C61 ANALYSER

Chemistry Analyzer

Service Manual

Symbols description

Symbols in the manual

NOTE!
Notes contain additional information or tips when using the instrument.

ATTENTION! Cautions
Cautions should be followed carefully to ensure your instrument work correctly and to avoid unnecessary personal injury.

Symbols on the instrument

This symbol means that the labeled item is hot while the instrument is in use. Don't touch the labeled item as you could be burnt.
The symbol is labeled on the lamp bracket of optic system.

This means that the labeled item could lead to personal injury and/or damage to the analyzer.
The symbol is labeled beside the power outlet and some external interface.

The symbols for "SERIAL NUMBER", The serial number shall be after or below the symbol, adjacent to it

The symbol means the product is in vitro diagnostic medical device.

Safety Precautions and Potential Hazards

General

Before you start installing and working with the analyzer, you should read the safety precautions and regulations shown in this chapter.

Operator Qualification

Please note that the operation with Chemistry Analyser should be carried out only by the doctor or clinical inspector who have undergone necessary training provided by the sales agent.

Service Technician Qualification

To install, maintain and repair the instrument, a service technician has to be trained on the instrument by the manufacturer or their representative. A service technician is also expected to be familiar with the normal operation of the instrument as described in the User's manual and the special operations as described in the service manual.

Electrical

To use Analyser safely, pay attention to the following items:

To prevent the risk of electrical shock and/or damage to the instrument **Operator** should not open the white cover of the instrument. Only authorized personnel, for example, **service technicians**, may open the instrument to perform maintenance or repair.

Touching the main board when the power is on may cause severe injury or death. Any problem, please ask for helps from your supplier.

Mechanical

There is no risk presented by the mechanical parts of the instrument when the instrument is closed. If the covers of the instruments are removed, mechanical parts could cause personal injury or the instrument may be damaged if the following advice is not being considered: DO NOT wear loose garments or jewellery that could catch in mechanisms. DO NOT put your fingers/hands into the pathway or any part while the analyzer is in operation. DO NOT attempt mechanical repair unless the instrument is not in operation or OFF.

Lamp

The source lamp becomes extremely hot during operation; never touch the lamp when it is on! Look directly into the light path of the lamp may cause eyes damage, too.

If the lamp needs to be changed, always switch off the lamp by switching off the instrument and then wait until the lamp has cooled down.

Chemical

The operator is responsible for taking all necessary precautions against hazards associated with the use

of clinical laboratory chemicals. Specific recommendations for each reagent used with the analyzer are normally found on the manufacturer's package inserts or the on the product information sheets for each chemical. Wipe up any reagent spillage on the instrument immediately.

Biohazardous Materials

As with all vitro diagnostic equipment, patient samples and serum-based quality control (QC) products that are assayed on this system, as well as all waste from the waste container, should be treated as the potentially biohazardous. All materials and mechanical components associated with the sampling and waste system should be handled according to your facility's biohazard procedure. Use the personal protective equipment recommended by your facility when handling any of these components. Detailed recommendations:

- **Samples**

Treat all samples as potentially biohazardous and infectious. If any sample is spit on the instrument, utilize the correct personal protective equipment (PPE- gloves, lab coat, etc..), wipe it up immediately and clean the contaminated with a disinfectant.

- **Waste solutions and solid wastes**

Avoid direct contact with waste solution and/or solid waste. Both should be handled as potentially biohazardous.

Dispose of waste solution and/or solid waste according to the relevant governmental regulations.

Consult the reagent manufacturer for information on the concentrations of heavy metals and other toxic constituents in each reagent.

- **Biohazardous parts**

Avoid direct contact with the sipper tubing and all parts of the sample flow path. Treat these areas as potentially biohazardous and /or infectious

- **Reagents**

Avoid direct body-contact with reagents. Direct body-contact may result in irritation or damage to your skin. Refer to the manufacturer's reagent kit box and package inserts, or product information sheets for specific instructions.

Avoid direct body-contact with cleaning solution. Direct body-contact may result in skin irritation or damage. Refer to the manufacturer's kit box and package inserts, or product information sheets for specific instructions.

ATTENTION! Cautions

Requirements for samples, reagents, calibrators and controls

C61 Chemistry Analyzer is a Reagent open system. But before the testing, the following items should be noted first.

Generally, all the reagent and samples have to be stored and prepared as per the manufactures' instructions. Avantor do recommend that these reagents should from **the manufactures** with valid **product quality certificate** and **production permission legalized by local government** or from the **valid distributors** appointed by **Avantor Performance Materials India Ltd** in your country.

Before your test, please check the following.

Check the expiration date of the material

Check if the reagent is stored properly as the requirement. (e.g. cooled or frozen storage before using)

Check for proper programming in parameter setting menu according to the specified reagent instructions.

Check for volume required for each material.

Check for proper and calibrated pipette to prepare the solution.

Additional Precautions

- **Flammables**

Avoid using dangerous flammable material around the instrument.

- **Accuracy/Precision of the Measured Results**

For proper use of the instrument, measure control samples and monitor the instrument during the operation.

An incorrectly measured result may lead to an error in diagnosis, thereby posing a danger to the patient.

Treat all reagents according to the manufacturer's recommendations. Refer to the reagent kit box and package inserts, or product information sheets for specific instructions.

Make sure that the sample/reagent mixture does not contain any blood clots, dust or other insoluble contaminants. If insoluble contaminants are contained in the sample, correct measuring values may not be obtained.

- **Application**

The instrument is designed for clinical chemistry test analysis using water-soluble samples and reagents.

Please note that other types of analysis may not be applicable to the instrument.

- **Operation and Maintenance**

During operation and maintenance of the instrument, proceed according to the instructors and do not touch any parts of the instrument other than those specified.

Never leave a Reagents/sample mixture in the flowcell for longer than necessary. Always clean the flowcell after a batch of measurement and keep the flowcell filled with distilled water when not in use.

Verify the front covers closed while the instrument in operation.

Avoid touching the mechanism, such as the sipper mechanism inside the instrument, while the instrument is operating. This may cause operation stop or damage the instrument.

Chapter 1 Introduction of the Analyzer

- C61 Analyser is a biochemical analyzer. It can be used for determining:

  Electrolytes

  Substrates

  Enzymes

  Plasma proteins

  Hormones

  Coagulation

  TDA‘ S

- It can be programmed for 60 testing items，47 items has been named. Original program settings of all testing items can be modified by users.
- With double colorimetric systems: Flowcell system and colorimetric cup system.
- Following testing methods are provided:

  Endpoint

  Fixed time

  Kinetics

  Bichromatic(double wavelength)

  Absorbance

  Multi-Calibration

- The analyzer can be used for analysis of serum, urine and other samples.
- Both built-in serial printer.

1.1 Installation

1.1.1 Unpacking the analyzer

Unpack and remove materials for transportation. Keep the package box and materials for repackaging.

1) Take out the analyzer from the package box.

2) Remove the packing materials and take out the analyzer from the plastic bag.

3) Check the articles in the package box and the following article should be included:

- C61 analyzer
- Instruction manual
- Packing list
- Power cable

1.1.2 Selecting suitable installation place

Find a place without direct sunlight on working site. Select a worktable with flat surface and enough space to accommodate C61 Analyser. The reader front edge should be close to the edge of worktable. Avoid shock on the table (for example, when a centrifuge is placed on the table).

Explanatory note: ***Operational environment of the analyzer*** ***Temperature : 15℃- 32℃***
Relative humidity: 20%-85%.

To ensure the normal operation of the analyzer, please do not install the analyzer at the following places:

- Places where the temperature changes extremely.
- Extremely hot or cold places.
- Places where large amount of dust exists.
- Places in the vicinity of electromagnetic equipment that generates magnetic field.

1.1.3 Power supply

- AC110V /250V
- 50/60 Hz
- 80W

1.1.4 Connecting the analyzer to the power supply

1) Insert one end of the power cable into the power socket of the analyzer.

2) Insert the other end of the power cable into an AC power socket.

Warnings

- **AC power supply must be well grounded (Zero terminal voltage<5V)**
- **The AC power supply should be stable, and should not be used together with a high-power electric apparatus. It'd better be provided with a power stabilizer.**
- **If smoke, peculiar smell or strange sound is found on the analyzer, you should switch off the analyzer and contact to the maintenance centre.**
- **When unplugging the power cable, grasp the plug instead of the cord.**

1.1.5 Installation of the flow cell

Open the light source cover as the following picture indicates (*Please handle with moderate force*).

