ARES
Coagulation Analyzer
Service Manual

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CONTENT

1. Introduction to Analyzer

1.1 Features

1. ARES is a networking coagulation analyzer, which collects sample data through photoelectricity sensing and is designed for various applications, such as diagnosis of bleeding and thrombus diseases, monitoring of fibrinolytic and anti-coagulation therapy, and observation of curative effect.
2. Large touch screen with displaying English characters is provided for convenience of entry.
3. Various built-in programmable items and high-capacity history data memory are available.

   Various comprehensive English reports are available, and external printers of various brands are supported.
4. With powerful network functions (optional), the analyzer can be linked to the LAN of the hospital, quality monitoring center, and LINEAR service center for convenient and quick operation.
5. With LINEAR Coagulation Analysis Lab Management System (optional), data management and analysis can be performed in any PC linked to the LAN.
6. Assistance Management Functions (optional): Built-in department database, doctor database and system log database.

1.2 Specifications

Sample preheating position:	24
Reagent preheating position:	6
Test channel:	4
Display:	LCD
Operation form:	Touch screen
Print:	External printer
Preheating bath temperature:	37℃
Interface:	RS-232 bi-directional communication interface, USB interface, SD card interface, network wire interface and pipette interface.
Weight:	6.5kg
Dimensions:	410mm(L)×320mm(W)×150mm(H)
Power supply:	a.c.110V ~ 220V, 50/60Hz
Fuse:	T3.15AL250V, Φ5×20
Operating conditions:	10℃ ~ 30℃; relative humidity ≤ 70%

Storage conditions: -10℃～40℃; relative humidity ≤ 80%

2. Installation

2.1 Unpacking the analyzer

Unpack and remove the 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 accessories in the package box and the following article should be included:
   - ARES unit
   - User's Manual
   - Packing list
   - Agentical warranty card
   - Product approved certificate
   - Accessories: Power cord, printer cable, touch screen pen, spare fuse, etc. (Actual accessories are subject to the packing list).

Caution: If any loss of part or difference from the packing list is found, please contact the distributor.

2.2 Environment requirements

Find a place without direct sunlight in working site. Select a worktable with flat surface and enough space to accommodate ARES. Avoid shock on the table (e.g. when a centrifuge is placed on the table).

Note: The operating temperature of the analyzer should be 10℃~30℃, and the relative humidity should be less than 70%.

For ensuring 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 close to electromagnetic equipment that generates magnetic field.

2.3 Power supply

- **a.c.220V ± 22V**
- **50Hz ± 1Hz**
- **80VA**

Cautions:

- ***The AC power supply should be securely grounded (N-to-G voltage should be <5V).***
- ***The AC power supply should be stable, and should not be used together with a high-power electric apparatus.***
- ***When unplugging the power cord, grasp the plug instead of the cord.***
- ***If smoke, peculiar smell or strange sound is found on the analyzer, you should switch off the analyzer and contact to the maintenance center.***

2.4 Starting to install

1. Connecting the analyzer to the power supply

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

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

2. Connecting the external printer

1) Ensure the analyzer and printer is power-off.

2) Connect the USB plug on one end of the printer cable to the USB interface on the back of the printer.

3) Connect the other end to the USB interface of the analyzer.

4) Connect the printer to the AC power supply with the provided power cord for the printer.

Warning: To ensure normal operation of the printer, switch on the analyzer unit first and then switch on the external printer. To connect or disconnect printer power cord, switch off the external printer first; otherwise, the analyzer will be damaged or lead to abnormal operation.

