CardioCare 2000

SERVICE MANUAL

20100315 Revision B

Bionet

www.ebionet.com

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Section 1. General Information

1-1. Introduction

EKG2000 is 12ch ECGs equipment which measure and record ECGs of the patient.
EKG2000 provides users with ECGs record of the patient, measurement parameters for diagnosis and auto analysis.
Patient information and user identification printed along with ECGs on the output report is effective for hospital chart control.
For convenient operation, ECGs can be measured and recorded by pressing short key. Then, ECGs is printed in A4 sized report form after applying filter, calculating the measurement parameter and auto analysis.
In addition to an AC power, it can be continuously operated with a built-in rechargeable battery. This enables the EKG2000 to be used in an ambulance, in a visit to patients or during patient transportation.

1-2. Features of the equipment

12 channel ECGs is printed in a various channel form of 3ch+1rhy, 6ch+1rhy, 12ch rhy, 60s 1rhy in A4 sized report form.

1. 1 channel rhythm is recorded for 60 seconds and printed in A4 sized report form.
2. 12 channel rhythms are printed simultaneously and continuously in real time..
3. Measurement parameters such as heart rate, PR interval, QRS duration, QT/QTc, P-R-T axes required for diagnosis is printed along with ECGs on the output report after calculating automatically.
4. Auto analysis enables 75 diagnosis.
5. For convenient diagnosis, ECGs can be printed after changing system setting such as filter, signal level, printing speed, channel form, rhythm cannel of the recorded ECG data.
6. Easy to carry with built-in rechargeable battery.
7. Patient information and user identification can be entered and printed along with ECGs for effective hospital chart control.

1-3. Equipment description

EKG 2000 is composed of the items as follows.
Checks out all the listed accessories are available after opening the packaging box. Also, check if the main unit and accessories are damaged or harmed.

Standard accessories

① EKG2000 Main unit

② Patient cable (1 EA)

③ Limb electrode (1 SET)

④ Chest electrode(1SET)

⑤ Operation manual (1EA)

⑥ ECG Gel (1 EA)

⑦ Recording paper (1 EA)

⑧ AC power cable (1 EA)

⑨ Diagnosis guide book (1EA)

Options

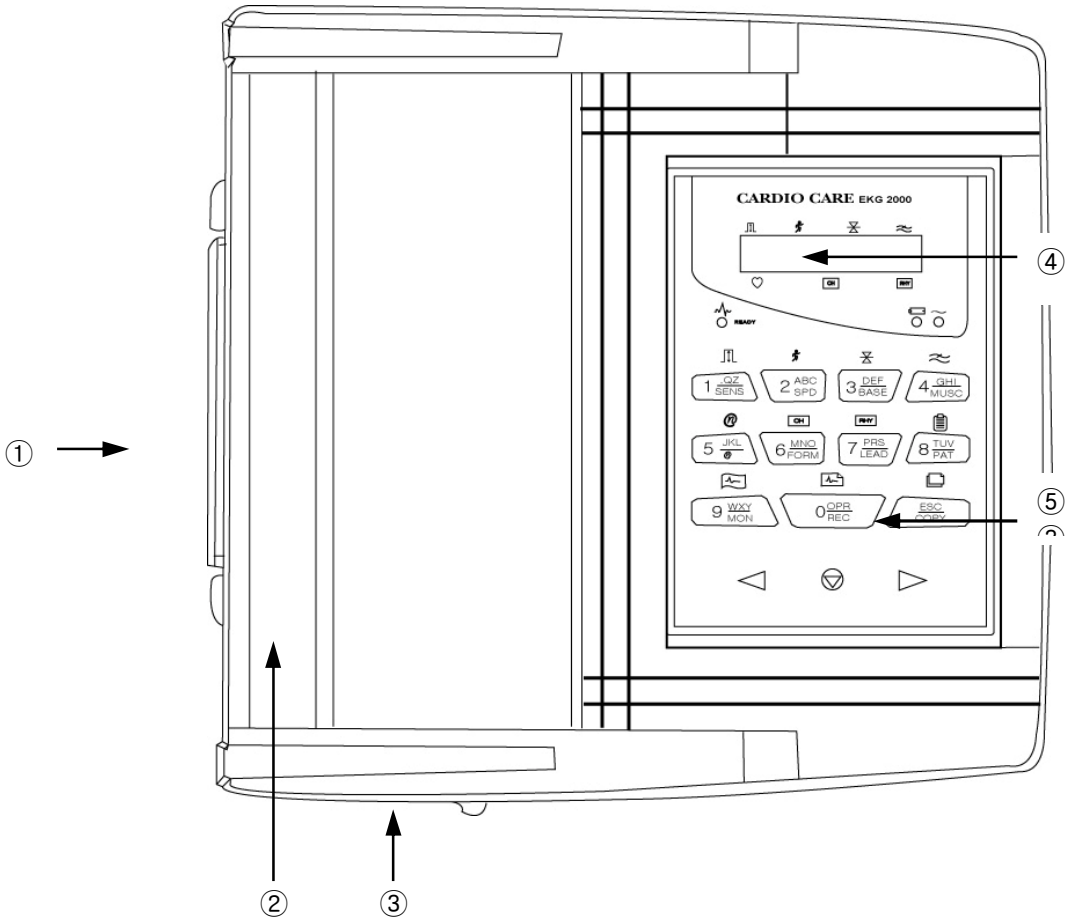
① Cart

② Hanger

③ Built-in Battery

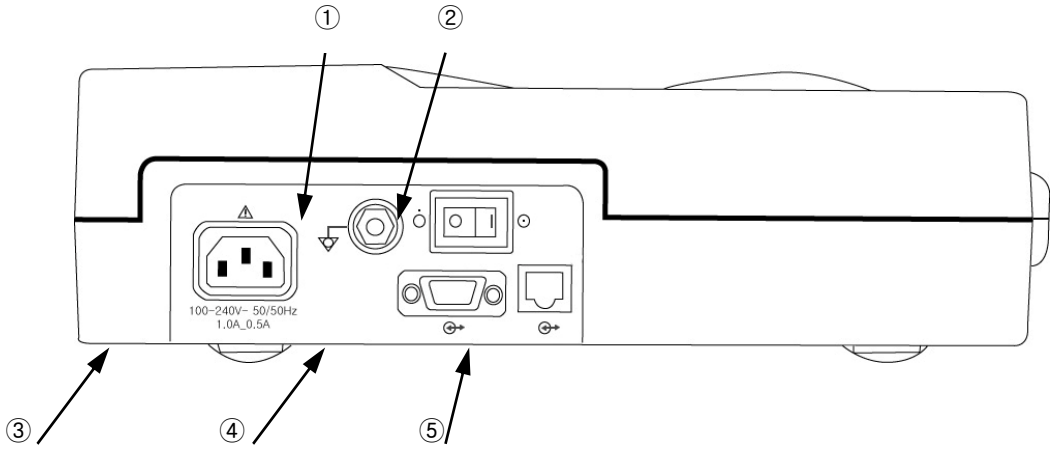
Main Unit

▣ Front View



① Knob
② Printer door
③ Printer door release button
④ LCD
⑤ Control panel

▣ Rear view



① Potential equalization stud

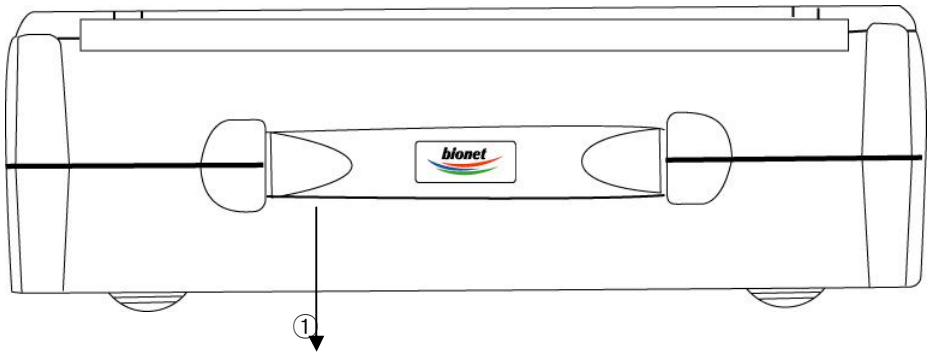
② Main power switch

③ AC power socket

④ RS-232C SERIAL port

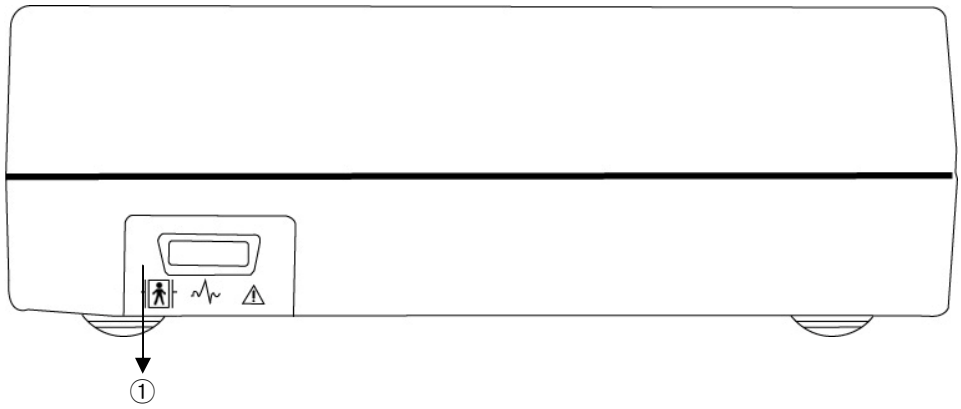
⑤ LAN port

▣ Left side view



① Handle

▣ Right side view



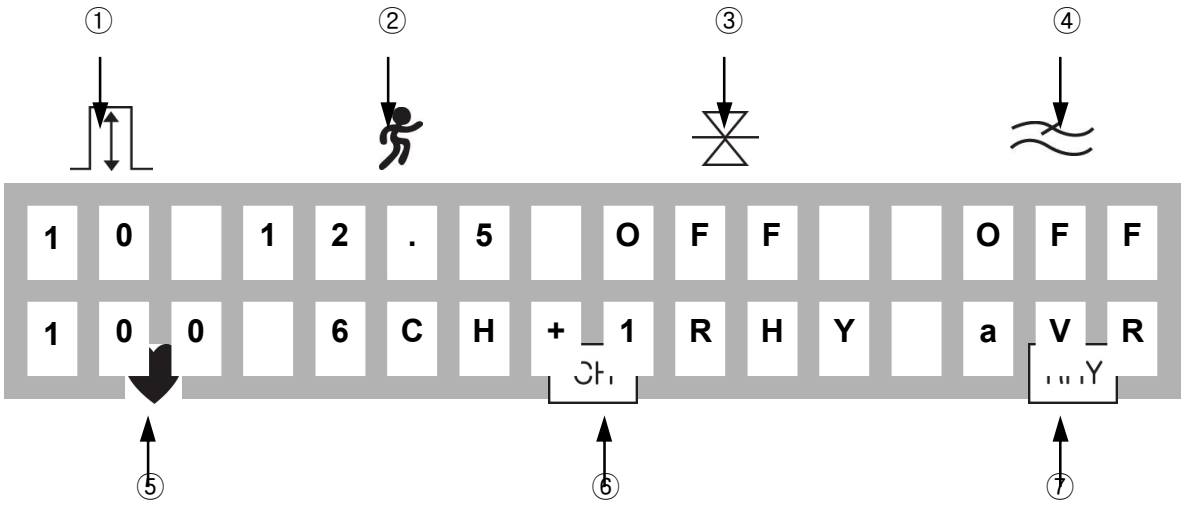
① Patient cable connection port

Warning
Do NOT disassemble the case of the equipment to avoid the electric shock. Refer servicing to Bionet Co., Ltd qualified personnel or your local authorized dealer.

