

ESCO HEALTHCARE



Esco Life Science Laboratory Equipment Solutions

PCR Thermal Cyclers • Real-time PCR System • Microplate Shakers / Incubators

Swift•MiniPro®
Thermal Cyclers

Service Manual

Thank you for purchasing the Esco Swift MiniPro Thermal Cycler. Please read this manual thoroughly to familiarize yourself with the many unique features and exciting innovations we have built into cyclers. You can view this manual online at www.pcrthermalcyclers.com, where you can find many other resources to help you enjoy many years of productive and safe use of your Esco equipment.



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Service Manual

Swift•MiniPro® Thermal Cyclers

US \$ 50.00
Europe € 40.00

Additional manuals can
be purchased through
your Esco Distributor

Esco SWT-MIP Service Manual (Version 1.0)
Released August 2009

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CHAPTER 1 INTRODUCTION

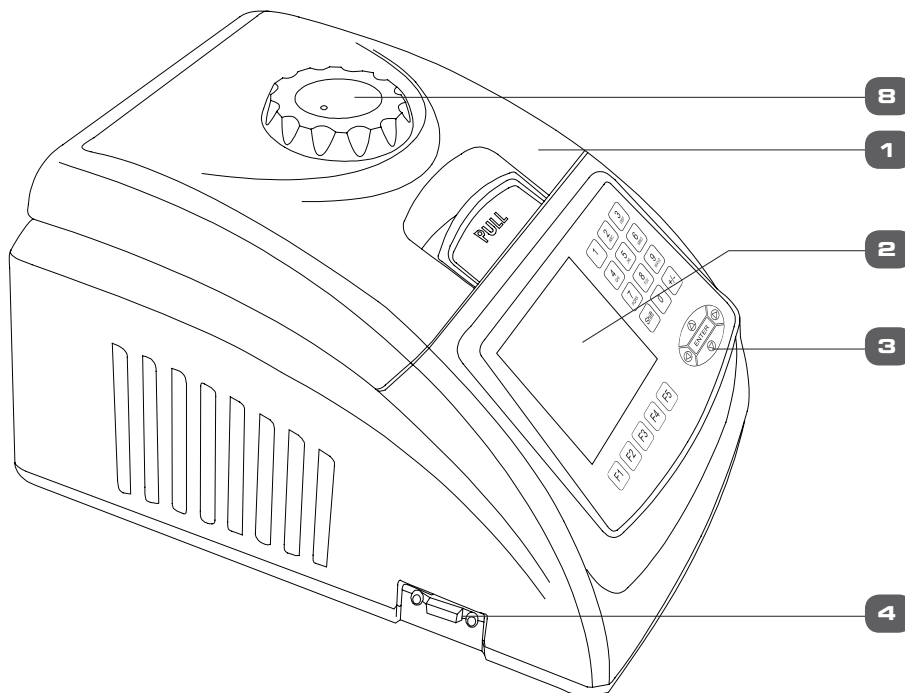
1.1 Products Covered

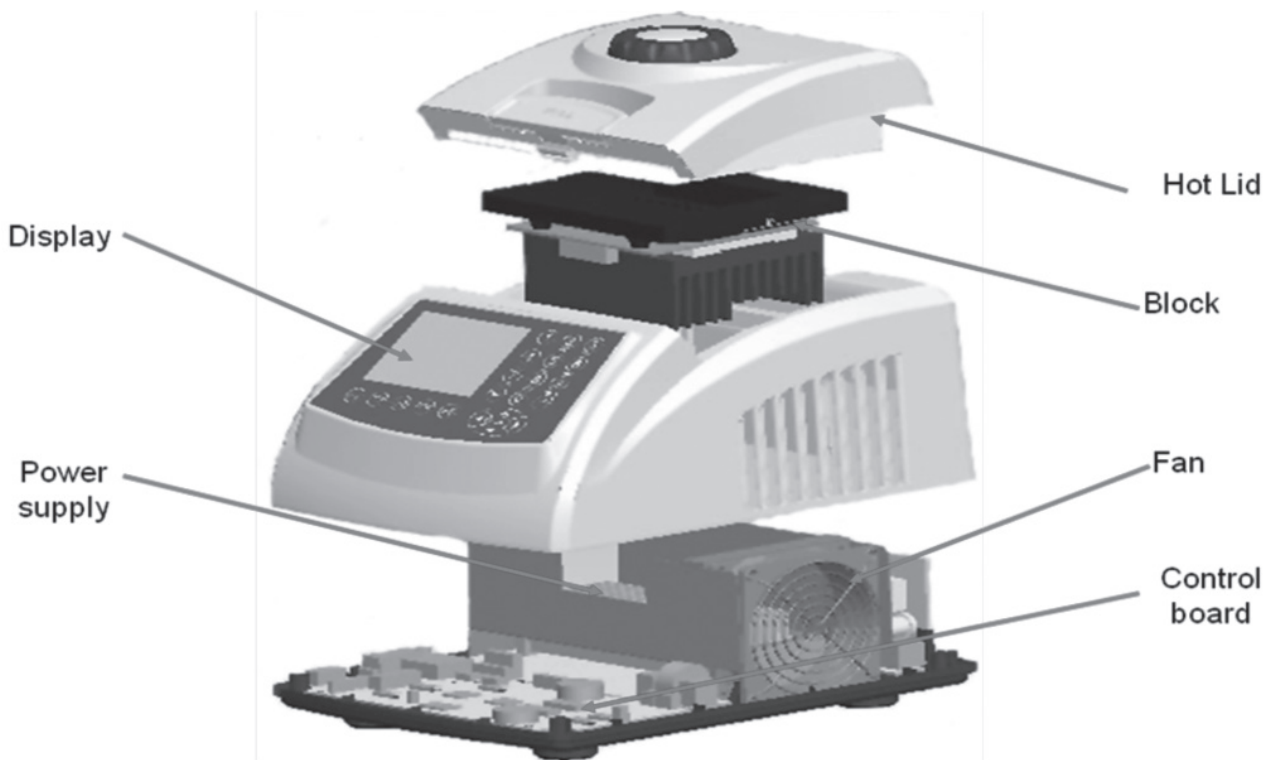
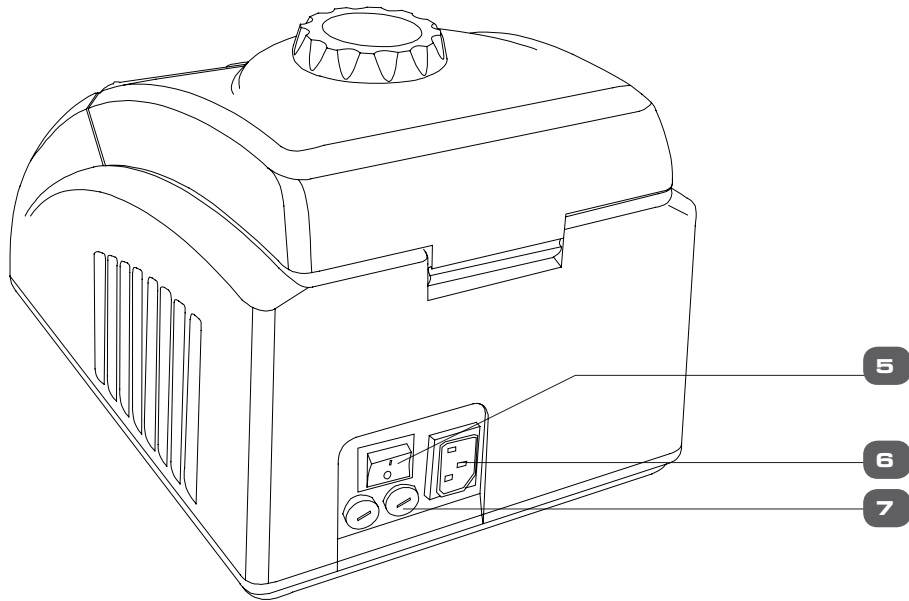
This manual is applicable and specific to the following Esco products.

Swift MiniPro Thermal Cycler (SWT-MIP)		
Rated voltage (V)	With 24 X 0.2ml block	With 18 X 0.5ml block
100-120VAC, 50/60Hz	SWT-MIP-0.2-1	SWT-MIP-0.5-1
200-240VAC, 50/60Hz	SWT-MIP-0.2-2	SWT-MIP-0.5-2

1.2 Basic product information

1.2.1 Quick View





NO	NAME	DESCRIPTION	NOTE
1	Hot lid and Knob	The Knob is for adjusting the height of the Hot Lid	Turn the knob counter-clockwise before closing the lid. Note that the knob can be tightened by turning it clockwise, and can be loosened by turning counter-clockwise.
2	LCD Screen	Display protocol, conditions and other information during setting and running.	
3	Keyboard	For setting and controlling.	
4	RS232 interface	PC interface for software upgrading	
5	Power Switch	Turn the equipment ON/OFF.	
6	Power Socket	Connect power supply.	
7	Fuse Socket	Install fuse in the socket to protect equipment from over-current.	The fuse specifications are as follows: 250V 2.5A(or 125V 5A), $\phi 5 \times 20$ mm. Fuse should be replaced by one that complies with these specifications.
8	Unlocking Device	Loose the hot lid knob	If hear click sound at the beginning of turning the knob clockwise and counter clockwise, press the unlocking device and turn the knob counter-clockwise for two rounds to loose the knob

1.2.2 Technical specification summary table

General Specifications, Swift MiniPro Thermal Cycler		
Model Code	SWT-MIP-0.2-*	SWT-MIP-0.5-*
Sample Capacity	24 x 0.2 mL	18 X 0.5 mL
Applicable Consumables	0.2 mL tubes, 3 X 8 strips, 24-well microplates	0.5 mL tubes
Max. Heating Rate	5.0°C / sec	4.0°C / sec
Max. Cooling Rate	4.0°C / sec	3.0°C / sec
Temperature Uniformity	±0.3°C	
Temperature Accuracy	±0.3°C	
Temperature Range	4°C - 99°C	
Hot lid Temp. range	30°C - 110°C	
Temp. Control Mode	Block mode or tube mode	
Display	Graphical LCD	
Protocol Capacity	100 protocols	
PC Interface	RS232 for software updates	
Dimension (W x D x H)	212 x 297 x 200 mm (8.3" x 11.7" x 7.9")	
Weight	3.2 kg (7 lbs)	
Electrical	100-240VAC 50/60Hz 200W	
Warranty	3 years for main body, 2 years for blocks	

1.3 Security Notes

- i. Turn the power OFF and unplug the power cord before performing any procedure.
- ii. Please read all the instructions thoroughly before maintenance. Always follow this service manual. Keep this service manual well for future reference and review it as necessary.
- iii. Engineers must inspect and ensure operation of the equipment is completely back to normal after maintenance.