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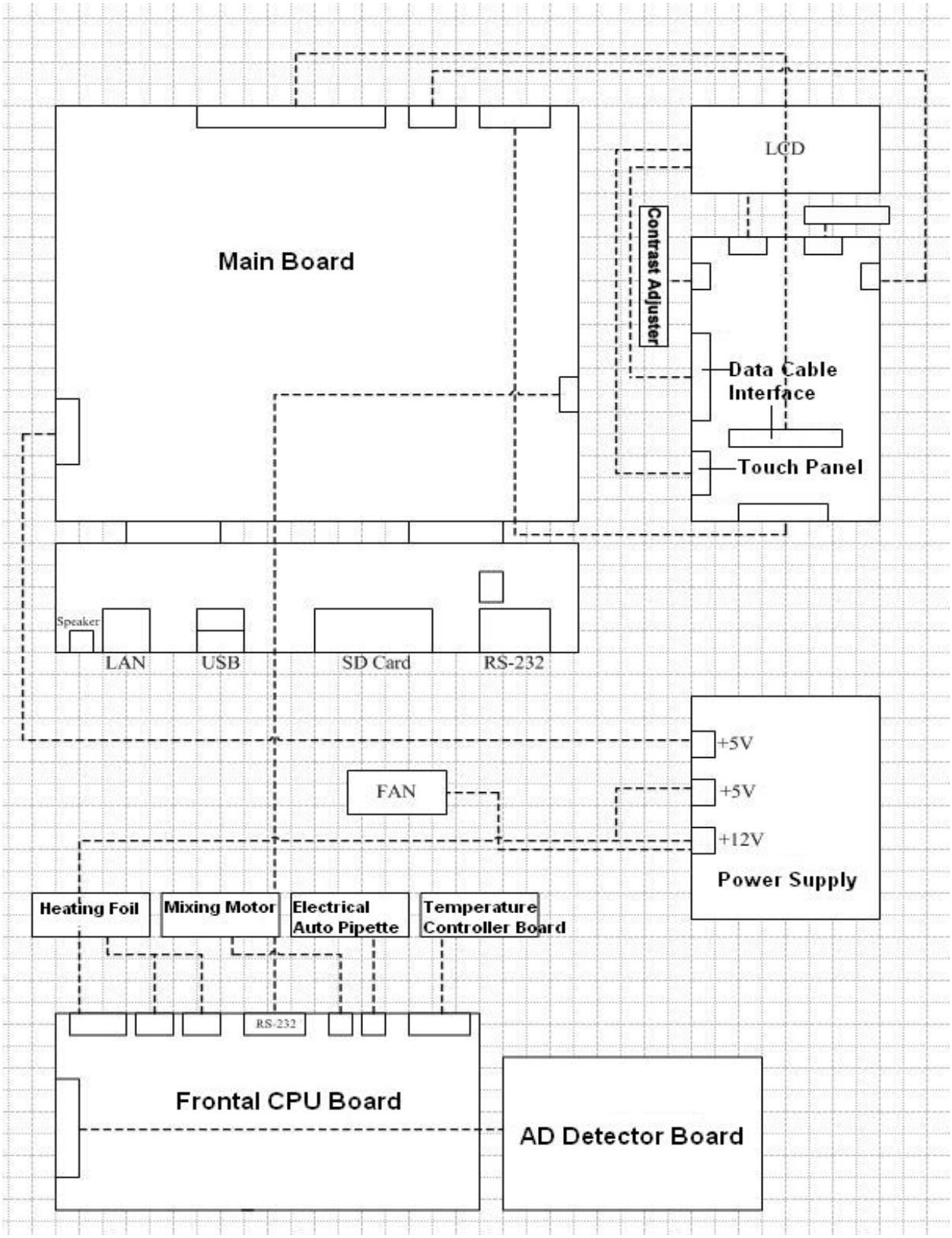
3. Functions

3.1 Function block diagram



3.2 Power board functions

The power board is powered by the switching power supply module and outputs 4-channel DC power.

5V power output for the main board.

12V power output for the fan.

5V and 12V power output for the heater and CPU board.

3.3 Main board functions

The main board is designed for operation of system software and applications.

It provides interfaces to connect the front end system for control and data collection of front end system.

It also provides I/O interfaces, including 1 RS232 interface, 2 USB interfaces, 1 SD card interface and 1 network interface.

3.4 CPU board functions

The board coverts commands sent from the main board into driving signals, controlling the agitating pump and the temperature of thermostatic bath. In addition, it sends the digital signal received from the AD detector board back to the main board.

3.5 AD detector board functions

The board converts the light signal into the electrical signal which is amplified and converted into digital signal later that is sent back to the CPU board.

3.6 LCD transition board functions

The board is used for switching with the LCD, receives the touch operation signal from the LCD, and sends back the signal to the main board.

3.7 LCD functions

The LCD displays and receives commands from touch operation.

4. Replacement of Accessories

4.1 Disassembling

Operation procedures:

1. Switch off the analyzer and printer, and disconnect all cables.
2. Put a piece of soft silk on a clean flat table, turn over the analyzer on the silk to avoid damage to the outer surface of plastic analyzer upper cover due to shock.
3. Remove three screws fixing the upper cover with a screwdriver as shown in Figure 4-1.

