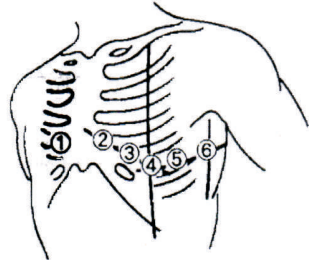
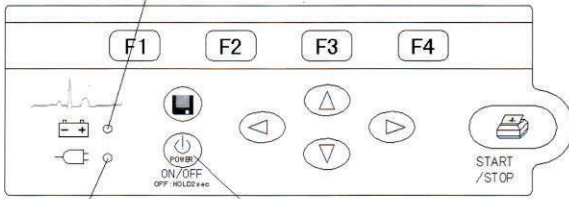




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ECG12031

USER MANUAL



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Chapter 1 Introduction

Welcome to use Electrocardiograph ECG1203I.

1.1 Brief Introduction

This manual has been prepared to provide necessary information on use of Electrocardiograph 1203/1203I correctly. There are 6 chapters in total.

Chapter 1 Introduction mainly presents this manual and demonstrates the composition of the ECG1203/ECG1203I, the taboo of the parts and materials, the requirement of signal input and output, the application requirement of internal power, the special parameters necessary to operate safely, and limitation of transportation and storage;

Chapter 2 Control and Function mainly introduce display, operation keys, print, input/output and give explanation of the figures, symbols and warning signs and abbreviations;

Chapter 3 Operation Preparations recommend the operating steps of running the instrument;

Chapter 4 Operation Explanation mainly introduces the operating methods of menu in measurement, content of display and record in different modes;

Chapter 5 Maintenance and Repair mainly introduce product's professional precaution check, the methods & period of the maintenance & clean, the methods of clean, disinfection & sterilization of parts contacting patients; the methods of safe use and maintenance of rechargeable battery;

Chapter 6 Electrical Circuit and Module List show the circuit and module figures (tables), and the methods to replace the fuse and other parts.

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1.2 Component List and Accessories


No	Type	Quantity	Remark
ECG1203I	Mainframe	1	
ECG1203I-01	ECG cable	1	CP-101J12 ECG cable
ECG1203I-02	Limb electrode	1	Containing 4 pieces to match ECG cables
ECG1203I-03	Chest electrode	1	Containing 6 pieces to match ECG cables
ECG1203I-04	Lead plaster	1	
ECG1203I-05	Thermal paper	1	Inner diameter Φ 18 110mm×20m
ECG1203I-06	Operation manual	1	
ECG1203I-07	Power supply cable	1	
ECG1203I-08	Earthing line	1	

Table 1-1.


1.3 Warning Symbols

1. Warning's implication and degree


 Caution: If operation is not carried out as requirements, device may be partially or entirely damaged; fires may be caused; even bodily harm may be caused to people.

 Warning: If operation is not carried out as requirements, device may be partially or entirely damaged; fires may be caused; even bodily harm may be caused to people.

2. Interpretation of warning symbol

 Contents of "Caution" and "Warning"

 Forbiddance

 Contents to be executed

1.4 Safety Explanations

In order to smoothly perform the functions of the device and complete the

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tasks, please read this manual carefully before using. If you have any advice or suggestion on device or this operation manual, please feel free to contact us.

As a manufacturer and sale company of medical electronic instruments, we are concentrated on ensuring the safety, reliability and performance of the device. To guarantee safe and reliable run of the device in daily operation, the operator is liable for ensuring that:

- ★ Only professional engineers of our company or qualified maintenance men trained by our company can maintain, repair and replace the instrument;
- ★ The equipment can only be replaced with the components recommended by our company, which is necessary to ensure safety and efficiency of the device.
- ★ Use the proper voltage and frequency according to the symbol requirement.

The static electricity in the dry environment (indoors) may have influence on the operation of ECG1203I, especially in winter. Therefore it is necessary to moisten the indoor air first or release the static electricity of the cables and operators before operating ECG1203I.

If there are thunders and lightning nearby, it may cause voltage impact within ECG1203I, which may cause hazards to people. Therefore we suggest shutting off AC power and running the device by internal power.

1. ECG1203I device classification

It belongs to following classifications:

- 1) Electric shock protection: Class I with internal power
- 2) Electric shock protection degree: Type CF
- 3) Degree of preventing entry of harmful water: Common device
- 4) Device safety degree in gas environment: The product can not be operated in the environment with inflammable anaesthetic gas or inflammable cleaning agent.
- 5) Operation mode: Continuous operation.

2. Device symbols and marks

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1) Following symbols and marks printed on ECG1203I


 Warning or Caution


 CF device with defibrillation-proof function


 Potential equalization terminal


 Alternating current power


2) Before using the device ECG1203I, please do read this part carefully to make sure the safety and exactness of operation. The following part is related to safety and operator must abide them strictly.


3)  Warning: connection part


 To protect patients, isolation earth is provided. It is dangerous if ECG electrodes contact any metal objects or other conductive body, even the contact is indirect.

 All ECG leads, input receptacle and amplifiers must be insulated from other parts of the device.


 The increase of enclosure leakage current will lead to latent danger, if several devices are connected together by one receptacle. And the danger will become more serious if patients embedded heart pacemaker or other electrical stimulators. Please notice these safety problems and ensure leakage current at a safe level by taking adequate measurements;


 ECG1203I is CF type, which can monitor direct cardiac application.

4)  Warning: power request

 Please make sure that AC power line is connected with medical 3-pin power receptacle. If not using this receptacle, please earth the device properly with earthing line. If all these requirement can't be met, please use rechargeable batteries to run it when the discharge identifier is normal.

5)  Warning: attention points for batteries

 Make sure to use the stated batteries, and charge them with ECG1203I. If not, it will be dangerous.

 Don't open or refit batteries, otherwise it may arouse a fire.