LCD Panel

LCD panel displays system setting status after indicating the version of the system and manufacturer name for 2 seconds when power is turned on.

Displayed items on the LCD are as follows.



① Display ECG signal level out of 5, 10, 20, aut (Auto Gain)
② Display printing speed out of 12.5, 25, 50
③ Display base line filter setting on or off
④ Display EMG filter setting on or off
⑤ Display heart rate
⑥ Display channel form of the output report out of 3ch+1rhy, 6ch+1rhy, 12ch rhy, 60s 1rhy.
⑦ Display rhythm channel setting out of I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6.

Control panel

▣ Indicator lamp

READY

Indicate the lead connection status.

If LED is illuminated green, connection status is good .

If LED is off, connection status is bad.

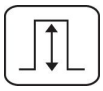
In this case, check off which one of lead connection is in lead-off status through monitor mode output.

Caution: Start printing when LED is illuminated green.

Indicate the level of battery charge in 2 steps with green and yellow. When battery charge indicator lamp is illuminated yellow, turn the system power off and connect the AC power source. Then turn the system power on again.

Indicate AC power is operated if LED is illuminated green and not in use if LED is off.

▣ Short keys

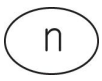


Select signal level(mm/mV) out of 5, 10, 20, aut
(I-aVF:10, V1-V6:5)

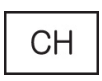
Select printing speed(mm/sec) out of 12.5, 25, 50

Select on or off whether or not to activate the filter that eliminates base line drift

Select on or off whether or not to activate the filter that eliminates EMG. ECG signal can be distorted by applying this filter.



This key is excepted to use when network function is added ahead.



Select channel form of the output report out of 3ch+1rhy, 6ch+1rhy, 12ch rhy, 60s 1rhy

Select rhythm channel

Call up the menu to enter patient ID, name, age, sex, height, weight

Display real-time ECGs from the patient continuously or monitoring the patient ECGs for long time,

Record ECGs for 10 seconds by pressing key and prints in A4 sized report form after calculating the measurement parameter of the recorded ECGs

Print the same report as previously printed one in record mode or prints after changing system setting such as filter, signal level, output speed, channel form, rhythm cannel of previously recorded ECGs data in record mode.

Exit during printing or recording of ECGs.

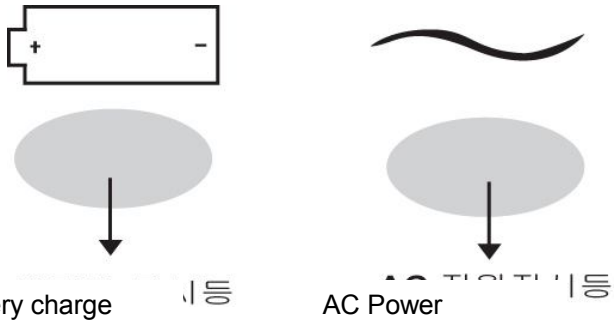
Except that, call up the menu or select menu.

Move the selected focus to the left in menu mode

Move the selected focus to the right in menu mode

AC Power

When AC power is supplied to the equipment, AC power indicator lamp at the front side is illuminated green and battery is being charged automatically.



Battery charge indicator lamp

AC Power indicator lamp

When AC power is turned off and system power is turned on, the equipment is operated from battery power. When battery power in on, battery charge indicator lamp is illuminated green. When battery power is low, buzzer alarms three times in series and battery charge indicator lamp is illuminated yellow. In this case, turn the system power off and connect the AC power source. Then turn the system power on again.

- Required time for charging : more than 4 hours
- Continuous battery operating time : 1 hour

Caution
For the protection of environment, do NOT throw wasted battery away. Please inquire at the biomedical engineering lab of the hospital and dispose according to the appropriate procedure to the authorized place(according to national regulations).

1-4. System Installation

Installation precautions

When installing EKG2000 system, take the following precautions.

- The equipment should be operated within 10～40℃ temperature and 30～85%humidity.
- Check the power cord connection and probe should be handled with care.
- Do not plug several power cords in one electric outlet.
- Main unit should be installed on an even, level place.
- Check that the equipment is properly grounded to avoid noise.
- The entire system settings are stored on the internal memory even when system power is turned off and on again
- Avoid excessive shock or vibration that could result in equipment damage.
- Avoid using in the vicinity of dust and flammable material.

Power cable connection

The equipment operates when the power cable end connect into the EKG2000 power cord. Replace the fuse of the equipment if power is not turned on despite that power cord is connected and battery power is in normal condition. Contact service dept. of Bionet Co.,Ltd if the equipment is not operated after replacing fuse.

Caution
For the continuous protection against the fire hazard, the fuse must be changed to the same type and rate of fuse by technician (T3A250V). For the protection of environment, do NOT throw wasted fuse away in a dangerous place for the example fire hazard

Patient cable connection

- Connect the patient cable into the connection port at the rear of the equipment.
- Connect the limb electrodes to the N, F, R, L lead and chest electrodes to C1, C2, C3, C4, C5, C6 of the patient cable.

Recording paper installation

- Printer door open if printer release button at the side of EKG 2000 is pushed in the right. Place the recording paper with the signal-recording side up and push back to close.

1-5. Terms of Warranty

- This product is manufactured and passed through strict quality control and thorough inspection. Compensation standard concerning repair, replacement, refund of the product complies with "Consumer's protection law" noticed by Ministry of Finace and Economy.

- EKG 2000 is warranted by Bionet Co., Ltd. to be free from defects in material and workmanship for one year(two years in Europe) from date of purchase.

- Warranty repair or replacement will be made by Bionet Service Center at no charge for warranty period if properly used under normal condition in accordance with the instructions for use.

- In the event of a malfunction or failure during warranty period, customer should inform Bionet Co., Ltd. of the model name, serial number, date of purchase and explanation of failure of the defective equipment.

1-6. Specification

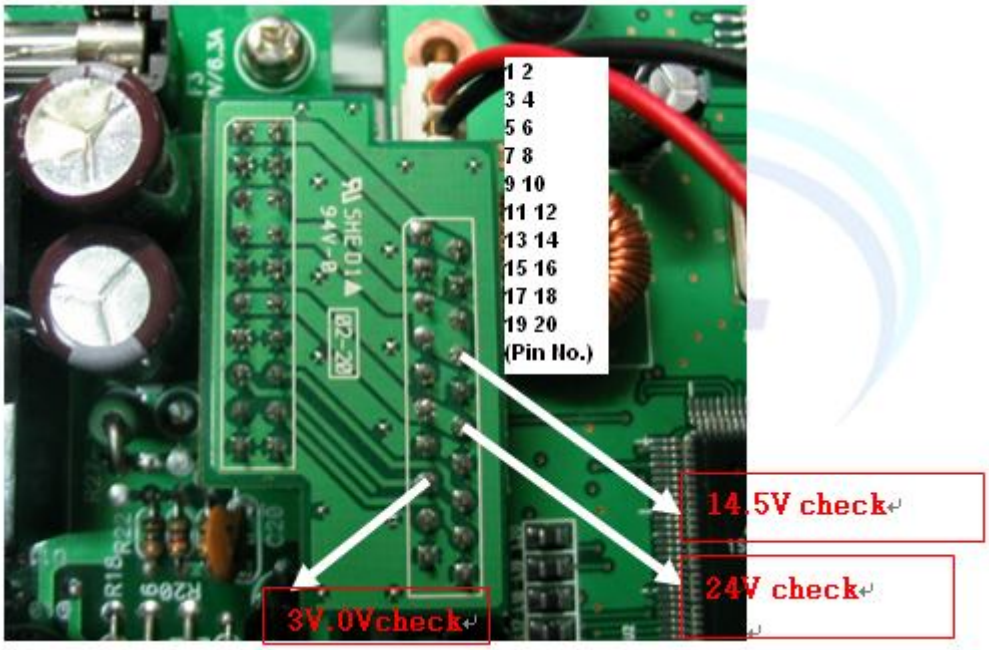
- Input circuit : Isolated and defibrillation protected
- ECG leads : Standard 12 leads
- Sensitivity selection : 5,10,20 mm/mV ± 5 %
- Calibration voltage : 1mV ± 2 %
- Electrode offset tolerance : ≥ ± 250mV
- Resolution : 2 μV, 500 Sample/Sec
- Frequency response: 0.05 ~ 150Hz
- Common mode rejection : > 100 dB
- Input impedance : 10 MΩ
- Patient leakage : < 50 μA
- Signal quality control : Disconnected lead detection
- Communication : PC connection with RS-232 interface and LAN
- Display : 2x16 char LCD Display
- Registration Resolution :
  - Vertical : 8 points/mm; Horizontal: 25 μm at 25 mm/S
  - Paper type : Thermal, roll paper
  - Paper width : A4: 210 mm or 8.5" ; Length : A4 : 300 mm or 11"
- Keyboard : Membrane keyboard
- Electrical :
  - Power supply : AC or built-in Battery(option)
  - Voltage rating : 100 - 240Vac (50/60 Hz)
- Environment :
  - · Operating Temperature：15°C to 30°C (59°F to 86°F)
  - · Storage Temperature：- 10°C to 60°C (14°F to 140°F)
  - · Operating/Storage Humidity：20% to 95% RH, non-condensing
  - · Operating Altitude：70(700) to 106Kpa(1060mbar)
- RS232C Interface
  - Protocol: asynchronous
  - Baud rate: 19200
  - Byte format: 8 data bit, 1 stop bit, no parity bit
  - Connection socket: 9 pole female, wired as DTE(Data Terminal Equipment)
  - Pin connection: 3=TXD(out), 2=RXD(in), 6=DSR, 4=DTR, 5=GND

Section 2. Troubleshooting

Power- Related Problems

Problem	Solution
Case1. The CardioCare 2000 open will turn on and off frequently. **Case2. Power will not turn on.**	- General Checking - 1. Check the power cable is connected with AC Power connection at the back of the system. 2. Check the power source of the multi-tab with connection to the power cable. (If power is connected, AC power indicator is lighted.) 3. Check the power switch. 4. Check any of three fuses on the power board is cut. If it is, replace Power board. **Case1:** Check if the soldering of J3 on the main board(power switch connector) is poor. => Re-solder the connector. **Case2-1:**  Check if the connector is disconnected. =\> Connect it. **Case2-2:** Faulty main board or power board => replace the board. (Refer to next page 16)

Tips for checking the faulty board.(Main board or Power board)



- When the CardioCare 2000 is turned on, the pin no. 8's voltage has to be always 14.5V.

