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### 签批信息:

作者：肖, 丽军 (xiaolijun) 2016-01-07 17:18:55

审核人：陈, 勇强 (chenyongqiang) 2016-01-07 17:57:31

审核人：肖, 玉华 (xiaoyuhua) 2016-01-07 17:34:53

审核人：童, 晓密 (tongxiaomi) 2016-01-07 17:29:18

批准人：黄, 玉平 (huangyuping) 2016-01-08 14:30:45

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# SE-1200 Series

Electrocardiograph

Version 2.1

## User Manual

## About this Manual

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## Statement

This manual will help you understand the operation and maintenance of the product better. It is reminded that the product shall be used strictly complying with this manual. User's operation failing to comply with this manual may result in malfunction or accident for which EDAN INSTRUMENTS, INC. (hereinafter called EDAN) cannot be held liable.

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EDAN holds the rights to modify, update, and ultimately explain this manual.

## Product Information

**Product Name:** Electrocardiograph

**Model:** SE-1200, SE-1200 Express

## Responsibility of the Manufacturer

EDAN only considers itself responsible for any effect on safety, reliability and performance of the equipment if:

Assembly operations, extensions, re-adjustments, modifications or repairs are carried out by

persons authorized by EDAN, and

The electrical installation of the relevant room complies with national standards, and

The instrument is used in accordance with the instructions for use.

Upon request, EDAN may provide, with compensation, necessary circuit diagrams, and other information to help qualified technician to maintain and repair some parts, which EDAN may define as user serviceable.

## Terms Used in this Manual

This guide is designed to give key concepts on safety precautions.

### **WARNING**

A **WARNING** label advises against certain actions or situations that could result in personal injury or death.

### **CAUTION**

A **CAUTION** label advises against actions or situations that could damage equipment, produce inaccurate data, or invalidate a procedure.

### **NOTE**

A **NOTE** provides useful information regarding a function or a procedure.

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## Chapter 1 Safety Guidance

This chapter provides important safety information related to the use of SE-1200 series electrocardiograph.

### 1.1 Indications for Use/Intended Use

The intended use of SE-1200 series electrocardiograph is to acquire ECG signals from adult and pediatric patients through body surface ECG electrodes. The electrocardiograph is only intended to be used in hospitals or healthcare facilities by doctors and trained healthcare professionals. The cardiogram recorded by the electrocardiograph can help users to analyze and diagnose heart disease. However, the interpreted ECG with measurements and interpretive statements is offered to clinicians on an advisory basis only.

#### **WARNING**

1. This equipment is not designed for intracardiac use or direct cardiac application.
2. This equipment is not intended for home use.
3. This equipment is not intended for treatment or monitoring.
4. This equipment is intended for use on adult and pediatric patients only.
5. The results given by the equipment should be examined based on the overall clinical condition of the patient, and they cannot substitute for regular checking.

### 1.2 Warnings and Cautions

In order to use the electrocardiograph safely and effectively, and avoid possible dangers caused by improper operation, please read through the user manual and be sure to be familiar with all functions of the equipment and proper operation procedures before use.

Please pay more attention to the following warning and caution information.

## 1.2.1 Safety Warnings

### **WARNING**

1. The electrocardiograph is intended to be used by qualified physicians or personnel professionally trained. They should be familiar with the contents of this user manual before operation.
2. Only qualified service engineers can install this equipment, and only service engineers authorized by the manufacturer can open the shell. Otherwise, safety hazards may happen.
3. **EXPLOSION HAZARD** - Do not use the electrocardiograph in the presence of flammable anesthetic mixtures with oxygen or other flammable agents.
4. **SHOCK HAZARD** - The power receptacle must be a hospital grade grounded outlet. Never try to adapt the three-prong plug to fit a two-slot outlet. This equipment must only be connected to a supply mains with protective earth
5. Make sure that the power is turned off and the power cord is disconnected from the AC socket before connecting or disconnecting equipment. Otherwise, electrical shock or other injuries may happen to the patient or operator.
6. If the integrity of the external protective conductor is in doubt, the equipment should be powered by an internal li-ion rechargeable battery.
7. Do not use this equipment in the presence of high static electricity or high voltage equipment which may generate sparks.
8. Only the patient cable and other accessories supplied by the manufacturer can be used. Or else, the performance and electric shock protection cannot be guaranteed.
9. The use of patient cable and other accessories not supplied by the manufacturer may result in increased emissions or decreased immunity of the equipment.
10. The electrocardiograph has been safety tested with the recommended accessories, peripherals, and leads, and no hazard is found when the electrocardiograph is operated with cardiac pacemakers or other stimulators.
11. Make sure that all electrodes are connected to the patient correctly before operation.
12. Ensure that the conductive parts of electrodes and associated connectors, including neutral electrodes, do not come in contact with earth or any other conducting objects.

### **WARNING**

13. If reusable electrodes with electrode gel are used during defibrillation, the electrocardiograph recovery will take more than 10 seconds. The manufacturer recommends the use of disposable electrodes at all times.
14. Electrodes of dissimilar metals should not be used; otherwise it may cause a high polarization voltage.
15. The disposable electrodes can only be used for one time.
16. Do not touch the patient, bed, table or the equipment while using the ECG together with a defibrillator.
17. Do not touch accessible parts of non-medical electrical equipment and the patient simultaneously.
18. Do not touch the signal input or output connector and the patient simultaneously.
19. The use of equipment that applies high frequency voltages to the patient (including electrosurgical equipment and some respiration transducers) is not supported and may produce undesired results. Disconnect the patient data cable from the electrocardiograph, or detach the leads from the patient prior to performing any procedure that uses high frequency surgical equipment.
20. If WIFI technology is used, in order to maintain compliance with the FCC RF exposure guidelines, WIFI should be installed and operated with a minimum distance of 20cm between the radiator and the human body. There should be no shield in or around the room where WIFI is used.
21. Fix attention on the examination to avoid missing important ECG waves.
22. **SHOCK HAZARD** - Don't connect non-medical electrical equipment, which has been supplied as a part of the system, directly to the wall outlet when the non-medical equipment is intended to be supplied by a multiple portable socket-outlet with an isolation transformer.
23. **SHOCK HAZARD** - Don't connect electrical equipment, which has not been supplied as a part of the system, to the multiple portable socket-outlet supplying the system.
24. Do not connect any equipment or accessories that are not approved by the manufacturer or that are not IEC/EN 60601-1-1 approved to the electrocardiograph. The operation or use of non-approved equipment or accessories with the electrocardiograph is not tested or supported, and electrocardiograph operation and safety are not guaranteed.

### **WARNING**

25. Any non-medical equipment (such as the external printer) is not allowed to be used within the patient vicinity (1.5m/6ft.).
26. Do not exceed the maximum permitted load when using the multiple portable socket-outlet(s) to supply the system.
27. Multiple portable socket-outlets shall not be placed on the floor.
28. Do not use the additional multiple portable socket-outlet or extension cord in the medical electrical system, unless it's specified as part of the system by manufacturer. And the multiple portable socket-outlets provided with the system shall only be used for supplying power to equipment which is intended to form part of the system.
29. Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore all configurations shall comply with the valid version of the standard IEC/EN 60601-1-1. Therefore anybody, who connects additional equipment to the signal input or output connector to configure a medical system, must make sure that it complies with the requirements of the valid version of the system standard IEC/EN 60601-1-1. If in doubt, consult our technical service department or your local distributor.
30. Connecting any accessory (such as external printer) or other device (such as the computer) to this electrocardiograph makes a medical system. In that case, additional safety measures should be taken during installation of the system, and the system shall provide:
  - a) Within the patient environment, a level of safety comparable to that provided by medical electrical equipment complying with IEC/EN 60601-1, and
  - b) Outside the patient environment, the level of safety appropriate for non-medical electrical equipment complying with other IEC or ISO safety standards.
31. All the accessories connected to system must be installed outside the patient vicinity, if they do not meet the requirement of IEC/EN 60601-1.
32. You should purchase computer, printer, treadmill, ergometer and BP monitor from the manufacturer. Otherwise, the manufacturer will not be held responsible for the maintenance of the PC hardware, operating system and other accessories.

### **WARNING**

33. If multiple instruments are connected to a patient, the sum of the leakage currents may exceed the limits given in the IEC/EN 60601-1 and may pose a safety hazard. Consult your service personnel.
34. The potential equalization bar can be connected to that of other equipment when necessary. Make sure that all the equipment is connected to the potential equalization terminal.
35. The electrocardiograph shall not be serviced or maintained while in use with a patient.
36. The appliance coupler or mains plug is used as isolation means from supply mains. Position the electrocardiograph in a location where the operator can easily access the disconnection device.
37. The medical electrical equipment needs to be installed and put into service according to Appendix 2 EMC Information.
38. The equipment should not be used adjacent to or stacked with other equipment, refer to the recommended separation distances provided in Appendix 2 EMC Information.
39. Portable and mobile RF communications equipment can affect medical electrical equipment, refer to the recommended separation distances provided in Appendix 2 EMC Information.
40. Assembly of the electrocardiograph and modifications during actual service life shall be evaluated based on the requirements of IEC60601-1.

## **1.2.2 Li-ion Battery Care Warnings**

### **WARNING**

1. Improper operation may cause the internal li-ion battery (hereinafter called battery) to be hot, ignited or exploded, and it may lead to the decrease of the battery capacity. It is necessary to read the user manual carefully and pay more attention to warning messages.
2. Only qualified service engineers authorized by the manufacturer can open the battery compartment and replace the battery, and batteries of the same model and specification as manufacturer configuration should be used.

### **WARNING**

3. **DANGER OF EXPLOSION** -- Do not reverse the anode and the cathode when installing the battery.
4. Do not heat or splash the battery or throw it into fire or water.
5. Do not destroy the battery; Do not pierce battery with a sharp object such as a needle; Do not hit with a hammer, step on or throw or drop to cause strong shock; Do not disassemble or modify the battery.
6. When leakage or foul smell is found, stop using the battery immediately. If your skin or cloth comes into contact with the leakage liquid, cleanse it with clean water at once. If the leakage liquid splashes into your eyes, do not wipe them. Irrigate them with clean water first and go to see a doctor immediately.
7. Properly dispose of or recycle the depleted battery according to local regulations.
8. Only when the device is off can the battery be installed or removed.
9. Remove the battery from the electrocardiograph when the electrocardiograph isn't used for a long time.
10. If the battery is stored alone and not used for a long time, we recommend that the battery be charged at least once every 6 months to prevent overdischarge.

## **1.2.3 General Cautions**








### **CAUTION**







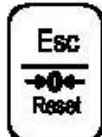






1. Federal (U.S.) law restricts this device to sale by or on the order of a physician.
2. Avoid liquid splash and excessive temperature. The temperature must be kept between 5 °C and 40 °C during operation, and it should be kept between -20 °C and 55 °C during transportation and storage.
3. Do not use the equipment in a dusty environment with bad ventilation or in the presence of corrosive.
4. Make sure that there is no intense electromagnetic interference source around the equipment, such as radio transmitters or mobile phones etc. Attention: large medical electrical equipment such as electrosurgical equipment, radiological equipment and magnetic resonance imaging equipment etc. is likely to bring electromagnetic interference.

### **CAUTION**

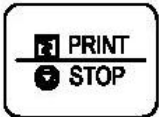

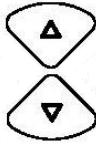
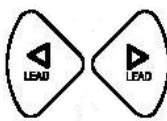








5. Ruptured fuse must only be replaced with that of the same type and rating as the original.
6. The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal. Batteries are hazardous waste. Do NOT dispose of them together with house-hold garbage. At the end of their lives hand the batteries over to the applicable collection points for the recycling of waste batteries. For more detailed information about recycling of this product or battery, please contact your local Civic Office, or the shop where you purchased the product.






## **1.3 List of Symbols**

No.	Symbol	Description
1		Output
2		Input
3		DEFIBRILLATION-PROOF TYPE CF APPLIED PART
4		Attention, consult ACCOMPANYING DOCUMENTS
5		Operating instructions
6		Equipotential grounding
7	PATIENT	Patient Cable Socket
8		USB socket

9		Net port
10		Alternating Current
11		Battery check
12		Battery recharging indicator
13		Delete key
14		Enter key
15		Esc key/Reset key
16		Shift key
17		Fn key
18		Power On/Off key
19		1mV/COPY key
20		MODE key
21		SLEEP/WAKE UP key



22		PRINT/STOP key
23		Tab key/Feed paper key
24		UP/DOWN Arrow key
25		LEFT/RIGHT Arrow key / Lead switch key
26		Gender key
27		Age Group key
28		General symbol for recovery/recyclable
29	P/N	Part Number
30		SERIAL NUMBER
31		Date of manufacture
32		MANUFACTURER
33		AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY
34		CE marking

35*		With respect to electrical shock, fire and mechanical hazards only in accordance with UL 60601-1 and CAN/CSA C22.2 No. 601.1
36	<b>Rx Only</b>	Caution: Federal (U.S.) law restricts this device to sale by or on the order of a physician.
37		Disposal method
38		Refer to User Manual (Background: Blue; Symbol: White)
39		Warning (Background: Yellow; Symbol&Outline: Black)
40		Non- ionizing electromagnetic radiation

**NOTE:**

1. \*The UL mark is optional.
2. The user manual is printed in black and white.

## Chapter 2 Introduction

SE-1200 series electrocardiograph gathers ECG signals of 12 leads simultaneously. It displays the operation menu, ECG parameters as well as electrocardiograms.

The 12-channel ECG waves can be viewed on the LCD screen and printed out by using a high-quality thermal recorder. The sampled ECG data can be saved, transmitted and exported.

The manual, auto, rhythm, R-R analysis or VCG (only configurable for SE-1200 Express) mode can be chosen freely.

SE-1200 series electrocardiograph can be powered by the mains supply or battery.

With a high resolution thermal recorder, a 32-bit processor and a large-capacity memorizer, SE-1200 series electrocardiograph has advanced performance and high reliability. The compact size makes it suitable for clinic and hospital uses.

SE-1200 series electrocardiograph has two models: SE-1200 and SE-1200 Express.

SE-1200 adopts 320×240 dot single color LCD screen; SE-1200 Express adopts 800×600 multicolor LCD screen.

**Configuration:** main unit, power cord, patient cable, chest electrodes, limb electrodes, disposable electrodes, alligator clips, thermal recorder paper, fuses, battery.

**NOTE:** The pictures and windows in this manual are for reference only.

### 2.1 Top Panel

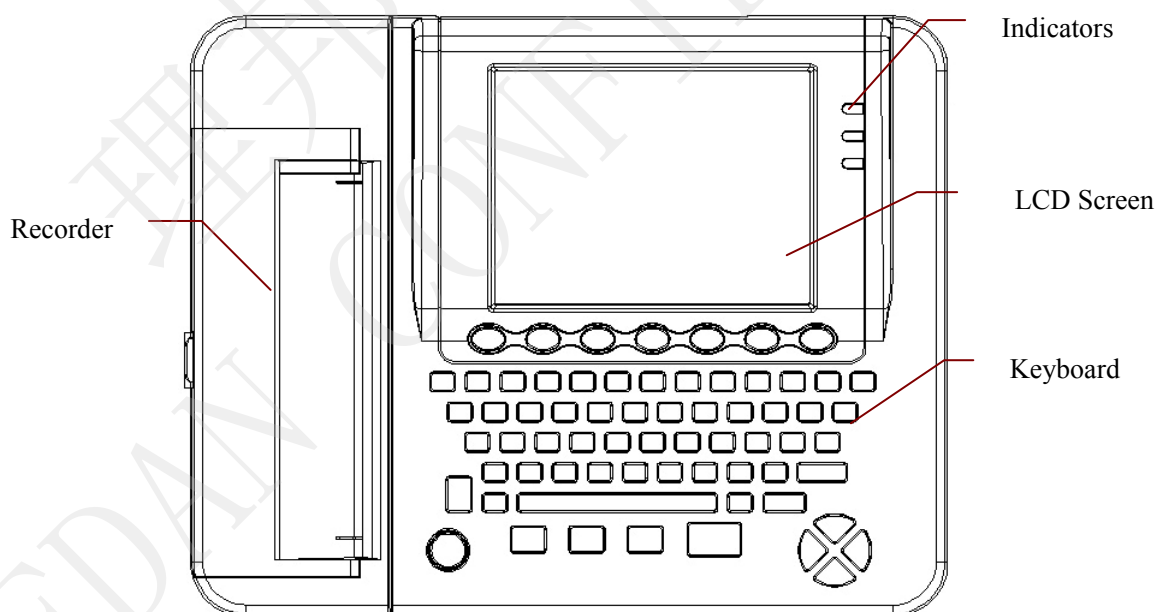


Figure 2-1 SE-1200 Express

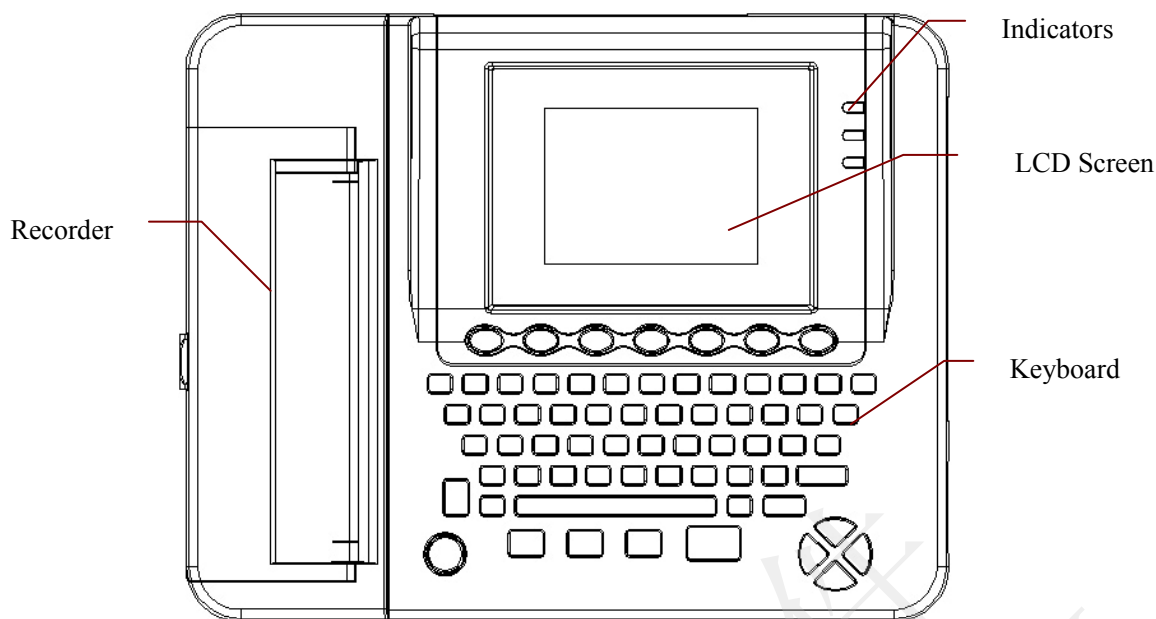


Figure 2-2 SE-1200

## 2.2 Keyboard and Keys

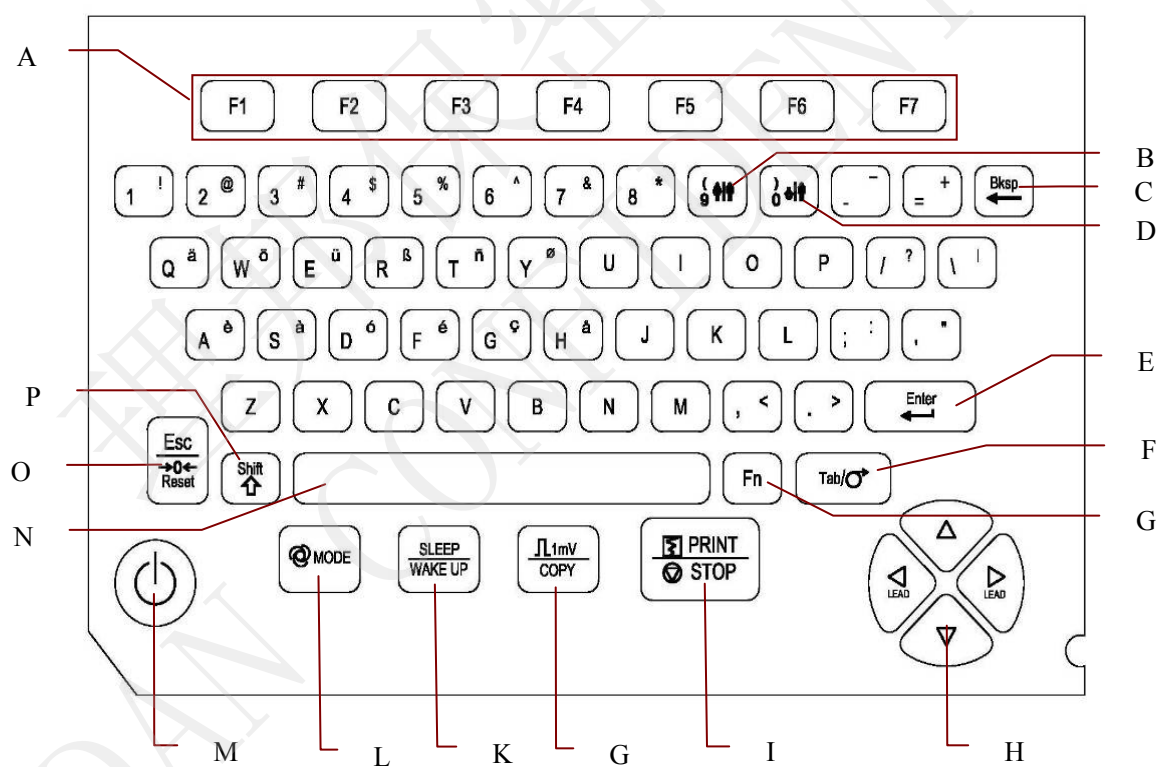


Figure 2-3 SE-1200 Express/SE-1200 Keyboard

	Name	Explanation
A	Function Key	Press to select menu functions on the screen.
B	Gender Key	Press to quickly select the gender for the patient when <b>Gender</b> is selected in the <b>Patient Information Setup</b> window.
C	Delete Key	Press to delete characters.
D	Age Group Key	Press to quickly select the age group on the main screen when you set <b>Age</b> to <b>Age Group</b> in the <b>Patient Information Setup</b> window.
E	Enter	Press to confirm operation.
F	Tab/Feed paper	Press to move the cursor: Pressing <b>Tab</b> can move the cursor forward, and pressing <b>Shift + Tab</b> can move the cursor backward. Press to feed paper: If <b>Paper Marker</b> is set to <b>Yes</b> , pressing <b>Tab</b> can advance the recorder paper to the next black marker; if <b>Paper Marker</b> is set to <b>No</b> , pressing <b>Tab</b> can advance the paper for 2.5cm. Pressing <b>Tab</b> again can stop advancing the paper.
G	Fn	Press <b>Fn</b> and a letter key to type special characters. Pressing <b>Fn + a</b> can type è.
H	Arrow Keys	Press to move the cursor (Up, Down, Left, Right) In the manual mode or on the previewing screen, press the Left or Right arrow to switch the lead groups. Pressing <b>Shift + Up/Down</b> can turn pages on the <b>Order Manager</b> screen and the <b>File Manager</b> screen.
I	PRINT/STOP	Press to start or stop printing reports Pressing <b>Shift + PRINT/STOP</b> can quickly enable or disable the print out function in the auto or rhythm mode.
J	1mV/COPY	In the manual mode, pressing the <b>1mV/COPY</b> key can insert a 1mV calibration mark during the printing course. In the auto, rhythm or VCG (only configurable for SE-1200 Express) mode, pressing the <b>1mV/COPY</b> key can print the ECG report which was printed out last time.
K	SLEEP/WAKE UP	Press to rest/waken the electrocardiograph

L	MODE	Press to select a working mode among the auto, manual, rhythm, R-R analysis and VCG (only configurable for SE-1200 Express) modes. <b>NOTE:</b> Only if a working mode is selected in the <b>Work Mode Setup</b> window, can the working mode be selected by pressing the <b>MODE</b> key when the main screen is displayed.
M	Power On/Off	Power-on/Power-off
N	Spacebar	Press to add a space between typed characters or select/deselect a checkbox
O	Esc/Reset	Press to cancel operation <b>NOTE:</b> A large polarization voltage may cause baseline drift. On the main screen, pressing <b>Esc</b> can decrease the polarization voltage and draw the baseline to zero quickly.
P	Shift	Press <b>Shift</b> + <b>Tab</b> to move the cursor backward. Press <b>Shift</b> and a number key to input the special character in the top right corner of the key. If <b>Caps Lock</b> is set to <b>Off</b> , pressing <b>Shift</b> + <b>P</b> can type a capital <b>P</b> . If <b>Caps Lock</b> is set to <b>On</b> , pressing <b>Shift</b> + <b>P</b> can type a lowercase <b>p</b> .