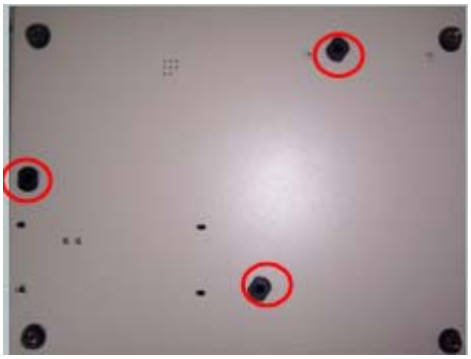


Figure 4-1

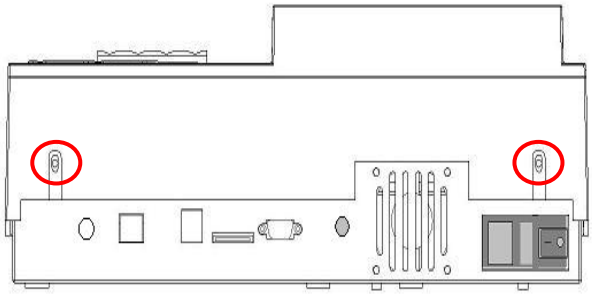


Figure 4-2

4. Remove two screws on the back of the analyzer as shown in Figure 4-2, and lightly raise the upper cover.

4.2 Replacement of fuse

Operation procedures:

1. Switch off the analyzer, and remove power cords.
2. Take out the fuse holder with a screwdriver, and the fuse will be found as shown in Figure 4-4.

Figure 4-3

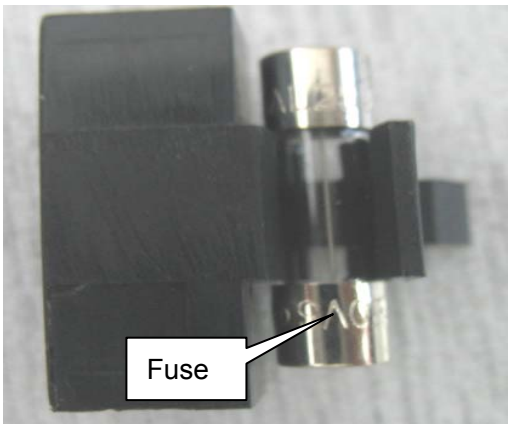


Figure 4-4

3. Replace the fuse with a new one of the same specifications, and reassemble the analyzer.

4.3 Replacement of power switch

Procedures for replacement:

1. Remove screws on the base of the analyzer, and remove the upper cover of the analyzer.

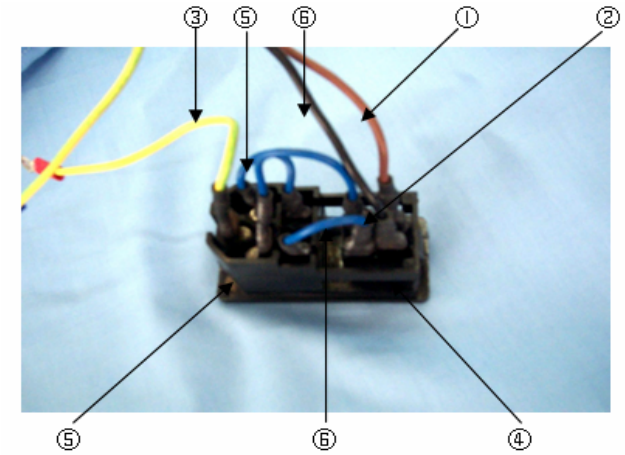


Figure 4-5 Power Switch

2. Press the tabs ④ on both sides of the switch holder, pull out the whole switch holder. The construction of the switch is as shown in Figure 4-5.
3. Remove wiring on the power switch, replace the power supply module with a new one and reassemble it.

   Note: In case of wrong wire connecting, it is better to disconnect a wire from the previous switch module and connect it to the new one.

4.4 Replacement of AD detector board

Procedures for replacement:

1. Switch off the power supply, remove the power cord, and open the upper cover of the analyzer, and incubation module and AD detector board can be seen as shown in Figure 4-6.

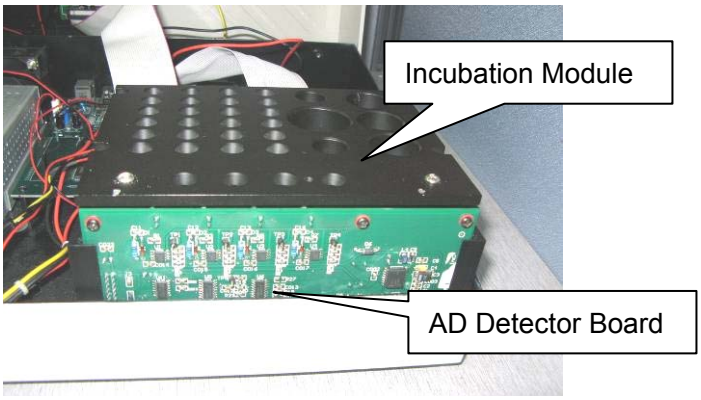


Figure 4-6

2. Remove 6 fixing screws on the incubation module to remove the incubation module as shown in Figure 4-8.

Figure 4-7

Figure 4-8

3. Remove all wires on the front CPU board, and then remove the whole worktable as shown in Figure 4-9.

   The front worktable consists of AD detector board, front CPU board and worktable.

