

GEA

Microplate Reader

Service Manual



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Note of this manual

Note: for uncorrectable errors or repeated occurrence of an error during usage, please contact the dealer.

Note: this manual may contain other declarations of proprietary rights and copyright information that must be observed. This manual may contain inaccurate technical information or misprints.

This manual is subject to change or updating without separate notice. LINEAR can improve and/or modify the products and/or programs described in this manual at any time without separate notice.

General Description

1.1. Foreword

- 1) GEA is a microprocessor –controlled, general purpose photometer system designed to read and calculate the result of assays, including contagion, tumorous mark, hemopathy, dysghormonism, which are read in microplate.
- 2) Touch panel and pen brings you convenience in operation.
- 3) 100 tests can be programmed.
- 4) Multiple calculations :
 - Absorbance mode (ABS)
 - Cut-Off mode
 - Single standard mode
 - Point to point mode
 - % Absorbance Multi-Point Mode
 - Linear regression mode
 - Exponent regression mode
 - Logarithm regression mode
 - Power regression mode
- 5) Visual allocation of microplate , you can set blank, control, sample ,standard in any place , and perform 12 different tests in one 96 microplate.
- 6) Test time < 5S/plate,and mix plate before test
- 7) Maximum 1000 patient data and 10000 sample records can be saved.
- 8) Comprehensive report , support common printers.
- 9) Information manage function : Department database, operator database, system log database.

1.2. Technical parameters

Weight:	7.5kg
Overall dimensions:	460mm (L) ×330mm (W) ×190mm (H)
Power:	a.c.110V~220V , 50/60Hz
Fuses:	T3.15AL250V
Work Environment:	temperature 10℃ ~ 40℃ ; Humidity ≤85%
Store Environment:	-10℃ ~ 40℃ ; Humidity ≤85%
Lamp:	Halogen tungsten lamp
Standard Wavelength:	405 , 450 , 492 , 630nm , (substitute filters from 340-700nm available on special order)
Accuracy:	0-2.0A : ±1.0% or ±0.007A
Precision:	0-2.0A : ±0.5% or ±0.005A
Linearity:	±2.0% or±0.007A
Reading speed:	Continuous mode < 5s , step by step mode < 15s
Warm up time:	1 minute
Interface:	RS-232C serial interface, Interface for USB, SD card and LAN

Display: 5.7"LCD display (320×240 discernibility,256 gray scale)

Input: Touch panel and pen, external mouse (Optional)

1.3. Diagram of function

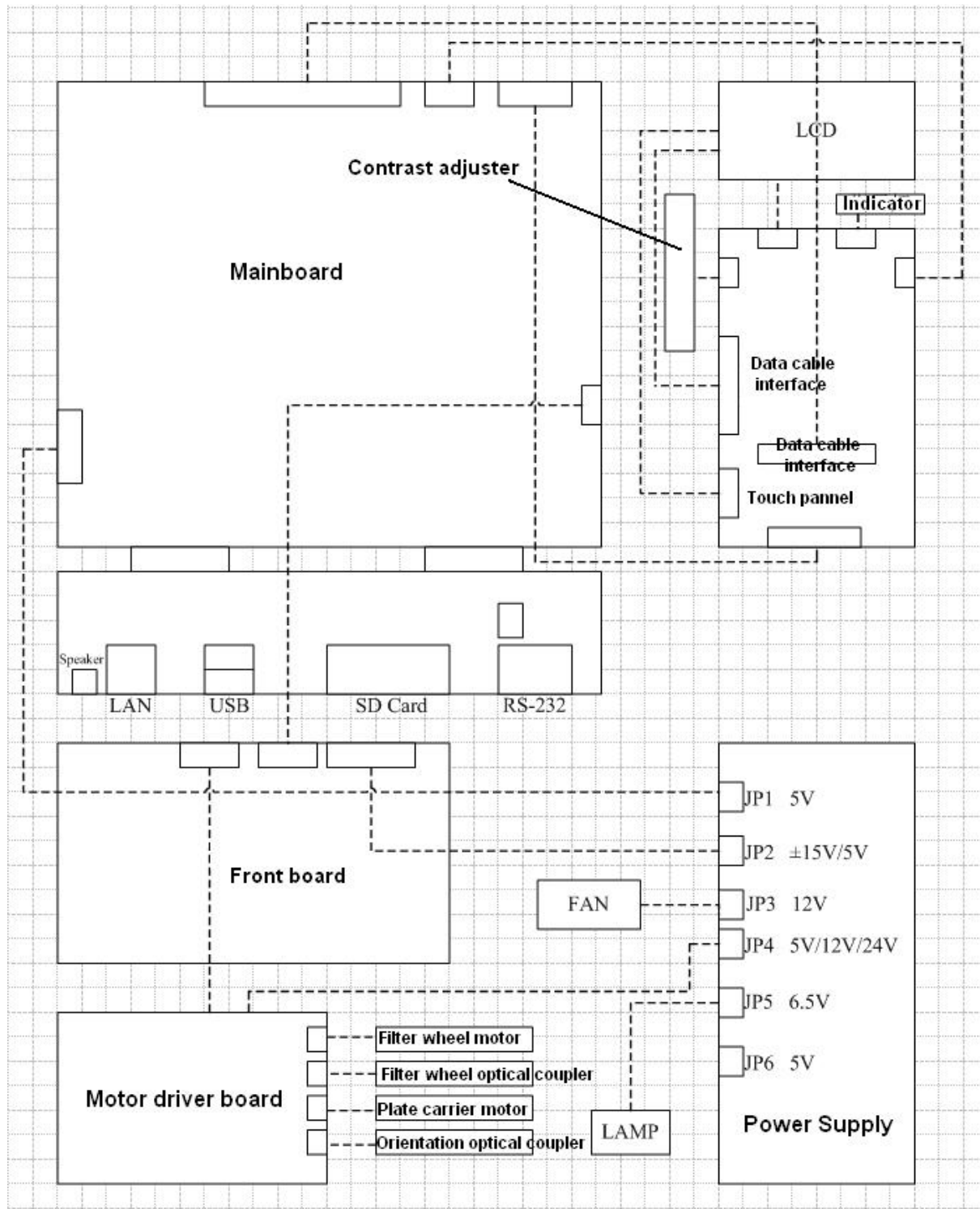


Figure 1-1 Diagram of function

1.4. Function description of each part

1.4.1. Function description of power supply board

The power of GEA system is provided by switching power supply, which outputs 6 channels of AC electric power.

JP1 outputs 5V, for the mainboard

JP2 outputs 5V, 15V and –15V, for the front board

JP3 outputs 12V, for the fan

JP4 outputs 5V, 12V and 24V for motor driver board

JP5 outputs 6.5V for Lamp

JP6 outputs 5V for printer driver board

1.4.2. Function description of mainboard

Mainboard is the platform of GEA system, which provides the running environment for system software and application software;

It provides the interface to connect front board, and controls the front board and data acquisition procedure;

It provides the I/O interfaces for the system, supports one RS-232 interface, 2 USB interface, 1 LAN interface and 1 SD interface.

1.4.3. Function description of front-end board

The front board converts the instructions from the mainboard into driving signals and locating signals, to control the filter wheel's motor and control the predetermined-position attainment signal and reset signal for the plate carrier. It also converts the photoelectric signal that the photocell received into digital signal and returns it to the mainboard.

1.4.4. Function description of motor driver board

The motor board receives the control signal from front-end board, providing voltage and control signals for filter wheel motor and plate carrier motor.

1.4.5. Function description of LCD transition board

LCD transition board controls the displaying of LCD. It provides high voltage for LCD screen receives the signal from the touch panel and returns it to the mainboard.

1.4.6. Function description of LCD screen

The LCD screen displays and the touch panel receive the signal by external touches.