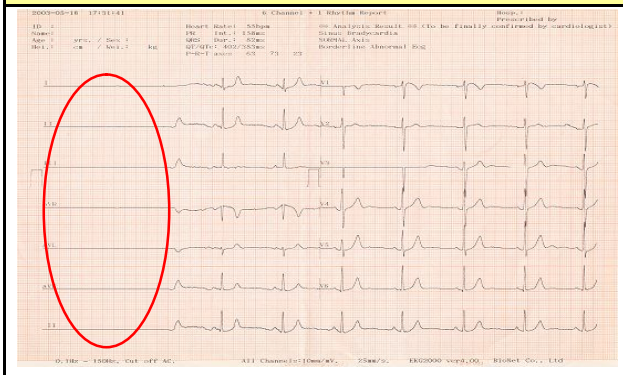
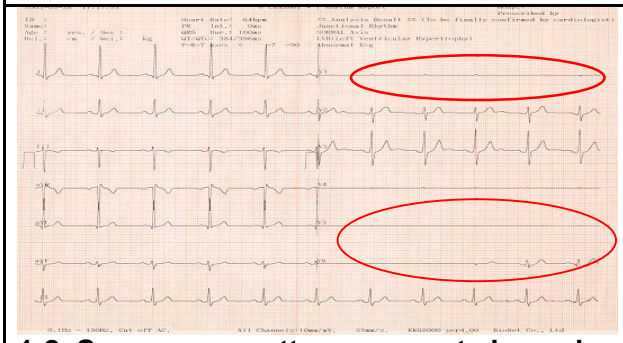
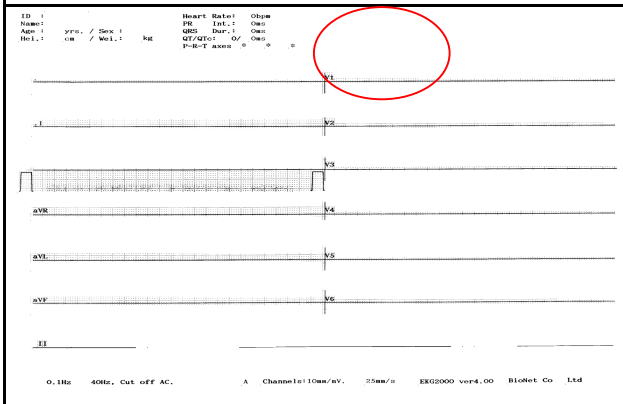
⇨ Is the pin no. 8's voltage is 14.5 => Yes => replace the main board.
⇨ Is the pin no 8's voltage is 14.5 => No => replace the power board.

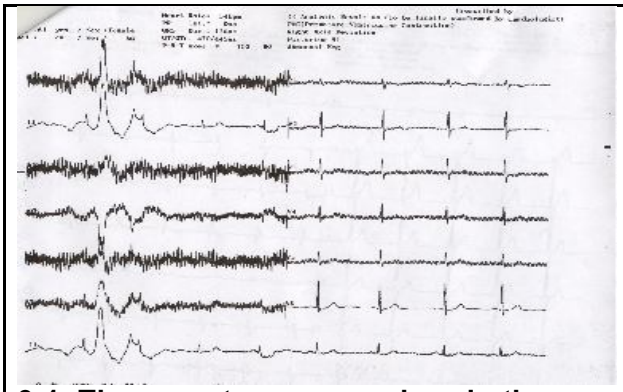
- When the '0' REC key is pressed,(during printer is working)

Pin no. 12's voltage has to be changed from 0V to 24V
⇨ If not, faulty power board, replace the power board.

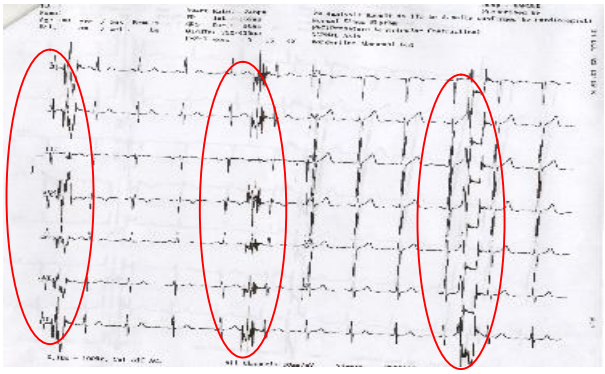
Pin no. 15's voltage has to be changed from 3V to 0V.
⇨ If not, faulty CPU, replace the main board.

Wave Problems

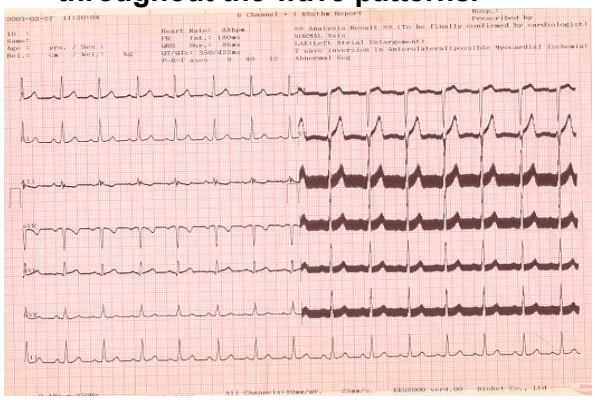
Problem	Solution
 **1-1. The wave pattern changes from the flat line on the left to the wave forms on the right.**	1. If the normal wave patterns show up to the right of chart as shown in problem1, 2, diagnosis output print too early. 2. It takes some time to show the normal wave patterns. 3. The normal wave patterns will show if output is requested after the system is stabilized by showing the HR variance of ±5 on the LCD display. 4. Check connection of the limbs electrode and the chest electrode to the body parts. 5. If used on the dry skin or in the winter season, connectivity may be degraded. In that case, used water or ECG gel. The electrode must be washed after using ECG gel. Otherwise, the electrode will be rusted and corroded.
 **1-2. Some wave patterns are not shown in V1~6.**	* Connection location of the limbs electrode and the chest electrode Reference p. 24 ~ 27 of ECG2000 Manual. Reference p. 25 ~ 28 of ECG3000 Manual.
 **2. The diagnosis is not shown in print.**	1. Press the menu key, showing the overlapped circle and triangle, at the bottom of the Keypad.  MENU Key 2. Press the right arrow button twice to select PRN and then press the menu key. 3. Press the left arrow button once to select DIAG and then press the menu key. 4. Press ESC key from the menu to enter the basic display and then press '0' to printout.



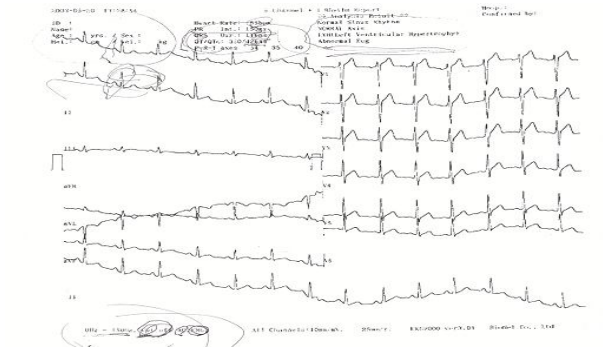
3-1. There are too many noises in the wave pattern.



3-2. The noises periodically occur throughout the wave patterns.



3-3. The thick noise is made on the wave patterns.



3-4. The wave output looks like the noise and are not properly shaped.

1. This problem occurs when the filter value is not corrected.

2. Press the menu key, showing the overlapped circle and triangle, at the bottom of the Keypad.

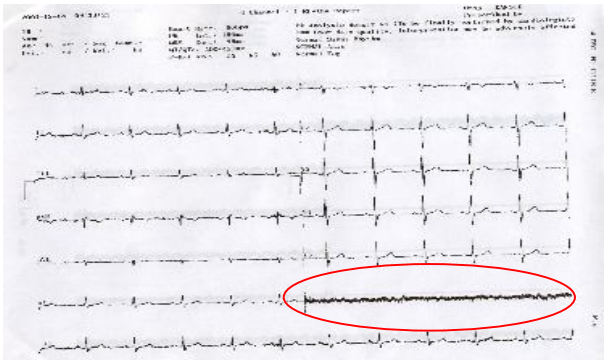
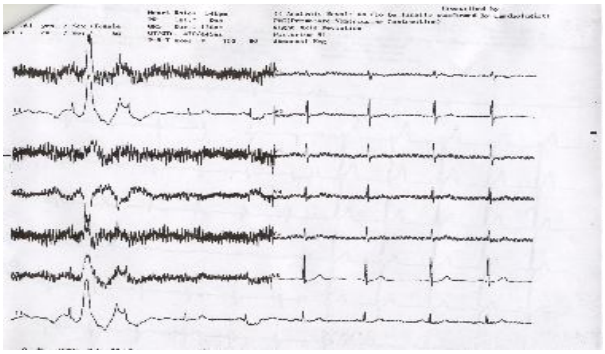
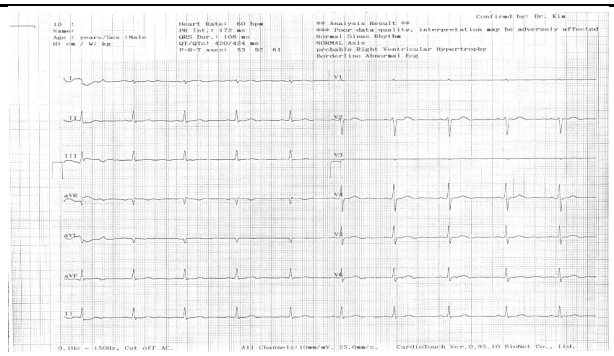
MENU Key

3. Press the right arrow key once to select FLT and then press the menu key.

4. Check if the filter value shows BASE: ON, MUSC: OFF, AC: 60 Hz, LDF: 150Hz and, if not, correct it.

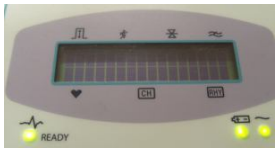
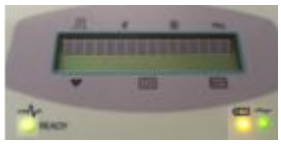
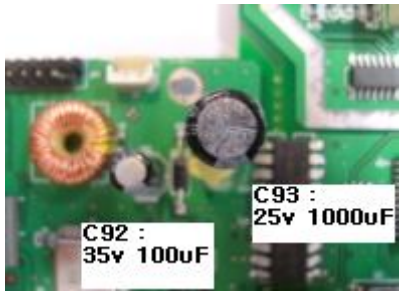
5. Since the noise occurs as in problems 2 and 3 if the AC filter is turned off or set at different frequency from the power source, the system must be set at 50Hz or 60Hz to correspond to the input power. (It is different each country) The AC filter status is shown at the left bottom of the printout as 'CUT OFF (ON) AC'.