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- ⊗ Don't heat batteries or put them into fires, otherwise it may cause batteries leakage or arouse a fire or explosion.
 - ⊗ Do not make the battery short circuit; otherwise it may arouse a fire.
- 6) ⚠ Warning: anti-explosion request
- ⊗ Don't use ECG1203I in environment that has hidden explosion danger or combustible anaesthetic air.
 - ⊗ Don't sterilize the device with high-pressure sterilizer or strong-oxidant, or soak the ECG device in disinfectant. When disinfecting, please pull off power supply socket.
- 7) ⚠ Warning: MRI disturbance
- ⊗ Don't use ECG1203I during MRI scanning. The current in lead may burn patients. ECG1203I may affect MRI image and MRI may depress ECG1203I precision.
- 8) ⚠ Warning: against high frequency electrical surgical equipments and defibrillation protection
- ❗ Please make sure to use the cables, leadwires, power plugs and other devices appointed in the accessory list.
 - ⊗ Using the appointed components, otherwise it will reduce the effect of against high frequency electrosurgery, damage ECG device, or even burn patients.
 - ❗ Only when use cables equipped with defibrillation-proof, ECG1203I can be kept connecting with patients during defibrillation. When using these cables, ECG1203I can run normally, even if the electrodes of defibrillation device contact with that of ECG.
- 9) ⚠ Warning: precautionary check and maintenance
- ❗ Precautionary check is necessary which includes checking ECG device, patient cables and leadwires. Usually, checking the device at least one time each year. Before using the device, if there are the following physical damages, please maintain it at once.
- ⊙ The device suffers from strong concussion, such as falling off heavily.

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- Solid or liquid drops on the device, or enters into it.
- The device cannot work normally.
- The device's enclosure breaks or damages partly.
- Leadwires, power lines or equipotential wires appear damaged.

10) ⚠ Caution: transportation and storage

- ❗ During transportation, ECG1203/ECG1203I must be packed with appointed wrapper.

11) ⚠ Caution: General attention points

- Don't put the device in locations that is liable for eroding it. If there is liquid entering into the device, it may cause electric shock to checker or operator.
- Avoid strong wallop and tremor or else it may lead to electric shock or fire.
- If the device is fallen off carelessly, please contact with us.
- Avoid LCD display suffering from strong wallop, otherwise it may be damaged.
- ❗ Make sure that patients don't contact other devices or conductors. Otherwise, it will increase leakage current to bring dangers.
- ❗ When cut off power supply, please pull from the connector plug of power inlet, not from power line. Further more, don't insert or pull out power line with wet hands, otherwise it may cause electric shock and do damage to persons.
- ❗ Please use soft fabric dipped with medical alcohol to wipe dust and feculence on the screen surface.
- ❗ Check-up
 - Please check ECG1203/ECG1203I everyday.
 - Please make all-sided check-up every three or four months.
 - Please make professional check-up every year.

12) ⚠ Caution: measure procedure

- ❗ Environment noise will distort the ECG waveforms, such as baseline drift, muscle interference, AC interference and so on. In addition, some feeble R waves in V1 and V2 may be ignored and some S waves may be interpreted as Q waves mistakenly. ECG1203/ECG1203I can't be used as Arrhythmia

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Monitor, because it doesn't have alarm function of arrhythmia.

1.5 Device Storage and Transportation Condition

1. Environment temperature range $-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$
2. Relative humidity range $\leq 93\%$
3. Atmosphere pressure range $500 \text{ hPa} \sim 1060 \text{ hPa}$

1.6 Equipment Operation Environment Condition

1. Environment temperature range $+10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
2. Relative humidity range $30\% \sim 75\%$
3. Atmosphere pressure range $700 \text{ hPa} \sim 1060 \text{ hPa}$

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Chapter 2 Control and Function

2.1 Function Introduction

ECG1203I can measure standard 12-lead ECG waveform. This device adopts English menu and is flexible to operate. Whenever you want, you can have a physical examination.

