UNICO SQ Series

MODEL

UV-2800 / UV-2802 /UV-2802PC/UV-2802S/

UV-2802PCS / UV-3802 / UV-4802

SPECTROPHOTOMETER

SERVICE MANUAL

UNICO

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C O N T E N T S

1. Introduction

The SQ series Spectrophotometer are available in five models, the model UV-2800, UV-2802, UV-2802S, UV-3802 and UV-4802. This series products cover the Ultra Violet and Visible wavelength regions from 190nm to1100nm.

The analytical grating system has 1200 grooves/mm for high spectral dispersion. The models UV-2800, UV-2802,UV-2802PC, UV-2802S and UV-2802PCS are Single Beam, the model UV-3802 is Split Beam and the model UV-4802 is Double Beam.

The SQ series Spectrophotometer used Double CPU, RTOS, High Precision A/D and 320×240 dot matrix LCD Display(320X240). All of these made the instruments have excellent performance and good stability.

Figure 1.1 Model UV-2800

Figure 1.2 Model UV-2802, UV-2802S

Figure 1.3 Model UV-2802PC, UV-2802PCS

Figure 1.4 Model UV-3802

Figure 1.5 Model UV-4802

2. Specifications

	UV-2800	UV-2802	UV-2802S	UV-2802PC	UV-2802PCS	UV-3802	UV-4802
Optical System	Single beam, grating system1200 lines/mm					Split beam, grating system1200 lines/mm	Double beam, grating system1200 lines/mm
Spectrum Bandwidth	4nm	1.8nm	0.5, 1, 2, 4nm	1.8nm	0.5, 1, 2, 4nm	1.8nm	
Wavelength Range	190-1100nm						
Wavelength Accuracy	±0.8nm	±0.5nm					
Wavelength Reatability	0.5nm	0.3nm					
Display	LCD(320×240), DMF50083			PC Monitor		LCD(320×240), DMF50174	
Stray Light	≤0.15%T@220nm&340nm					≤0.1%T@220nm&340nm	
Photometric Range	0-200%T, -0.3-3.0A, 0-9999C						
Photometric Accuracy	±0.5%T						
Stability	±0.002A/h@500nm						
Baseline Straight	±0.004A						
Light Source	Tungsten lamp, Deuterium lamp						
Data Output	RS-232, Centronics Parallel Port						
Dimensions	545X425X260	620X400X280					
Weight	20kg	21kg	22kg	21kg	22kg	23kg	24kg

3. Layout

3.1 Layout of UV-2800

1. Cooling Fan
2. Concave Mirror
3. Tungsten Lamp(W Lamp)
4. Heat Radiator
5. D2/W Power Supply PCB
6. Motor1(Lamp Change)
7. Transformer
8. Mirror1(Lamp Change)
9. Lamp Limit Switch
10. Light Blocking Shelf
11. Deuterium Lamp(D2 lamp)
12. Entrance Slit
13. Monochromator
14. Monochromator Cover
15. Movable Nut
16. Screw Thread Pole
17. Sine Bar
18. Drive PCB
19. Motor2(Wavelength)
20. Synchro-Strap
21. Photo-couple1(Wavelength)
22. Pull-Push Rod
23. Shield Cover
24. Photo-couple2(Filter)
25. Motor3(Filter)
26. Amplifier PCB
27. Condenser Lens
28. 4-cell Sample Holder
29. Sample Compartment
30. Slave CPU PCB
31. Lamp Source Room
32. Auto-cell Changer Connector
33. Light Blocking Plate
34. Rectifier
35. Power Distributing PCB
36. Switch Power Supply
37. Main CPU PCB
38. Program Switch for Software Update
39. LCD Screen(320x240 dots)
40. Keypad
41. Sample Compartment Lid
42. Transferring PCB(In Upper Case)
43. Upper case
44. Viewing Plate
45. Viewing Hole
46. Contrast Potentiometer for LCD
47. 232 Serial Port Interface
48. Printer Interface
49. Power Switch
50. Power Socket with Fuse with Fuse
51. 110V/220V Selector

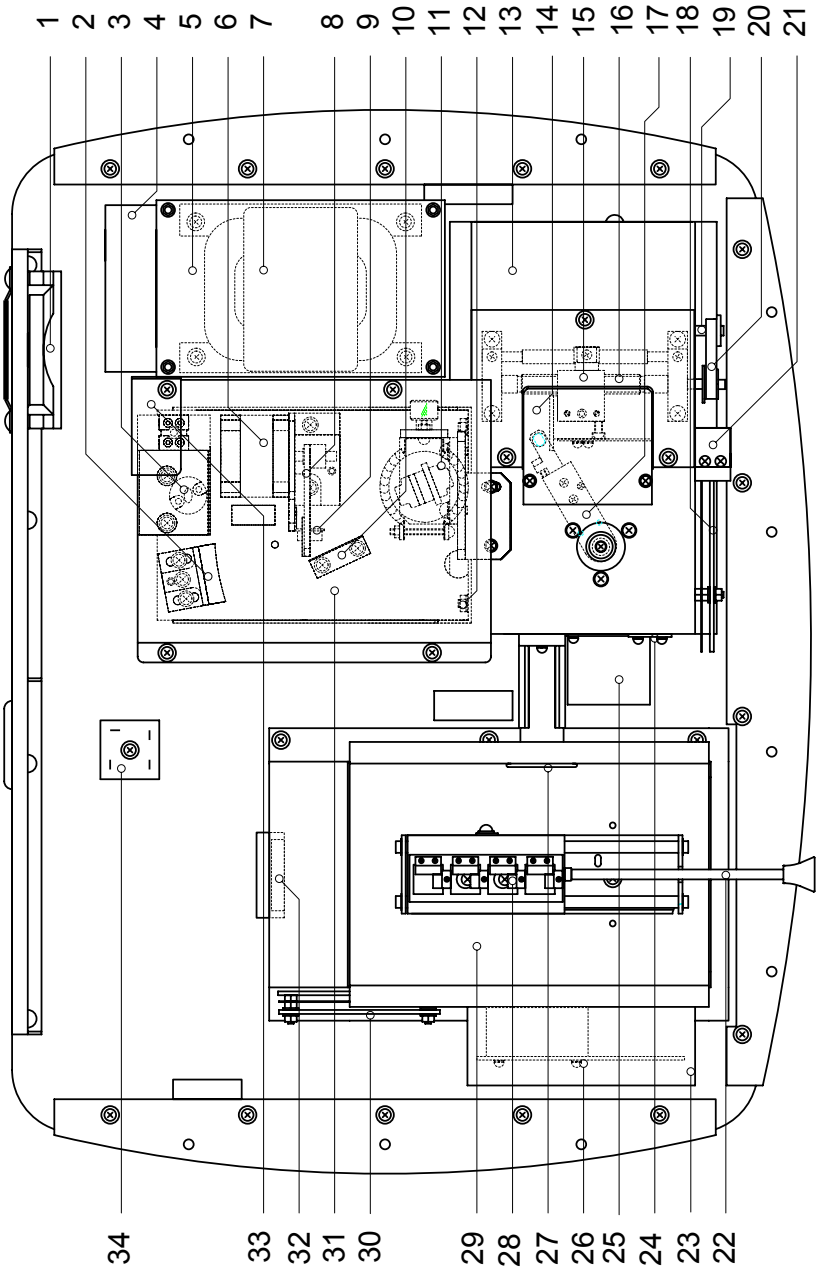

Figure 3.1 Layout of UV-2800 Inside Top View

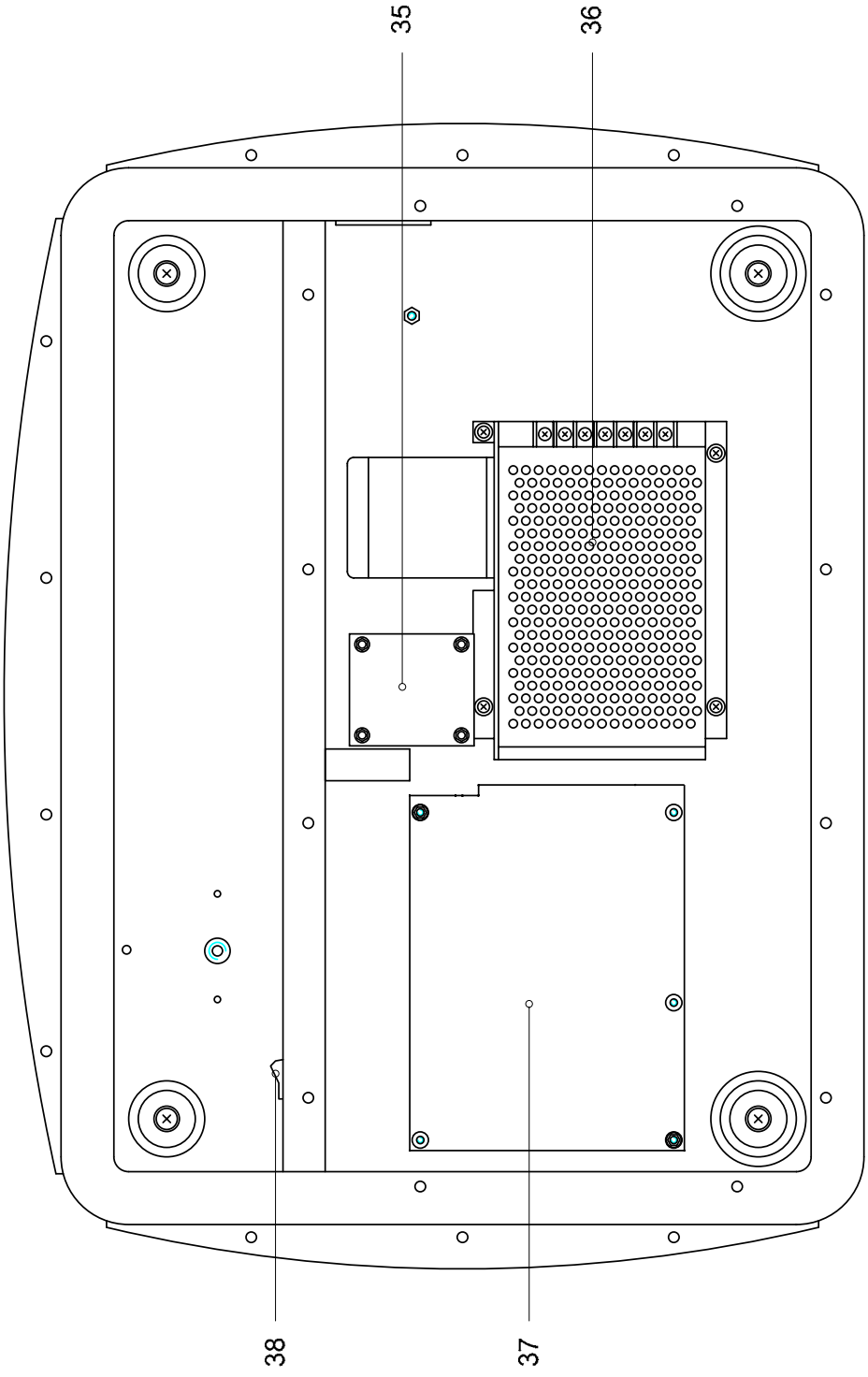

Figure 3.2 Layout of UV-2800 Inside Bottom View

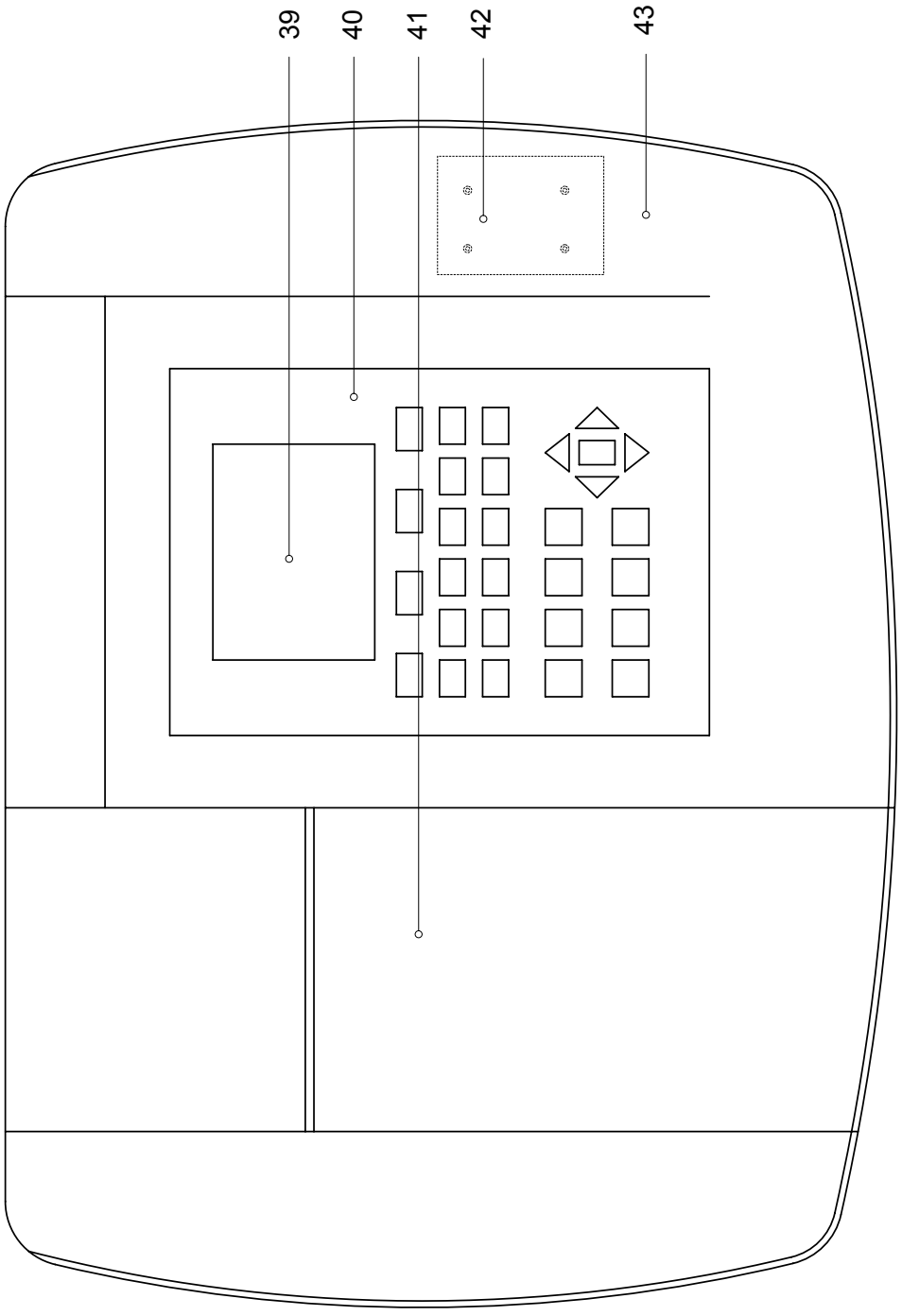

Figure 3. 3 Layout of UV-2800 Top View

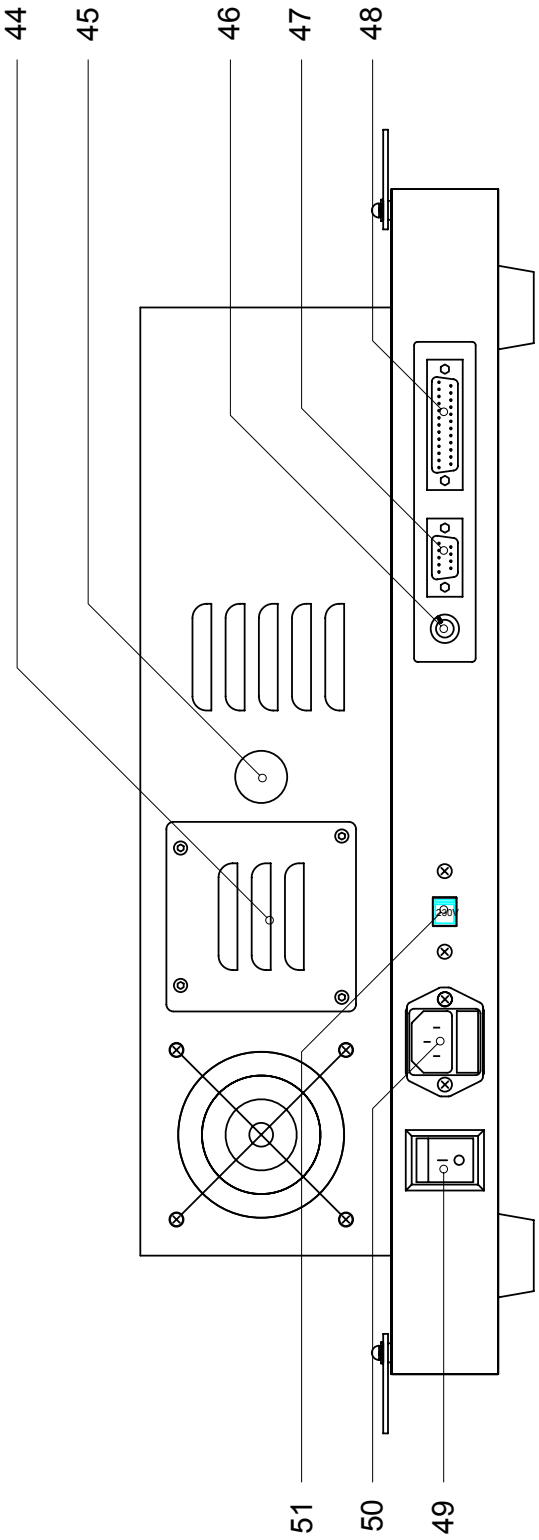

Figure 3. 4 Layout of UV-2800 Back View

3.2 Layout of UV-2802(S), UV-2802PC(S)

1. Cooling Fan
2. Concave Mirror
3. Tungsten Lamp(W Lamp)
4. Heat Radiator
5. D2/W Power Supply PCB
6. Motor1(Lamp Change)
7. Transformer
8. Mirror1(Lamp Change)
9. Lamp Limit Switch
10. Light Blocking Shelf1
11. Deuterium Lamp(D2 lamp)
12. Entrance Slit
13. Monochromator
14. Fortified Board
15. Sine Bar
16. Screw Thread Pole
17. Movable Block
18. Wavelength Limit switch
19. Gear
20. Motor2(Wavelength)
21. Photo-coupler1(Wavelength)
22. Drive PCB
23. Auto-cell Changer Connector
24. Pull-Push Rod
25. Photo-coupler2(Filter)
26. Motor3(Filter)
27. Shield Cover
28. Amplifier PCB
29. Condenser Lens
30. Sample Compartment
31. Slit Switch Equipment *
32. 4-Cell Sample Holder
33. Photo-coupler4(Slit) *
34. Motor4(Slit) *
35. Lamp Source Room
36. Slave CPU PCB
37. Light Blocking Shelf2
38. Rectifier
39. Power Distributing PCB
40. Switch Power Supply
41. Main CPU PCB
42. Program Switch for Software Update
43. LCD Display(320X240) **
44. Keypad **
45. Sample Compartment Lid
46. Transferring PCB(In Upper Case) **
47. Upper Case
48. Viewing plate
49. Viewing Hole
50. Contrast Potentiometer for LCD
51. 232 Serial Interface
52. Printer Interface
53. Power Switch
54. Power Socket with Fuse
55. 110V/220V Selector