6. Problems 3.4 occurs when the BASE is set at OFF. Change it to ON.

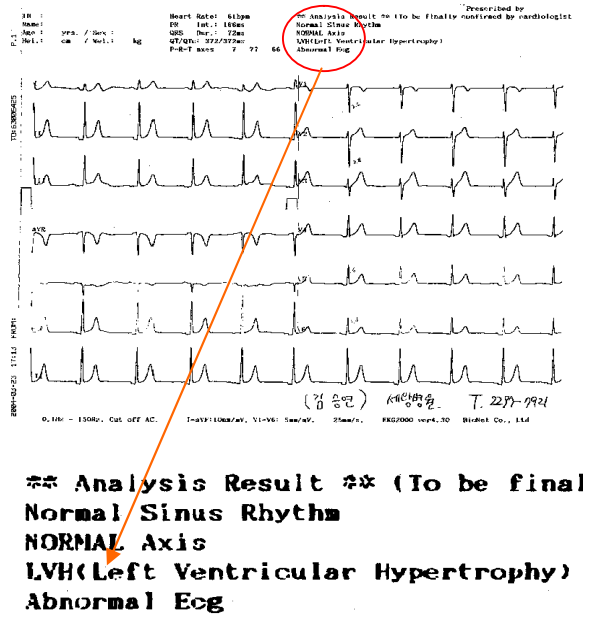
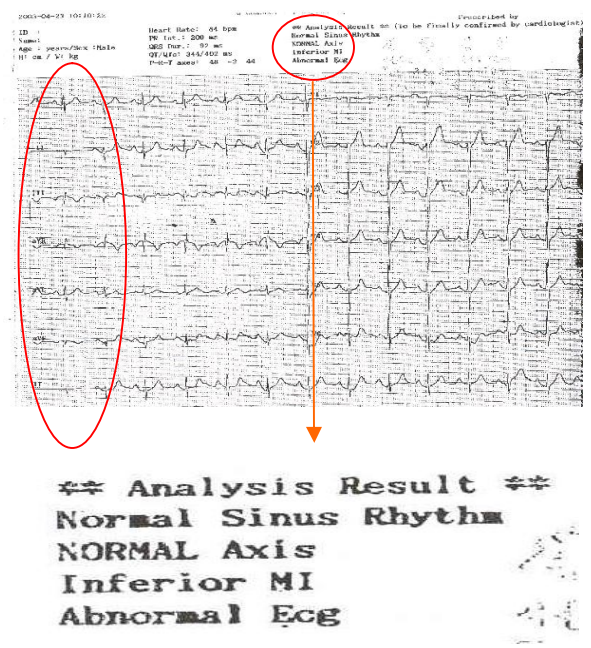
 **4. The wave output looks like the noise and are not properly shaped.**	1. This problem occurs when the chest electrode is not properly in contact with the body. 2. Check with simulator there is any cut on the patient cable. 3. Check there is any damage to the chest electrode. 4. Test it again after applying alcohol, water or ECG gel to the electrode. * If the problem can not be solved by the above procedures, please contact us.
 **5. Heavy noise on the wave forms**	1. The noise occurs as there is no signal from the limbs electrode. 2. If the polar plate in the limbs electrode is blacked or copper colored, or if ECG gel residue remains, the signal may not be detected. Replace it. 3. If discoloring is too noticeable in the limbs electrode, replace it.
 **6. The wave pattern shows the straight line among V1~6.**	1. If some wave patterns are too small as shown in the problem 6, the problem is most likely to be with the patient cable, limbs electrode or chest electrode. 2. If the problem is not with the accessories, then the main board is the problem. 3. The main board must be shipped to us for repair since the condenser of the main board must be replaced.
7-1. When diagnosis output key is pressed, the measurement goes on past 10S. **7-2. Operation stops at processing, print after 10S measurement.**	1. Replace the main board. * If the above procedure does not solve the problem, please contact us

8-1. ECG2000: When turned on, the key functions, but there is no display. **8-2. ECG3000: The backlight on the screen is on, but there is no display.**	1. ECG-2000 : Check the film cable which connects Key board and the main board and replace the main board 2. ECG-3000 : Check the Key cable which connects Key board and the main board and replace the main board. * This problem is more likely with all ECG3000 products and very unlikely with ECG2000.

Display Problems

Problem	Resolution
Case1.  **Case2.**  **Case3.**  **Case4.** **Symtom4-1:** **When the printer key 9 or 0, the unit will stop immediately.** **Symtom4-2:** **When the data 10S processing, the counting of 10S will not stop until 99S.**	Case1 & 2: Faulty LCD => Replace the LCD with a new one. Case3: Faulty C93 (or C92) capacitor on the main board. => Replace C93 with a 25V 1000uF and C92 with a 35v 100uF.  Case4 Step1: Check D5,D6,D7,D8 is working well. (Use the multi-meter.) Step2: Replace the U23 marked with AT89C52 on the main board.

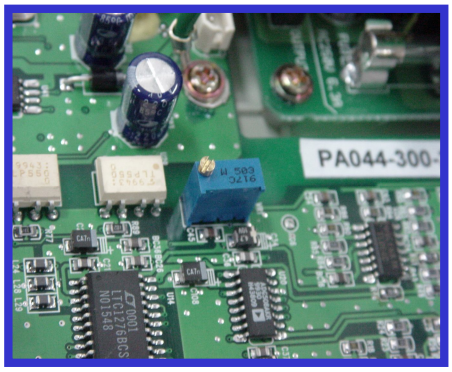
Diagnosis Problems

Problem	Resolution
 **1. The diagnosis shows LVH.**	1. If disease is diagnosed, abnormal ECG always appears. 2. LVH occurs when the sum of one of V1 or V2 and one of V5 or V6 is 3.5 or higher. 3. Upgrade to the latest version of the software. * How to upgrade the software Refer to our homepage. http://www.ebionet.com
 **2. Diagnosis shows MI.**	1. If MI is diagnosed, it is likely that the print button was pressed before the wave patterns are stabilized. 2. Check HR before printout and print it again. 3. Upgrade to the latest version of the software. * How to upgrade the software Refer to our hpmepage. http://www.ebionet.com

Section 3. Adjustment

1. Adjustment of the EKG wave volume

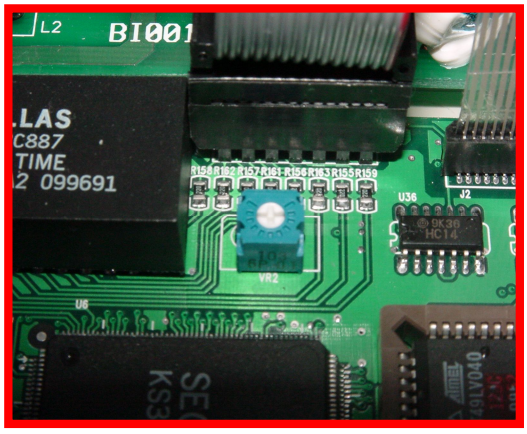
Set printer speed of EKG-2000 to 25mm/sec and EKG signal volume to 10mm/mV. Connect the EKG cable to a simulator, and then set a heart rate to no. 16 Sine, and a wave volume to 1mV. make the wave volume 10mm while outputting through a monitor
(The EKG2000 has to be upgraded with a latest version and higher 5.04 version.)



VR part to adjust the volume of the EKG wave

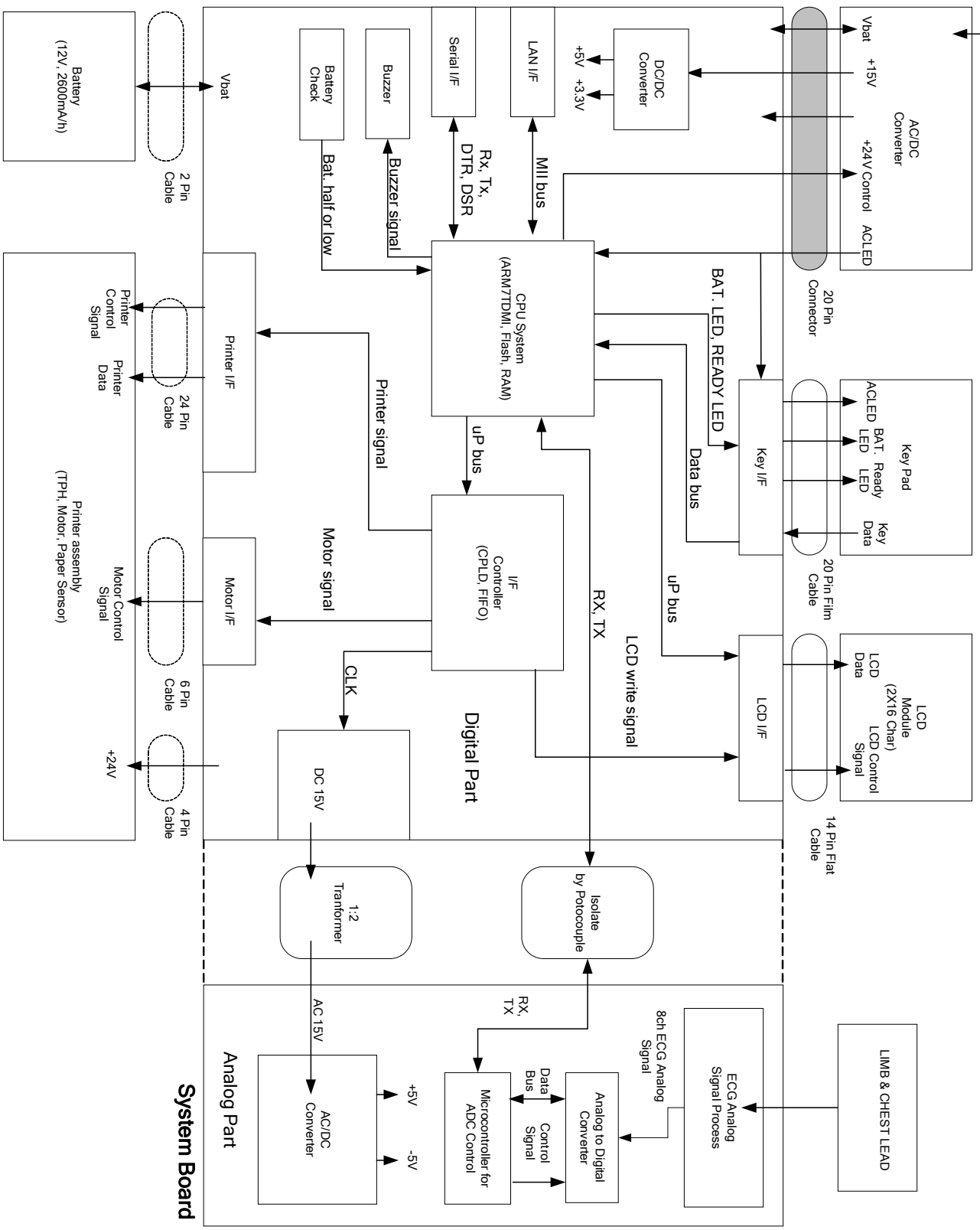
2.Adjustment of the LCD brightness.

To make the letters on the LCD screen clear, set the brightness by turning VR2 clockwise.



VR part to adjust the brightness of the LCD

Section 4. Block Diagram/Description



System Board

It is mainly divided into a digital part and an analogue part.