2.2 Structure

1. Front panel

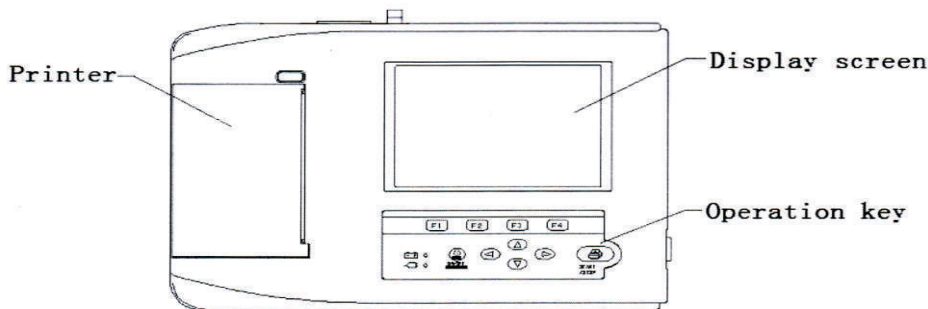


Figure 2-1

2. Key

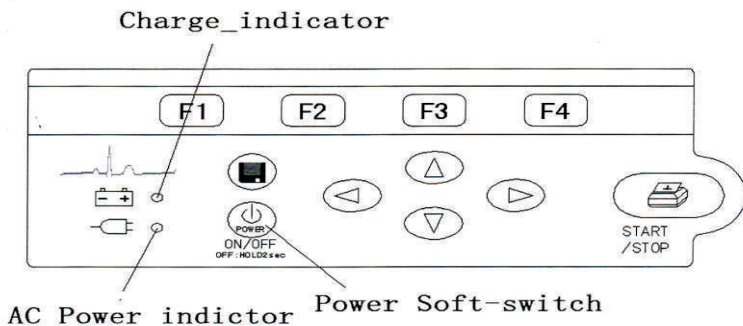


Figure 2-2

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3. Back panel

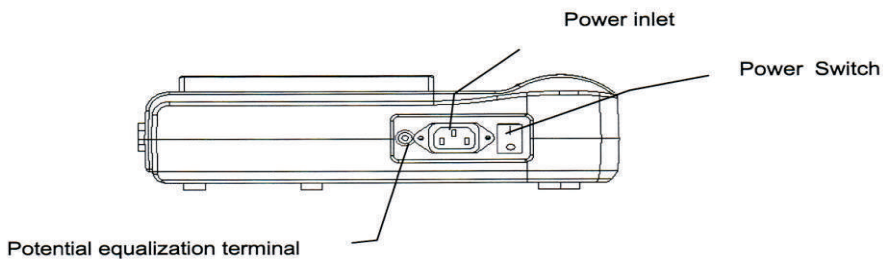


Figure 2-2

4. Right panel

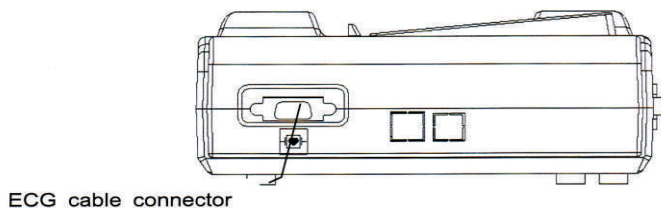


Figure 2-3

5. Bottom panel

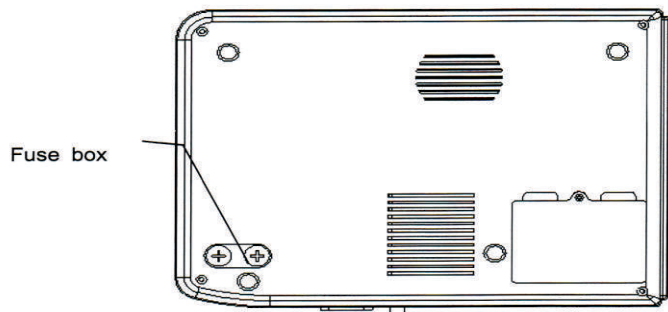


Figure 2-4

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2.3 Specifications

- 1) Input resistance: $\geq 5M \Omega$
- 2) Print resolution: Y axis ≥ 8 points/mm, X axis ≥ 16 points/mm (speed of paper 25mm/s), X axis ≥ 8 points/mm (speed of paper 50mm/s)
- 3) Recording sensitivity
Standard sensitivity 10mm/mV, allowance inaccuracies $\pm 5\%$
- 4) Sensitivity shift
Amplifier has 1/2 (5mm/mV) \1 (10mm/mV) \2 (20mm/mV) sensitive shift when printing. The allowance inaccuracies range from one shift to other shift is $\pm 5\%$.
- 5) Common Mode Rejection Ratio: $\geq 80dB$
- 6) Bandwidth frequency response characteristic
For 10 Hz sine's 1mV signal, the signal amplifier's input range should be 100%, 0.5Hz~100Hz should be between 70% ~105%
- 7) Time constant: $\geq 3.2s$
- 8) Temperature drift: between $5^{\circ} C \sim 40^{\circ} C$ and the baseline drift average is not more than $0.5mm/^{\circ} C$
- 9) Disturbance between channels: under standard sensitivity, each channel's interdisturbance should be more than 0.5mm

2.4 Characters and Applicability

1. The device is smart and flexible to use and carry, especially suitable for hospitals, first-aid centers, sickrooms.
2. Install zero-memory chargeable battery to use flexibly for mobile and salvage on locale.
3. Easy and convenient to operate, shortcut key to change the ECG measurement setting, single key to record automatically.
4. It can display the state of electrodes' connection, printer error and menu. It can show the rhythmic lead waveform.
5. The recording methods: automatic lead recording, manual recording, interpretation, single key swift recording and selection recording.
6. 110 mm printer paper, record 3-channel ECG waveform simultaneously.
The paper is rolling and is quick and convenient to be replaced.

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Chapter 3 Operation Preparations

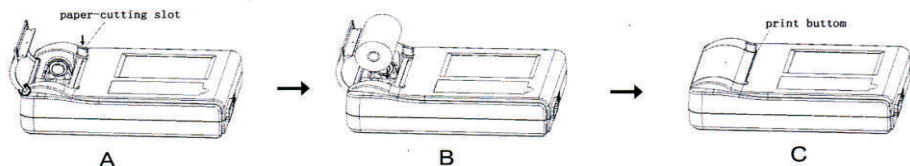
3.1 Operation Surrounding Selection

1. Install the ECG device smoothly according to the following methods strictly.
2. Use the 3-phase AC power socket with protective earthing, make full use of earthing line and guarantee the ECG device to connect the earth.
3. If there is strong electromagnetic radiation around, it will cause different degrees disturbance to the device, such as current leakage, static induction, electromagnetic induction, coupling magnetism and so on. Please choose the location that there is no high voltage and big load driving force power line passing by the equipment and sickbed.
4. The place where Room temperature is between 20~25°C and humidity is below 70% is best for the device.