## 2.3 Front Panel

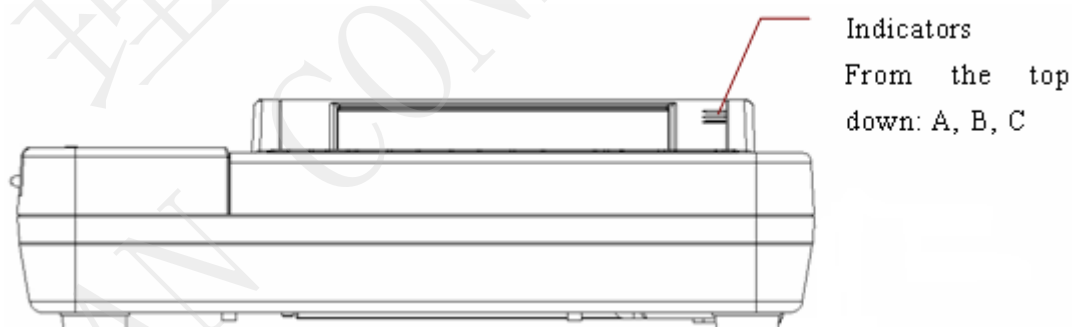


Figure 2-4 SE-1200 Express Front Panel

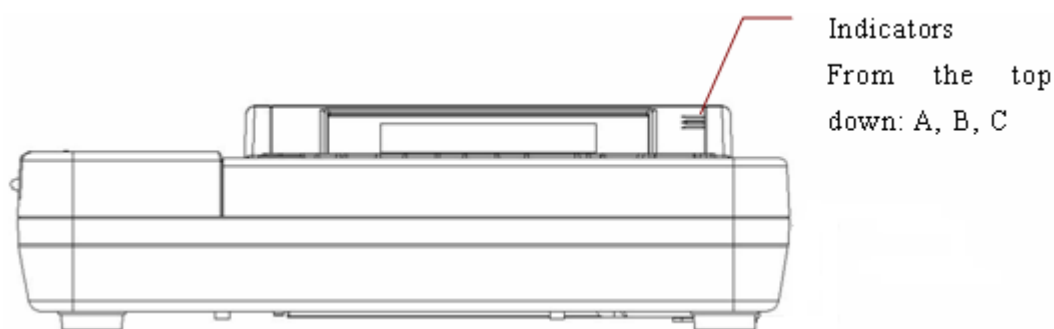


Figure 2-5 SE-1200 Front Panel

	Symbol	Name	Explanation
A	~	Mains supply indicator	When the device is powered by the mains supply, this indicator is lit.
B		Battery indicator	When the device is powered by battery, this indicator is lit.
C		Battery recharging indicator	When the battery is being recharged, this indicator is lit.

## 2.4 Rear Panel

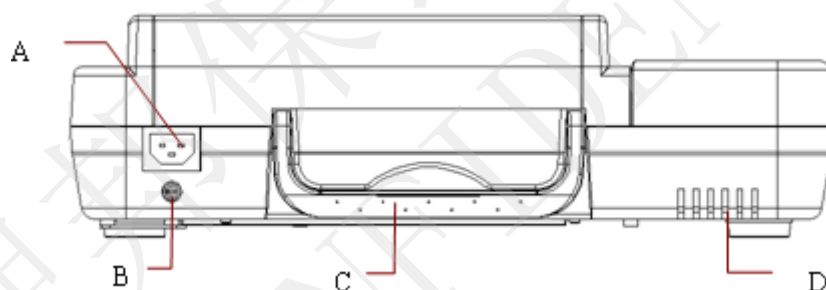


Figure 2-6 SE-1200/SE-1200 Express Rear Panel

	Name	Explanation
A	Mains Supply Socket	~ AC SOURCE: alternating current supply socket
B	Potential Equalization Conductor	Potential equalization conductor provides a connection between the unit and the potential equalization bus bar of the electrical installation.
C	Handle	Part for people to hold
D	Heat Emission Hole	Path for internal heat emission

## 2.5 Right Panel

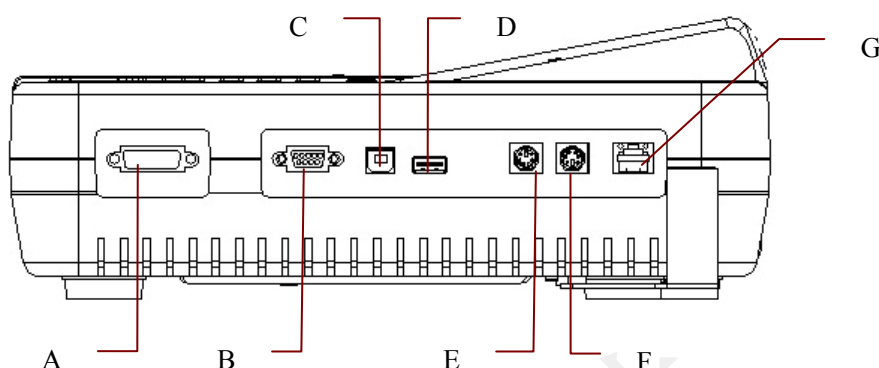
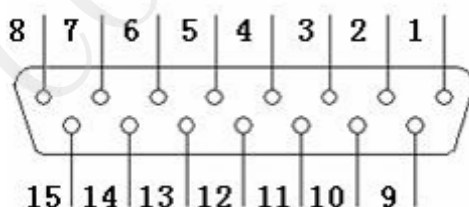


Figure 2-7 SE-1200 Express/SE-1200 Right Panel

	Name	Explanation
A	Patient Cable Socket	Connecting to the patient cable
B	Serial Port 1	Connecting to a PC
C	USB Socket 1 (Optional)	Standard USB socket, connecting to a PC
D	USB Socket 2 (Optional)	Standard USB socket, connecting to a U disk, a bar code reader or a USB printer recommended by the manufacturer
E	External Input / Output Socket	Connecting to the external signal device
F	Serial Port 2	Reserved
G	Net port	Standard net port, connecting to a PC

### 1) Patient Cable Socket



: DEFIBRILLATION-PROOF TYPE CF APPLIED PART



: Attention, consult ACCOMPANYING DOCUMENTS



Definitions of corresponding pins:

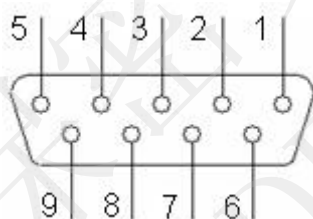
Pin	Signal	Pin	Signal	Pin	Signal
1	C2 / V2	6	SH	11	F / LL
2	C3 / V3	7	NC	12	C1 / V1 or NC
3	C4 / V4	8	NC	13	C1 / V1
4	C5 / V5	9	R / RA	14	RF (N) / RL or NC
5	C6 / V6	10	L / LA	15	RF (N) / RL

**NOTE:** The left side of “/” is European standard, and the right side is American standard.

## 2) Serial Port 1

### **WARNING**

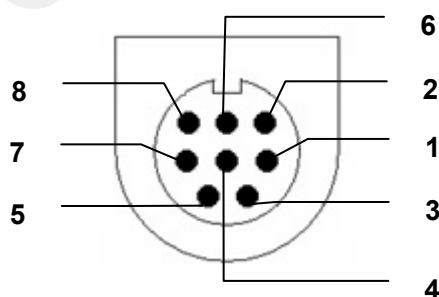
The isolated intensity of serial port 1 is 1500V AC and the maximum voltage applied should not exceed +15V DC.



Definitions of corresponding pins:

Pin	Signal	Pin	Signal	Pin	Signal
1	NC	4	NC	7	NC
2	RxD (input)	5	GND	8	NC
3	TxD (output)	6	NC	9	NC

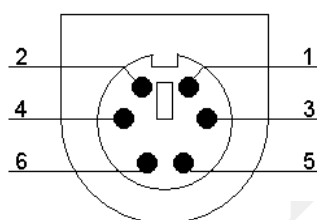
## 3) Serial Port 2



Definitions of corresponding pins:

Pin	Signal	Pin	Signal
1	TxD (output)	5	NC
2	RxD (input)	6	NC
3	NC	7	GND
4	NC	8	GND

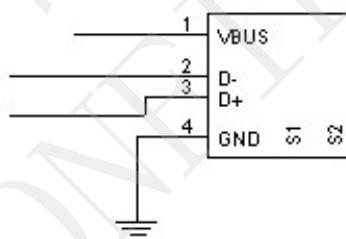
#### 4) External Input/Output Socket



Definitions of corresponding pins:

Pin	Signal	Pin	Signal
1	GND	4	GND
2	GND	5	ECG Signal (input)
3	GND	6	ECG Signal (output)

#### 5) USB Socket 1/USB Socket 2 (Optional)



### CAUTION

Only the USB equipment recommended by the manufacturer can be connected to the USB interface.

Definitions of corresponding pins:

Pin	Signal	Pin	Signal
1	+5V	3	D+
2	D-	4	GND

### **WARNING**

1. Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore all configurations shall comply with the valid version of the standard IEC/EN 60601-1-1. Therefore anybody, who connects additional equipment to the signal input or output connector to configure a medical system, must make sure that it complies with the requirements of the valid version of the system standard IEC/EN 60601-1-1. If in doubt, consult our technical service department or your local distributor.
2. If multiple instruments are connected to a patient, the sum of the leakage currents may exceed the limits given in the IEC/EN 60601-1 and may pose a safety hazard. Consult your service personnel.

## **2.6 Bottom Panel**

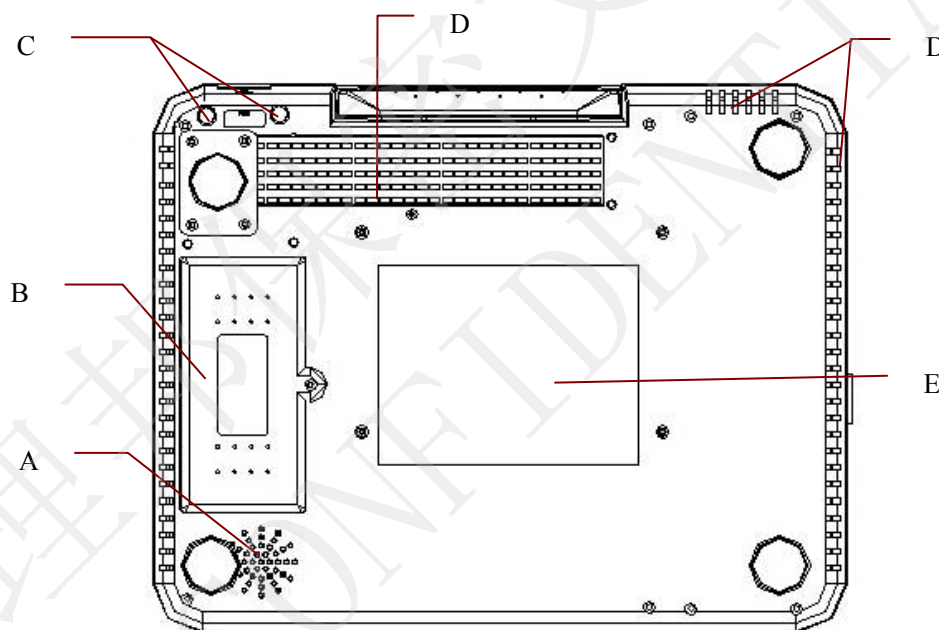


Figure 2-8 SE-1200 Express/SE-1200 Bottom Panel

	Name	Explanation
A	Speaker Hole	Path for sound from speaker
B	Battery Compartment	Compartment for battery
C	Fuse	The specification is: T3.15AH250V, Ø5×20mm; T1AL250VP, Ø5×20mm (for UL device)
D	Heat Emission Hole	Path for internal heat emission

E	Label	Position for product information label
---	-------	--

## 1) Battery Compartment

The rated voltage and the rated capacity of the battery pack are as follows:

**SE-1200 Express:** Rated Voltage: 14.8V; Rated Capacity: 2500mAh or 5000mAh

**SE-1200:** Rated Voltage: 14.8V; Rated Capacity: 2500mAh

### **WARNING**

1. Improper operation may cause the battery to be hot, ignited or exploded, and it may lead to the decrease of the battery capacity. Therefore, it is necessary to read the user manual carefully and pay more attention to warning messages.
2. When leakage or foul smell is found, stop using the battery immediately. If your skin or cloth comes into contact with the leakage liquid, cleanse it with clean water at once. If the leakage liquid splashes into your eyes, do not wipe them. Irrigate them with clean water first and go to see a doctor immediately.
3. Only qualified service engineers authorized by the manufacturer can open the battery compartment and replace the battery, and batteries of the same model and specification must be used.
4. Only when the device is off can the battery be installed or removed.

**NOTE:** If the battery has not been used for two months or more, you should recharge it before using it again.

## 2) Fuse

There are two fuses of the same specification installed on the bottom of the main unit.

### **WARNING**

Ruptured fuses must only be replaced with those of the same type and rating as the original.

## 2.7 Features

- ◆ Supporting AC and DC power supply modes, internal rechargeable li-ion battery with professional battery powered circuit, battery management and protection systems
- ◆ Supporting multi-language
- ◆ Full alphanumeric keyboard (For SE-1200 Express, touch screen is available)
- ◆ ECG signals of 12 leads are gathered and amplified simultaneously, 12-channel waves

are displayed and recorded simultaneously

- ◆ Correct detection for failure electrodes
- ◆ Convenient operation of recording by pressing the **PRINT/STOP** key with high efficiency
- ◆ High resolution thermal recorder, recording frequency response  $\leq 150\text{Hz}$
- ◆ Supporting external USB printer
- ◆ Supporting accurate digital filter to decrease the polarization voltage and other interferences
- ◆ Supporting rolled and folded paper recorded with high resolution waveforms, calibration mark, gain, speed and filter
- ◆ The auto, manual, rhythm, R-R analysis and VCG (only configurable for SE-1200 Express) modes can be chosen freely
- ◆ Flexible printing formats
- ◆ Supporting ECG waves displaying with grid
- ◆ Automatic baseline adjustment for optimal printing
- ◆ Convenient operation of system setup and file management
- ◆ Multiple file formats: DAT V1.03, DAT, PDF and optional formats (SCP/FDA-XML/DICOM)
- ◆ Measurement function and interpretation function
- ◆ Supporting bar code reader
- ◆ ECG data can be transmitted to the PC software through the serial cable, net cable, or WIFI (optional)
- ◆ Real-time transmission to ECG data management software
- ◆ Supporting order function
- ◆ Supporting USB Socket forbidden which can enhance the secrecy of ECG data and avoid the spread of virus via USB socket
- ◆ Supporting QTcFm and QTcFm formulae

## Chapter 3 Operation Preparations

### **WARNING**

Before use, the equipment, patient cable and electrodes should be checked. Replace them if there is any evident defectiveness or aging which may impair the safety or the performance, and make sure that the equipment is in proper working condition.

### 3.1 Connecting the Patient Cable to the Electrocardiograph and Electrodes

### **WARNING**

The performance and electric shock protection can be guaranteed only if the original patient cable and electrodes of the manufacturer are used.

The patient cable includes the main cable and lead wires which can be connected to electrodes.



#### 3.1.1 Connecting the Patient Cable to the Electrocardiograph

Connect the patient cable to the patient cable socket on the right side of the main unit, and then secure them with two screws.

#### 3.1.2 Connecting the Patient Cable to Electrodes

Align all lead wires of the patient cable to avoid twisting, and connect the lead wires to the reusable electrodes or the alligator clips. Firmly attach them.

The identifiers and color codes of electrode connectors used comply with IEC/EN requirements. In order to avoid incorrect connection, the identifiers and color codes are specified in Table 3-1. Moreover the equivalent codes according to AHA requirements are given in Table 3-1 too.

Table 3-1 Electrode Connectors and Their Identifiers and Color Codes

Electrode Connectors	IEC		AHA	
	Identifier	Color Code	Identifier	Color Code
Right arm/Right deltoid	R	Red	RA	White
Left arm/Left deltoid	L	Yellow	LA	Black
Right leg/Upper leg as close to torso as possible	N or RF	Black	RL	Green
Left leg/Upper leg as close to torso as possible	F	Green	LL	Red
Chest 1	C1	White/Red	V1	Brown/Red
Chest 2	C2	White/Yellow	V2	Brown/Yellow
Chest 3	C3	White/Green	V3	Brown/Green
Chest 4	C4	White/Brown	V4	Brown/Blue
Chest 5	C5	White/Black	V5	Brown/Orange
Chest 6	C6	White/Violet	V6	Brown/Violet

## 3.2 Preparing the Patient

### 3.2.1 Instructing the Patient

Before attaching the electrodes, greet the patient and explain the procedure. Explaining the procedure decreases the patient's anxiety. Reassure the patient that the procedure is painless. Privacy is important for relaxation. When possible, prepare the patient in a quiet room or area where others can't see the patient. Make sure that the patient is comfortable. The more relaxed the patient is, the less the ECG will be affected by noise.

### 3.2.2 Preparing the Skin

Thorough skin preparation is very important. The skin is a poor conductor of electricity and frequently creates artifacts that distort the ECG signals. By performing methodical skin preparation, you can greatly reduce the possibility of noise caused by muscle tremor and baseline drift, ensuring high-quality ECG waves. There is natural resistance on the skin surface due to dry, dead epidermal cells, oils and dirt.

## To Prepare the Skin

Shave hair from electrode sites, if necessary. Excessive hair prevents a good connection.

Wash the area thoroughly with soap and water.

Dry the skin with a gauze pad to increase capillary blood flow to the tissues and to remove the dead, dry skin cells and oils.

## 3.3 Attaching Electrodes to the Patient

Two kinds of electrode can be used, one is the reusable electrode (including chest electrodes and limb electrodes), and the other is the disposable electrode.

### **WARNING**

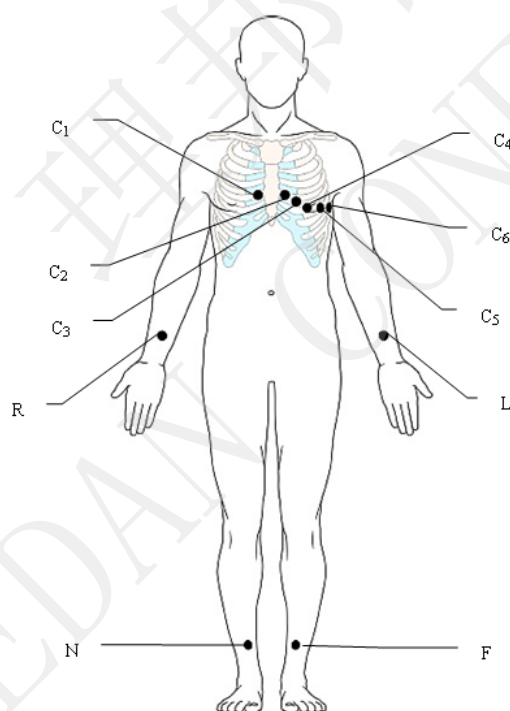
1. Make sure that all electrodes are connected to the patient correctly before operation.
2. Ensure that the conductive parts of electrodes and associated connectors, including neutral electrodes, do not come in contact with earth or any other conducting objects.

**NOTE:** The quality of ECG waveform will be affected by the contact resistance between the patient and the electrode. In order to get a high-quality ECG, the skin-electrode resistance must be minimized while connecting electrodes.

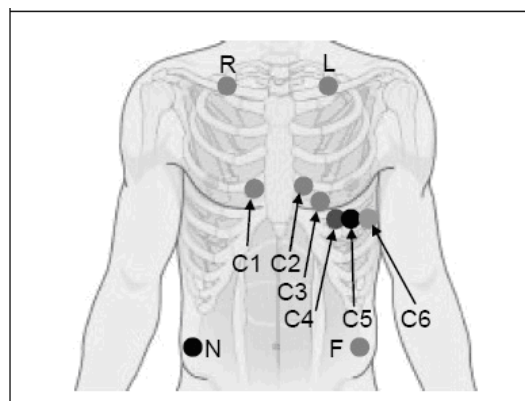
### 3.3.1 Electrode Placement

The electrodes' positions on the body surface are shown in the following table and figure.

#### Standard 12-Lead Placement



Only for the Reusable Electrodes

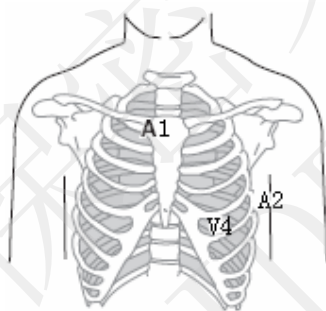


Only for the Disposable Electrodes



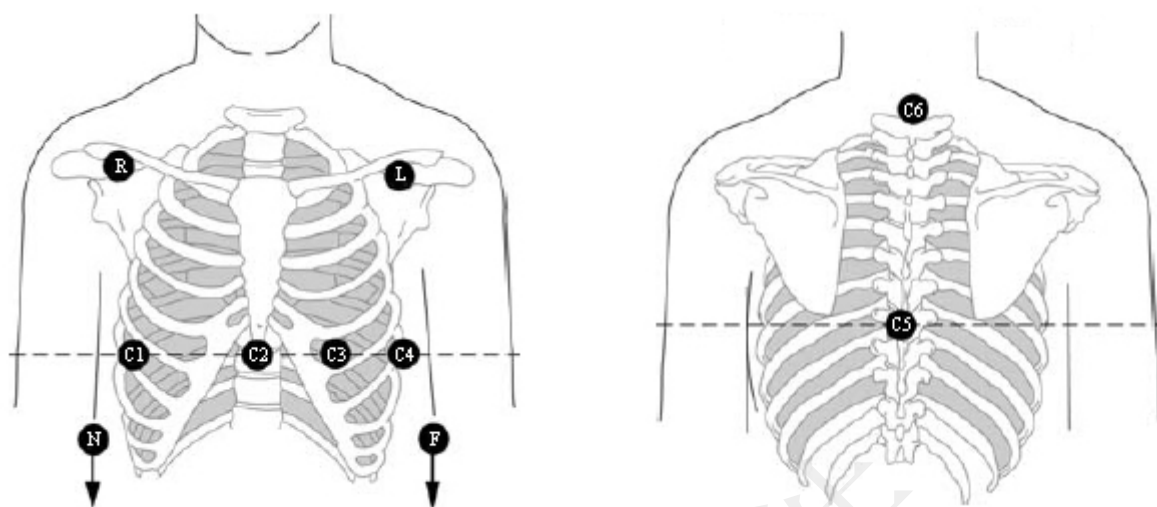
IEC	AHA	Electrode Placement
C1	V1	Fourth intercostal space at the right border of the sternum
C2	V2	Fourth intercostal space at the left border of the sternum
C3	V3	Fifth rib between C2 and C4
C4	V4	Fifth intercostal space on the left midclavicular line
C5	V5	Left anterior axillary line at the horizontal level of C4
C6	V6	Left midaxillary line at the horizontal level of C4
L	LA	Left arm/Left deltoid
R	RA	Right arm/Right deltoid
F	LL	Left leg/Upper leg as close to torso as possible
N	RL	Right leg/Upper leg as close to torso as possible

#### NEHB Placement



IEC	AHA	Electrode Placement
N <sub>st</sub>	A1	Attachment point of the second rib to the right sternal edge
N <sub>ax</sub>	A2	Fifth intercostal space on the left posterior axillary line
N <sub>ap</sub>	V4	Left mid-clavicular line in the fifth intercostal space
R	RA	Right arm
L	LA	Left arm
N or RF	RL	Right leg
F	LL	Left leg

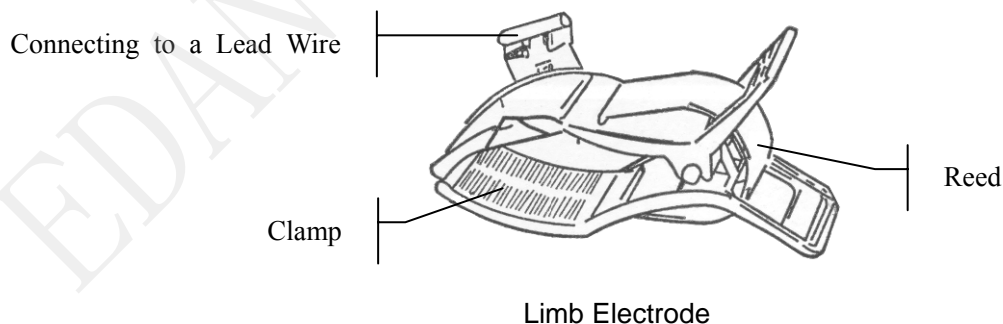
## Frank Lead Placement (for VCG)

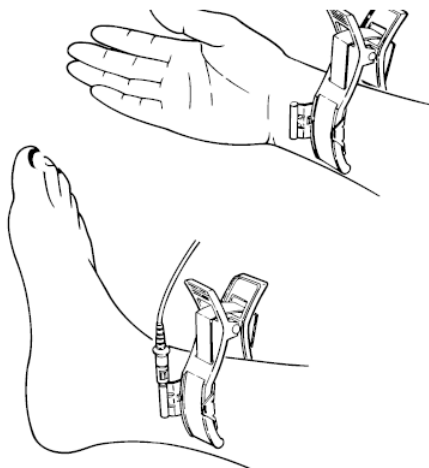


IEC	AHA	Electrode Placement
C1	V1	Right mid-axillary line on the same horizontal level as C3 and C4
C2	V2	Sternum at the level of C3 and C4
C3	V3	Mid-clavicular line in the fifth intercostals space
C4	V4	Left mid-axillary line on the same horizontal level as C3
C5	V5	Center of spine on the same horizontal level as C3 and C4
C6	V6	Neck, avoid carotid artery and jugular vein
L	LA	Left arm/Left deltoid
R	RA	Right arm/Right deltoid
F	LL	Left leg/Upper leg as close to torso as possible
N	RL	Right leg/Upper leg as close to torso as possible

## 3.3.2 Attaching the Reusable Electrodes

### 3.3.2.1 Attaching the Limb Electrodes

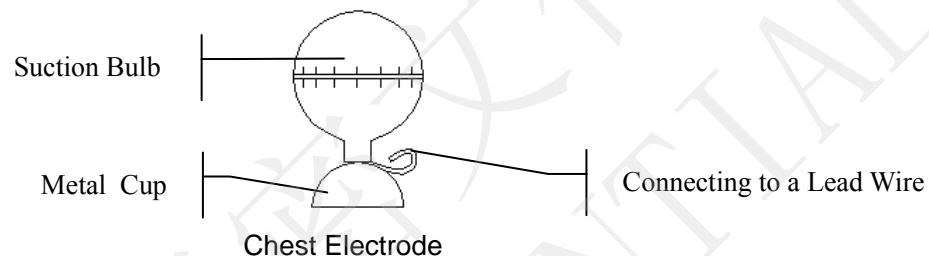




#### Limb Electrode Connection:

- 1) Ensure that the electrodes are clean;
- 2) Clean the electrode area which is a short distance above the ankle or the wrist with 75% alcohol;
- 3) Daub the electrode area on the limb with gel evenly;
- 4) Place a small amount of gel on the metal part of the limb electrode clamp;
- 5) Connect the electrode to the limb, and make sure that the metal part is placed on the electrode area above the ankle or the wrist;
- 6) Attach all limb electrodes in the same way.