The digital part consists of ARM7TDMI, Memory, Interface Controller, DC/DC Converter, Buzzer, Battery Check, DC/AC Controller and chip, which are linked to other external modules.

Whereas, the analogue part consists of (1) an electrocardiogram analogue part where receives bio signals (2) and an analogue-to-digital converter which changes the analogue signals into the digital signals (3) and micro-controller which controls the ADC (Analogue-to-Digital Converter) and sends the coming signals to the digital part. Also, it is divided into power and signal, in order to produce the minimum effect by electrical noise, despite sitting on the system board same as the digital part.

AC/DC Converter

It receives 100-240V AC, 50-60Hz signal or battery and supplies 15V and 24V to the system board.

Key Pad

It is linked to the system board with a 20-pin film cable and consists of a 14 key, AC LED, battery LED, ready LED.

The AC LED will light up if the equipment approves AC power.

The Battery LED will always light up if the equipment is switched on and it indicates how much battery has been recharged. The green LED will light up if the battery is satisfactory. Whereas, the red LED will light up if the battery is run out shortly.

The Ready LED will light up if the electrocardiogram signal is stably detected.

LCD Module

It has 2 rows and 16 columns in a characterized LCD and is linked to the system board with a 14-pin flat cable.

Printer assembly

It consists of the TPH (Thermal Printer Head), motor, and paper sensor. And it is linked to the system board with 3-pin, 4-pin, 6-pin, and 24-pin cable and approves 24V AC power which will be approved only if the printer assembly is working.

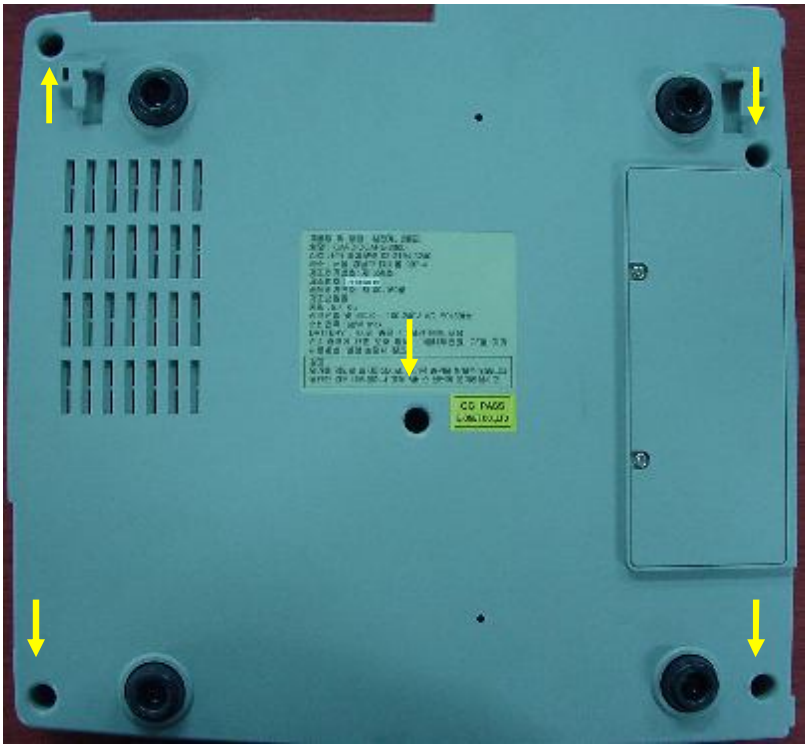
Battery

It is linked to the system board with a 2-pin cable. It is 12V, 2400mA/h and consists of twenty 1.2V, 1200mA/h NiMH battery. It is packed in parallel with 2 sets which are are connected with 10 cells in series

Section 5. Disassembly and Assembly

5.1. Removing the Top cover

a. Removing the 5 screws from the bottom as shown below.



5.2. Removing the Top cover.

1. Open the printer cover by pushing slide knob.
2. Disconnect 2 cables.
3. Remove Top cover as shown below.

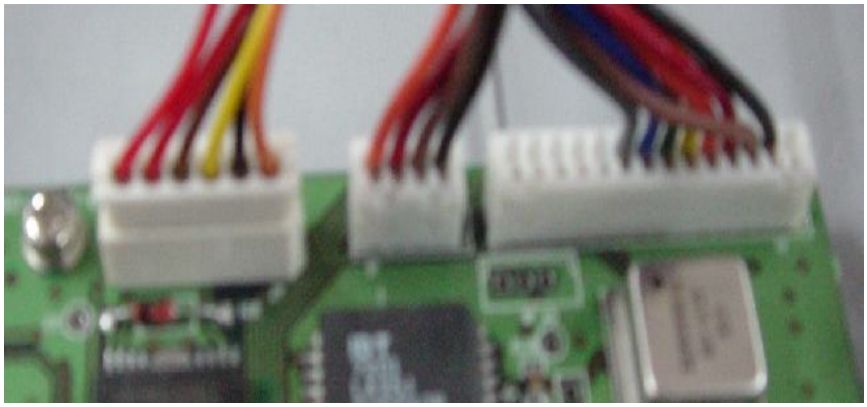
< BOTTOM COVER>

<TOP COVER>

5.3. Replacing the Printer Module

a. Remove the 4 screws from the bottom cover.

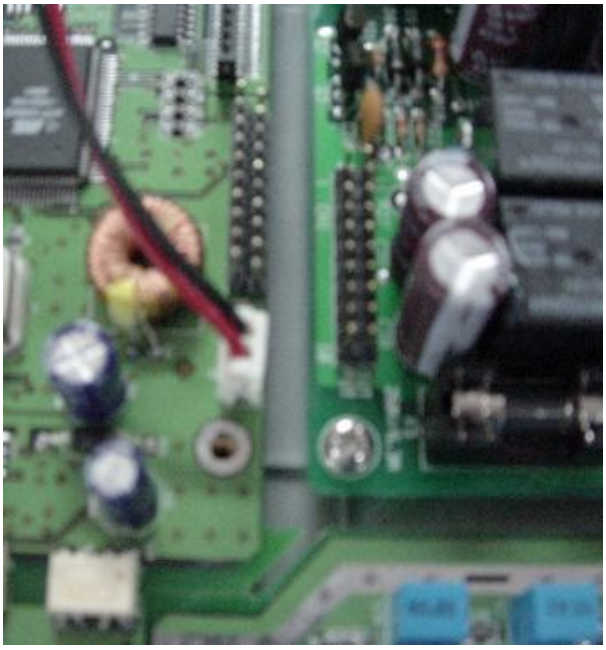
b. Disconnect the 3 printer cables from the MAIN board.



< Printer Module>

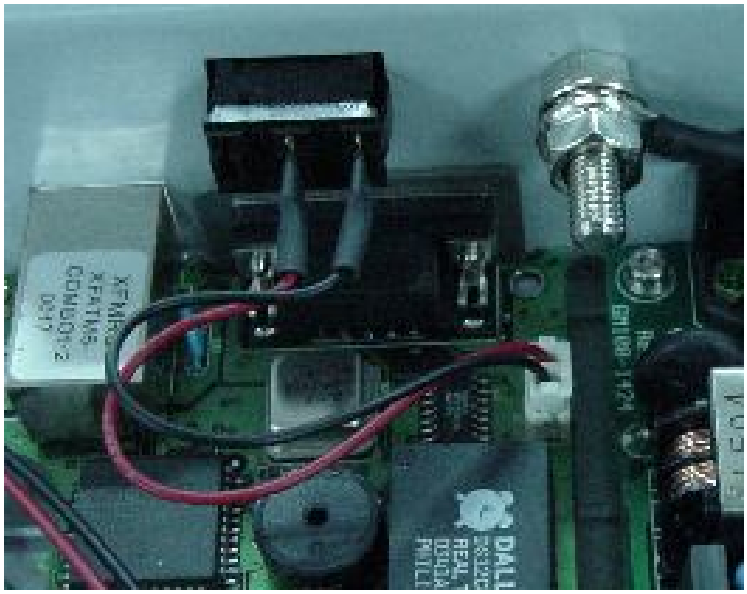
5.4. Replacing the MAIN Board

a. Disconnect the connector

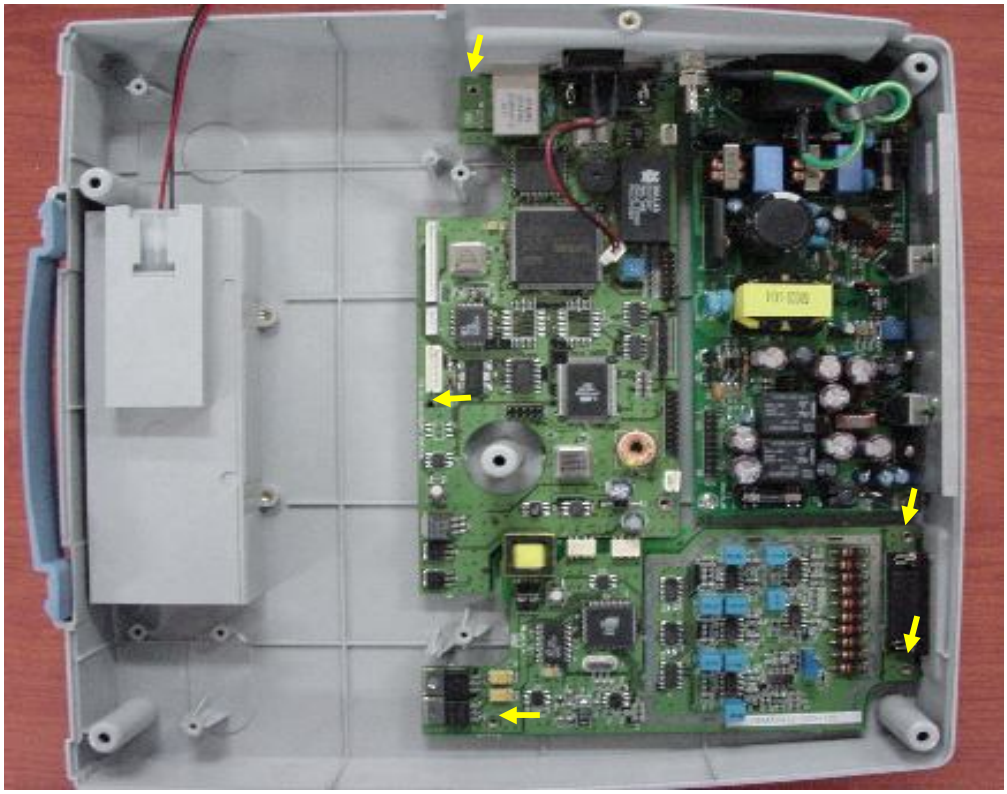


b. Disconnect the Battery cable from MAIN board.

c. Remove the power switch cable from MAIN board

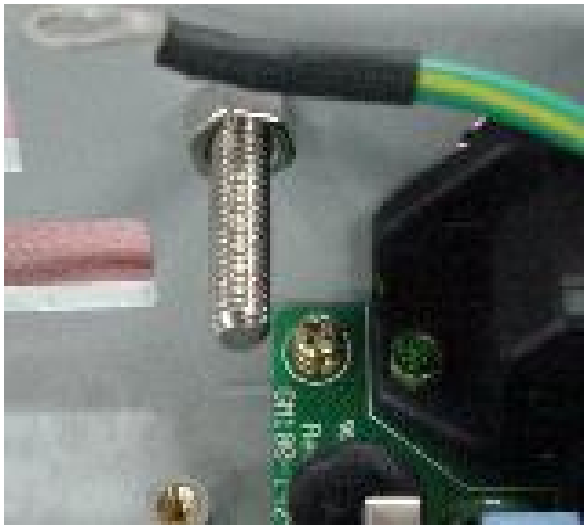


d. Remove the 5 screws from Bottom cover



5.5. Replacing the Power Board

a. Disassemble GND cable of POWER B/D from Protection Grounding Terminal.