Note: **** Only for UV-2802S, UV-2802PCS***
***** Only for UV-2802, UV-2802S***

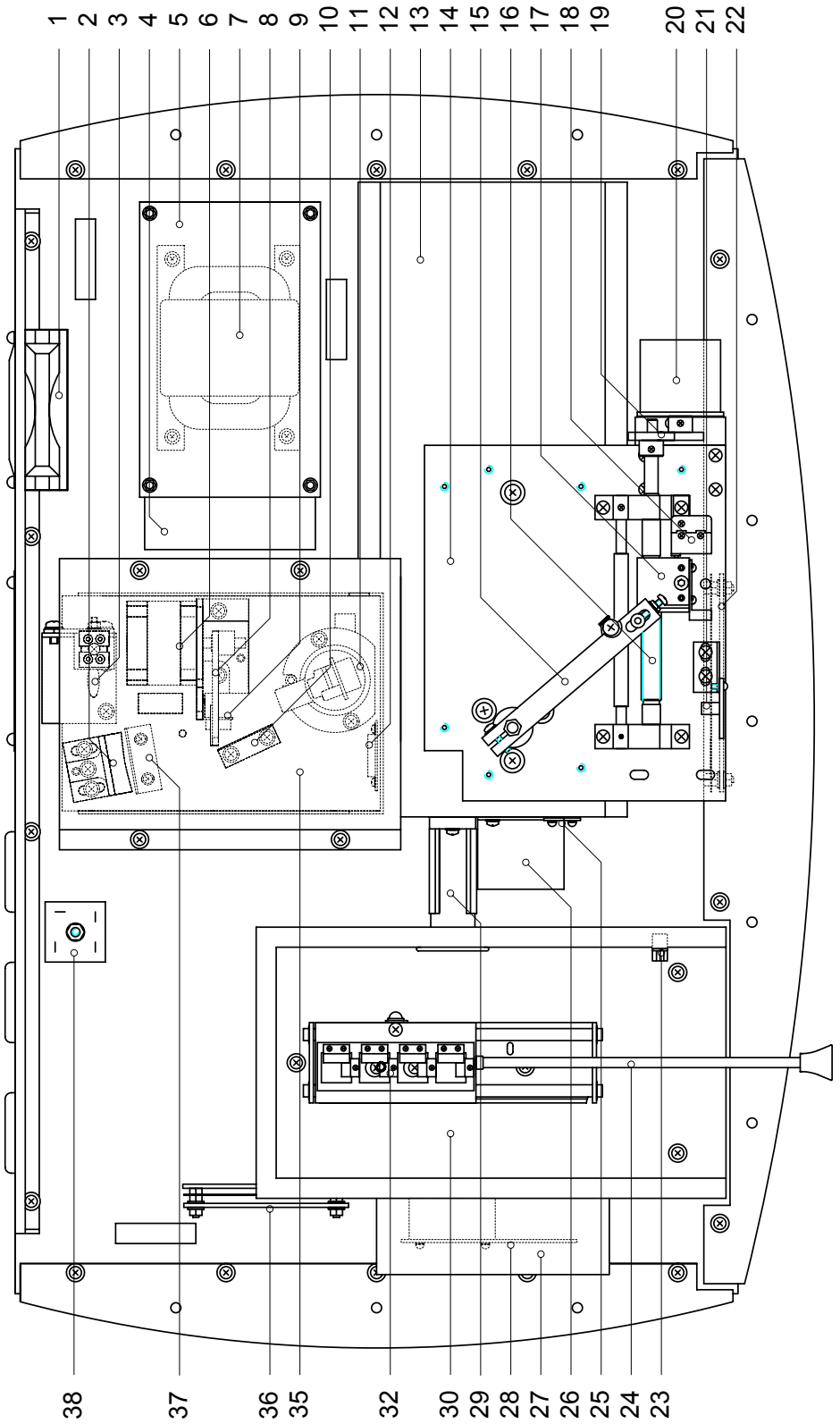

Figure 3.5 Layout of UV-2802, UV-2802PC Inside Top View

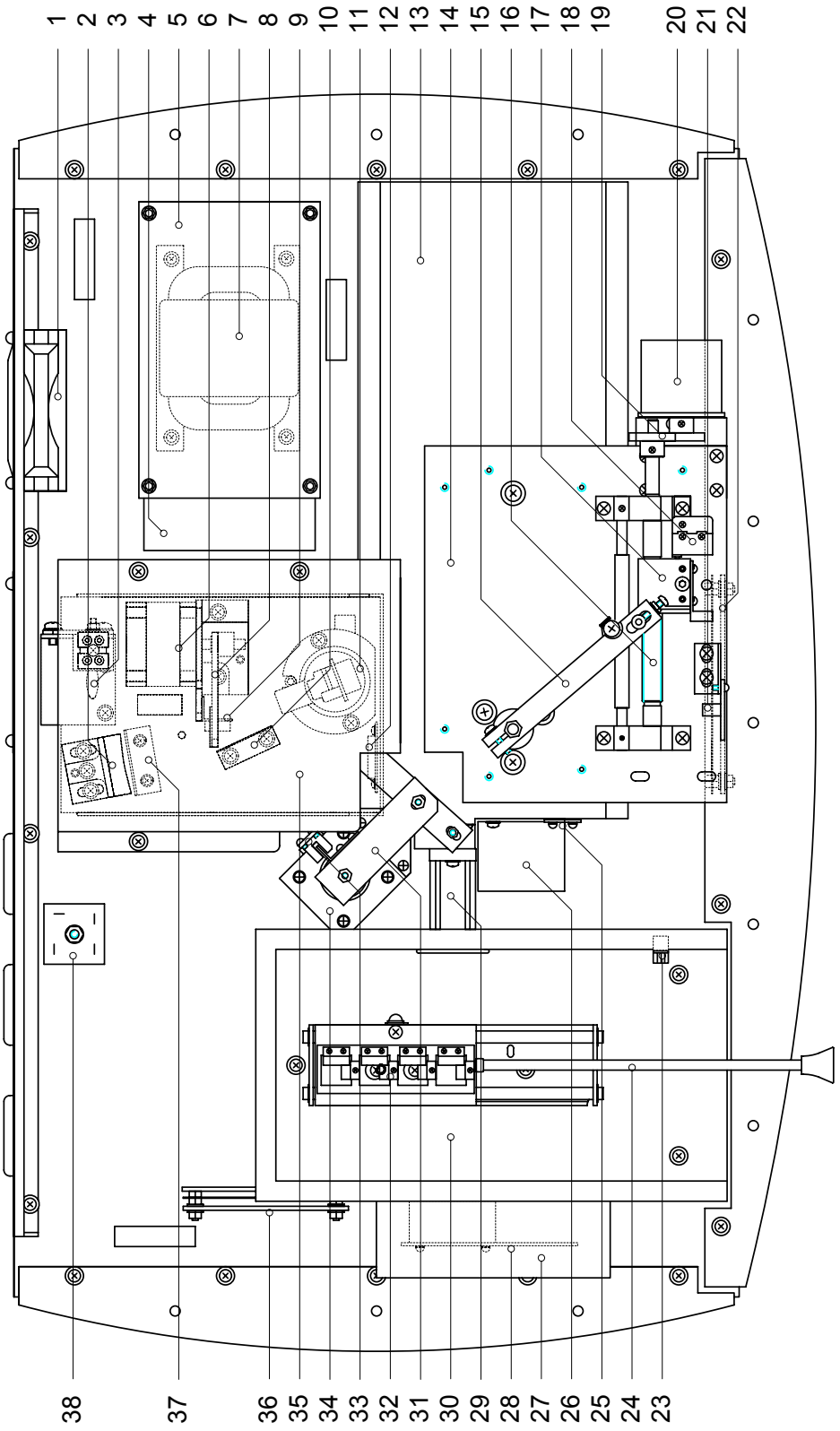

Figure 3.6 Layout of UV-2802S, UV-2802PCS Inside Top View

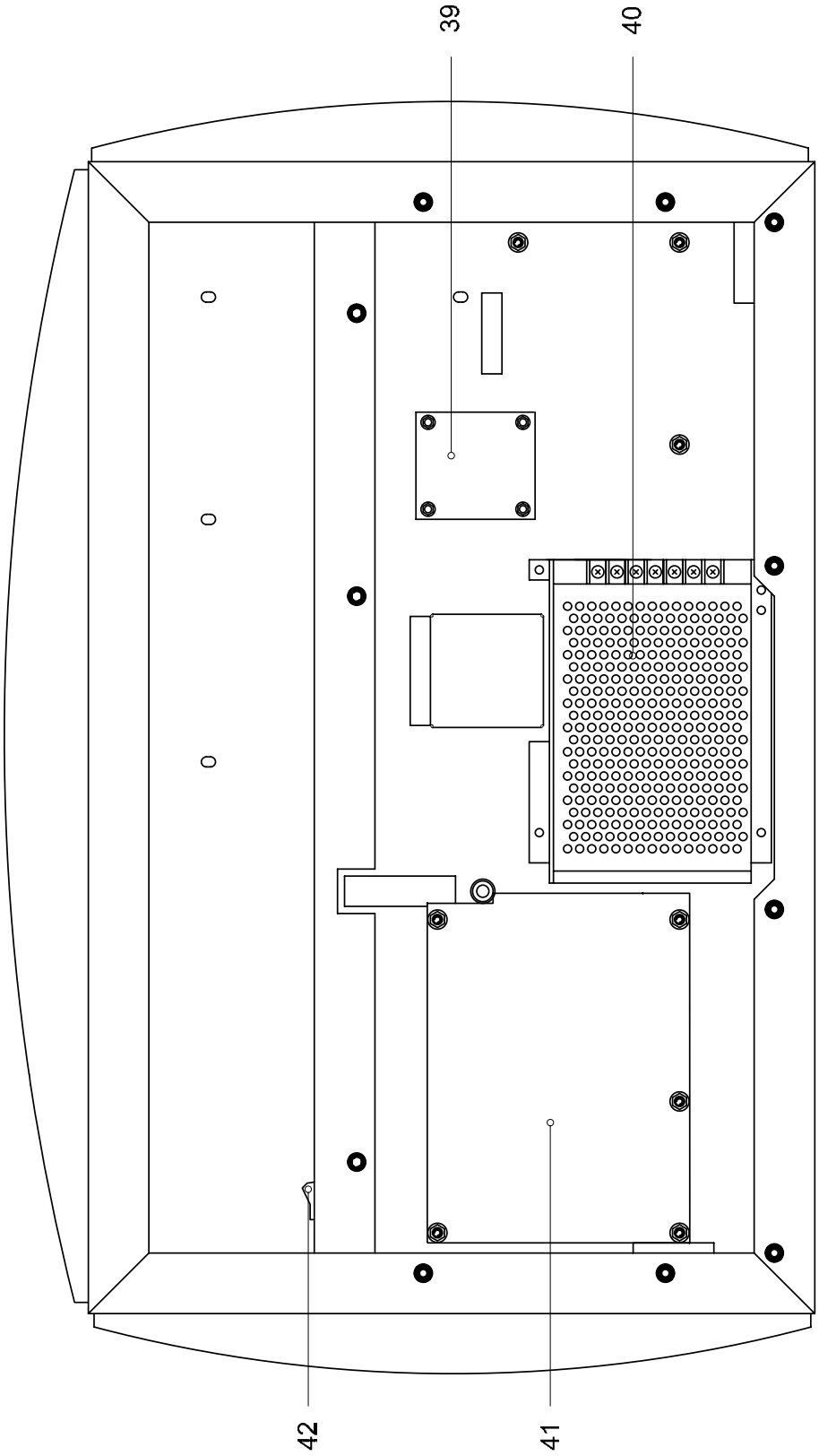

Figure 3.7 Layout of UV-2802(S), UV-2802PC(S) Inside Bottom View

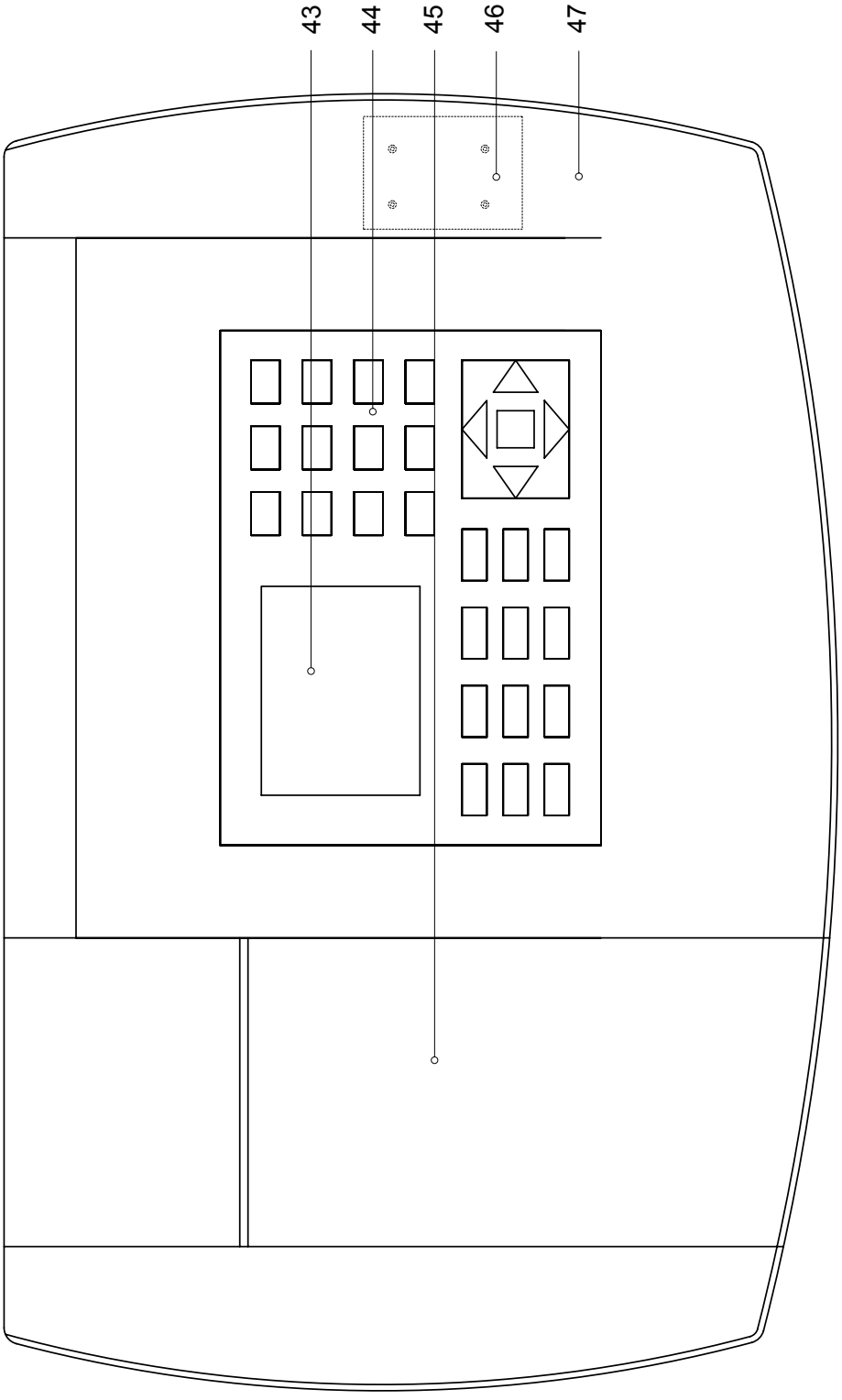

Figure 3.8 Layout of UV-2802(S) Top View

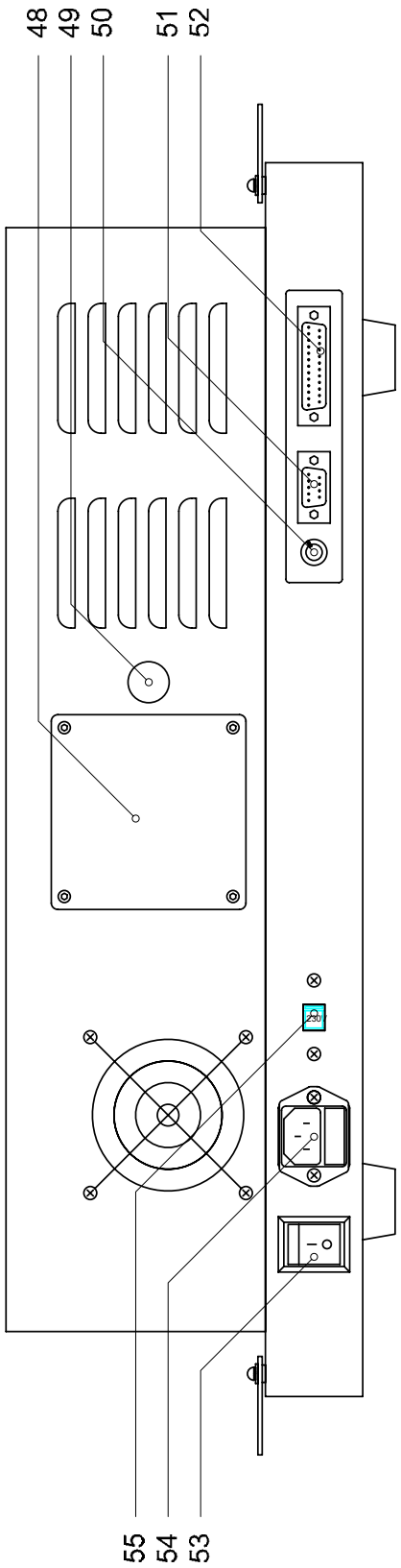

Figure 3.9 Layout of UV-2802(S) , UV-2802PC(S) Back View

3.3 Layout of UV-3802

1. Cooling Fan
2. Concave Mirror
3. Tungsten Lamp(W Lamp)
4. Heat Radiator
5. D2/W Power Supply PCB
6. Motor1(Lamp Change)
7. Transformer
8. Mirror1(Lamp Change)
9. Lamp Limit Switch
10. Light Blocking Shelf1
11. Deuterium Lamp(D2 lamp)
12. Entrance Slit
13. Monochromator
14. Fortified Board
15. Sine Bar
16. Screw Thread Pole
17. Movable Block
18. Wavelength Limit switch
19. Gear
20. Motor2(Wavelength)
21. Photo-coupler1(Wavelength)
22. Drive PCB
23. Auto-cell Changer Connector
24. Pull-Push Rod
25. Photo-coupler2(Filter)
26. Motor3(Filter)
27. Shield Cover
28. Main Amplifier PCB
29. Condenser Lens
30. Sample Compartment
31. Light Distribute Room
32. 4-Cell Sample Holder
33. Condenser Lens
34. Slave Amplifier PCB
35. Lamp Source Room
36. Slave CPU PCB
37. Shield
38. Light Blocking Shelf2
39. Rectifier
40. Power Distributing PCB
41. Switch Power Supply
42. Main CPU PCB
43. Program Switch for Software Update
44. LCD Display(320X240)
45. Keypad
46. Sample Compartment Lid
47. Transferring PCB(In Upper Case)
48. Upper Case
49. Viewing plate
50. Viewing Hole
51. Contrast Potentiometer for LCD
52. 232 Serial Interface
53. Printer Interface
54. Power Switch
55. Power Socket with Fuse
56. 110V/220V Selector

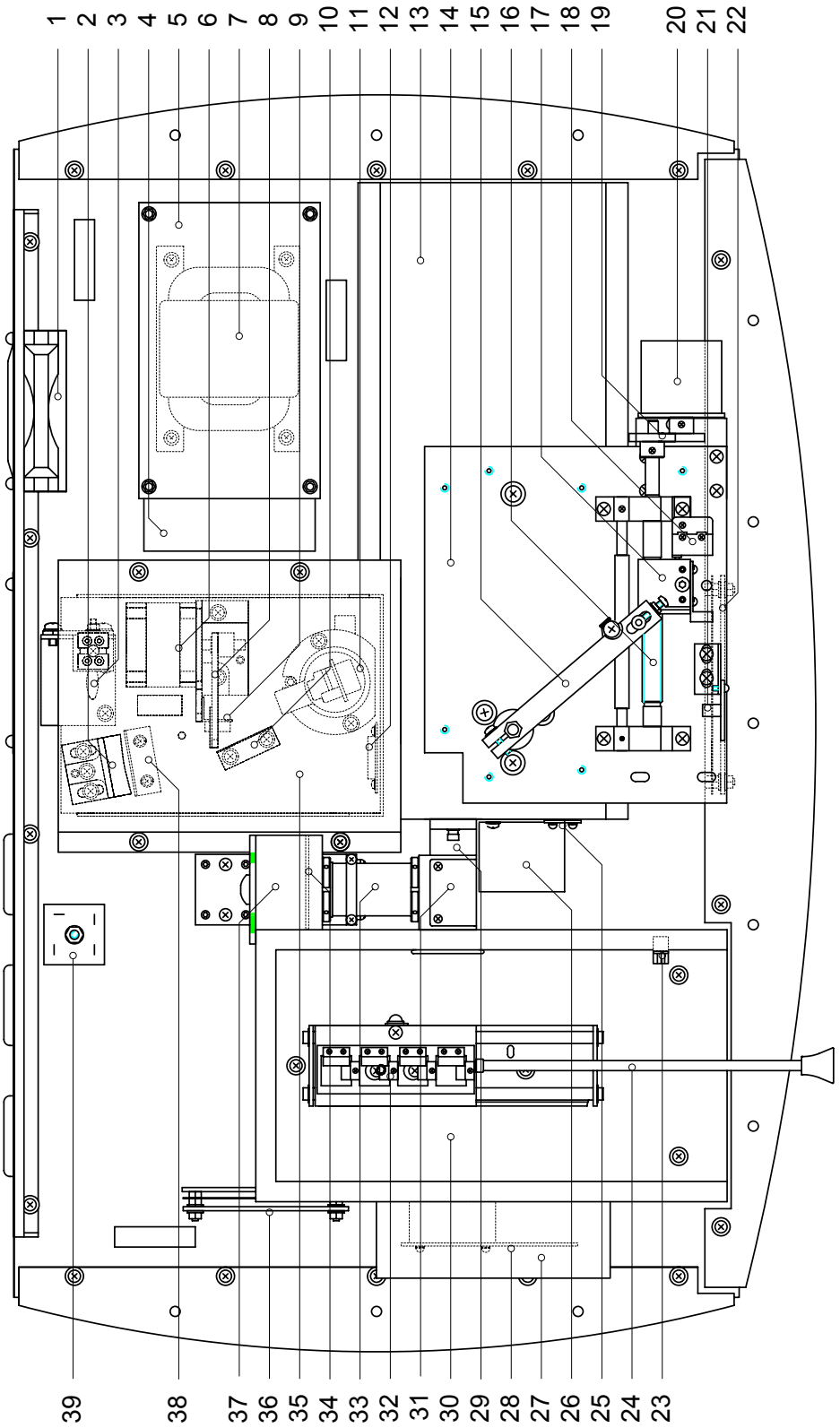

Figure 3.10 Layout of UV-3802 Inside Top View

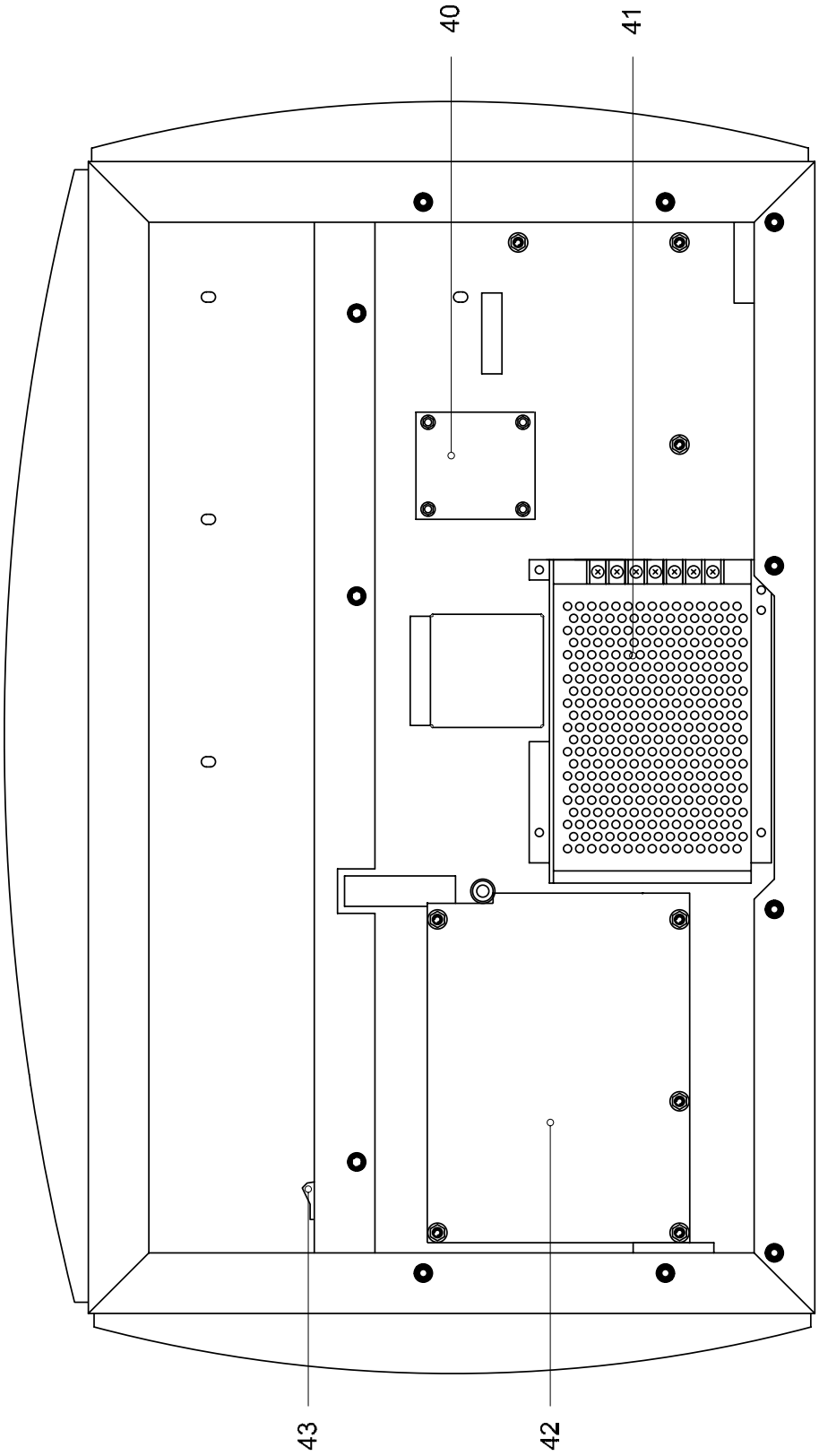

Figure 3.11 Layout of UV-3802 Inside Bottom View

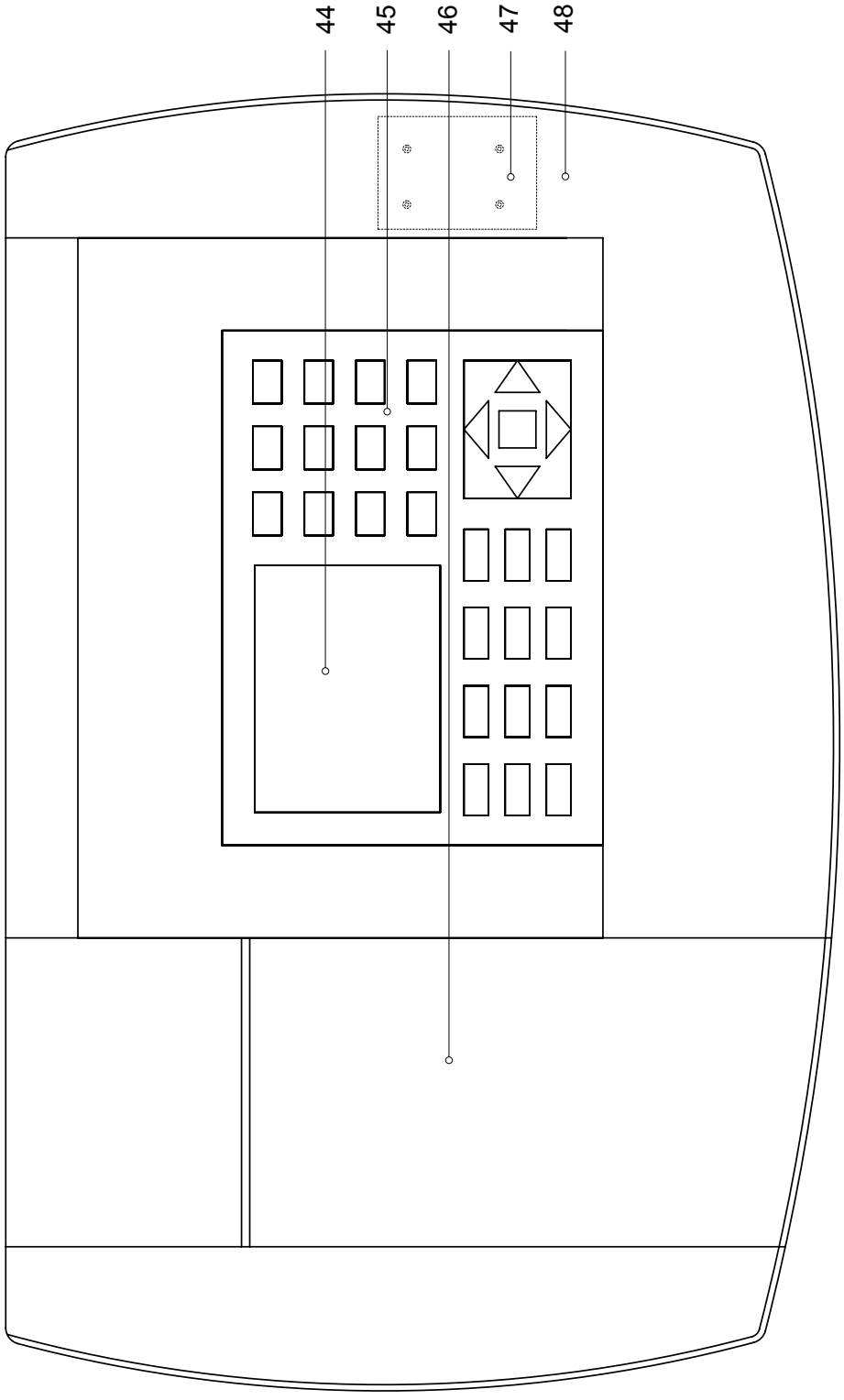

Figure 3.12 Layout of UV-3802 Top View

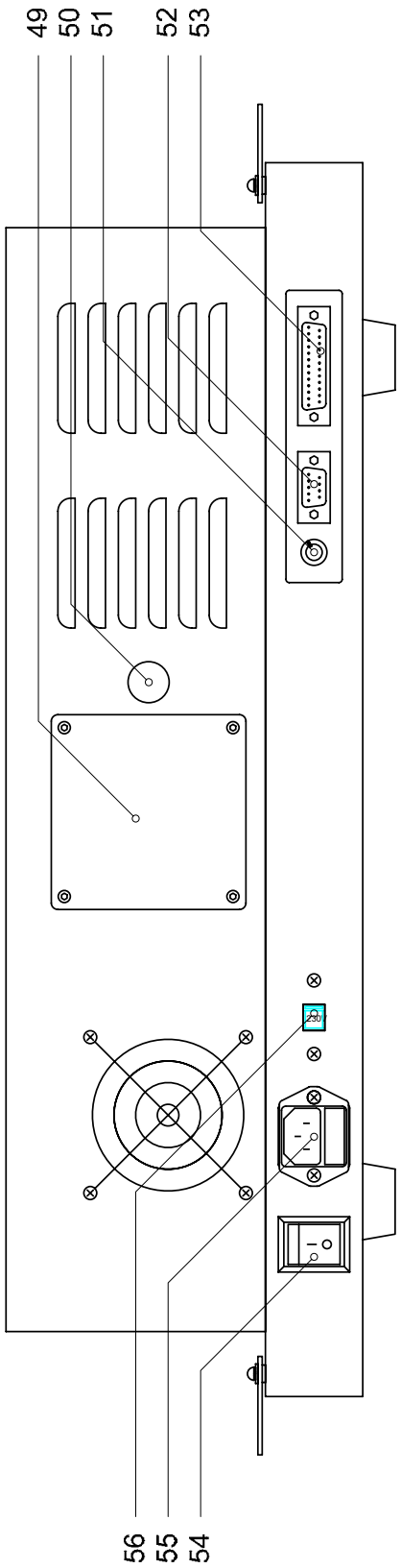

Figure 3.13 Layout of UV-3802 Back View

3.4 Layout of UV-4802

1. Cooling Fan
2. Concave Mirror
3. Tungsten Lamp(W Lamp)
4. Heat Radiator
5. D2/W Power Supply PCB
6. Motor1(Lamp Change)
7. Transformer
8. Mirror1(Lamp Change)
9. Lamp Limit Switch
10. Light Blocking Shelf1
11. Deuterium Lamp(D2 lamp)
12. Entrance Slit
13. Monochromator
14. Fortified Board
15. Sine Bar
16. Screw Thread Pole
17. Movable Block
18. Wavelength Limit switch
19. Gear
20. Motor2(Wavelength)
21. Photo-coupler1(Wavelength)
22. Drive PCB
23. Auto-cell Changer Connector
24. Pull-Push Rod
25. Photo-coupler2(Filter)
26. Motor3(Filter)
27. Shield Cover
28. Main Amplifier PCB
29. Condenser Lens
30. Sample Compartment
31. Light Distribute Room
32. Sample Holder
33. Slave Amplifier PCB
34. Lamp Source Room
35. Reference Holder
36. Light Blocking Shelf2
37. Slave CPU PCB
38. Rectifier
39. Power Distributing PCB
40. Switch Power Supply
41. Main CPU PCB
42. Program Switch for Software Update
43. LCD Display(320X240)
44. Keypad
45. Sample Compartment Lid
46. Transferring PCB(In Upper Case)
47. Upper Case
48. Viewing plate
49. Viewing Hole
50. Contrast Potentiometer for LCD
51. 232 Serial Interface
52. Printer Interface
53. Power Switch
54. Power Socket with Fuse
55. 110V/220V Selector

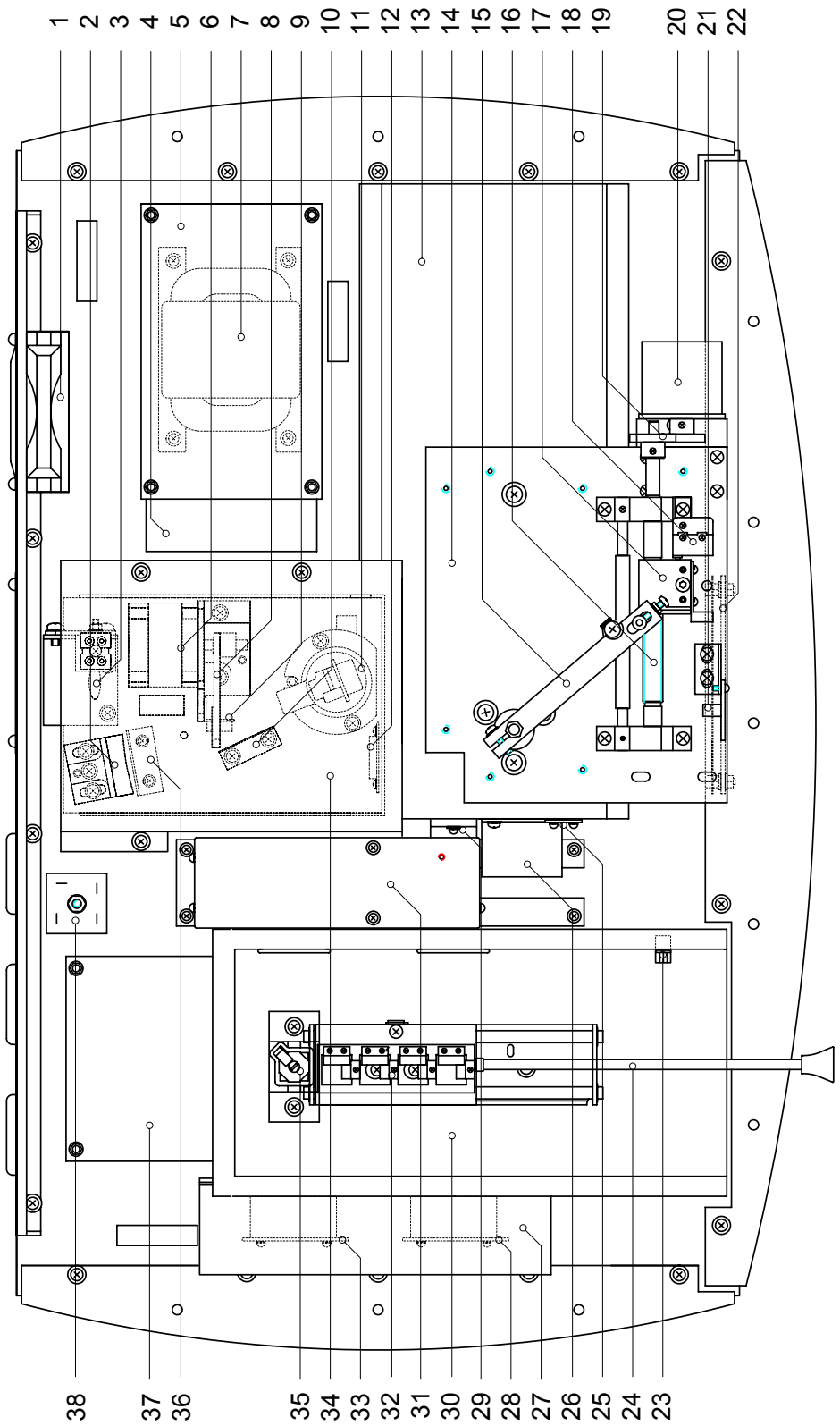
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Figure 3.14 Layout of UV-4802 Inside Top View