1.4 Guidance

Pay attention on the following before hand.

- i. Investigate :-
 - Situation of the equipment as operating
 - Previous maintenance record
 - Symptom of the failure
 - Hardware environment
 - Structure of the equipment
 - Years of the equipment be used
- ii. Check power supply.
- iii. Check installation of the equipment.
- iv. Clean internal of the equipment to eliminate failures caused by dust, dirt, redundant solder, welding oil.
- v. Read all the instructions thoroughly before maintenance to ensure full understanding.

1.5 Maintenance tools

- Wire-stripping pliers, wire stripper
- Torque screwdriver $\Phi 3$
- Word screwdriver $\Phi 2$
- Cross screwdriver $\Phi 3$
- Sharp nose pliers, diagonal cutting nippers
- Pen knife
- Tweezers
- Multimeter
- Electric iron

CHAPTER 2 SERVICE PROCEDURES

2.1 Fan Replacement

2.1.1 Remove the screws at the bottom of the unit. Refer to Fig.1. Then remove the cover.

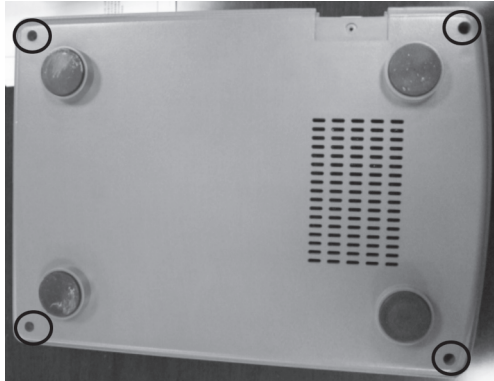


Fig.1

2.1.2 The location of the fan is as Fig.2

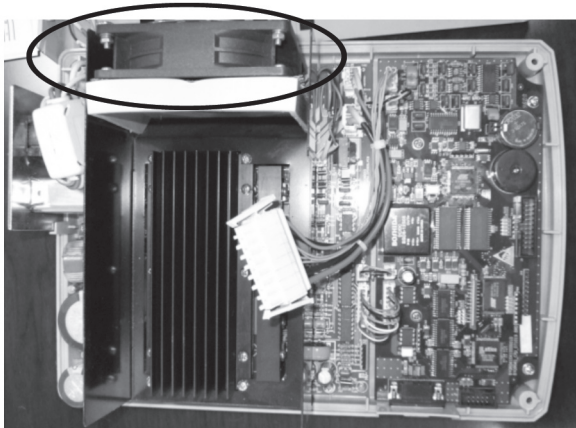


Fig.2

2.1.3 Remove all connectors and take out the fan. As Fig. 3 and Fig.4

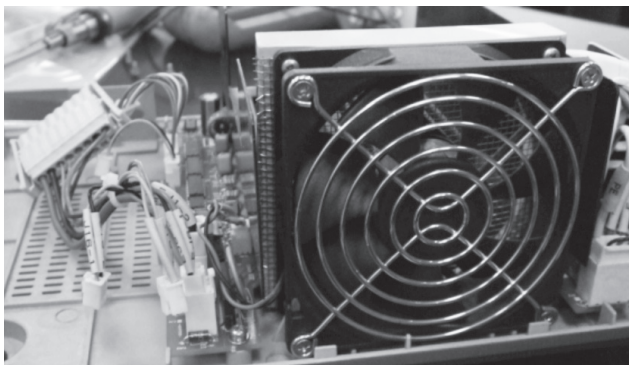


Fig.3



Fig.4

2.14 Replace a new fan.

Notes: Please note the air flow direction of the fan and the polarity of the connection wire when replacing the fans. Please mark them to avoid forgetting the correct sequence and make sure the connection is secure.

2.2 LCD replacement

2.2.1 Remove the front cover and see the LCD control board as Fig.5

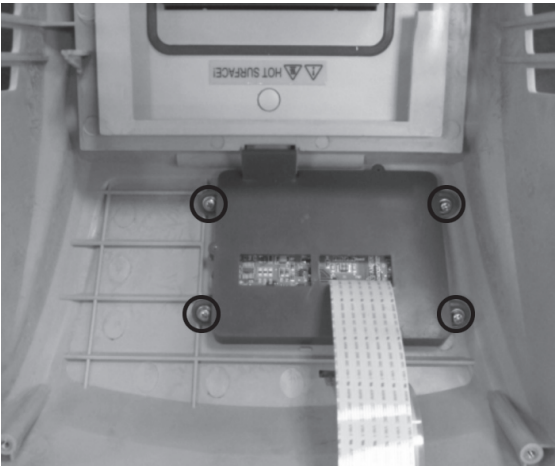


Fig.5

2.2.2 Remove the screws as Fig.5, and get the LCD and LCD control board which are combined into one part. As Fig.6

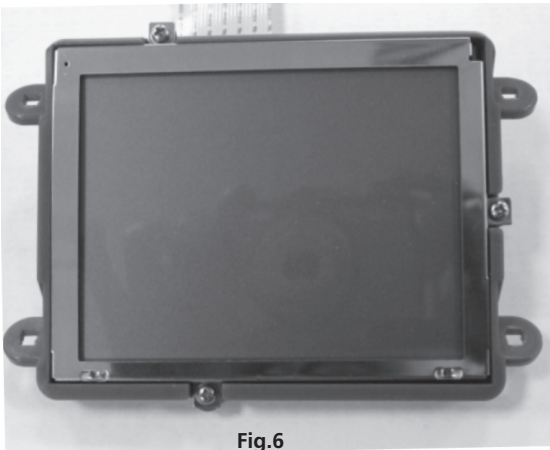


Fig.6

2.3 Hot Lid adjust knob repair and replacement

2.3.1 Use a tweezers to remove the small hot lid lock device. As Fig.7

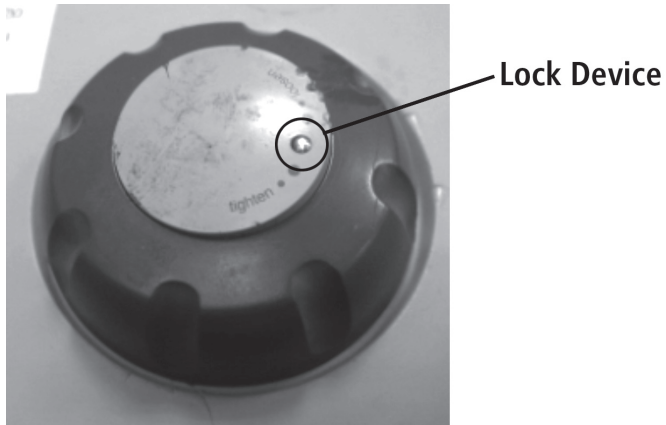


Fig.7

2.3.2 The cover will be removed together with the lock device. As Fig.8



Fig.8

2.3.3 Remove the small rotate metal ring. As Fig. 9

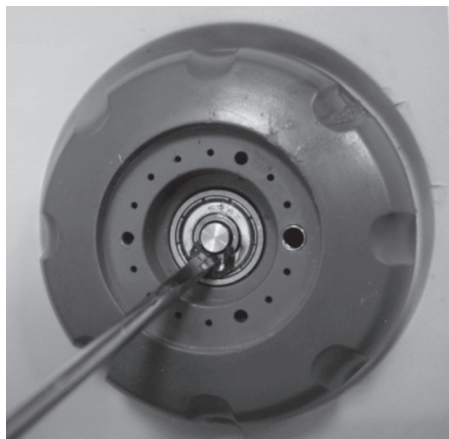


Fig.9

2.3.4 Remove the adjustable knob, and see the inner part .As Fig. 10



Fig.10

Note: Most of the time, the hot lid adjustable knob looses because the contact between the four small gears and the big gear is broken. Please adjust and make sure the four gears are in the same level, otherwise the hot lid can not be positioned even which will cause reagent evaporation.