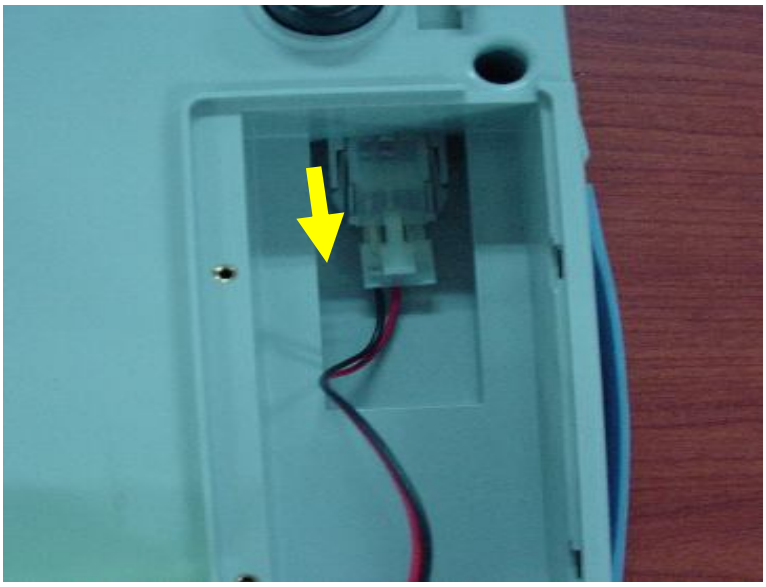
b. Remove the 4 screws from Bottom cover

5.6. Replacing the Battery

a. Remove the 2 screws from Bottom cover

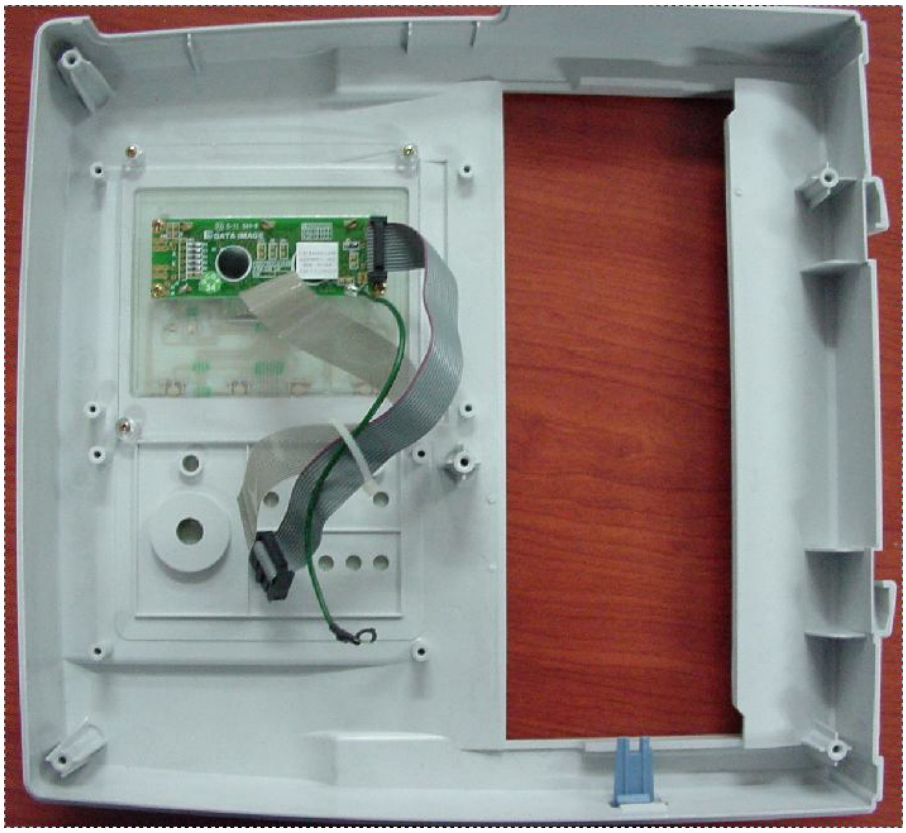
b. Take out Battery from Bottom cover

c. Remove the Battery cable connector



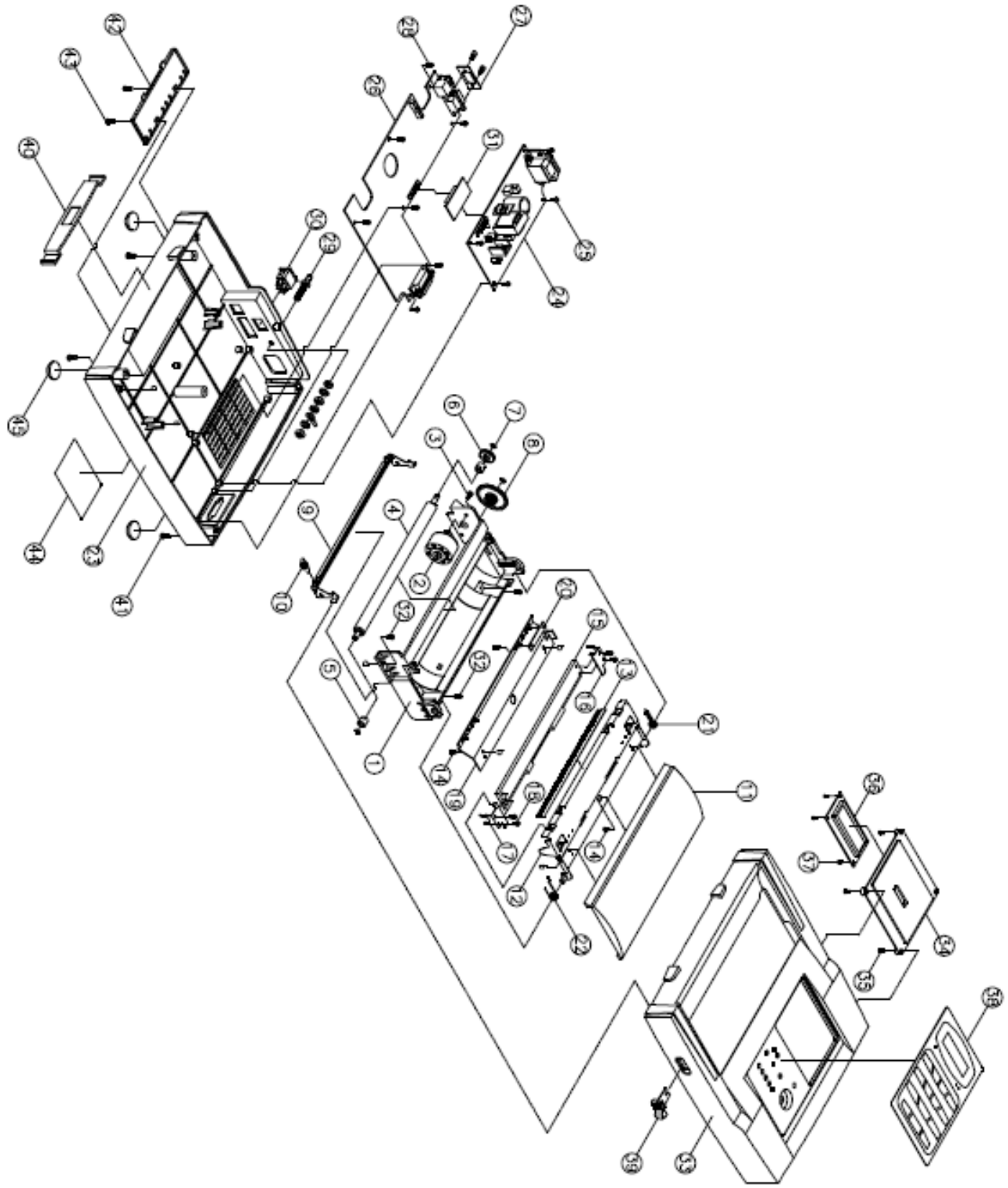
5.6. Replacing the LCD

a. Inside of Top cover



b. Remove the 4 screws from Top cover

Section 6. Replaceable Parts List



6-1. For Unit.

Find Number	Part Number	Item Description	Qty
1	152100-000500	PRINTER FRAME	1
2	151900-009700	STEPPING MOTER ASS'Y	1
3		SCREW (3x8L, BIND)	2
4		PLATEN ROLLER ASS'Y	1
5		BUSHING	2
6		GEAR (A)	1
7		E RING (φ3)	3
8		GEAR (B)	1
9		HOOK BRACKET	1
10		HOOK SPRING	1
11		COVER	1
12		MAIN BRACKET ASS'Y	1
13		BRUSH	1
14		TAP SCREW (3x8L, BIND)	3
15	151900-001000	TPH	1
16		TPH BRACKET (L)	1
17		TPH BRACKET (R)	1
18		SCREW (3x5L, BIND)	4
19		TPH COVER	1
20		PAPER SENSOR B/D ASS'Y	1
21		COVER SPRING (L)	1
22		COVER SPRING (R)	1
23		BOTTOM COVER	1
24	151900-013800	POWER MODULE ASS'Y	1
25		SCREW (3x6L, SEMS)	4
26	130101-000100	MAIN B/D ASS'Y	1
27		CONNECTOR PLATE	1
28		SCREW (3x6L, SEMS)	7
29		GND POLE ASS'Y	1
30		POWER S/W ASS'Y	1
31		POWER CONNECT B/D ASS'Y	1
32		TAP SCREW (3x8L, BIND)	4
33		TOP COVER	1
34	152100-011700	WINDOW (A)	1
35		TAP SCREW (2.6x8L, ROUND)	4
36	151100-001200	LCD ASS'Y	1
37		TAP SCREW (2.6x5L, BIND)	4
38		OVERLAY	1
39		SLIDE KNOB	1
40		HANDLE	1
41		TAP SCREW (4x15L, BIND)	5
42		BATTERY COVER	1
43		SCREW (M3x6L, BIND)	2
44		ID LABEL	1
45		RUBBER FOOT (φ22x5)	4