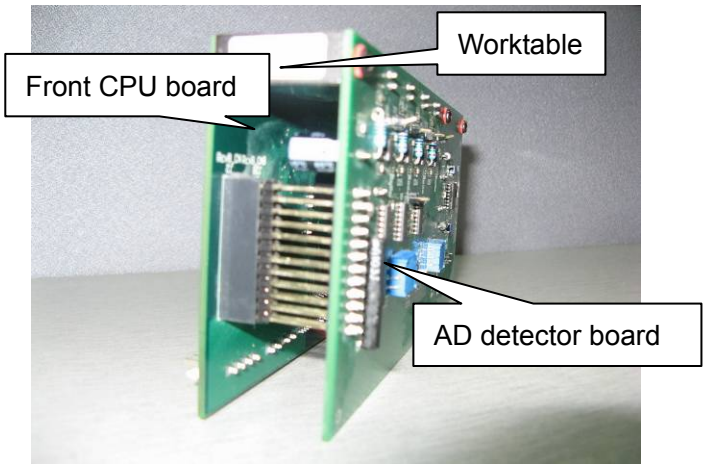


Figure 4-9

4. Remove 3 screws fixing the AD detector board as shown in Figure 4-10. Carefully remove the AD detector board as shown in Figure 4-11.

Figure 4-10

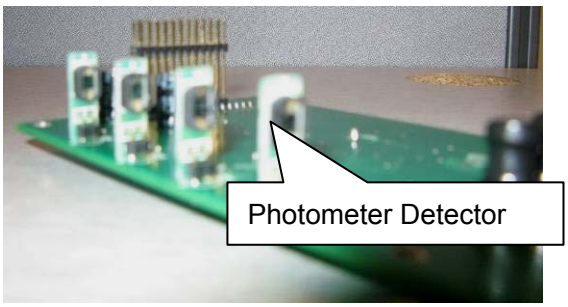


Figure 4-11

5. Replace the AD detector board with a new one of the same specification, and reassemble it.

4.5 Replacement of front CPU board

Procedures for replacement:

1. Switch off the power supply, remove the power cord, and open the upper cover of the analyzer, and incubation module and AD detector board can be seen as shown in Figure 4-12.

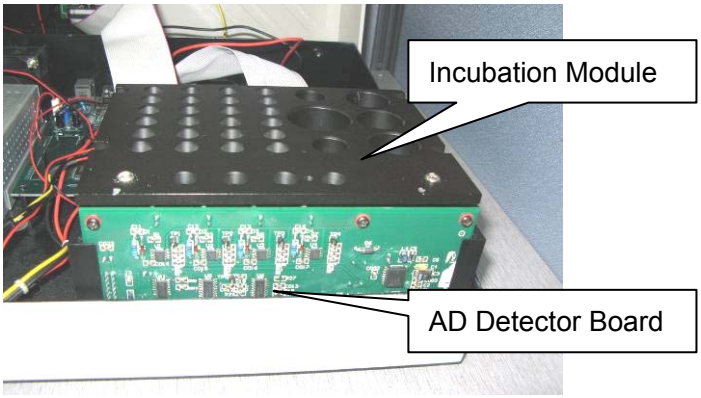


Figure 4-12

2. Remove 6 fixing screws on the incubation module to remove the incubation module as shown in Figure 4-14.

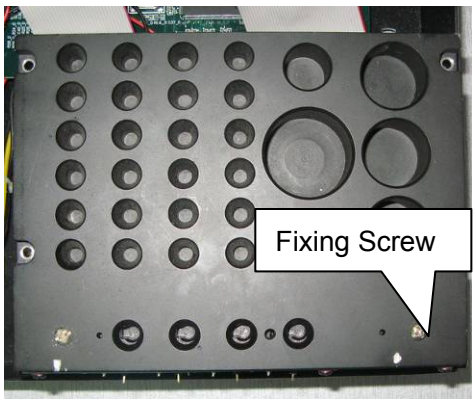


Figure 4-13

Figure 4-14

3. Remove all wires on the front CPU board, and then remove the whole worktable as shown in Figure 4-15.

   The front worktable consists of AD detector board, front CPU board and worktable.