### 3.3.2.2 Attaching the Chest Electrodes



#### Chest Electrode Connection:

- 1) Ensure that the electrodes are clean;
- 2) Clean the electrode area on the chest surface with 75% alcohol;
- 3) Daub the round area of 25mm in diameter on each electrode site with gel evenly;
- 4) Place a small amount of gel on the brim of the chest electrode's metal cup;
- 5) Place the electrode on the chest electrode site and squeeze the suction bulb. Unclench it and the electrode is adsorbed on the chest;
- 6) Attach all chest electrodes in the same way.

**NOTE:** Long-time measurement with a strong negative pressure on the suction bulb may cause reddening of the skin. When using the electrode on kids or patients with delicate skin, squeeze the suction bulb lightly.

### 3.3.3 Attaching the Disposable Electrodes

#### **CAUTION**

The disposable electrodes can only be used for one time.

#### Disposable Electrode:



#### Alligator Clip:



Disposable electrodes must be used together with alligator clips.

#### Disposable Electrode Connection

- 1) Align all lead wires of the patient cable to avoid twisting, and connect the alligator clips to the lead wires.
- 2) Clean the electrode areas on the body surface with 75% alcohol.
- 3) Attach the disposable electrodes to the electrode positions on the body surface.
- 4) Clip the disposable electrodes with the alligator clips.

The quality of ECG waveform will be affected by the contact resistance between the patient and the electrode. In order to get a high-quality ECG, the skin-electrode resistance must be minimized while connecting electrodes.

### 3.4 Inspection Before Power-On

In order to avoid safety hazards and get good ECG records, the following inspection procedures are recommended before operation.

#### **WARNING**

The electrocardiograph is intended to be used by qualified physicians or personnel professionally trained, and they should be familiar with the contents of this user manual before operation.

**1) Environment:**

- ◆ Make sure that there is no electromagnetic interference source around the equipment, especially large medical electrical equipment such as electrosurgical equipment, radiological equipment, magnetic resonance imaging equipment etc. Turn off these devices when necessary.
- ◆ Keep the examination room warm to avoid muscle tremor voltages in ECG signals caused by cold.

**2) Power Supply:**

- ◆ If the mains supply is used, please check whether the power cord is connected to the unit well. The grounded three-slot outlet should be used.
- ◆ When the battery capacity is low, recharge the battery before use.

**3) Patient Cable:**

- ◆ Make sure that the patient cable is connected to the unit firmly, and keep it far away from the power cord.

**4) Electrodes:**

- ◆ Make sure that all electrodes are connected to lead wires of the patient cable correctly.
- ◆ Ensure that the chest electrodes do not contact with each other.

**5) Patient:**

- ◆ The patient should not come into contact with conducting objects such as earth, metal parts etc.
- ◆ Ensure that the patient is warm and relaxed, and breathes calmly.

## 3.5 Turning On/Off the Electrocardiograph


### **WARNING**

1. If the integrity of the external protective conductor is in doubt, the equipment should be powered by the battery.
2. Potential equalization conductor of the unit should be connected to the potential equalization bus bar of the electrical installation when necessary.

The electrocardiograph can be powered by either the mains supply or the battery.


### To turn on the Electrocardiograph:


- ◆ When operating on AC power

Make sure that the mains supply meets the requirements (refer to A1.4 Power Supply Specifications) before power-on, and then press  on the keyboard to turn on the unit. The mains supply indicator (⌚) is lit, and the logo will be displayed on the LCD screen after self-test.

If the battery is weak when the mains supply is used, it will be recharged automatically at the same time. Both the mains supply indicator (⌚) and the battery recharging indicator (➡□) will be lit.

- ◆ When operating on battery power

Press  on the keyboard to turn on the unit, and then the battery indicator (□■) will be lit and the battery symbol will be displayed. The logo will be displayed on the LCD screen after self-test.


Because of the consumption during the storage and transport course, the battery capacity may not be full. If the symbol  and the hint information *Battery Weak* are displayed, which means the battery capacity is low, please recharge the battery first.

### **CAUTION**


1. If the electrocardiograph is turned off because of low battery capacity or unexpected power failure, the settings or the current ECG report may not be saved.
2. The electrocardiograph cannot print an ECG report when the battery is weak.
3. The use of electrocardiograph accessories (such as barcode reader) will deplete battery power at a faster rate. The battery will require more frequent charging if these accessories are used with the electrocardiograph.

### To turn off the Electrocardiograph:


- ◆ When operating on AC power

Hold down the  key to display the hint *System is shutting down...* on the screen. Then the device will be off a few seconds later. Remove the plug from the outlet.

- ◆ When operating on battery power

Hold down the  key to display the hint *System is shutting down...* on the screen. Then the device will be off a few seconds later.

**NOTE:**

1. When turning off the device, follow the above sequence strictly, or else there may be something wrong on the screen.
2. Do not hold down the  key when the device displays the hint information *System is shutting down...* on the screen.

### 3.6 Loading/Replacing Recorder Paper

Two kinds of recorder paper can be used. One is the folded thermal paper, and the other is the rolled thermal paper.

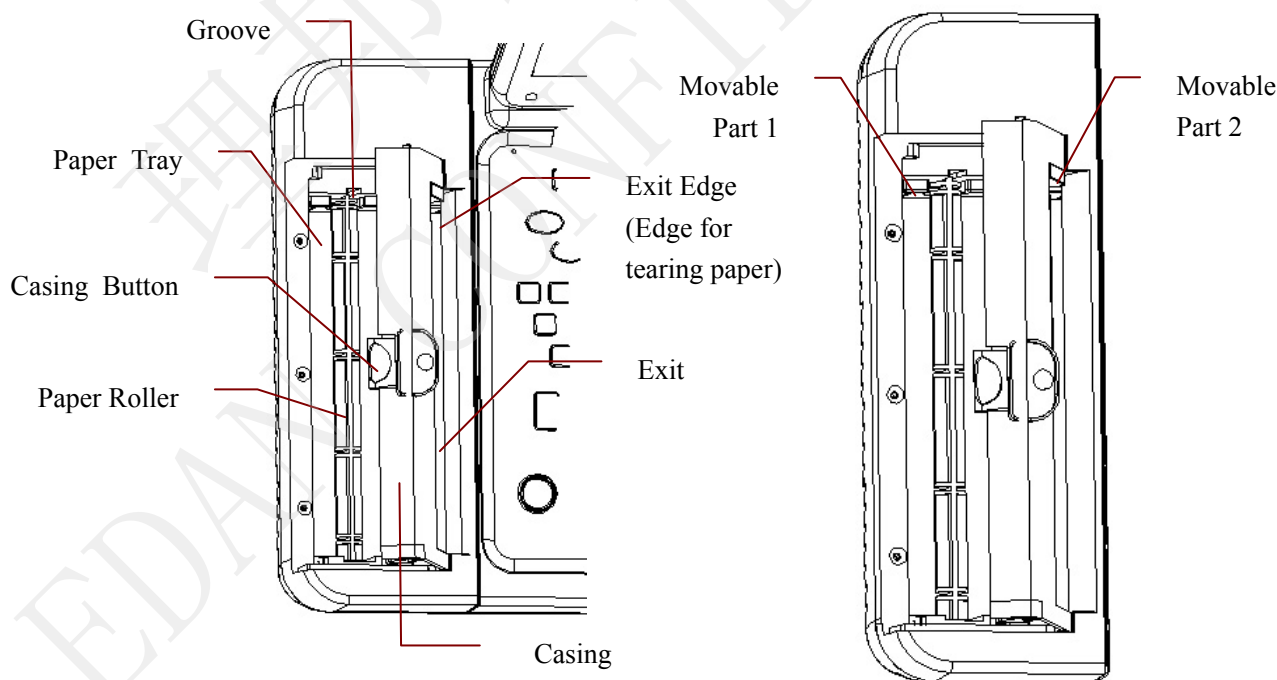
**NOTE:**

1. When the folded thermal paper is used, the paper roller is unnecessary and must be taken out.
2. When using the paper of 216mm in width, the two movable parts should be removed.
3. The exit edge can help you tear the recorder paper.

**CAUTION**

Make sure that the recorder paper, is installed in the center of the recorder, and the paper edge is parallel with the casing edge in the direction of advancing paper, in order to avoid paper deviation or damage to the paper edge.

When the recorder paper runs out or is not loaded, the hint message **No Paper** will appear on the screen. Then you should load or replace the recorder paper immediately.



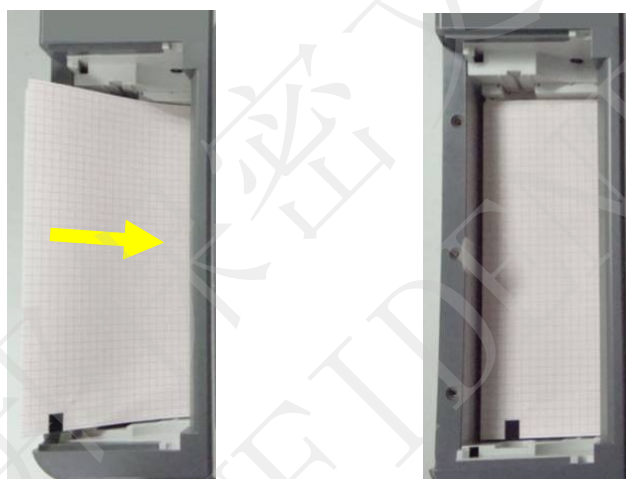


### Loading/Replacing Process of Folded Paper:

- 1) Press the casing button downwards and remove the casing to open the recorder.



- 2) Remove the remainder paper from the paper tray if necessary.
- 3) Take off the wrapper of the new folded paper, and then put it in the paper tray.



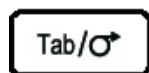
- 4) Pull the paper out with the grid side facing the thermal print head, and replace the casing on the recorder.





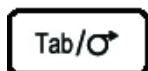
- 5) Press down the recorder casing firmly.
- 6) Advance the recorder paper.

When the main screen is displayed, if **Paper Marker** is set to **Yes**, you can press

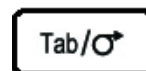


to advance the recorder paper to the next black marker; if **Paper Marker** is

set to **No**, you can press



to advance the paper for 2.5cm. Press



again to stop advancing the paper.

### Loading/Replacing Process of Rolled Paper:

- 1) Press the casing button downwards and remove the casing to open the recorder.




- 2) Take out the paper roller, and remove remainder paper from the roller if necessary.
- 3) Take off the wrapper of the new thermal paper roll, and then put the paper roll through the roller.
- 4) Place the paper and the roller gently in the recorder with the roller pin clicking into the groove.




- 5) Pull the paper out with the grid side facing the thermal print head, and replace the casing on the recorder.



- 6) Press down the recorder casing firmly.
- 7) Set **Paper Marker** to **No** in the **Record Info Setup1** window.
- 8) Advance the recorder paper.

When the main screen is displayed, you can press  to advance the paper for

2.5cm. Press  again to stop advancing the paper.

## Chapter 4 Basic Operation Guidance

The following sections provide an overview of the main operations and functions.

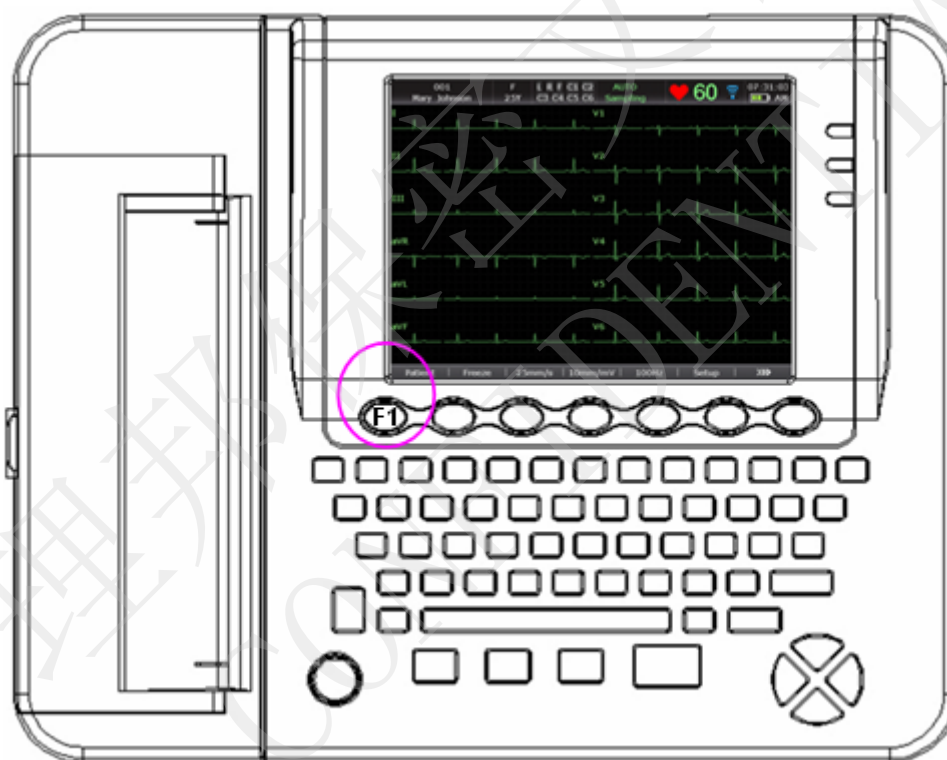
You can operate the electrocardiograph by using the touch screen (optional).

### **CAUTION**

Do not touch the LCD screen with sharp things such as pencils or pens; otherwise, it will be damaged.

## 4.1 Navigation Tips

### 4.1.1 Selecting Menu Functions



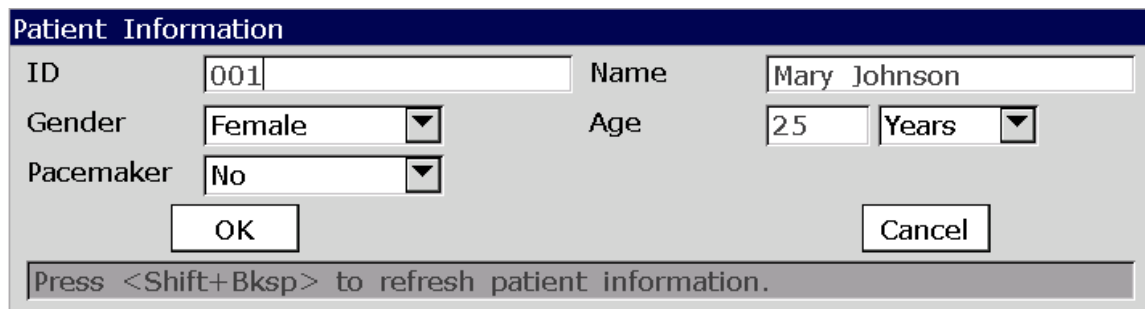
Press **F1**, **F2**, **F3**, **F4**, **F5** or **F6** to select the corresponding menu function.

- To select **Patient**, press the function key **F1** below **Patient** on the main screen<sup>1</sup>.
- To select **File**, press the function key **F1** below **File** on the main screen<sup>2</sup>.

For details about the main screen, please refer to Section 4.3.1 “About the Main Screen”.

## 4.1.2 Entering Data

Take the **Patient Information** window for example:

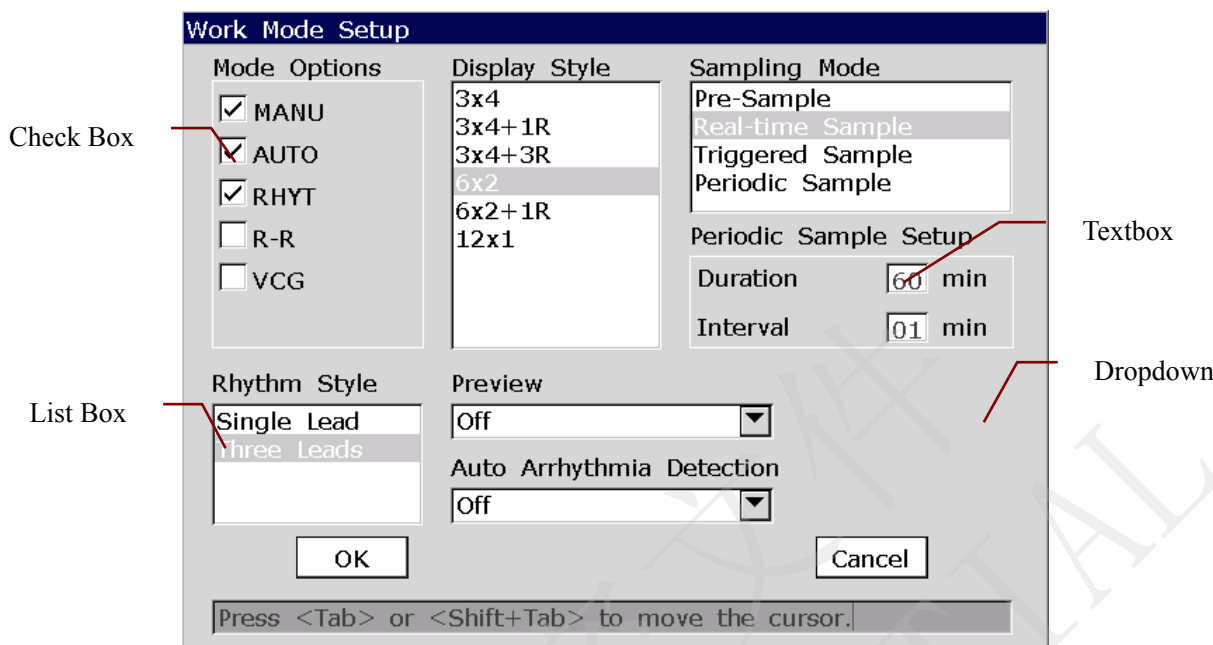


The screenshot shows a 'Patient Information' dialog box. It has a title bar with the text 'Patient Information'. Inside, there are several input fields: 'ID' with the value '001', 'Name' with the value 'Mary Johnson', 'Gender' with a dropdown menu showing 'Female', 'Age' with a value of '25' and a unit dropdown showing 'Years', and 'Pacemaker' with a dropdown menu showing 'No'. Below these fields are two buttons: 'OK' and 'Cancel'. At the bottom of the dialog, there is a message bar that says 'Press <Shift+Bksp> to refresh patient information.'

1. Press **F1** below **Patient** on the main screen1 to open the **Patient Information** window.
2. Press **Tab** or **Shift + Tab** to move the cursor to the **Name** textbox.
  - To input patient name, press the letter or numeric keys on the keyboard.
  - To input the special character in the top right corner of the key, press **Fn** and a letter key.  
For example, press **Fn + a** to input è.
  - To input the special character in the top right corner of the key, press **Shift** and a numeric key.  
For example, press **Shift + 3** to input #.
  - When **Caps Lock** is set to **Off** in the **Other Setup** window, pressing **Shift** and a letter key can input a capital letter.  
For example, pressing **Shift + P** can type a capital **P**.
  - When **Caps Lock** is set to **On** in the **Other Setup** window, pressing **Shift** and a letter key can input a lowercase letter.  
For example, pressing **Shift + P** can type a lowercase **p**.
3. Press **Bksp** on the keyboard to erase the typed information.
4. Press **Enter** to confirm, or press **Tab** or **Shift + Tab** to move the cursor to the **OK** button, and then press **Enter** to confirm.
5. Press **Esc** to cancel the operation, or press **Tab** or **Shift + Tab** to move the cursor to the **Cancel** button, and then press **Enter** to cancel the operation.
6. Press **Shift+Bksp** to refresh all patient information except for the **Gender**, **Age Group**, **Exam.Room**, **Physician** and **Technician** information after you print an ECG report.

### 4.1.3 Selecting an Item

Take the **Work Mode Setup** window for example:



1. In the **Work Mode Setup** window, press **Tab** or **Shift + Tab** to move the cursor among different check boxes. Press spacebar to select a check box, and a check mark √ appears in the box.
2. In the **Work Mode Setup** window, press **Tab** or **Shift + Tab** to move the cursor to a list box or dropdown. Press the Up or Down arrow to highlight an option.
3. In the **Work Mode Setup** window, press **Tab** or **Shift + Tab** to move the cursor to a textbox. Enter data in the selected textbox.
4. Press **Enter** to confirm, or press **Tab** or **Shift + Tab** to move the cursor to the **OK** button, and then press **Enter** to confirm.
5. Press **Esc** to cancel the operation, or press **Tab** or **Shift + Tab** to move the cursor to the **Cancel** button, and then press **Enter** to cancel the operation.

## 4.2 Configuring the Electrocardiograph

For details on configuring the system settings and the order settings, please refer to Chapter 10 “System Setup” and Section 8.5 “Setting Orders”.

## 4.3 Screen Description

### 4.3.1 About the Main Screen

After the electrocardiograph is turned on, the main screen appears.

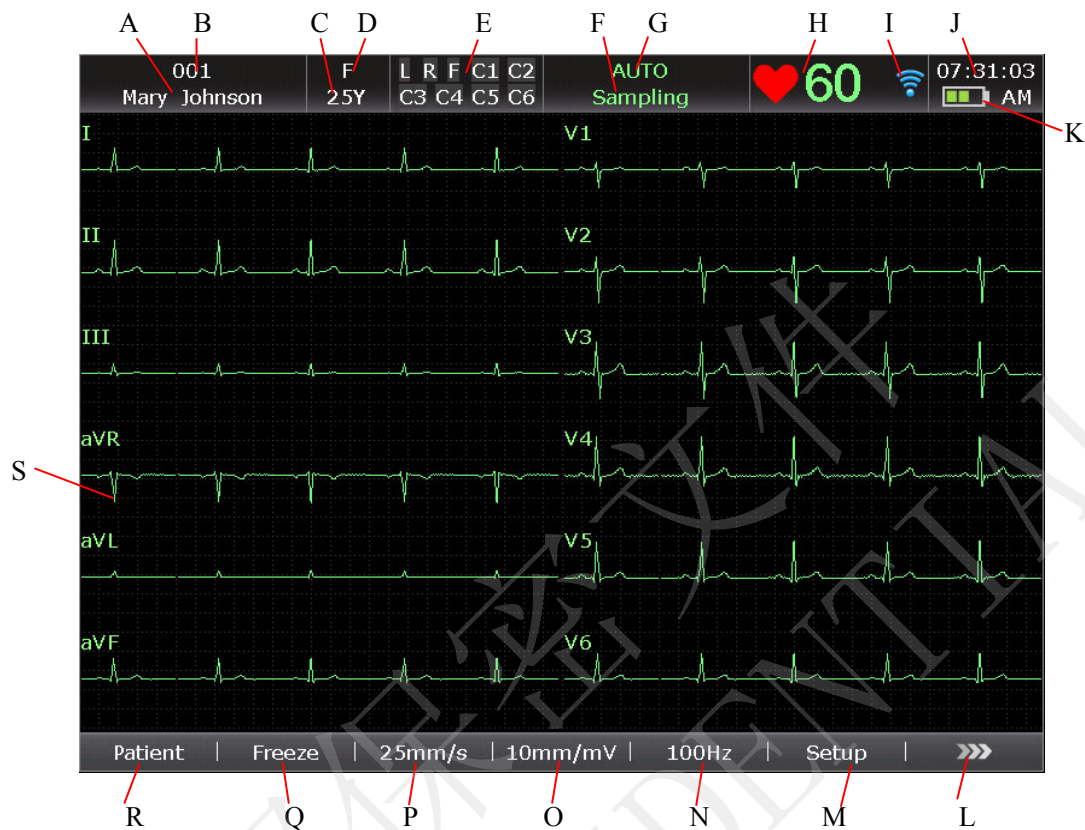


Figure 4-1 SE-1200 Express Main Screen1

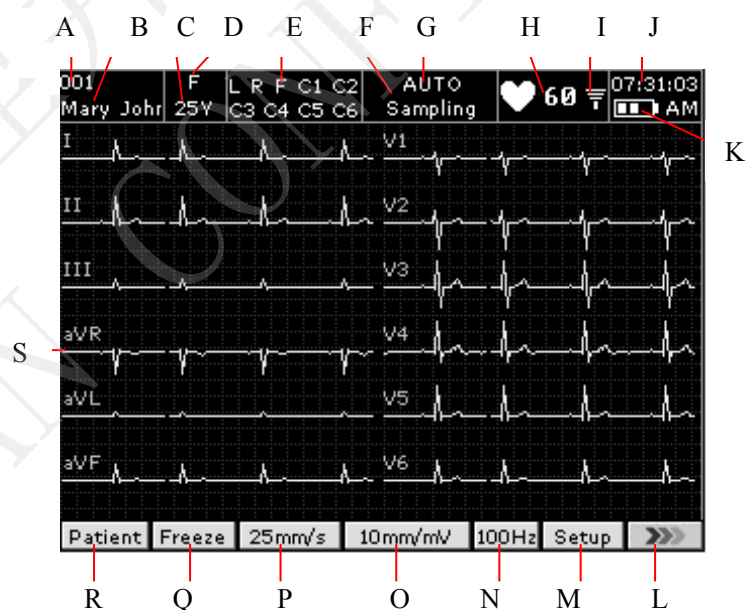


Figure 4-2 SE-1200 Main Screen1

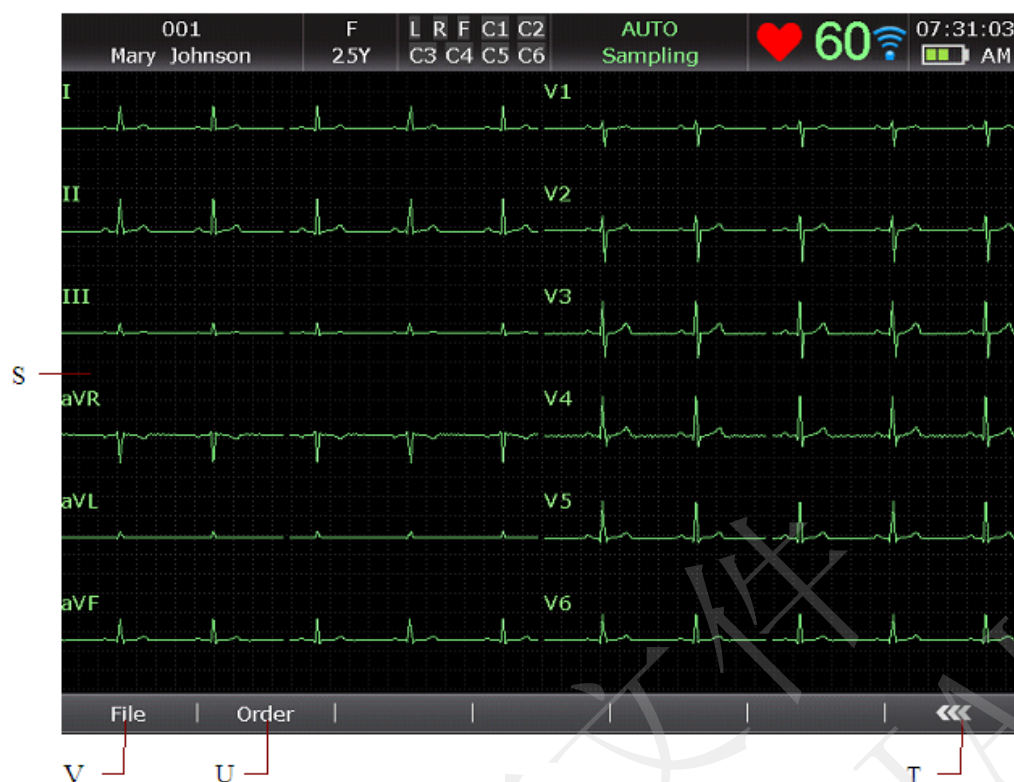


Figure 4-3 SE-1200 Express Main Screen2

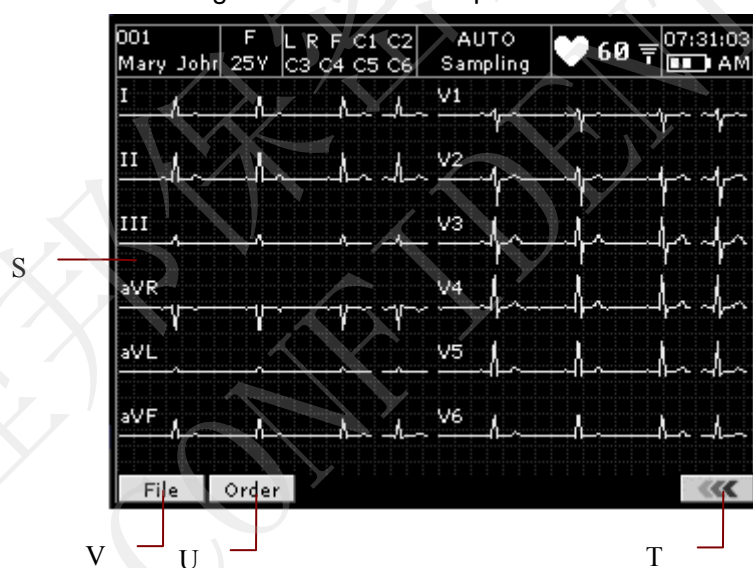











Figure 4-4 SE-1200 Main Screen2

	Name	Explanation
A	Name	Patient Name: within 60 ASCII characters or the equivalent number of other characters that can be supported by equivalent memory used by 60 ASCII characters
B	ID	When <b>ID Mode</b> is set to <b>Manual</b> , the length of the patient ID plus the length of the default ID is within 30 ASCII characters.