6-2. For Accessory

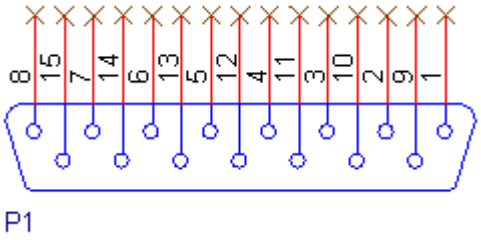
1	152600-019000		EKG 12Channel Patient EU-Cable STANDARD CABLE **S/N : ALL**
2	152600-012800		EKG 12Channel Patient EN-Cable **ALL**
3	152600-021800		EKG adaptor cable for disposable **ALL**
4	151600-016400		Electrode patch 100 EA Option **ALL**
5	120108-040100		Electrode patch 50 EA Option **ALL**
6	152600-011500		Chest electrode. **ALL**
7	152600-011600		Limb electrode. **ALL**

8	152300-005300		Thermal paper roll for EKG. Dimension : 215X25 GRID **ALL**
9	152600-011400		ECG GEL 260ML **ALL**
10	151900-010100		Battery for FM and EKG(Common) Battery type : Ni-MH Voltage : 12V Capacity : 2600mAh **ALL**
11	120108-038300		ECG hanger (Option) **ALL**
12	120108-038400		ECG CART (NEW) (Option) **ALL**

Section 7. Connector Pin Assignment

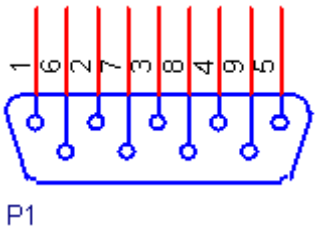
1) Patient Cable (EKG2000 / EKG3000)

Pin Description	
Pin	Name
1	V2
2	V3
3	V4
4	V5
5	V6
6	GND
7	N.C
8	N.C
9	RA
10	LA
11	LL
12	V1
13	N.C
14	RL
15	N.C



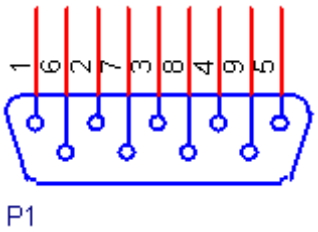
2) Serial Port (EKG2000)

Pin Description	
Pin	Name
1	N.C
2	RXD1
3	TXD1
4	RXD2
5	GND
6	TXD2
7	N.C
8	N.C
9	N.C



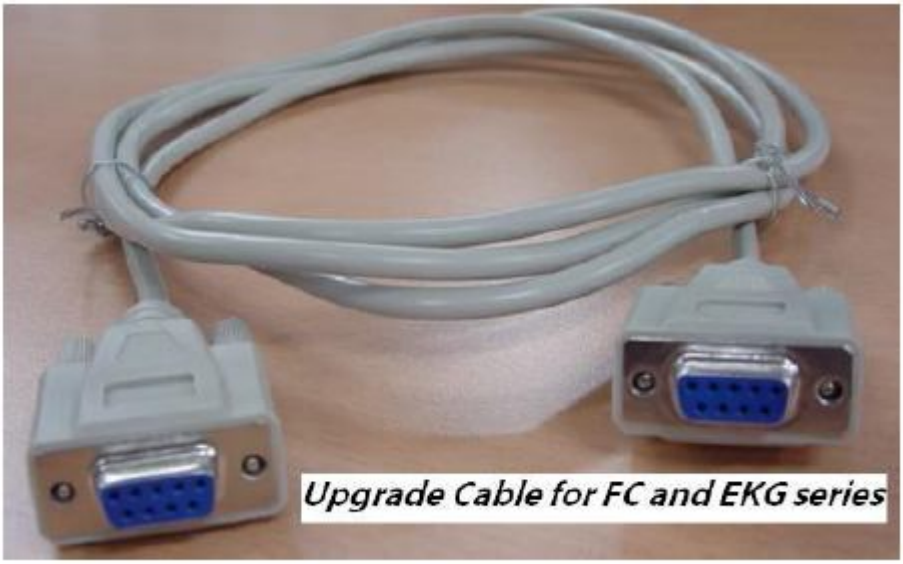
3) Serial Port (EKG3000)

Pin Description	
Pin	Name
1	N.C
2	RXD
3	TXD
4	SPIRO POWER
5	GND
6	N.C
7	N.C
8	N.C
9	N.C



Section8. Software Upgrade

1. Connect between PC and CardioCare2000 with the cable as shown below.
   At this time, CardioCare2000(or CardioTouch3000) power is off.



2. Go to "HyperTerminal" from the "Start" button by clicking as shown in Fig.1.
   Start -> "Program" -> Accessories" -> "Hyper Terminal" folder.

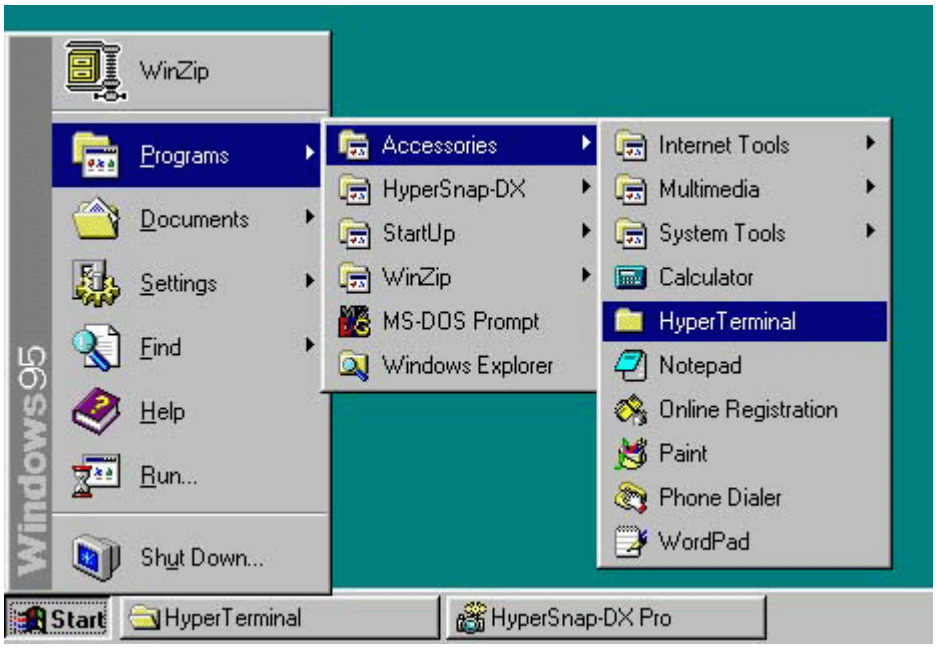


Fig. 1

3. Double click the HyperTerminal execution file "Hypertrm". (Fig. 2)

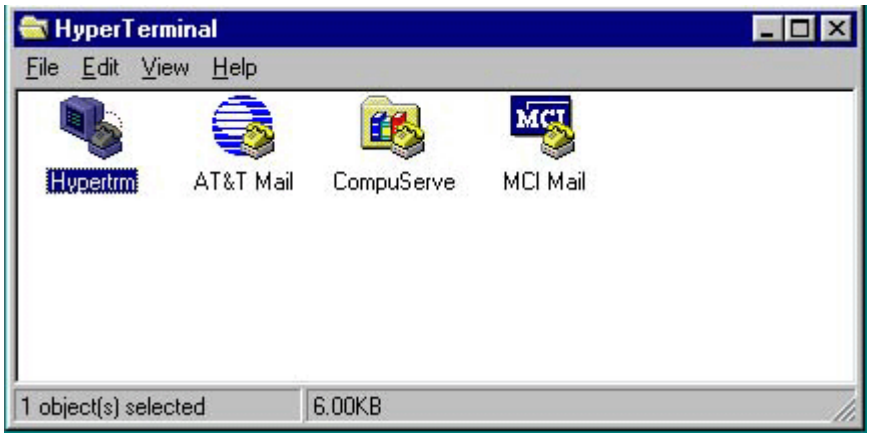


Fig. 2

4. In the Connection Description
Name : "Program Upgrade" or any name which can be easily memorized.
Icon : take the icon which is shown in Fig.3

Fig. 3

5. In Fig. 4, Phone Number window, there are 4 blanks but you can just fill the last one ("Connect using") as Direct to Com1 or Direct to Com2. And click the OK button.