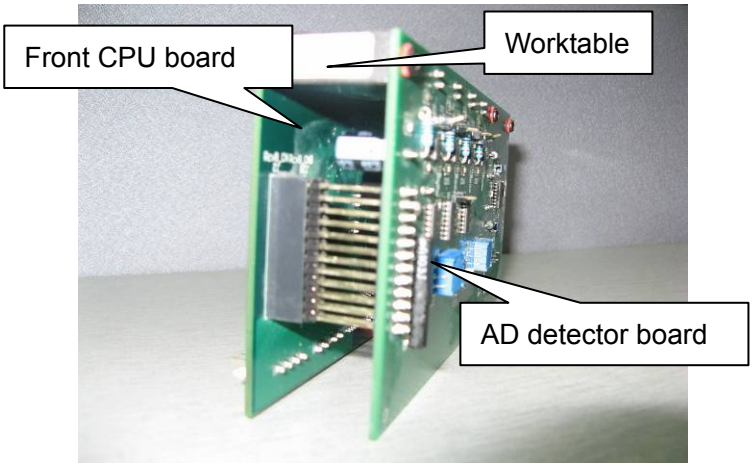


Figure 4-15

4. Remove 4 screws fixing the front CPU board as shown in Figure 4-16, and carefully remove the front CPU board as shown in Figure 4-17.

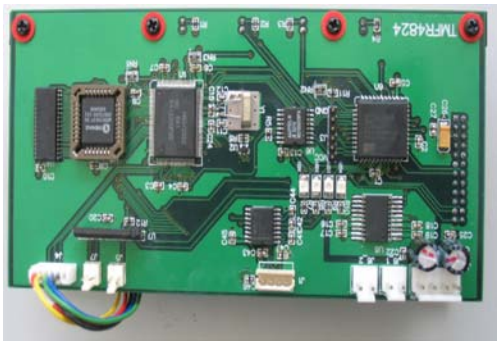


Figure 4-16

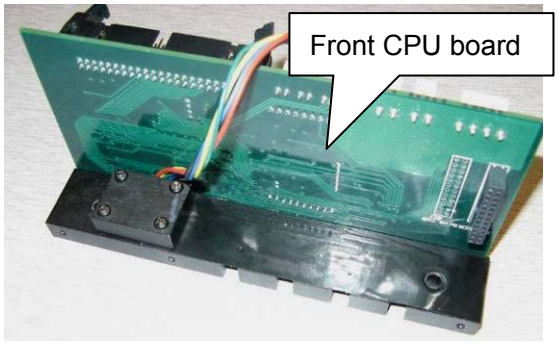


Figure 4-17

5. Replace the front CPU board with a new one of the same specification, and reassemble it.

4.6 Replacement of temperature sensor

Procedures for replacement:

1. Switch off the power supply, remove the power cord, and open the upper cover of the analyzer, and incubation module and AD detector board can be seen as shown in Figure 4-18.

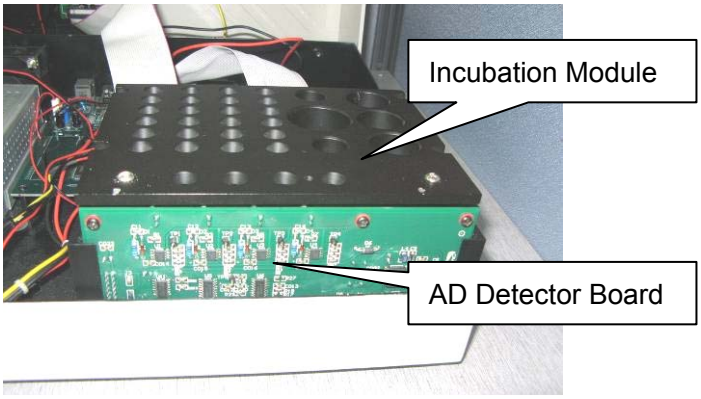


Figure 4-18

2. Remove 6 fixing screws on the incubation module to remove the incubation module as shown in Figure 4-20.

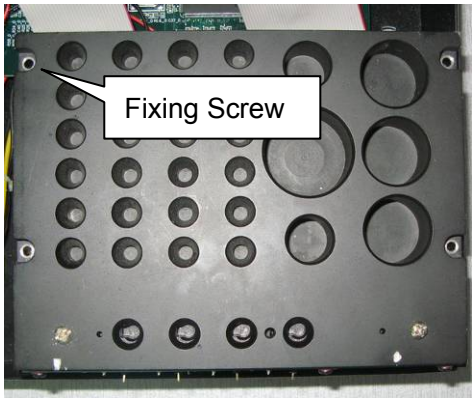


Figure 4-19

Figure 4-20

3. Remove all wires on the front CPU board, and then remove the whole worktable as shown in Figure 4-21.

   The front worktable consists of AD detector board, front CPU board and worktable.