1.5. Optic system

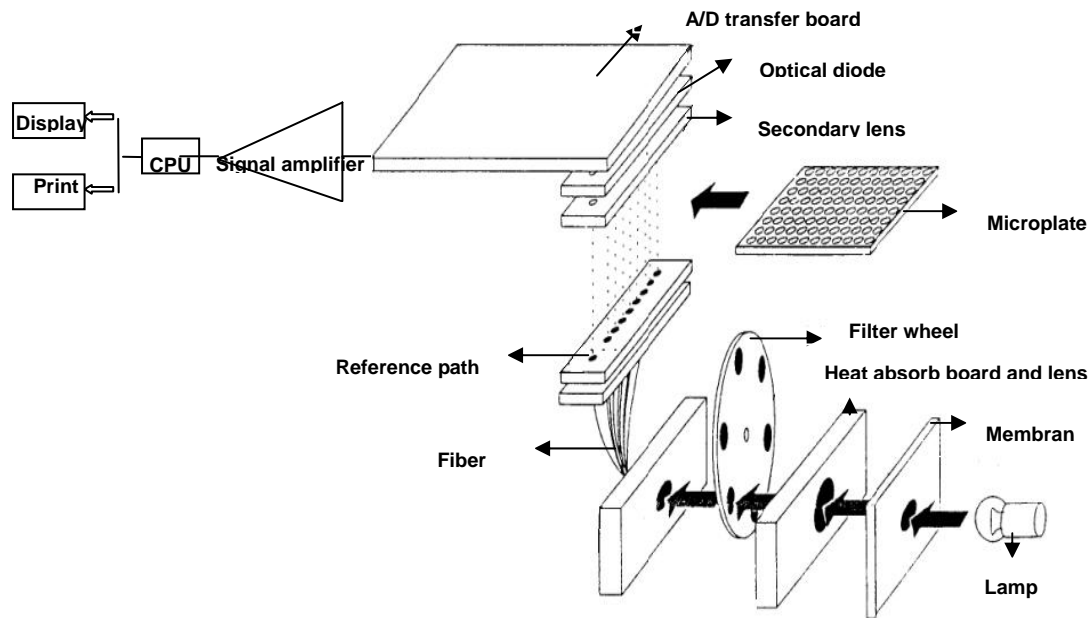
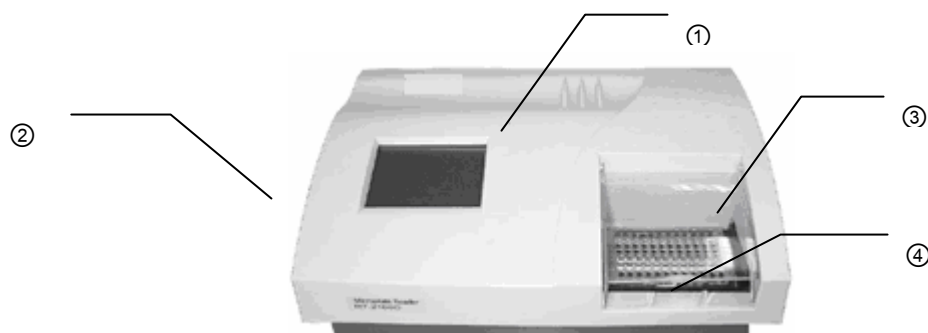


Diagram 1-3 Optic system of GEA

1.6. General views of GEA

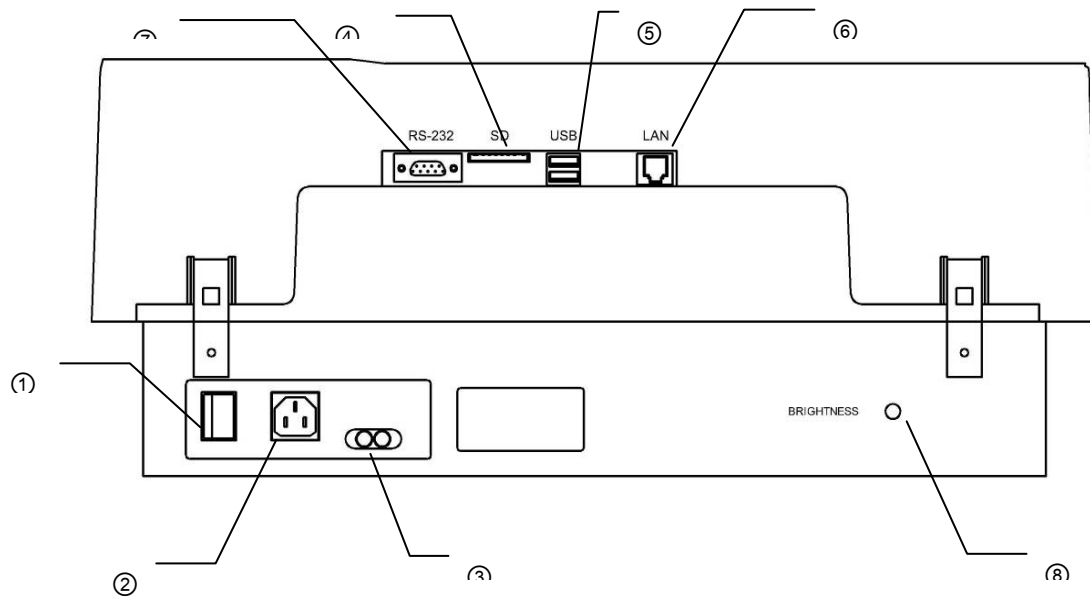
1.6.1. GEA front view



- ☐ power pilot lamp : It light when opens the instrument
- ☐ touch panel & LCD : displaying by LCD and you can operate by touch panel.
- ☐ Plastic cover

Plate carrier : Microplate in plate carrier

1.6.2. GEA rear view



- Power switch
- Power socket
- Fuses
- Interface for SD Card
- Interface for USB
- Interface for LAN
- ⑦ RS-232 interface
- ⑧ Brightness adjuster (to adjust the brightness of displaying)

2. Installation and primary operation

2.1. Instrument unsealing

Unseal the packing of the instrument and remove the material used for conveyance. Retain the packing box and packing material for the purpose of re-packing the instrument in future.

- 1) Take the instrument out of the box.
- 2) Remove the packing material and take the instrument out of the plastic packing bag.
- 3) Check the contents of the packing box for the following:
 - **GEA** main system
 - user manual
 - Packing list
 - guarantee card
 - Accessories: power line, RS-232 serial cable, touch pen and spare fuses.

Note: if any part is found missing or damaged or not conform to the encasement checklist, please contact the dealer.

2.2. Environmental requirements

Find a location in your working place that is not directly exposed to the sun. The working table selected shall have a smooth surface as well as an enough space to put the GEA. The front edge of the instrument shall be close to the edge of the working table. Avoid much vibration on the working table (e.g. a centrifugal machine is put on the table).

Note: the ambient temperature of the instrument shall be 10 °C-40 °C, and the humidity shall be ≤85 %.

In order to ensure the normal working of the instrument, it must not be put in the following places:

- Where there is a wide temperature range;
- Where it is too hot or too cold;
- Where there is a lot of dust;
- Close to the electromagnetic equipment that generates magnetic field;
- AC110V - AC220V
- 50 / 60Hz
- 120VA

Note:

- ***AC mains must have a good earthing (zero-ground voltage <5V =.***
- ***AC power supply must be stable and the instrument must not share the AC mains with large-power electrical appliances.***
- ***Must clutch at the plug itself, not at the power cord, to disconnect the power cord.***

If fumes, peculiar smells or strange sounds are found given forth from the instrument, please cut off the electricity supply immediately and contact the dealer.

2.3. Printer installation

- 1) Make sure that the printer and instrument have been turned off.

- 2) Connect one end of the USB printer cable to the USB interface of the printer.
 - 3) Connect the other end of the USB printer cable to the USB Interface of instrument.
 - 4) Connect the printer to power supply by the power line for the printer.
-

Note : To make the printer work properly, you must turn on the instrument before you turn on the printer.

When you are inserting or pulling out the printer cable, you must make sure that the printer has been turned off. Or it may cause damage to the instrument and make it work abnormally.

3. Daily maintenance and spare parts replacement

3.1. Maintenance of the instrument

GEA is a precision instrument for clinic analysis, and in order to keep the instrument in a good condition, daily maintenance is a must. The maintenance of GEA is very simple, but one must do it with care.

3.1.1. Instrument cleaning

- Keep the instrument's working environment clean.
- Use neutral detergent and wet cloth to clean the surface of the instrument.
- Please clean the LCD with soft cloth.
- Clean the moveable working table with neutral detergent and wet cloth.

Note: please keep this instrument away from any organic solvent, grease or corrosive substance.

3.1.2. Maintenance of LCD touch-screen

- Please use the machines attached special-purpose pen for operation.
- Never touch the screen surface with sharp-pointed or high-hardness objects (such as metal, glass and etc), so as not to cause damage.
- If there is a great deviation of the position the arrow points at from the position you point at, the touch-screen need recalibration.

3.2. How to disassemble the instrument

Steps of disassemble

Steps of disassembly:

- 1) Fix the plate cover of the microplate reader with adhesive paper.
- 2) Switch off the instrument and the printer and disconnect the power cord.
- 3) Remove the printer cable.
- 4) Remove the screws used to fix the top cover with a cross screwdriver, as shown in figure 3-1.
- 5) Lift the top cover carefully and you can see the inside of the instrument.

- 6) Remove the corresponding parts according to your requirement.