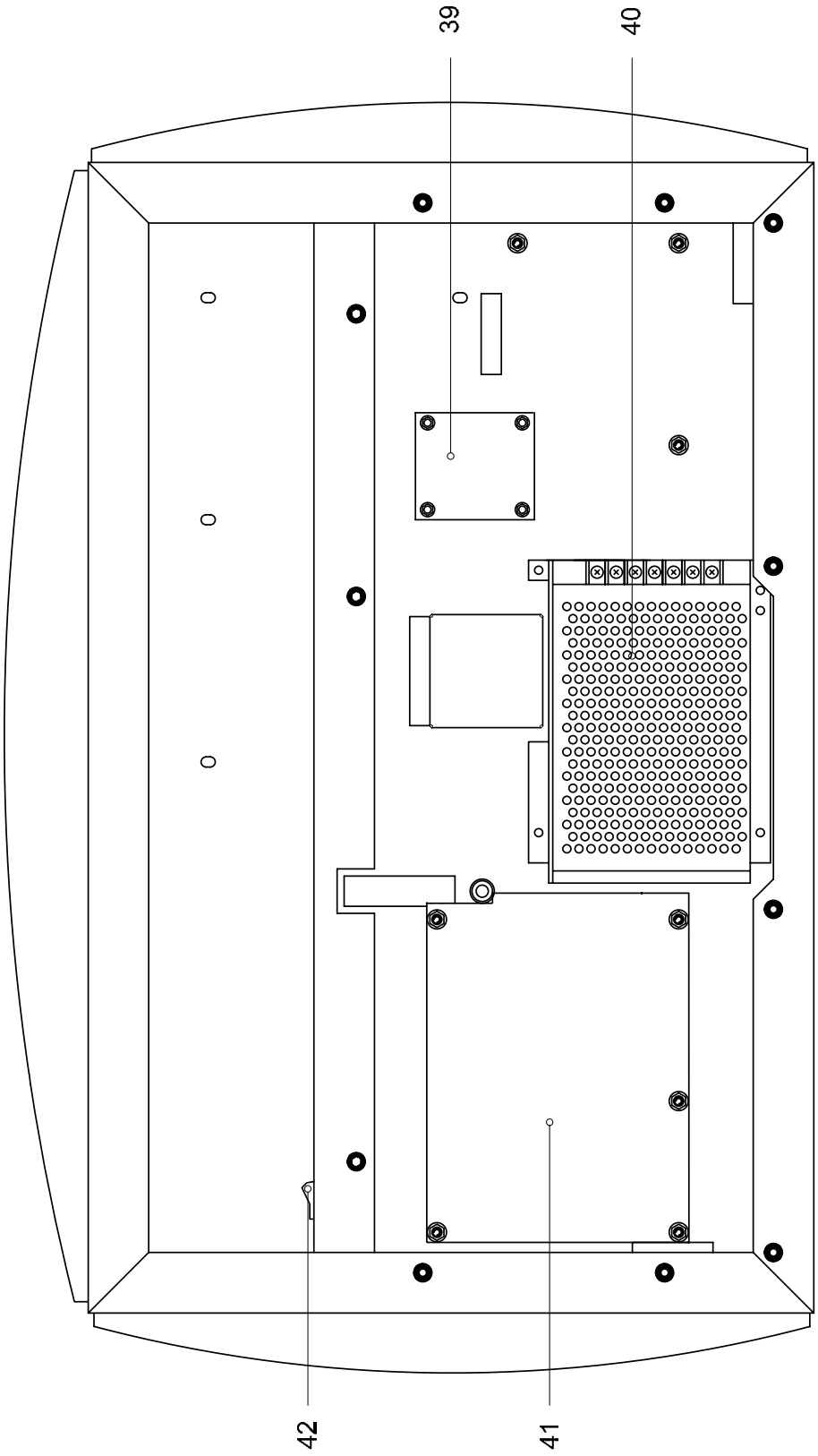


Figure 3.15 Layout of UV-4802 Inside Bottom View

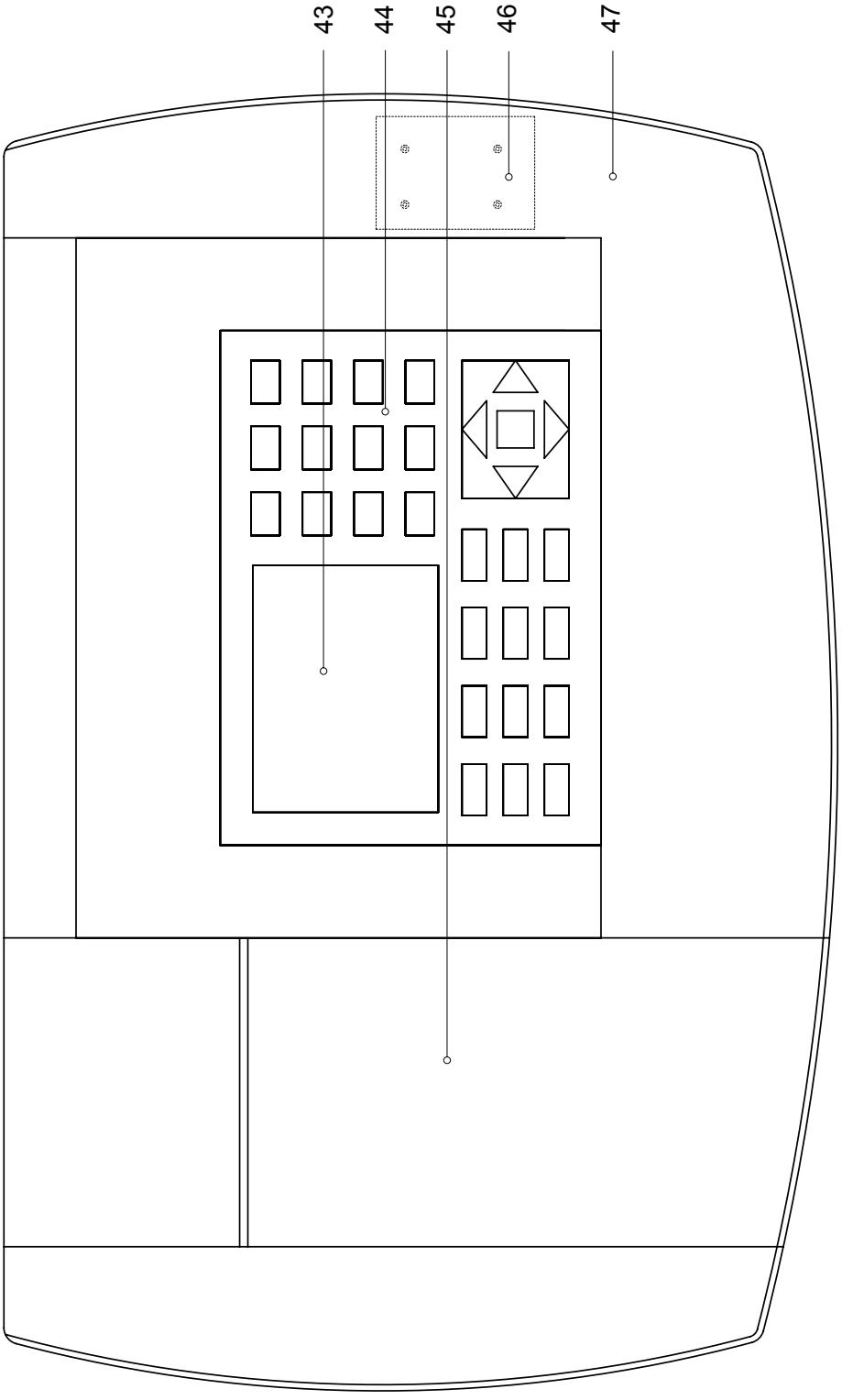


Figure 3.16 Layout of UV-4802 Top View

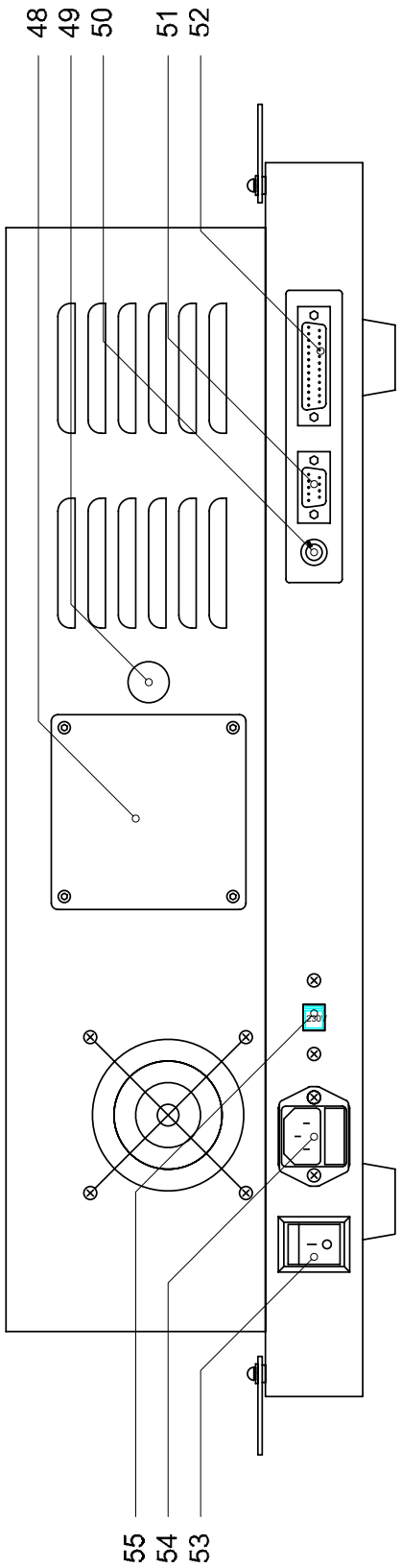


Figure 3.17 Layout of UV-4802 Back View

4. Optical System

The optical system of SQ series Spectrophotometers are adopted littrow type with 1200lines/mm grating, UV-2800, UV-2802,UV-2802PC, UV-2802S and UV-2802PCS are Single Beam, the optical system schematic diagram are shown in 4.1. UV-3802 and UV-4802 are Split Beam and Double Beam, the optical system schematic diagram are shown in 4.2 and 4.3.

4.1 Incidence of Light

The neutral light coming from the Tungsten lamp or the Deuterium lamp is focused at the entrance slit of the monochrometer by the concave mirror.

4.2 Dispersion of Light

The light passed through the entrance slit , reflected by the collimating mirror to analytical grating. The light is spectrally dispersed by the grating and reflected collimating mirror to the exit slit.

4.3 Exit of Light

4.3.1 Exit of the Single Beam (UV-2800, UV-2802(S), UV-2802PC(S))

The light from the exit slit, through the condenser lens focused on the sample, continue pass through the sample, the light finally to the photodetector. Shown in Figure 4.1.

4.3.2 Exit of the Split Beam (UV-3802)

From the exit slit, the light was separated two path by the mirror, the main light focused on the sample after it passed though the condenser lens, continue pass through the sample, the light finally to the photodetector on the main Amplifier PCB. The slave light passed though the condenser lens to the photodetector on the Slave Amplifier PCB. Shown in Figure 4.2.

4.3.3 Exit of the Double Beam (UV-4802)

From the exit slit, the light was separated two paths by the mirror, the main light focused on the sample after it passed though the condenser lens, continue pass through the sample, the light finally to the photodetector on the main Amplifier PCB. The slave light focused on the 2nd exit slit in the slave light path, then focused on the reference after it passed though the slave condenser lens, continue pass through the reference, the light finally to the photodetector on the slave Amplifier PCB. Shown in Figure 4.3.

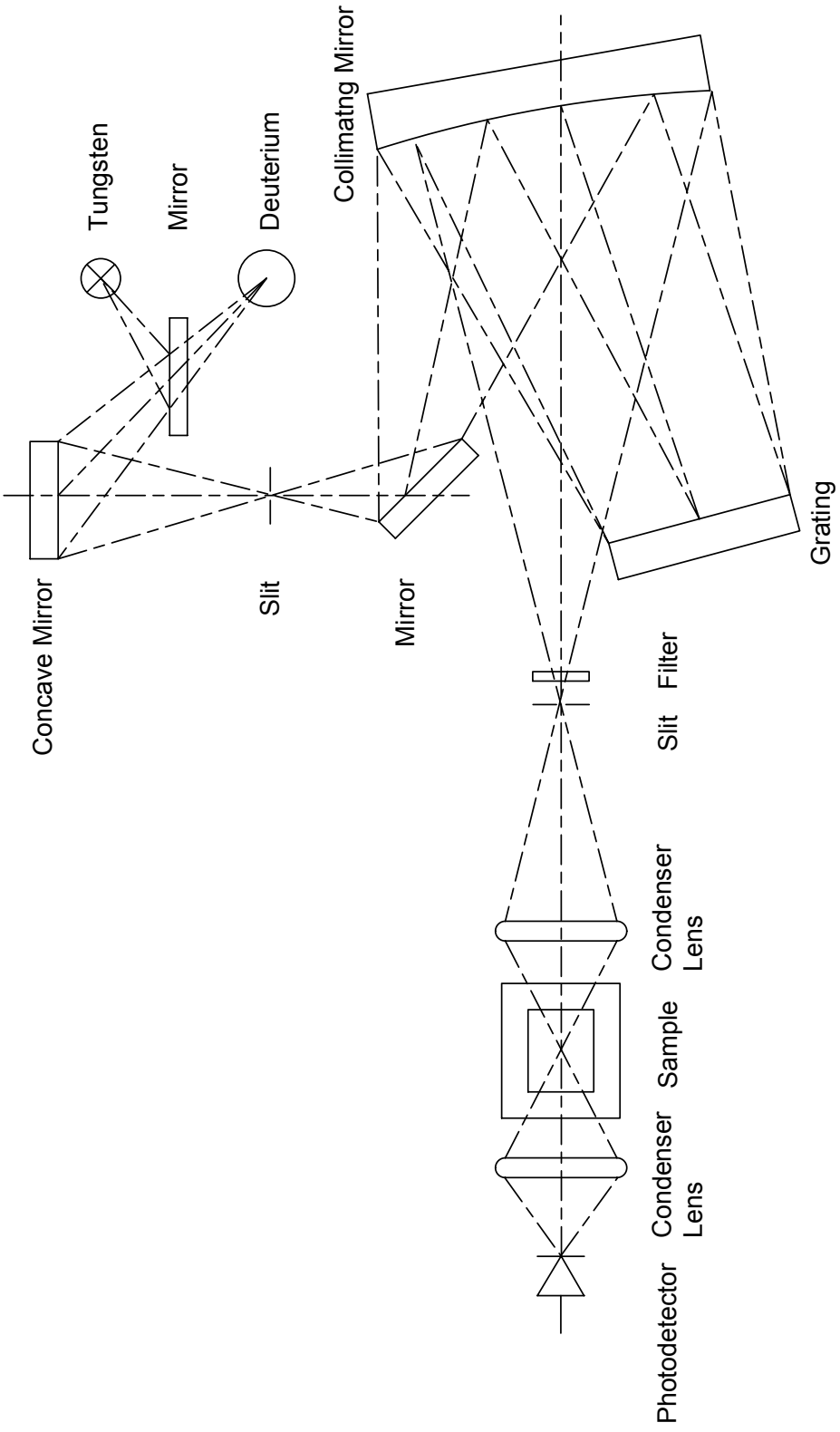


Figure 4.1 Optical System schematic diagram of UV-2800, UV-2802, UV-2802S, UV-2802PC, UV-2802PCS