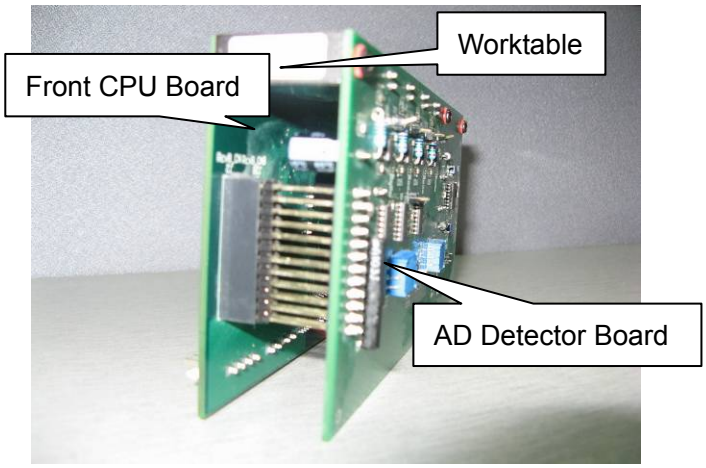


Figure 4-21

4. Remove 4 screws fixing the front CPU board as shown in Figure 4-22, and carefully remove the front CPU board as shown in Figure 4-23.

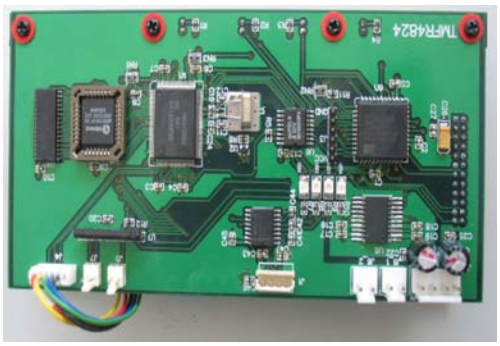


Figure 4-22

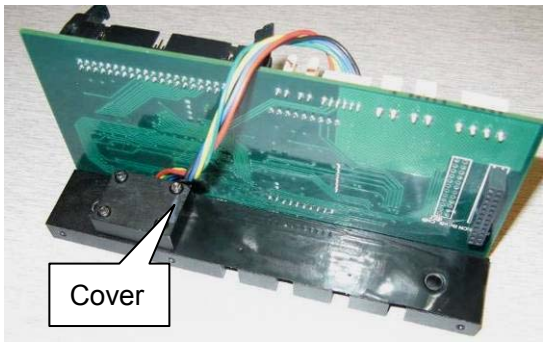


Figure 4-23

5. Remove 4 screws on cover plate as shown in Figure 4-23, and temperature sensor can be seen as shown in Figure 4-24.

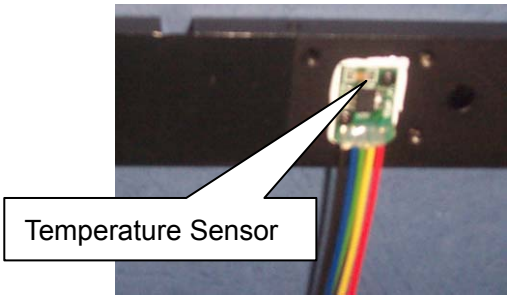


Figure 4-24

6. Replace the front CPU board with a new one of the same specifications, and reassemble it.

4.7 Replacement of main board

Procedures for replacement:

1. Switch off the power supply, remove the power cord, and open the upper cover of the analyzer, and main board can be seen as shown in Figure 4-25.