Figure 3-1



Figure 3-2

3.3. Replacement of spare parts

Note: *you must observe carefully the positions and wiring of the original parts before replacing them, so as to restore the instrument.*

3.3.1. Replacement of fuses

- 1、 As shown in figure 3-3, use a screwdriver to remove the fuse from fuse box. Push the fuse socket in and turn it anticlockwise, then you can take out the fuse socket, as shown in figure 3-4.

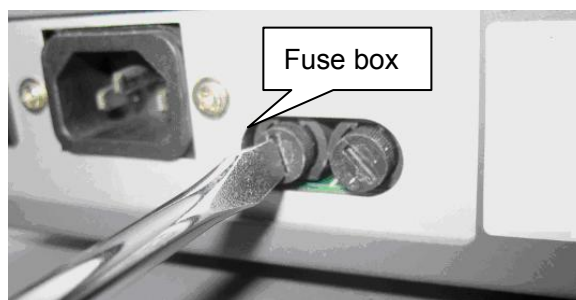


Figure 3-3



Figure 3-4

- 2、 After taking out the fuse socket, as shown in figure 3-5, take the fuse out form the socket and replace a new one. Install the fuse socket into the fuse box again. Use a screwdriver to push the fuse socket in and turn it clockwise.

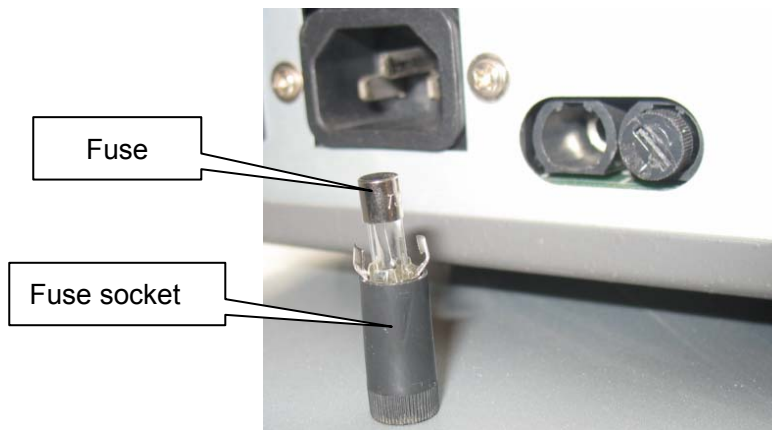


Figure 3-5

3.3.2. Replacement of power switch

- 1、 Switch off the instrument, remove the screw which fixed the top cover and remove the cover

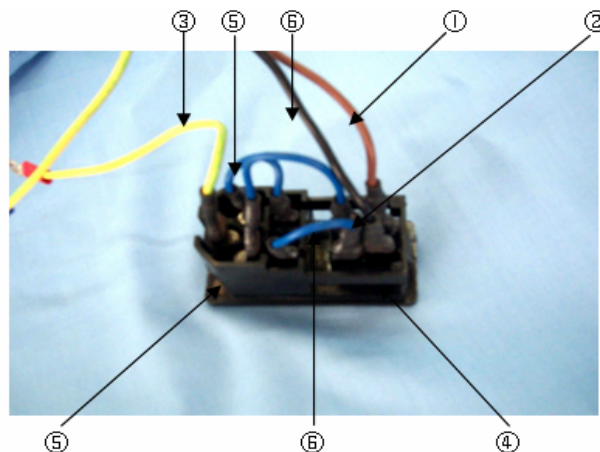


Figure 3-6

- 2、 Press out the spring piece ④ at the two sides of switch socket, take out the whole switch socket, the structure of power switch is shown as figure 3-6
- 3、 Take off the wires from the switch, change a new switch and connect the wires as original, then re-install the switch

Note : Please pay attention to the original position of wires, they must be correctly connected. You'd better connect the wire to new switch as soon as you take it form the old switch.

3.3.3. Replacement of Lamp

Note: You must wait for the lamp to cool down, then you can replace it.

- 1、Lift the top cover of instrument, you can see the lamp, as shown in figure 3-7, the lamp is shown as figure 3-8.

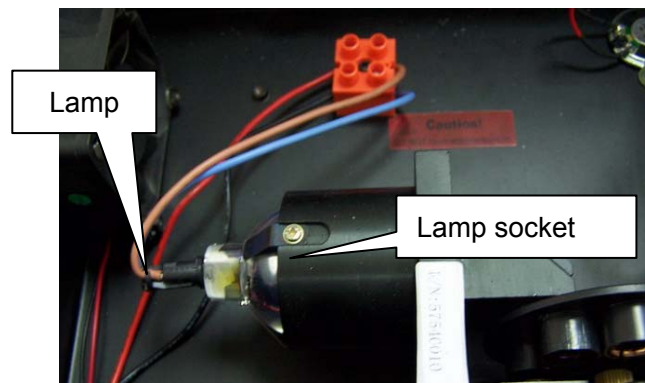


Figure 3-7



Figure 3-8

- 2、As shown in figure 3-9, remove the screw and spring piece which fix the lamp, press the lamp down slightly, take off the lamp form lamp socket, disconnect the wires on lamp, replace a new lam and connect the wires again.
- 3、The installation of lamp is shown in figure 3-10, press down the lamp slightly, push it into the lamp socket and make it locked, then fix the lamp by screw and spring piece as original. At last you shall check if the lamp has been fixed tightly. If not, you must take off the lamp again; adjust the spring piece to make sure that it has enough power to fix the lamp.

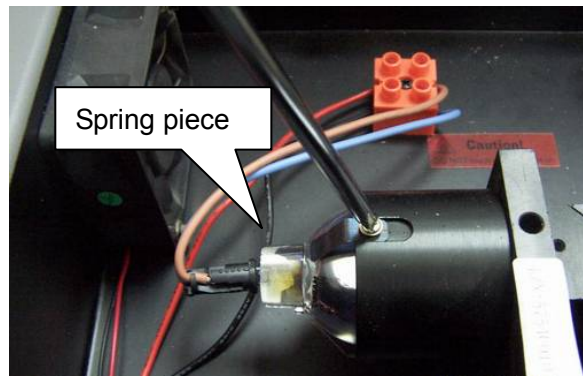


Figure 3-9

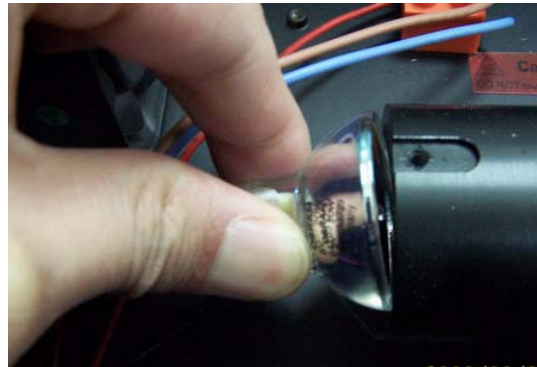


Figure 3-10

3.3.4. Replacement of plate carrier

- 1、 Lift the top cover of instrument, remove the black shield box on the front board.
- 2、 Remove the fixing bracket at right side of plate carrier, take off the two metal rails.

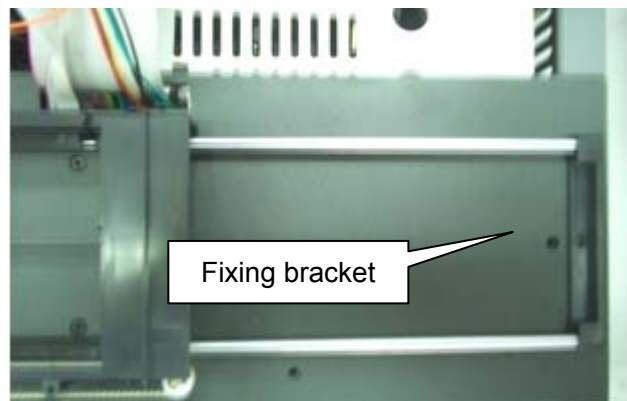


Figure 3-11

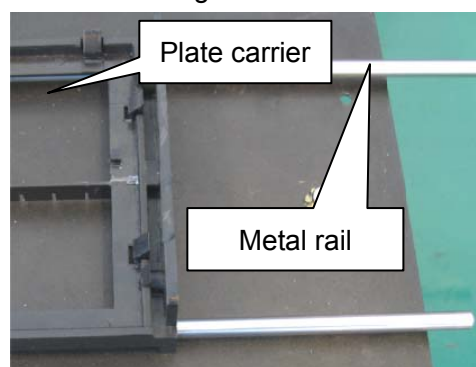


Figure 3-12

- 3、 As shown in figure 3-12, loosen the belt on the plate carrier, take it off from the motor at left side of plate carrier, then upturn the plate carrier.