3.2 Recording Paper Installation

This printer adopts 110mm width, 20m length and $\Phi 18$ inside diameter thermal paper. Following are the steps for paper installation:

- 1) Press printer-cover button, recorder cover will bounce automatically, open recorder cover through outward rolling. (Figure 3-1A)
- 2) Open recording paper, and put in recording paper, makes sure recording paper rolling towards the paper cover. (Figure 3-1B)
- 3) Unfold the recording paper about 3cm, then close recorder cover tightly.
- 4) Cut off the additional paper along the paper-cutting slot.F



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3.3 ECG Cable Connection

1. Check whether the ECG lead wires and cables have been wore away and broken. If wires are damaged, then they can't be used anymore.
2. Attach leadwires to electrodes, please match the corresponding colors with the words carefully. (Table 3-2)

Leadwire color	Red	Orange	Green	Black	Red and white	Orange and white	Green and white	Brown and white	Black and white	Purple and white
Mark	R	L	F	N	C1	C2	C3	C4	C5	C6
Electrode position	Right arm	Left arm	Left leg	Right leg	V1	V2	V3	V4	V5	V6

Table 3-2

3. Before attaching Electrodes to patients, clean lipin on skin with alcohol, and then place the electrodes on the standard lead position.
4. Daub the lead paster on skin with finger carefully. Be sure that lead paster daubed on each required position is disconnected with lead paster of other position. And be care of not connecting the lead paster parts together when attaching the chest lead electrodes.
5. Observe the patients' measurement state, and check carefully whether the patients' limbs connect metals and conductive objects. To guarantee patient safety, please make sure that all electrodes either connect with patient or disconnect with patient are not allowed to touch any conductive body.
6. Limbs' electrodes installation

To connect the limbs' electrodes several centimeters to Right finesse (R) (Figure 3-3), left finesse (L) (Figure 3-4) , left foot wrist (F) (Figure 3-5) , right foot wrist (N) (Figure 3-6)

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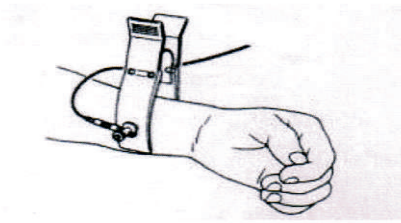


Figure 3-3

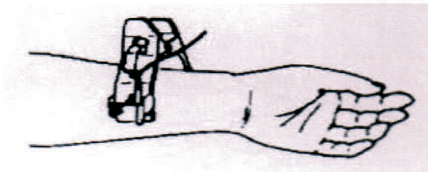


Figure 3-4

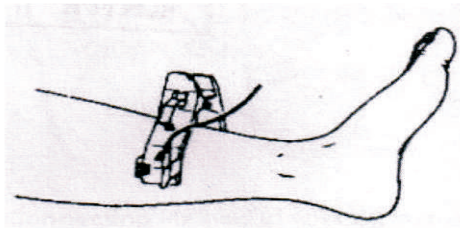


Figure 3-5

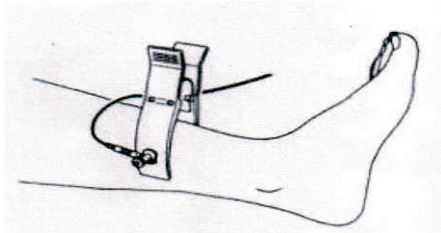


Figure 3-6

7. Chest leads placement

After attaching limb leads, place chest leads (sucking balls) according to

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V1-V6. The positions of chest leads are as followings:

V1: The fourth rib at right sternum

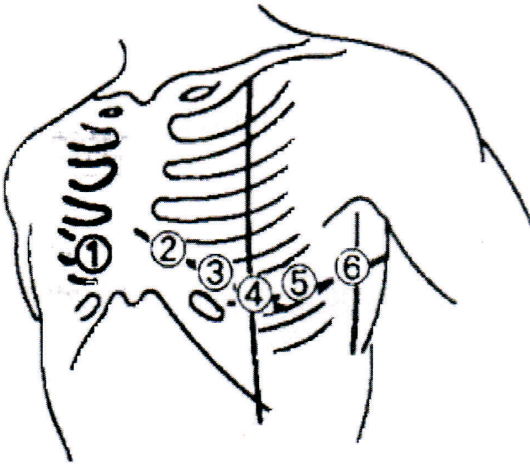
V2: The fourth rib at left sternum

V3: The line center connecting V2 and V4

V4: Intersection which are the fifth rib at left sternum and the central line of clavicle cross.

V5: As high as V4 and the intersection of fornt left armpit line.

V6: As high as V4 and the intersection of middle left armpit line.



Connecting Method of Chest Electrode

Figure 3-7

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Chapter 4 Operation Explanation

4.1 General Introduction

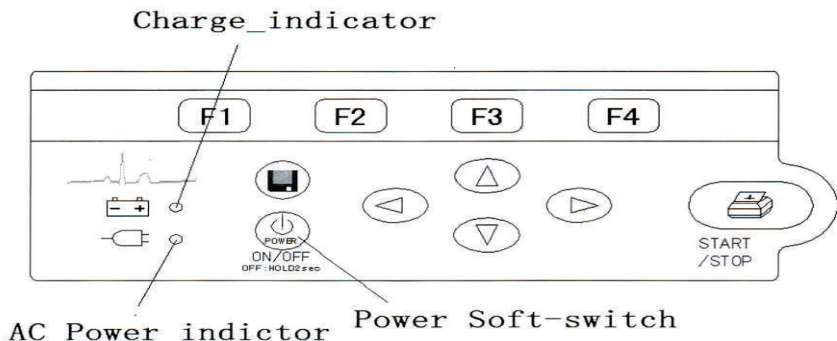











Figure 4-1

1. Connect the power line and earthing line according to ECG preparation requirements;
2. Install thermal paper;
3. Turn on the Power Switch;
4. Starting measuring after connecting the ECG leads well with patients.

4.2 Key Function

1.  record (print) start/stop key, under the state of print stop, press this key, recording starts ; during recording ,press this key, printing stops.
2.     Function shift shortcut key
 -  Function Key represents shifting the display speed of ECG waveform;
 -  Shift ECG display gain;
 -  Shift analysis/print mode;
 -  Enter system setting (see 4.3section)
3. Function operation key in the menu: used for system setting

press this key, move the cursor

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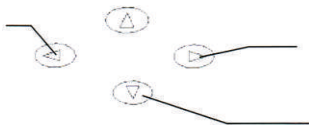
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Press this key,
function shift or
data conversion
ascending order



Press this key, function shift, or
data

Press this key, move the
cursor



4. Power soft-switch: Press this key turn on /off the power supply

5. Print/Stop Key:



Function Explanation: enter/exit print state. Press this key,
print start, in the process of printing,
press this key, print stop.