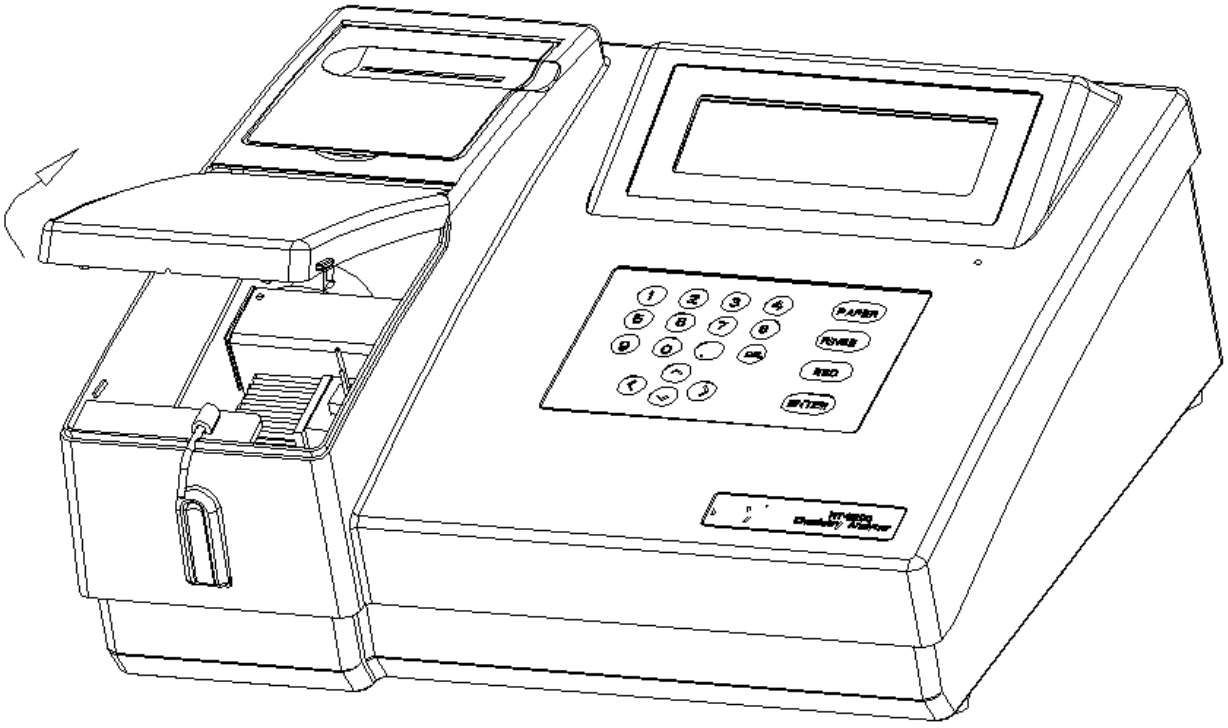


Fig. 1-1 Open light source cover

1) Remove the sticky tape for fixing the cell;
2) Remove the wrappings.
3) Place the cell in thermostat trough;
4) Insert the cell into thermostat trough slightly; lead the pipette through the fixing hole and make it stretch forwards;
5) Cover the light source cover.

Warnings:

- **Please don't touch the surface of the light inlet window of the flow cell, in case oil on your hand stains the light inlet window and affects its light transmission negatively.**
- **Make sure the pipette is in the groove, or the caused bend will affect the test result and be apt to inhale air bubble and make the water level over-high.**

1.2 Structure

1.2.1 Front view

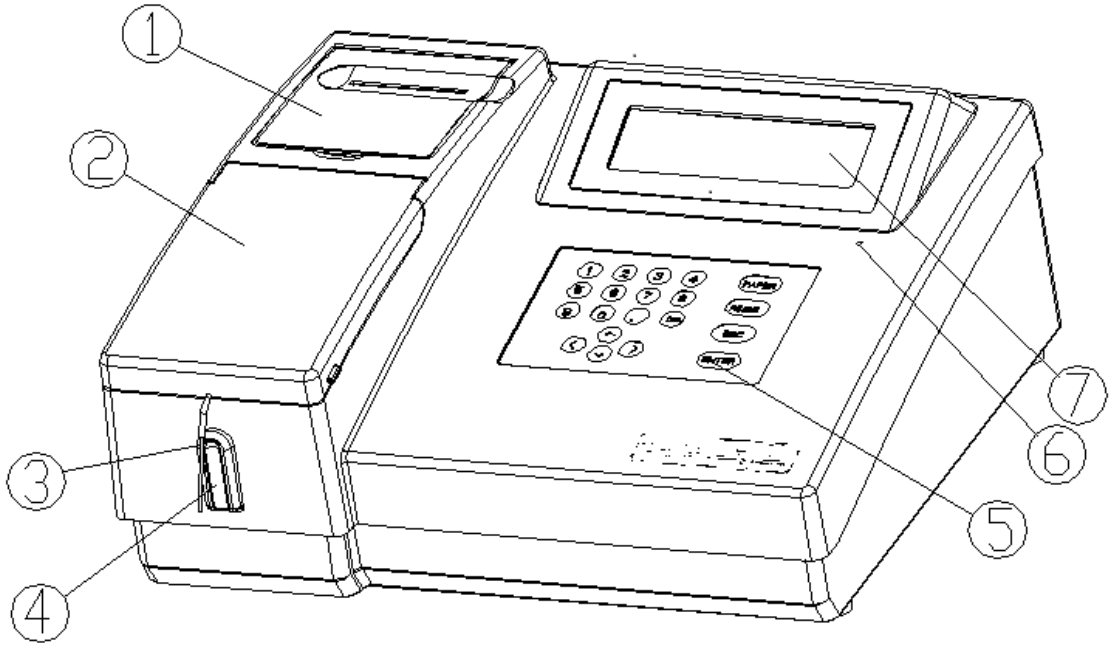


Fig. 1-2 Front view

① Printer cover

② Light source cover

③ Pipette

④ Button for liquid absorbing

⑤ Keyboard

⑥ Power indicator

⑦ LCD screen

1.2.2 Keyboard

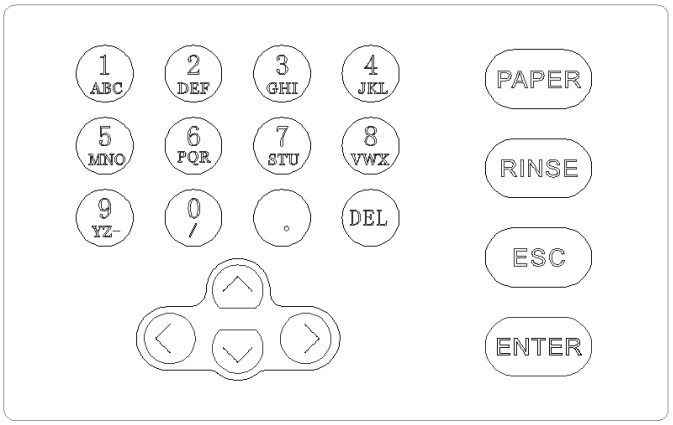
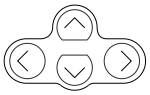


Fig 1-3 Keyboard



Direction keys: To make the cursor on the screen move down or up or to the left or right.

Paper feed key: Feed paper manually (Hot key for parametrized print)

Rinse key: Rinse the pipeline and flow cell

Escape key: Escape current screen and cancel the operation

Enter key: Confirm input and saving.

1.2.3 Rear view

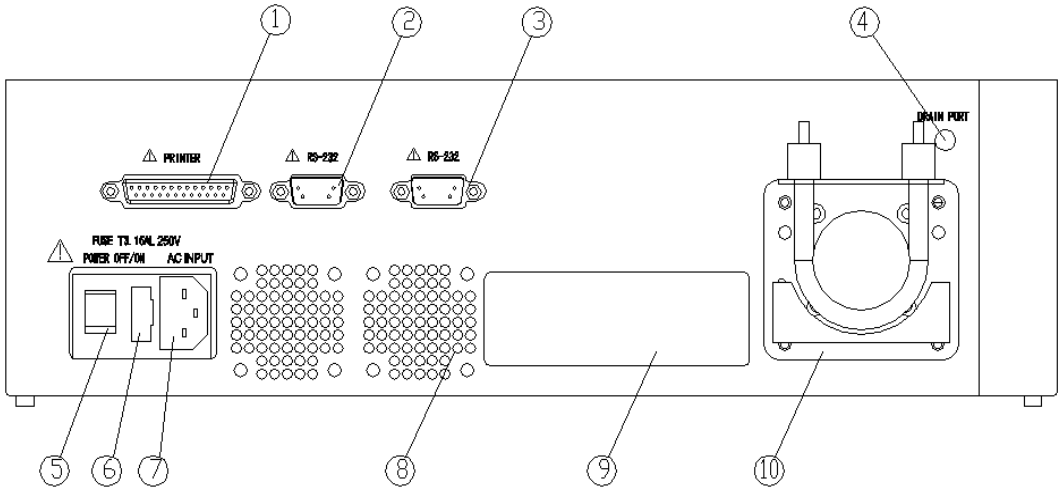


Fig. 1-4 Rear view

1) Parallel interface (option)
2) RS-232 interface
3) RS-232 interface
4) Waste liquid outlet
5) Switch
6) Fuse
7) Outlet
8) Fan
9) Label on the rear board
10) Peristaltic pump