Figure 3-12

- 4、 Remove the two screws, you can take off the plate carrier. Replace a new one, re-install it as original, fix the screws.

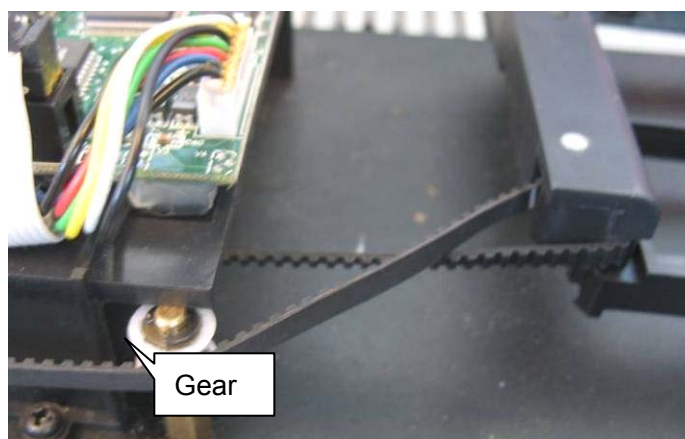


Figure 3-14

- 5、 Upturn the plate carrier, install the belt to the gear on the plate carrier motor at left side, as shown in figure 3-14.
- 6、 Install the metal rails and fixing bracket, adjust the belt to make the plate carrier moves smoothly, install the shield box and top cover of instrument.

3.3.5. Replacement of the belt.

- 1、 Lift the top cover of instrument, remove the shield box on front board.
- 2、 Remove the fixing bracket at right side of plate carrier, take out the two metal rails.

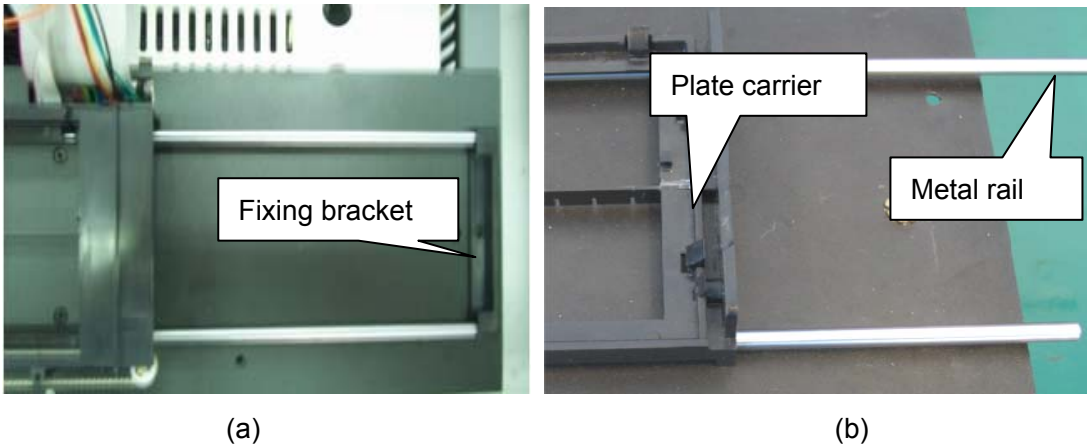


Figure 3-15

- 3、 As shown in figure 3-16 (a), loosen the belt on plate carrier, take it off from the motor at left side of plate carrier, then upturn the plate carrier, as 3-16 (b) .



Figure 3-16

- 4、 Remove the two screws shown in figure 3-16 (b), you can take off the plate carrier.

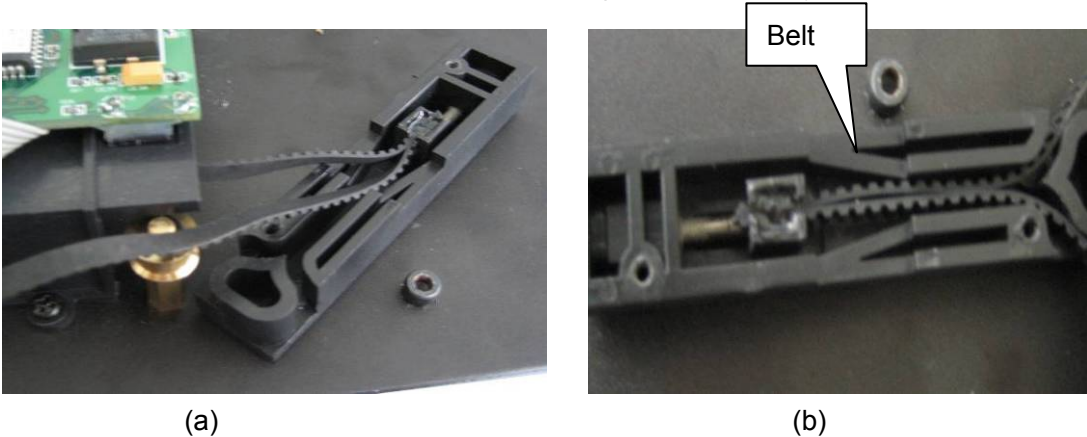


Figure 3-17

- 5、 Take off the old belt and replace a new one. The replacing procedure is shown as figure 3-17 (b), here please note that the side with tooth should face outside. In 3-18 (a) , please note that the side with tooth should face inside.

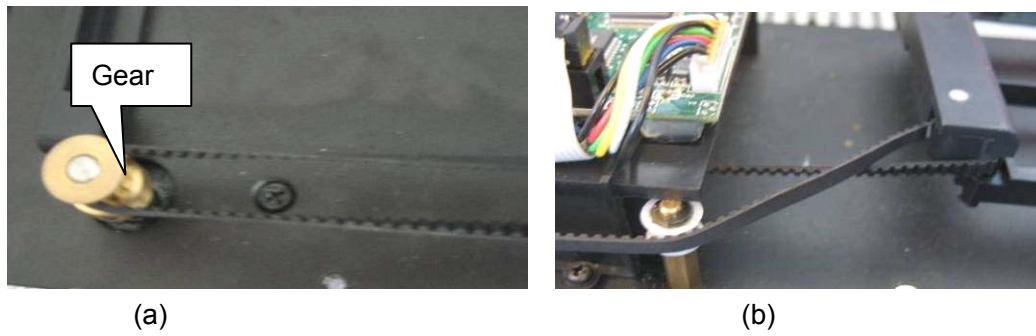


Figure 3-18

- 6、 Install the plate carrier then upturn it, as shown in figure 3-18 (b), install the belt to the gear on the plate carrier motor.
- 7、 Install the metal rail and fixing bracket, adjust the belt to make the plate carrier move smoothly, then install the shield box and top cover, restore the instrument.

3.3.6. Replacement of filters

- 1、 Take off the label, you can see the hole of screw, as shown in figure 3-19.



Figure 3-19

- 2、 Use hex wrench M3 to loosen the two fixing screws, as shown in figure 3-20.

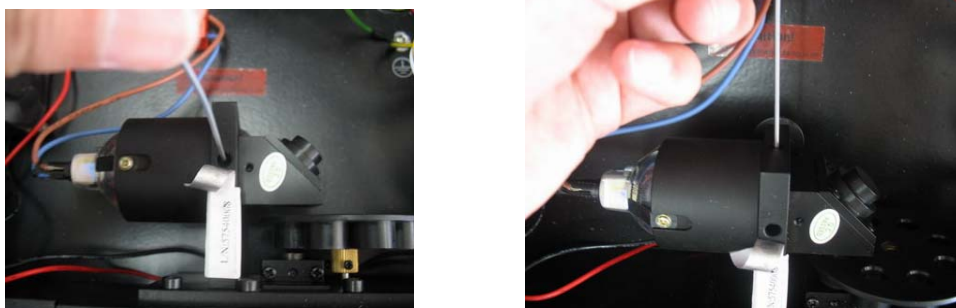


Figure 3-20

- 3、 Take out the convergent mirror assembly, as shown in Figure 3-21 (a)