2.4 Hot lid repair and replacement.

2.4.1 Remove screws as Fig.11 and Fig.12



Fig.11



Fig.12

2.4.2 Remove the sticker, as Fig.13



Fig.13

2.4.3 Remove the screw, as Fig. 14



Fig.14

2.4.4 Remove the inner cover and see the hot lid inner part. As Fig.15

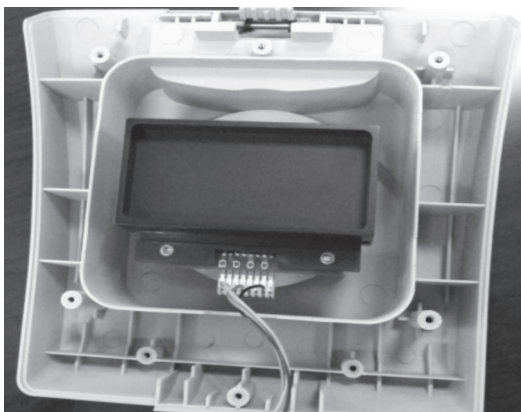


Fig.15

2.4.5 Remove the connector. Measure the resistance, as Fig.16. If the value is out of range, need to repair.

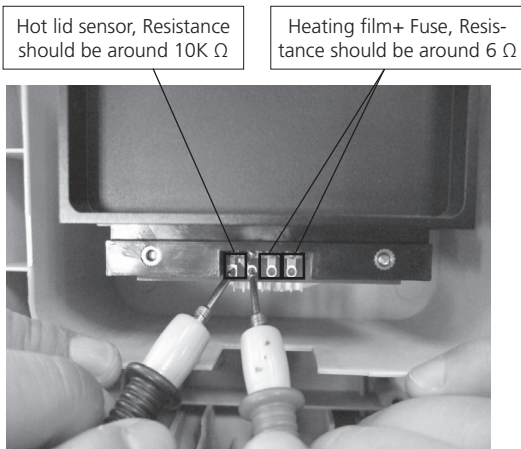


Fig.16

2.4.6 Refer to Chapter 2.3, remove the hot lid knob.

2.4.7 Remove the two screws and then remove all the white plastic gears. As Fig.17

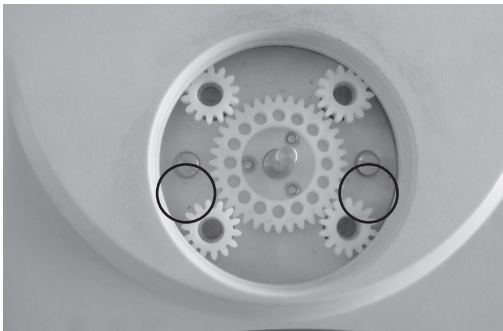


Fig.17

2.4.8 The hot lid is as Fig. 18

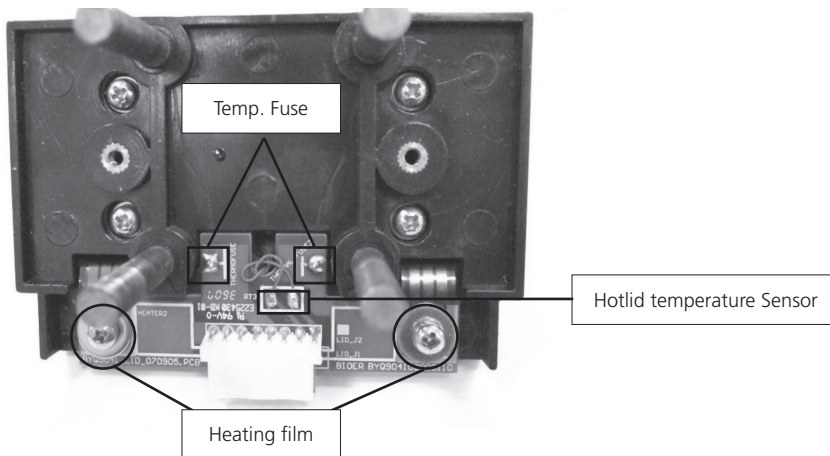


Fig.18

2.4.9 Remove the 6 screws in above picture, the heat film is as Fig. 19

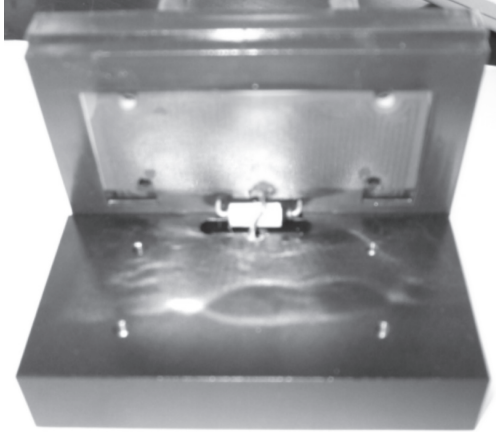


Fig.19

2.4.10 Remove the solder and replace heat film, fuse or sensor.

2.4.11 Solder the new fuse or sensor, and make sure the fuse contact the hot lid surface well after fixed.

2.5 Heating and Cooling parts Replacement

2.5.1 Pull the handle and put it to the center. Take out the block as Fig.20

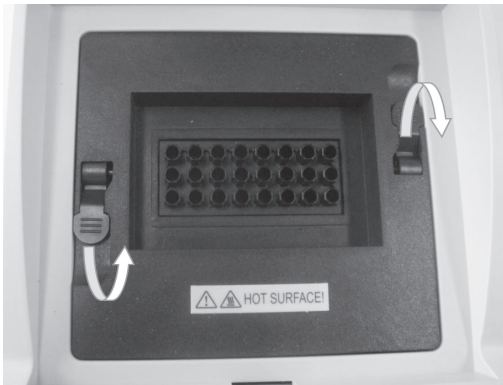


Fig.20

2.5.2 Press and remove the connector as Fig. 21

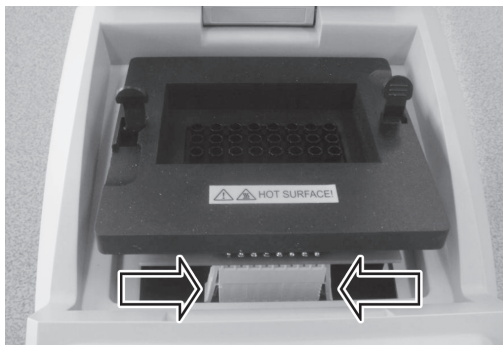


Fig.21

2.5.3 Take out the block as Fig. 22.

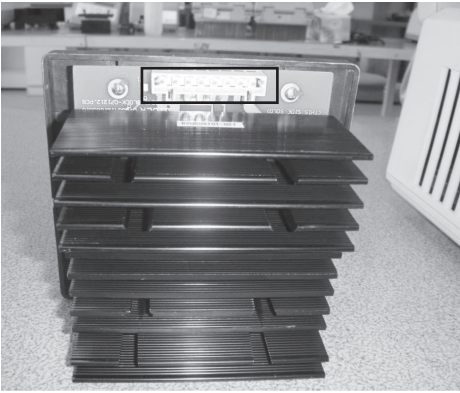


Fig.22

2.5.4 Test the resistance as Fig.23. The resistance of TE should be around $3\ \Omega$, and the resistance of Sensor should be around $10K\ \Omega$. If not, need to repair the block.

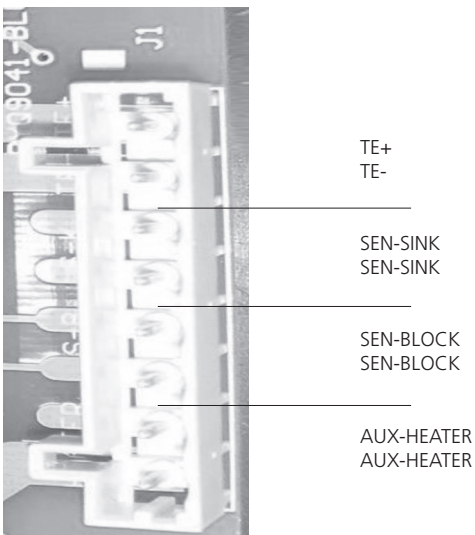


Fig.23

2.5.5 Remove the screws as Fig.24 to remove the heat sink.

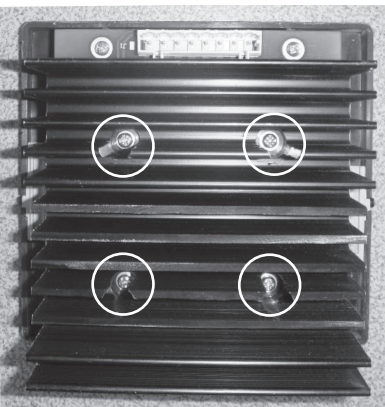


Fig.24

2.5.6 The heating and cooling part is as Fig. 25

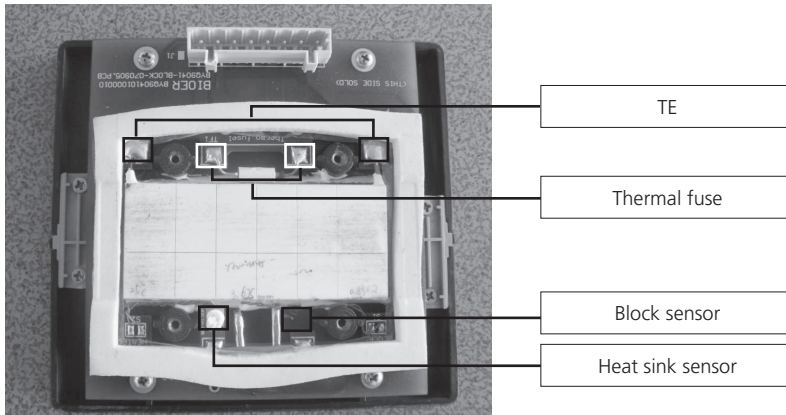


Fig.25

2.5.7 Fuse and Heat sink sensor can be replaced but the block sensor can be only replaced by manufacturer.

2.5.8 Replace the only peltier (TE) and install back the heat sink by using Torque screwdriver $\Phi 3$ and the torque for four screws are 2.5KG.

Note: *It is not recommend that distributor replace the heating and cooling parts, because it is very difficult to control the temperature accuracy and uniformity. A temperature acquisition device is necessary for replacing peltier. Is it recommend to send the whole block back to manufacturer for repair.*

2.6 Printed Circuit Board Recognitions and replacement

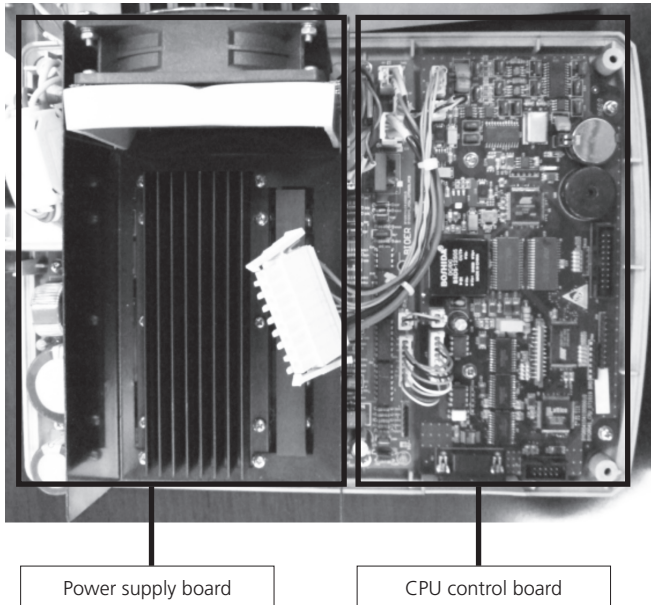


Fig.26

Replace the Printed circuit boards above.

2.6.1 Wrap the connector by using a damp cotton swab soaked with ethanol until can unplug the plug.

2.6.2 Note the connection sequence of the wires. Remove the wires.

2.6.3 Unscrew the panel screws.



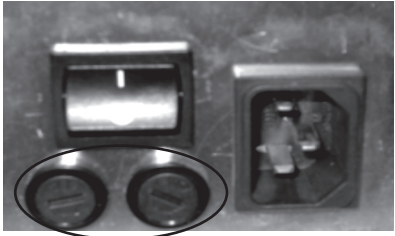
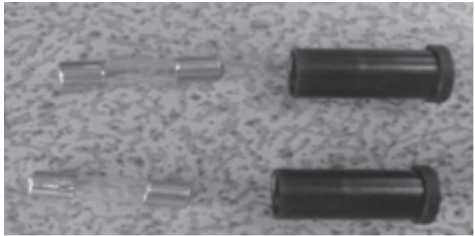
2.6.4 Replace the panel.