		<p>When <b>ID Mode</b> is set to <b>Auto</b>, <b>ID</b> can be automatically generated after you press <b>Shift+Bksp</b> to refresh the patient information. The patient ID is 0~1999, 999, 999.</p> <p>When <b>ID Mode</b> is set to <b>Time</b>, press <b>Shift+Bksp</b> to refresh the patient information, and then the patient ID can be automatically generated according to the time when you press the <b>PRINT/STOP</b> key to print an ECG report. Entering the patient ID manually is not supported.</p>
C	Age	<p>Patient Age</p> <p>The patient age value and the age unit can be set in the <b>Patient Information</b> window.</p>
D	Gender	Patient Gender (Male/Female/Cleared)
E	Hint Information 1	Including <b>DEMO</b> , <b>Module Error</b> , <b>Overload</b> , Lead Name (When the leads are off, the lead names will be highlighted.) For details, please refer to Chapter 11 “Hint Information”.
F	Hint Information 2	Including <b>No Paper</b> , <b>Paper Error</b> , <b>Battery Weak</b> , <b>Sampling</b> , <b>Analyzing</b> , <b>Recording</b> , <b>Testing</b> , <b>Learning</b> , <b>Transmitting</b> , <b>Loading Orders</b> , <b>Detecting</b> , <b>Memory Full</b> , <b>U Disk</b> , <b>USB Printer</b> , <b>Lead Off</b> , <b>USB Scanner</b> . For details, please refer to Chapter 11 “Hint Information”.
G	Work Mode	<p>Manual, Auto, Rhythm, R-R Analysis and VCG (only configurable for SE-1200 Express)</p> <p>If <b>Print Out</b> is set to <b>Off</b> in the <b>Record Info Setup1</b> window,  appears in the auto or rhythm mode. For details, please refer to Section 10.4.1 “Setup1”.</p>
H	Heart Rate	Actual Heart Rate
I	WIFI	<p>If a wireless network is connected successfully, an icon appears on the main screen.</p> <p>SE-1200 Express:</p> <p>: Poor signal; : Good signal; : Great signal</p> <p>SE-1200:</p> <p>: Poor signal; : Good signal; : Great signal</p>
J	Current Time	Current system time. For details, please refer to Section 10.9 “Date&Time Setup”.

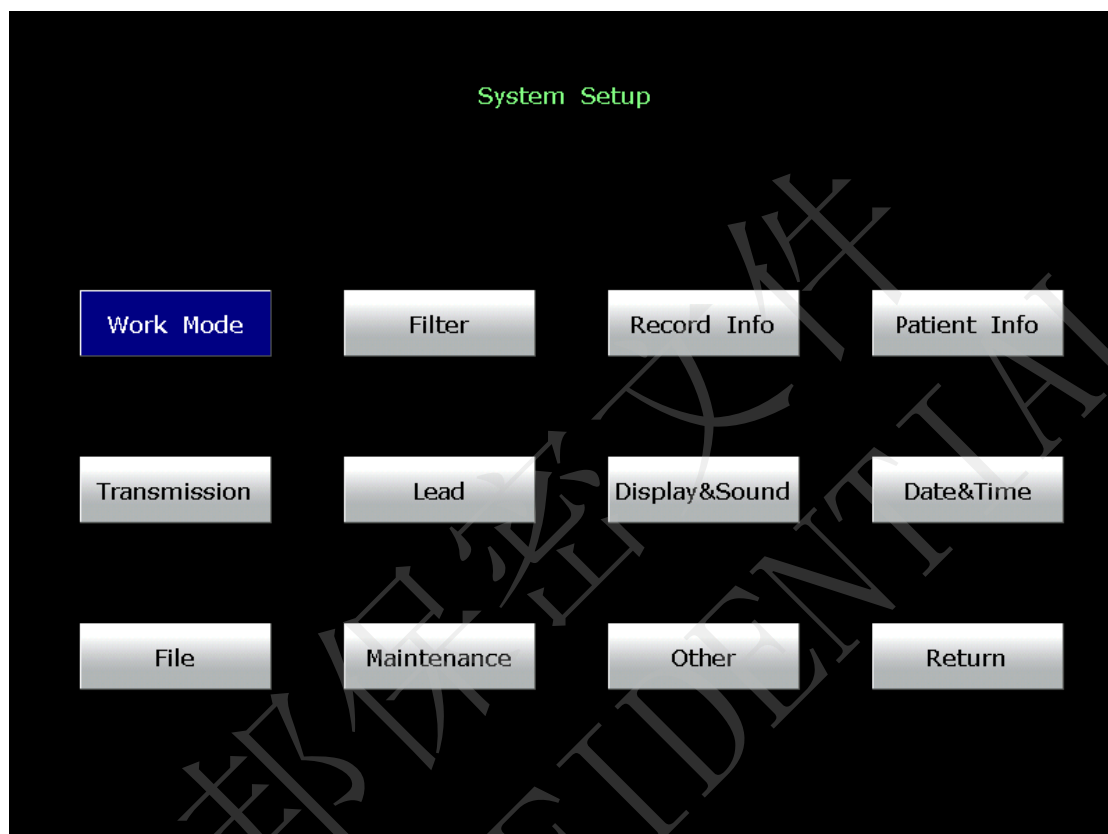


K	Battery Symbol	Identify the current capacity of the battery
L		Press to open the main screen2.
M	Setup	Press to display the <b>System Setup</b> screen. For details, please refer to Chapter 10 “System Setup”.
N	Filter	EMG Filter: Off, 25Hz, 35Hz or 45Hz Lowpass Filter: 75Hz, 100Hz or 150Hz <b>NOTE:</b> This setup modified on the main screen is only effective for the current patient.
O	Gain	Gain: 1.25 mm/mV, 2.5 mm/mV, 5 mm/mV, 10 mm/mV, 20 mm/mV or 10/5 mm/mV <b>NOTE:</b> This setup modified on the main screen is only effective for the current patient.
P	Speed	In the manual mode, <b>Speed</b> can be set to <b>5mm/s</b> , <b>6.25mm/s</b> , <b>10mm/s</b> , <b>12.5mm/s</b> , <b>25mm/s</b> or <b>50mm/s</b> . In the auto, rhythm and VCG (only configurable for SE-1200 Express) modes, <b>Speed</b> can be set to <b>25mm/s</b> or <b>50mm/s</b> . In the R-R analysis mode, <b>Speed</b> can only be set to <b>25mm/s</b> and cannot be modified. <b>NOTE:</b> This setup modified on the main screen is effective for both the display speed and the paper speed, but only for the current patient.
Q	Freeze	Freezing ECG waves. For details, please refer to Section 6.3 “Freezing ECG Waves”.
R	Patient	Press to open the <b>Patient Information</b> window. For details, please refer to Chapter 5, “Entering Patient Information”.
S	ECG waveform	Display ECG waveform
T		Press to return to the main screen1.
U	Order	Press to open the <b>Order Manager</b> screen. For details, please refer to Chapter 8 “Managing Orders”.
V	File	Press to open the <b>File Manager</b> screen. For details, please refer to Chapter 9 “Managing Files”.

### 4.3.2 About the System Setup Screen

Select **Setup** on the main screen1 to display the **System Setup** screen.

**NOTE:** If you set the system password in the **System Maintenance** window, you need enter the password before opening the **System Setup** screen. For details, refer to Section 10.11, “System Maintenance Setup”.



On the **System Setup** screen, move the cursor on an item, and then press **Enter** to open the setup window of the item.



C	Return	Press to return to the main screen1.
D	Del All	Press to delete all the orders from the electrocardiograph.
E	Delete	Press to delete the selected order from the electrocardiograph.
F	Search	Press to search for orders on the Order Manager screen.
G	Setup	Press to make the related settings.
H	Load	Press to load orders to the electrocardiograph.
I	Examine	Press to return to main screen1 for starting examination of the selected order.

Once the electrocardiograph is turned on, you can open the **Order Manager** screen by pressing **Patient** if orders without examination exist on the **Order Manager** screen.

After you press **Esc** on the **Order Manager** screen to return to main screen1, you cannot open the **Order Manager** screen by pressing **Patient** until you complete an order examination next time.

#### 4.3.4 About the File Manager Screen

##### Switch to the File Manager Screen 1/2

- To open the **File Manager** screen1, select **File** on the main screen2.
- To open the **File Manager** screen2, select a file on the **File Manager** screen1, and then press **Select**.
- To return to the previous screen, select **Return**.



	Name	Explanation
A	File Count	For example, 0% (1) 0% is space occupancy of the files stored in the electrocardiograph. 1 is the current number of files stored in the electrocardiograph.
B	File List	Files will be loaded and displayed in the file list. The file information includes ID, Name, Time, Mode and State. State includes: No mark T indicates the file is transferred successfully. E indicates the file is exported successfully. C indicates the file has been edited. <b>NOTE: A file can be displayed in more than one state at the same time.</b>
C	Return	Press to return to the main screen.
D	Import	Press to import files from the U disk to the electrocardiograph.
E	Search	Press to open the SearchInfo Setup window.
F	Select	Press to highlight a file on the File Manager screen1, and then press Select to select the file and display the File Manager screen2.
G	Del All	Press to delete all the files from the electrocardiograph.
H	Export All	Press to export all the files from the electrocardiograph to the U disk.
I	Trans All	Press to transmit all the files to the PC.
J	Return	Press to return to the File Manager screen1.
K	Preview	Press to open the file preview screen.
L	Delete	Press to delete the selected file from the electrocardiograph.
M	Export	Press to export the selected file from the electrocardiograph to the U disk.
N	Trans	Press to transmit the selected file to the PC.
O	Record	Press to print the selected file.
P	Edit	Press to open the Patient Information window. Then you can edit the patient information.

## 4.4 Work Mode Description

There are five work modes in SE-1200 series electrocardiograph.

- AUTO:** In the auto mode, the ECG data can be analyzed, saved, printed and transmitted. The lead groups are switched automatically according to the lead sequence during the printing course. After the ECG waves of one lead group are printed within a certain time, the system switches to print ECG waves of another lead group automatically. 1mV calibration marks will be printed at the beginning of an ECG report.
- MANU:** In the manual mode, you can determine the lead group to be displayed and printed. Pressing the Left or Right arrow can switch among the lead groups.
- RHYT:** In the rhythm mode, the ECG data can be saved and transmitted. You can print 60s rhythm-lead ECG waveform of one lead in the **Single Lead** style or 20s rhythm-lead ECG waveform of three leads in the **Three Leads** style.
- R-R:** In the R-R analysis mode, you can select a lead to print its R-R histogram, R-R trend chart, 180s compressed ECG waveform and all the R-R interval values.
- VCG**  
(only configurable for SE-1200 Express) In the VCG mode, X, Y, Z waves and frontal, horizontal, sagittal planes can be displayed. 10s sampled ECG data can be analyzed, and vector waves, vector loops, measure information, diagnosis information can be printed.

For details on printing ECG reports in the Auto, Manual, Rhythm, R-R or VCG (only configurable for SE-1200 Express) mode, please refer to Section 6.1 “Printing an ECG Report”.

## Chapter 5 Entering Patient Information

### 5.1 Entering Patient Information Manually

Operation procedures are as follows:

1. Configure the **Patient Information Setup** window. (Optional)
  - 1) Select the desired items.
  - 2) Select a mode from the **ID** list box.

For details, please refer to Section 10.5 “Patient Information Setup”.

2. Select **Patient** on the main screen1 to open the **Patient Information** window.
3. Enter data in a desired textbox.
4. Press **Enter** to confirm or press **Esc** to return to the main screen.

First Name	Within 30 ASCII characters
Last Name	Within 30 ASCII characters
Age	Age Unit: <b>Years, Months, Weeks</b> or <b>Days</b>
Gender	Patient Gender (Male/Female/Empty)
BP	Patient Systolic Blood Pressure/Diastolic Blood Pressure



Race	Patient Race (unknown/ Oriental/ Caucasian/ Black/ Indian/ Mongolian/ Hispanic/ Asian/ Pacific/ Chinese/ Malay/ other)
Pacemaker	<p>Select <b>Yes</b> to detect very small pacemaker pulses. However, when <b>Pacemaker</b> is set to <b>Yes</b>, the system is very sensitive, and should not be close to equipment emitting high frequency radiation. High frequency radiation can interfere with pacemaker pulse detection and normal ECG acquisition.</p> <p><b>NOTE: Pacemaker</b> is recommended to be set to <b>No</b> unless it is known that the majority of the electrocardiograph usage will be on patients with pacemakers.</p>

**NOTE:** The total number of supported characters may be fewer if special Latin characters are entered.

## 5.2 Entering Patient Information by Using a Reader (Optional)

Operation procedures are as follows:

1. Configure the bar code

For more detailed information about configuring the bar code, please contact the manufacturer or the local distributor.

2. Connect the bar code/social security card/ID card reader to USB socket 2 on the right panel of the electrocardiograph.
3. When the main screen is displayed, scan the patient's bar code with the bar code/social security card/ID card reader, and then the patient information will appear in the corresponding box.

**NOTE:** Recommended social security card reader: T6-ULD-I, USB socket;

Recommended ID card reader: GTICR100-02, USB socket.

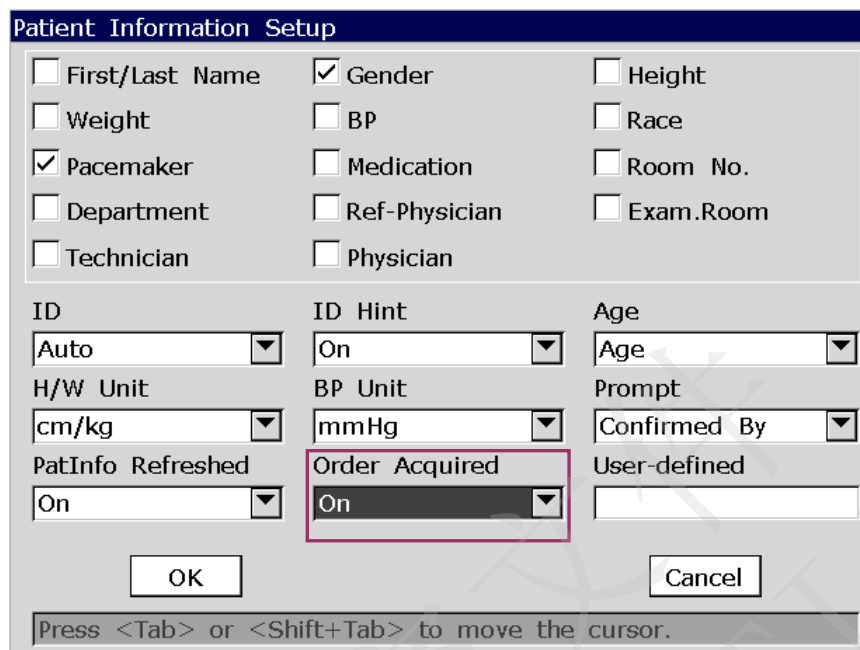
## 5.3 Entering Patient Information by Acquiring Orders

**NOTE:** To use the order function, the ECG data management software (DMS) of the manufacturer must be installed in the PC..

Operation procedures are as follows:

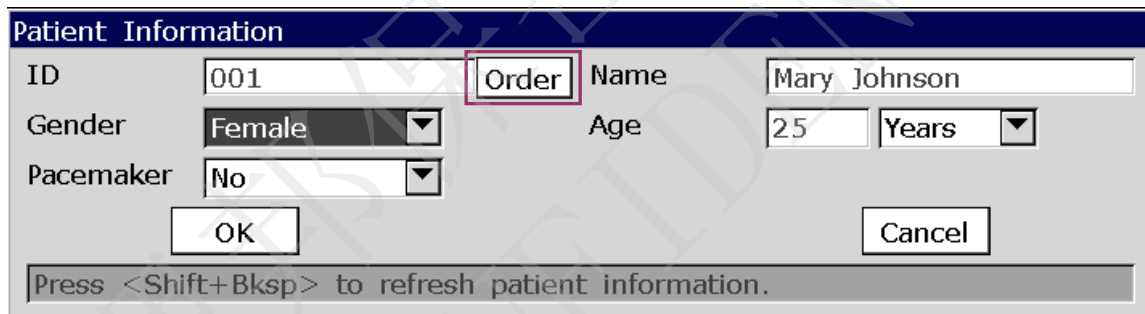
1. Connect the electrocardiograph to the PC with Ethernet cable recommended by the manufacturer.
2. Log into the DMS.
3. Set **Remote IP**, **Local IP**, **Gateway** and **Subnet Mask** in the **Transmission Setup** window.

4. Select **Order Acquired** function.
  - 1) Select **Setup-> Patient Info** to open the **Patient Information Setup** window.
  - 2) Select **On** from the **Order Acquired** list box, and then press **Enter** to confirm.



The 'Patient Information Setup' window contains various configuration options. The 'Order Acquired' dropdown menu is highlighted with a red box and set to 'On'. Other options include checkboxes for First/Last Name, Gender, Height, Weight, BP, Race, Pacemaker, Medication, Room No., Department, Ref-Physician, Exam Room, Technician, and Physician. There are also dropdown menus for ID (Auto), ID Hint (On), Age, H/W Unit (cm/kg), BP Unit (mmHg), Prompt, PatInfo Refreshed (On), Confirmed By, and User-defined.

5. Select **Patient** on the main screen1 to open the **Patient Information** window.



The 'Patient Information' window displays patient details. The 'Order' button is highlighted with a red box. The ID is '001', Gender is 'Female', Pacemaker is 'No', Name is 'Mary Johnson', and Age is '25 Years'. There are 'OK' and 'Cancel' buttons at the bottom.

Enter the patient ID manually in the **ID** textbox or connect a bar code reader, press **Order**, and then the matched order will be loaded from the DMS and the order information will be displayed in the corresponding textboxes.

## Chapter 6 Printing ECG Reports

### NOTE:

1. The working mode cannot be changed during the printing course. Stop printing reports before changing the working mode.
2. Within three seconds after returning to the main screen, if you press the **PRINT/STOP** key to print an ECG report in the auto quick mode or the manual mode, the recorder will not respond.
3. If **Print Out** is set to **Off** in the **Record Info Setup1** window, the ECG report can be saved and transmitted, but cannot be printed out by pressing the **PRINT/STOP** key in the auto and rhythm modes.
4. When the main screen is displayed, pressing the **MODE** key can select a working mode.

## 6.1 Printing an ECG Report

### 6.1.1 Auto Mode

The auto mode is the most common electrocardiograph usage and is applied to normal ECG test. 10s ECG data can be sampled, analyzed, and printed by pressing the **PRINT/STOP** key.

#### Operation Method:

1. Set **Mode Options**, **Display Style**, **Preview**, **Sampling Mode**, **Record Style**, **Rhythm Lead1/2/3**, or **Lead Sequence** (Optional)
  - 1) Select **AUTO** from the **Mode Option** list in the **Work Mode Setup** window.
  - 2) Select a style from the **Auto DispStyle** list in the **Work Mode Setup** window.
  - 3) Select a mode from the **Sampling Mode** list in the **Work Mode Setup** window.
  - 4) Select **On** or **Off** from the **Preview** list box in the **Work Mode Setup** window.
  - 5) Select a style from the **Record Style** list in the **Record Info Setup** window.
  - 6) Select a lead from the **Rhythm Lead1/2/3** list in the **Lead Setup** window.
  - 7) Select a sequence from the **Lead Sequence** list in the **Lead Setup** window.
  - 8) Press **Enter** to confirm.

2. Print an auto ECC report.

### 6.1.2 Manual Mode

In the manual mode, the sampling or print time can be adjusted manually according to clinic needs. ECG data of arbitrary length can be sampled or printed.

#### Operation Method:

1. Set **Mode Options**, **Manual Style** or **Lead Sequence** (Optional)
  - 1) Select **MANU** from the **Mode Option** list in the **Work Mode Setup** window.
  - 2) Select a style from the **Manual Style** list in the **Work Mode Setup** window.
  - 3) Select a sequence from the **Lead Sequence** list in the **Lead Setup** window.
  - 4) Press **Enter** to confirm.

2. Print a manual ECC report.

### 6.1.3 Rhythm Mode

The rhythm mode contributes to discover the abiogenetic or frequent arrhythmia. The rhythm-lead ECG waveform of one lead or three leads can be sampled or printed for a long time.

#### Operation Method:

1. Set **Mode Options**, **Rhythm Style**, **Rhythm Lead1/2/3** or **Lead Sequence**(Optional)
  - 1) Select **RHYT** from the **Mode Option** list in the **Work Mode Setup** window.
  - 2) Select a style from the **Rhythm Style** list in the **Work Mode Setup** window.
  - 3) Select a lead from the **Rhythm Lead1/2/3** list in the **Lead Setup** window.
  - 4) Select a sequence from the **Lead Sequence** list in the **Lead Setup** window.
  - 5) Press **Enter** to confirm.

**Work Mode Setup**

<b>Mode Options</b> <input checked="" type="checkbox"/> MANU <input checked="" type="checkbox"/> AUTO <input checked="" type="checkbox"/> <b>RHYT</b> <input type="checkbox"/> R-R <input type="checkbox"/> VCG	<b>Display Style</b> 3x4 3x4+1R 3x4+3R 6x2 6x2+1R 12x1	<b>Sampling Mode</b> Pre-Sample Real-time Sample Triggered Sample Periodic Sample  <b>Periodic Sample Setup</b> Duration: 60 min Interval: 01 min
<b>Rhythm Style</b> Single Lead Three Leads	<b>Preview</b> Off  <b>Auto Arrhythmia Detection</b> Off	

OK Cancel

Press <Tab> or <Shift+Tab> to move the cursor.

2. Press the **PRINT/STOP** key to begin sampling, the sampling time will be displayed on the main screen. When the sampling time reaches 60s in the **Single Lead** style or 20s in the **Three Leads** style, it begins to print an ECG report.

## 6.1.4 R-R Analysis Mode

The R-R analysis mode contributes to get the related indicators of HRV (Heart Rate Variability). HRV analysis refers to the variability between durations of the two following heart rates, and it is a predicted indicator to sudden death caused by acute myocardial infarction and vicious arrhythmia. For healthy persons, RR Histogram presents open and multi-peak; for patient with the low variability caused by cardiovascular diseases (such as myocardial infarction or heart failure), RR Histogram presents a single peak.