1.2.4 flow Cell

Remove light source cover as the figure indicates

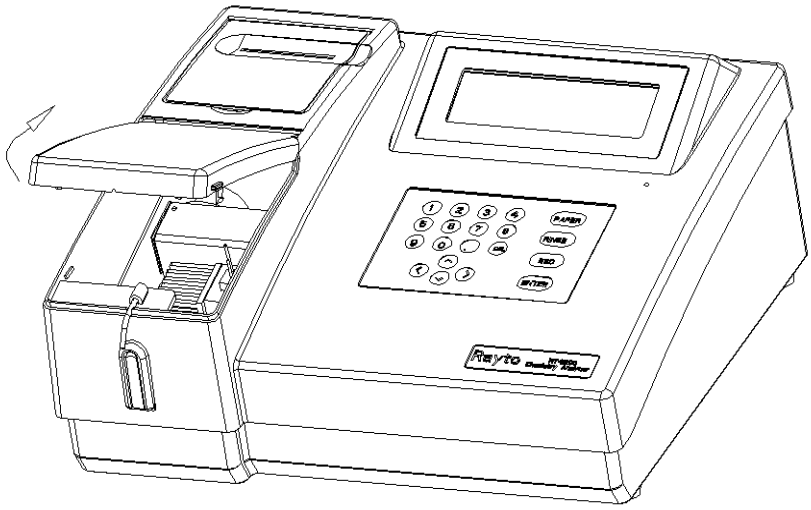


Fig. 1-5 Open light source cover

Inside of the cell system:

- Thermostatic bath
- Cell

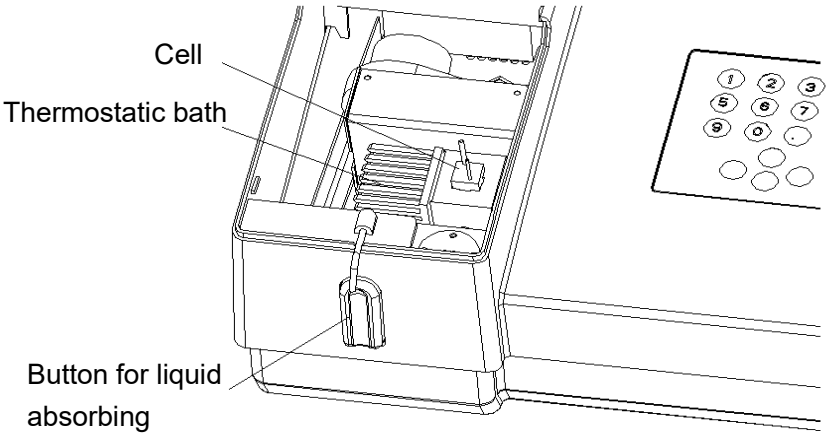


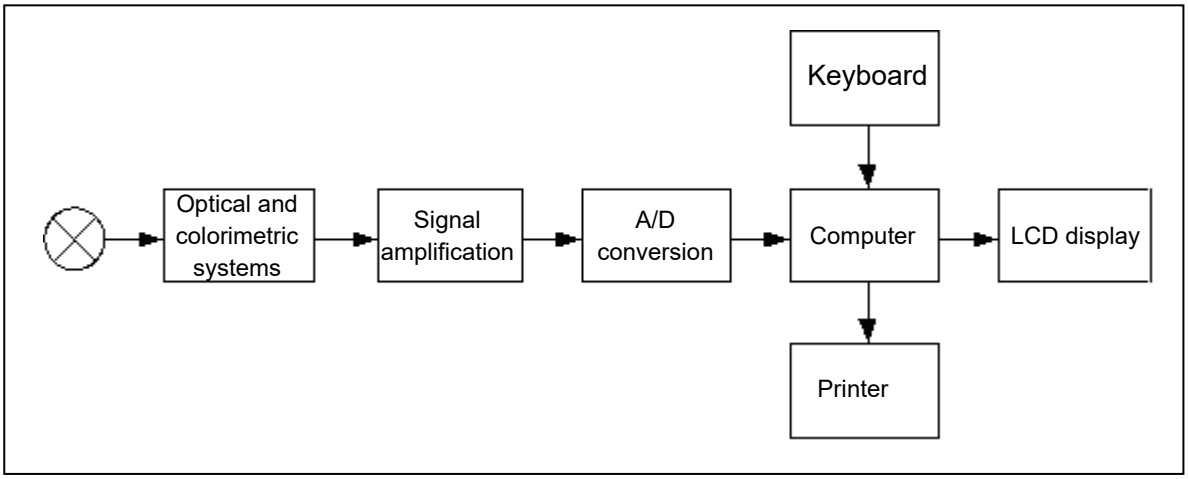
Fig 1-6 Inside of the cell system:

1.3 Specifications

Linear range:	0.000-2.500A
Resolution:	0.001Abs (Display), 0.0001 Abs (Internal calculation)
Light source:	Tungsten halogen lamp, 6V/10W, the life-span is 2000 hours
Wavelength:	340nm, 405nm, 500nm, 546nm, 620nm, two other wavelength can be added.
Drift:	0.005A/1h
Temperature control:	Room temperature, 25, 30, 37℃ (Peltier component), precision is ±0.1℃
Cell:	Meta flow cell
Quantity of fed sample:	200-2000μ l
Colorimetric cup:	12.5mm×12.5mm square test tube
Cross contamination:	≤1.5% (300μl)
Storage:	60 test items, 2000 test results
Interface:	RS-232 bidirectional communication interface
Display:	Large screen, highly bright and clear monochromatic LCD Display resolution: 240*64 pixels
Printer:	Built-in or external serial printer
Computer	MCS-51 series 8 digit single-chip computer
Operating environment:	15℃- 32℃; Maximum humidity: 85% R.H. (Below 30℃)
Storing environment:	-20℃-50℃; Maximum humidity: 85% R.H. (Below 30℃)
Weight:	7kg
Dimensions:	360mm(L)×318mm(W)×160mm(H)
Fuse:	250V, 3.15A
Power supply:	110VAC or 250VAC±10%,50/60Hz

Chapter 2 Functions

2.1 Function block diagram of C61 Analyser



2.2 Functional description of the power supply

Powered by the switching power supply module and adopting high-frequency PWM conversion technology, the power supply of C61 analyzer is small in size, light in weight, high in efficiency dependability. Its load and power adjusting ranges are wide.

This power supply outputs two DC electrical sources, each electrical source is described as follows:

CH1: +12V/4A It is used for the motors of filter and peristaltic pump, heating/cooling of Peltier and the motor of the fan as well.

CH2: +5V/8A It is used for the logical control of the rear board and the font board, Tungsten Halogen Lamp, built-in printer and heating/cooling of Peltier

2.3 Front board functions

2.3.13 Functional description of the rear board

1. As the system platform, it provides hardware environment for the operation of system softwares.
2. It provides an interface connected to the font system, control of the font system and processing of data collected by the font system.

   It provides I/O interfaces of the system, I/O interfaces supported by it comprises three RS232 interfaces which are respectively used for built-in serial printer, exterior RS232 interface 1 and exterior RS232 interface 2, one parallel printer interface (Not used), one keyboard panel interface, one interface for LCD with resolution of 240*64 pixels and the front ISA bus interface.

2.3.2 Function block diagram of the back board

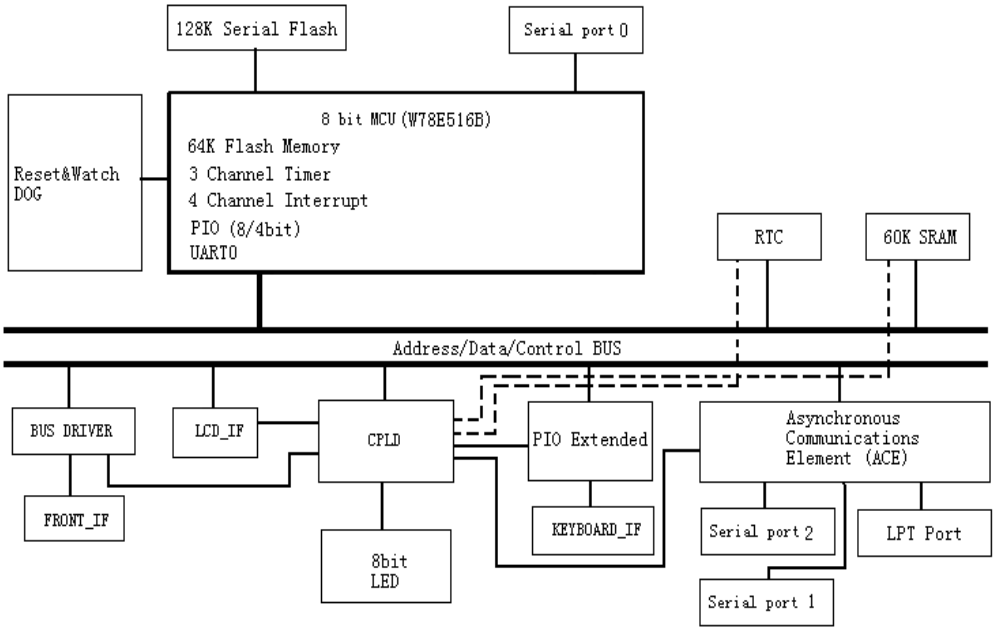


Fig 2-1 Function block diagram of the back board

2.3.3 Principle description of the rear board

As the above figure indicates, the rear board mainly consists of the following parts:

1. MCU, SRAM and the embedded FLASH memory in MCU constitute the basic platform for the operation of the system; the system software is embedded in the Flash Memory which is in MCU. As the hardware structure of MCS-51 one-chip computer is based on Harvard principle, namely the addressing of program space and the addressing of data space are independent of each other. Address space of 64K Flash Memory is allocated in the 64K program space of the system, 60K SRAM address space and 4K system I/O address space are allocated in the 64K data space of the system. The CPU external frequency is 22.1184MHz. When the system is started, program runs in the Flash Memory directly.
2. Serial communication port

   There are three serial communication ports on the rear board, namely: RS232 port, which is composed of serial port 0 of MCU and is connected to PC, for upgrading of external programs; additionally provided two serial ports and one parallel port for the system through TL16C552 chip extension. Therein, one of the two serial ports is used for the built-in printer, and the other is used for transmitting the test result.
3. PLC

   PLC provides the logic control over all parts of the system. Through extension, the PLC provides a port for controlling eight LED indicators, and provides control over transformation of interrupt signal and local bus which is connected to the font, and allocates decoded address of the system.
4. Scanning the keyboard

   Keyboard scanning logic of 5×5 array is formed by the lower 5 digits of PA and the lower 5 digits of PB of 8255 chip; 8255 chip sends out keyboard scanning signal from PA port periodically and detects any press onto the key through PB port.

5. Power transformation circuit

   System power supply provides +5V power for the rear board, the rear board needs +5V power and +3.3V power. Therefore, +5V power must be transformed to +3.3V power to meet the need of the rear board.

2.4 Front board functions

2.4.1 Description of font board functions

The front board, under the control of the rear board, fulfills the unique functions that a semi-automatic biochemical analyzer can provide. The front board is the key controlling and executing part of the semi-automatic biochemical analyzer. For the semi-automatic biochemical analyzer C61, its front board mainly provides the following functions:

- Choosing spectral filter
- Peristaltic pump rotates and draws in a certain amount of liquid
- Control of tungsten halogen lamp (Switch on / Switch off)
- Transformation, amplification and sampling of photoelectric signal.
- Detection and controlling of temperature

2.4.2 Principle block diagram of front board

Principle block diagram of front board is showed as followings:

Principle block diagram of front board of C61 semi-automatic biochemical analyzer

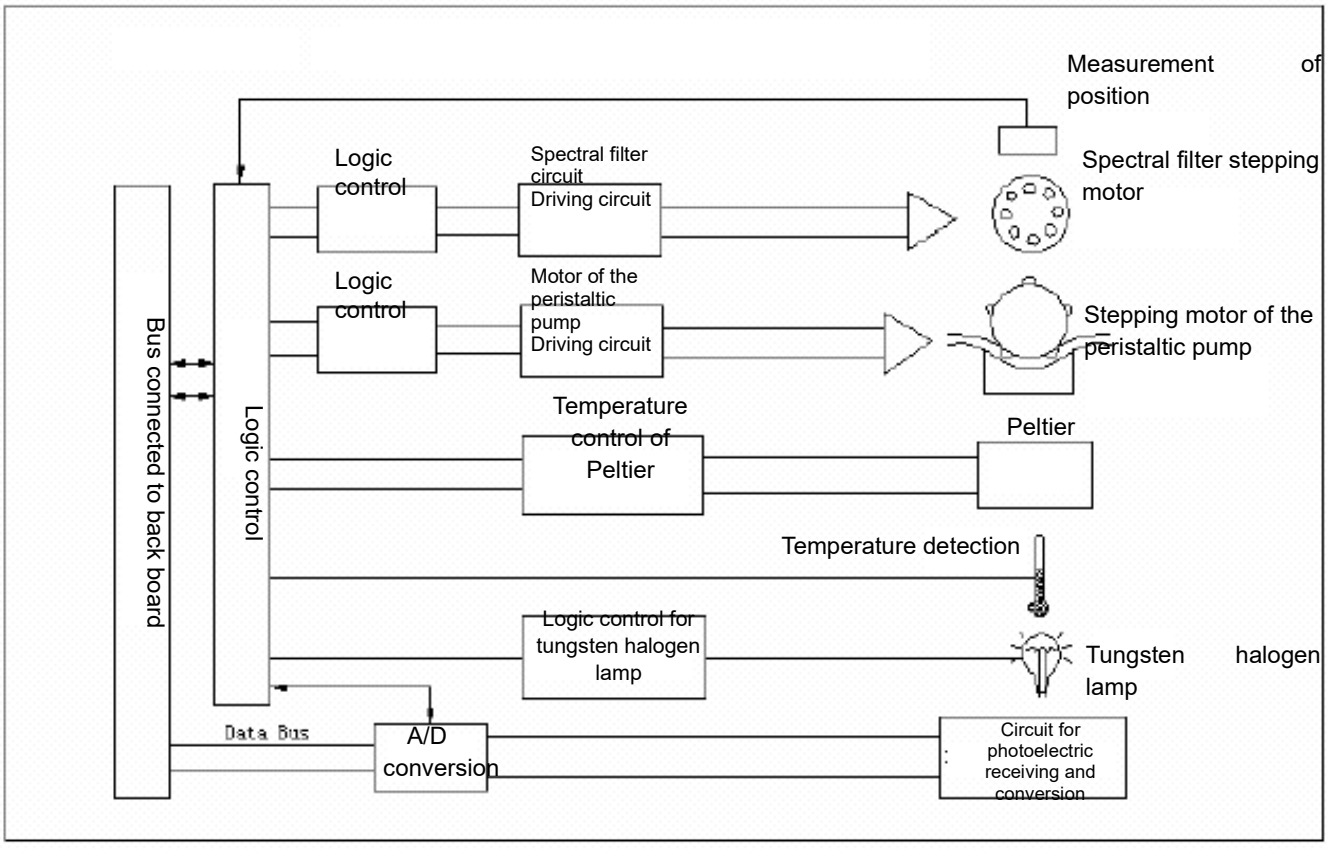


Fig 2-2 Function block diagram of the front board

2.4.3 Controlling of choosing spectral filter

There are five different spectral filters available for the semi-automatic biochemical analyzer C61 Analyser with the wavelength of 340nm, 405nm, 500nm, 546nm and 620nm. Spectral filter varies with different testing method. Install all the spectral filters evenly on the round plate with 8 holes, contained angle of any two adjoining holes is 360/8 =45°. One surplus hole is spared for further installation of spectral filter for special wavelength. The stepping motor drives the plate rotating. Spectral filter the system choose varies with rotating angle of the stepping motor. The type of the stepping motor is 35BYC412L-01201C-L1 (Its parameters are the same as the stepping motor typed UBD6N07D04ANNC). The motor is equipped with a reducing gear box to increase its rotational torque. The reducing gear box is a complementary unit to the stepping motor. The 8254 OUT port outputs pulse generated by the spectral filter so that corresponding spectral filter is chosen.

2.4.4 Control over liquid-intake of the peristaltic pump

The semi-automatic biochemical analyzer C61 Analyser can automatically draw in certain amount of reagent according to the preset amount in a test item. Similar to the motor of the spectral filter, it realizes precise control over the intake amount of liquid under the driving of stepping motor. Its controlling method is similar to the stepping motor of the spectral filter: The amount of reagent the instrument intake varies with the rotation angle of the stepping motor. The peristaltic pump will generate a relatively greater torque in intake liquid, so we choose the bipolar stepping motor, typed 17HS1025-2. Correspondingly, the driving circuit adopts bipolar controlling/driving chip L297 and L298.

Eight different rotational speed can be available according to different concentration of sample to be tested and different intake speed provided to users. Write specific frequency division constant into Timer/Count 0 of the 82C54 chip and the OUT_0 port will output corresponding frequency and the peristaltic pump will rotate at a corresponding speed.

2.4.5 Detection and controlling of temperature

Temperature control consists of temperature detection and control over heating/cooling. For temperature detection, it adopts Bus-structured Fully Digital Temperature Sensor DS1820 made by DALLAS Company to reduce the periphery transformation circuit.

