F
19		△		~				D	~			作成 DRAWN	佐野		
19		△		~				C	~			検閲 CHECKED			
19		△		~				B	~			承認 APPROVED	佐野		
		△	新規					A	~						
変更No MODIFICATION	日付 DATE	記号 SYMBOL	変更記事 REVISION	適用 SERIAL AFFECTED	発行 ISSUER	承認 APP	5690-2243	プリント基板 PART NUMBER	適用 SERIAL AFFECTED					6590-504CA	図番 DWG NUMBER

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JIS A4 (210X297)

変更No. MODIFICATION	日付 DATE	記号 SYMBOL	変更記事 E.C. LEVEL	適用 SERIAL AFFECTED	発行者 ISSUER	承認 APP	プリント基板バージョン PRINTED BOARD NUMBER	適用 SERIAL AFFECTED
			新規				5690-	A
	19	△B		~				B ~
	19	△C		~				C ~
	19	△D		~				D ~
	19	△E		~				E ~



日付 DATE 19 86. 7. 7.	機種名 NAME U beat 30	回路名 DESCRIPTION PHOTO SENSE SCAN
 日本分光	作成 DRAWN 佐野	承認 APPROVED 結城
	技術 ENOR	検査 CHECKED
図面番号 DWG NUMBER 6590-505CA		1/1