### Operation Method:

#### 1. To set **Mode Options** or **Rhythm Lead1**

- 1) Select **R-R** from the **Mode Option** list in the **Work Mode Setup** window.
- 2) Select a lead from the **Rhythm Lead1** list in the **Lead Setup** window.
- 3) Press **Enter** to confirm.

2. Press the **PRINT/STOP** key to begin sampling, the sampling time will be displayed on the main screen. When the sampling time reaches 180s, it begins to analyze and print an ECG report.
3. It will stop automatically after a complete R-R analysis report is printed. During the printing course, pressing the **PRINT/STOP** key again can stop printing the ECG report.

**NOTE:** In the R-R analysis mode, you cannot set the speed. The constant speed is 25mm/s and the printing speed is 5mm/s, because in the R-R analysis mode, the ECG wave length is compressed to one fifth of the original wave length.

## 6.1.5 VCG Mode (Only Configurable for SE-1200 Express)

VCG (Vectorcardiogram) is stereo images to show phase shifts of heart activities. As an advance and a complement to the cardiogram diagnosis, VCG excels in diagnosis of myocardial infarction, intraventricular conduction block and ventricular hypertrophy.

**NOTE:** Auto diagnosis of VCG reports are for reference only. Except the diagnosis to myocardial infarction, atrial hypertrophy, ventricular hypertrophy, pre-excitation syndrome, bundle branch block, myocardial injury and coronary heart disease, cardiograms are diagnosed as normal VCG.

### Operation Method:

1. Prepare for the operation.  
For details, please refer to Chapter 3 “Operation Preparations”.
2. Set **Mode Options**, **Preview**, **VCG Record Info**, or **QRS Gain** (Optional)
  - 1) Select **VCG** from the **Mode Option** list in the **Work Mode Setup** window.
  - 2) Select **On** or **Off** from the **Preview** list box in the **Work Mode Setup** window.
  - 3) Select VCG record information to be printed out in the **Record Info Setup3** window.
  - 4) Select a value from the **QRS Gain** list box in the **Record Info Setup3** window.

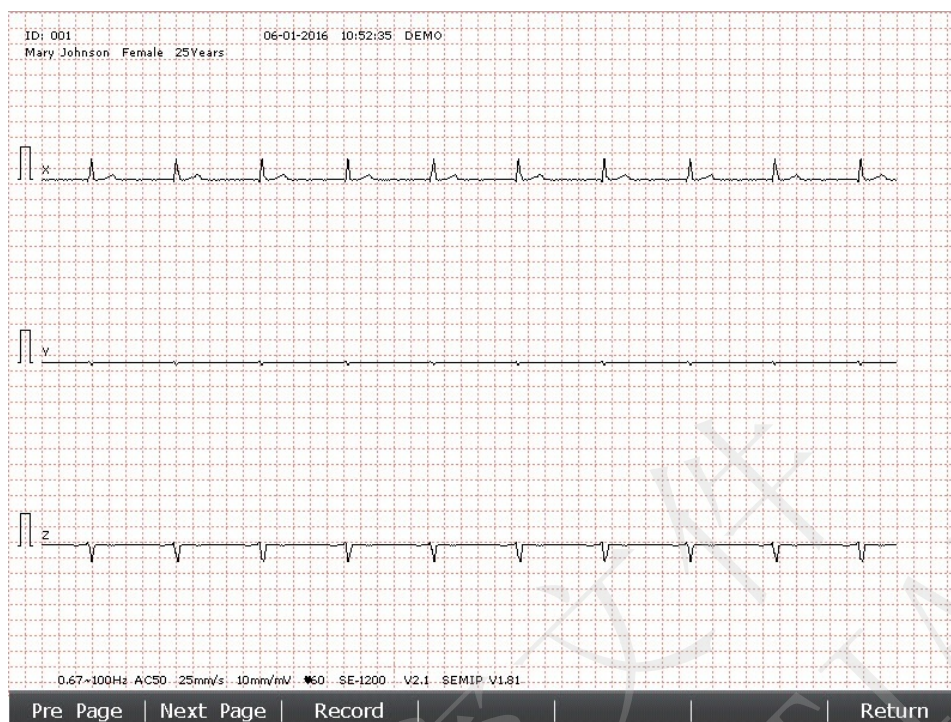
The screenshot shows the 'Work Mode Setup' dialog box. In the 'Mode Options' section, the 'VCG' checkbox is selected and highlighted with a red box. In the 'Preview' dropdown menu, 'Off' is selected and also highlighted with a red box. Other options like MANU, AUTO, RHYT, and R-R are also checked. The 'Display Style' list shows various lead configurations. The 'Sampling Mode' is set to 'Real-time Sample'. The 'Periodic Sample Setup' shows a duration of 60 minutes and an interval of 01 minute. The 'Rhythm Style' is set to 'Single Lead'. The 'Auto Arrhythmia Detection' is set to 'Off'. At the bottom, there are 'OK' and 'Cancel' buttons, and a status bar提示: 'Press <Tab> or <Shift+Tab> to move the cursor.'

**NOTE:** Pressing **F2** twice in the **Record Info Setup** window can display the **Setup3** window.

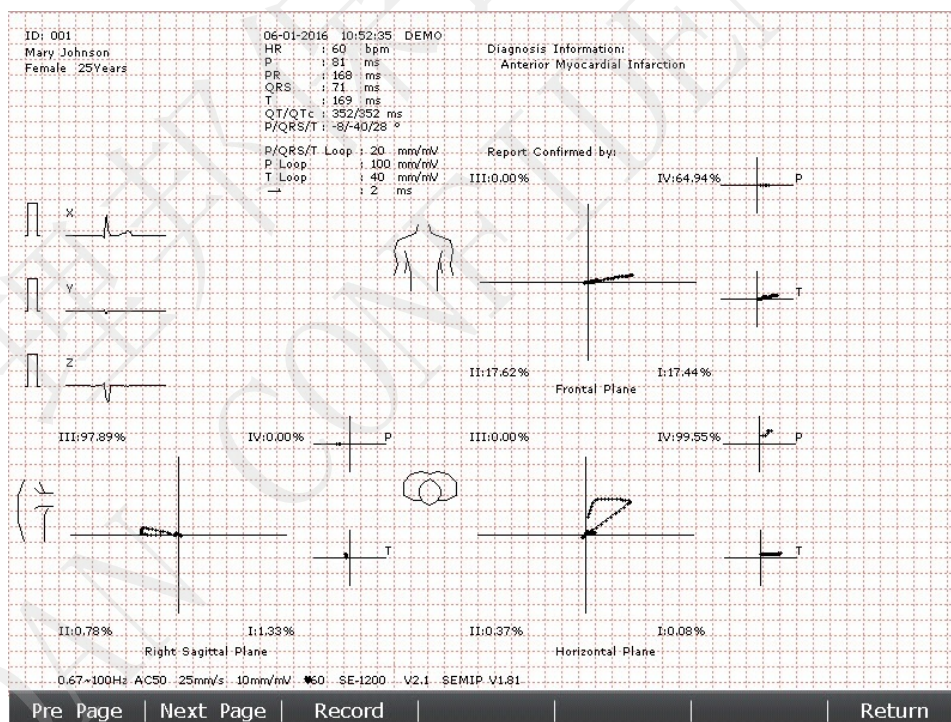
- 5) Press **Enter** to confirm.



- If **Preview** is set to **On** in the **Work Mode Setup** window, pressing the **PRINT/STOP** key can preview an ECG report.



- Select **Next Page** to view the loop and measurement information, and select **Record** to print the report.





ID: 001		06-01-2016 10:52:35 DEMO					
Mary Johnson Female 25Years							
	Degree: deg.	Frontal Plane		Horizontal Plane		Right Sagittal Plane	
	Amplitude: mV	deg.	Amp.	deg.	Amp.	deg.	Amp.
P	Max Vec.:51ms	-3	0.043	-45	0.061	183	0.043
	Direction	CW		S		S	
	Max Vec.:37ms	-9	0.661	-38	0.827	188	0.540
	0.01s	158	0.054	135	0.071	21	0.054
	0.02s	-4	0.167	-33	0.199	186	0.109
QRS	0.03s	-8	0.507	-36	0.622	191	0.376
	0.04s	-8	0.633	-39	0.812	190	0.528
	Init. Vec.:10ms	158	0.054	135	0.071	21	0.054
	Term. Vec.:1ms	-3	0.043	-80	0.268	180	0.265
	Direction	S		CCW		CCW	
	Max Vec.:91ms	-10	0.156	-12	0.158	218	0.045
	ST Vector	-3	0.038	-80	0.235	180	0.232
	Len/Width	15.357		16.500		3.167	
T	T-R Degree	-1		26		30	
	Direction	S		S		S	
M60							
Pre Page		Next Page		Record		Return	

## 6.2 Copy Printing

In the auto, rhythm and VCG (only configurable for SE-1200 Express) modes, pressing the **1mV/COPY** key can print the ECG report which was printed out last time. Pressing the **PRINT/STOP** key can stop printing the ECG report.

## 6.3 Freezing ECG Waves

You can freeze the ECG waves displayed on the main screen.

### Operation Method:

- 1) Press **F3** to set the paper speed, press **F4** to set the gain, and press **F5** to set the filter on the main screen1.
- 2) Select **Freeze** to display the freezing screen.

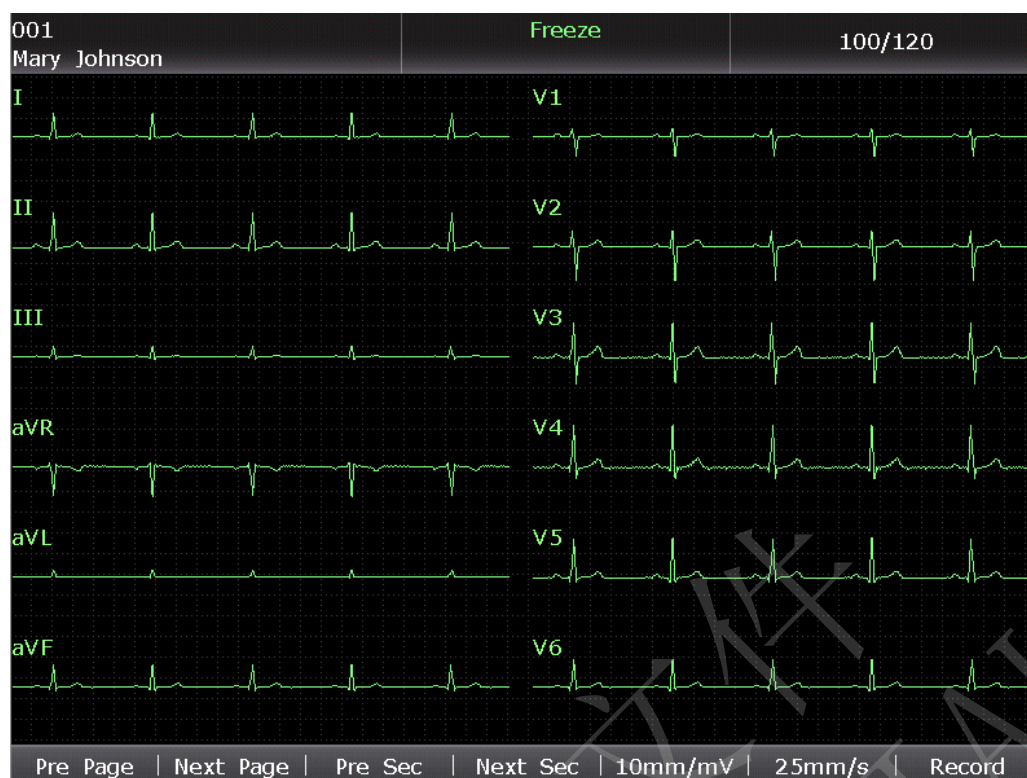


Figure 6-1 Freezing Screen (Auto/Manual/Rhythm/R-R Analysis mode)

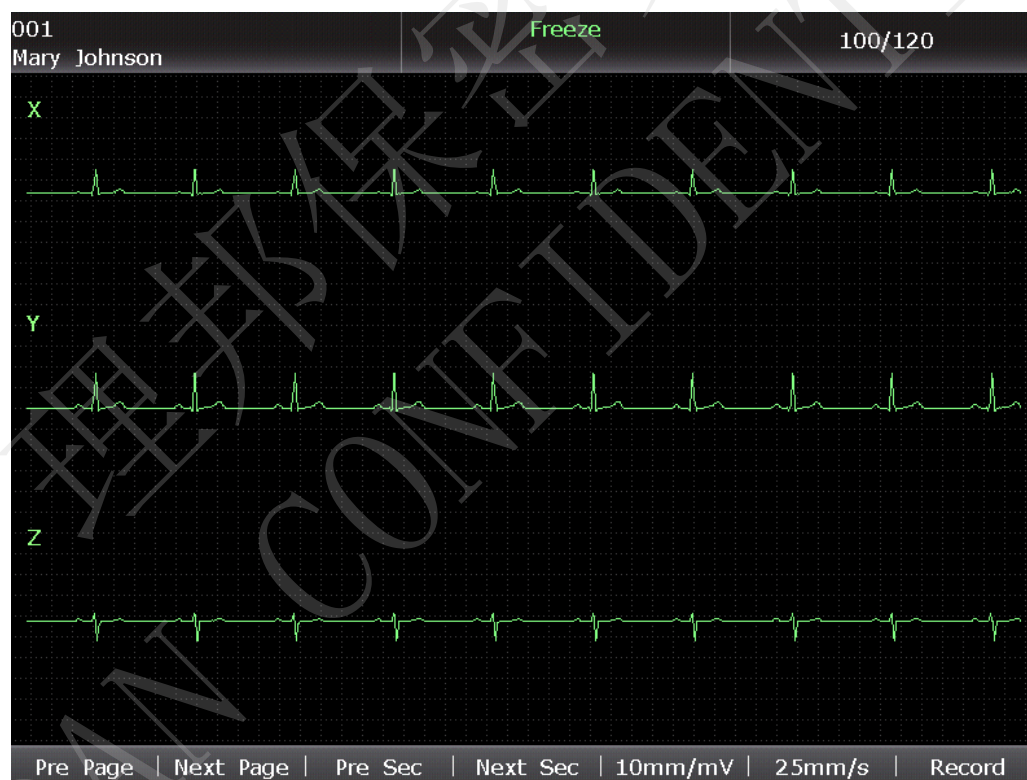


Figure 6-2 VCG Freezing Screen (only configurable for SE-1200 Express)

**NOTE:** Within 10 seconds after returning to the main screen, pressing **F2** cannot display the freezing screen.

- 3) Press **PRINT/STOP** or select **Record** on the freezing screen to print the current waveform.

## 6.4 Printing a Stored ECG Report

### 6.4.1 Printing on the File Manager Screen1/2

#### Operation Method:

1. Select a file on the **File Manager** screen1.
2. Press **PRINT/STOP** to print the file, or press **Select** to display the **File Manager** screen2, and then press **PRINT/STOP** to print the file.
3. Or, press **PRINT/STOP** again to stop printing the file.

### 6.4.2 Printing on the Preview Screen

#### Operation Method:

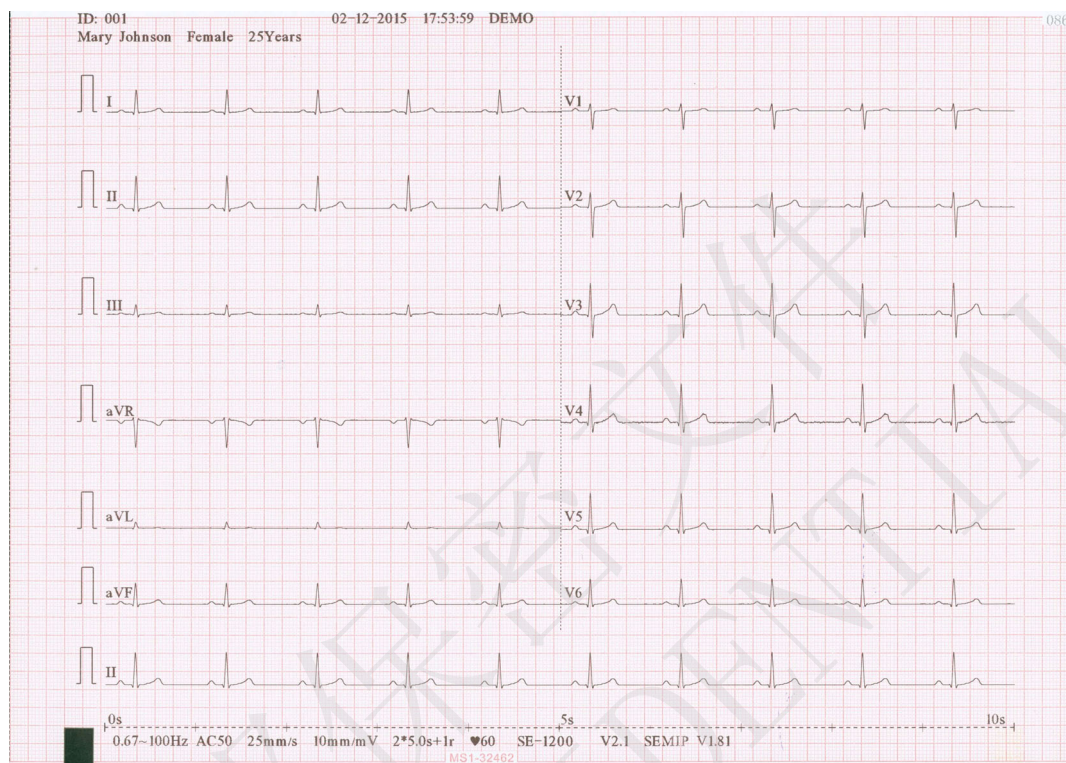
1. Select a file on the **File Manager** screen1, and then press **Select** to display the **File Manager** screen2.
2. Select **Preview** on the **File Manager** screen2 to open the preview screen.
3. Press **PRINT/STOP** or select **Record** on the preview screen to print the selected file.
4. Or, press **PRINT/STOP** again to stop printing the file.

**NOTE:** Rhythm data cannot be previewed.

## 6.5 ECG Reports

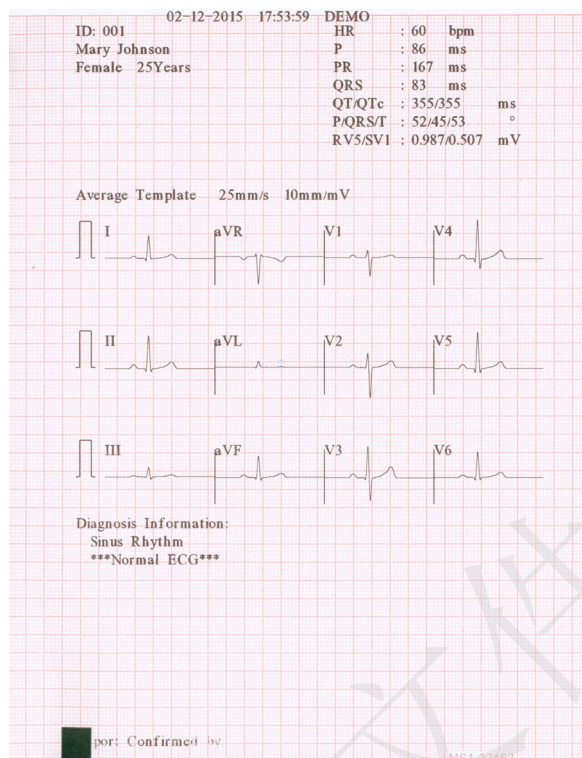
### 6.5.1 Auto ECG Report

#### Quick Mode



(a)





(b)

The above figure (a) and (b) show an ECG report in the auto mode. **Template** is selected, and **Record Style** is set to **6×2+1R**.

The ECG report includes:

#### 6×2+1R ECG waves

#### Current Date and Time

**Patient Information:** Name, ID, Gender, Age

#### Measure Information:

HR Heart Rate

P P wave duration: the average P-wave duration from several selected dominant beats;

PR P-R interval: the average P-R interval from several selected dominant beats;

QRS QRS complex duration: the average QRS complex duration from several selected dominant beats;

QT/QTc Q-T interval: the average Q-T interval from several selected dominant beats / Normalized QT interval;

P/QRS/T Dominant direction of the average integrated ECG vectors;

RV5/SV1 The maximum of the amplitude of R or R' wave of one selected dominant

beat from lead V5 / The maximum absolute value of the amplitude of S or S' wave of one selected dominant beat from lead V1;

RV5+SV1 Sum of RV5 and SV1;  
(optional)

RV6/SV2 The maximum of the amplitude of R or R' wave of one selected dominant  
(optional) beat from lead V6 / The maximum absolute value of the amplitude of S or S' wave of one selected dominant beat from lead V2;

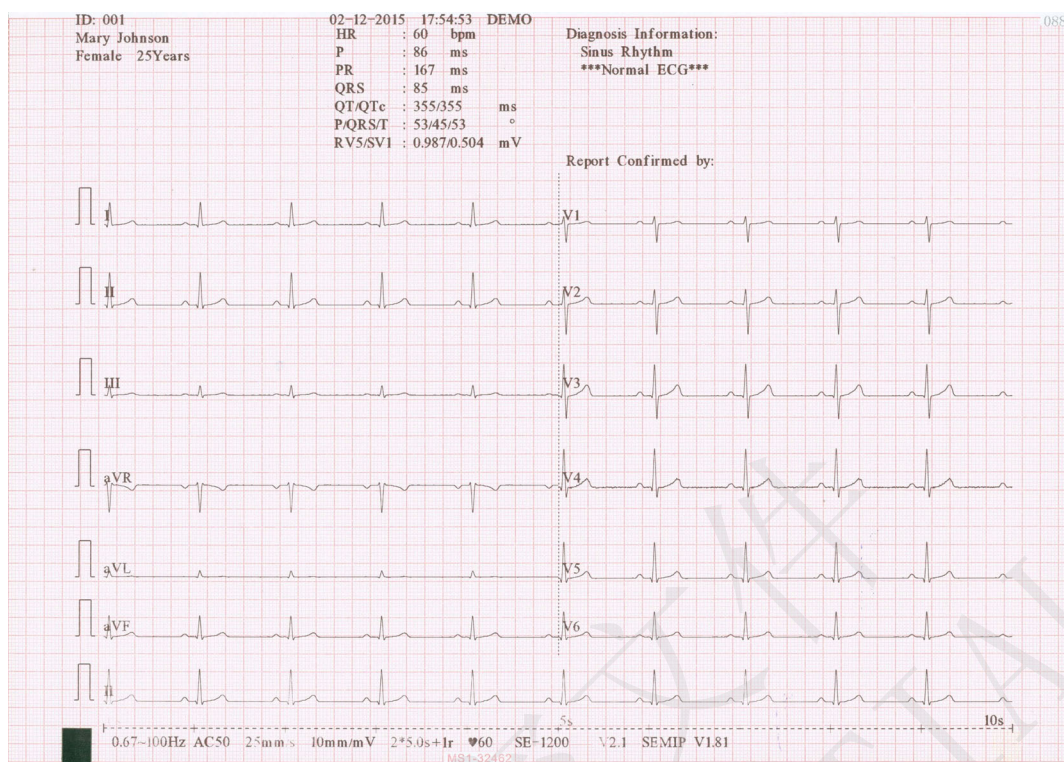
**Average Template:** Average template shows the average value of 10s sampled ECG signals of every lead.

The broken lines on the template are position markers. They respectively mark the start and end points of the P and QRS waves, and the end point of the T wave.

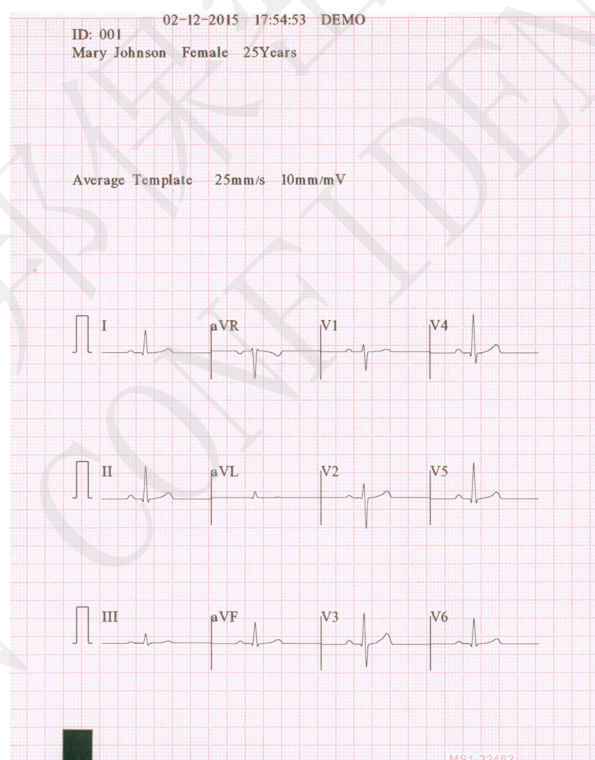
**Diagnosis Information:** Diagnosis information shows the auto diagnosis result.