Fig. 4

6. In the COM1(COM2) properties fill the blanks as shown in Fig.5. And click the OK button.

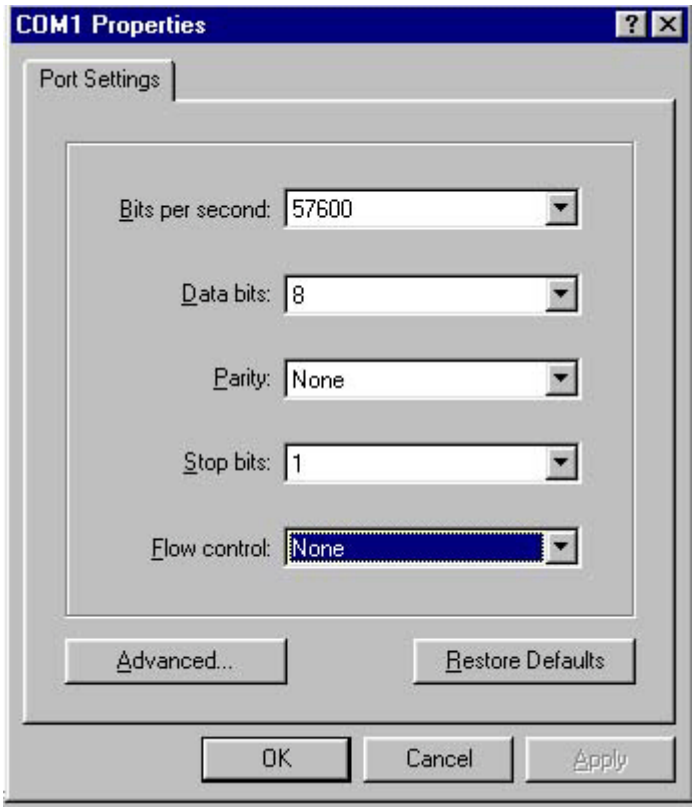


Fig. 5

7. In the Program Upgrade - HyperTerminal" window, go to "Transfer" and then choose "Send File" like Fig. 6.

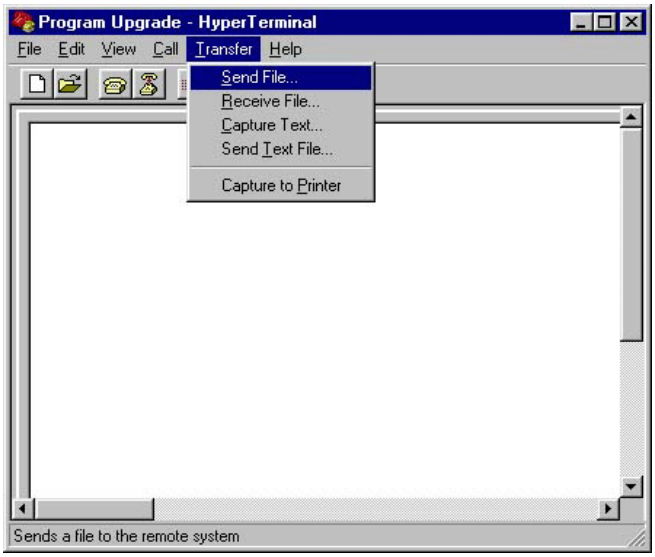


Fig. 6

8. And then you can find small Send File window as shown in Fig.7

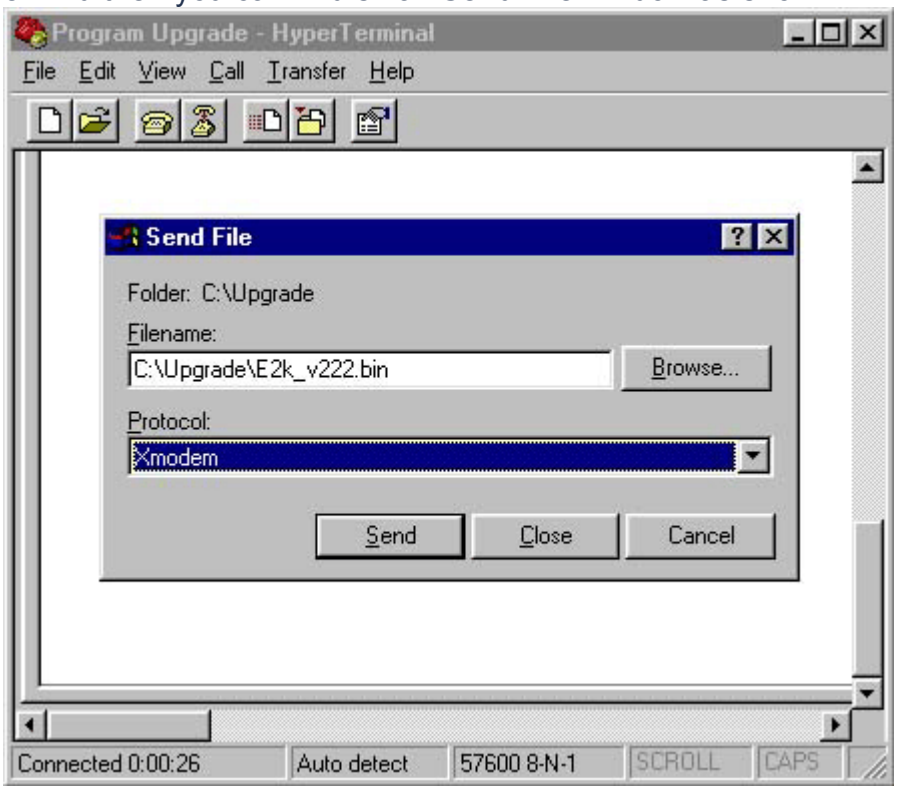


Fig. 7

9. In the Send File window,"File name" -> insert the filename with right path, or using Browse,choose the upgrade program, for example, C:\Upgrade\E2k_v222.bin (find the exact path on your computer).
"Protocol" -> choose "Xmodem" and click the Send button.

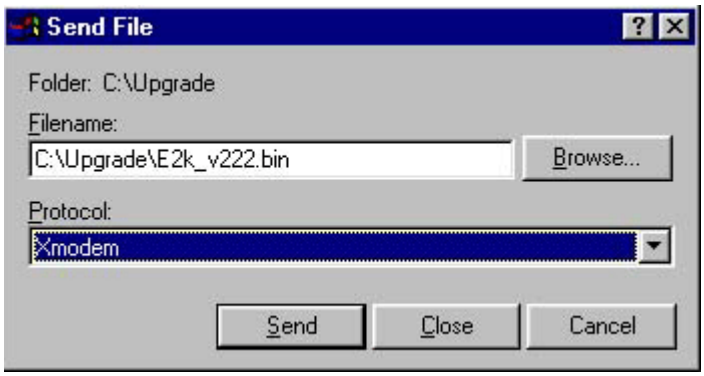


Fig. 8

10. Another window will coming up like shown in Fig. 9;
named Xmodem file send for Program Upgrade.

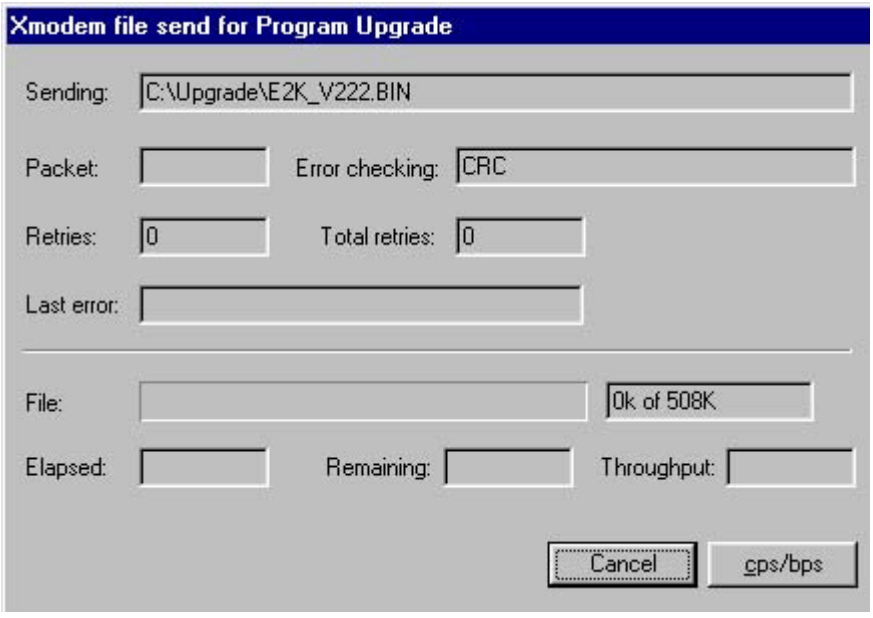


Fig. 9

11. Turn on the CardioCare2000.

12. You can see the state of data transfer in the Xmodem file secnd for program Upgrade window. It takes about 3 minutes to finish the process.(Fig. 10)

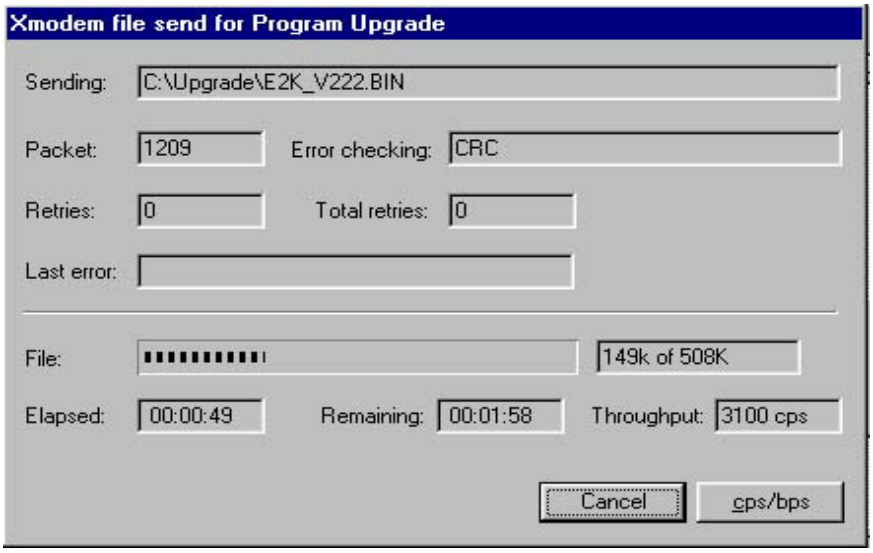


Fig. 10

13. Finishing the process(upgrade), Hyper-Terminal window will display following window.

14. Check following message; "Verify image.. finished.
Flash write finished without error. -- press reset" CardioCare2000 will show the latest Version automatically.

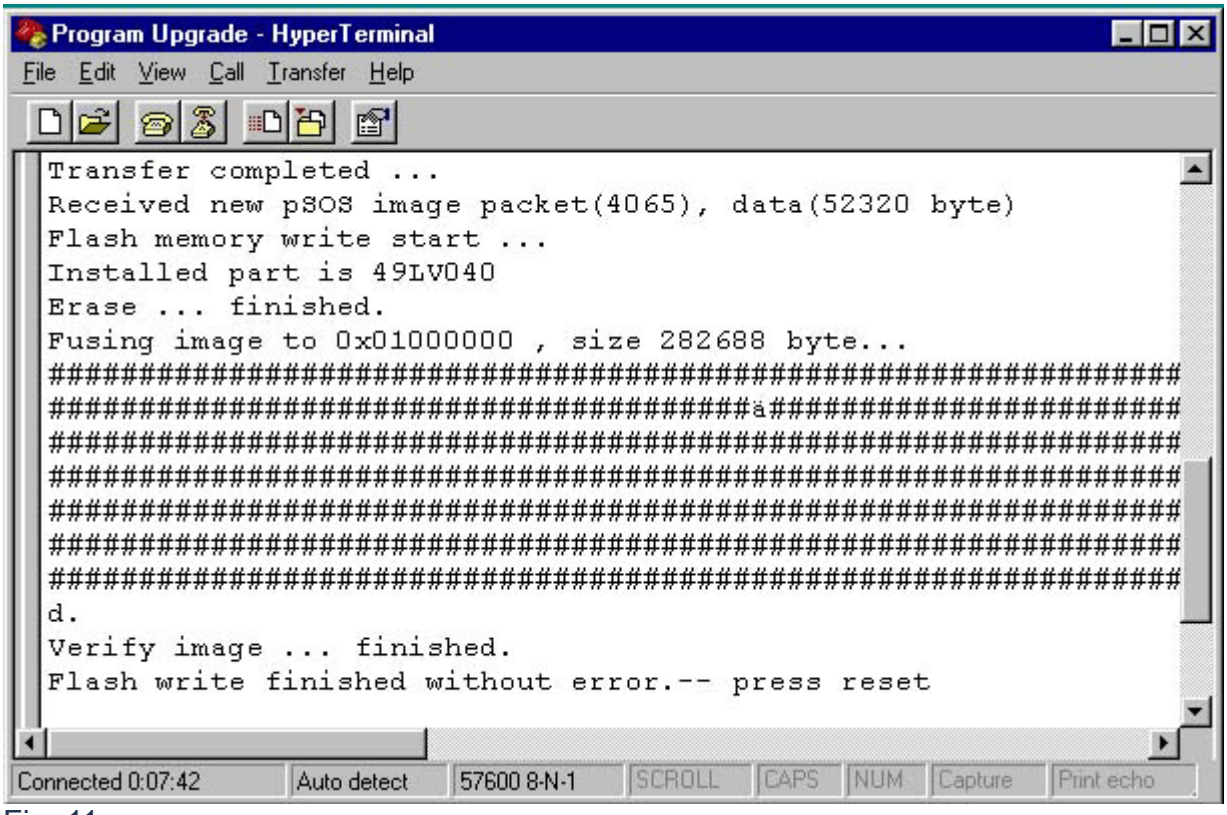


Fig. 11

15. Close the window. Then you can see the following message box.

Fig. 12

16. Save it for next convenient use.
Then you can see the new file "Program Upgrade" as shown in Fig. 13.
Next time, just double click the new file.

Fig. 13

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