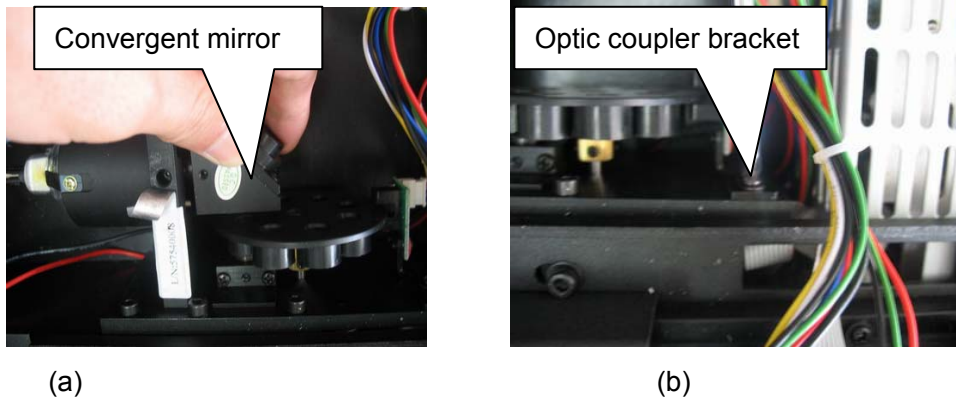


Figure 3-21

- 4、 Loosen the two M3 cross screws which fix the optical coupler bracket, please not that you don't need to take them off, as shown in figure 3-21 (b).
- 5、 Move away the optic coupler, take out the filter wheel, as shown in figure 3-22 (a)

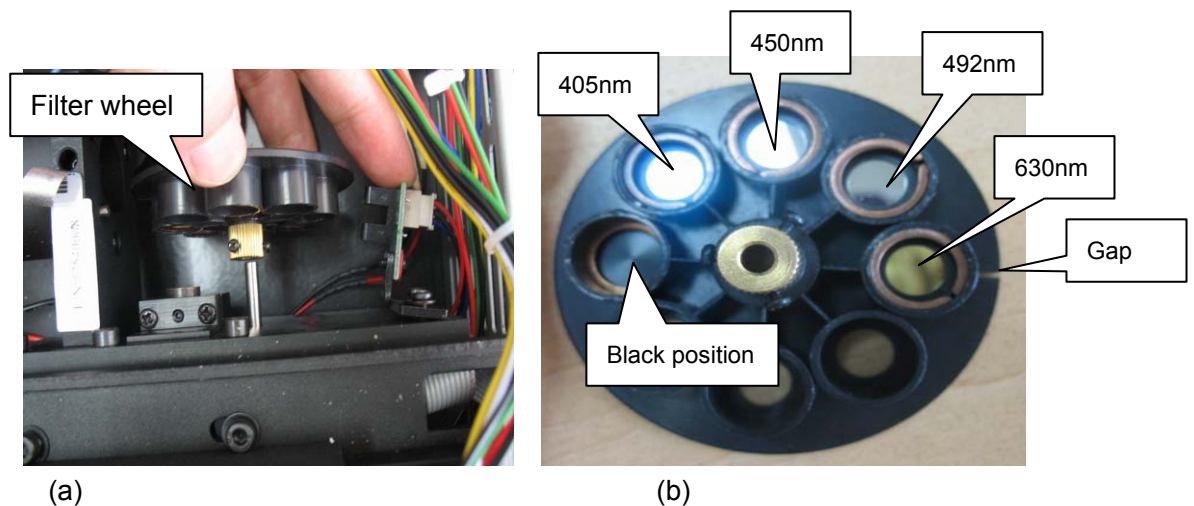


Figure 3-22

- 6、 Replace filters according to wavelength as shown in figure 3-22 (b), please note that you can use the gap to distinguish the hole for different filters.
- 7、 After changing the filters, re-install the filter wheel. Please note that the upside surface between the optic couplers should align at the side board surface of the optical path, as shown in figure 3-23.

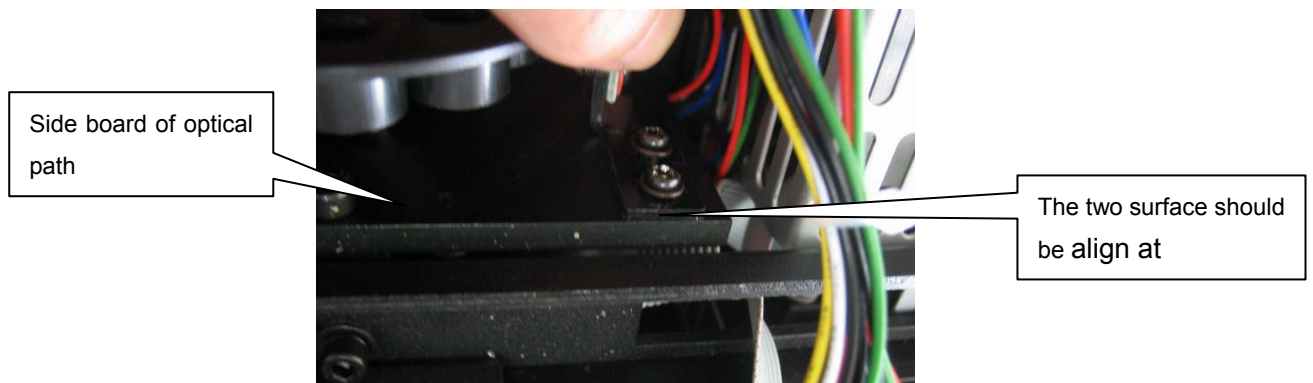
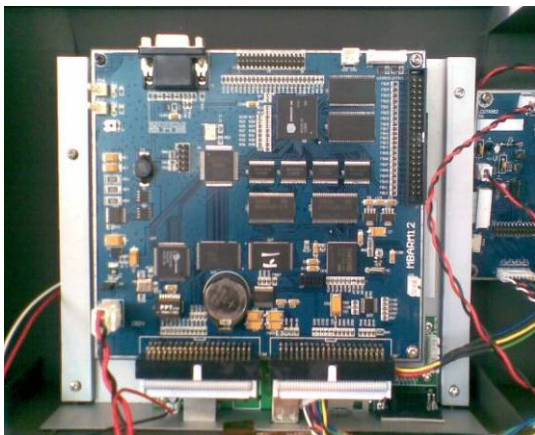


Figure 3-23

3.3.7. Replacement of touch panel/LCD screen

- 1、 Lift the top cover of instrument, remove the fixing screw on the main board, take out the main board, as shown in figure 3-24 (a).



(a)



(b)

Figure 3-24

- 2、 Remove the two data cable at right side of LCD form the transition board by forceps ,as shown in figure 3-24 (b).
- 3、 Remove the four screws which fix the LCD, take out the LCD and touch panel, as shown in figure 3-25 (a) and (b).



(a)



(b)

Figure 3-25

- 4、 Replace a new touch panel of the same model, restore the instrument.

Note: please pay attention to the sides of touch panel while installation, the rough side of the touch panel is the touch side, which should be towards outside.

3.3.8. Replacement of LCD transition board

- 1、Lift the top cover of instrument, you can see the LCD transition board at the right side of LCD, as shown in figure 3-26 (a).

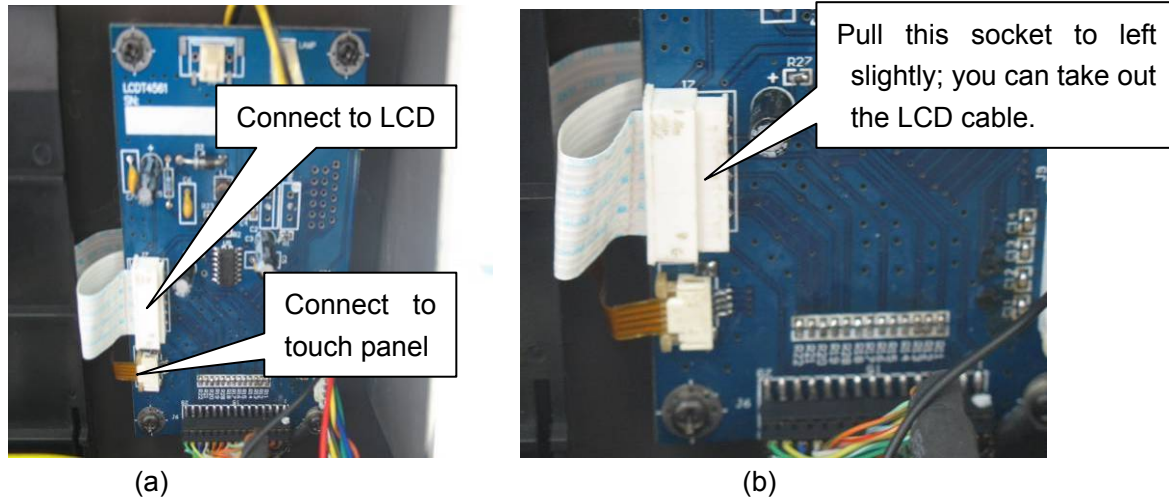


Figure 3-26

- 2、Remove all the cables on LCD transition board (including LCD cable and touch panel cable), remove the 4 screws which fix the LCD Transition board, you can take out the board.
- 3、Replace a new LCD Transition board, connect the LCD cable and touch panel cable, connect all the wires, fix the four screws, install the shield box and top cover of instrument.