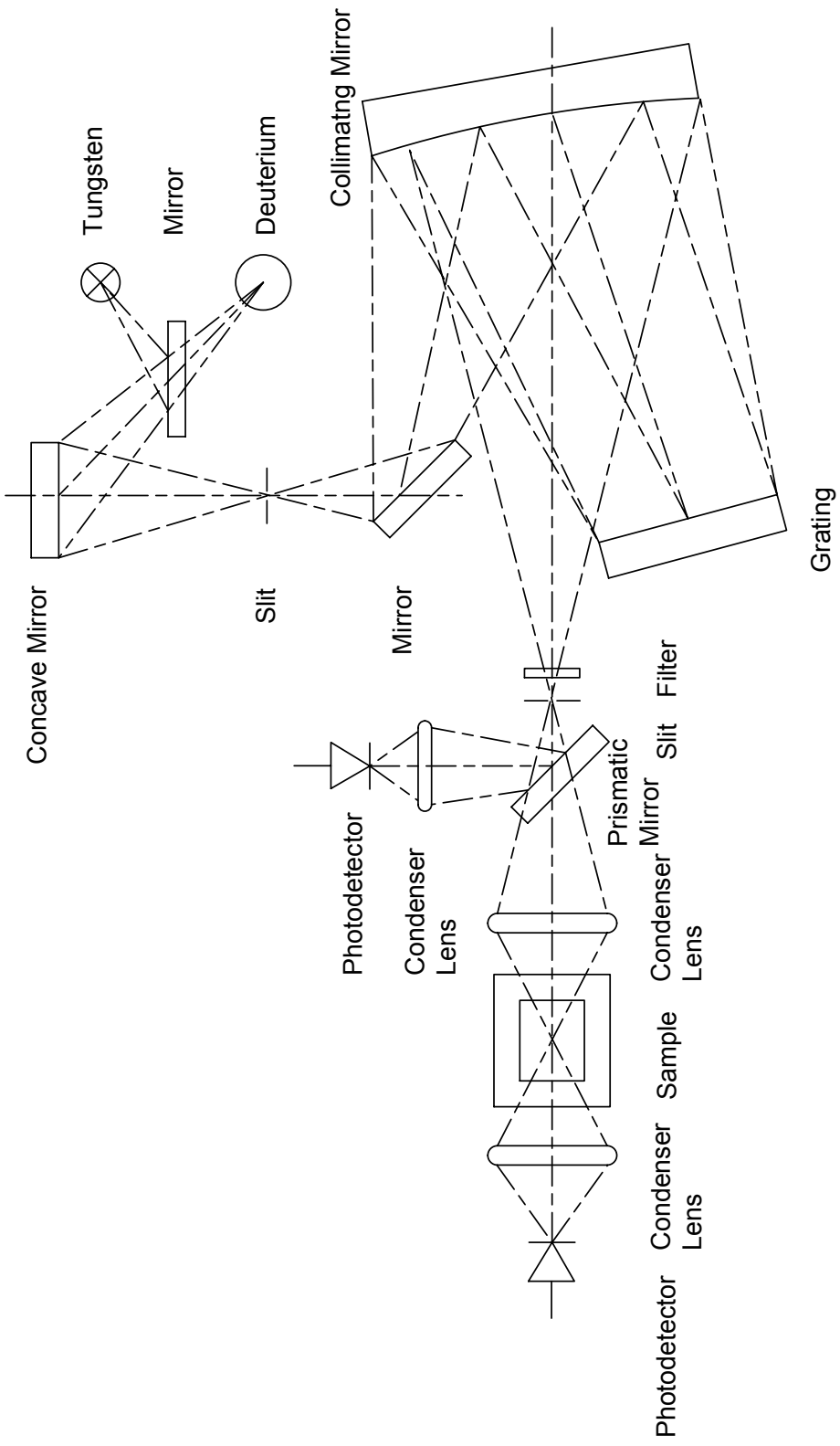


Figure 4.2 Optical System schematic diagram of UV-3802

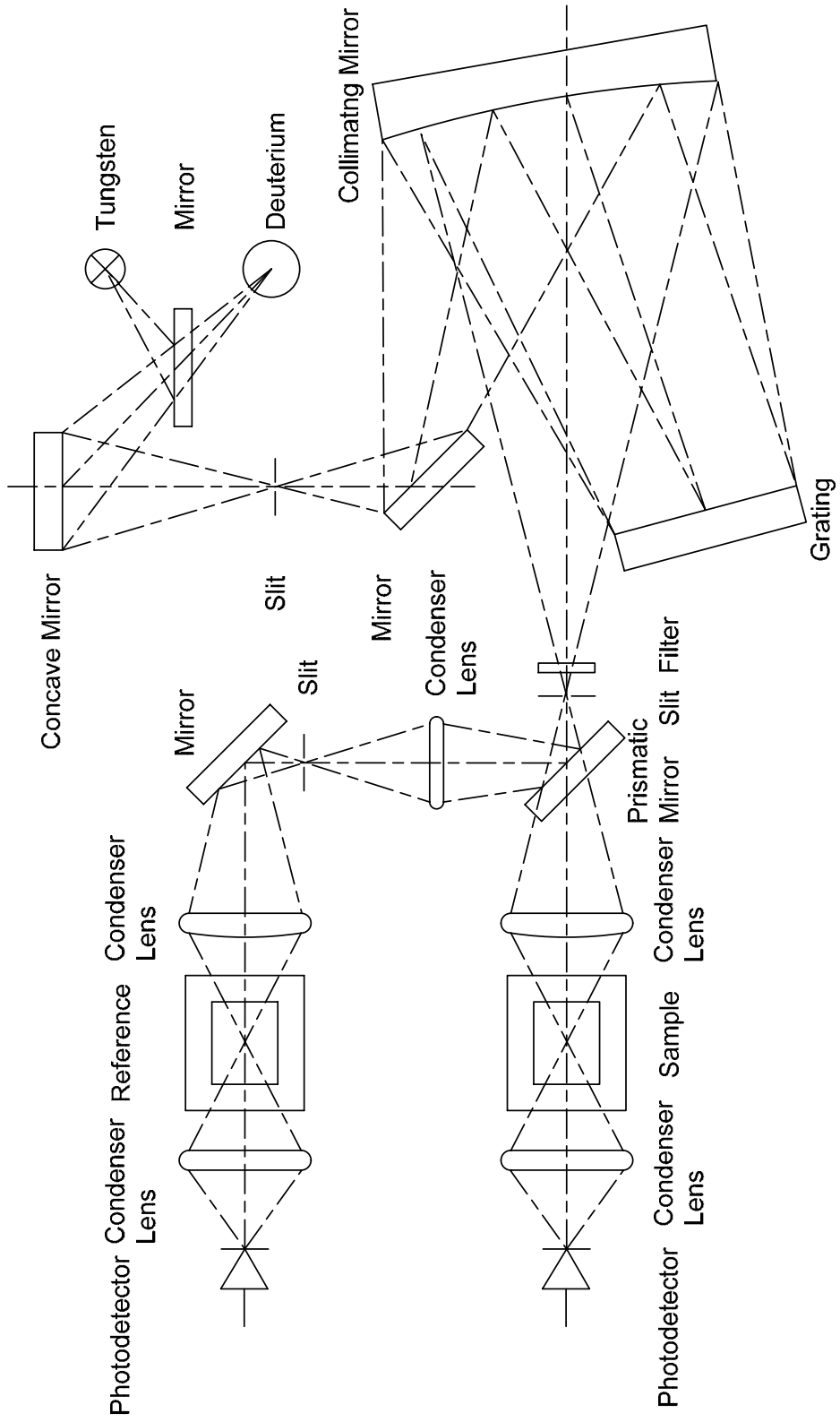


Figure 4.3 Optical System schematic diagram of UV-4802

5. Electronic System

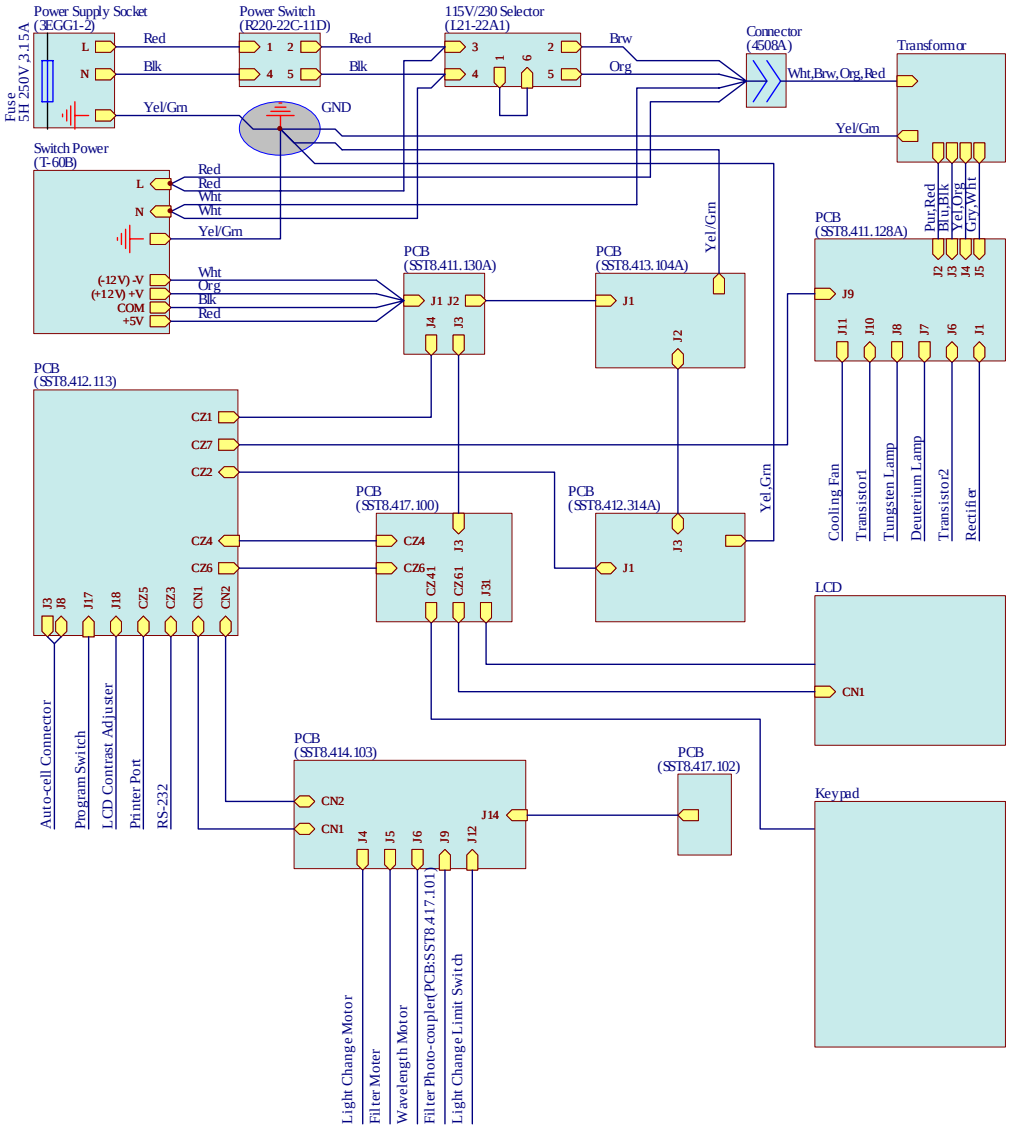


Figure 5.1 Connection of UV-2800

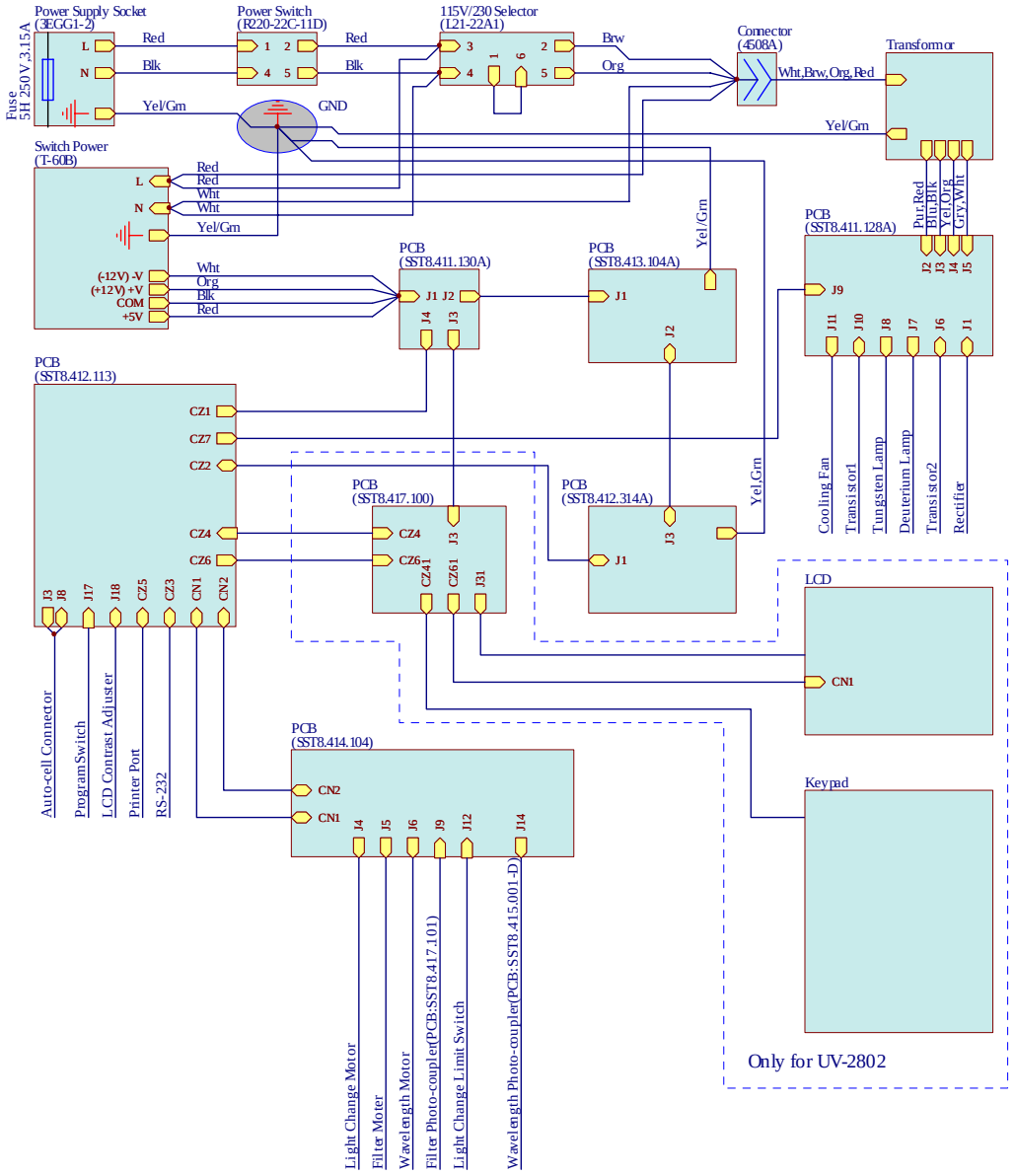


Figure 5.2 Connection of UV-2802, UV-2802PC

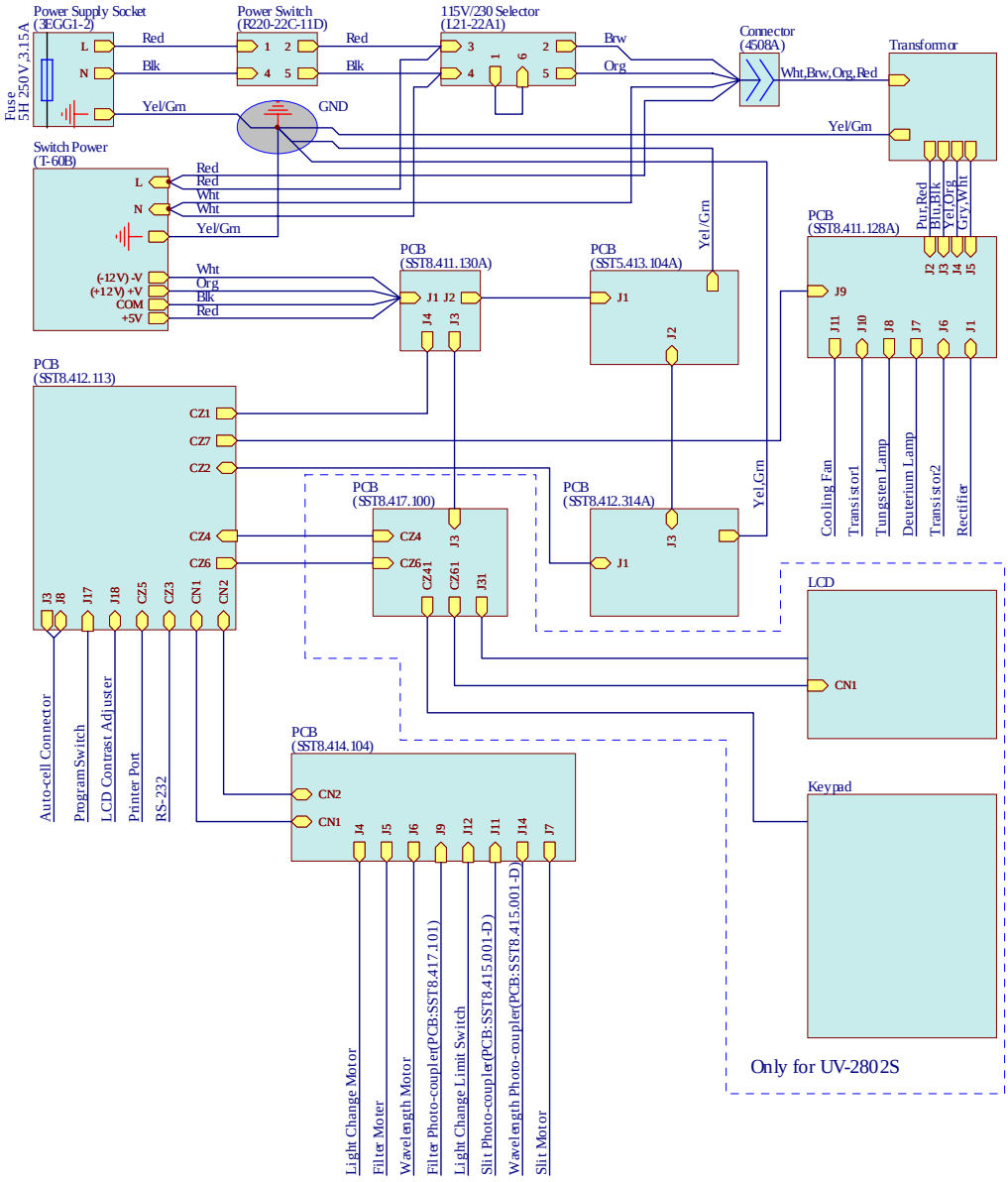


Figure 5.3 Connection of UV-2802S, UV-2802PCS

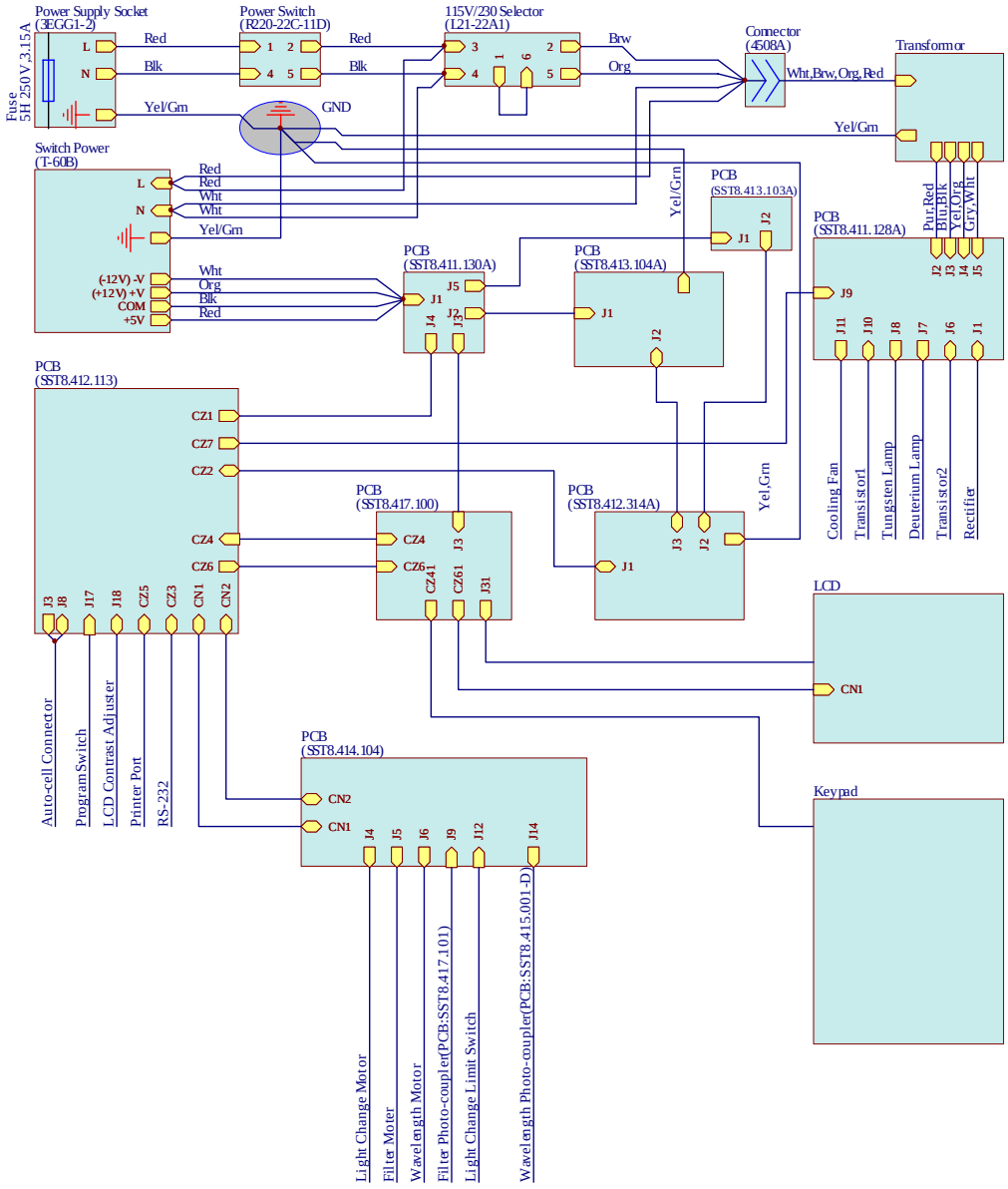


Figure 5.4 Connection of UV-3802

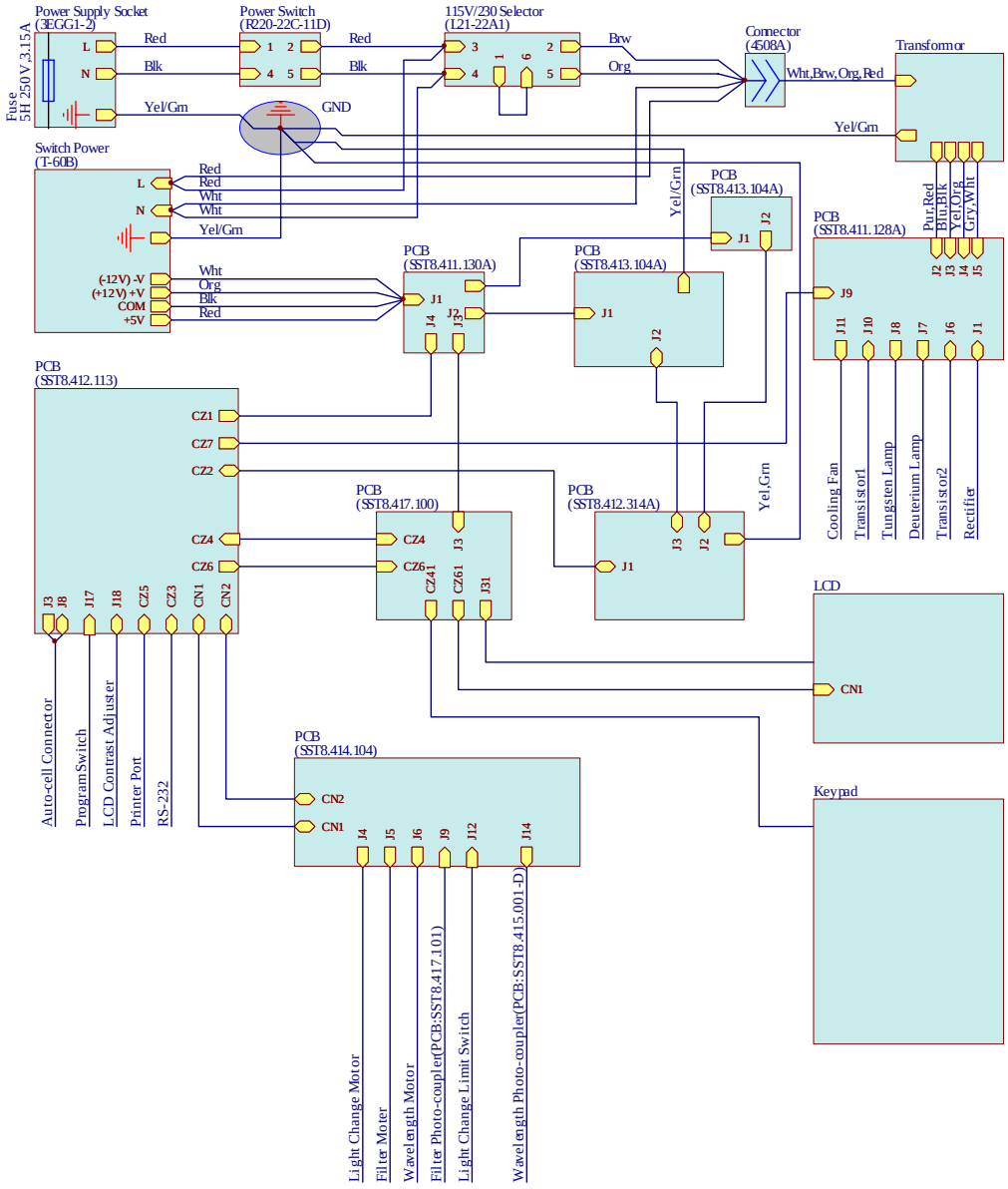


Figure 5.5 Connection of UV-4802

5.1 Power Supply System

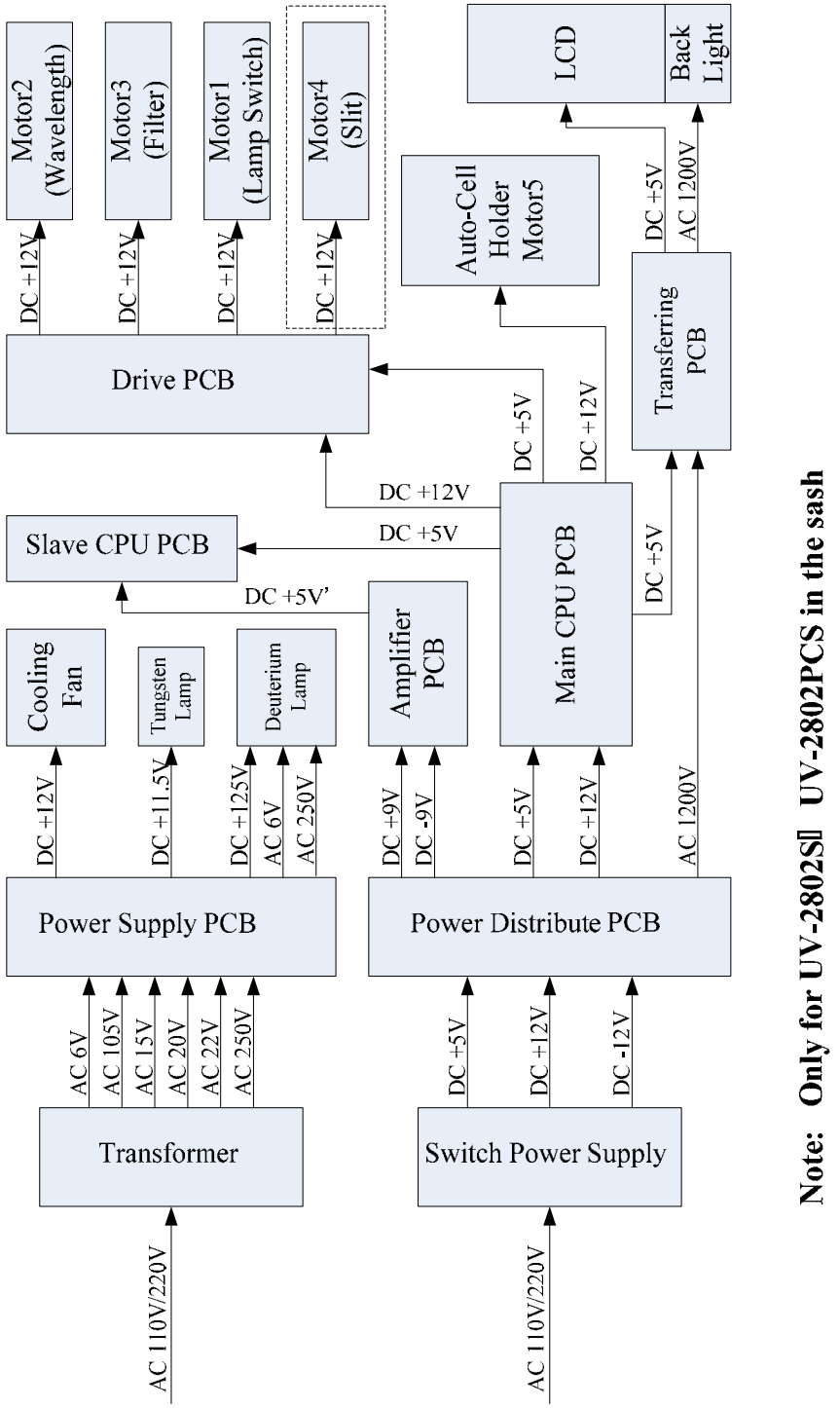


Figure 5.6 Power Supply schematic diagram of UV-2800, UV-2802, UV-2802PC, UV-2802S, UV-2802PCS

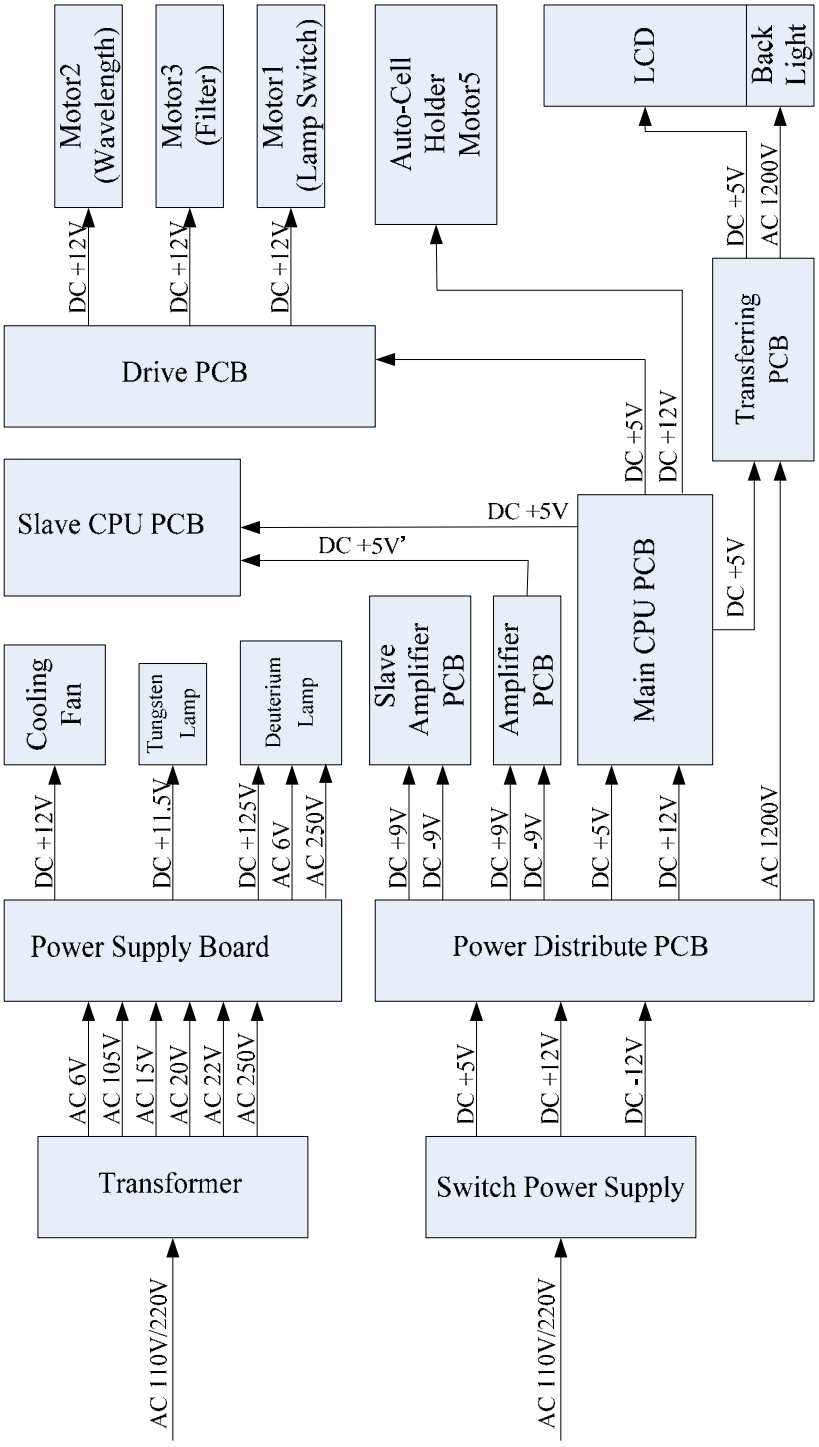


Figure 5.7 Power Supply schematic diagram of UV-3802, UV-4802

The power supply system of the SQ series are made up of two parts, the transformer supplied for the light source as Tungsten lamp and Deuterium lamp, and the Switch Power Supply supplied for the control system as CPU, Driver …,

and so on. The schematic diagrams are shown in figure 5.6 and 5.7.

5.1.1 Power Supply PCB(SST8.411.128A)

The layout of the Power Supply PCB is shown in figure 5.8

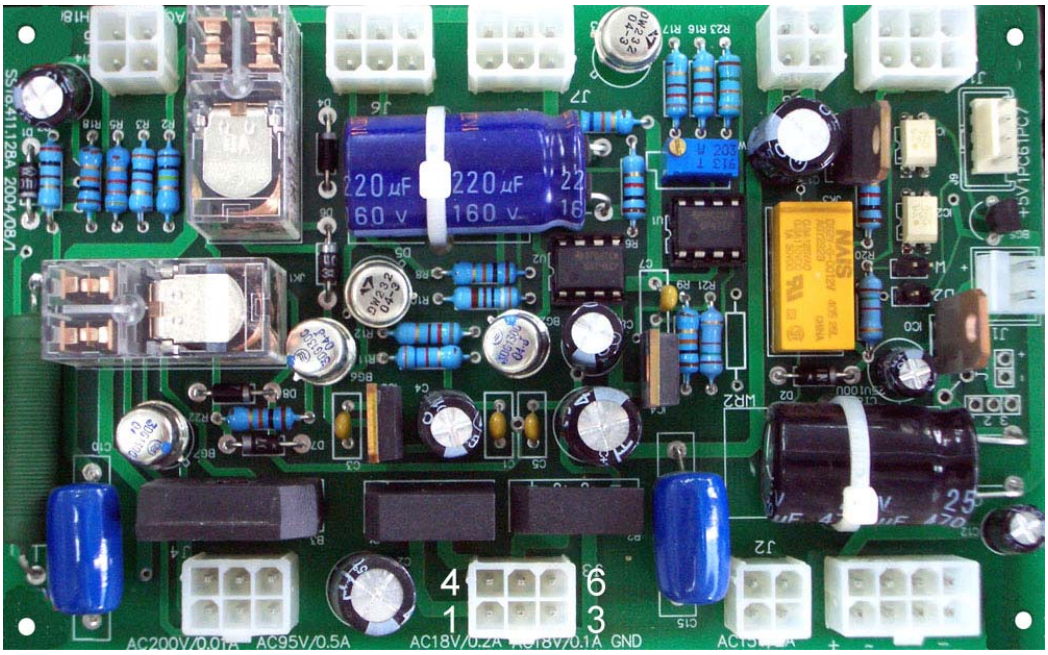


Figure 5.8 Layout of Power Supply PCB

The sockets description of the Power Supply PCB as follow:

J1---To Rectifier
- Pin 1: DC +18V
- Pin (2, 3): AC 15V

J2---From Transformer
- Pin (1, 2): AC 15V

J3---From Transformer
- Pin (1, 4): AC 18V
- Pin (2, 5): AC 18V
- Pin 3, 6: GND

J4---From Transformer
- Pin (1, 4): AC 250V
- Pin (5, 6): AC 105V

J5---From Transformer
- Pin (1, 3): AC 6V

J6---To 2SC2625 of Deuterium Lamp
- Pin 1: DC +46V
- Pin 2: DC +3.6V
- Pin 3: DC +3V

J7---To Deuterium Lamp

Pin 1: DC +118V(+131V)
Pin 2: DC +49V(+11.5V)
Pin 3: DC +49V(+11.5V)

Note: When staring the Deuterium lamp, the voltage refer in the ( ).

J8---To Tungsten Lamp
Pin 1: DC +11V
Pin 2: GND

J9---From Main CPU PCB
Pin 1, 2: DC +5V
Pin 3: DC +3.85V(+5V)
Pin 4: DC +5V(+3.85V)

Note: 1. If the voltage of pin 3 is +3.85V, the Deuterium lamps is on, or it is off.
2. If the voltage of pin 4 is +5V, the Tungsten lamps is on, or it is off.

J10---To 2SC2625 of Tungsten Lamp
Pin 1: DC +18V
Pin 2: DC +10.8V
Pin 3: DC +10.5V

J11---To Cooling Fan
Pin 1: DC +12V
Pin 2: GND

5.1.2 Power Distributing PCB(SST8.411.130A)

The layout of the Power Distributing PCB is shown in figure 5.9

Figure 5.9 Layout of Power Distributing PCB

The sockets description of the Power Distributing PCB as follow:

J1---From Switch Power Supply
Pin 1: DC -12V
Pin 2, 6, 7: DC +5V

Pin 3, 4, 5: DC +12V
Pin 8, 9, 10: GND

J2---To (Main) Amplifier PCB
Pin 1: DC +9V
Pin 2: GND
Pin 3: DC -9V

J3---To Transferring PCB(In Upper Case)
Pin (1, 3): AC 1200V

J4---To Main CPU PCB
Pin 1, 2: DC +12V
Pin 3, 4: GND
Pin 5, 6: DC +5V

J5---To Slave Amplifier PCB
Pin 1: DC +9V
Pin 2: GND
Pin 3: DC -9V

5.2 Control and Drive System

The working principle as follow (shown in figure 5.10, 5.11 and 5.12):

1. User setup the “Test Parameters” by operating the Keypad. The main CPU (on “Main CPU PCB”) command the motor to goto the setup wavelength, select the correct light source and filter;
2. Halogen or deuterium lamp to supply the light, the Monochromator to isolate the wavelength of interest and eliminate the unwanted second order radiation, the sample compartment to accommodate the sample solution;
3. The detector to receive the transmitted light and convert it to an electrical signal, the slave CPU (on “Slave CPU PCB”) control to amplifier the electrical signal and convert it to be digital signal, send it to main CPU;
4. The main CPU gets the digital signal, process and outputs the results (display, print or send to PC, and so on).