**Bottom Information:** 0.67~100Hz (0.67Hz DFT Filter, 100Hz Lowpass Filter),  
AC50 (50Hz AC Filter)  
25mm/s (Paper Speed)  
10mm/mV (Gain)  
♥60 (Heart Rate)  
2\*5s+1r (12 leads are printed in 2 groups of 6 with the ECG wave of one lead on the bottom, and every group is printed for about 5s)  
Time Scale (0-10s)  
V2.1 (Software Version)  
SEMIP V1.81 (Algorithm Version; if Glasgow algorithm is enabled, Glasgow V28.6.0 will be printed instead.)  
SE-1200 (Electrocardiograph Model)  
Institution Name  
Report Confirmed by

## Save Paper Mode



(a)

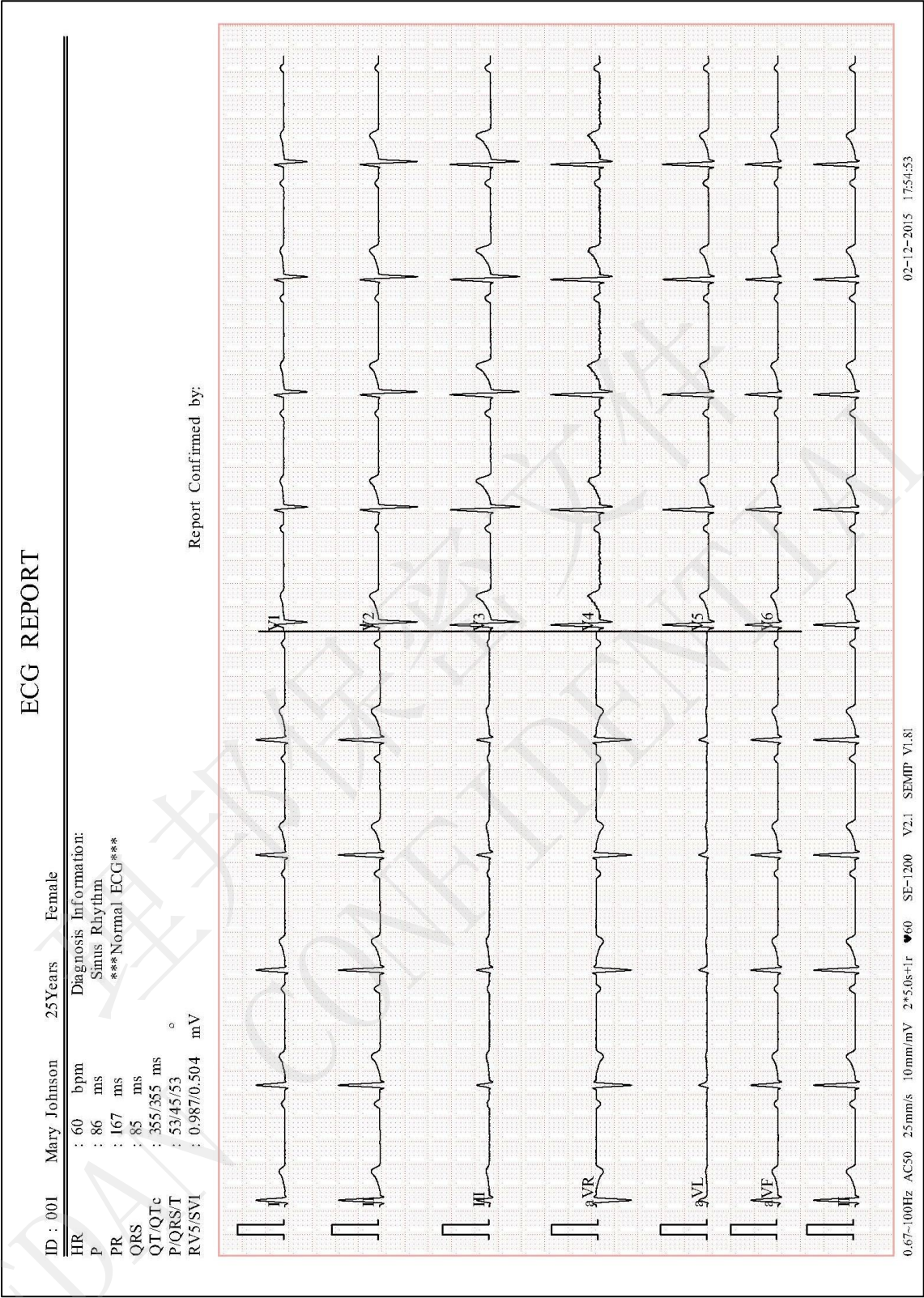


(b)

The above figure (a) and (b) show an ECG report in the auto mode. **Template** is selected, and **Record Style** is set to **6×2+1R**.



6.5.2 Auto ECG Report Printed by the USB Printer





## Chapter 7 Transmitting ECG Data

### 7.1 Transmitting ECG Data to the PC

ECG data in DAT/PDF/SCP/FDA-XML/DICOM format can be transmitted to the PC. To transmit ECG data in DAT format, the DMS of the manufacturer must be installed in the PC. To transmit ECG data in PDF/SCP/FDA-XML/DICOM format, the FTP receiving software must be installed in the PC.

#### **CAUTION**

It is forbidden to connect or disconnect a U disk or a USB printer during the transmission course.

#### 7.1.1 Transmitting ECG Data in DAT V1.03 Format Through Serial Cable

1. If the PC has RS232 socket, connect the PC RS232 socket to the electrocardiograph RS232 socket with an RS232 cable.
2. If the PC has no RS232 socket, you can connect the PC USB socket to the electrocardiograph RS232 socket by RS232-USB Assembly.

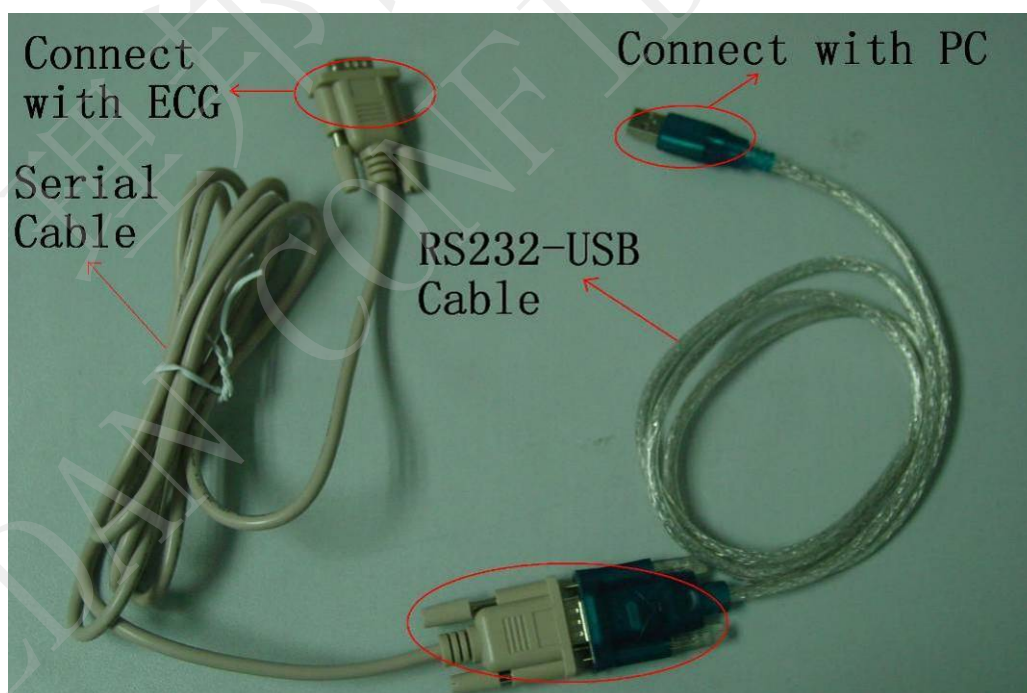


Figure 7-1 RS232-USB Assembly

3. Set **Auto Transmission** to **On** and **Transmission Mode** to **UART** in the **Transmission Setup** window.
4. Log into the DMS.
5. In the auto or rhythm mode, ECG data will be transmitted through the serial cable automatically after an ECG report is printed out.

## 7.1.2 Transmitting ECG Data in DAT and DAT V1.03 Format Through Ethernet Cable

1. Log into the DMS.
2. Connect the electrocardiograph to the PC with an Ethernet cable recommended by the manufacturer.
3. Configure the **Transmission Setup** window.

**NOTE:** For more information on configuring network settings, consult your Network Administrator.

### For Ethernet Transmission:

- 1) Press **Shift+F1** in the **Transmission Setup** window to open the **Basic Setup** window.
- 2) Set **Auto Transmission** to **On** and **Transmission Mode** to **Wired**.
- 3) Set the **Server IP** item to the IP of the PC.  
For details, please refer to Section 10.6.1 "Basic Setup".
- 4) Press **Enter** to confirm, and then press **Esc** to return to the main screen.

### For Wireless Network Transmission:

- 1) Press **Shift+F1** in the **Transmission Setup** window to open the **Basic Setup** window.
  - 2) Set **Auto Transmission** to **On** and **Transmission Mode** to **Wireless**.
  - 3) Set the **Server IP** item to the IP of the PC.  
For details, please refer to Section 10.6.1 "Basic Setup".
  - 4) Press **Shift+F2** in the **Transmission Setup** window to open the **WIFI Setup** window.  
For details, please refer to Section 10.6.2 "WIFI Setup".
  - 5) Connect the wireless network.
4. Set **File Format** to **DAT** in the **File Setup** window.
  5. In the auto or rhythm mode, ECG data will be transmitted through the network automatically after an ECG report is printed out.

### 7.1.3 Transmitting ECG Data in SCP/FDA-XML/PDF/DICOM Format Through Ethernet Cable

**NOTE:** The SCP/FDA-XML/DICOM function can be activated on the **Advanced Setup** screen. For details, please contact the manufacturer or the local distributor.

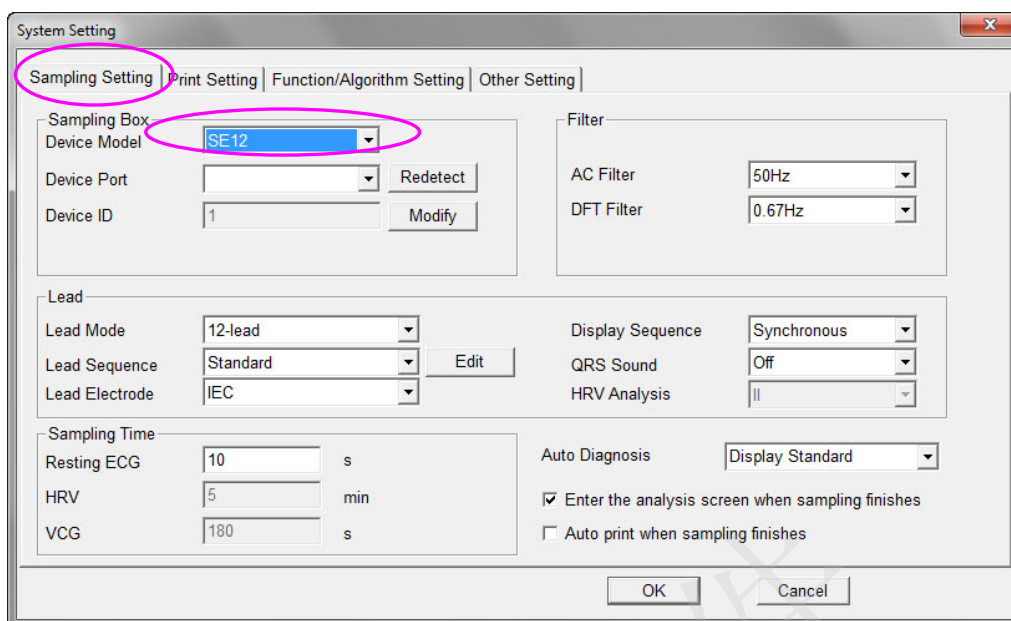
1. Log into the FTP receiving software.
2. Connect the electrocardiograph to the PC with an Ethernet cable recommended by the manufacturer. If WIFI has been used, connect the PC and electrocardiograph to WIFI.
3. Configure the **Transmission Setup** window.
  - 1) Press **Shift+F1** in the **Transmission Setup** window to open the **Basic Setup** window.
  - 2) Set **Auto Transmission** to **On** and **Transmission Mode** to **Wired** or **Wireless**.
  - 3) Set the **Server IP** item to the IP of the PC.  
For details, please refer to Section 10.6.1 "Basic Setup".
  - 4) Set the **FTP User Name**, **FTP Password** and **FTP Path** items.
    - a) The user name and the password you input in the **FTP User Name** and **FTP Password** items must be available for FTP server.
    - b) The path you input in the **FTP Path** item must be the subdirectory of the path you input in the FTP receiving software.

**NOTE:** For more information about FTP server, consult your Network Administrator.
3. Set **File Format** to DICOM/SCP/FDA-XML/PDF in the **File Setup** window.
4. In the auto or rhythm mode, ECG data will be transmitted through the network automatically after an ECG report is printed out.

## 7.2 Real-time Transmission to SE-1515

**NOTE:** To use the real-time transmission function, the SE-1515 software of the manufacturer must be installed in the PC.

1. Double-click on the SE-1515 shortcut icon to start up the SE-1515 software..
  - 1) Enter the resting ECG sampling screen and click **Setup**. The System Setting window will be display.
  - 2) Select the **Sampling Setting** tab, and set **Device Model** to **SE12** in the Sampling Box setup panel.



- 3) After setup, click on the **OK** button to confirm.
2. Connect USB socket 1 of the electrocardiograph to the USB socket of the PC by using the high-speed USB cable.



For details, please contact the manufacturer or the local distributor.

3. Start the real-time transmission

The sampling box transmits to the PC the ECG signals acquired from the patient. Acquisition and transmission are simultaneous. The ECG signals are displayed on the PC monitor and eventually analyzed. For more details, refer to the user manual of the SE-1515 software.

In the real-time transmission, the electrocardiograph functions as an ECG sampling box to the SE-1515 software.

## Chapter 8 Managing Orders

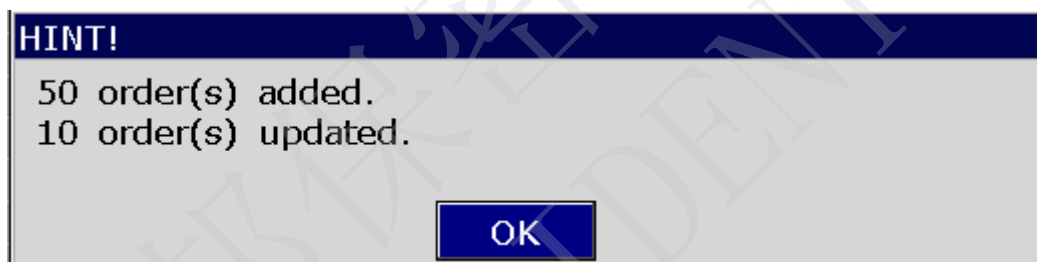
**NOTE:** To use the order function, the ECG data management software (DMS) of the manufacturer must be installed in the PC.

### 8.1 Loading Orders

Before loading orders, please configure the **Order Setup** screen. For details, please refer to Section 8.5 “Setting Orders”.

Operation procedures are as follows:

1. Connect the electrocardiograph to the PC installed with the DMS by using an Ethernet cable recommended by the manufacturer.
2. Set **Remote IP**, **Local IP**, **Gateway** and **Subnet Mask** in the **Transmission Setup** window. For details, please refer to Section 10.6 “Transmission Setup”.
3. Select **Load** on the **Order Manager** screen to load orders from the DMS, and then a hint will be displayed as follows.

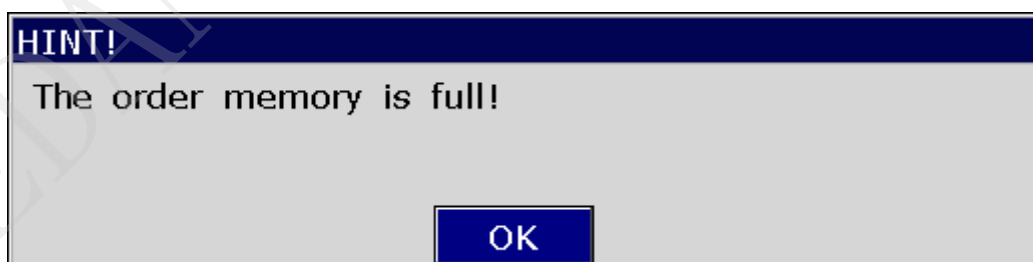


**NOTE:** If orders are modified on the DMS, the corresponding orders displayed on the **Order Manager** screen will be refreshed after you load orders from the software.

4. If you select **Exam.Room Filter** on the **Order Setup** screen, orders will be filtered after you press **Load**.

For details, please refer to Section 8.5 “Setting Orders”.

5. If 200 orders already exist on the **Order Manager** screen, the following hint pops up after you press **Load**.



## 8.2 Examining Orders

Select an order on the **Order Manager** screen, and then select **Examine** or press **Enter** to return to main screen1 for starting an examination.

**NOTE:** If you select **Delete After Examination** on the **Order Setup** screen, the order will be deleted from the **Order Manager** screen after you examine the selected order. Otherwise, the order will be marked by √ mark on the **Order Manager** screen after you examine the selected order.

## 8.3 Deleting Orders

Pressing **Del All** on the **Order Manager** screen can delete all the orders from the electrocardiograph.

Or, you can select an order on the **Order Manager** screen, select **Delete** to delete the selected order from the electrocardiograph.

## 8.4 Searching Orders

Select **Search** on the **Order Manager** screen to display the following window.

**SearchInfo Setup**

Search Type

☒ ID

☐ Name

☐ Request No.

☐ Exam.Room

☐ Department

☐ Order Date  -  -  ---  -  -

DD/MM/YYYY

OK Cancel

Select the search type, such as ID, Name, Request No., Exam. Room, Department, Time, enter the search information, and then press **Enter** to confirm. All the orders which meet the requirements will be searched and displayed on the **Order Manager** screen.

**NOTE:** The time mode in the **SearchInfo Setup** window is the mode you select in the **Date & Time Setup** window.

## 8.5 Setting Orders

### 8.5.1 Factory Defaults of Orders

Items	Default
Condition	Default
Sequence	Ascending
Delete After Examination	Deselect
Exam. Room Filter	Deselect

### 8.5.2 Order Setup

Select **Setup** on the **Order Manager** screen to make settings of orders.

Item	Description
Condition	<p>Choose from: <b>Default, ID, Order Date, Request No. or State</b></p> <p>Select <b>Default</b>, orders will be displayed in sequence of the time when the orders are loaded from the DMS.</p> <p>Select <b>ID, Order Date, Request No. or State</b>, orders will be displayed in sequence of the selected condition on the <b>Order Manager</b> screen.</p>

Item	Description
Sequence	<p>Choose from: <b>Ascending</b> or <b>Descending</b></p> <p><b>NOTE:</b></p> <ol style="list-style-type: none"> <li>1. When <b>Condition</b> is set to <b>State</b> and <b>Sequence</b> is set to <b>Ascending</b>, orders without examination will be displayed on the top of the <b>Order Manager</b> screen.</li> <li>2. When <b>Condition</b> is set to <b>State</b> and <b>Sequence</b> is set to <b>Descending</b>, orders with examination will be displayed on the top of the <b>Order Manager</b> screen.</li> </ol>
Delete After Examination	Select this item, the order will be deleted from the <b>Order Manager</b> screen after the order is examined.
Order Date Filter/Exam.Room Filter/Department Filter	<p>Select this item, a check mark √ appears in the box before <b>Order Date Filter/Exam.Room Filter/Department Filter</b>.</p> <p>You can enter an exact exam.room in the textbox, such as Electrocardiograph. All the orders which meet the requirements will be searched and displayed on the <b>Order Manager</b> screen.</p> <p>Deselect this item or enter nothing in the textbox, all the orders will be searched and displayed on the <b>Order Manager</b> screen.</p>
Load	You can click <b>Load</b> to download the information about the related departments.



## Chapter 9 Managing Files

If you want to save the ECG data in the electrocardiograph, you should set **Auto Save** to **to ECG** in the **File Setup** window. Then the ECG data in the auto or rhythm mode will be saved on the **File Manager** screen automatically. For details, please refer to Section 10.10 “File Setup”.

On the **File Manager** screen, files can be printed, transmitted, exported, displayed, edited, searched or deleted.

### CAUTION

1. When files are being printed, transmitted, deleted or exported, you cannot turn off the electrocardiograph.
2. Do not cut off the mains supply directly when no battery is installed in the device, or else, the stored data may be lost.

### 9.1 Transmitting Files

Make configuration in accordance with Section 7.1 “Transmitting ECG Data” before you transmit files.

Pressing **Trans All** on the **File Manager** screen<sup>1</sup> can transmit all the files from the electrocardiograph.

Or, select **Trans** on the **File Manager** screen<sup>2</sup>, and then press **Enter** to transmit the selected file from the electrocardiograph.

**NOTE:** If you select **Delete After Trans. Or Export** in the **File Setup** window, the files will be deleted from the **File Manager** screen after they are transferred.

### CAUTION

It is forbidden to connect or disconnect a U disk or a USB printer during the transmission course.

### 9.2 Exporting Files

1. Connect the U disk recommended by the manufacturer to the electrocardiograph.
2. Select **DAT/SCP/FDA-XML/PDF/DICOM** from the **File Format** list box in the **File Setup** window.
3. Select **Export All** on the **File Manager** screen<sup>1</sup> to export all the files to the directory of *ECGDATA\ECG-X\Export\Export Date and Time* of the U disk.

4. Or select a file on the **File Manager** screen1, and then press **Select** to display the **File Manager** screen2. Select **Export** on the **File Manager** screen2 to export the selected file to the directory of *ECGDATA\ECG-X\Export\Export Date and Time* of the U disk.

**NOTE:**

1. Please insert the U disk recommended by the manufacturer. Please set the format to **FAT** or **FAT32** when formatting the U disk.
2. X in the directory of *ECGDATA\ECG-X\Export\Export Date and Time* can be set in the **Device No.** textbox in the **Transmission Setup** window.
3. If you select **Delete After Trans. Or Export** in the **File Setup** window, the files will be deleted from the **File Manager** screen after they are exported.

## 9.3 Deleting Files

Pressing **Del All** on the **File Manager** screen1 can delete all the files from the electrocardiograph. Or, select **Delete** on the **File Manager** screen2 to delete the selected file from the electrocardiograph.

## 9.4 Searching Files

Select **Search** on the **File Manager** screen1 to display the following window.

Select the search type, such as ID, Name, Time, enter the search information, and then press **Enter** to confirm. All the files which meet the requirements will be searched and displayed on the **File Manager** screen.

If Untransmitted is selected, all the files that have not been transmitted will be displayed.

**NOTE:** The time mode in the **SearchInfo Setup** window is the mode you select in the **Date & Time Setup** window.

## 9.5 Importing Files

Operation procedures are as follows:

1. Save files that you want to import to the electrocardiograph to the directory of **ECGDATA** of the recommended U disk.
2. Connect the U disk to the electrocardiograph.
3. Select **Import** on the **File Manager** screen1 to import files from the directory of **ECGDATA** of the U disk to the electrocardiograph.

**NOTE:** Only the ECG files in DAT format produced by the electrocardiograph of the manufacturer can be imported.

## 9.6 Editing Patient Information

Press **Select** on the **File Manager** screen1 to display the **File Manager** screen2, and then select **Edit** to open the **Patient Information** window.

Patient Information			
ID	<input type="text" value="001"/>	Name	<input type="text" value="Mary Johnson"/>
Gender	<input type="text" value="Female"/> ▼	Age	<input type="text" value="25"/> <input type="text" value="Years"/> ▼
Weight	<input type="text" value="50"/> kg	Height	<input type="text" value="165"/> cm
Pacemaker	<input type="text" value="No"/> ▼	Address	<input type="text"/>
<input type="button" value="OK"/>		<input type="button" value="Cancel"/>	

**NOTE:** The **Address** item can be defined in the **User-defined** text box in the **Patient Information Setup** window. For details, please refer to Section 10.5 “Patient Information Setup”.

For details on inputting data, please refer to Section 4.1.2, “Entering Data”.

## 9.7 Printing Files

You can press **PRINT/STOP** on the File Manager screen1/2 or the preview screen to print ECG reports. For details, please refer to Section 6.4 “Printing a Stored ECG Report”.

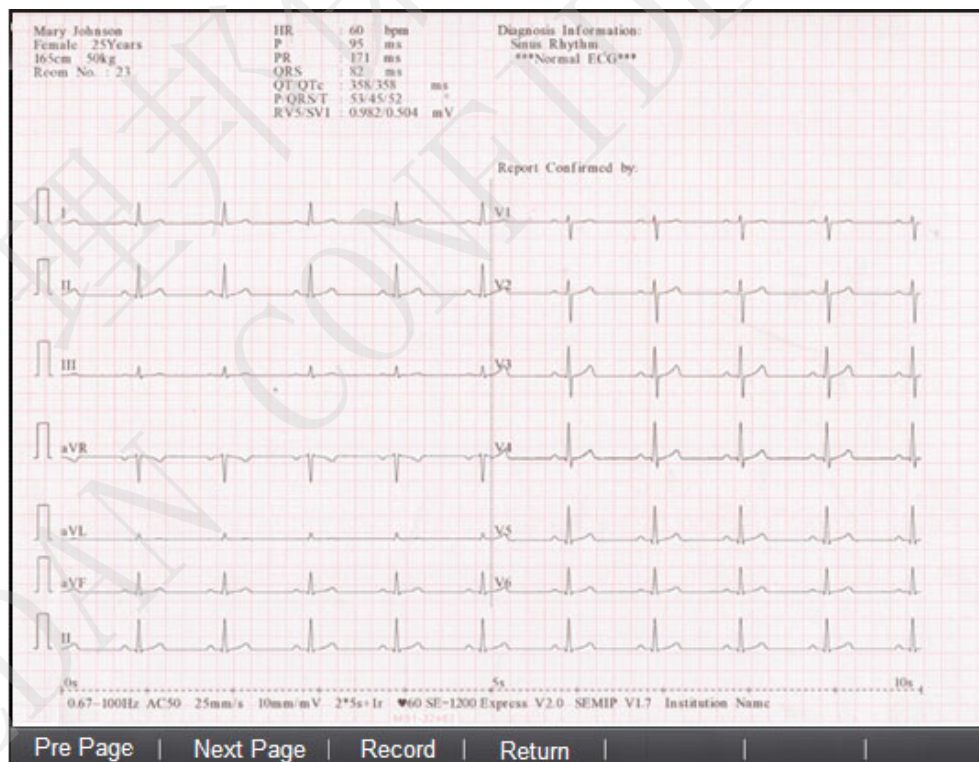
## 9.8 Previewing a File

### 9.8.1 SE-12 Express

Select **View** on the **File Manager** screen<sup>2</sup> to open the file preview screen.