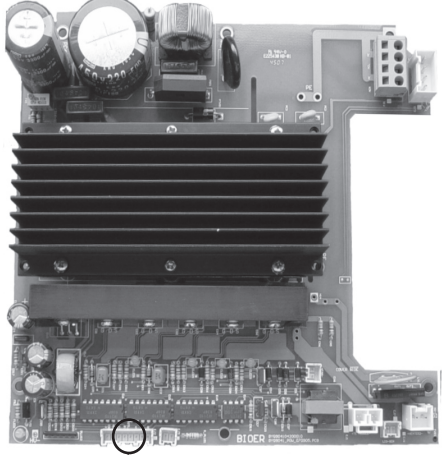
2.6.5 Reconnect all wire according to the recorded sequence.

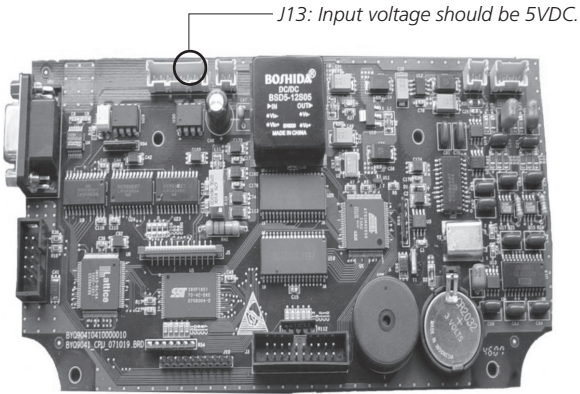
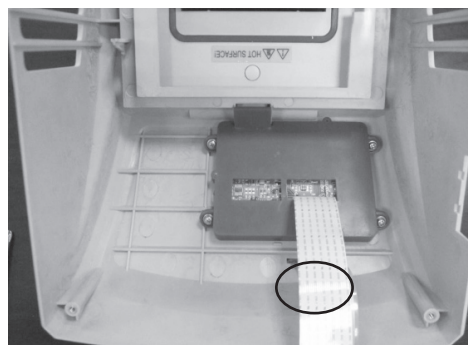
2.6.6 Reconnect all plugs and sockets.

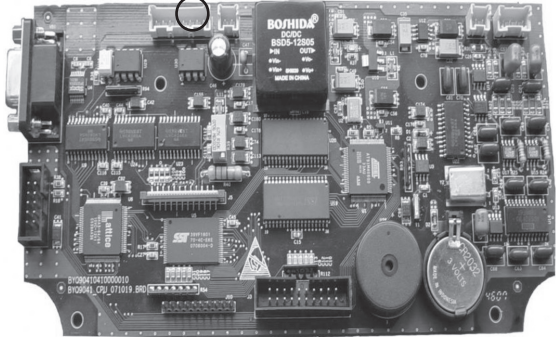
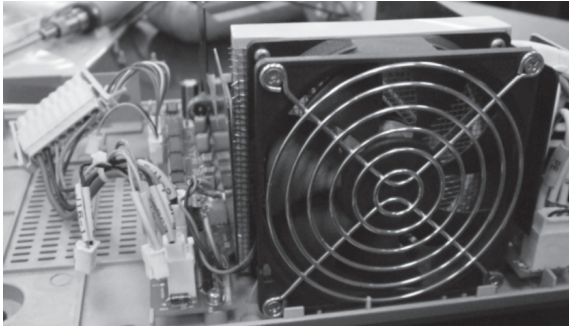
2.6.7 Run the instrument. If no problem, add Thermosol to connector.


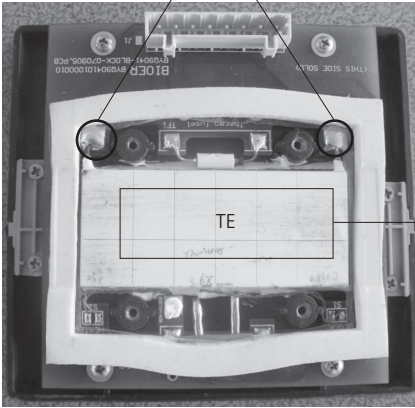
CHAPTER 3 TROUBLESHOOTING

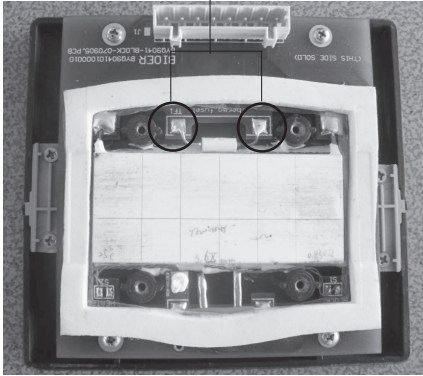
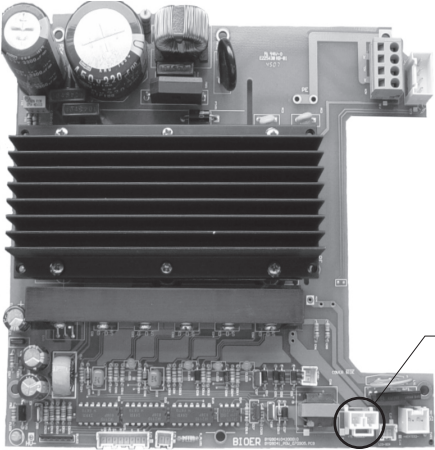
Problem	Possible Cause	Corrective Action
No display when power on	Power Failure	<ul style="list-style-type: none"> If no beep sound and the fan is not working, input power or fuse may has problem. Check if there is power at the wall/building socket. You can use voltmeter or test pen to check power on the wall/building socket. Ensure the socket switch is at ON position. As 1-1
	<p>Wall Socket (Sample of Singapore Socket)</p>  <p>1-1</p>	
	Power cord is not connected properly or faulty	<ul style="list-style-type: none"> Check whether power cord has been connected properly into wall/building socket and also into the unit. Check whether the power cord is giving power, measure the AC voltage between the live and the neutral terminal of the cord by using voltmeter If the voltage is NOT within +/-2% of the wall socket voltage, replace the whole part as See 1-2. If the voltage is within +/-2% of the wall socket voltage, please proceed to next step.
	 <p>1-2</p>	
Faulty fuse	<ul style="list-style-type: none"> Use word screwdriver to take out the fuse holder, as 1-3 Check whether the fuse is broken, as 1-4 If yes, replace fuse. 	
 <p>1-3</p>  <p>1-4</p>		

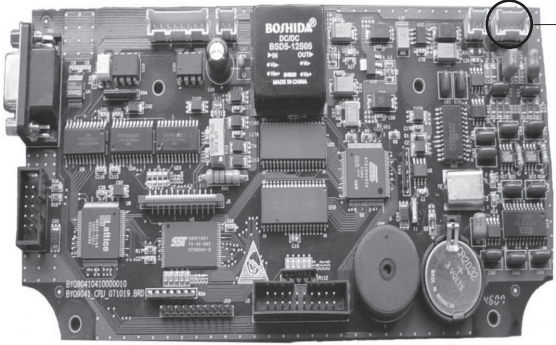
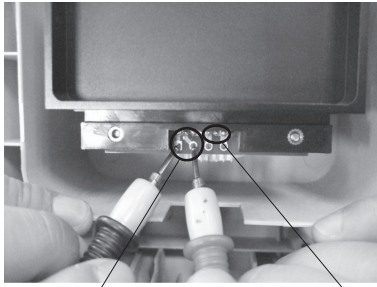
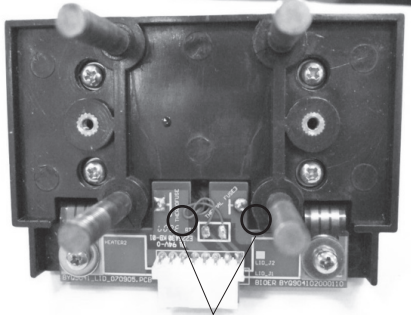
<p>Faulty Switch</p>	<ul style="list-style-type: none"> • If the Switch is broken, • Replace the whole part as See 1-5
<div style="text-align: center;">  <p>1-5</p> </div>	
<p>Defective power supply board</p>	<ul style="list-style-type: none"> • No beep sound and eliminated the above possibility, the power supplyboard or CPU control board may have connection problem or are defective. • Measure the output voltage on the power supply board at terminal EJ2, See drawing 1-6 below to locate terminal EJ2. Note: Measure output voltage of the power supply board after turn on the thermal cycler. • Voltage should be 5VDC. • If voltage is out of range, power supply board has problem. Change the whole power supply board.
<div style="text-align: center;">  <p>1-6 — EJ2: Supply power for CPU board. Output voltage should be 5 VDC</p> </div>	

<p>No display when power on</p>	<p>Connection problem/ Defective CPU control board</p>	<ul style="list-style-type: none"> • If voltage is correct, measure the input voltage on the CPU control Board at terminal J13, See drawing 1-7 below to locate terminal J13. • Voltage should be 5VDC. • If voltage is out of range, check connection between Power supply board EJ2 and CPU control board J13, unplug it and plug again or change the cable with plug. • If voltage is correct, replace the CPU control Board. <p>Note: When replacing CPU control Board, please re-connect all the wires back correctly. Any wrong wiring may result in damage.</p>
	<div style="text-align: center;">  <p>J13: Input voltage should be 5VDC.</p> <p>1-7</p> </div>	
	<p>Faulty LCD</p>	<ul style="list-style-type: none"> • The beep sound is normal and you can hear the noise of the fan. • Remove the base cover; remove all the wires, as 1-8. • Connect a new LCD to the LCD port on main board. • If the new LCD functions properly, means the old one is defective. Replace it. • Unscrew the screws. • Replace LCD
<div style="text-align: center;">  <p>1-8</p> </div>		