Caution: the key is invalid in operation menu.

4.3 Screen Display

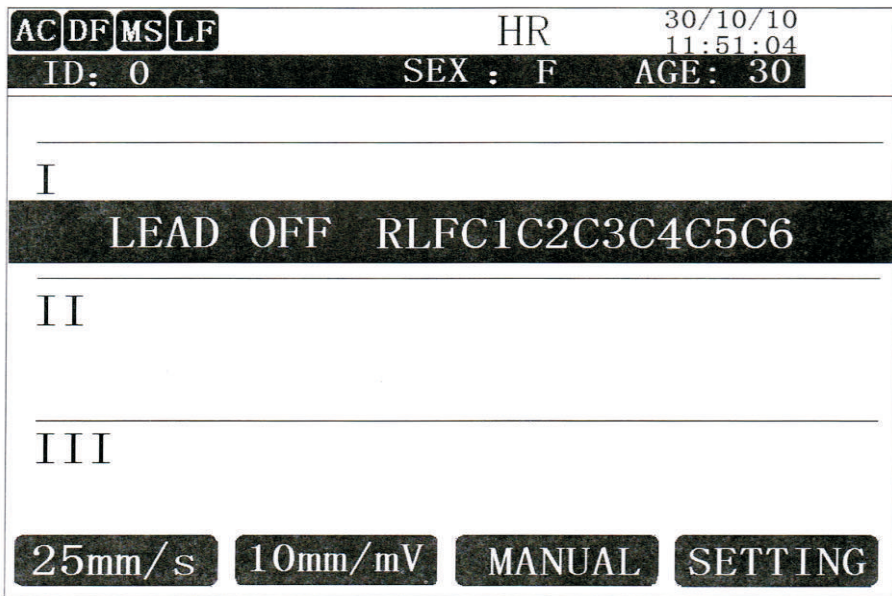


Figure 4-2

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As shown in the figure, screen includes 3 sections; top 2 lines is state section:

The first line shows ECG current working state. From left to right: filter setting (shows whether AC, myoelectricity, drift, low pass filter are opened, open a filter, the corresponding mark will appear), state indication (such as the information about paper out, printing), heart rate, system date and time, battery electric quantity.

The second line shows the user information. From left to right: ID No., name, age.

Parts of screen middle shows 3~6 leads ECG waveform, if the leads come off, the "off" indication will be shown in the middle of these parts.

The underside screen shows key indication, the corresponding 4 function key of system —, in different mode every function key have their corresponding different function, and in the current mode the function of this key will be shown in function key indicating section. In the figure, represents shifting display speed of ECG waveform, shift ECG display gain, shift analysis/print mode, enter system setting (refer to 4.4)

Caution: Press the influence to the waveform display also will be acted on the automatic/manual print mode, in this mode the printing speed of waveform and gain should conform to display setting of screen.

4. 4 System Setting

On the screen of waveform display, press to enter picture of system setting, and there are three pages. Press to shift "previous page" or "next page". In any page, pressing can return to display picture.

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4. 4. 1 Display setting

▶ RHYTHMLEAD1	I
RHYTHMLEAD2	II
ARRHYTHMIA LEAD1	I
ARRHYTHMIA LEAD2	II
ARRHYTHMIA LEAD3	III
ALTERNATING CURRENT FILTER	OFF
DRIFT FILTER	OFF
MUSCLE FILTER	OFF
LOW PASS FILTER	OFF



Figure 4-3

In this page, rhythmic lead, filter, arrhythmic lead can be set. Press  to move the cursor to items which need to be modified, and press   to shift numeric.

4.4.3 Print, display and sound setting

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▶ DISPLAY CHANNEL NUMBER	3L
PRINT CHANNEL NUMBER	1L
AUTO PRINT TIME	2.5s
PRINT STORAGE	OFF
HEART SOUND	OFF
SIMULATED WAVE	OFF
1 LEAD PRINT	I
3 LEAD PRINT	I~III
RR STAT. TIME	100b



Figure 4-4

In this page, under the automatic printing and manual printing mode, set the print. Press ▲▼ to move cursor to the items which need to be modified, press◀▶ shift the numeric.

Waveform printing designates printed waveform number under the mode of automatic printing and manual printing. 1channel+rhythm lead, 3channel+rhythm lead can be selected. As to the automatic printing mode, system will shift lead automatically during printing, the interval of shifting time will be set and confirmed according to automatic printing time.

4.4.4 Set system clock and chest lead masked off

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DATE 30/10/2010
TIME 11:30:59
CHEST LEAD MASKED OFF



Figure 4-5

In this page, set system time/date. Press the key $\blacktriangle \blacktriangledown$, move the cursor to the items which need to be modified, press key $\blacktriangleleft \blacktriangleright$ to shift numeric.

Before this system is put in use for the first time, the system time should be set first. Move cursor and set system time and date, then press $\boxed{F4}$, the set is completed.

If it is not convenient to connect chest lead in use, the chest lead can be closed, then chest lead will not play a part in analyzing and printing (print will be shown as a straight line or as blank)

Chest lead masked off: This selection set whether to use V1~V6 lead to analyze ECG data during ECG analysis.

If this selection set is off, use 12lead (I~V6) to analyze the ECG data.