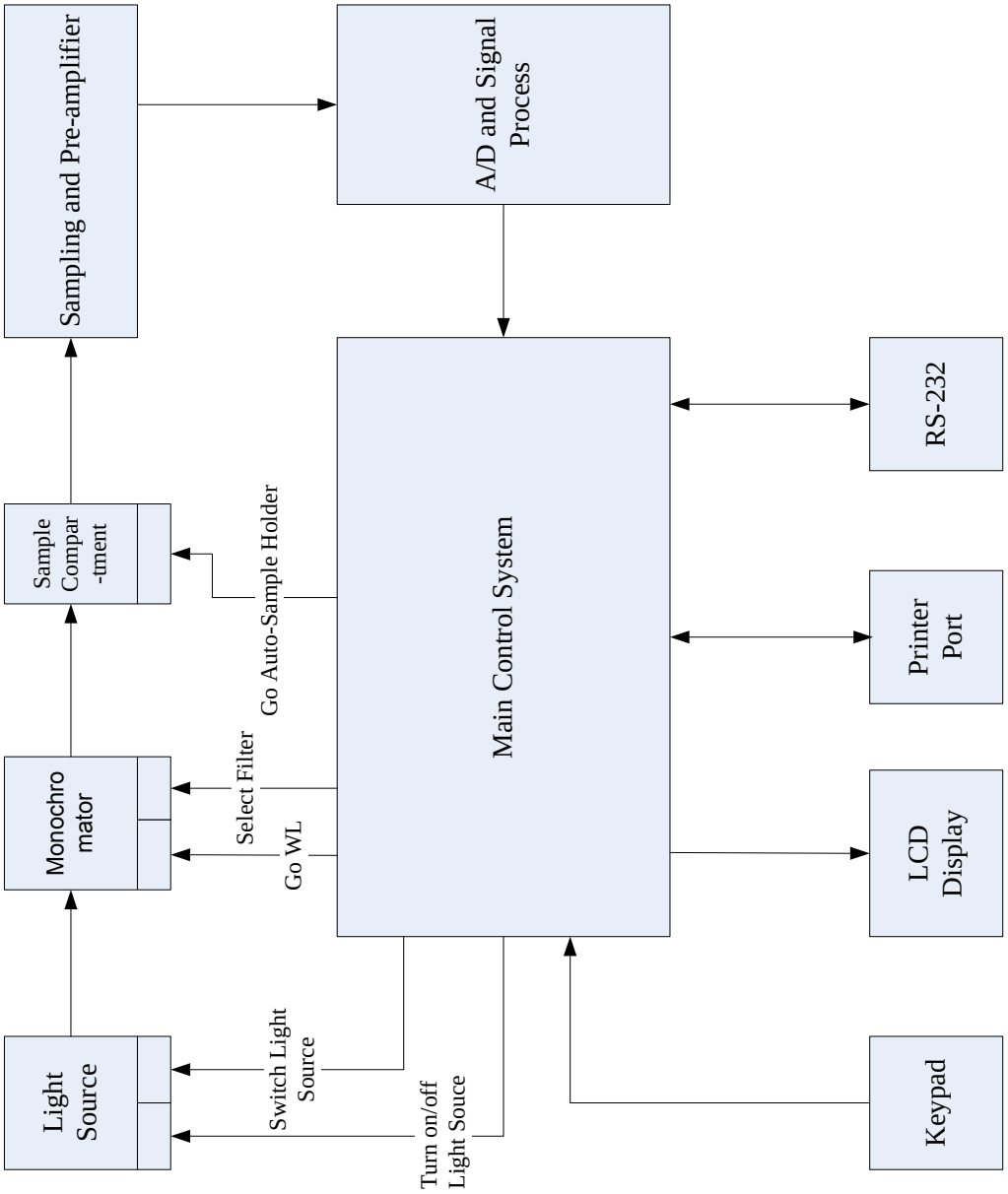


Figure 5.10 Working Principle of UV-2800, UV-2802(S)

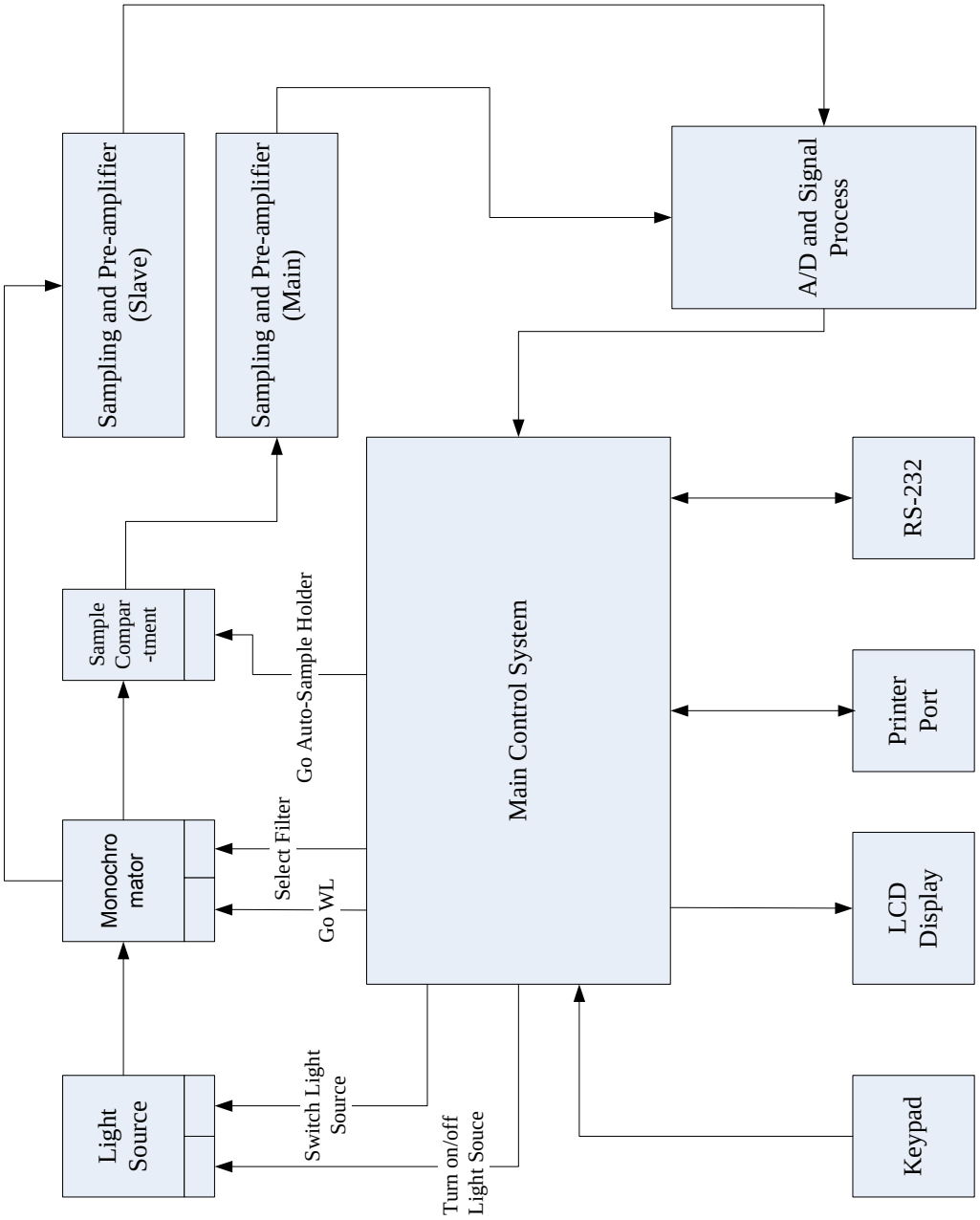


Figure 5.11 Working Principle of UV-3802

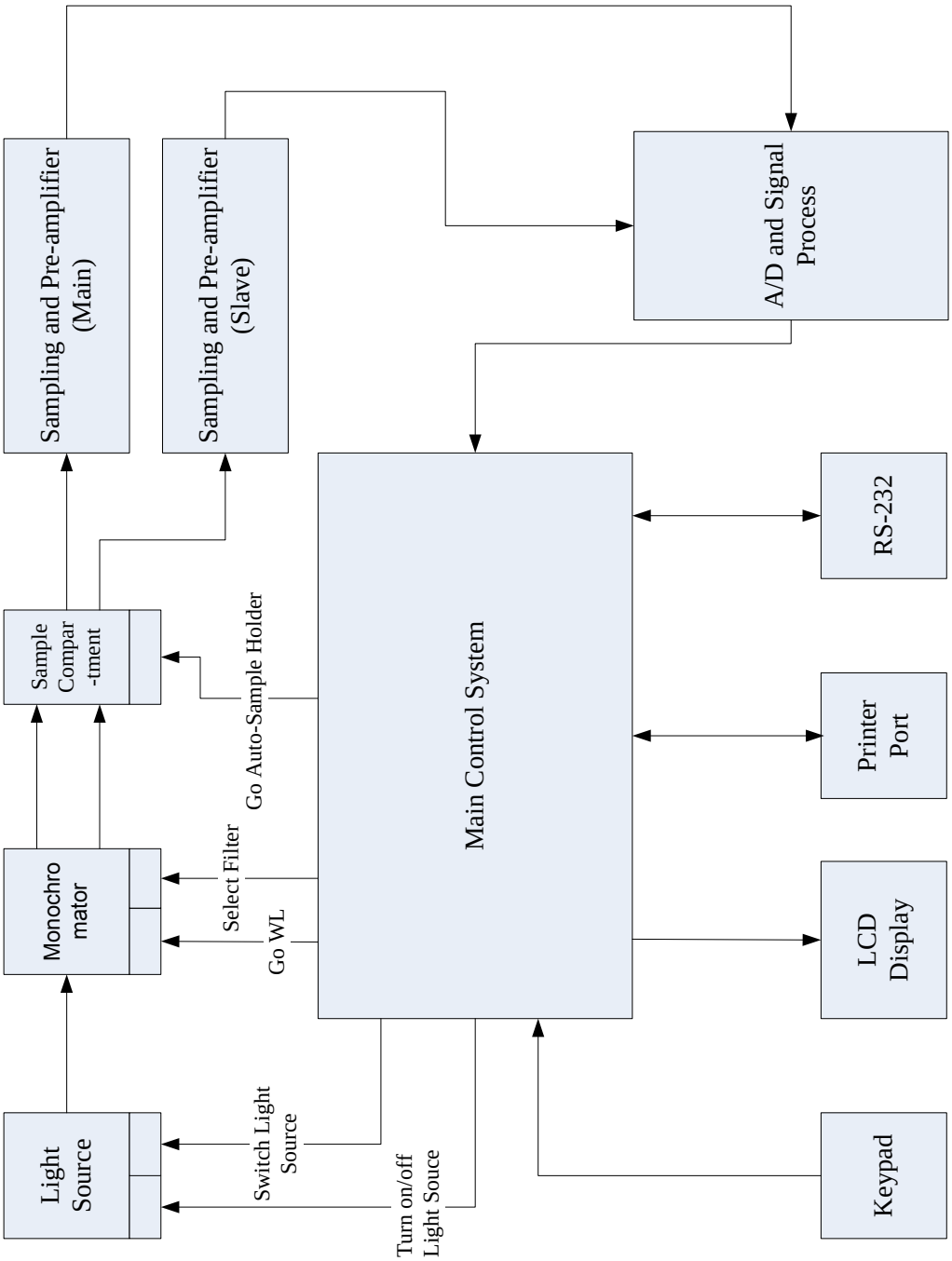


Figure 5.12 Working Principle of UV-4802

5.2.1 Main CPU PCB(SST8.412.113)

The layout of the main CPU PCB is shown in figure 5.13

Figure 5.13 Layout of Main CPU PCB

The sockets description of the main CPU PCB as follow:

CZ1---From Power Distributing PCB

Pin 1, 2: DC +12V
Pin 3, 4: GND
Pin 5, 6: DC +5V

CZ2---To Slave CPU PCB

Pin 1: Reset W78E52B on Slave CPU PCB
Pin 2: Transfer signal to W78E52B on Slave CPU PCB
Pin 3: Receive signal from W78E52B on Slave CPU PCB
Pin 4: GND
Pin 5: DC +5V

CZ3---To RS-232 Port

Pin 1: GND
Pin 2: Transfer signal
Pin 3: Receive signal

CZ4---To Transferring PCB(In Upper Case)

Pin 1-8: Output to signal Keypad
Pin 9-12: Input signal from Keypad

CZ5---To Printer Port

Pin 1: Pulse for read the data for printer
Pin 2-9: Data bus
Pin 10: Error detect. +5V indicate the printer is OK
Pin 11: Busy detect. +5V indicate the printer is busy
Pin 12: Reset the printer
Pin 15,16: GND

CZ6---To Transferring PCB(In Upper Case)

Pin 1-4, 13: Control signal of LCD
Pin 5: DC +5V- -20.5V, contrast adjust
Pin 6: DC +5V
Pin 7: GND
Pin 8: DC -20.5V
Pin 9-12: Data bus

CZ7---To Power Supply PCB

Pin 1: DC +5V(+3.85V). +5V: Tungsten lamps is on
Pin 2: DC +3.85V(+5V). +3.85V Deuterium lamps is on
Pin 3, 4: DC +5V

J3---To Auto-cell Connector

Pin 1-4: Drive auto-sample Holder step motor
Pin 5: DC +12V

J8---To Auto-cell Connector

Pin 1,2: DC +5V(0V)
Pin 3: DC +12V
Pin 4,5,6: DC +5V

Pin 7: GND

J17---To Program Switch for Software Update

Pin 1: DC +5V (0V). +5V: instrument is working on “Test Mode”, or it working on “Program Mode”.

Pin 2: GND

J18---To Contrast Adjustor

Pin 1: DC -20.5V

Pin 2: DC +5V- -20.5V, contrast adjust

Pin 3: DC +5V

CN1---To Drive PCB

Pin 1-4: Control slit step motor

Pin 5: Slit Photo-coupler signal

Pin 6: Wavelength Photo-coupler and limit switch signal

Pin 7: Filter Photo-coupler signal

Pin 8: Lamp limit switch signal

Pin 9,11,13,15: GND

Pin 10,12,14,16: DC +12V

CN2---To Drive PCB

Pin 1: GND

Pin 2: DC +5V

Pin 3-6: Control wavelength step motor

Pin 7-10: Control filter step motor

Pin 11-14: Control lamp Change step motor

5.2.2 Drive PCB(SST8.414.103 or SST8.414.104)

The layout of the Drive PCB is shown in figure 5.14, 5.15 and 5.16

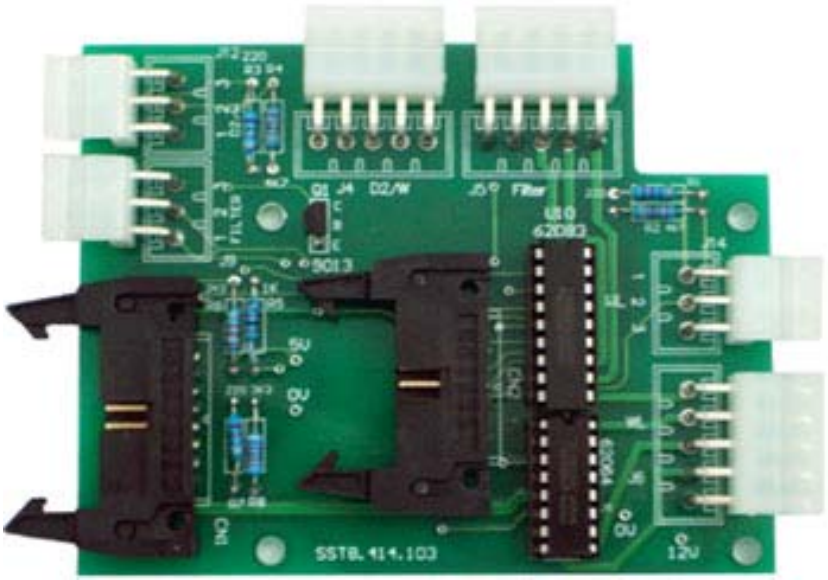


Figure 5.14 Layout of UV-2800 Drive PCB

Figure 5.15 Layout of UV-2802S,UV-2802PCS Drive PCB

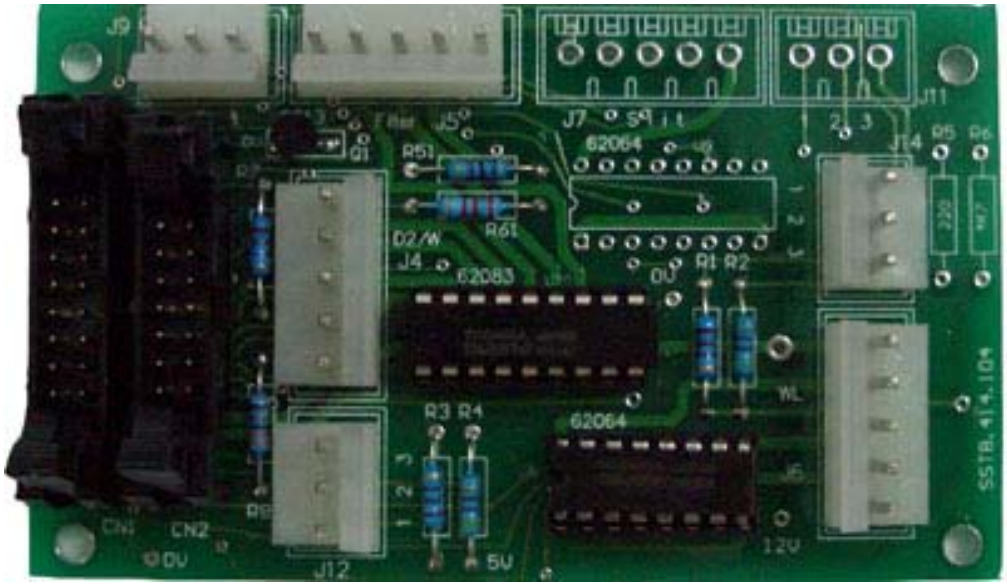


Figure 5.16 Layout of UV-2802, UV-2802PC, UV-3802, UV-4802 Drive PCB

The sockets description of the Drive PCB as follow:

CN1---From Main CPU PCB

Pin 1-4:	Control slit step motor
Pin 5:	Slit Photo-coupler signal
Pin 6:	Wavelength Photo-coupler and limit switch signal
Pin 7:	Filter Photo-coupler signal
Pin 8:	Lamp limit switch signal

Pin 9,11,13,15: GND
Pin 10,12,14,16: DC +12V

CN2--- From Main CPU PCB
Pin 1: GND
Pin 2: DC +5V
Pin 3-6: Control wavelength step motor
Pin 7-10: Control filter step motor
Pin 11-14: Control lamp Change step motor

J4---To lamp Change step motor
Pin 1-4: Drive slit step motor
Pin 5: DC +12V

J5---To filter step motor
Pin 1-4: Drive filter step motor
Pin 5: DC +12V

J6---To wavelength step motor
Pin 1-4: Drive wavelength step motor
Pin 5: DC +12V

J7---To slit step motor
Pin 1-4: Drive slit step motor
Pin 5: DC +12V

J9---To filter Photo-coupler
Pin 1: GND
Pin 2: DC +5V (0V). 0V: only at initiative position
Pin 3: DC +1.2V

J11---To slit Photo-coupler
Pin 1: GND
Pin 2: DC 0V (+5V). +5V: only at initiative position
Pin 3: DC +1.2V

J12---To lamp limit switch
Pin 1: GND
Pin 2: DC +5V (0V). 0V: only at initiative position
Pin 3: DC +5V

J14---To wavelength Photo-coupler and limit switch
Pin 1: GND
Pin 2: DC 0V (+5V). +5V: when the mobile block at start or end point
Pin 3: DC +5V

5.2.3 Transferring PCB(In Upper Case)(SST8.417.100)

The layout of the Transferring PCB(In Upper Case) is shown in figure 5.17

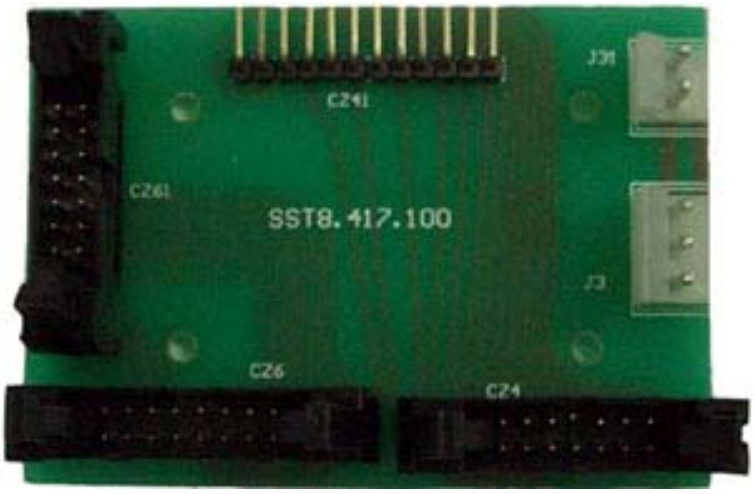


Figure 5.17 Layout of Transferring PCB(In Upper Case)

The sockets description of the Transferring PCB(In Upper Case) as follow:

J3---From Power Distributing PCB

Pin (1, 3): AC 1200V

J31---To LCD back light

Pin (1, 2): AC 1200V

CZ4---From Main CPU PCB

Pin 1-8: Output signal to Keypad

Pin 9-12: Input signal from Keypad

CZ41---To keypad

Pin 1-8: Output signal to Keypad

Pin 9-12: Input signal from Keypad

CZ6--- From Main CPU PCB

Pin 1-4, 13: Control signal of LCD

Pin 5: DC +5V- -20.5V, contrast adjust

Pin 6: DC +5V

Pin 7: GND

Pin 8: DC -20.5V

Pin 9-12: Data bus

CZ61--- To LCD Display(320X240)

Pin 1-4, 13: Control signal of LCD

Pin 5: DC +5V- -20.5V, contrast adjust

Pin 6: DC +5V

Pin 7: GND

Pin 8: DC -20.5V

Pin 9-12: Data bus

5.3 Sampling and Signal Processing System

The working principle as follow:

1. The photo-detector receives the light signal, converts it to be electrical signal (analog signal);
2. Amplifier the analog signal, the multiple is control by the CPU on the Slave CPU PCB (W78E52B);
3. The A/D converts analog signal to be digital signal;
4. The Slave CPU send the digital signal to the main CPU.

5.3.1 Amplifier PCB(SST8.413.104A)

The layout of the Amplifier PCB of UV-2800, UV-2802, UV-2802PC, UV-2802S and UV-2802PCS (R17—R20 of UV-2802S and UV-2802PCS are different from others) is shown in figure 5.18, UV-4802 is shown in figure 5.19:

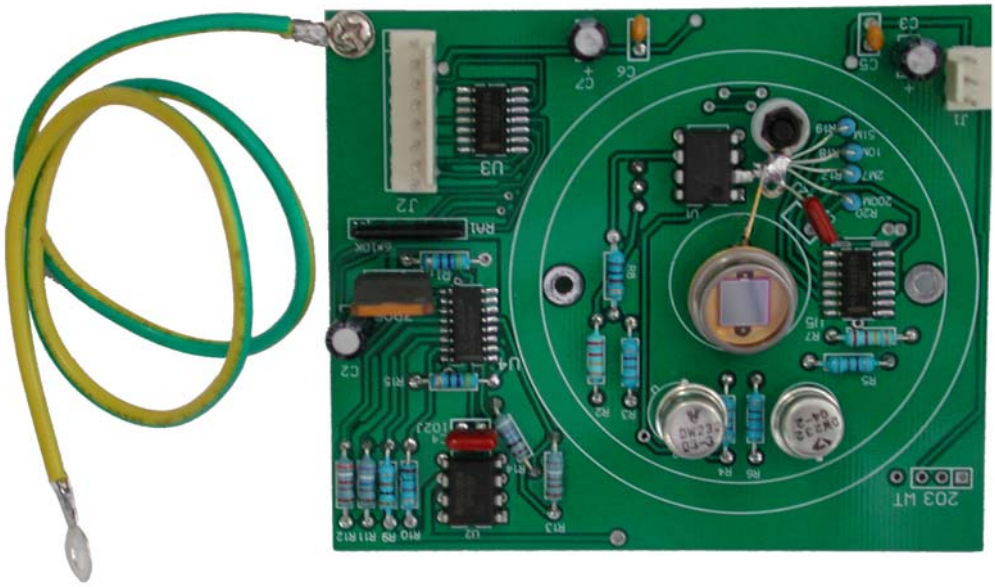


Figure 5.18 Layout of UV-2800, UV-2802, UV-2802S, UV-2802PC, UV-2802PCS, UV-3802 Amplifier PCB

The sockets description of the Amplifier PCB of UV-2800, UV-2802(S), UV-3802 as follow:

J1---From Power Distributing PCB

Pin 1: DC +9V

Pin 2: GND

Pin 3: DC -9V

J2---From Slave CPU PCB

Pin 1: GND
Pin 2: Analog signal from pin 6 of OP07
Pin 8: DC +5V
Pin 3-7: Control amplifier multiple from Slave CPU PCB

The amplifier multiple of UV-2800, UV-2802(S) Amplifier PCB as follow:

Amplifier multiple	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
0	0	0	0	0	0
1	0	1	0	0	0
2	1	0	0	0	0
3	1	1	0	0	0
4	1	1	0	0	1
5	1	1	0	1	0
6	1	1	0	1	1
7	1	1	1	0	0
8	1	1	1	0	1
9	1	1	1	1	0
10	1	1	1	1	1

Note: 1. 0: Logic low (0V) 1: Logic high (+5V)

The amplifier multiple of UV-3802 Amplifier PCB as follow:

Amplifier multiple	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
0	1	1	0	0	0
1	1	1	0	0	1
2	1	1	0	1	0
3	1	1	0	1	1
4	1	1	1	0	0
5	1	1	1	0	1
6	1	1	1	1	0
7	1	1	1	1	1
8	1	1	1	1	1
9	1	1	1	1	1
10	1	1	1	1	1

Note: 1. 0: Logic low (0V) 1: Logic high (+5V)

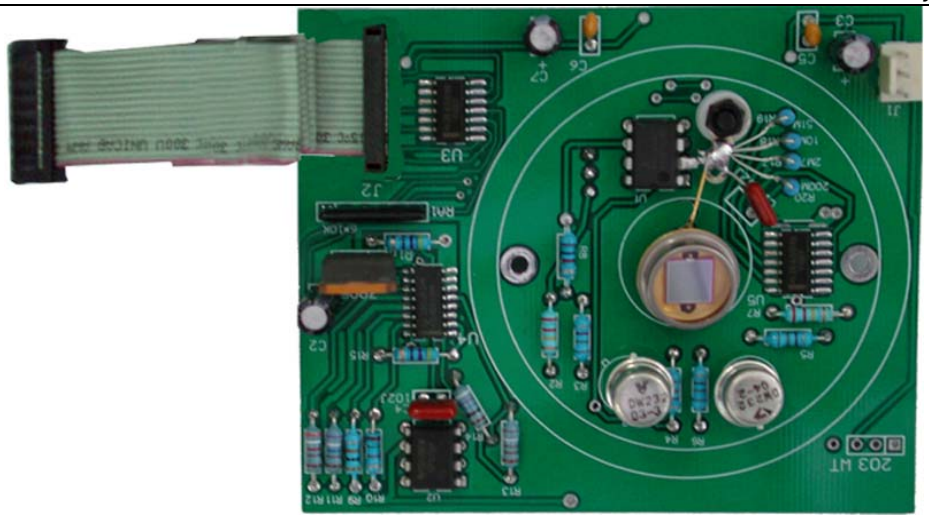


Figure 5.19 Layout of UV-4802 Amplifier PCB

The sockets description of the Amplifier PCB of UV-4802 as follow:

J1---From Power Distributing PCB

Pin 1:	DC +9V
Pin 2:	GND
Pin 3:	DC -9V

J2---From Slave CPU PCB

Pin 1,2,3,5,7,9,11,13,15:	GND
Pin 4:	Analog signal from pin 6 of OP07
Pin 16:	DC +5V
Pin 6,8,10,12,14:	Control amplifier multiple from Slave CPU PCB

The amplifier multiple of UV-4802 Amplifier PCB as follow:

Amplifier multiple	Pin 6	Pin 8	Pin 10	Pin 12	Pin 14
0	1	1	0	0	0
1	1	1	0	0	1
2	1	1	0	1	0
3	1	1	0	1	1
4	1	1	1	0	0
5	1	1	1	0	1
6	1	1	1	1	0
7	1	1	1	1	1
8	1	1	1	1	1
9	1	1	1	1	1
10	1	1	1	1	1

Note: 1. 0: Logic low (0V) 1: Logic high (+5V)

5.3.2 Slave Amplifier PCB(SST8.413.103A or SST8.413.104A)

Figure 5.20 Layout of UV-3802 Slave Amplifier PCB

The sockets description of the slave Amplifier PCB of UV-3802 as follow:

J1---From Power Distributing PCB

Pin 1: DC +9V

Pin 2: GND

Pin 3: DC -9V

J2---From Slave CPU PCB

Pin 1: GND

Pin 2: DC +5V

Pin 3, 4: Control amplifier multiple from Slave CPU PCB

The amplifier multiple of UV-3802 slave Amplifier PCB as follow:

Amplifier	Pin 3	Pin 4
1	0	0
2	0	1
3	1	0
4	1	1

Note: 1. 0: Logic low (0V) 1: Logic high (+5V)

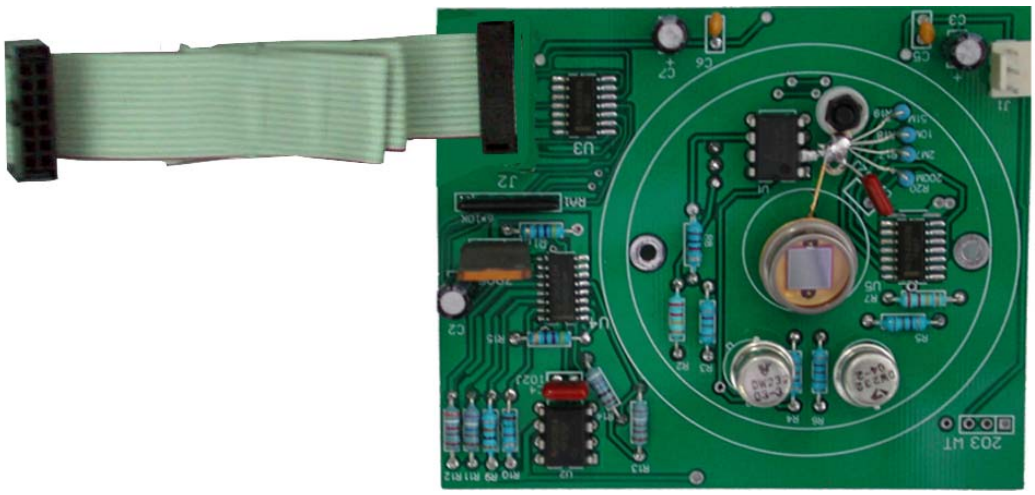


Figure 5.21 Layout of UV-4802 Slave Amplifier PCB

The sockets description of the slave Amplifier PCB of UV-4802 as follow:

Pin 1: DC +9V
Pin 2: GND
Pin 3: DC -9V

J2---From Slave CPU PCB

Pin 1,2,3,5,7,9,11,13: GND
Pin 4: Analog signal from pin 6 of OP07
Pin 6,8,10,12,14: Control amplifier multiple from Slave CPU PCB

The amplifier multiple of UV-4802 slave Amplifier PCB as follow:

Amplifier multiple	Pin 6	Pin 8	Pin 10	Pin 12	Pin 14
0	1	1	0	0	0
1	1	1	0	0	1
2	1	1	0	1	0
3	1	1	0	1	1
4	1	1	1	0	0
5	1	1	1	0	1
6	1	1	1	1	0
7	1	1	1	1	1
8	1	1	1	1	1
9	1	1	1	1	1
10	1	1	1	1	1

Note: 1. 0: Logic low (0V) 1: Logic high (+5V)

5.3.3 Slave CPU PCB(SST8.412.314)

The layout of the slave CPU PCB is shown in figure 5.22, 5.23, 5.24.