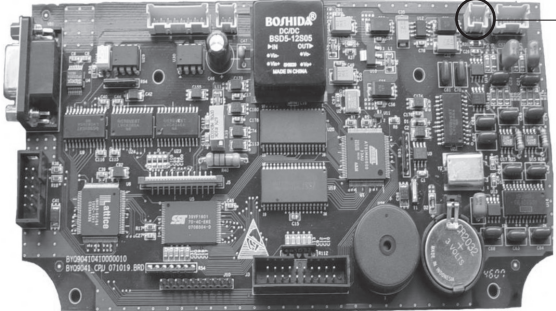

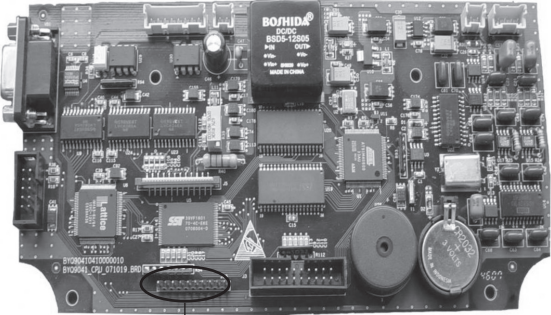

	<p>Connection problem/ Defective CPU control board</p>	<ul style="list-style-type: none"> • If the beep sound is normal, fan is working and LCD has no problem, the CPU control board has connection problem or is defective. • Measure the input voltage on the CPU control Board at terminal J13, See drawing 1-9 below to locate terminal J13. • Voltage should be 5VDC. • If voltage is out of range, check connection between Power supply board and CPU control board, unplug and plug again or change the cable with plug. • If voltage is correct, replace the CPU control Board. <p>Note: When replacing CPU control Board, please re-connect all the wires back correctly. Any wrong wiring may result in damage.</p>
	<p style="text-align: center;">J13: Input voltage should be 5VDC.</p>  <p style="text-align: center;">1-9</p>	
<p>Low heating and cooling rates or the block temperature can not reach the setting temperature</p>	<p>Ventilation Blocked</p>	<p>Clear the blockage</p>
	<p>Fan is defective, and can not work properly</p>	<ul style="list-style-type: none"> • The temperature of the main body is very high. • Reconnect the connection wire of the fan, as 1-10 • If still not good, Replace the fan. As Chapter 2.1 <p>Note: Please note the air flow direction of the fan and the polarity of the connection wire when replacing the fans.</p>
	 <p style="text-align: center;">1-10</p>	

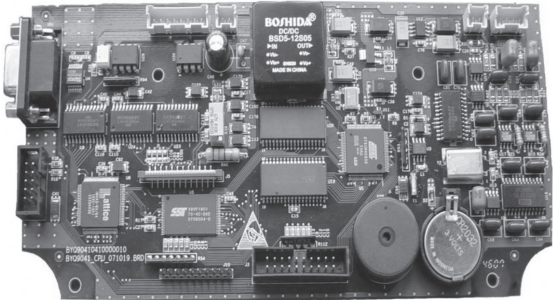
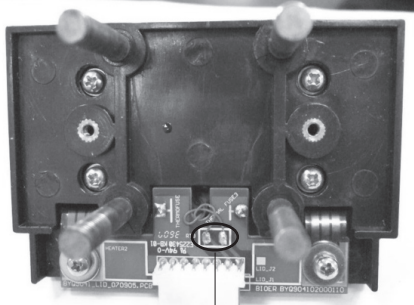
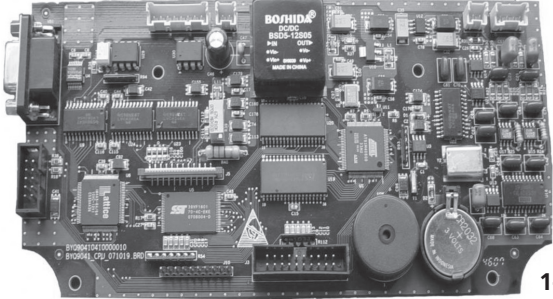
<p>Low heating and cooling rates or the block temperature can not reach the setting temperature</p>	<p>The screws of the heat sink is loose</p>	<p>Use Torque screwdriver to tighten the screw, as 1-11. Torque is equal to 2.5kg.</p>
	<div style="text-align: center;">  <p>1-11</p> </div>	
	<p>Peltier failure</p>	<ul style="list-style-type: none"> • Remove the heat sink and thermo film, as Chapter 2.5 • Measure the resistance of the peltier. If resistance is beyond the area as indicated, as 1-12, • Replace Peltier. as Chapter 2.5 <p>Note: <i>It is not recommend that distributor replace peilter, because it is very difficult to control the temperature accuracy and uniformity. A temperature acquisition device is necessary for replacing peltier.</i></p>
<div style="text-align: center;"> <p>Peltier resistance should be <math><10\Omega</math></p>  <p>1-12</p> </div>		

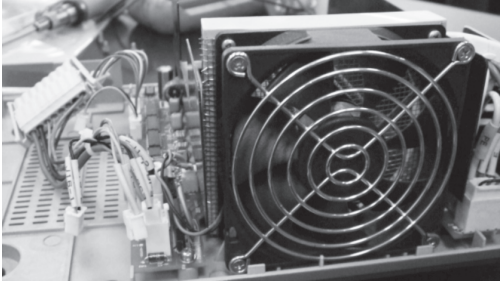
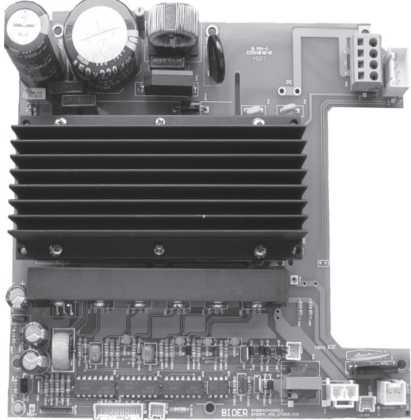

<p>The block doesn't heat.</p>	<p>Block thermal fuse is broken</p>	<ul style="list-style-type: none"> • If the hot lid temperature increase normally, has to find out which part has problem, block or main body. Note: We suggest distributor to keep one set of spare parts to easily change parts and identify where the problem is. • If you have a spare block, replace with the new block, as chapter 2.5 • Check whether the block works normally. If yes, the thermal fuse of the old block is broken. • If you don't have a spare block, go to the step below to remove the heat sink directly. • Remove the heat sink as chapter 2.5, check the fuse resistance which should be 0 Ω. As 1-13 • If resistance is infinite, replace the 139°C thermal fuse.
		<div style="text-align: center;"> <p>Fuse resistance should be around 0</p>  <p>1-13</p> </div>
	<p>Defective power supply board</p>	<ul style="list-style-type: none"> • If the block fuse has no problem, check the main body. • Measure the output voltage on the power supply board at terminal EJ1, See drawing 1-14 below to locate terminal EJ1. • Voltage should be 12.8VDC. • If voltage is out of range, replace the power supply board. Note: When replacing power supply board, please re-connect all the wires back correctly. Any wrong wiring may result in damage. • If voltage is normal, See next step.
		<div style="text-align: center;">  <p>1-14</p> <p><i>EJ1: Supply power for TE, output voltage should be 12.8VDC.</i></p> </div>

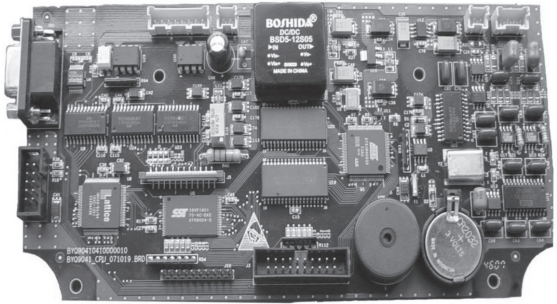
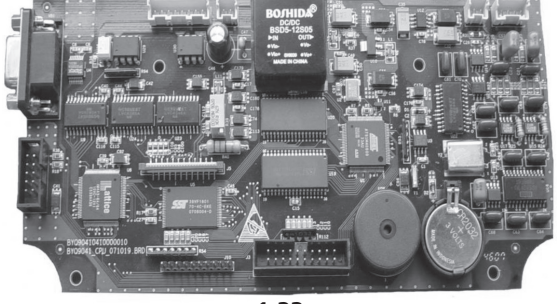
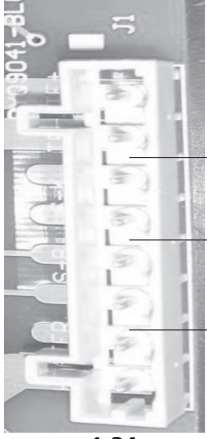
<p>The block doesn't heat.</p>	<p>Connection problem/Defective control board</p>	<ul style="list-style-type: none"> • Check the plug connection at terminal J15, See drawing 1-15 below to locate terminal J15. • If no problem, replace the CPU control board. <p>Note: When replacing power supply board, please re-connect all the wires back correctly. Any wrong wiring may result in damage.</p>
	 <p style="text-align: right;">J15</p> <p style="text-align: center;">1-15</p>	
<p>Temperature accuracy and uniformity control is low</p>	<p>Defective CPU control board</p>	<p>Note: We suggest distributor to keep one set of spare parts to easily change parts and identify where the problem is.</p> <ul style="list-style-type: none"> • If you have a spare block/ main body, replace with the new block/ main body, as chapter 2.5 • Check whether the new main body with old block works normally. If yes, the CPU control board of the old main body has problem. • Replace the CPU control board. <p>Note: When replacing power supply board, please re-connect all the wires back correctly. Any wrong wiring may result in damage.</p>
	<p>Defective block sensor</p>	<ul style="list-style-type: none"> • If the new main body with old block still have the same problem, the block sensor has problem. • Contact Esco and return the block for repair. The block sensor must be changed by manufacturer.
<p>Lid does not heat</p>	<p>Damaged fuse in hot lid</p>	<ul style="list-style-type: none"> • Turn over the hot lid, remove the inner cover and see the hot lid inner part. As Chapter 2.4. <p>Note: Don't remove the hot lid knob first.</p> <ul style="list-style-type: none"> • Measure the heating film resistance, as 1-16 • Resistance should be around 6Ω • If resistance is infinite, remove the hot lid knob as Chapter 2.4. • Measure the fuse resistance as 1-17. It should be around 0Ω. If no, • Remove the old fuse, solder the new fuse. <p>Note: Make sure the fuse contact the hot lid surface well after fixed.</p>
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Hot lid sensor, Resistance should be around 10K Ω</p> <p>Heating film+ Fuse resistance should be around 6 Ω</p> <p>1-16</p> </div> <div style="text-align: center;">  <p>Fuse normal resistance should be 0</p> <p>1-17</p> </div> </div>	