- When the lead comes off, it will show the "off lead" corresponding with (I~V6) 12lead .
- If display channel number of waveform is set as 6lead, use key $\blacktriangleleft \blacktriangleright$ to shift display lead between I~aVF and V1~V6
- If display channel number of waveform is set as 3lead , use key $\blacktriangleleft \blacktriangleright$

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to shift the lead between I~III, aVR~ aVF, V1~V3, V4~V6.

d) If printing channel number of waveform is set as 1lead or 1lead +rhythm , under the manual printing, use key $\leftarrow \rightarrow$ to shift print lead among I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6 lead.

Under the automatic printing, to shift print lead according to the order of I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6 automatically.

e) If printing channel number of waveform is set as 3lead or 3lead +rhythm , under manual printing, use key $\leftarrow \rightarrow$ to shift print lead among I~III, aVR~aVF, V1~V3, V4~V6. Under automatic printing, to shift print lead according to the order of I~III, aVR~aVF, V1~V3, V4~V6 automatically.

If the set is on, use 6lead (I~aVF) to analyze ECG data.

1. When the lead is off , it only shows the "off lead" corresponding with (I~aVF) 6lead

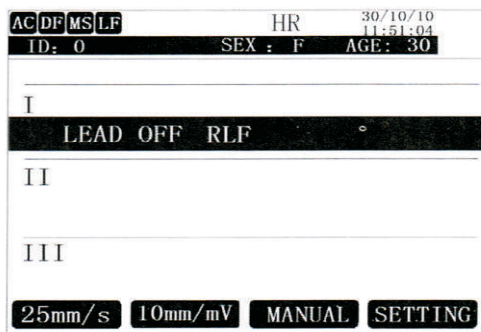


Figure 4-6

2. If display channel number of waveform is set as 6lead, use key $\leftarrow \rightarrow$ and the display lead can not be shifted, the display lead only can be I~aVF
3. If display channel number of waveform is set as 3lead, use key $\leftarrow \rightarrow$, only shift lead between I~III and aVR~aVF.
4. If printing channel number of waveform is set as 3lead or 3lead +rhythm, under manual printing, use key $\leftarrow \rightarrow$, only shift print lead between I~III and

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aVR~aVF. Under automatic printing, shift print lead only according to the order of I~III and aVR~aVF

5. If printing channel number of waveform is set as 1lead or 1lead +rhythm, under manual printing, use the key  , only shift print lead among I、 II、 III、 aVR、 aVL、 III、 aVR、 aVL、 aVF. Under automatic printing , shift print lead only according to the order of I、 II、 III、 aVR、 aVL、 aVF.

Under the way of automatic analysis, the print results will not show V1~V6 lead waveform and analysis results

4. 4. 5 Other sets

Including:

After the auto record ID set is open, instrument will assign serial number for the print results.

After opening "print user information", the information such as gender, age, height, weight, will be printed.

After closing, the specific data of this information will not be printed, leave space for user to fill in.

▶ AUTO RECORD ID	OFF
RECORD FORWARD TIME	OFF
EXTERN INPUT SIGNAL	OFF
AUTO DELAYED ARRHY-REC	OFF
USER INFORMATION PRINTING	OFF

PREV

NEXT

EXIT

Figure 4-7

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4.5 Playback operation

ECG machine can store and playback, and to the longest, it can store 1min ECG.

4.5.1 Storage operation

During storage operation, users can select whether to store ECG waveform

system setting→print storage

On: Store ECG waveform

Off: do not store ECG waveform

DISPLAY CHANNEL NUMBER	3L
PRINT CHANNEL NUMBER	1L
AUTO PRINT TIME	2.5s
▶ PRINT STORAGE	OFF
HEART SOUND	OFF
SIMULATED WAVE	OFF
1 LEAD PRINT	I
3 LEAD PRINT	I~III
RR STAT. TIME	100b

PREV

NEXT

EXIT

Figure 4-8

Before storing ECG data, user set "system setting→print storage" selection, after returning to main interface, press print key. ECG machine prints according to the printing mode users select.

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4.4.5 patient information setting

Press storage playback key



to enter playback interface, as shown in figure 4-9

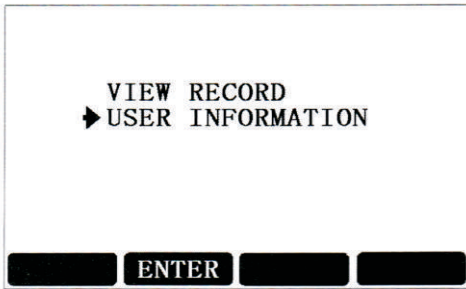


Figure 4-9

press "enter" again, then the picture will appear as following

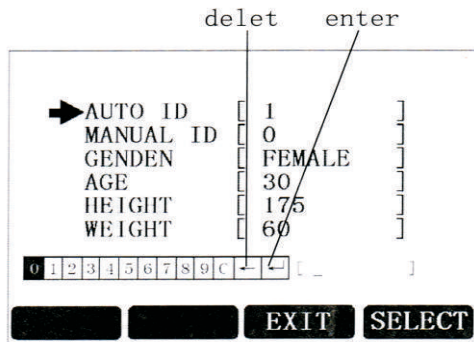


Figure 4-20

Then to set the following items:

- 1) set patients ID
- 2) set patients gender
- 3) set patients age
- 4) set patients height
- 5) set patients weight

the ways to set are following

Use the key \uparrow / \downarrow , move the selection to the items which need to be modified, use the key \leftarrow / \rightarrow , move the cursor to the characters which to be selected, press "select" character will be selected, press "delete" the character will be

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deleted, after finishing the selection, press "enter" to enter, and press "back" to return previous menu list.