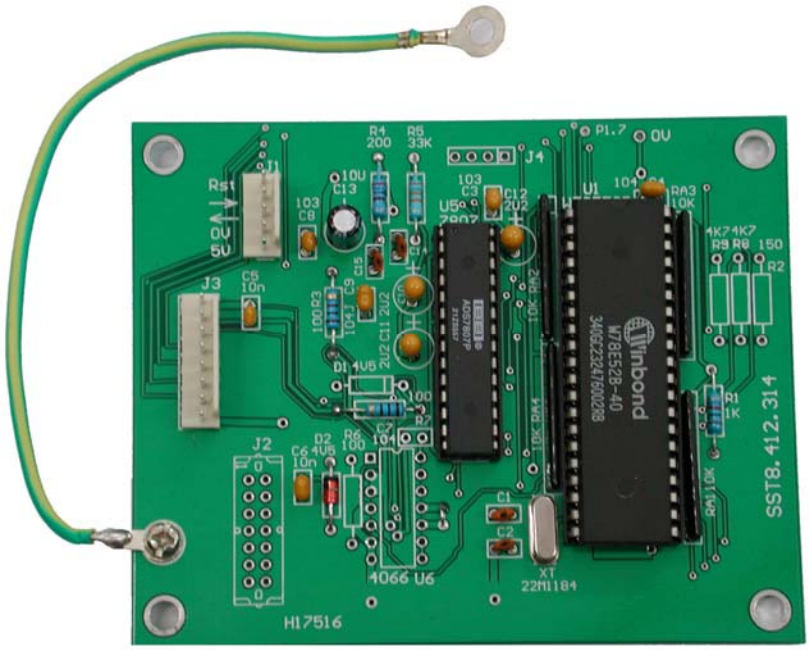


Figure 5.22 Layout of UV-2800, UV-2802(S) Slave CPU PCB

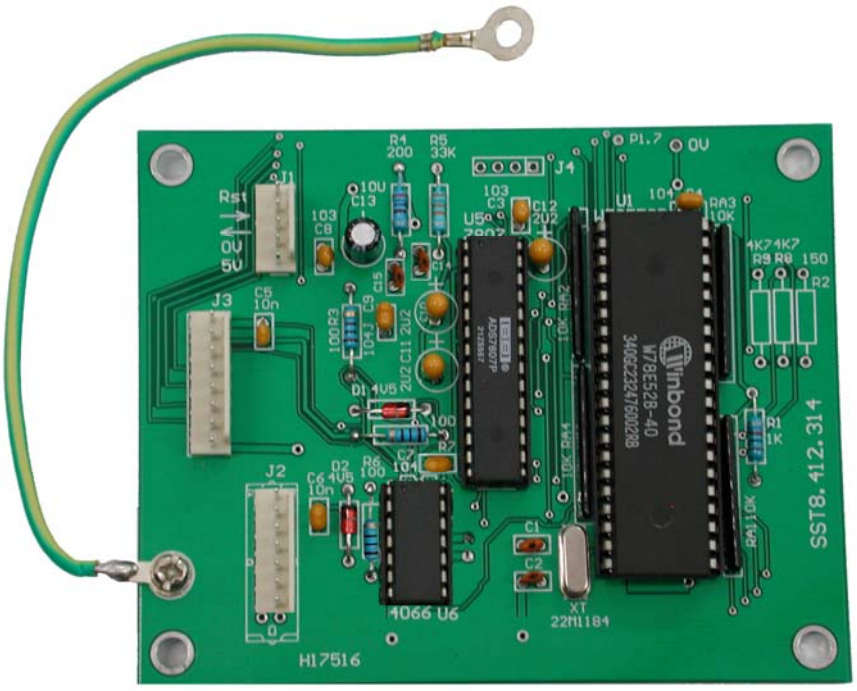


Figure 5.23 Layout of UV-3802 Slave CPU PCB

The sockets description of the slave CPU PCB of UV-2800, UV-2802(S), UV-3802 as follow:

J1---From Main CPU PCB

Pin 1: Reset W78E52B
Pin 2: Receive signal from W77E58 on Main CPU PCB
Pin 3: Transfer signal to W77E58 on Main CPU PCB
Pin 4: GND
Pin 5: DC +5V

J2---To Slave Amplifier PCB

Pin 1: GND
Pin 2: Analog signal from pin 6 of OP07
Pin 3,4: Control amplifier multiple of Slave Amplifier PCB

J3---To Amplifier PCB

Pin 1: GND
Pin 2: Analog signal from pin 6 of OP07
Pin 8: DC +5V
Pin 3-7: Control amplifier multiple of Amplifier PCB

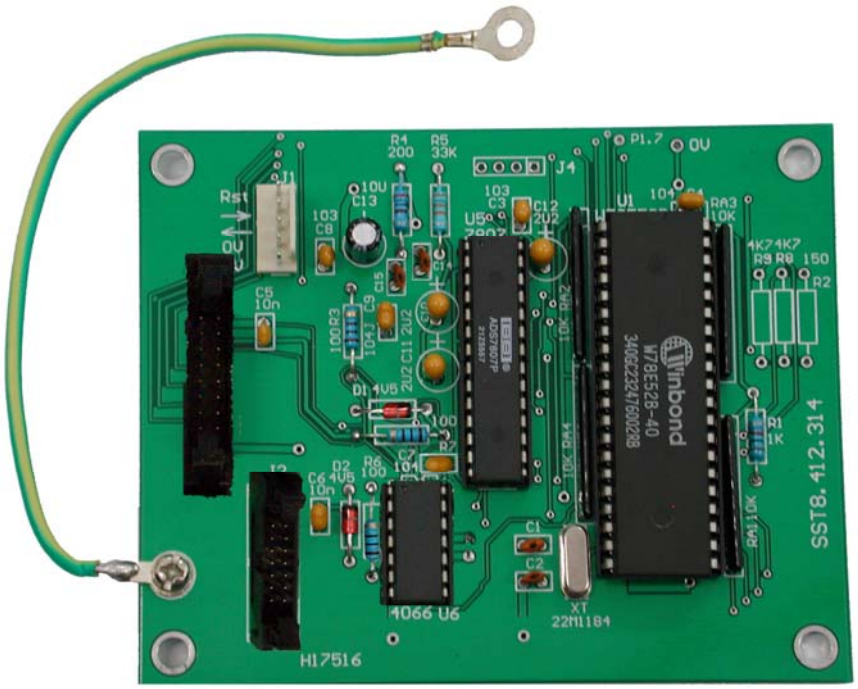


Figure 5.24 Layout of UV-4802 Slave CPU PCB

The sockets description of the slave CPU PCB of UV-4802 as follow:

J1---From Main CPU PCB

Pin 1: Reset W78E52B
Pin 2: Receive signal from W77E58 on Main CPU PCB
Pin 3: Transfer signal to W77E58 on Main CPU PCB

Pin 4: GND

Pin 5: DC +5V

J2-- To Slave Amplifier PCB

Pin 1,2,3,5,7,9,11,13: GND

Pin 4: Analog signal from pin 6 of OP07

Pin 6,8,10,12,14: Control amplifier multiple of Slave Amplifier PCB

J3--- To Amplifier PCB

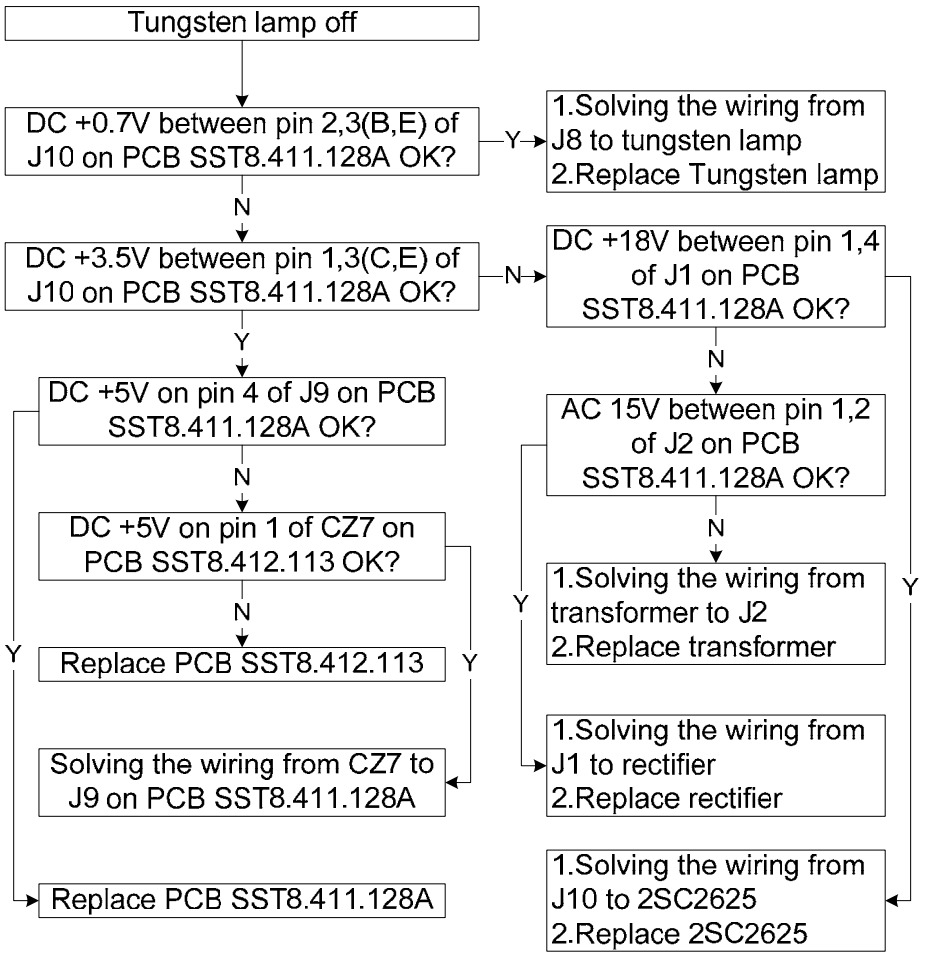
Pin 1,2,3,5,7,9,11,13,15: GND

Pin 4: Analog signal from pin 6 of OP07

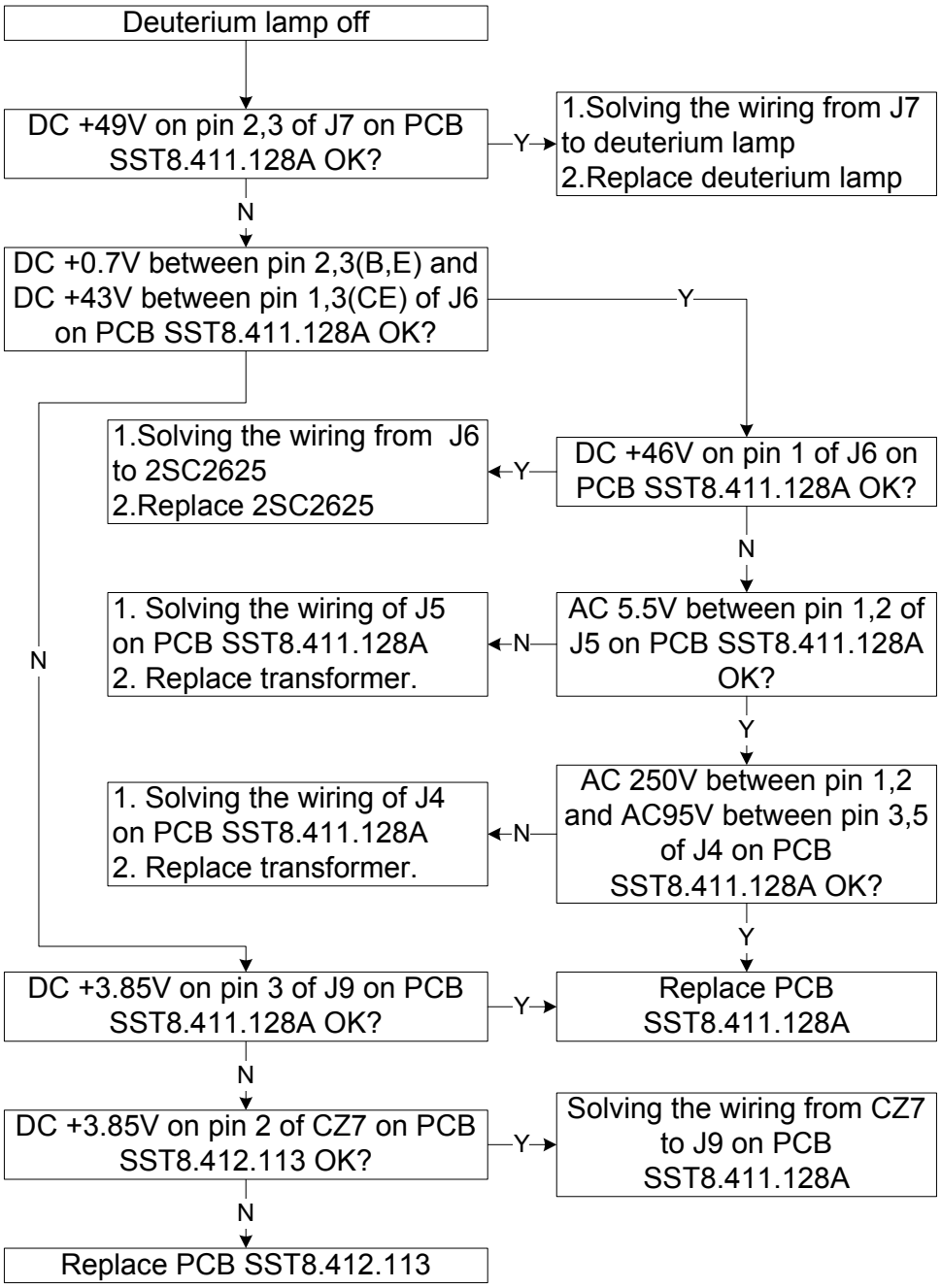
Pin 6,8,10,12,14,16: Control amplifier multiple of Slave Amplifier PCB

6. Trouble Shooting

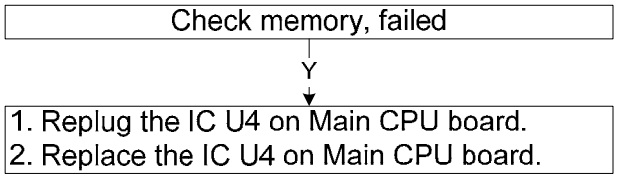
6.1 Tungsten lamp off



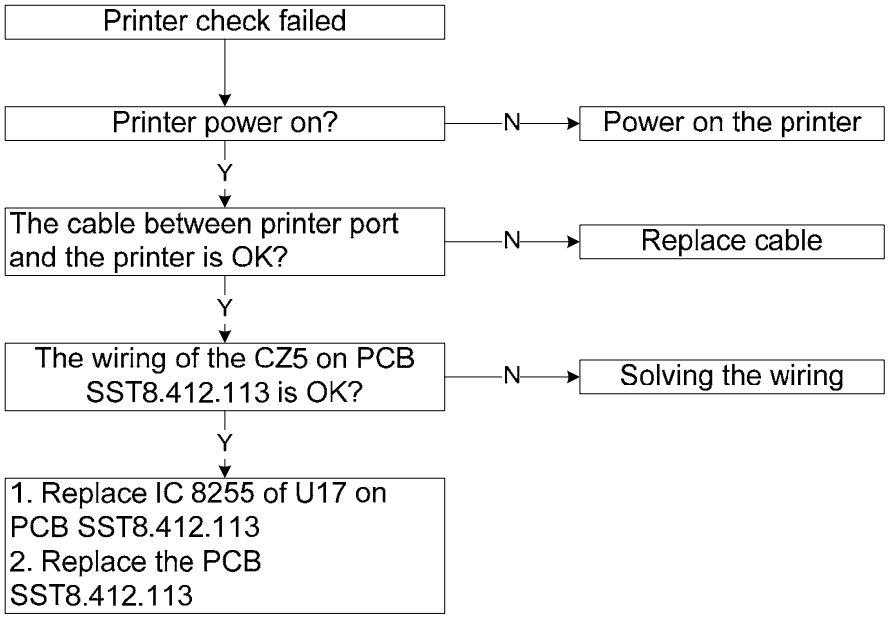
6.2 Deuterium lamp off



6.3 Memory check failed

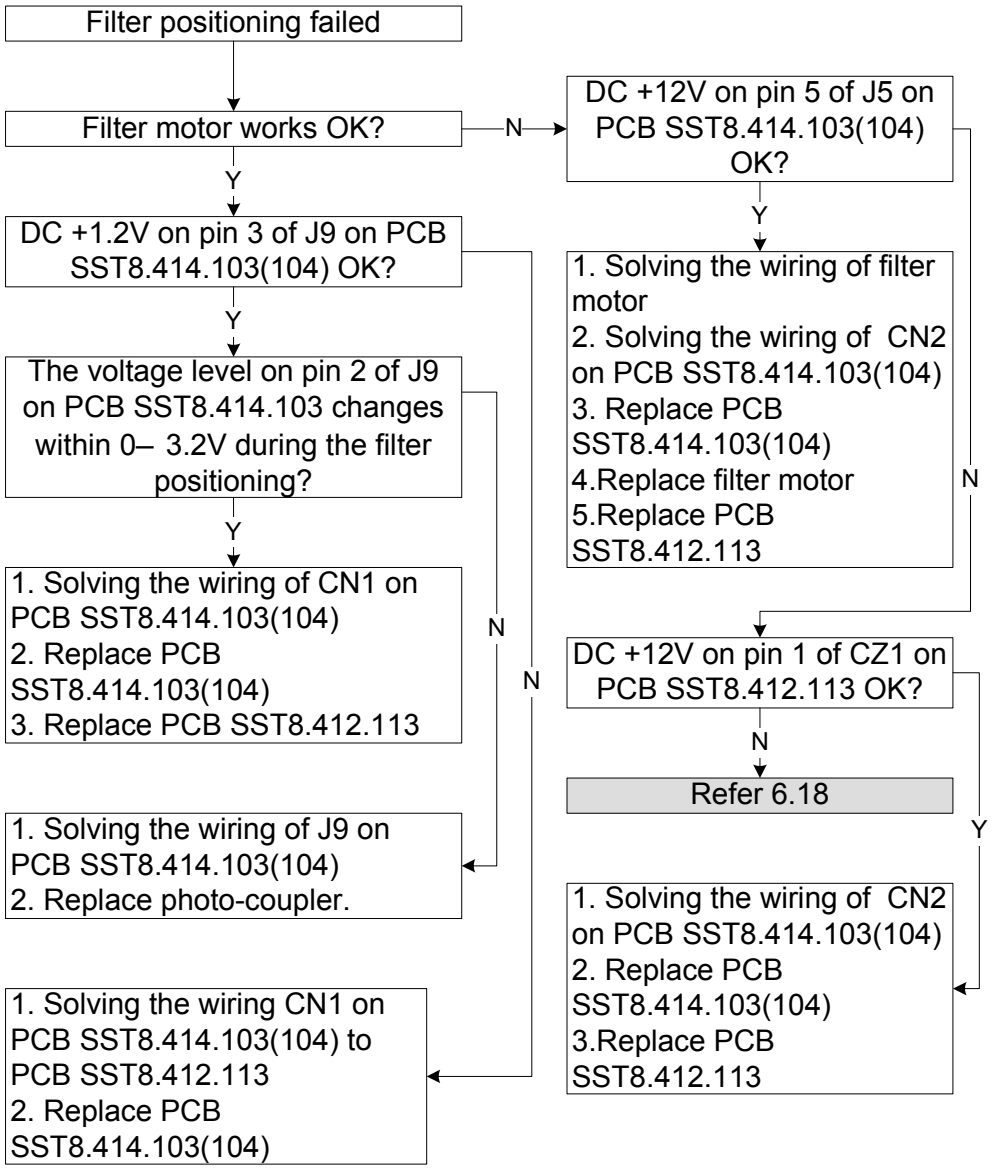


6.4 Printer check failed

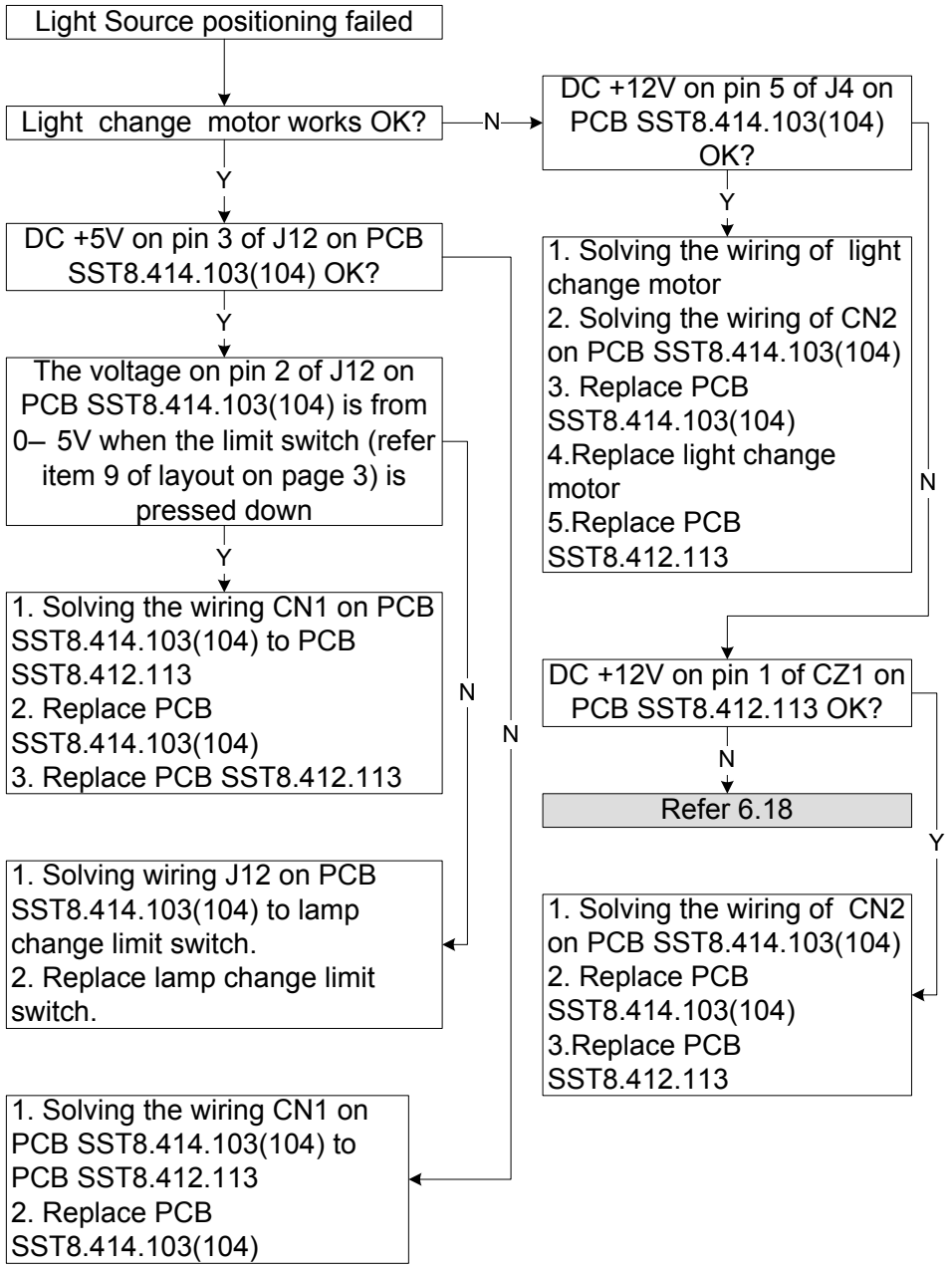


Note : It is recommended to connect the M501 to printer with cable after both are powered on!