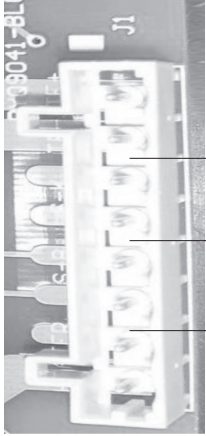
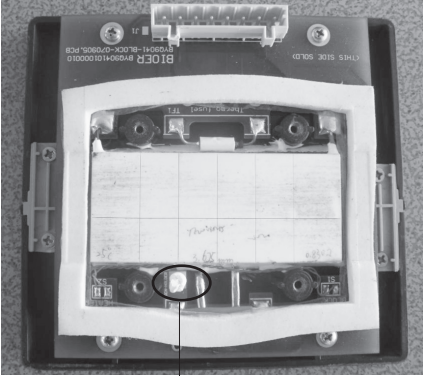
	<p>Damaged heating film</p>	<ul style="list-style-type: none"> • Measure the heating film, refer to 1-18. • The resistance should be around 6 Ω. • If resistance is infinite or zero, replace the heating film as Chapter 2.4. Heating film location as 1-19
	<p>Defective power supply board</p>	<ul style="list-style-type: none"> • If the resistance are all normal, as 1-20 • Install the inner cover of the hot lid, and open the main body as Chapter 2.1 • Measure the output voltage on the power supply board at terminal EJ3, See drawing 1-21 below to locate terminal EJ3. Note: Measure output voltage of the power supply board after turn on the thermal cycler. • Voltage should be 28VDC. • If voltage is out of range, power supply board has problem. Change the whole power supply board.
<p>Lid does not heat</p>		<div data-bbox="411 474 833 817"> <p>1-18</p> </div> <div data-bbox="849 474 1372 817"> <p>1-19</p> <p>Heating film</p> </div> <div data-bbox="630 1137 1008 1422"> <p>1-20</p> </div> <div data-bbox="622 1433 869 1496"> <p>Hot lid sensor, Resistance should be around 10K Ω</p> </div> <div data-bbox="877 1433 1145 1496"> <p>Heating film+ Fuse resistance should be around 6Ω</p> </div> <div data-bbox="550 1512 965 1926"> <p>1-21</p> </div> <div data-bbox="901 1657 1197 1736"> <p>EJ3: Supply power for hotlid and sensor, output voltage should be 28VDC.</p> </div>

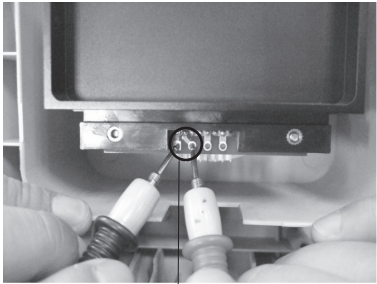
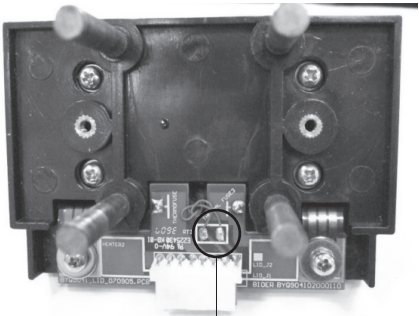
<p>Lid does not heat</p>	<p>Connection problem/Defective control board</p>	<ul style="list-style-type: none"> • Check the plug connection at terminal J16, See drawing 1-22 below to locate terminal J16. • If no problem, replace the CPU control board. <p>Note: When replacing power supply board, please re-connect all the wires back correctly. Any wrong wiring may result in damage.</p>
	 <p style="text-align: right;">J16</p> <p style="text-align: center;">1-22</p>	
<p>Abnormal characters are displayed</p>	<p>Bad contact between display control board and its socket</p>	<ul style="list-style-type: none"> • Reconnect it
	<p>Defective Display control board</p>	<ul style="list-style-type: none"> • Replace the whole LCD part because the display control board and LCD are combined to one part.
 <p style="text-align: center;">1-23</p>		
<p>Buttons on the touch panel do not work.</p>	<p>Poor / bad connection between key pad connector and control board as 1-24.</p>	<ul style="list-style-type: none"> • Check the J10 in CPU control board to make sure it is well connected. As 1-24. If no, reconnect it. • If the problem still exists, replace the key pad. As 1-25
	 <p style="text-align: center;">1-24</p> <p style="text-align: center;">J10: connected with touch panel</p>  <p style="text-align: center;">1-25</p>	

Buttons on the touch panel do not work.	The connections are sticky, resulting in a bad connection.	<ul style="list-style-type: none"> • Clean the sticky connections, and re-connect the plug to the socket.
	Defective CPU control board.	<ul style="list-style-type: none"> • If the problem still exists, change the CPU control board. As 1-26.
	 <p>1-26</p>	
Tube damaged or burned	Bad quality tubes	<ul style="list-style-type: none"> • Change tubes
	Damaged/ loose block temperature sensor	<ul style="list-style-type: none"> • The bottom of the tubes are burned. • Measure the temperature of block. • If actual temperature is higher than display temperature, please contact manufacturer and send the block back for repair because block sensor is not allowed to be changed by customer/ distributor.
	Damaged/ loose hot lid sensor	<ul style="list-style-type: none"> • The top of the tubes are burned. • Test the temperature of hot lid. • If actual temperature is higher than display temperature, • Measure the hot lid sensor resistance, normal value should be around 10KΩ. See 1-27 • If our of this range, re-joint the hot lid sensor and solder it
	 <p>1-27 — Hot lid sensor</p>	
	Defective CPU control board	<ul style="list-style-type: none"> • If the above possibilities are eliminated, replace the CPU control Board. As 1-28
 <p>1-28</p>		

<p>Loud noise while instrument is running.</p>	<p>Damaged fan.</p>	<ul style="list-style-type: none"> • Reconnect the connection wire of the fan, as 1-29 • If still not good, replace the fan. As Chapter 2.1 <p>Notes: Please note the air flow direction of the fan and the polarity of the connection wire when replacing the fans.</p>
	 <p>1-29</p>	
<p>Equipment powers off and restart again when it is bumped.</p>	<p>Bad socket results in bad connection between cable plug and socket.</p>	<ul style="list-style-type: none"> • Check the power supply connections. • If the contact between plug and socket is loose, it is advisable to replace the cable or the socket. • Check the outside contact first. • If the outside contact is good, open the instrument to check the interior of the power supply.
	<p>Power supply problem</p>	<ul style="list-style-type: none"> • Check the power supply board. • Input 230VAC or 115VAC +/- 10%. • Output refer to Appendix 1. • If input is correct but output is not, then replace the power supply board. As 1-30
	 <p>1-30</p>	
<p>The LCD is dark/ can not show background light</p>	<p>Connection problem / Damaged lamp in LCD</p>	<ul style="list-style-type: none"> • Check the connection between LCD and CPU control board, reconnect it. • If the problem still exists, replace the display LCD part. As 1-31
	 <p>1-31</p>	

<p>The LCD is dark/ can not show background light</p>	<p>The R39 in CPU control board is damaged</p>	<ul style="list-style-type: none"> • If the problem still exists after changing LCD, • The R39 in CPU control board is damaged. • Change the CPU control board. As 1-32.
<div style="text-align: center;">  <p>1-32</p> </div>		
<p>System can not time when temperature of the block reach the setting temperature</p>	<p>The chip in control board which controls the time is damaged. Refer to 1-33</p>	<ul style="list-style-type: none"> • Replace CPU control Board.
<div style="text-align: center;">  <p>1-33</p> </div>		
<p>During the run, the screen shows: "Please check error", and "Temperature sensor disconnect" or "Temperature sensor short-circuit"</p>	<p>Block sensor damaged or bad connection</p>	<ul style="list-style-type: none"> • Block temperature higher than 115°C. • Take out the block as Chapter 2.5. • Measure the Block sensor through Pin 5 and pin 6 below, as 1-34, the normal resistance should be around 10 KΩ. • If the resistance is infinite or 0, block sensor has problem. Contact Esco and return the block for repair. The block sensor must be changed by manufacturer. • If the resistance is around 10 KΩ, go to next step.
<div style="display: flex; align-items: center;"> <div style="flex: 1;">  </div> <div style="flex: 1;"> <ol style="list-style-type: none"> 1. TE+ 2. TE- <hr/> <ol style="list-style-type: none"> 3. SEN-SINK 4. SEN-SINK <hr/> <ol style="list-style-type: none"> 5. SEN-BLOCK 6. SEN-BLOCK <hr/> <ol style="list-style-type: none"> 7. AUX-HEATER 8. AUX-HEATER </div> </div> <p style="text-align: center;">1-34</p>		