2.4.6 Sampling and transformation of light energy

The part for sampling and transformation of light energy is the core of the semi-automatic biochemical analyzer. All calculation of detection on the semi-automatic biochemical analyzer is conducted on basis of detection in luminous intensity. So the sampling and detection in light energy must be performed precisely and stably to meet the requirement of the instrument in the speed of sampling and detection. It adopts photoelectric sensor OPT301M from B-B the Company. Silicon photocell and built-in operational amplifier are integrated in the sensor. The silicon photocell transforms photocurrent into faint voltage signal and the built-in operational amplifier amplifies the faint voltage signal to meet the measurement requirement in voltage. OPT301M is high in integrated level and good in performance. The voltage signal must be transformed into digital signal before being processed in CPU, so an A/D converting circuit is indispensable. For the A/D converter, we adopt ADS774 A/D from B-B Company. It is a 12Bit converter which can meet all requirements of the instrument in range, precision and speed of the measurement. The scope of the voltage input A/D is 0-10V.

2.4.7 Control of the tungsten halogen lamp

To prolong service life of the light source, the instrument should be capable of turning off the light source automatically if the instrument is not in service for a long time. The light source that the instrument uses

is a tungsten halogen lamp. Its specification is 6V/10W and the electric current goes through it is relatively larger and its power is relatively larger as well. If we use MOS tube to control the on-off mode of the tungsten halogen lamp, the large voltage drop and high power dissipation in the MOS will cause many unfavorable problems such as the heat dissipation problem. So we use small-scale relay in stead. The voltage drop at the contact point of the relay is approximately zero and the power of the controlling relay's wire pad is relatively less. Control signal is output from $P_{B.6}$ port of the 8255 chip. The triode is used to control the on-off mode of the wire pad of the controlling relay.

2.5 Functional description of the pipeline

2.5.1 Functional Specifications

When the intake button is pressed during the measurement process, the system makes the motor of the peristaltic pump rotate and then the pressing wheel of the peristaltic pump presses against the pipeline tightly to make the liquid flow to the outlet and thus the liquid is taken into the cell. Once taken the right amount preset in the test item, the system will stop the motor of the peristaltic pump. The liquid will reside in the cell for measurement. After the measurement, the system urges the motor of the peristaltic pump rotate and drains the liquid in the cell to reduce cross contamination and waits for the next measurement.

2.5.2 Structure of the pipeline

Fig. 2-3 Structure figure of the pipeline

2.6 Functional description of the optical path

2.6.1 Functional Specifications

Optical structure of C61 Analyser is given as following. It is the back-dividing-light structure of the interference spectral filter. Radiation the tungsten halogen lamp giving off goes through the convex lens and is turned into parallel rays. The protective glass is used to protect the convex lens. The parallel light casts into the cell which is loaded with liquid to be tested, part of the light energy is absorbed by the liquid and the light out becomes monochromatic light after goes through the monochromatic spectral filter. Then the monochromatic light casts onto the photoelectric receiver and is converted into electronic signal thereafter and input into the front board for processing. Color of the spectral filter and that of the solution to be tested should be complementary colors.

2.6.2 Structure of optical path

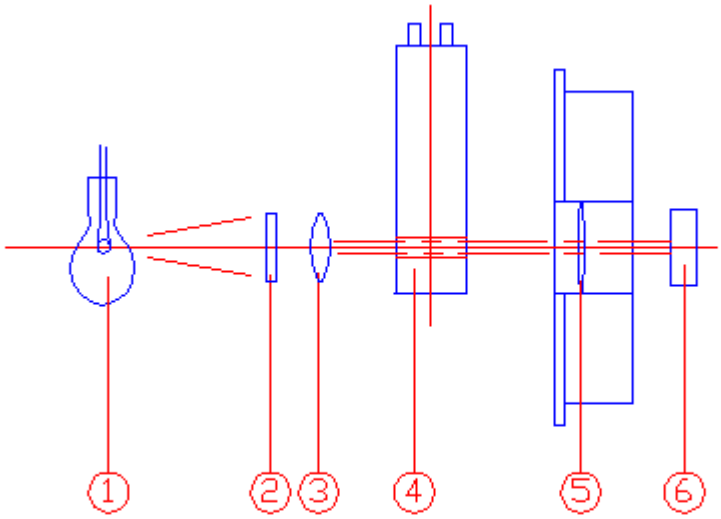


Fig. 2-4 Diagram of optical path

① 6V/10W tungsten halogen lamp

② Protective glass

③ Convex lens

④ Flow cell

⑤ Filter

⑥ Photoelectric receiver

Chapter 3 Replacement of Accessories

3.1 Disassembling of the analyzer

C61 Analyser is a complicated high-precision analyzer, and all the components inside can not be repaired by customers. When problems arising can not be solved according to the above mentioned methods, you should turn to professional personnel for help; Follow the disassembling procedures below once you find that there is any problem with the component inside and it is necessary to perform maintenance or the have the component replaced:

1) Get rid of the residual solution in the pipeline thoroughly and fix the flow cell..
2) Power off the analyzer and disconnect the power cable.
3) Place a piece of soft silk on a clean and even worktable and then place the analyzer on the silk up side down so as to prevent the surface of the plastic upper lid from being damaged .
4) Loose the two tapping screws which are used to fasten the plastic upper lid onto the metal base with a screwdriver.

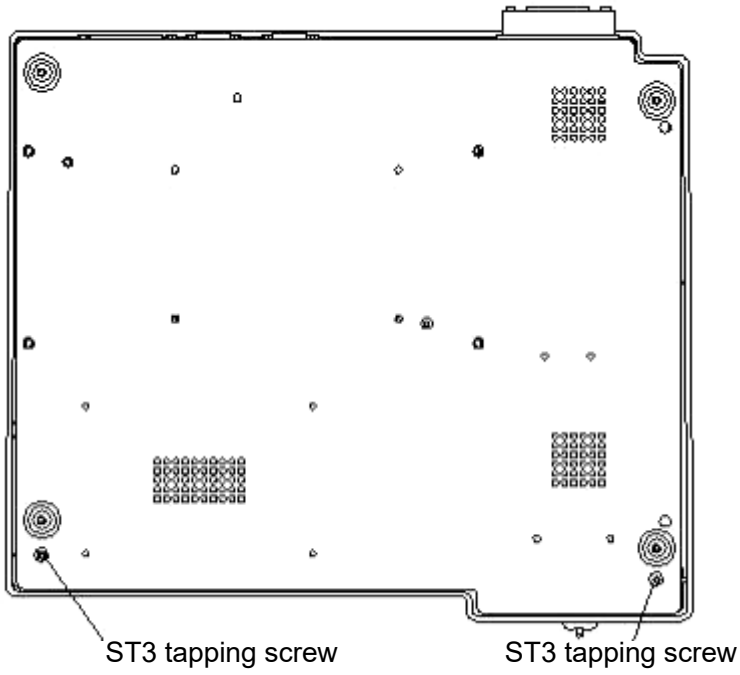


Fig. 3-1 Position diagram of screws on the upper and lower lids

And then loose the two screws at the back of the instrument. See the diagram below.

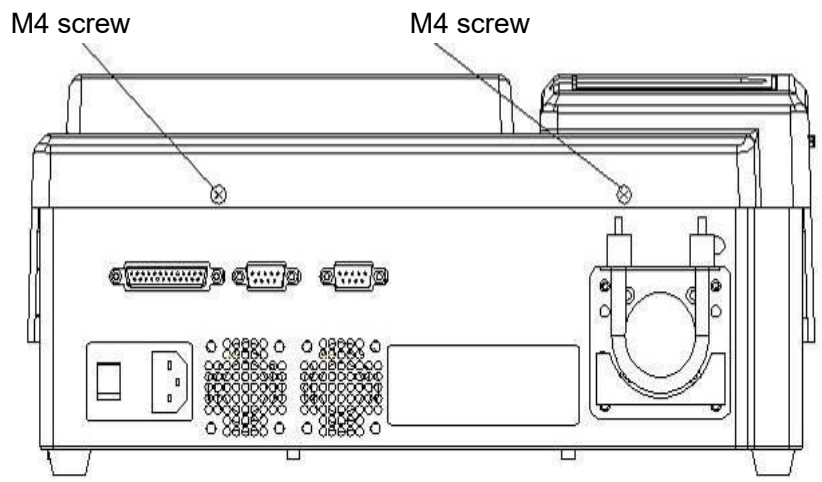


Fig. 3-2 Position diagram of the rear screws

5) Place the whole instrument on the worktable carefully and open the lid for the light source and take out the pipette from the hole in the plastic upper lid.