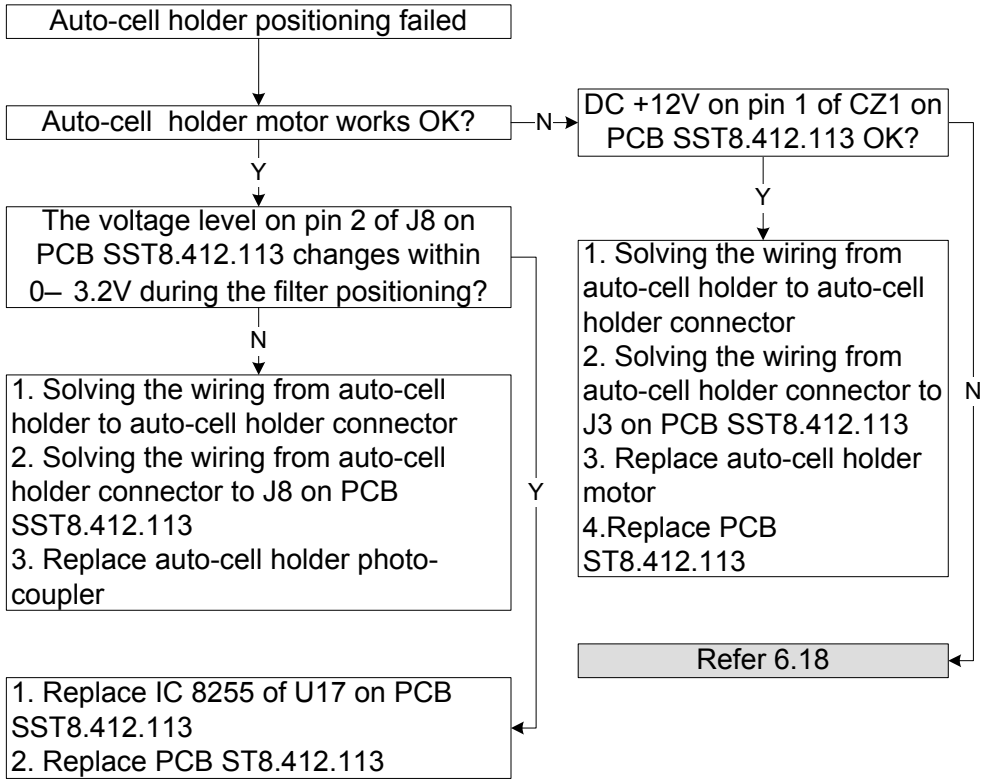
6.5 Filter check failed



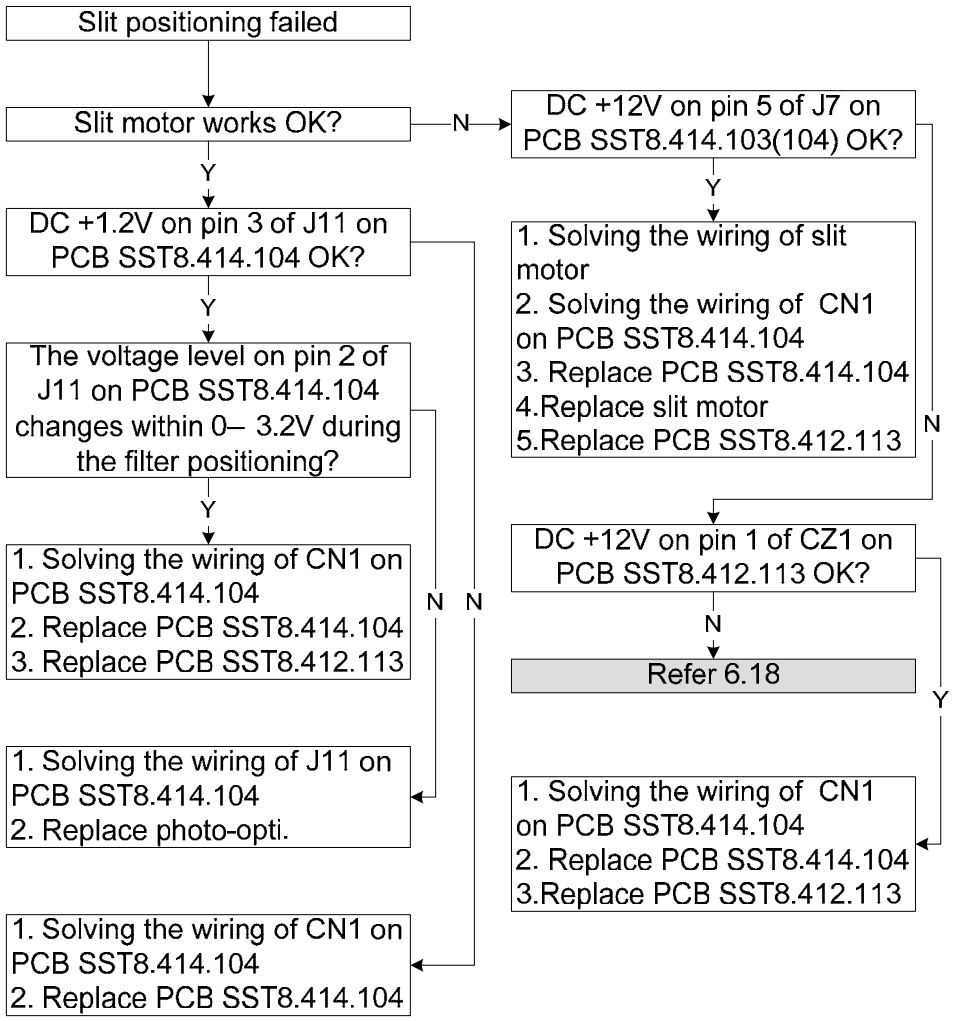
6.6 Light source check failed



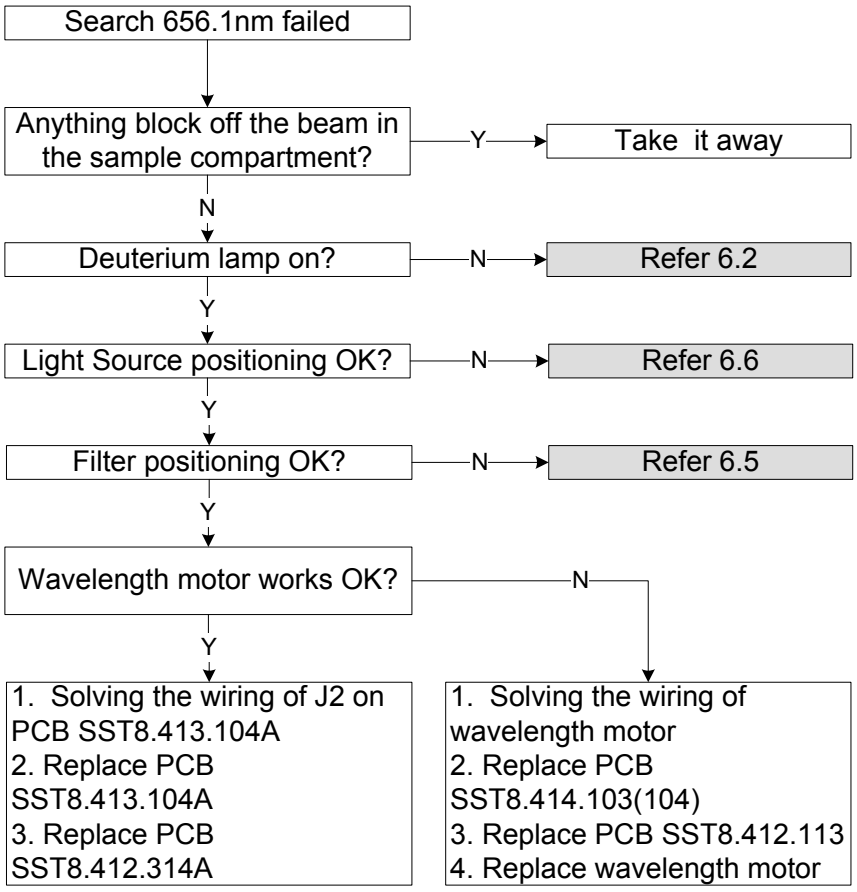
6.7 Auto-cell check failed



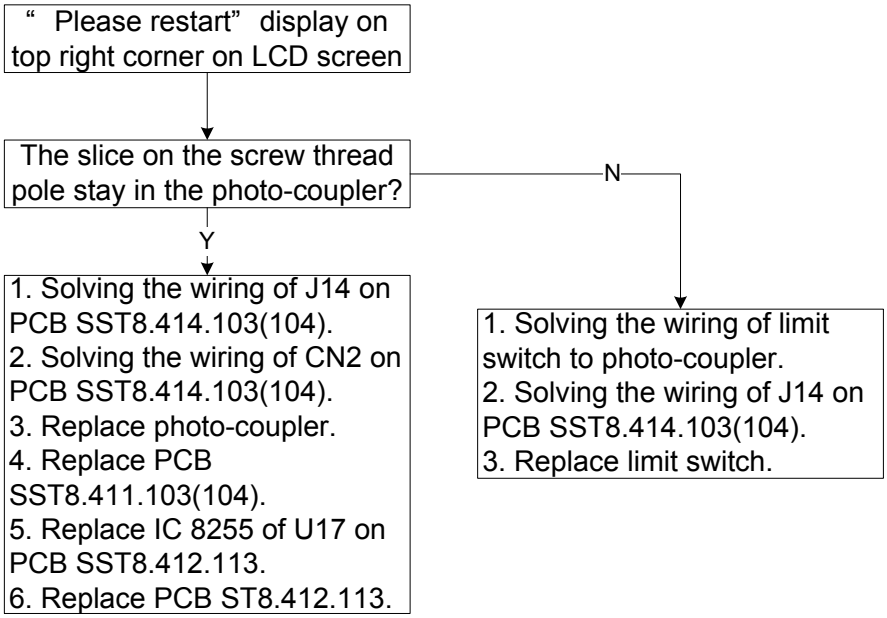
6.8 Slit check failed(Only for UV-2802S, UV-2802PCS)



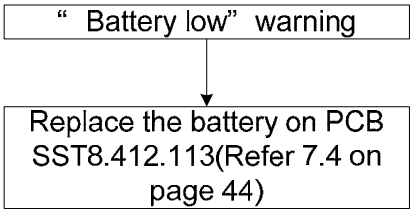
6.9 **Search 656.1nm failed**(“D2 Energy too low” display on top side of right hand corner of the screen after finishing “Reset WL”)



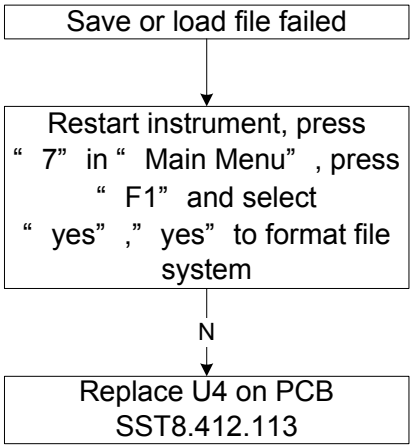
6.10 “Please restart” warning



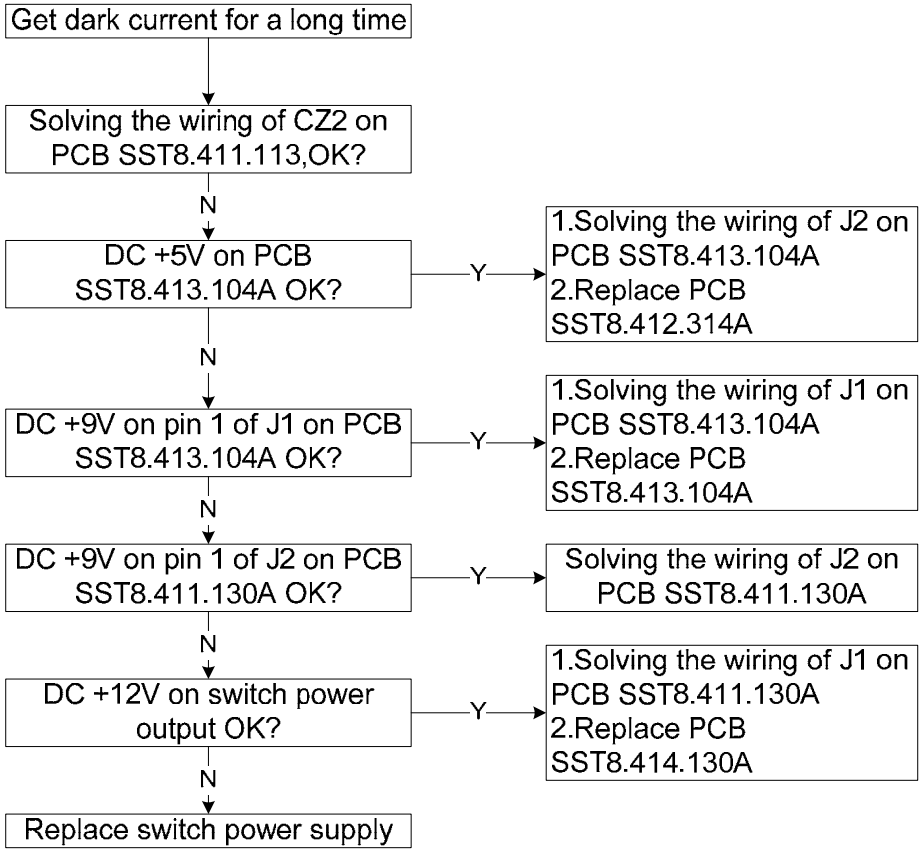
6.11 “Battery low” warning



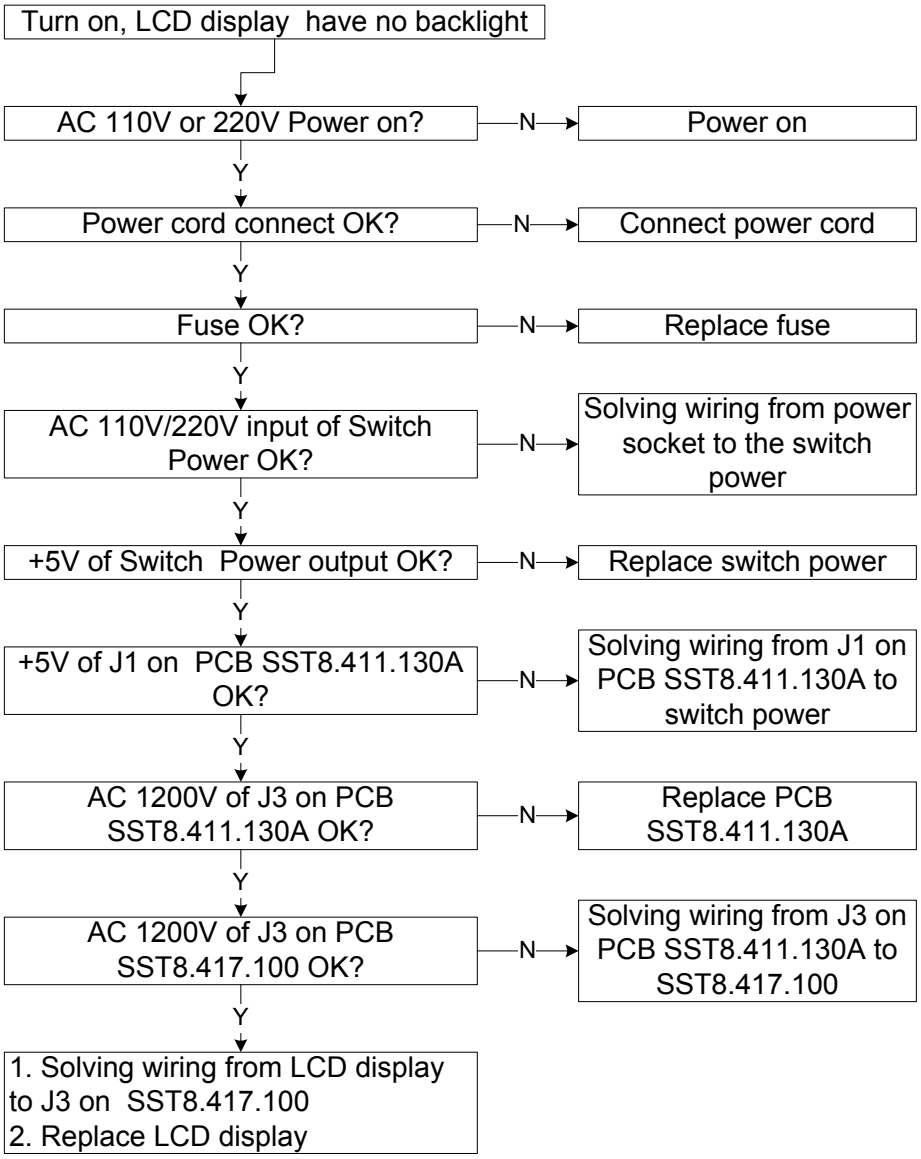
6.12 Save or load file failed (keypad goes dead after the key “Save” or “Load” is pressed)



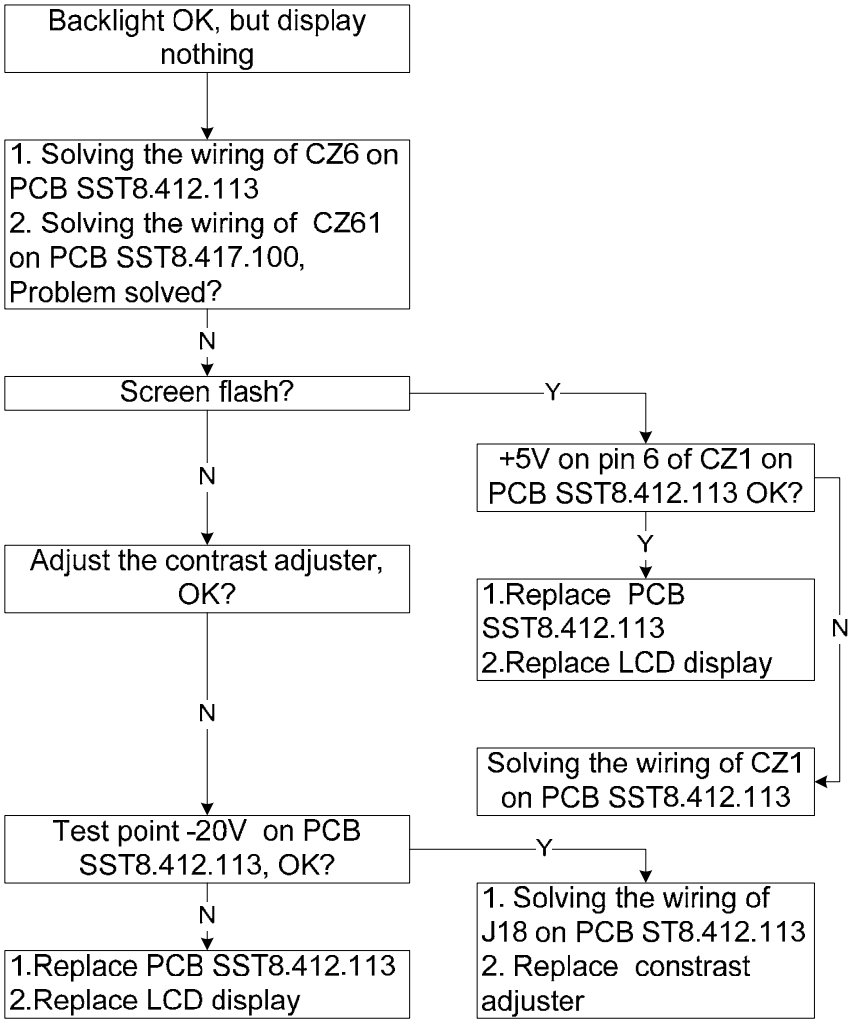
6.13 Get dark current for a long time



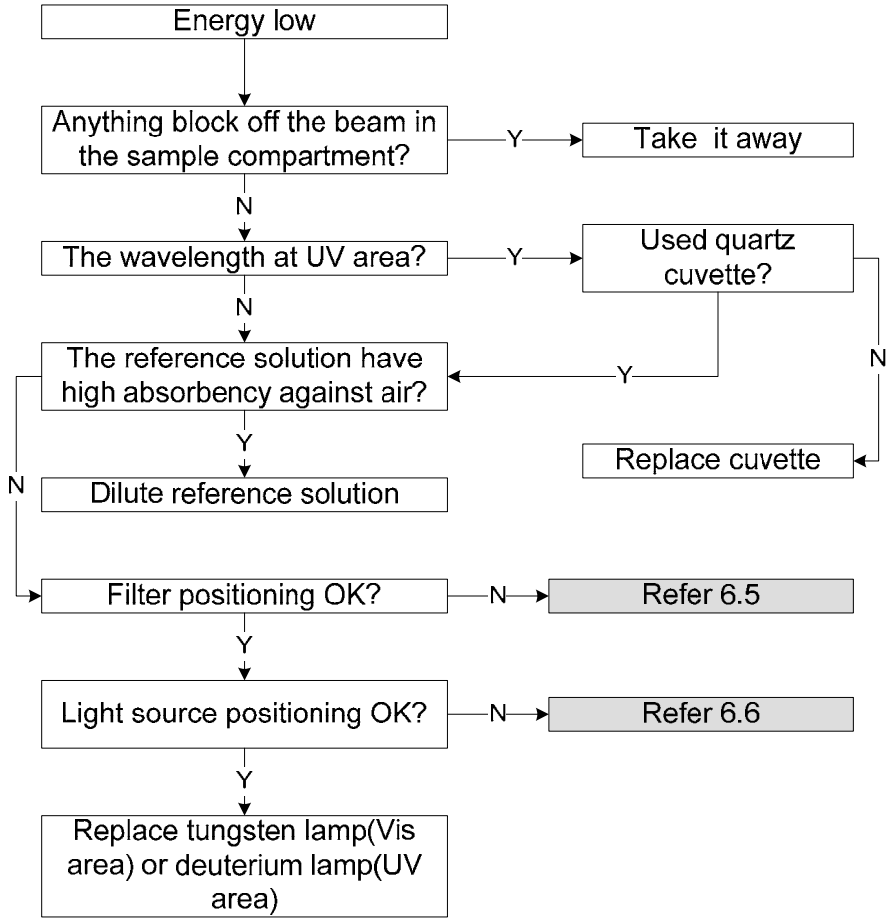
6.14 No backlight of LCD Display



6.15 Backlight OK, but display nothing on LCD Display

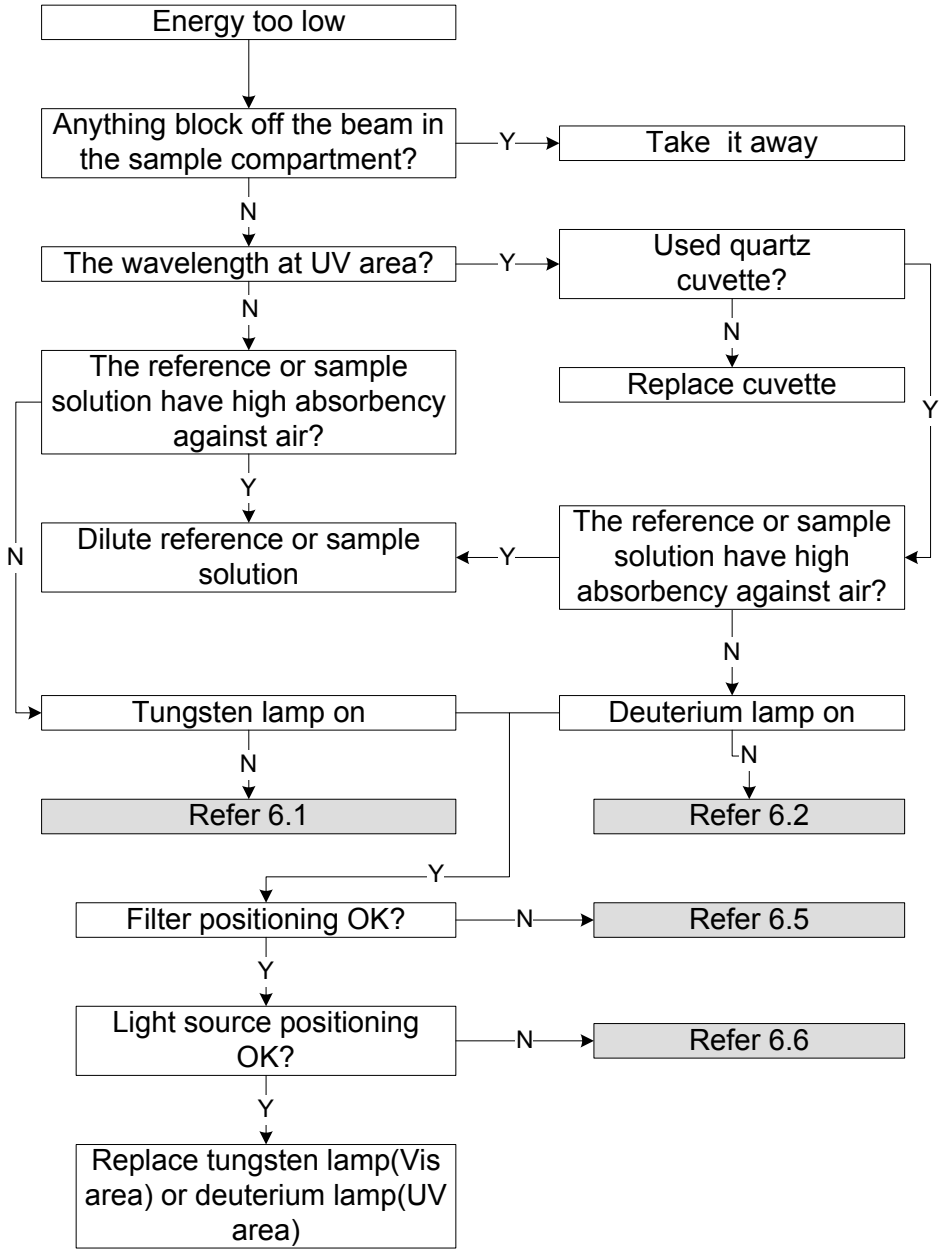


6.16 "Energy low" warning after blanking

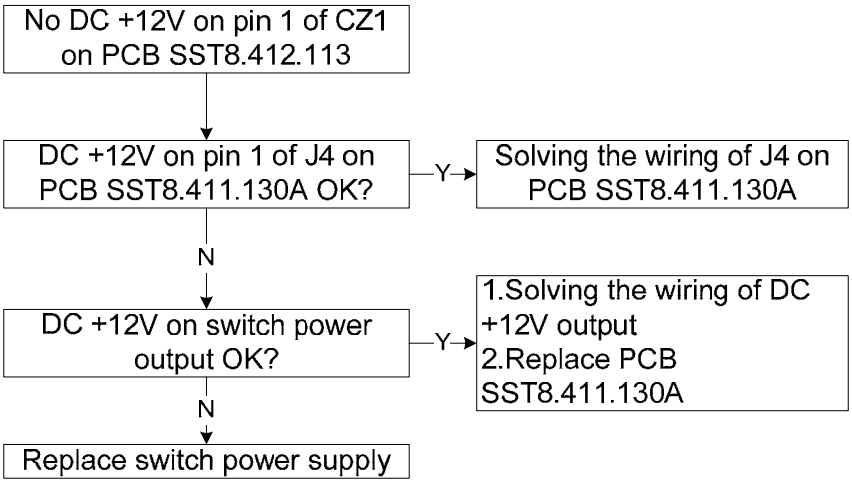


Note: If measuring at less than 200nm or more than 1000nm,it is possible to appear "Energy low" warning!

6.17 “Energy too low” warning



6.18 No DC +12V on PCB SST8.412.113



7. Maintenance

7.1 Working Environment

Placed the instrument on a clean non-vibrational table, the optimum environment as follow: the temperature is between 5℃ to 35℃, the humidity is no more than 85%, avoid direct strong light and air flow, the voltage stability is greater than ±10% and the frequency stability is greater than ±1% of the power supply, no strong magnetic field near the instrument. Always allow the instrument to warm up for 20 minutes prior before do any test.

7.2 Replace Tungsten Lamp

CAUTION: HIGH VOLTAGE

1. Turn off and unplug the instrument.
2. Remove the cuvette holder rod by unscrewing the rod counterclockwise.
3. Remove the all screws around the sides of the spectrophotometer. Show in Figure 7.1.