[illegible]

The file preview screen displays the patient information, ECG waveform, measurement information and diagnosis information, as shown in the figure below:





Select **Measure** to display the measure screen which shows the measurement information.

```

001
Mary Smith
Measurement Information:
HR          : 0    bpm
P           : 94   ms
PR          : 171  ms
QRS         : 82   ms
QT/QTc      : 355/355 ms
P/QRS/T     : 55/45/54 °
RV5/SV1     : 0.980/0.501 mV
  
```

Waveform Template **Measure** Diagnosis Record Return

Select **Diagnosis** to show Minnesota Code and Diagnosis Information.

```

001
Mary Smith
Minnesota Code:
9-4-1

Diagnosis Information:
Sine Rhythm
***Normal ECG***
  
```

Waveform Template Measure **Diagnosis** Record Return

## Chapter 10 System Setup

Select **Setup** on the main screen1 to display the **System Setup** screen.

### 10.1 Factory Defaults

Work Mode Setup		
Items	Default	Default (Only in the U.S.)
Mode Options	Auto, Manual, Rhythm	Auto, Manual, Rhythm, R-R
Display Style	6×2	3×4+1R
Rhythm Style	Three Leads	Three Leads
Sampling Mode	Real-time Sample	Real-time Sample
Duration (Periodic Sample)	60 min	60 min
Interval (Periodic Sample)	1 min	1 min
Preview	Off	Off
Auto Arrhythmia Detection	Off	Off
Filter Setup		
Items	Default	Default (Only in the U.S.)
AC filter	On	On
EMG filter	Off	Off
DFT filter	0.67Hz	0.67Hz
Lowpass filter	100Hz	100Hz

<b>Record Info Setup1</b>		
<b>Items</b>	<b>Default</b>	<b>Default (Only in the U.S.)</b>
Auto Record Style	6×2	3×4+1R
Manual REC Style	6 channels	6 channels
Record Mode	Save Paper	Save Paper
Record Sequence	Sequential	Sequential
Gain	10mm/mV	10mm/mV
AGC	Off	Off
Print Out	On	On
Paper Marker	Yes	Yes
Record Device	Thermal	Thermal
Speed	25mm/s	25mm/s
Sample Time	10s	10s
<b>Record Info Setup2</b>		
<b>Items</b>	<b>Default</b>	<b>Default (Only in the U.S.)</b>
Measure / Analysis / Diagnosis Conclusion / Time Scale	On	On
Template / Position Marker / Minnesota Code / Device No.	Off	Off
Baseline Adjustment	Horizontal	Horizontal
RR Interval List	Off	Off



Grid of Thermal Report	Off	Off
Grid of USB Report	On	On
<b>Record Info Setup3</b> (VCG function needs to be activated)		
Items	Default	Default (Only in the U.S.)
XYZ Wave / Measure / Analysis	Off	Off
QRS Gain	20mm/mV	20mm/mV
<b>Patient Information Setup</b>		
Items	Default	Default (Only in the U.S.)
Gender / Pacemaker	On	On
First/Last Name / BP / Race / Height / Weight / Medication / Room No. / Department / Physician / Technician / Ref-Physician / Exam. Room	Off	Off
ID Mode	Auto	Manual
ID Hint	On	On
Age Mode	Age	D.O.B
H/W Unit	cm/kg	inch/lb.
BP Unit	mmHg	mmHg
Prompt	Confirmed By	Confirmed By
Patient Information Refreshed	On	On

Order Acquired	Off	Off
User-defined	Cleared	Cleared
<b>Transmission Setup</b>		
<b>Items</b>	<b>Default</b>	<b>Default (Only in the U.S.)</b>
Auto Transmission	Off	Off
Transmission Mode	Ethernet	Ethernet
FTP User Name / FTP Password/ FTP Path	Cleared	Cleared
<b>Transmission - WIFI Setup (with WIFI configured)</b>		
<b>Items</b>	<b>Default</b>	<b>Default (Only in the U.S.)</b>
Enable WIFI	Disabled	Disabled
Auto Get IP	Off	Off
<b>Lead Setup</b>		
<b>Items</b>	<b>Default</b>	<b>Default (Only in the U.S.)</b>
Lead Sequence	Standard	Standard
Nehb	Off	Off
Rhythm Lead 1	II	II
Rhythm Lead 2	V1	V1
Rhythm Lead 3	V5	V5
Lead Off Hint	Off	Off
<b>Display &amp; Sound Setup</b>		

Items	Default	Default (Only in the U.S.)
Brightness	10	10
Key Volume	Medium	Medium
Hint Volume	Medium	Medium
QRS Volume	Off	Off
Notify Volume	Medium	Medium
Display Colors	Option 1	Option 1
Grid	On	On
<b>Date &amp; Time Setup</b>		
Items	Default	Default (Only in the U.S.)
Date Mode	DD-MM-YYYY	DD-MM-YYYY
Time Mode	24 Hours	24 Hours
Power Off/ LCD Off	Cleared	Cleared
<b>File Setup</b>		
Items	Default	Default (Only in the U.S.)
Auto Save	To ECG	To ECG
File Format	DAT	PDF
Delete After Trans. Or Export	Off	Off
Replace When Memory Full	Off	Off
<b>Maintenance Setup</b>		
Items	Default	Default (Only in the U.S.)

System Password	Cleared	Cleared
Other Setup		
Items	Default	Default (Only in the U.S.)
External Input	Off	Off
External Output	Off	Off
Caps Lock	Off	Off

10.2 Work Mode Setup

Select **Work Mode** on the **System Setup** screen, and then press **Enter** to open the **Work Mode Setup** window.

Work Mode Setup

Mode Options

☒ MANU
 ☒ AUTO
 ☒ RHYT
 ☐ R-R
 ☐ VCG

Display Style

3x4  
 3x4+1R  
 3x4+3R  
 6x2  
 6x2+1R  
 12x1

Sampling Mode

Pre-Sample  
 Real-time Sample  
 Triggered Sample  
 Periodic Sample

Periodic Sample Setup

Duration  min  
 Interval  min

Rhythm Style

Single Lead  
 Three Leads

Preview

Auto Arrhythmia Detection

OK

Cancel

Press <Tab> or <Shift+Tab> to move the cursor.

Figure 10-1 Work Mode Setup Window

Item	Description
Mode Options	Select a working mode. Choose from: <b>MANU</b> , <b>AUTO</b> , <b>RHYT</b> , <b>R-R</b> or <b>VCG</b> (only configurable for SE-1200 Express)
Display Style	Select a style to display the ECG waves. Choose from: <b>3×4</b> , <b>3×4+1R</b> , <b>3×4+3R</b> , <b>6×2</b> , <b>6×2+1R</b> , <b>12×1</b> , or <b>6×1</b>

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Rhythm Style	Select a style to print the ECG waves of the appointed rhythm lead. Choose from: <b>Single Lead</b> or <b>Three Leads</b>
Sampling Mode (Only available in the auto mode)	Choose from: <b>Pre-Sample</b> , <b>Real-time Sample</b> , <b>Triggered Sample</b> or <b>Periodic Sample</b> Select <b>Pre-Sample</b> , 10s ECG data sampled before pressing the <b>START/STOP</b> key will be printed out. <b>NOTE:</b> When <b>Sampling Mode</b> is set to <b>Pre-Sample</b> , if you press the <b>PRINT/STOP</b> key before the electrocardiograph samples for 10s, the recorder will not respond.
Sampling Mode (Only available in the auto mode)	Select <b>Real-time Sample</b> , 10s ECG data sampled after pressing the <b>PRINT/STOP</b> key will be printed out. Select <b>Triggered Sample</b> , after pressing the <b>PRINT/STOP</b> key, if Arrhythmia ECG data, including Asystole, Ventricular Fibrillation/Ventricular Tachycardia, 5>PVCS>=3, Paired PVCs, Bigeminy, Trigeminy, R ON T, single PVC and Missed Beat, is detected during the learning course, the printing will be triggered automatically. Select <b>Periodic Sample</b> , first you should set <b>Duration</b> and <b>Interval</b> . <b>NOTE:</b> ID and patient information will not be changed while carrying out the periodic printing.
Duration & Interval	In the auto mode, when <b>Sampling Mode</b> is set to <b>Periodic Sample</b> , if <b>Interval</b> is set to <b>2 min</b> , <b>Duration</b> is set to <b>24 min</b> , after pressing the <b>PRINT/STOP</b> key, the printing will be performed every two minutes and come to 12 times.
Preview	Enable or disable the preview function in the auto or VCG (only configurable for SE-1200 Express) mode. Choose from: <b>On</b> or <b>Off</b>
Auto Extend Record	Choose from: <b>On</b> or <b>Off</b> Select <b>On</b> , if arrhythmia is detected in the auto mode, a hint will pop up to ask you whether to print an extra rhythm report after the 12-lead ECG report.

### 10.3 Filter Setup

Select **Filter** on the **System Setup** screen, and then press **Enter** to open the **Filter Setup** window.

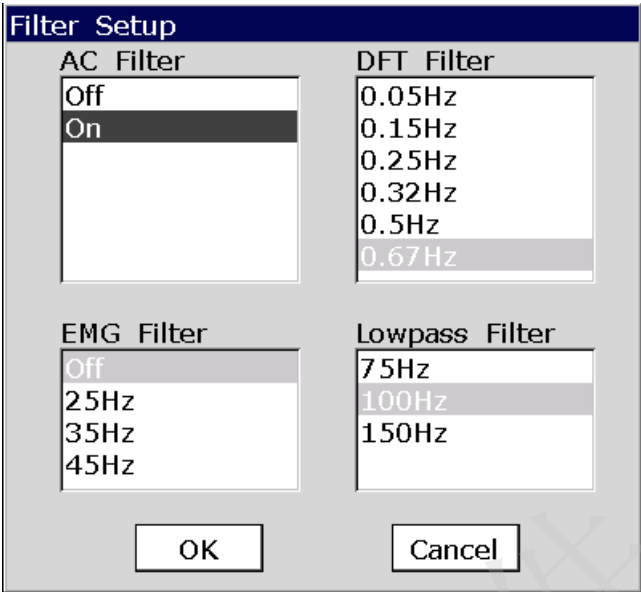


Figure 10-2 Filter Setup Window

Item	Description
AC Filter	<p>Choose from: <b>On</b> or <b>Off</b></p> <p><b>NOTE:</b> AC frequency can be set to <b>50Hz</b> or <b>60Hz</b> on the <b>Advanced Setup</b> screen according to local mains supply specifications.</p>
DFT Filter	<p>DFT Filter greatly reduces the baseline fluctuations without affecting the ECG signals. The purpose of this filter is to keep the ECG signals on the baseline of the printout.</p> <p>Choose from: <b>0.05Hz</b>, <b>0.15Hz</b>, <b>0.25Hz</b>, <b>0.32Hz</b>, <b>0.5Hz</b> or <b>0.67Hz</b></p> <p>The set value is the low limit of the frequency range.</p>
EMG Filter	<p>EMG Filter suppresses disturbance caused by strong muscle tremor.</p> <p>The cutoff frequency can be set to <b>25Hz</b>, <b>35Hz</b> or <b>45Hz</b>.</p>
Lowpass Filter	<p>Lowpass Filter restricts the bandwidth of input signals.</p> <p>The cutoff frequency can be set to <b>75Hz</b>, <b>100Hz</b> or <b>150Hz</b>.</p> <p>All the input signals whose frequency is higher than the set cutoff frequency will be attenuated.</p> <p><b>NOTE:</b> Only when <b>EMG Filter</b> is set to <b>Off</b>, can the setting of <b>Lowpass Filter</b> be effective.</p>

**NOTE:** To pass the distortion test, the electrocardiograph has to be configured with the highest bandwidth in filter settings. Otherwise, ECG signal may be distorted.

10.4 Record Info Setup

Select **Record Info** on the **System Setup** screen, and then press **Enter** to open the **Record Info Setup** window.

10.4.1 Setup 1

Press **F1** to switch to the **Setup 1** window.

Record Info Setup

Setup 1

Setup 2

Setup 3

Auto Record Style

3x4

3x4+1R

3x4+3R

6x2

6x2+1R

12x1

Record Mode

Save Paper

Quickly

Gain

10mm/mV

Record Sequence

Sequential

Synchronous

AGC

Off

Record Device

Thermal

Print Out

Off

Sample Time

10s

Manual Record Style

6 channels

Speed

25mm/s

Paper Marker

Yes

OK

Cancel

Press F1 or F2 to switch page.

Figure 10-3 Record Info Setup1

Item	Description
Auto Record Style	Select a style to print the ECG waves of 12 leads in the auto mode. Choose from: <b>3×4</b> , <b>3×4+1R</b> , <b>3×4+3R</b> , <b>6×2</b> , <b>6×2+1R</b> or <b>12×1</b>
Manual REC Style	Select a style to print the ECG waves in the manual mode. Choose from 3 channels, 6 channels, 12 channels.
Record Mode	Choose from: <b>Save Paper</b> or <b>Quickly</b>  Select <b>Save Paper</b> , 10s after pressing the <b>PRINT/STOP</b> key on the main screen, an ECG report is printed in the auto mode. The patient information, measure information, interpretation and ECG waves are printed at the same paper.  Select <b>Quickly</b> , pressing the <b>PRINT/STOP</b> key on the main screen to begin printing an ECG report immediately in the auto mode, the patient information, measure information, interpretation and ECG waves are

	<p>printed on the different pieces of paper.</p> <p><b>NOTE:</b> Only when <b>Sampling Mode</b> is set to <b>Real-time Sample, Quickly</b> is available.</p>
Record Sequence	<p>Choose from: <b>Sequential</b> or <b>Synchronous</b></p> <p>Select <b>Sequential</b>, the lead group is printed one by one in a certain sequence. The start time of a lead group is just the end time of the previous lead group.</p>
Record Sequence	<p>Select <b>Synchronous</b>, the lead group is printed one by one in a certain sequence. All leads are printed with the same start time.</p>
Gain	<p>You can set the indicated height of 1mV ECG on the paper.</p> <p>Choose from: <b>1.25mm/mV, 2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV</b> or <b>10/5mm/mV</b>.</p> <p><b>10/5mm/mV</b> means that the gain of limb leads is set to <b>10mm/mV</b>, while the gain of chest leads is set to <b>5mm/mV</b>.</p>
AGC (not available in the VCG mode)	<p><b>AGC</b> means auto gain control.</p> <p>Choose from: <b>On</b> or <b>Off</b></p> <p>Select <b>On</b>, the gain can be automatically adjusted according to actual signals.</p>
Record Device	<p>Choose from: <b>Thermal, HP1010/1510, HPM401, HP1020/1020PLUS/1106</b></p> <p>You should connect the corresponding USB printer to the electrocardiograph.</p>

### **WARNING**

If the printer used is not the type listed above, additional safety measures (such as applying an isolation transformer to supply the medical system) should be taken when the safety of the medical system has not been evaluated. If in doubt, consult our technical service department or your local distributor.

### **CAUTION**

It is forbidden to connect or disconnect a U disk or a USB printer during the transmission course.

Record Device	<p><b>NOTE:</b></p> <ol style="list-style-type: none"> <li>During the USB printing course, pressing the <b>PRINT/STOP</b> key again cannot stop printing ECG reports.</li> </ol>
---------------	--



	<ol style="list-style-type: none"> <li>2. For details of the ECG report printed by the USB printer, please refer to 6.5.2, "ECG Reports Printed by the USB Printer".</li> <li>3. USB printing is ineffective in the auto periodic sampling mode, VCG mode,, manual mode and R-R analysis mode.</li> <li>4. Make sure that paper is installed in the USB printer before printing. Error may occur if no paper is loaded in the USB Printer.</li> </ol>
Print Out (Only available in the auto and rhythm modes)	<p>Choose from: <b>On</b> or <b>Off</b></p> <p>Select <b>On</b>, the ECG report can be printed out by pressing the <b>PRINT/STOP</b> key.</p> <p>Select <b>Off</b>, the ECG report can be saved, but cannot be printed out by pressing the <b>PRINT/STOP</b> key.</p>
Speed	<p>Choose from: <b>5mm/s</b>, <b>6.25mm/s</b>, <b>10mm/s</b>, <b>12.5mm/s</b>, <b>25mm/s</b> or <b>50mm/s</b></p> <p>In the manual mode, select <b>5mm/s</b>, <b>6.25mm/s</b>, <b>10mm/s</b>, <b>12.5mm/s</b>, <b>25mm/s</b> or <b>50mm/s</b>.</p> <p>Only <b>25mm/s</b> and <b>50mm/s</b> are available in the auto, rhythm and VCG (only configurable for SE-1200 Express) modes.</p> <p>Only <b>25mm/s</b> is available in the R-R analysis mode.</p>
Paper Marker	<p><b>Paper Marker</b> is used to identify the start point of each page of the recorder paper.</p> <p>Choose from: <b>Yes</b> or <b>No</b></p> <p>Select <b>Yes</b> if the paper with black markers on the bottom is used, and the device can identify the start point of each page of the recorder paper while printing ECG reports.</p>
Sample Time	<p>Choose from: 10s, 20s, 30s, 40s, 50, 60s</p> <p><b>NOTE:</b> If the time period is longer than 10s, the ECG data sampled will be stored, and the specified part of data will be analyzed.</p>

## 10.4.2 Setup 2

Press **F2** to switch to the **Setup 2** window.

Record Info Setup

Setup 1

Setup 2

Setup 3

Auto Record Info

☐ Minnesota Code

☐ Template
 ☐ Position Marker
 ☒ Measure

☒ Analysis
 ☒ Diagnosis Conclusion
 ☐ Time Scale

Baseline Adjustment

Horizontal

☐ Device No.

R-R Record Info

☐ RR Interval List

Grid Of Report

☐ Thermal Report
 ☒ USB Report

OK

Cancel

Press <SPACE> to toggle the checked state.

Figure 10-4 Record Info Setup2

Item	Description
Auto Record Info	<p>Select the item printed in the ECG reports.</p> <p><b>NOTE:</b></p> <ol style="list-style-type: none"> <li><b>Template, Position Marker, Measure, Analysis, Diagnosis Conclusion, and Minnesota Code</b> are available only in the auto mode, and <b>Time Scale</b> and <b>Device No.</b> are available in all the work modes.</li> <li>To get more information about the above contents, please refer to Section 6.5.1, “Auto ECG Reports”.</li> </ol>
Baseline Adjustment	<p>Choose from: <b>Horizontal, Auto or Off</b></p> <p>Select <b>Horizontal</b>, the baselines of the lead groups are adjusted simultaneously, and the baselines of the leads in the same row are on the same line.</p> <p>Select <b>Auto</b>, the baselines of the lead groups are adjusted respectively.</p> <p>Select <b>Off</b>, the baselines of the lead groups are adjusted equally in the ECG reports.</p>
RR Record Info	Select <b>RR Interval List</b> , the item will be printed in the ECG reports.
Grid of Report	Select <b>Thermal Report</b> or <b>USB Report</b> , the grid will be printed while printing ECG reports with the thermal recorder or USB printer.

10.4.3 Setup 3

NOTE:

- Only if the VCG function is activated, can the **Record Info Setup3** window appear. For details on activating the VCG function, please contact the manufacturer or the local distributor.
- Pressing **F2** twice in the **Record Info Setup** window can display the **Setup3** window.

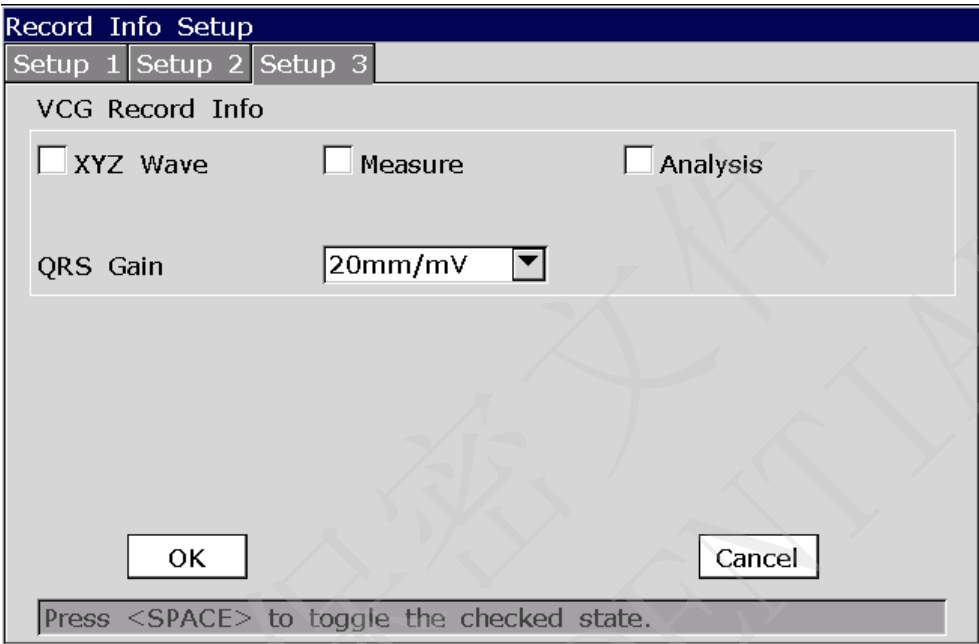


Figure 10-5 Record Info Setup3

Item	Description
VCG Record Info	Select the item printed in the ECG reports.
QRS Gain	Choose from: 10mm/mV, 20mm/mV, 40mm/mV or 80mm/mV

### 10.5 Patient Information Setup

Select **Patient Info** on the **System Setup** screen, and then press **Enter** to open the **Patient Information Setup** window.

Patient Information Setup

☐ First/Last Name

☒ Gender

☐ Height

☐ Weight

☐ BP

☐ Race

☒ Pacemaker

☐ Medication

☐ Room No.

☐ Department

☐ Ref-Physician

☐ Exam.Room

☐ Technician

☐ Physician

ID

ID Hint

Age

Auto

On

Age

H/W Unit

BP Unit

Prompt

cm/kg

mmHg

Confirmed By

PatInfo Refreshed

Order Acquired

User-defined

On

Off

OK

Cancel

Press <Tab> or <Shift+Tab> to move the cursor.

Figure 10-6 Patient Information Setup Window

Item	Description
Patient Options	<p>Select the item displayed in the <b>Patient Information</b> window.</p> <p><b>Child Mode</b> is available only when Glasgow algorithm is used. In the Child Mode, lead V3 is used to sample ECG signals of V4R.</p> <p>The lead sequence of the Child Mode is: I, II, III, aVR, aVL, aVF, V4R, V1, V2, V4, V5, V6.</p> <p><b>NOTE:</b></p> <ol style="list-style-type: none"><li><b>Pacemaker</b> appears in the <b>Patient Information</b> window after it is selected in the <b>Patient Information Setup</b> window. Set <b>Pacemaker</b> to <b>Yes</b> in the <b>Patient Information</b> window, and the <b>Pacemaker</b> information will be displayed on the report printed out.</li><li><b>Pacemaker</b> is recommended to be set to <b>No</b> unless it is known that the majority of the electrocardiograph usage will be on patients with pacemakers.</li><li>Glasgow algorithm is an optional advanced function. To activate it, please contact the local distributor.</li></ol>
ID	<p>Choose from: <b>Auto</b>, <b>Time</b> or <b>Manual</b></p> <p>Select <b>Manual</b>, the patient ID is within 30 ASCII characters.</p> <p>Select <b>Auto</b>, <b>ID</b> can be automatically generated after you press</p>

	<p><b>Shift+Bksp</b> to refresh the patient information. The patient ID is 0~1999, 999, 999.</p> <p>Select <b>Time</b>, press <b>Shift+Bksp</b> to refresh the patient information, and then the patient ID can be automatically generated according to the time when you press the <b>PRINT/STOP</b> key to print an ECG report. Entering the patient ID manually is not supported.</p>
ID Hint	<p>Choose from: <b>On</b> or <b>Off</b></p> <p>In the auto, rhythm or VCG (only configurable for SE-1200 Express) mode, when <b>ID</b> is set to <b>Manual</b> and <b>ID Hint</b> is set to <b>On</b>, if you do not input the patient ID before pressing the <b>PRINT/STOP</b> key, a hint will pop up to remind you to input the patient ID.</p>
Age	<p>Choose from: <b>Age</b>, <b>D.O.B</b> or <b>Age Group</b></p> <p>Select <b>Age</b>, you can enter the patient age manually in the <b>Patient Information</b> window.</p> <p>Select <b>D.O.B</b>, the <b>D.O.B</b> textbox appears and the <b>Age</b> textbox becomes unavailable in the <b>Patient Information</b> window, you can enter the birthday of the patient, and the system will calculate the patient age automatically.</p> <p>Select <b>Age Group</b>, the <b>Age Group</b> textbox appears in the <b>Patient Information</b> window and the <b>0</b> key (or <b>Age Group</b> key) can be available. For details, please refer to Section 2.2 “Keyboard and Keys”.</p>
H/W Unit	Choose from: <b>cm/kg</b> or <b>inch/lb</b>
BP Unit	Choose from: <b>mmHg</b> or <b>kPa</b>
Prompt	<p>Choose from: <b>Confirmed By</b> or <b>Unconfirmed</b></p> <p>Select <b>Confirmed By</b>, the physician’s name is printed in the ECG reports if it is input in the <b>Patient Information</b> window.</p> <p>Select <b>Unconfirmed</b>, <b>Unconfirmed Report</b> is printed in the ECG reports.</p>
PatInfo Refreshed	<p>Choose from: <b>On</b> or <b>Off</b></p> <p>Select <b>On</b>, the patient information will be refreshed after the ECG report is printed out and all the leads are off.</p>
Order Acquired	<p>Choose from: <b>On</b> or <b>Off</b></p> <p>Select <b>On</b>, the <b>Order</b> item will be displayed in the <b>Patient Information</b> window and you can acquire orders by clicking it.</p>
User-defined	Input customized information such as <b>Address</b> , the information will be displayed in the <b>Patient Information</b> window.