6) Hold the front side of the plastic upper lid with your hands and raise it carefully, notice that there are several cables connecting the upper lid and the lower lid, exert decent force so as not to damage the cable plugs /sockets. Unplug the connecting cable when detach the upper lid and the lower lid. The diagram below shows the view of the upper lid and the lower lid after they are detached

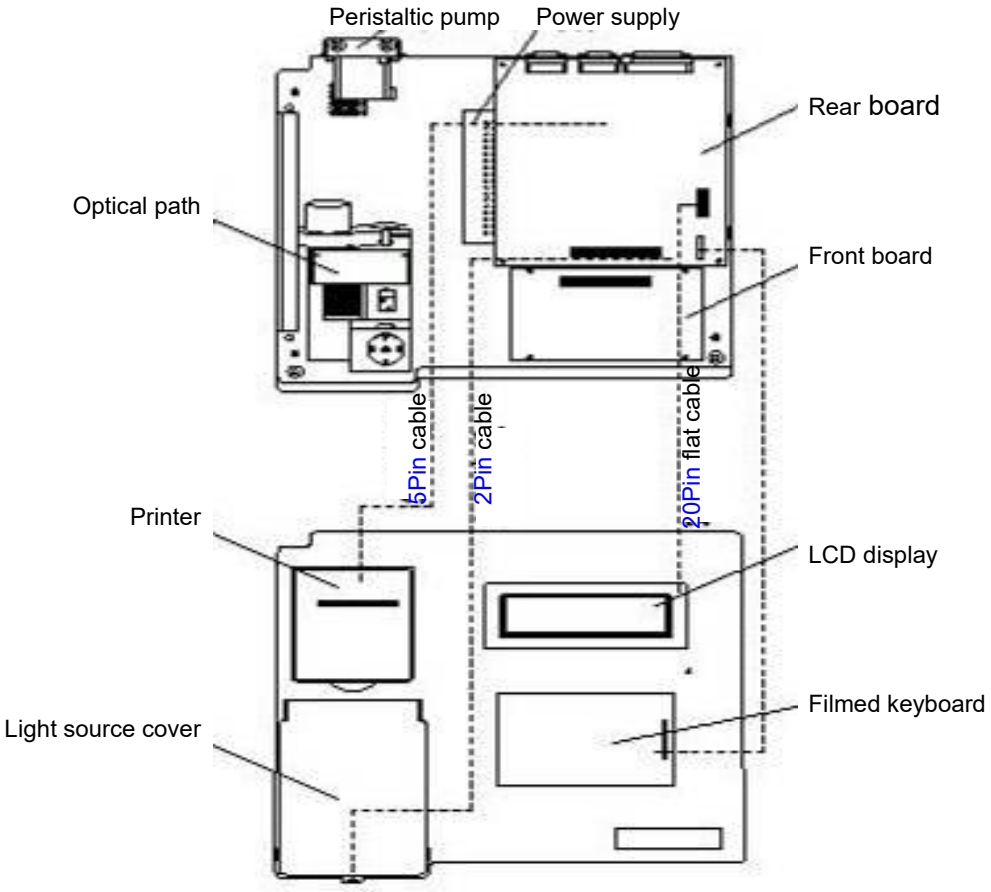
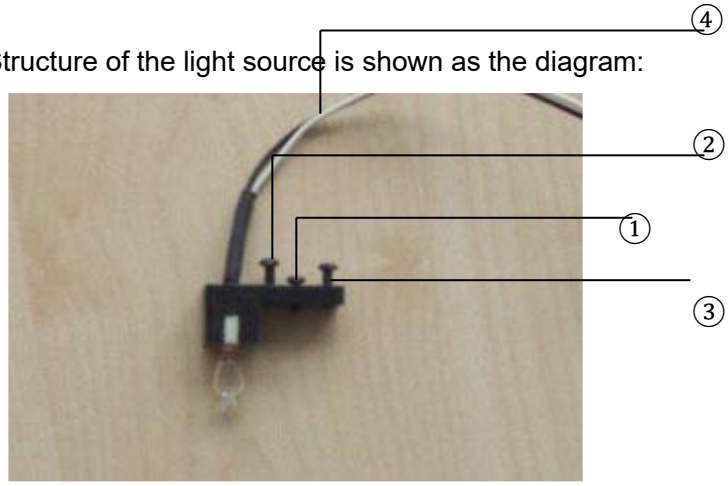


Fig 3-3 View of the upper lid and the lower lid after they are detached:

3.2 Replacement of lamp

Structure of the light source is shown as the diagram:

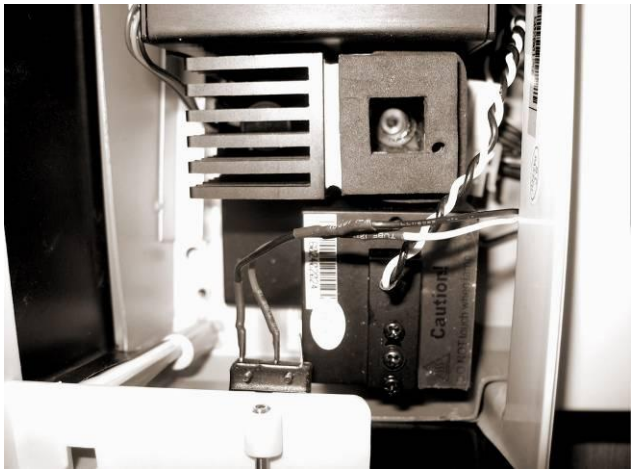


① Is the fastening screw. It is used to fasten the light source onto the lamp holder.

② And ③.are adjusting screws. Finely adjust position of the light source so as to adjust the light intensity

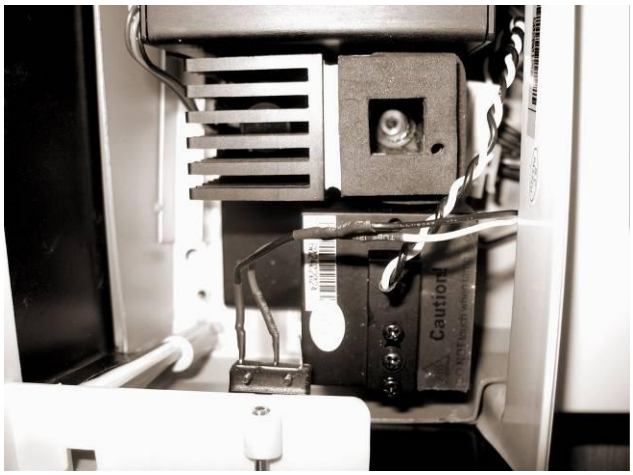
④ Is the power cable of the light source. Power for the light source can be available once the power cable is connected to the mainboard.

1. Shut down the instrument and open the cover of the apron of the light source, remove the power cable of the light source and loose the screw ① to remove the light source.



2. Place the new light source in the holder and fasten the screw ① and connect the power cable to power supply.
3. Mount the screw ② and screw ③. Do not screw them excessively.
4. Start the machine, enter main menu, choose " whether 3 system set up " select, " 4 only better to test " after entering " first, set up wavelength as 340nm, suck according to " RINSE " distilled water wash pipeline about half minute, press, suck distilled water test 340 AD value and then first.

5. Slide the light source back and forth to maximize the tested AD value (value in the round brackets).
6. Adjust screw ② and screw ③. Note that direction of movement for ② and ③ are opposite. Unscrew screw ③ and tighten screw ② simultaneously to make the AD value stay at 3000 or around (Any value between 2500 and 3800 is acceptable) and then fasten screw ①.



7. Fasten screw ① and return the apron of the light source.

3.3 Replacement of switch

1. Shut down the instrument and unscrew the screw on the base and remove the upper lid of the instrument.
2. Unplug the ①, ②, ③ connectors (Fig. - 1).
3. Clamp the spring pieces ④ on each side of the switch base. Push the switch base outwards and then remove it (Fig. -1).
4. Pull out the power cable ⑤ and ⑥ from the connector on the switch and clamp the spring pieces on each side of the switch and push out the switch (Fig. -1).
5. Pick a good switch and turn the " I " mark toward the socket direction and plug it into the switch base.
6. Connect the power cable ⑤ and ⑥to the connector of the switch (Fig. - 1).
7. Press the switch base into the instrument base (Fig - 2) and make sure the plug of the power cable toward the fan direction (Fig - 2).
8. Connect the ①, ②, ③ power cables (Fig. - 1).
9. Return the upper lid and fasten the screw on it and then start the instrument (Avoid the cables on the upper lid being pressed by the screw head lest the cables be damaged).