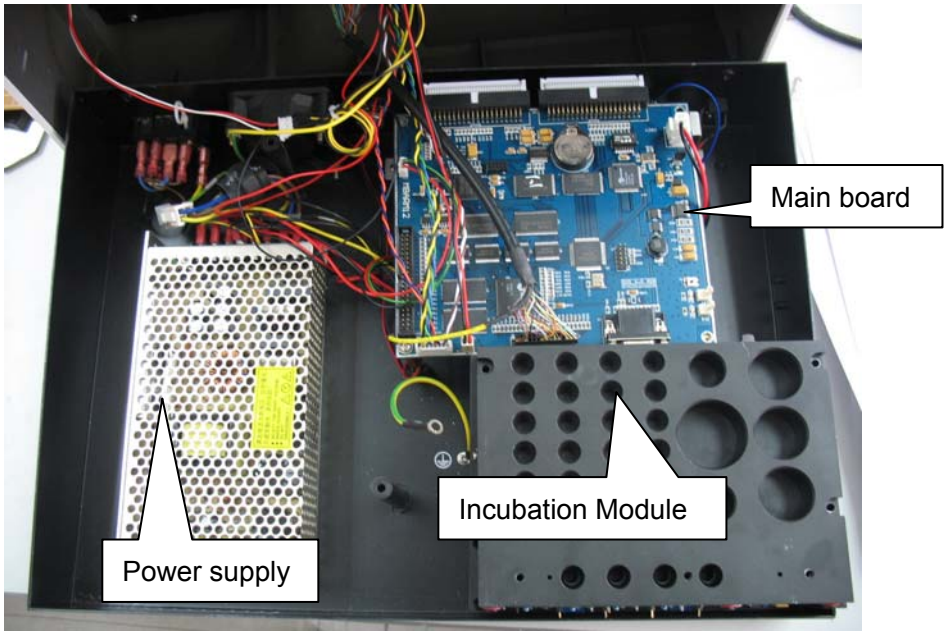


Figure 4-25

2. Remove the screws fixing the main board, carefully remove the patch plug on the board, and remove the main board.

3. Replace the main board with a new one of the same specifications, and reassemble it.

4.8 Replacement of power supply module

Procedures for replacement:

1. Switch off the power supply, remove the power cord, and open the upper cover of the analyzer, and power supply module can be seen as shown in Figure 4-25.

2. Remove screws fixing the power supply module, carefully remove the patch plug and remove the main board.

3. Replace the main board with a new one of the same specifications, and reassemble it.

4.9 Replacement of LCD transition board

Operation procedures:

1. Switch off the power supply, remove the power cord, and open the upper cover of the analyzer, and LCD transition board can be seen as shown in Figure 4-26.

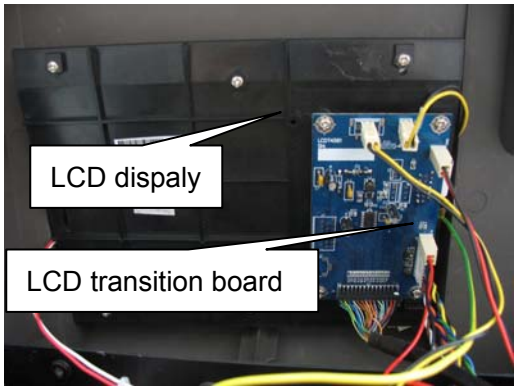


Figure 4-26

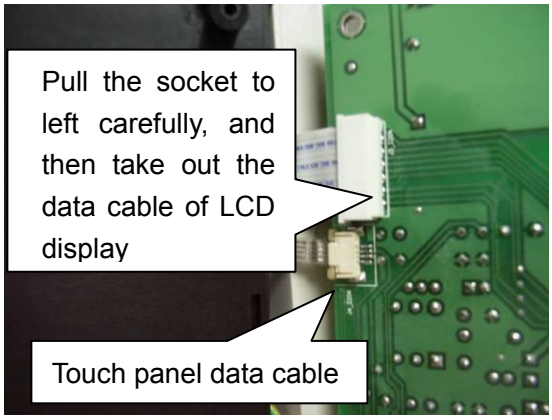


Figure 4-27

2. Remove all wires to the LCD transition board, remove 4 screws fixing the board, turn over the board as shown in Figure 4-27, and carefully remove the data cables of the display and touch screen.

3. Replace the LCD transition board with a new one of the same specifications, correctly connect the cables of display and touch screen, fix the fixing screws, connect all wires and reassemble the analyzer.

4.10 Replacement of touch screen/LCD

Procedures for replacement:

1. Open the upper cover, remove screws fixing the main board and remove the main board as shown in Figure 4-28.

Figure 4-28

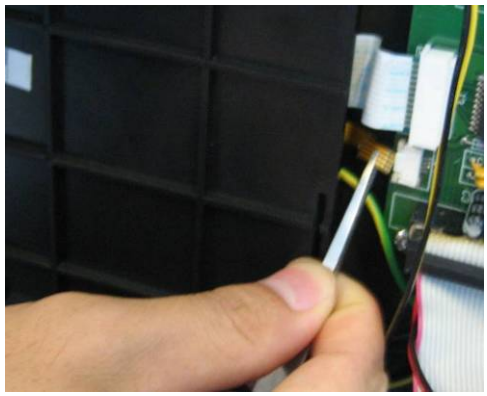


Figure 4-29

2. Remove two data cable on the right of LCD module from the transition board with tweezers as shown in Figure 4-29.

3. Remove 4 screws fixing the LCD module and remove the LCD module as shown in Figure 4-30.

Figure 4-30

4. Components of screen module are as shown in Figure 4-31. Replace the touch screen/LCD with a new one of the same specifications, and reassemble the analyzer.