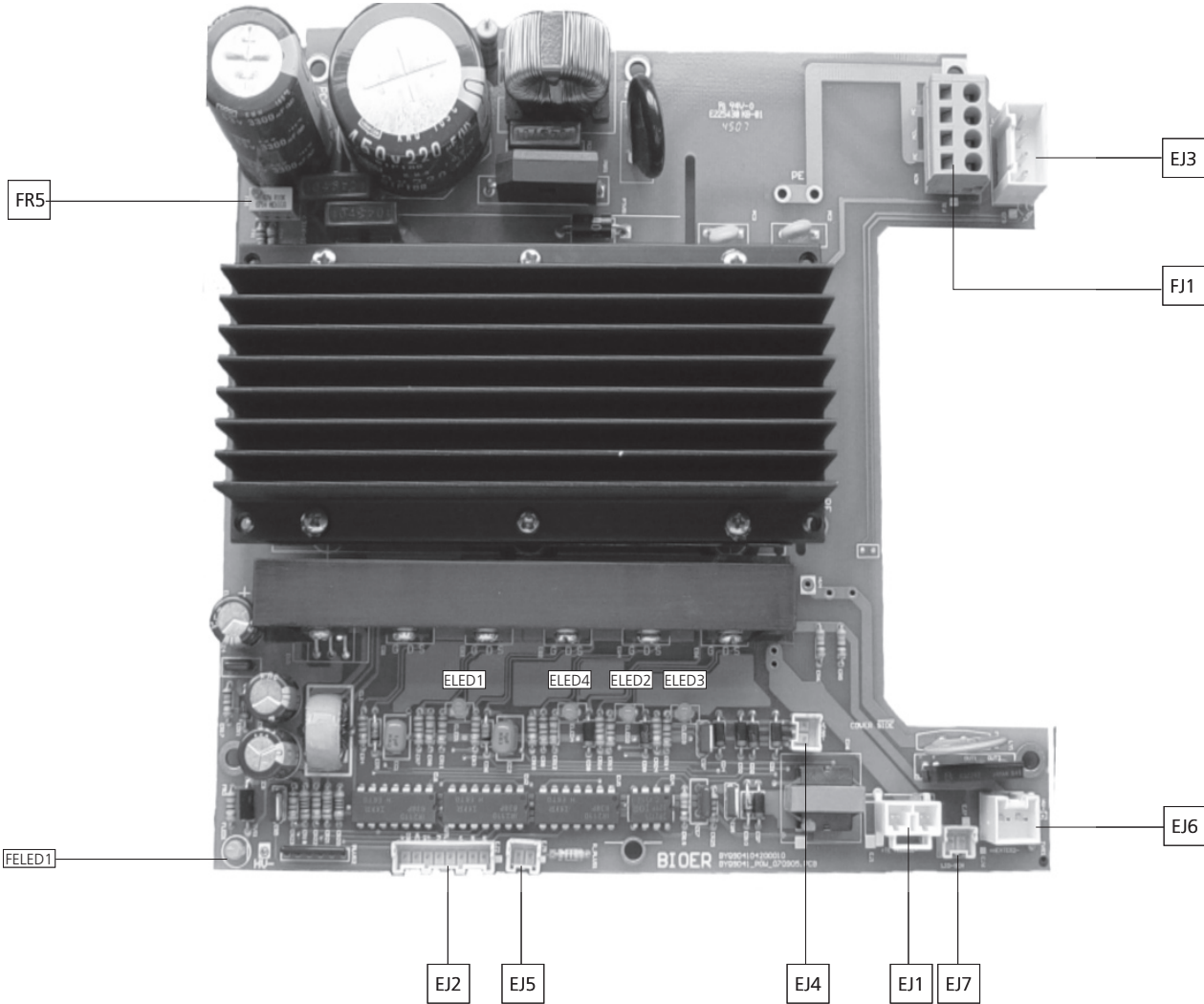
<p>During the run, the screen shows: "Please check error", and "Temperature sensor disconnect" or "Temperature sensor short-circuit"</p>	<p>Block PCB board is damaged</p>	<ul style="list-style-type: none"> • Measure pin 3&5, 4&6, 5&7, 6&8 separately, normal resistance should be infinite. • If not, the block PCB board has problem. Contact Esco and return the block for repair. The PCB board must be changed by manufacturer as Peltier location on it is very important. • If resistances are infinite, go to next step.
	<p>CPU control board is damaged</p>	<ul style="list-style-type: none"> • Replace the CPU control board, as 1-33.
	<p>Fan doesn't work</p>	<ul style="list-style-type: none"> • Heat sink temperature higher than 70°C. • Check the fan. • If the fan is broken, replace the fan. As Chapter 2.1 • If the fan is OK, go to next step.
	<p>Heat sink sensor damaged or bad connection</p>	<ul style="list-style-type: none"> • Take out the block as Chapter 2.5. • Measure the heat sink sensor through Pin 3 and pin 4 below, as 1-35, the normal resistance should be around 10 KΩ. • If the resistance is infinite or 0, block sensor has problem • Remove the heat sink as Chapter 2.5, find the heat sink sensor as 1-36 • Reconnect it or replace it, with thermal conductive grease on it and make sure it connects the heat sink well. • If the resistance is around 10 KΩ, go to next step.
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>1-35</p> </div> <div style="text-align: center;">  <p>1-36</p> <p>Heat sink sensor</p> </div> </div>	
<p>Block PCB board is damaged</p>	<ul style="list-style-type: none"> • Measure pin 1&3, 3&5, 2&4, 4&6 separately, normal resistance should be infinite. • If not, the block PCB board has problem. Contact Esco and return the block for repair. The PCB board must be changed by manufacturer as Peltier location on it is very important. • If resistances are infinite, go to next step. 	
<p>CPU control board is damaged</p>	<ul style="list-style-type: none"> • Replace the CPU control board, as 1-33. 	

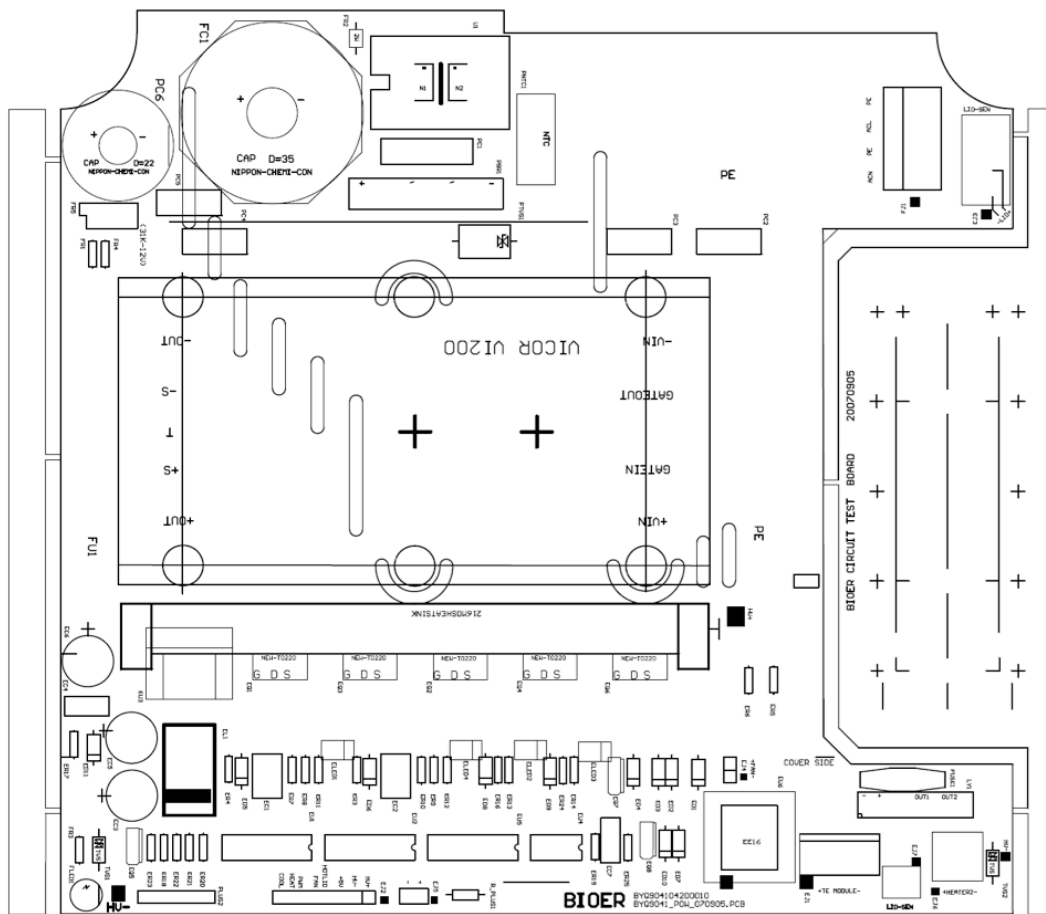
<p>During the run, the screen shows: "Please check error", and "Hot lid sensor disconnect" or "Hot lid sensor short-circuit"</p>	<p>Hot lid sensor damaged or bad connection</p>	<ul style="list-style-type: none"> • Hot lid temperature higher than 115°C. • Turn over the hot lid, remove the inner cover and see the hot lid inner part. As Chapter 2.4. • Note: Don't remove the hot lid knob first. • Measure the hot lid sensor resistance, as 1-16 • Resistance should be around 10KΩ • If resistance is infinite or 0, remove the hot lid knob as Chapter 2.4. • Find the hot lid sensor as 1-38. • Replace and solder the hot lid sensor.
	 <p>Hot lid sensor, Resistance should be around 10K Ω</p> <p>1-37</p>	 <p>Hotlid temperature Sensor</p> <p>1-38</p>
<p>CPU control board is damaged</p>	<ul style="list-style-type: none"> • If the problem still exists, replace the CPU control board, as 1-33. 	

APPENDIX

APPENDIX 1 PRINTED CIRCUIT BOARD LAYOUT

Power supply board

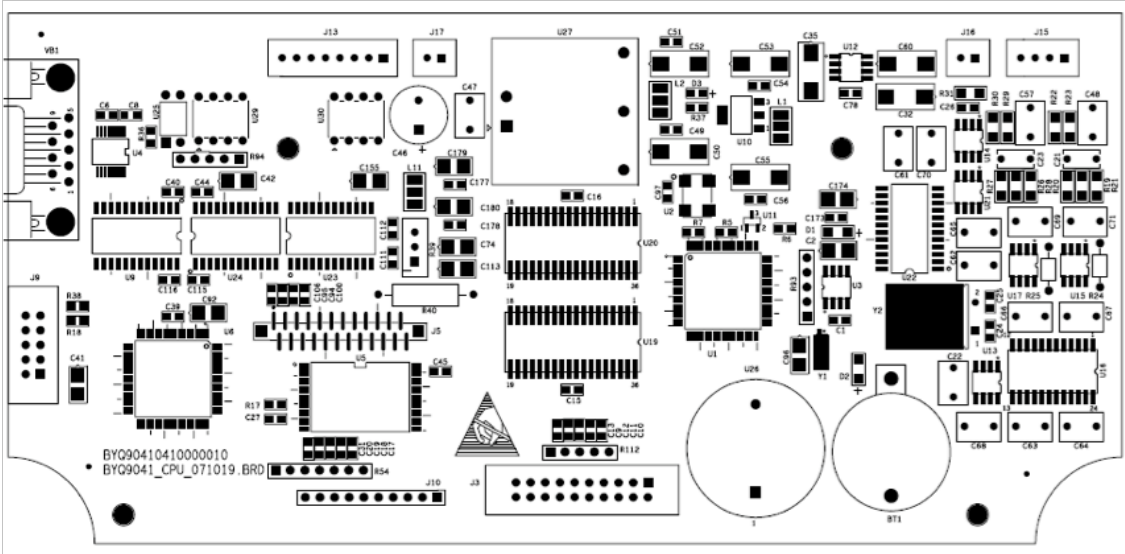
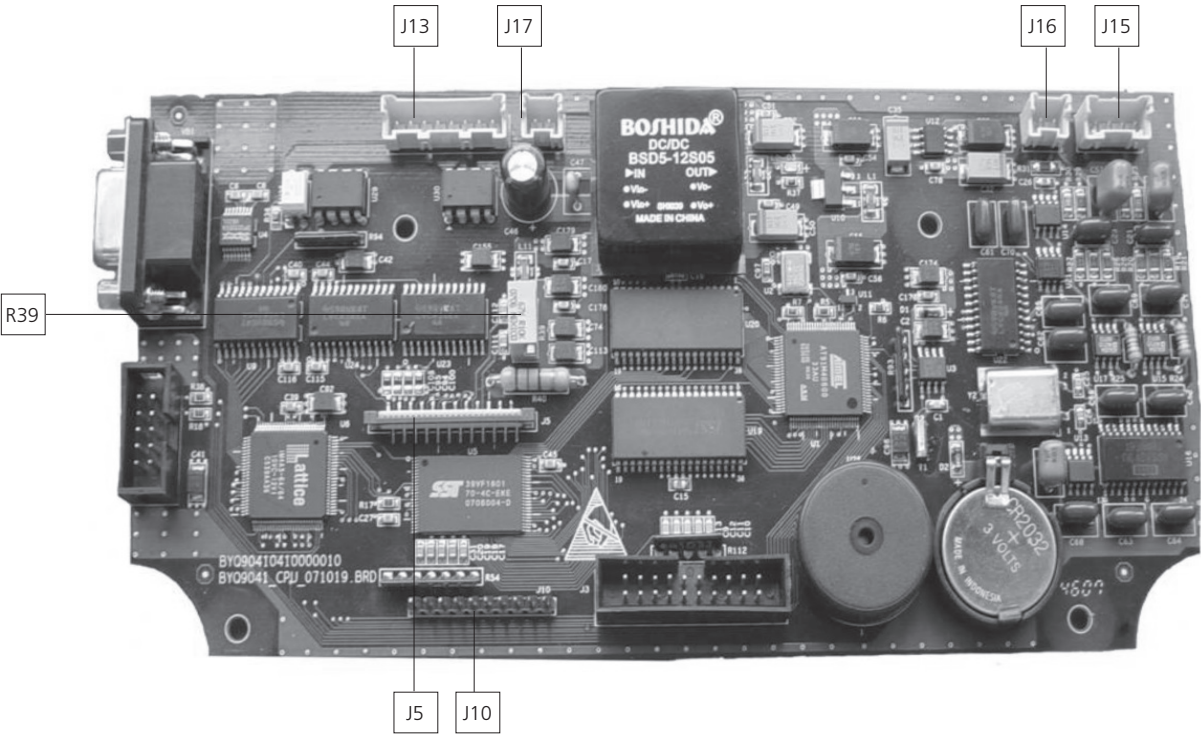