Fig - 1

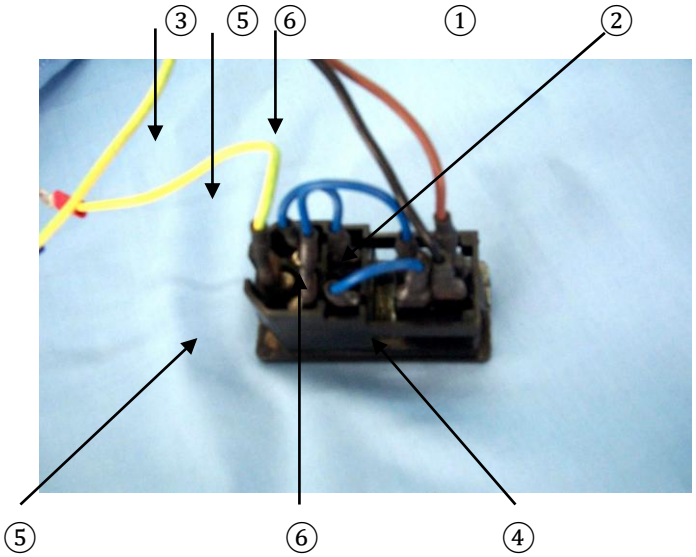
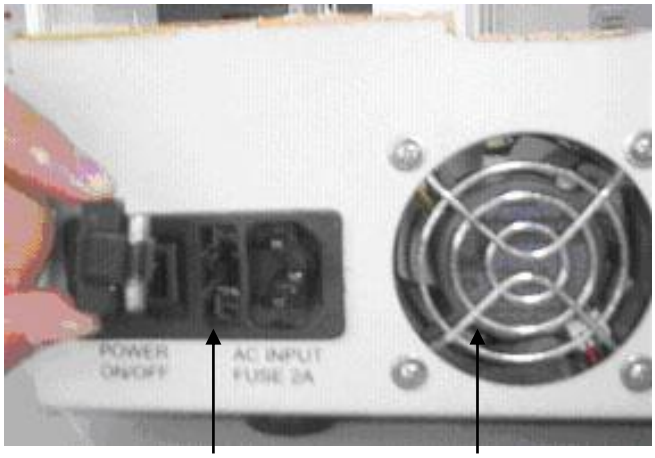


Fig - 2

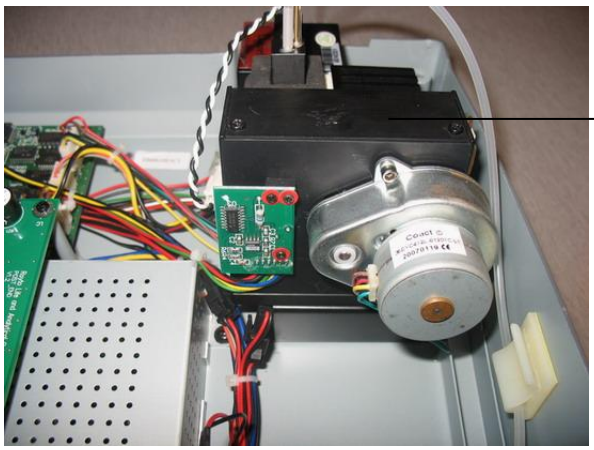


Cable socket Fan

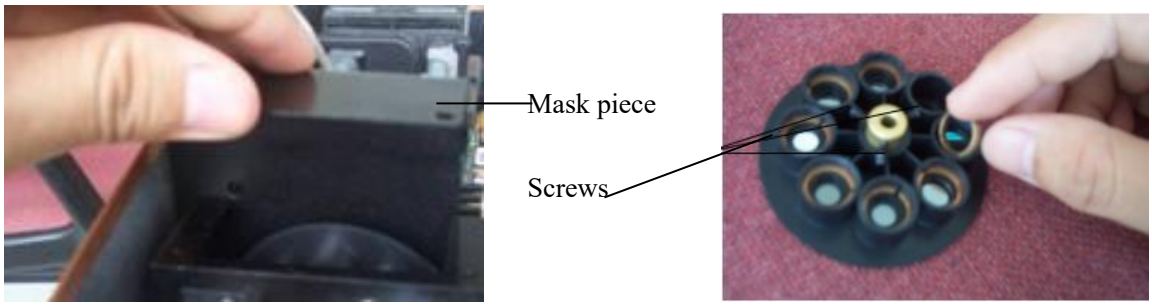
3.4 Replacement of spectral filter

1. Open the upper lid of analyzer C61 Analyser and handle the connecting cables between the upper lid and the mainboard carefully.

2. Loosen the screws on the Cassette of the spectral filter.



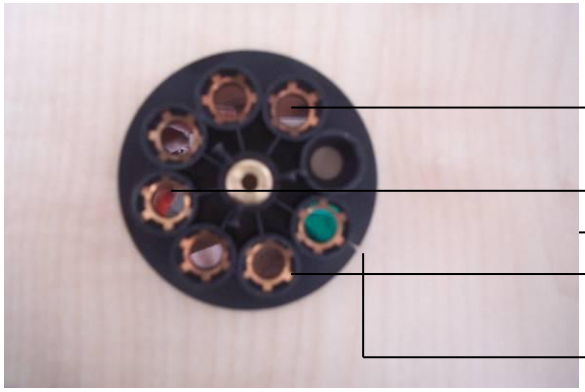
3. Pull out the mask and loosen the 3 screws on the spectral filter wheel at the same time as the figure indicates.



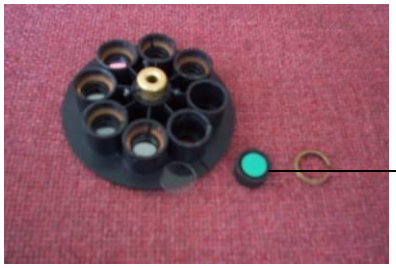
4. Unscrew the fastening screws and unload stepping motor.

5. Pull out the stepping motor first and then take out the spectral filter plate as the figure indicates.

6. The spectral filter plate which has been taken out



7. Each spectral filter for specific wavelength is shown as the figure. Wavelength the notch corresponding is 340nm. All wavelengths from 340nm to 670nm are sequentially arranged clockwise.
8. Take out the fastening copper ring carefully, and then take out the old spectral filter.

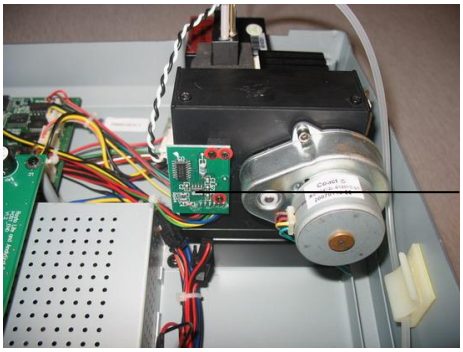


9. Mount a new spectral filter for corresponding wavelength and return the fastening copper ring thus the replacement of the spectral filter is completed.

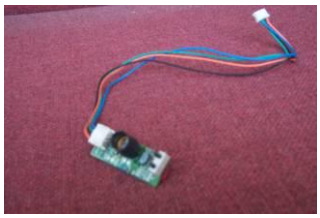
10. To install the spectral filter into the cassette, the above mentioned disassembling procedures in a contrary order. 3.5 Replacement of signal receiving board

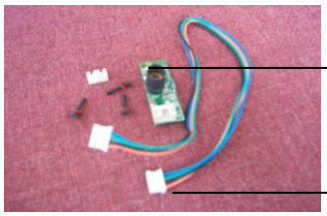
Signal receiving board is used to convert the ever changing optical signal into electronic signal for further calculation. It is the most important component in the optical system. To replace it, see the procedures as follows.

1. Unscrew the screws and remove the Cassette then your can see the signal receiving board.



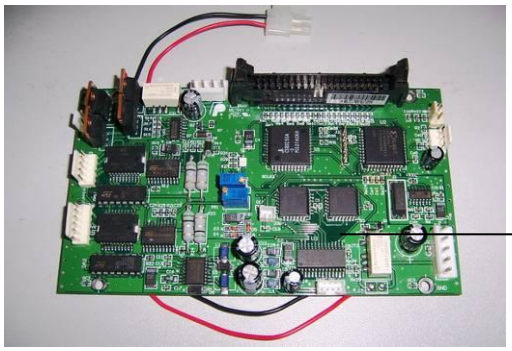
3. Unscrew the 3 screws with red spacers and pull out the receiving board then you can have a full look at the board.





4. Replace a new signal receiving module and insert the power cables sequentially then screw the screws and mount the spacers.

5. Insert the other end of the power cable into the 6pin plug P on the front board firmly, then the signal receiving module can operate normally.



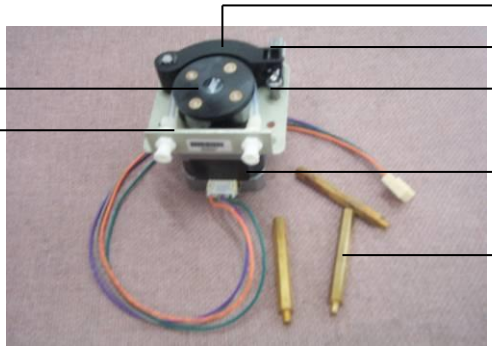
Note: For the new signal receiving board, there are two corresponding plugs, 4pin and 2pin respectively, on the front board.

3.6 Replacement of pipelines

Note: Perform the following procedures with care and don't drop any water onto the circuit board.