4.5.2 playback operation

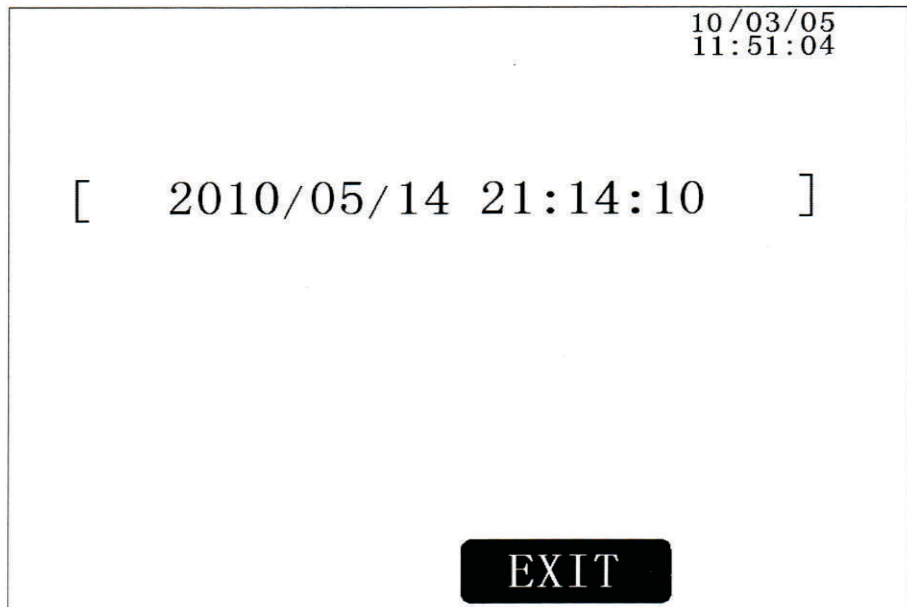






Figure 4-31

Under the main interface, press the key , to enter playback interface, and the stored ECG data will be shown in the playback interface. Press the key  , move the arrow tool to point to "VIEW RECORD", if there is some record, it will be shown as the above figure, it shows the recording time, and then press key  again.

If there is no record, it will show "NO RECORD"

If the record is invalid (mainly: except for manual, the print stop in the process of printing), "INVALID RECORD" will be shown.

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Chapter 5 Maintenance and Repair

5.1 Maintenance

1. Tips

- 1) The device should be placed in dry and ventilated place.
- 2) The device should be kept away from caustic gas and liquid.
- 3) The device should be wiped with clean water or neutral cleaning agent.

In order to guarantee the safety, function, performance and reliability of ECG1203I, operators must do daily checking according to daily checking list (see Figure 5-1) before using. And if the checking result is different with the standard ones (see Figure 5-1: Standard), please stop to use the device. The daily checking order is listed as: appearance checking, connection checking and performance checking. If the checking standard (listed in Figure 5-1) cannot be satisfied, operators have to adjust the device before running it.

Daily checking list

Type	Item	Step	Standard
Appearance checking	Keyboard	Keyboard damages checking	No damage
	Power line and leadwire	Damage and scratch checking	No damage and scratch
	Printer paper	Normal placement checking	Normal placement
	Electrode (clip and sucking ball)	Looseness, rust and scratch checking	No looseness, rust and scratch
	Earthing line	Normal connection of earthing line checking	Normal connection

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Connection checking	Power line and leadwire	Confirm that the power line is attached to power supply, leadwire is attached to electrodes correctly and leadwire is connected to ECG1203/ECG1203I closely.	Normal connection
	Electrode (clip and sucking ball)	Confirm that electrodes and leadwires is connected correctly	Correct connection
Performance checking	Keyboard	Check keyboard works normally	Normally work
	Display	Check LCD display can show normal waveform	Normal display
	Printer	Check the printer can print the waveform normally	Normally print the ECG waveform

Figure 5-1

2. Clean and disinfection

To make ECG device record well, please time to clean the electrodes (clips and sucking balls), mainframe and leadwires. Please adopt the following procedures to clean and disinfect them.

Use clinical alcohol or soapsuds to purge the electrode dirt away when cleaning. If it can't be washed out, to polish the dirt with yarn paper and then wipe it with a piece of clean cotton cloth dipping a few clean water. It can be put into use after the electrode dry.

3. Battery

- 1) When device is connected with AC power, the AC power indicator is on. If the battery power is insufficient, battery indicator will flicker, and if battery is fully charged, its indicator is off.
- 2) When using the battery, the LCD will display the battery sign. When the battery sign is flickering, please charge battery as soon as possible.

⚠ Warning: if the device is abnormal, do not operate device before engineers

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check and repair it.

5.2 Errors

1. Roller error

When it displays wrong message "ROLLOR ERROR" on the screen, please press the printer cover down until the wrong message disappears.

2. Paper end

If it displays "PAPER END" on the screen, Please open the cover of the printer and place a new roll of thermal paper.

3. Lead off

If it displays "LEAD OFF" on the screen, please check the lead according to the information displayed on Error code and take following measures:

- ✓ To replace the electrode;
- ✓ To reinsert the leadwire to ECG1203I and make sure the connection is close;
- ✓ To daub lead plaster to skin that lay the electrode and make sure that the electrode contacts skin fully;
- ✓ If some lead isn't displayed on screen, please check whether the lead is unclean, or damaged, or it does not connect well with patient. If it is unclean, please clean it and reconnect it with patient; if it does not connect well with patient, please make sure it connects well with patient, and if it is damaged, please contact our professional maintenance man to check or repair.

5.3 ECG Record Errors

Note:

The device can't be turned on: if the AC power indicator is not bright, please check whether device is well connected with AC power supply.

1) There is nothing on screen except one baseline, or heart rate cannot be displayed on screen

- ✓ If it shows "LEAD OFF" on the screen, please refer to "LEAD OFF" (see 5.2.3).