1. FJ1 : Power supply input. 110VAC +/- 10% or 220VAC +/- 10%.
 2. EJ1 : Power supply output for TE: Voltage: 12.8VDC
 3. EJ2 : Power supply output for CPU control board. Voltage: 5VDC
 4. EJ3 : Power supply output for hot lid and sensor. Voltage: 28VDC
 5. EJ4 : Power supply output for fan. Voltage: 12VDC
 6. EJ5 : AUX-Heater control port
 7. EJ6 : Power supply output for AUX-Heater. Voltage: 13.5VDC. Waveform output
 8. EJ7 : Hot lid sensor signal feedback port.

 9. FLED1 : LED indicator lights on if power supply output is normal.
 10. ELED1 : LED indicator lights on if block is heating.
 11. ELED2 : LED indicator lights on if hot lid is heating.
 12. ELED3 : LED indicator lights on if fan starts to work.
 13. ELED4 : LED indicator lights on if block is cooling.
- If all LED indicators doesn't light, CPU control board may have problem so there is no output signal.

Control Board

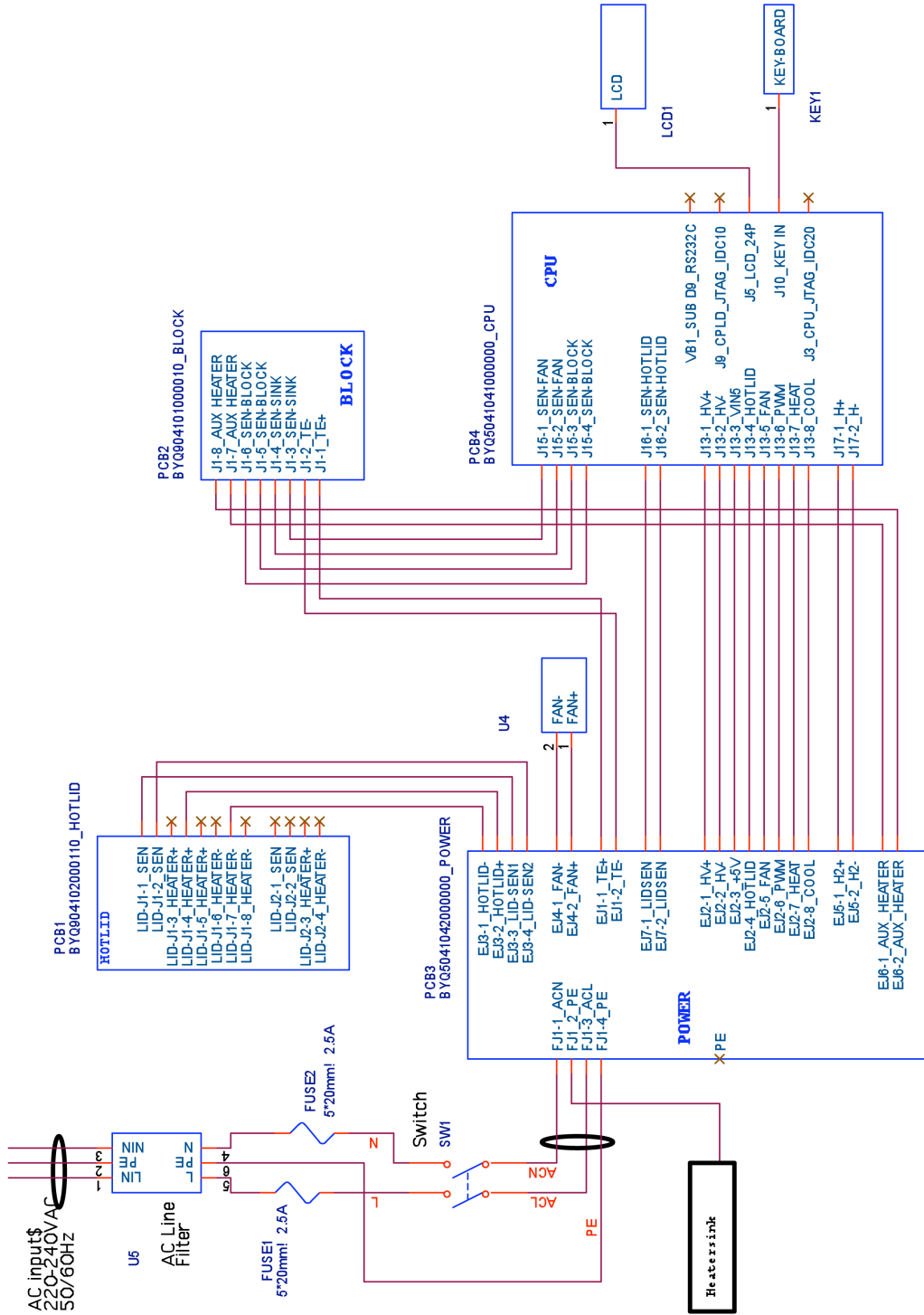


- 1. J5 : Display port
- 2. J10 : Touch panel port
- 3. J13 : Port connected to power supply board
- 4. J15 : Block and heat sink sensor port
- 5. J16 : Hot lid sensor port
- 6. J17 : Aux-heater control port

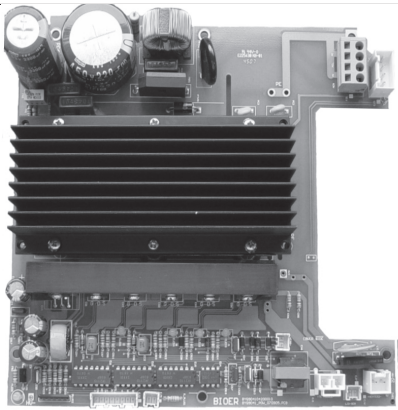
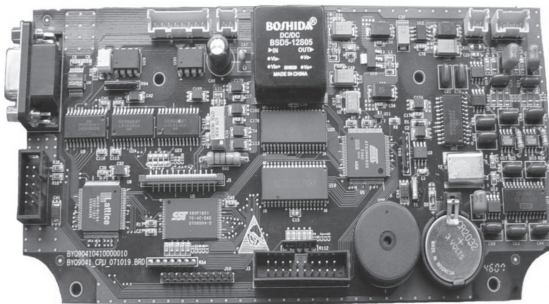



Note : Display brightness can be adjusted by R39.


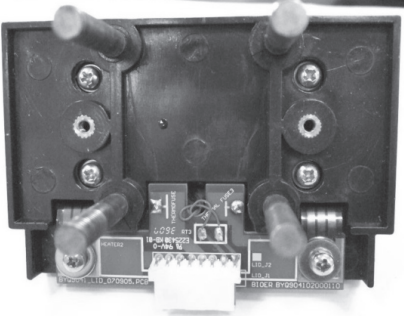
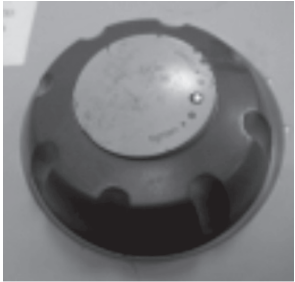
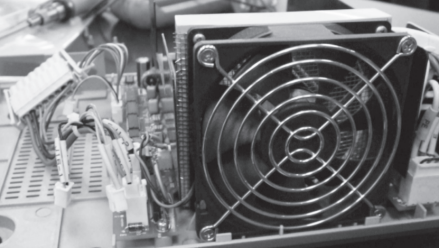
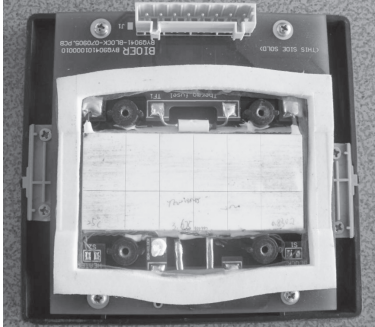
APPENDIX 2 Wiring Diagram

(This diagram is regarded only as a reference, and it is a subject to change without prior notice. We apologize for any inconvenience caused.)



APPENDIX 3 Wiring Diagram

PART NUMBER	DESCRIPTION	PICTURES
ESC/ BYQ5041042	Power Supply Part	
ESC/BYQ5041041	CPU control Board	
ESC/ BYQ90410300060	Touch Pad	
ESC/ BYQ162300000030	A whole part of power filter socket, switch and fuse	
ESC/ BYQ15542000010	LCD Display Part	

<p>ESC/BYQ904101000050</p>	<p>Heat sink</p>	
<p>ESC/BYQ504102</p>	<p>Hot lid part</p>	
<p>ESC/BYQ5041021</p>	<p>Hot Lid Knob</p>	
<p>ESC/BYQ159110000110</p>	<p>Fan</p>	
<p>ESC/BYQ904101000040</p>	<p>Peltier</p>	



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