3.3.9. Replacement of the front board

- 1、Lift the top cover of instrument, remove the shield box on the front board, you can see the front board, as shown in figure 3-27.

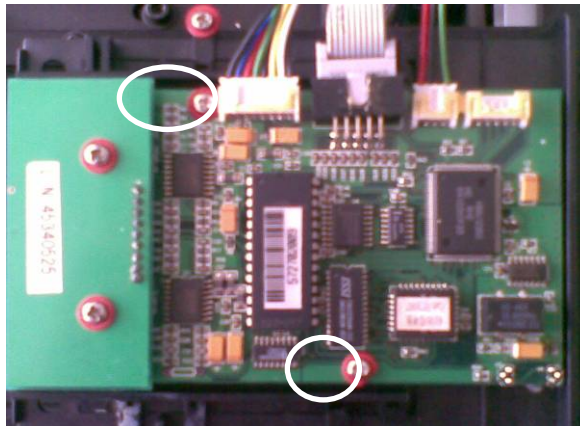


Figure 3-27

- 2、Remove all the wires on the front board, remove the two screws as shown in above figure, you can take out the front board.
- 3、Replace a new front board, fix the screws, connect all the wires and make them in good order. Please note that the Hoare unit must be installed above the groove of the worktable for front board. The deviation can not be too big or there will be an error of "No positioning signal for plate carrier".

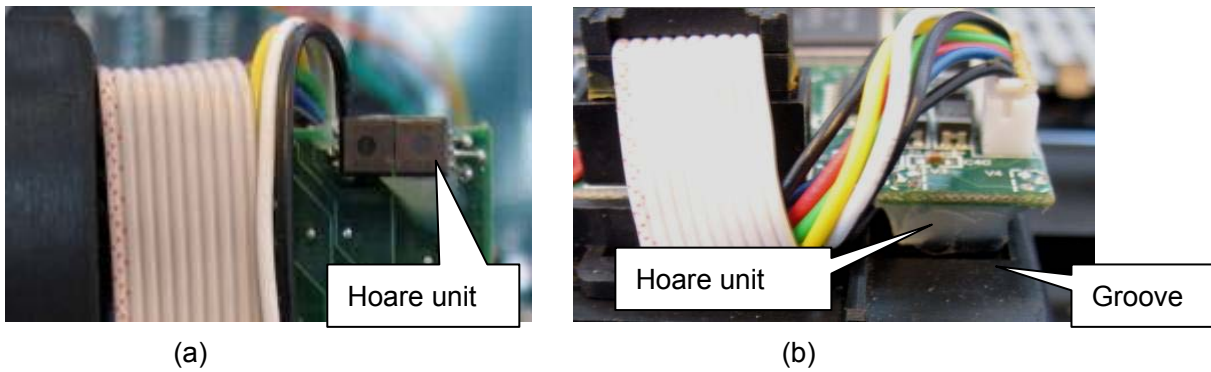


Figure 3-28

- 4、 Install the shield box and top cover of instrument.

3.3.10. Replacement of main board

- 1、 Lift the top cover of instrument; you can see one big board and one small board at the bottom of instrument. The big one is the main board, as shown in figure 3-29.



Figure 3-29

- 2、 Remove the screws which fix the main board, remove the cables connected to main board, connect them to a new board.
- 3、 Install the main board, fix the screws and restore the instrument.

3.3.11. Replacement of optical fibre

- 1、 Remove the lamp cable to prevent lamp from broken by misoperation, as shown in figure 3-30.

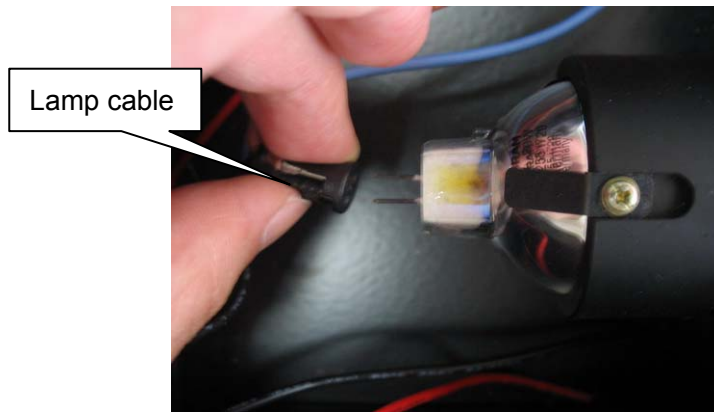


Figure 3-30

- 2、 Remove the shield box, remove the two screws which fix the platform by hex wrench M4, as shown in figure 3-31.



Figure 3-31

- 3、 Remove the two screws which fix the front board by cross screwdriver M3, as figure 3-32.

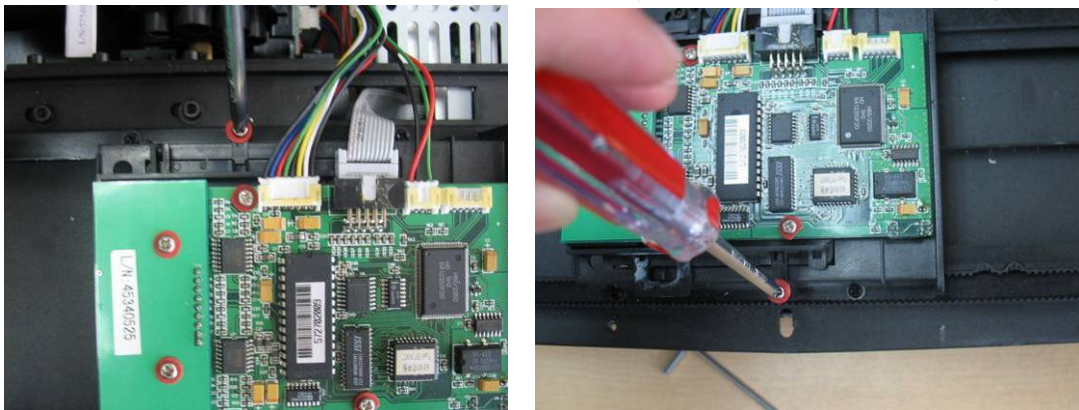


Figure 3-32

- 4、 Use a cross screwdriver M3 to loosen the screws which fix the optical fiber head, please note that you do not need to take the screw out. Then fix the screw in the middle by hex wrench M3, as shown in figure 3-33.

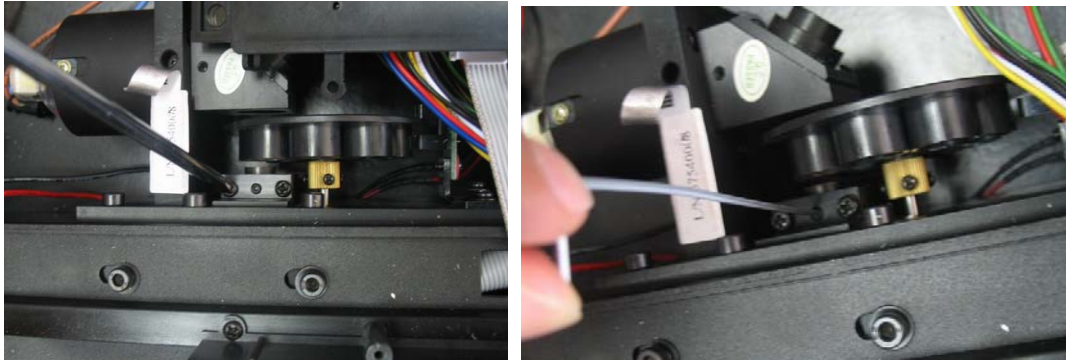


Figure 3-33

- 5、 Use a hex wrench M4 to loosen the two screws which fix the optical path, please note that you don't need to take them out, as shown in figure 3-34.

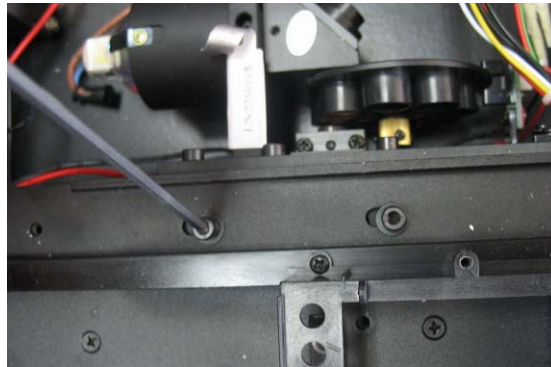


Figure 3-34

- 6、 Use a cross screwdriver M3 to remove the two screws which fix the optical fiber bracket, as shown in figure 3-35.