   Note: Pay attention to the front and rear of the touch screen when installing the screen. The rough surface is the touch surface, which shall be installed outwards.

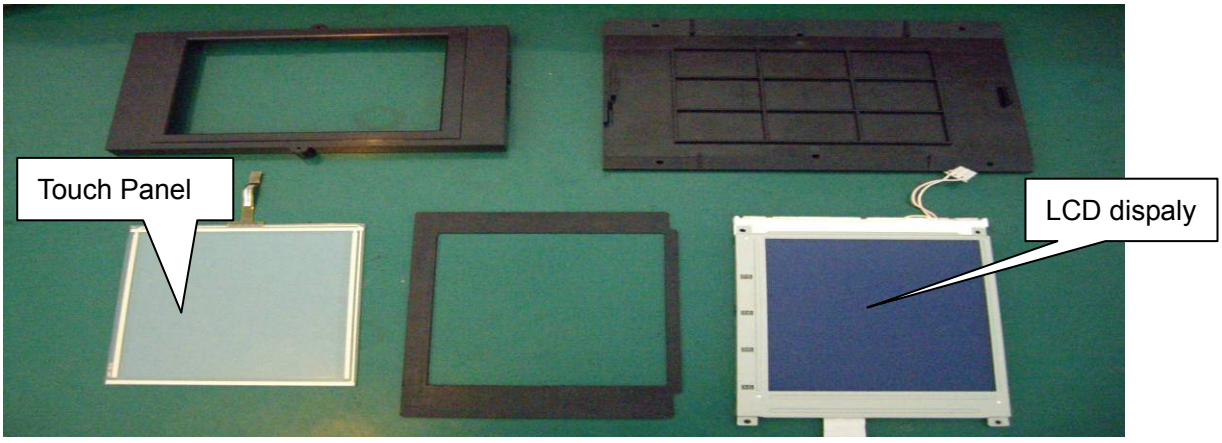


Figure 4-31

5. Maintenance

5.1 Overview

ARES is a precise clinical analyzer. To ensure its good conditions, daily maintenance should be done. Maintenance of ARES is very simple, but it should be carried out carefully.

5.2 Cleaning the analyzer

- Keep the operating environment of the analyzer clean.
- Clean the surface of the surface of analyzer with neutral detergent and wet cloth.
- Please use a soft cloth to clean the LCD.
- Clean the movable worktable with neutral detergent and wet cloth.

Caution: Do NOT expose the analyzer to any solvent, oil, and other corrosive substances.

5.3 Maintenance of touch screen

- Please operate the ARES with the provided pen.
- Do NOT apply any sharp or hard substance (e.g. metal and glass) to the surface of touch screen to avoid damage.
- In case that the position to which the arrow points deviates from the one clicked, calibration shall be reperformed to the touch screen.

6. Troubleshooting

Failure	Solution
The clock abnormally operates abnormally, and resetting is required on each startup of the analyzer.	This may be caused by no battery power, please replace the battery.
The analyzer is not switched on when it is turned on. (The power indicator on the analyzer panel is not on, the fan does not operate, and the screen does not have display)	Check whether 220V power supply is normal. Check whether the fuse blows out. Check whether the switch of the analyzer is damaged. Check whether the power supply module of the analyzer is damaged.
The analyzer does not start up when it is switched on. (The power indicator is on, but the screen has no display, and the system has no startup sound)	Check whether the power supply output voltage is normal. Check whether the DL1 indicator on the main board is on, and DL2 indicator flashes. If both the indicators are on, the main board does not start. This may be caused by the damage of the main board. Replace the main board and perform inspection by replacement method.
The analyzer has no display after startup. (The system has startup sound, but has no display)	Reconnect (or replace) the LCD cable and data cable to the LCD transition board to check for poor connection or damage. Check the input voltage of the screen (which is 5V normally) again and find out the damage of LCD transition board with replacement method. In case the LCD is damaged, replace the LCD and find out the damage with replacement method. In case the chip for display of main board is damaged, replace the main board and find out the damage with replacement method.
Inaccurate touch screen operation	Perform calibration to the touch screen. In case the touch screen is damaged, replace the touch screen. In case the main board is damaged, replace the main board.
The external printer fails to print.	Check whether the printer model is set correctly in the analyzer system settings. Is the analyzer switched on before the printer is switched on? In case of damaged printer cable or printer, replace the cable or the printer through replacement method.

Notes:

This manual may cover other ownership statement and copyright information; you should observe and conform to their clauses. Technical information or misprint might exist on the manual. Further notice might also not be made by LINEAR if any improvement and/or change are made for the product and/or program described in the manual.