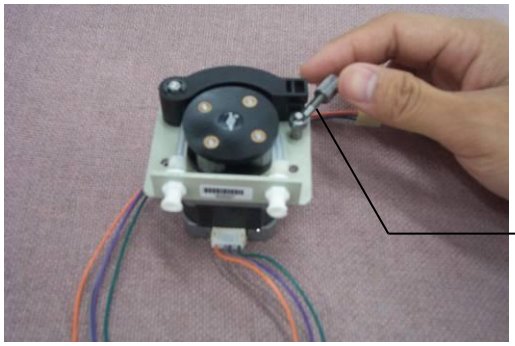
Replacement of pump tube

The overall view of peristaltic pump:

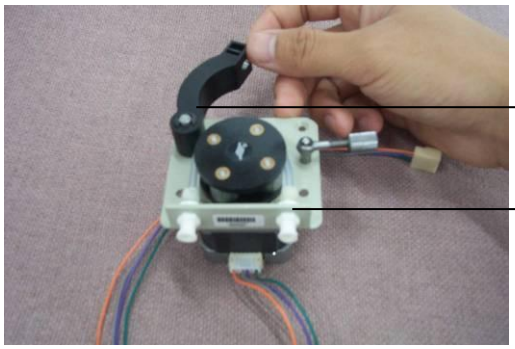


The copper column is used to fix the pump body onto C61 Analyser base.

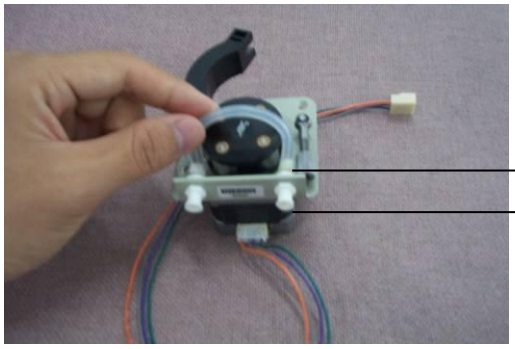
1. Loose the adjusting screw, open the stop bar.



2. Open the snap, the pump tube can be seen.



3. Remove the pump tube, shear off the bandage, you can separate the pump tube from the white cuff.



4. Replace the pump tube with a new one, bandage, and do the operation procedures above reversely, and adjust tightness through adjusting screw finally.

Chapter 4 Regular maintenance

4.1 Summary

C61 Analyser is a precision clinical analyzer. For ensuring its good conditions, daily maintenance should be done. Maintenance of C61 Analyser is very simple, but it should be carried out carefully.

4.2 Cleaning the analyzer

4.2.1 Cleaning the surface of the analyzer

- Keep the operating environment of the analyzer clean.
- Neutral detergent and wet cloth can be used for cleaning the surface of analyzer.
- Please use a soft cloth to clean the LCD.

Warnings: Caution: Do not let the analyzer be exposed to any solvent, oil, and other corrosive substances.

4.2.2 Cleaning the cell

The cell should be kept clean for ensuring the accuracy of the measured result.

1. Cleaning the outside of the cell.

a. The cell should be installed according to the requirements (refer to 1.1.5).

b. If the outside of the cell is dirty, a piece of soft cloth with absolute alcohol can be used for cleaning.

2. Cleaning the inside of the cell

a. Put a container full of distilled water under the pipette, press RINSE key to start continuous rinsing function. Then pres RINSE key again to stop rinsing. Normally it takes half a minute for continuous rinsing.

b. Detergent for glass container, dilute hydrochloric acid (0.1N), and Tween 20 diluent (2-3 drops/L) can be used for cleaning the flowcell. Press RINSE key to suck the detergent, press RINSE key again to stop the running of the peristaltic pump to let the detergent remain in the cell for 5min., and rinse the cell with distilled water for 1 min. finally. If it isn't clean enough, rinse the cell with detergent again.

The cell should be cleaned under the following conditions:

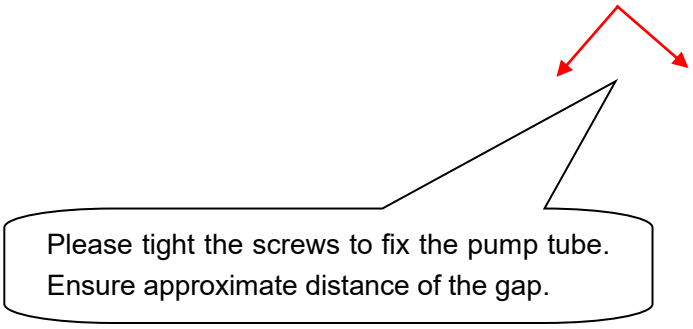
- Water blank difference is too large at the starting moment
- Change the testing item
- Before shut-down

Warnings: Do not leave the reaction liquid or other pollutants in the cell for a long time.

Chapter 5 Problem-solving guide line

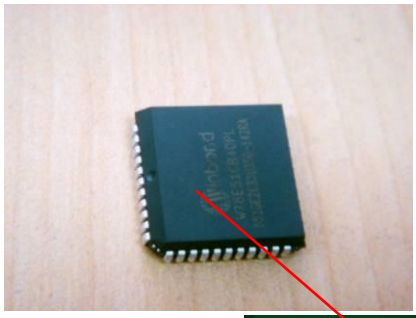
5.1 Fix pump tube

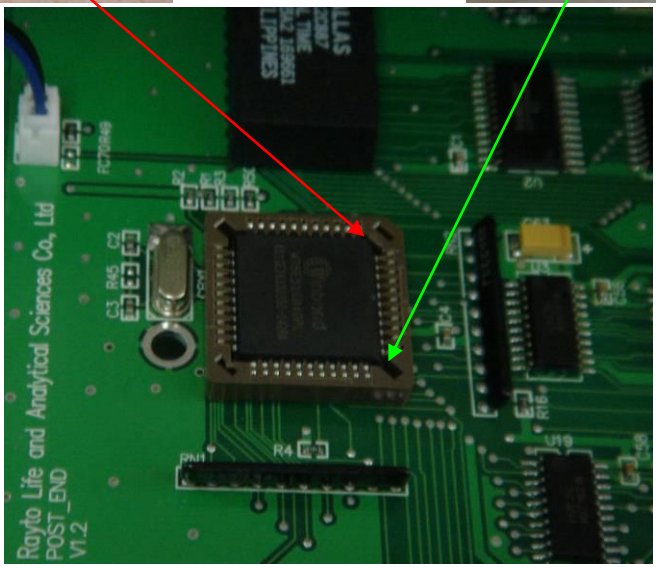
Before running the instrument, please tight the screw to fix the pump tube.



5.2 Change the chip

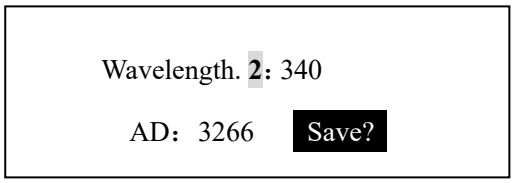
Please ensure the flat end on the right position. Please use the tool or forceps to take the chip out then install the new forceps carefully.

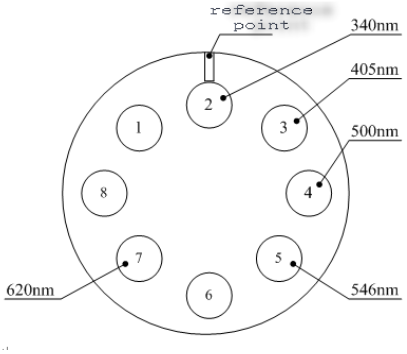




5.3 Optical setting instructions

In system setting menu, click the number'4' key , Instrument will display the menu as Figure 2-7 (a),





(a) AD value display interface (b) Filters position（face to rear of the filter wheel）

Figure 2-7 AD real-time value

（1）Save every filters' zero-blanking value

Press RINSE key to aspirate distilled water（make sure pipeline full），press Left and Right button （◀▶）change the wavelength。when the AD value keep stable，press ENTER button to save the current filters AD value ，if the value has been saved, the word "Save?" will disappear .AD value is used for program testing calculation please save properly.

（2）User-defined filters

1. User can change or add filters to the instrument according to requirement，but filters must be installed as Figure 2-7(b) described .（the wavelength displayed on Figure 2-7 (a) is correspond to the filter position on 2-7 (b) ）

Face to rear of filter wheel(installation face) ,take the trough as a reference point, just like 2-7(b) described, The filters in position 2、3、4、5、7 were installed in factory as standard collocation, no filters in position 1、6、8 。

Note : Don't install filter to the position 1,because this position rest on ligth path when instrument not testing.

2. After filter has been intalled properly, Turn on instrument and enter the AD value display interface, as 2-7(a). Press RINSE key to aspitrate distilled water (make sure pipeline fully flooded) ,Then press Left or Right button （◀▶） to find the position installed new filter, and then press .(dot)168, the wavelength value "None" will be lighted,at this moment,you can input the new filter's wavelength value, when the AD value keep stable，press ENTER key to save the current filter's wavelength value and corresponding AD value.