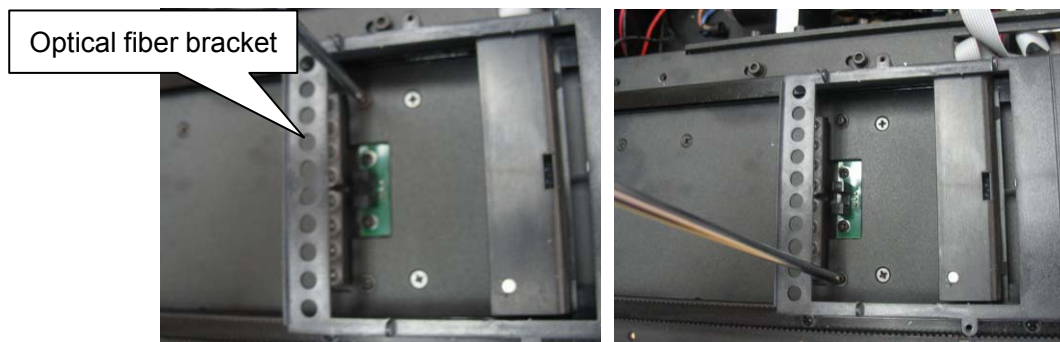


Figure 3-35

- 7、 Lift the platform; take out the optical fiber assembly, as shown in figure 3-36.

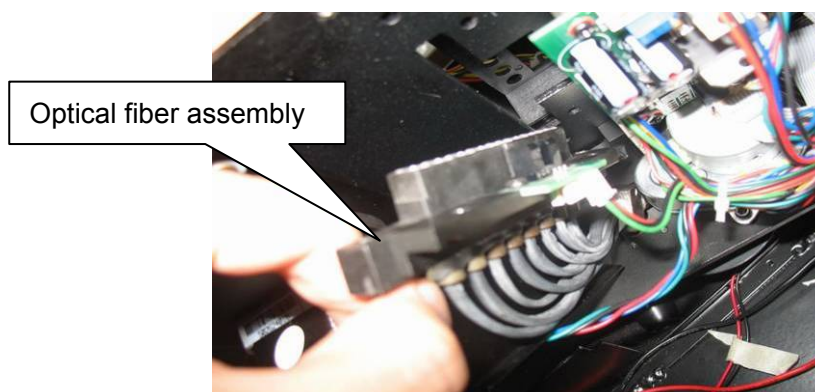


Figure 3-36

- 8、 The optical fiber is as figure 3-38; Remove the four screws which fix the optical fiber, replace a new one, as shown in 3-39.



Figure 3-38



Figure 3-39

9. Replace a new optical fiber with the same model, install it carefully as original, fix the optical fiber and its head, and restore the instrument.
10. Turn on the instrument, enter the backdoor procedure, turn on the lamp, turn the filter to 492nm.
11. Find a white thin paper; put it at the eight light points to watch the faculas, as shown in figure 3-40. The 8 faculas should be at the center position of the black hole as figure 3-40. If there is deviation, you shall loosen the two screws which fix the optical fiber, fine tuning the position of optical fiber, until the facula come to the center of the hole, then fix the screw again.

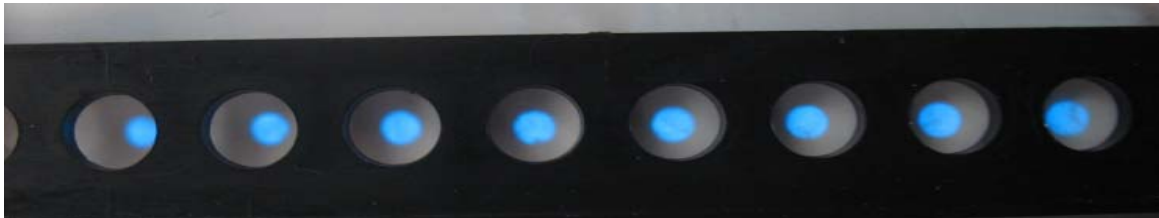


Figure 3-40

12. Install the platform, front board and shield box as original, install the top cover of instrument.
13. Enter the backdoor procedure of instrument, check the AD value of each channel, If the deviation is too big, you have to adjust the position of optical fiber or the fiber is not good, you must change a new fiber again.
14. Take calibration liquid of 2.0A to test the instrument at backdoor procedure, if it can not meet the requirement, you shall fine tuning the position of the optic coupler on the optical fiber. We do not suggest the engineer to replace the optical fiber at customer side.

3.3.12. Replacement of driver board

- 1、Lift the top cover of instrument; remove the shield box on front board.
- 2、Take off the lamp cable to prevent the lamp from broken by misoperation, as shown in figure 3-41.

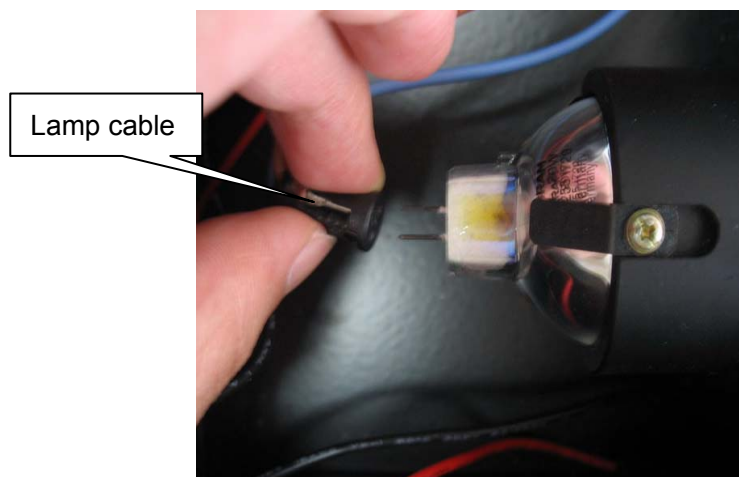


Figure 3-41

- 3、Remove the two hex screws which fix the platform, lift the platform carefully (pay attention not to pull the optical fiber), then you can see the motor driver board, as shown in figure 3-42.

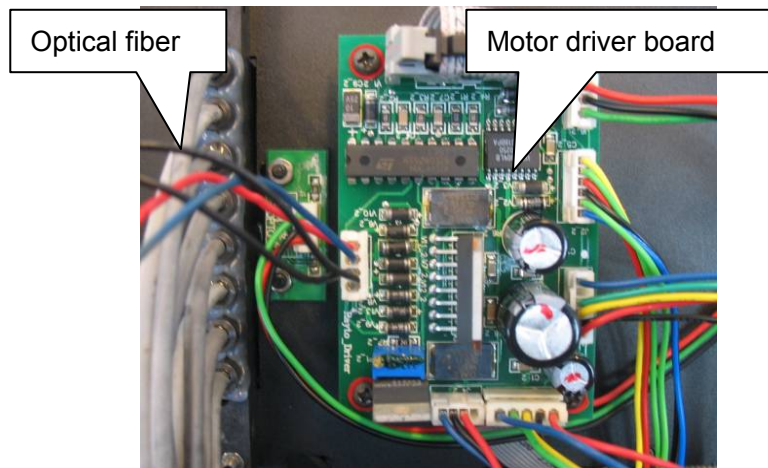


Figure 3-42

- 4、 Take off all the wires on motor driver board and remember their positions, remove the four screws which fix the board, take off the motor driver board, replace a new one, and install it as original.
- 5、 Install the shield and top cover of instrument.

3.3.13. Replacement of power supply

- 1、 Lift the top cover of instrument; remove the shield box on front board.
- 2、 Take off the lamp cable to prevent the lamp from broken by misoperation, as shown in figure 3-43.