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2) AC interference

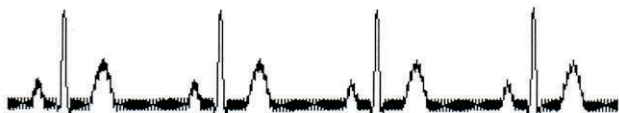


Figure 5-2

When the ECG waveform is displayed as figure 5-2, then it may be AC interference. Please use the following methods in turns:

- ✓ Open AC filter in the system setting menu;
- ✓ Daub lead plaster evenly on skin;
- ✓ Check whether the electrode is loose or doesn't contact well;
- ✓ Check whether the earthing pole contacts;
- ✓ Make sure there is no environmental disturbance.

3) Muscle interference

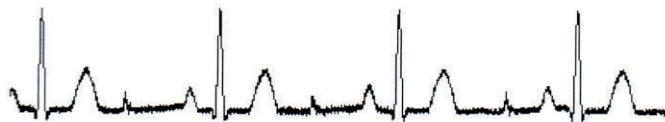


Figure 5-3

When it displays ECG waveform as figure 5-3, it may be muscle interference. Then please use the following methods in turns:

- ✓ Tell the patient to relax and not speak and move;
- ✓ Open the AC filter in system setting, but it will reduce QRS main wave height.

4) Baseline drift

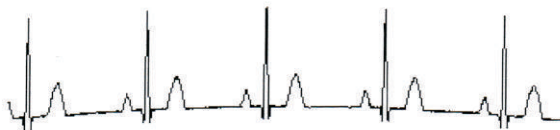


Figure 5-4

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When it displays ECG waveform as figure 5-4, then it may be baseline drift.

Then please using the following methods in turns:

- ✓ Tell the patient to relax and breathe evenly;
- ✓ The room temperature can't be higher than the degree to sweat the patient;
- ✓ Check the electrode carefully and make sure the electrode contact skin well;
- ✓ Open drift filter in system setting, but this will affect ST judgment.

5) When press the print key and the printer paper doesn't move.

- ✓ Roller error

Check the error information on screen and if it displays "ROLLER ERROR", please deal it with solving methods(refer to 5.2)

- ✓ Paper end

Observe the error information on the screen and if it displays "PAPER END", then please deal with it according to the procedure of "PAPER END" (refer to 5.2).

⚠ Caution: If problems can not be solved by the above trouble-shooting measurements, then please contact our company's maintenance man. Our company is not responsible for damage caused by other factors.

5.4. Maintenance Explanation

The company guarantees one year maintenance service for the device (excluding the artificial factors such as crashing, damage caused by improper operation, ect.). The engineers who are not trained and authorised by our company have no right to repair device.

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Chapter 6

Electrical Circuit & Module List

6.1 Electrical Circuit

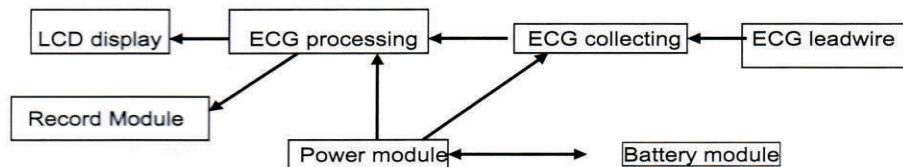


Table 6-1

6.2 Module List

No	Name	Quantity
ECG1203I-B001	Power module	1
ECG1203I-B002	Battery module	1
ECG1203I-B003	ECG processing	1
ECG1203I-B004	ECG collecting	1
ECG1203I-B005	LCD display	1
ECG1203I-B006	Record module	1
ECG1203I-P001	ECG leadwire	1

Table 6-2

6.3 Replacement Method

1. Fuse replacement

Prize up the fuse cover with screwdriver (Figure 6-3), then take it out and replace it(Fuse type: R3-11 3A $\phi 5 \times 20$).

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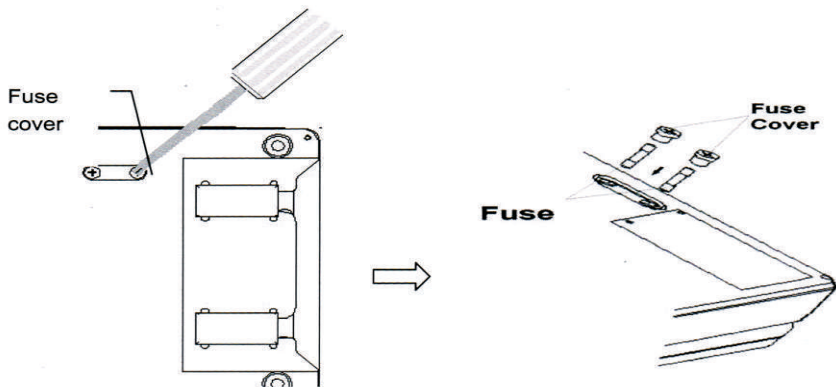


Figure 6-3

2. Battery replacement

Turn power off, prize up the battery box cover with a screwdriver (Figure 6-4) to get the used battery, pull out the line of used battery, connect the line of new with its socket, place the new battery in box, and then tighten the screw.

Note: Please recycle the waste batteries and avoid to pollute the environment.

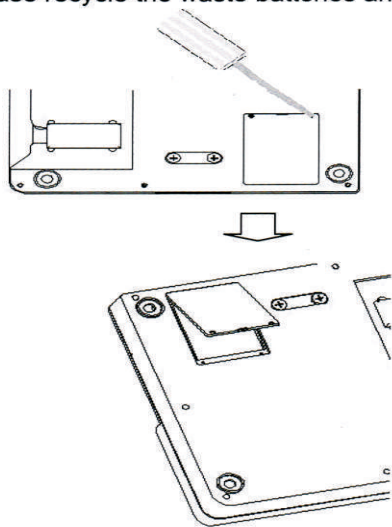


Figure 6-4

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Warranty Period	
Name of Doctor & Address :	

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- 2) Any Physical Damage**

3) Under Warranty Standby Unit Not Provide

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