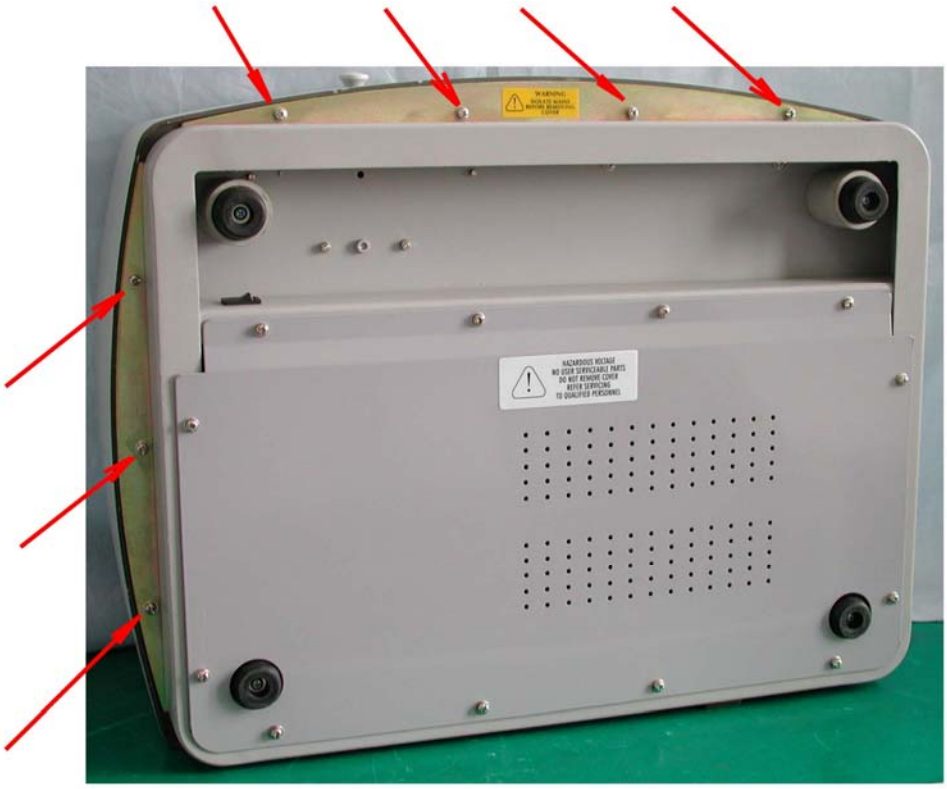


Figure 7. 1 Remove the cover screws

4. Very carefully remove the cover of the instrument and place in right side of the instrument. Show in Figure 7.2.

Figure 7. 2 Remove the cover

HINT: If it is necessary to remove the cover from the right side of the instrument, carefully remove 3 connectors (CZ6, CZ4 and J3) on PCB marked SST8.417.100 . Be sure to reconnect after replacing the lamp! Show in Figure 7.3.

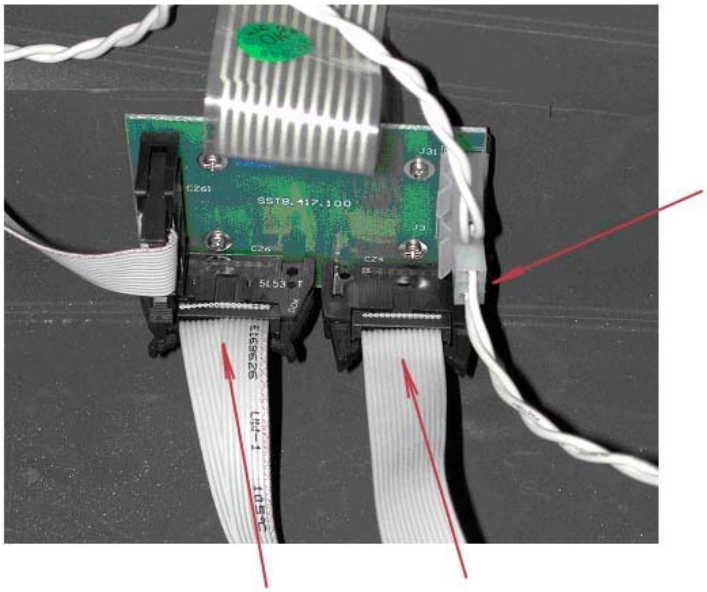


Figure 7.3 Unplug J3, CZ4, CZ6

5. Remove the grey metal protection cover. Using screwdrivers remove the two top screws and the two bottom screws, and then place the protective cover to the side. Shown in Figure 7.4.

Figure 7.4 Remove the Lamp Cover

6. Remove the lamp from the ceramic base.
7. Insert the new lamp (Figure 7.5), pushing it in as far as it will go.

Figure 7.5 Tungsten Lamp

8. Re-fit the grey metal protection cover, temporarily re-fit the main cover and fix with two screws, one each side.
9. Switch on and remove the grommet from the middle of the rear panel. You

can now look through the Viewing Hole and view the image of the lamp on the slit. Check the lamp alignment shown in Figure 7.6. If the image is not covering the slit, the lamp alignment needs adjustment. This requires running the SQ series without the covers, with high voltages accessible, and so should only be performed by a suitably qualified engineer.
If adjustment is required, remove the cover and grey protection cover and turn on the instrument. Adjust to make the image central on the slit.
Install the grey metal protection cover and instrument cover.

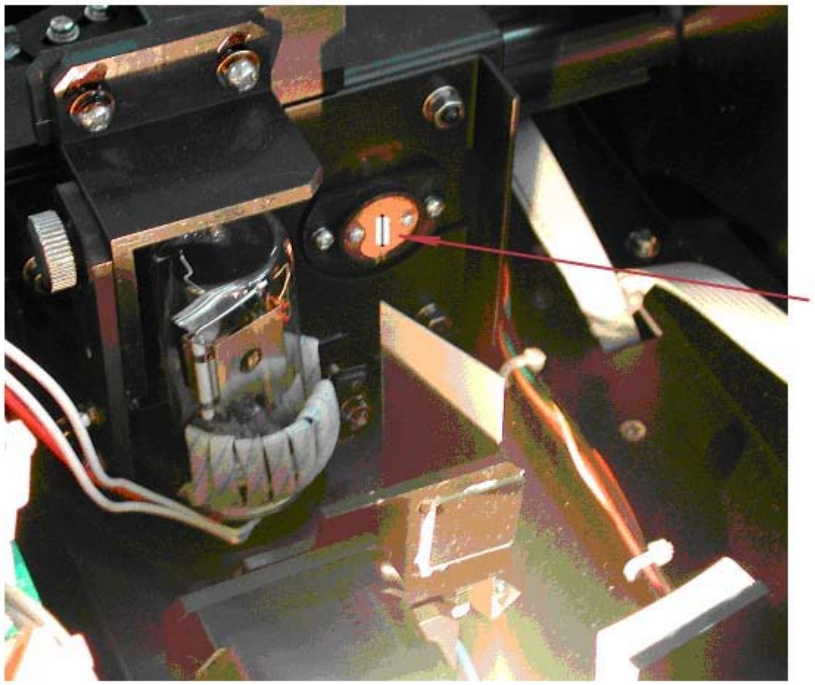


Figure 7.6 Adjust Tungsten Lamp

CAUTION: DO NOT HANDLE THE LAMP WITH BARE FINGERS. USE TISSUE OR CLOTH WHEN HANDLING LAMP. The oil from your fingers can cause the lamp to burn out prematurely.

10. Re-fit all the screws around the sides of the spectrophotometer.
11. Install the gray metal protection cover and cover of instrument.
12. Re-set the Tungsten lamp usage time. Select Utility, lamp and re-set W lamp usage time.

7.3 Replace Deuterium Lamp

1. Do the same step as 1-5 of 7.2 (replace Tungsten Lamp).
2. Disconnecting the connector J7 on the PCB marked SST8.411.128. Unscrew the screw that holds the lamp bracket to the instrument base. Pull the entire lamp and lamp holder assembly out. Shown in Figure 7.7.

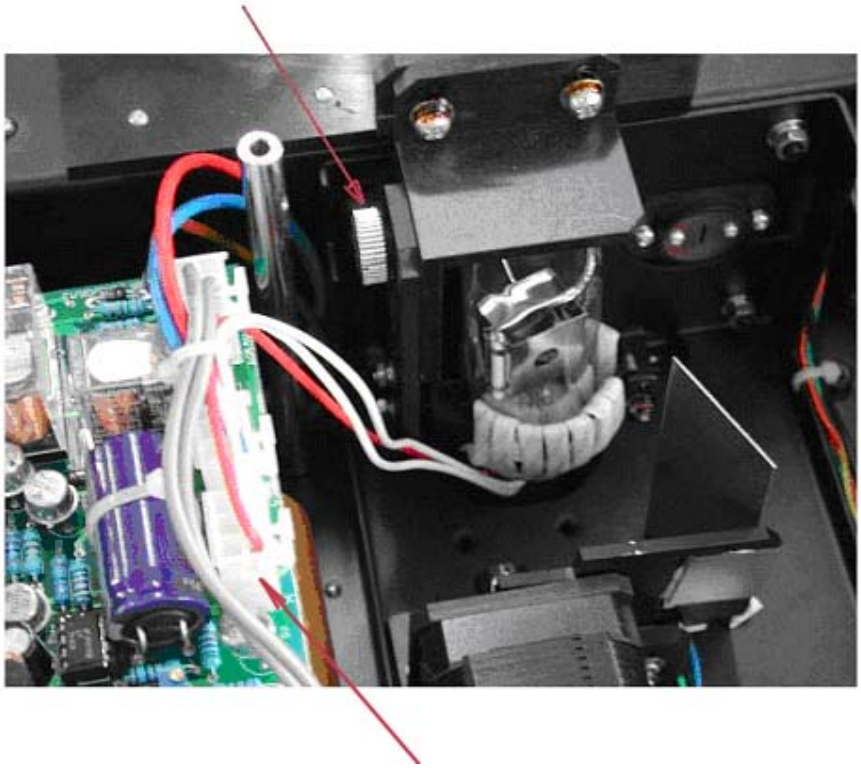


Figure 7.7 Take off the Deuterium Lamp

3. Replace the pre-aligned lamp with a lamp (Figure 7.8) provided by UNICO or an authorized UNICO Service Provider. This comes pre-assembled with lamp socket.

CAUTION: THE LAMP MAY BE HOT! TAKE PRECAUTIONS TO PREVENT POSSIBLE BURNS.

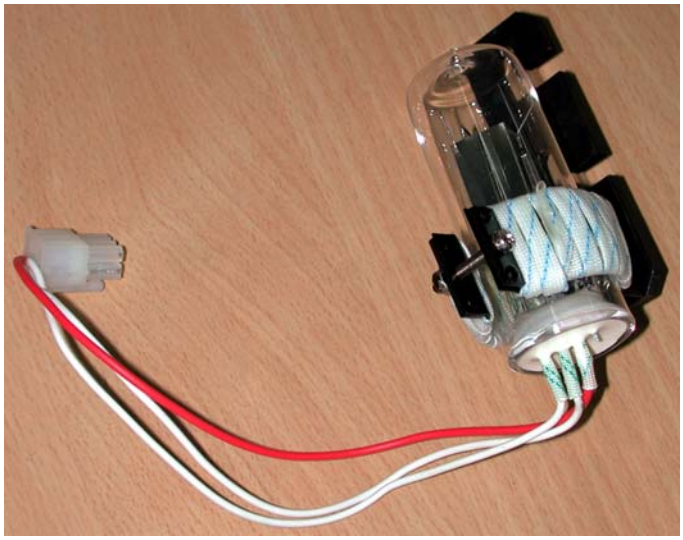


Figure 7.8 Deuterium Lamp

4. Reconnect the connector J7 to the PCB marked SST8.411.128.
5. Re-fit the grey metal protection cover. Temporarily re-fit the main cover and fix with two screws, one each side.
6. Switch on and remove the grommet from the middle of the rear panel. You can now look through the Viewing Hole and view the image of the lamp on the slit. Check the lamp alignment Figure 7.9. If the image is not covering the slit, the lamp alignment needs adjustment. This requires running the SQ series without the covers, with high voltages accessible, and so should only be performed by a suitably qualified engineer.
   If adjustment is required, remove the cover and grey protection cover, put on UV protection glasses and turn on the instrument. Adjust to make the image central on the slit, Figure 7.9.

CAUTION: Wear UV protection glasses when replacing deuterium lamp.

7. Install the grey metal protection cover and cover of instrument.
8. Re-fit all the screws around the sides of the spectrophotometer.
9. Re-set the lamp usage time. Select Utility, lamp, and re-set D2 usage time.

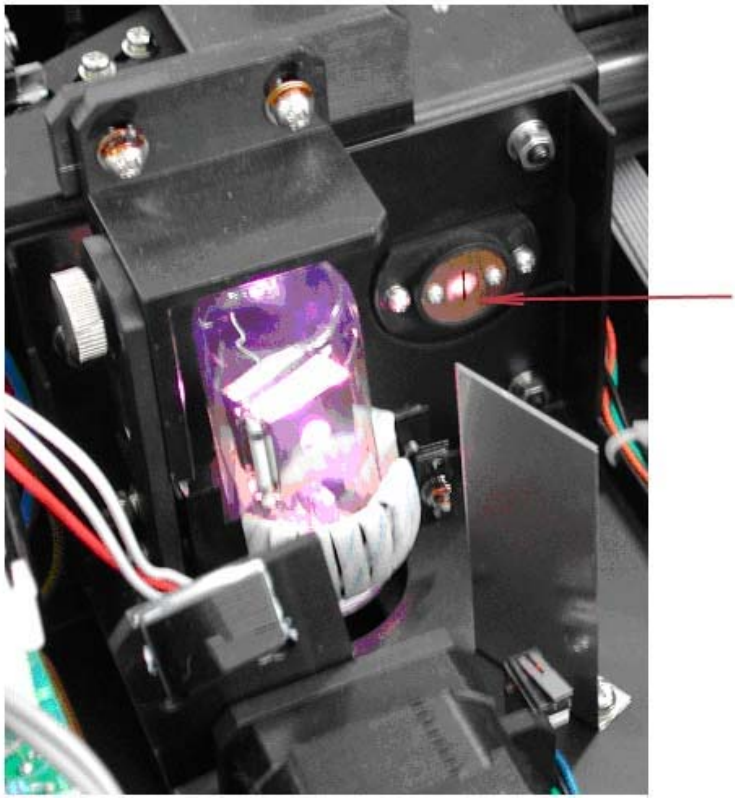


Figure 7.9 Adjust Deuterium Lamp

7.4 Replace Memory Battery

1. Turn the spectrophotometer upside down onto a padded surface. Remove the all screws around the sides of the spectrophotometer shown in Figure 7.10 and take away the bottom cover.

Figure 7. 10 Remove the bottom cover

2. There is a round lithium battery on the main CPU PCB. Shown in Figure 7.11where the red arrow is pointed. The battery model is CR1220 with 3V voltage from Panasonic.

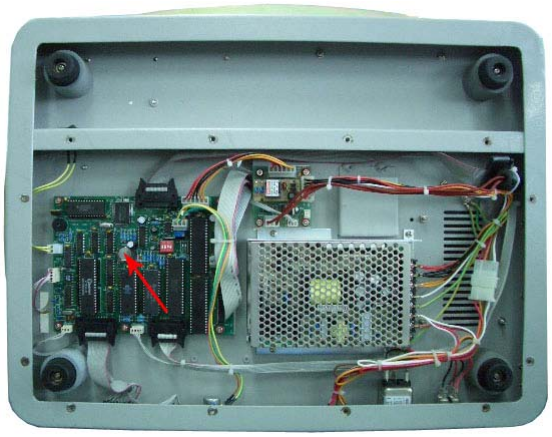


Figure 7. 11 Battery Position

Note: Since the capacitor will only be able to maintain power for 5-6 minutes, we suggest you follow the procedure.

1) With the power unplugged, remove the bottom cover.
2) Locate the battery to be replaced on the board. DO NOT REMOVE IT YET.
3) Make sure you have the replacement battery ready.
4) Turn on the spectrophotometer and keep it on for a few minutes.
5) Turn off the spectrophotometer.
6) Immediately after turning off the spectrophotometer, remove the old battery and insert the new one. This MUST be completed within 3 minutes of the spectrophotometer being turned off.

Note: Failure to follow the correct battery replacement procedure may result in saved data being lost and a possible PC software communication problem. It is recommended to transfer the data saved in the memory to computer with PC download software before replace battery.

3. Replace the bottom cover on the spectrophotometer, ensuring that all the star washers are in position.

7.5 Upgrade Firmware

1. Turn round spectrophotometer to find the switch shown in Figure 7.12 on the

base that controls spectrophotometer to run in normal or upgrading status. Convert the switch to upgrading status.

Figure 7. 12 Normal/Program Switch for Software Update

2. Connect spectrophotometer to the computer with the correct RS232 cable.

Note: It is recommended that you connect spectrophotometer to Comm1 of your computer.

3. Before updating the software, save or copy the folder “Update” UNICO provided to the disk C:/ of your computer. Usually there are five files in the folder “Update” which are respectively Flash-UNICO.exe, *.H00, *.H01, *.H02 and *.H03 (*.H00, *.H01, *.H02 and *.H03 is different base your instrument model.). After updating, two more files are created automatically, one is UV2800.bin, another is serial.ini.

Note: The original serial number of spectrophotometer is stored in serial.ini.

4. Open the folder “Update” and double click on the icon “Flash- UNICO”.
5. The “System updating program for UNICO” screen will appear. Shown in Figure 7.13.

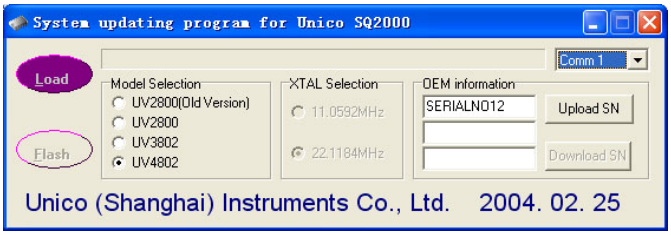


Figure 7. 13 Upgrade Form

6. Click to select instrument model in Model Selection. Click on the small pull-down triangle on the right to select the comm. port (Comm1 default.) There are 4 comm. ports available. It depends on which comm. port you connected between the computer and spectrophotometer.
7. Click on the ellipse icon “Load”, then only select the file “*.H00” in the folder “Update”, click on “Open” to load.
8. Turn on spectrophotometer, the screen will display as below (Figure 7.14) and wait for upgrading.

Figure 7. 14 Upgrade State

9. Click on the button “Upload SN” in OEM information, the original serial number of spectrophotometer will appear in line 1 – line 3 and is stored in serial.ini . shown in Figure 7.15. If you do not have the original serial number, please contact UNICO.

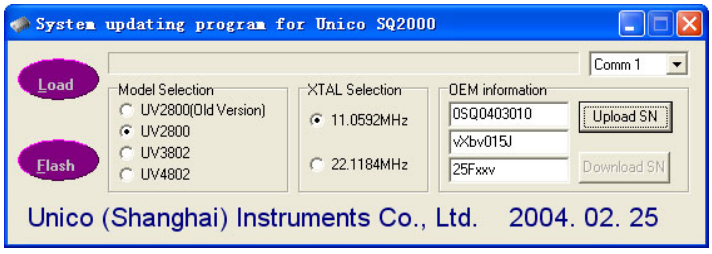


Figure 7. 15 Upload SN

10. Click on the ellipse icon “flash” on the left to start.

Figure 7. 16 Upgrading

Note: Do not click on any icon during the process of upgrading.

11. After beeping three times, the software is upgraded successfully, turn off the spectrophotometer, and then change the switch on the base of spectrophotometer to the normal position.
12. Turn on the spectrophotometer, it will run with the new software.
13. It is highly recommended that, following software upgrading, you select "calibration system" after the self-testing process, shown in Figure 7.17.

Figure 7. 17 Calibrating

7.6 Check Performance

7.6.1 Prepare

1. Switch on and wait for 15 minutes. Ensure beam is clear.
2. Select "system calibration" yes.
3. When main menu appears at the end of calibration.

7.6.2 Check Wavelength Accuracy

1. Prepare (Refer 7.6.1).
2. Press 3 to select “WL Scan”, press “F1” to setup, set the parameter as follow, press “Enter” to finished setup.
   Scan from: 400
   Scan to: 300
   Scan Step: 0.1
   Scan Speed: HI
3. Ensure beam is clear. Press “0Abs” to scan blank.
4. Insert holmium filter. Press “Start”.
5. When scan complete, press “F3”: Search, Press “▼”, record wavelength of holmium peak (specification: 360.9 ±1nm).
6. Press “ESC”, press “F1” to setup, set the parameter as follow, press “Enter” to finished setup.
   Scan from: 850
   Scan to: 750
   Scan Step: 0.1
   Scan Speed: HI
7. Ensure beam is clear. Press “0Abs” to scan blank.
8. Insert didymium filter. Press “Start”.
9. When scan complete, press “F3”: Search, Press “▼”, record wavelength of didymium peak (specification: 807.1 ±1nm).

7.6.3 Check Stray Light

1. Prepare (Refer 7.6.1).
2. Press “Setλ”, input 340, press “Enter” to go to 340nm.
3. Ensure beam is clear. Press 1 to “Basic Mode” and automatic blanking.
4. Insert GG375 filter.
5. Record stray light at 340nm (specification >3A, <0.1%T).
6. Remove filter.
7. Press “Setλ”, input 220, press “Enter” to go to 220nm.
8. Insert WG295 filter.
9. Record stray light at 220nm (specification >3A, <0.1%T).

7.6.4 Check Absorbance Accuracy

1. Prepare (Refer 7.6.1).
2. Fit neutral density filters, blank, 0.5A, 1A, 2A in cell changer and move blank into beam
3. Press “Setλ”, input 546, press “Enter” to go to 546nm.
4. Push filters into beam and record values. Compare the results with the calibrated absorbance (specification <±1%A, so <±0.005A at 0.5A, <±0.010A at 1A, <±0.020A at 2A).

7.6.5 Check Dark Current

1. Prepare (Refer 7.6.1).
2. Press 7 to select Utility.
3. Press "▲", "Print", to select diagnostic menu (**Note: Sometimes this page has a bar at the top and only the serial number below, instead of the diagnostic menu.**)
4. Press 5 to select "Check Dark Current" (even if "Check Dark Current" is not displayed). A table of Gain, Energy, will be produced (The minimum at Gain 0 should be greater than or equal to 1. The maximum at Gain 10 should be 2000 to 4000).

7.6.6 Check Energy Profile

1. Prepare (Refer 7.6.1).
2. Press 3 to select "WL Scan", press "F1" to setup, set the parameter as follow, press "Enter" to finished setup.
   Scan from: 1100
   Scan to: 190
   Scan Step: 0.5
   Scan Speed: HI
3. Press 6, Press "Enter" to select ADEX: 1.
4. The wavelength will go to 1100nm and the energy profile will be produced.
5. Record the maximum value around 550nm (25% to 60% full scale). Record the maximum value below 340nm (5% to 10% full scale).
   (For 2nm bandwidth, the energy will be approximately half these values)

Appendix

Order No. List of UV-2800

PART NUMBER	DESCRIPTION OR PCB NO.
SQ5-411-029	SST8.411.128
	SST8.411.128A
SQ5-411-030	SST8.411.130
	SST8.411.130A
SQ5-412-021	SST8.412.113
SQ5-412-022	SST8.412.314
	SST8.412.314A
SQ5-413-025	SST8.413.102
SQ5-414-012	SST8.414.103
SQ5-417-006	SST8.417.100
SQ5-415-007	SST8.417.101
SQ5-415-008	SST8.417.102
SQ6-491-317	Cooling Fan
SQ6-491-314	Transistor1(W Lamp)
SQ6-491-313	Transistor2(D2 Lamp)
SQ0-001-001	Rectifier
SQ6-491-324	Motor1(Lamp Change)
SQ6-491-308	Motor2(Wavelength)
SQ6-491-309	Motor3(Filter)
SQ0-002-001	W Lamp
SQ6-491-312	D2 Lamp
SQ6-491-315	Limit Switch
SQ6-491-307	LCD(320X240, DMF50081)
SQ6-491-320	Transformer
SQ0-003-001	Switch Power Supply(T-60B)

Order No. List of UV-2802, UV-2802PC

PART NUMBER	DESCRIPTION OR PCB NO.
SQ5-411-029	SST8.411.128
	SST8.411.128A
SQ5-411-030	SST8.411.130
	SST8.411.130A
SQ5-412-021	SST8.412.113
SQ5-412-022	SST8.412.314
	SST8.412.314A
SQ5-413-025	SST8.413.102
SQ5-414-013	SST8.414.104
SQ5-417-006	SST8.417.100
SQ5-415-007	SST8.417.101
SQ5-415-005	SST8.415.001-B
	SST8.415.001-D
SQ6-491-341	Cooling Fan
SQ6-491-314	Transistor1(W Lamp)
SQ6-491-313	Transistor2(D2 Lamp)
SQ0-001-001	Rectifier
SQ6-491-335	Motor1(Lamp Change)
SQ6-491-308	Motor2(Wavelength)
SQ6-491-309	Motor3(Filter)
SQ0-002-001	W Lamp
SQ6-491-339	D2 Lamp
SQ6-491-315	Limit Switch1(Lamp Change)
SQ6-491-334	Limit Switch2(Wavelength)
SQ6-491-343	LCD(320X240, DMF50081)
SQ6-491-320	Transformer
SQ0-003-001	Switch Power Supply(T-60B)

Order No. List of UV-2802S, UV-2802PCS

PART NUMBER	DESCRIPTION OR PCB NO.
SQ5-411-029	SST8.411.128
	SST8.411.128A
SQ5-411-030	SST8.411.130
	SST8.411.130A
SQ5-412-021	SST8.412.113
SQ5-412-022	SST8.412.314
	SST8.412.314A
SQ5-413-019	SST8.413.102
SQ5-414-014	SST8.414.104
SQ5-417-006	SST8.417.100
SQ5-415-007	SST8.417.101
SQ5-415-005	SST8.415.001-B
	SST8.415.001-D
SQ6-491-341	Cooling Fan
SQ6-491-314	Transistor1(W Lamp)
SQ6-491-313	Transistor2(D2 Lamp)
SQ0-001-001	Rectifier
SQ6-491-335	Motor1(Lamp Change)
SQ6-491-308	Motor2(Wavelength)
SQ6-491-309	Motor3(Filter)
SQ6-491-338	Motor4(Slit)
SQ0-002-001	W Lamp
SQ6-491-339	D2 Lamp
SQ6-491-315	Limit Switch1(Lamp Change)
SQ6-491-334	Limit Switch2(Wavelength)
SQ6-491-343	LCD(320X240, DMF50081)
SQ6-491-320	Transformer
SQ0-003-001	Switch Power Supply(T-60B)

Order No. List of UV-3802

PART NUMBER	DESCRIPTION OR PCB NO.
SQ5-411-029	SST8.411.128
	SST8.411.128A
SQ5-411-030	SST8.411.130
	SST8.411.130A
SQ5-412-021	SST8.412.113
SQ5-412-023	SST8.412.314
	SST8.412.314A
SQ5-413-025	SST8.413.102
SQ5-413-020	SST8.413.103
	SST8.413.103A
SQ5-414-013	SST8.414.104
SQ5-417-006	SST8.417.100
SQ5-415-007	SST8.417.101
SQ5-415-005	SST8.415.001-B
	SST8.415.001-D
SQ6-491-341	Cooling Fan
SQ6-491-314	Transistor1(W Lamp)
SQ6-491-313	Transistor2(D2 Lamp)
SQ0-001-001	Rectifier
SQ6-491-335	Motor1(Lamp Change)
SQ6-491-308	Motor2(Wavelength)
SQ6-491-309	Motor3(Filter)
SQ0-002-001	W Lamp
SQ6-491-339	D2 Lamp
SQ6-491-315	Limit Switch1(Lamp Change)
SQ6-491-334	Limit Switch2(Wavelength)
SQ6-491-343	LCD(320X240, DMF50174)
SQ6-491-320	Transformer
SQ0-003-001	Switch Power Supply(T-60B)

Order No. List of UV-4802

PART NUMBER	DESCRIPTION OR PCB NO.
SQ5-411-029	SST8.411.128
	SST8.411.128A
SQ5-411-030	SST8.411.130
	SST8.411.130A
SQ5-412-021	SST8.412.113
SQ5-412-025	SST8.412.314
	SST8.412.314A
SQ5-413-026	SST8.413.102(J2:16 pin)
SQ5-413-021	SST8.413.102(J2:14 pin)
SQ5-414-013	SST8.414.104
SQ5-417-006	SST8.417.100
SQ5-415-007	SST8.417.101
SQ5-415-005	SST8.415.001-B
	SST8.415.001-D
SQ6-491-341	Cooling Fan
SQ6-491-314	Transistor1(W Lamp)
SQ6-491-313	Transistor2(D2 Lamp)
SQ0-001-001	Rectifier
SQ6-491-335	Motor1(Lamp Change)
SQ6-491-308	Motor2(Wavelength)
SQ6-491-309	Motor3(Filter)
SQ0-002-001	W Lamp
SQ6-491-339	D2 Lamp
SQ6-491-315	Limit Switch1(Lamp Change)
SQ6-491-334	Limit Switch2(Wavelength)
SQ6-491-343	LCD(320X240, DMF50174)
SQ6-491-320	Transformer
SQ0-003-001	Switch Power Supply(T-60B)