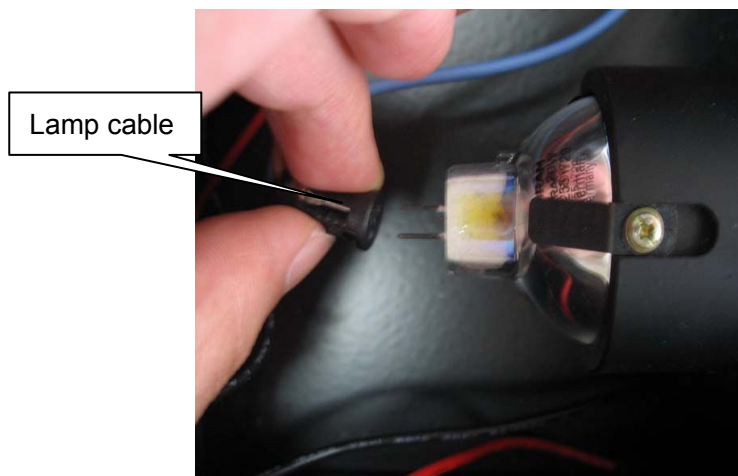


Figure 3-43

- 3、 Remove the two hex screws which fix the platform, lift the platform carefully (pay attention not to pull the optical fiber).
- 4、 Take off all the wires on the power supply and remember their positions, as shown in figure 3-44. Remove the screws which fix the power supply, then remove the screw which fix the bottom of power supply, change a new one and restore the instrument.



Figure 3-44

Note :

- 1、 *There is some glue on the plugs, before you take it out, you can use a tool to remove the glue.*
 - 2、 *If you are not familiar with the position of plugs on the board, you shall remember the corresponding positions carefully, so that you will not make mistakes when you want to install the plug again.*
-

4. Trouble shooting

Trouble	Solution
The plate courier can not move smoothly on the board and rubs against the optical grating board. Report "492nm wavelength is too weak" when start the machine.	The supporting frame in the middle of the plate courier is not properly installed. Reinstall the supporting frame. The lamp is aging. Replace the lamp. The light-filtering sheet is broken. Replace the light-filtering sheet and adjust the frequency and synchronization of the light-chopper wheel.
Report "shared ROM error" when start the machine.	Too short interval between the starts of the machine. It shall be above 3 minutes. No ground wire or the ground wire is in poor contact. Earthing the instrument properly.

	<p>The machine is started in the wrong order. You should switch on the host computer first and then the printer.</p> <p>The front-end board error. Add a 4.7K resistor to between the 20th pin and the 28th pin of U11 on the front-end board.</p>
Report "405nm wavelength is too weak" when start the machine.	<p>The lamp fell off or is not properly installed. Reinstall the lamp.</p> <p>The light-filtering sheet is broken. Replace the light-filtering sheet.</p> <p>The lamp is aging. Replace the lamp.</p> <p>The optical fiber is damaged. Replace the optical fiber.</p> <p>The photoelectric reaction board on the front-end board is broken. Replace the photoelectric reaction board.</p>
<p>The clock is out of order and need to be re-set up every time the machine is started.</p> <p>No display on the screen when start the machine.</p>	<p>The battery is electrically discharged. Replace the battery.</p> <p>The flat data cable that connects the displaying screen to the transfer board is loose or fell off. Re-plug it.</p> <p>The ground wire of the transfer board fell off or is in poor contact. Reconnect it.</p> <p>The transfer board is broken or fell off. Replace it or solder it.</p> <p>The displaying screen is broken. Replace the displaying screen.</p> <p>The mainboard is broken. Replace the mainboard.</p>
Report "shared ROM (RAM) error" when start the machine, and then all the data stored in the machine are lost.	<p>No ground wire or the ground wire is in poor contact. Earthing the instrument properly.</p> <p>The machine is started in the wrong order. You should switch on the host computer first and then the printer.</p> <p>The front-end board error. Add a 4.7K resistor to between the 20th pin and the 28th pin of U11 on the front-end board.</p> <p>The front-end board is broken. Replace the front-end board.</p>
The touch panel is inaccurately located.	<p>Re-locate the touch-screen.</p> <p>The touch-screen is broken. Replace the touch-screen.</p> <p>The Q1-Q6 triode on the mainboard is broken. Replace the Q1-Q6 triode.</p>
Feign positive in testing HbsAg.	<p>The sample is contaminated or incompetent. Re-make the sample.</p> <p>The range of negative contrast shall be set as 0.05-3.5.</p>

	The machine's internal K values are altered. Re-set the K values. Set all K1s as 1 and all K2s as 0.
Report the blank absorbency is too high in testing	<p>The blank is contaminated. Use clean blank holes.</p> <p>Modify the blank from ≤ 0.05 to ≤ 0.1 in item setting.</p>
<p>The enzyme label plate is wedged in the machine and can not be taken out, or wedged outside the machine and can not be put in for testing.</p> <p>The screen suddenly becomes a blank screen, and after a while, it restores normal displaying.</p>	<p>The enzyme label plate is not properly placed or the plate bar is incompetent. Open the machine housing and take the enzyme label plate out. Use the right one.</p> <p>The voltage is not stable. Connect it with a manostat.</p> <p>The flat data cable that connects the displaying screen to the transfer board is loose. Re-plug it.</p>
<p>The clip hood of the plate courier is damaged.</p> <p>The belt is broken.</p>	<p>Replace the plate courier.</p> <p>Replace the belt.</p>
The printer can not print.	<p>The model of the printer is improperly set up. Re-set up the model of the printer.</p> <p>The printing cable fell off. Re-plug the printing cable.</p> <p>The printer is broken. Replace the printer.</p>
Report monotonous errors in testing T3 and T4 items.	<p>The method selected in item setting shall be "Logarithmic regression".</p> <p>In plate arrangement, the standard articles shall be arranged in the same line and from left to right in Gradient disposition.</p>
Report "no predetermined-position attainment signal for the enzyme label plate" when start the machine.	<p>Too long distance between the Hall module at the bottom right corner of the front-end board and the magnetic ball of the plate courier. Adjust the position of the Hall module.</p> <p>The photoelectric coupler. Replace the photoelectric coupler.</p> <p>The front-end board is broken. Replace the front-end board.</p>

Report “no reset signal for the enzyme label plate” when start the machine.

Data can not be transferred to the computer.

Logarithmic regression testing curve is in confusion.

software upgrading error. Fail to start the machine.

When start the machine, the mouse appears, but soon after, it flashes and then disappears, and the screen becomes a blue screen.

The testing results are on the high side.

Report “FLASH self-check error” when start the machine.

No display when printing the synthetic report for the testing item.

Report “the front-end command is overtime” in the self-check when start the machine.

Fail to start the machine. The lamp is flashing.

Report “please check the light-chopper’s motor” in the self-check when start the machine.

The position of the driving motor is deviated. Readjust it and fix it.

The optical grating bar fell off. Glue the optical grating bar.
The drive board is broken. Replace the drive board.

The serial port cord is broken. Replace the serial port cord (the normal serial port twisted-wire shall be 2-3, 3-2 and 5-5).

Data transference shall be conducted in the main menu of the software.

External software error. Reinstall the software.

The setting of 0 density standard in logarithmic regression is unnecessary. Remove the 0 density standard from item setting.

In plate arrangement, the standard articles shall be arranged in the same line and from left to right in gradient disposition.

Re-upgrade the software

The reverse-converter on the transfer board is damaged.
Replace the reverse-converter.

Recommend the use of double-wavelength method of testing. Select 630 as the secondary wavelength.

The Flash ROM on the mainboard is broken. Replace it.

System software error. Update the system software.

The power supply board’s 5V voltage is on the low side.
Replace the V18 on the power supply board.

Irregular power supply. Replace the power supply unit

The circuit between the 1st pin of U8 on the front-end board and the drive board is broken. Reconnect it.

Appendix I Data transfer protocol of GEA

Plate transfer data format:

```
str.Format(L"B,%s,%s,%d,%s,%s,%d,%d,%s,%s,%s,%s,%s,%d,%%.3f,%%.3f,%%.3f,%%.3f,%%.3f,%%.3f,%%.3f,%d,%d,%%.4x,%s"
```

B(Plate Sign)plate number, cuvette, plate item number, item name, full name, 1 wavelength, 2 wavelength, sample number, absorbency, quantitative, qualitative, calculate mode, reagent name, control 2 represent double controls 3 represent three controls, factor, negative control, positive control, maximum normal value, minimum normal value, negative suspicious range, positive suspicious range, positive 0 negative 1 no 2, shake time, checkout code, TRANSFER FINISH

Quality control data transfer

```
str. Format(L"Q,%s,%s,%d,%s,%%.4x,%s"
```

//Q(quality control sign),assay name, method, month, data (include 31 days),checkout code , TRANSFER FINISH

Sample data transfer

```
R, %s,%s,%d,%d,%s,%03d,%s,%s,%f,%s,%s,%f,%-7.3f,%7.3f,%%.4x
```

R, patient name , section office name , gender of patient, age , time for test , sample number , assay name , full name , unit , qualitative , quantitative , normal range (low) , normal range (high) , checkout code , TRANSFER FINISH

TRANSFER FINISH is displayed when all the data is done.

port :

baud rate : 19200

verify : Odd

data bit : 8

stop bit : 1