## 10.6 Transmission Setup

### NOTE:

1. To transmit ECG data to the PC in DAT format, the ECG data management software (DMS) of EDAN must be installed in the PC.. You should log into the DMS before transmission.
2. To transmit ECG data to the PC in DICOM/SCP/FDA-XML/PDF format, the FTP receiving software must be installed in the PC. You should log into the FTP receiving software before transmission.

Select **Transmission** on the **System Setup** screen, and press **Enter** to open the **Transmission Setup** window.

### 10.6.1 Basic Setup

Before WIFI is configured, the **Transmission Setup** is as follows

The image shows the 'Transmission Setup' window with the 'Basic Setup' tab selected. The window contains the following fields and controls:

- Device No.:** Text box containing '0135135'.
- FTP User Name:** Text box.
- Auto Transmission:** Dropdown menu set to 'Off'.
- FTP Password:** Text box.
- Transmission Mode:** Dropdown menu set to 'Ethernet'.
- FTP Path:** Text box.
- Server IP:** Four text boxes containing '192', '168', '1', and '187'.
- Local IP:** Four text boxes containing '192', '168', '1', and '135'.
- Gateway:** Four text boxes containing '192', '168', '1', and '1'.
- Subnet Mask:** Four text boxes containing '255', '255', '255', and '0'.
- Buttons:** 'OK' and 'Cancel' at the bottom.

When WIFI is configured, the **Transmission Setup** is as follows

The image shows the 'Transmission Setup' window with the 'WIFI Setup' tab selected. The window contains the following fields and controls:

- Device No.:** Text box containing '0'.
- FTP User Name:** Text box.
- Auto Transmission:** Dropdown menu set to 'Off'.
- FTP Password:** Text box.
- Transmission Mode:** Dropdown menu set to 'Wired'.
- FTP Path:** Text box.
- Server IP:** Four text boxes containing '192', '168', '1', and '187'.
- Local IP:** Four text boxes containing '192', '168', '1', and '134'.
- Gateway:** Four text boxes containing '192', '168', '1', and '1'.
- Subnet Mask:** Four text boxes containing '255', '255', '255', and '0'.
- Buttons:** 'OK' and 'Cancel' at the bottom.
- Footer:** A bar at the bottom with the text 'Press <Shift+F1> or <Shift+F2> to switch page.'

Figure 10-7 Transmission Setup Window

Item	Description
Device No.	If you input <b>0</b> in the <b>Device No.</b> textbox, after you save data to the U disk or SD card, the data will be in the directory of <b>ECGDATA\ECG-0\Store\Examination Date</b> of the U disk or SD card; after you export files from the electrocardiograph to the U disk or SD card, the files will be in the directory of <b>ECGDATA\ECG-0\Export\Export Date and Time</b> of the U disk or SD card.
Auto Transmission	Choose from: <b>On</b> or <b>Off</b>  Select <b>On</b> , ECG data will be transmitted automatically after an ECG report is printed out in the auto or rhythm mode; in the off mode, 10s ECG data sampled before pressing the <b>PRINT/STOP</b> key can be saved and transmitted, but cannot be printed.
Transmission Mode (with WIFI configured)	Choose from: <b>Wired</b> , <b>Wireless</b> , or <b>UART</b>  Select <b>Wired</b> , ECG data will be transmitted to the PC through the wired network.  Select <b>UART</b> , ECG data will be transmitted to the PC through the serial cable.  Select <b>Wireless</b> , ECG data will be transmitted to the PC through the wireless network.
FTP Information	Enter data in the <b>FTP Path</b> , <b>FTP User Name</b> textboxes.
IP Addresses	<b>Set Server IP, Local IP, Set Gateway, Set Subnet Mask</b>  For details, please refer to Section 7.1.1 "Transmitting ECG Data in DAT V1.03 Format".  <b>NOTE:</b> If WIFI is enabled and <b>Auto Get IP</b> is selected in the <b>WIFI Setup</b> window, IP addresses can be acquired automatically.

### 10.6.2 WIFI Setup (Optional)

Press **Shift+F2** to switch to the **WIFI Setup** window.



Transmission Setup

Basic Setup

WIFI Setup

Disable WIFI

Add Wifi

☐ Auto Get IP

View MAC Address

SSID	SECURITY	RSSI	STATE
ASUS	WPA2	GREAT	None
D-Link	WPA2	BAD	None
EDAN-AP	NONE	GOOD	Connected

Press <Tab> or <Shift+Tab> to move the cursor.

Refresh

Connect

Return

Figure 10-8 WIFI Setup Window

**NOTE:** The WIFI transmission function is only available for the machine configured with the WIFI module.

Item	Description
SSID	The name of the searched wireless network.
SECURITY	The encryption type for the connected wireless network.
RSSI	The signal quality of the wireless network It includes <b>Poor</b> , <b>Good</b> and <b>Great</b> .
STATE	The connection status for the searched wireless network. It includes <b>Connected</b> and <b>Disconnected</b> .
Auto Get IP	Select this item, addresses of <b>Local IP</b> , <b>Gateway</b> and <b>Subnet Mask</b> will be acquired automatically after the wireless network is connected successfully.  NOTE: <ol style="list-style-type: none"> <li>Only if WIFI is disabled, can <b>Auto Get IP</b> option be available.</li> <li>To use <b>Auto Get IP</b>, DHCP function needs to be enabled on the router.</li> </ol>

Enable/Disable WIFI	Press <b>Tab</b> to move the cursor to <b>Enable WIFI</b> or <b>Disable WIFI</b> , press <b>Enter</b> to enable or disable WIFI.
Add WIFI	<p>If the network is on closed broadcasting, you can add it manually.</p> <p>Press <b>Tab</b> to move the cursor to <b>Add Wifi</b>, and then press <b>Enter</b> to open the <b>Enter Network Name</b> dialogue box. Enter the network name, and then press Enter in the dialogue box, the entered network will be displayed in the <b>WIFI Setup</b> window. If the entered network is not found, the hint <b>Net Not Found</b> pops up.</p>
Refresh	Press to search the networks in the wireless network region.
Connect	Press to highlight a network, select <b>Connect</b> to build a network connection. If the <b>Enter Password</b> dialogue box pops up, you can build a network connection after entering correct password.
Return	Press to return to the <b>System Setup</b> window and the settings will be saved.

### 10.7 Lead Setup

Select **Lead** on the **System Setup** screen, and press **Enter** to open the **Lead Setup** window.

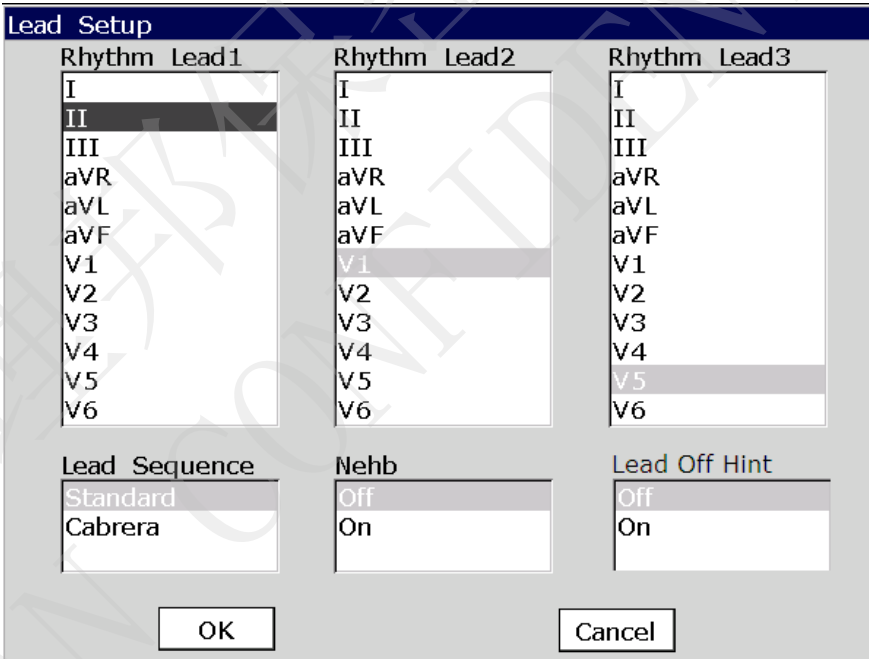


Figure 10-9 Lead Setup Window

Item	Description
Rhythm Lead1/2/3	<p>Choose from: <b>I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, or V6</b></p> <p>In the auto mode:</p> <p>When <b>Record Style</b> is set to <b>3×4+1R</b> or <b>6×2+1R</b>, the rhythm lead selected in the <b>Rhythm Lead1</b> list box will be printed in the ECG reports;</p> <p>When <b>Record Style</b> is set to <b>3×4+3R</b>, 3 rhythm leads selected respectively in the <b>Rhythm Lead1/2/3</b> list box will be printed in the ECG reports.</p> <p>In the rhythm mode:</p> <p>When <b>Rhythm Style</b> is set to <b>Single Lead</b>, 60s wave of the rhythm lead selected in the <b>Rhythm Lead1</b> list box will be printed in the ECG reports;</p> <p>When <b>Rhythm Style</b> is set to <b>Three Leads</b>, 20s waves of three rhythm leads selected respectively in the <b>Rhythm Lead1/2/3</b> list box will be printed in the ECG reports.</p> <p>In the R-R analysis mode:</p> <p>The R-R analysis report of the rhythm lead selected in the <b>Rhythm Lead1</b> list box will be printed.</p>

Lead Sequence Choose from: **Standard** or **Cabrera**

Lead Sequence	Lead group 1	Lead group 2	Lead group 3	Lead group 4
<b>Standard</b>	I, II, III	aVR, aVL, aVF	V1, V2, V3	V4, V5, V6
<b>Cabrera</b>	aVL, I, -aVR	II, aVF, III	V1, V2, V3	V4, V5, V6

Nehb Choose from: **On** or **Off**.

Lead Sequence: I, II, III, ND, NA, NI

**NOTE:** If you set **Nehb** to **On**, the working mode is fixed to be manual.

Lead Off Hint Choose from: **On** or **Off**.

When it is set to **On** and lead off waves are detected in the presampled waves, a lead off hint message will be displayed.

## 10.8 Display&Sound Setup

Select **Display&Sound** on the **System Setup** screen, and then press **Enter** to open the **Display&Sound Setup** window.

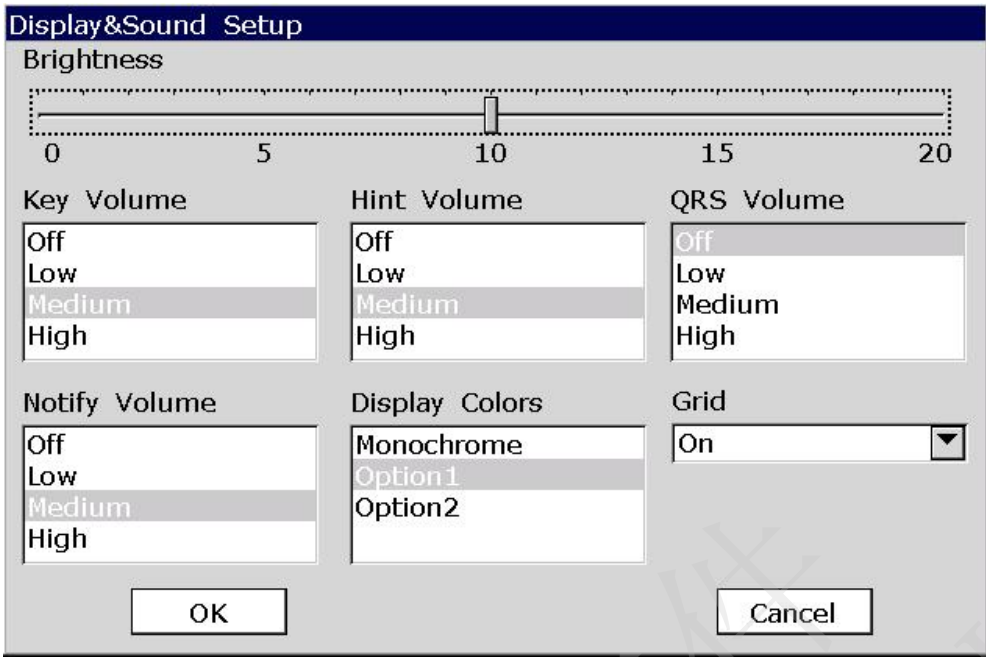


Figure 10-10 Display&Sound Setup Window

Item	Description
Brightness	Set the brightness within 0~20. <b>NOTE:</b> For SE-1200 Express, the brightness cannot be changed.
Key Volume	Choose from: <b>Low</b> , <b>Medium</b> , <b>High</b> or <b>Off</b> Select <b>Low</b> , <b>Medium</b> or <b>High</b> , the electrocardiograph gives a short sound when you press keys on the keyboard. Select <b>Off</b> , there is no sound.
Hint Volume	Choose from: <b>Low</b> , <b>Medium</b> , <b>High</b> or <b>Off</b> Select <b>Low</b> , <b>Medium</b> or <b>High</b> , the electrocardiograph gives a sound when a hint such as <i>Lead Off</i> , <i>Overload</i> , <i>Battery Weak</i> etc. is displayed. Select <b>Off</b> , there is no hint sound.
QRS Volume	Choose from: <b>Low</b> , <b>Medium</b> , <b>High</b> or <b>Off</b> Select <b>Low</b> , <b>Medium</b> or <b>High</b> , the electrocardiograph gives a sound when an R wave is detected. Select <b>Off</b> , there is no sound when an R wave is detected.
Notify Volume	Choose from: <b>Low</b> , <b>Medium</b> , <b>High</b> or <b>Off</b> Select <b>Low</b> , <b>Medium</b> or <b>High</b> , the electrocardiograph gives a sound after ECG report is printed. Select <b>Off</b> , there is no sound after ECG report is printed.
Display Colors	Choose from: <b>Monochrome</b> , <b>Option1</b> or <b>Option2</b>

Grid

Choose from: **On** or **Off**  
Select **On**, the waveforms will be displayed with a background grid.

### 10.9 Date&Time Setup

Select **Date&Time** on the **System Setup** screen, and press **Enter** to open the **Date&Time Setup** window.

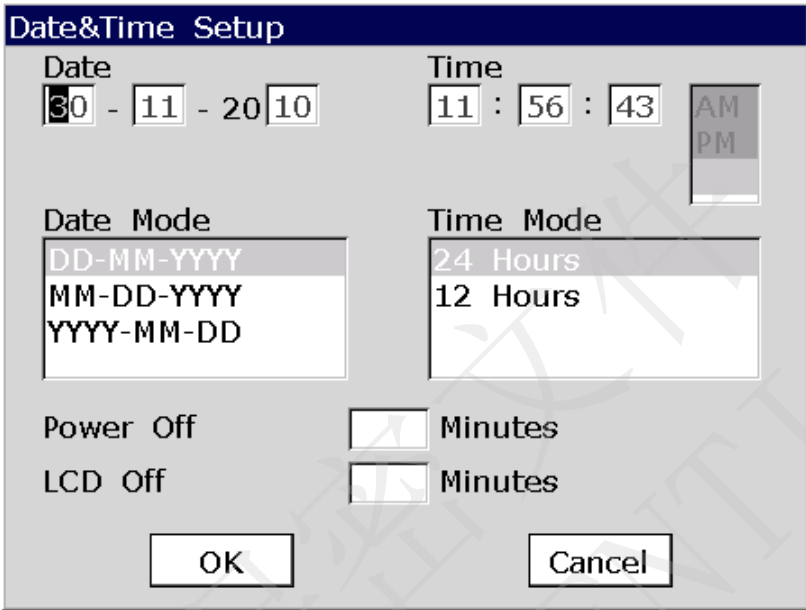


Figure 10-11 Date &Time Setup Window

**NOTE:** Please set DATE&TIME correctly when it's the first time you use the electrocardiograph.

Item	Description
Date&Time	Enter the current date and time displayed on the main screen and in the ECG reports.
Date Mode	Choose from: <b>DD-MM-YYYY</b> , <b>MM-DD-YYYY</b> or <b>YYYY-MM-DD</b>
Time Mode	Choose from: <b>24 Hours</b> or <b>12 Hours</b>
Power Off Time	Input the power-off time manually. If you enter <b>0 Minutes</b> or nothing, this function will not be effective. <b>NOTE:</b> <ol style="list-style-type: none"> <li>Power-off time is counted from the time when you last press the keys on the keyboard.</li> <li>Only when the device is powered by the battery, can the set automatic power-off time be effective.</li> </ol>
LCD off Time	Input the LCD off time manually.

If you enter **0 Minutes** or nothing, this function will not be effective.

**NOTE:** LCD Off time is counted from the time when you last press the keys on the keyboard.

### 10.10 File Setup

Select **File** on the **System Setup** screen, and press **Enter** to open the **File Setup** window.

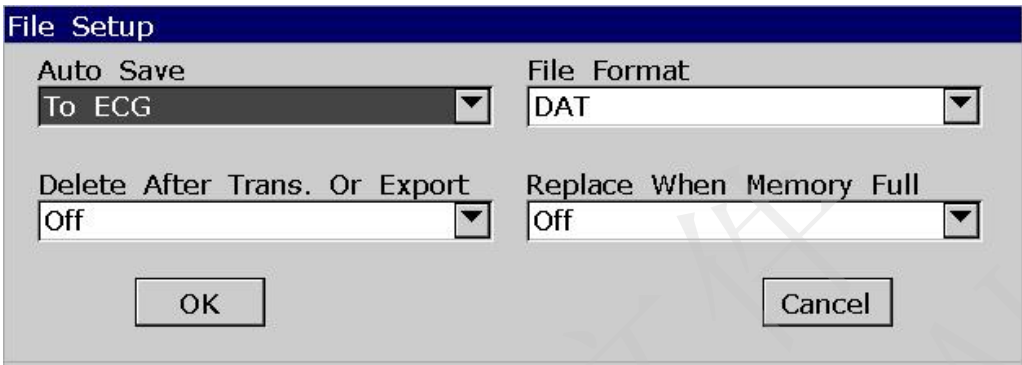


Figure 10-12 File Setup Window

Item	Description
Auto Save	<p>Choose from: <b>Off</b>, <b>To ECG</b> or <b>To U Disk</b></p> <p>Select <b>Off</b>, ECG data will not be saved.</p> <p>Select <b>To ECG</b>, ECG data in the auto or rhythm mode will be saved in the ECG automatically.</p> <p>Select <b>To U Disk</b>, ECG data in the auto or rhythm mode will be automatically saved to the directory of <b>ECGDATA\ECG-X\Store\Examination Date</b> of the U disk after an ECG report is printed out.</p> <p><b>NOTE:</b></p> <ol style="list-style-type: none"><li>1. Please insert the U disk recommended by the manufacturer. Please set the format to <b>FAT</b> or <b>FAT32</b> when formatting the U disk.</li><li>2. X in the directory of <b>ECGDATA\ECG-X\Store\Examination Date</b> can be set in the <b>Device No.</b> textbox in the <b>Transmission Setup</b> window.</li></ol>
File Format	<p>Select a file format of exported or transferred data.</p> <p>To select <b>SCP/FDA-XML/DICOM</b>, you should first activate the SCP/FDA-XML/DICOM function on the <b>Advanced Setup</b> screen. For details, please contact the manufacturer or the local distributor.</p>

Delete After Trans.	Choose from: <b>On</b> or <b>Off</b>
Or Export	Select <b>On</b> , the files will be automatically deleted from the <b>File Manager</b> screen after they are transmitted to the PC or exported to the U disk.
Replace When	Choose from: <b>On</b> or <b>Off</b>
Memory Full	Select <b>On</b> , if the stored files reach the upper limit, the files will replace the earliest one automatically.

### 10.11 System Maintenance Setup

Select **Maintenance** on the **System Setup** screen, and press **Enter** to open the **System Maintenance** window.

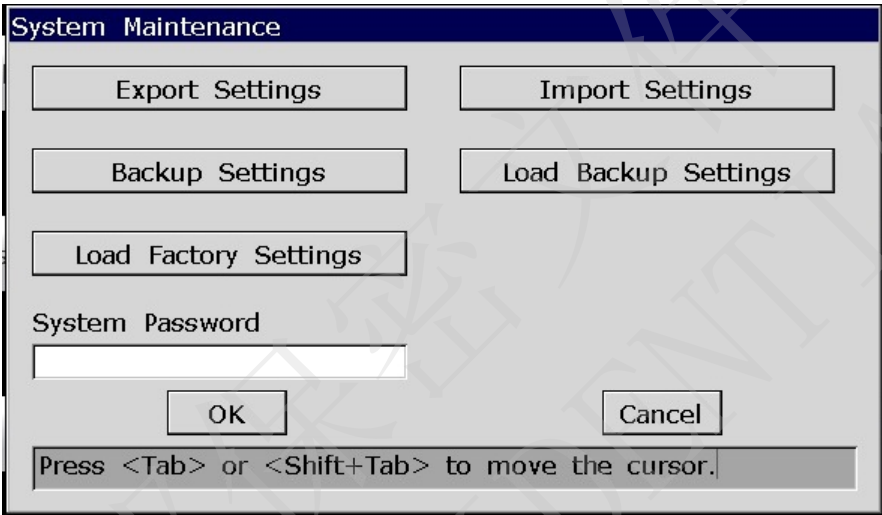


Figure 10-13 System Maintenance Window

Item	Description
Export Settings	Press to export the system settings to the U disk.
Import Settings	Press to load the system settings from the U disk to the electrocardiograph.
Back up Settings	Press to back up the system settings to the ECG memory.
Load Backup Settings	Press to load the backup settings from the ECG memory.
Load Factory Settings	Press to restore the factory settings.
System Password	Type a password that allows you to access the System Setup window.



10.12 Other Setup

Select **Other** on the **System Setup** screen, press **Enter** to open the **Other Setup** window.

Other Setup

Institution

Language

English

Caps Lock

Off

External Input

Off

On

External Output

Off

Standard

Triggered

OK

Cancel

Figure 10-14 Other Setup Window

Item	Description
Institution	Input the institution name manually within 40 ASCII characters.  <b>NOTE:</b> The total number of supported characters may be fewer if special Latin characters are entered.
Language	Select the language displayed on the main screen and in the ECG reports.
Caps Lock	Choose from: <b>On</b> or <b>Off</b>  Select <b>On</b> to create capital letters. Pressing <b>Shift</b> and a letter key can input a lowercase letter.  Select <b>Off</b> to create lowercase letters. Pressing <b>Shift</b> and a letter key can input a capital letter.
External Input	The external input socket is equipped in the electrocardiograph, through which the electrocardiograph can receive signals from the external equipment.  Choose from: <b>On</b> or <b>Off</b>  Select <b>On</b> , the electrocardiograph will display the signals which it receives from external input port.

Item	Description
External Output	<p>The external output socket is equipped in the electrocardiograph, through which the electrocardiograph can send rhythm lead signals to the external equipment.</p> <p>Choose from: <b>Off</b>, <b>Standard</b> or <b>Triggered</b></p> <p>Select <b>Standard</b>, the electrocardiograph sends ECG signals of rhythm lead 1.</p> <p>Select <b>Triggered</b>, the electrocardiograph sends pulses with the height of 5V and the width of 45ms, based on the data of rhythm lead 1.</p> <p><b>NOTE:</b> If external output function is enabled, you cannot use the touch screen of SE-1200 Express.</p>

## Chapter 11 Hint Information

Hint information and the corresponding causes provided by the electrocardiograph are listed in Table 11-1.

Table 11-1 Hint Information and Causes

Hint Information	Causes
Lead off	Electrodes fall off the patient or the patient cable falls off the unit, or a high polarization voltage occurs.
Battery Weak	The battery is weak.
No Paper	Recorder paper runs out or is not loaded.
Testing	The ECG data is being sampled periodically.
Paper Error	When <b>Paper Marker</b> is set to <b>Yes</b> , the electrocardiograph advances the recorder paper to the next black marker. If it advances the paper for 300mm and cannot find the next black marker, the hint <i>Paper Error</i> is displayed.
Testing	The ECG data is being sampled periodically.
Sampling/Analyzing/Recording	ECG signals are being sampled / analyzed / recorded.
Learning	The self-study process of arrhythmia arithmetic in the <b>Trigger Sample</b> mode
Detecting	The examining process of arrhythmia data in the <b>Trigger Sample</b> mode
Transmitting	ECG data is being transmitted from the electrocardiograph to the PC through the net or serial cable in the auto or rhythm mode.
Loading Order...	Orders are being loaded to the electrocardiograph.
Memory Full	There is no space for saving more records.
Module Error	There is something wrong with the signal sample module.
DEMO	The system is in the demonstration mode.
Overload	The direct current offset voltage on an electrode is too high.
U Disk / USB Printer / USB Scanner	A U disk, a USB printer or a bar code reader is connected to the USB interface.

## Chapter 12 FAQ

### 1. Operating Problems

Q1: I was trying to select a file from the file list on the **File Manage** screen, but the file was in the middle of the long list. Is there any way to make the selection faster?

A1: Actually, the system provides a method for fast moving: pressing **Shift + Up** or **Down** arrow can move the cursor up or down in the file list very fast.

Q2: I was just about to input the age when I suddenly realized that I had entered the **Name** textbox unintentionally, can I just go back without pressing **Tab** for a whole circle?

A2: As a matter of fact, the system does take such unintentionalities into consideration by providing **Shift + Tab** as the way back, as the Microsoft Windows operating system does.

Q3: I want to save the ECG data without printing, could it be possible?

A3: Yes, you can set **Print Out** to **Off** in the **Record Info Setup1** window. Or, in the auto or rhythm mode, you can directly press **Shift + PRINT/STOP** to enable or disable the print out function. The ECG data will be collected and saved without printing. In the same way, if the transmission settings are configured, the ECG data could be transmitted to the PC without printing.

Q4: The screen of SE-1200 electrocardiograph is too shiny. Could it be possible to weaken the brightness of the screen?

A4: There is a setup item named brightness in the **Display & Sound Setup** window, you can press the **Left** or **Right** arrow to change the value, which would lead to the change of the brightness of the screen, please refer to Section 10.8, “Display & Sound Setup”.

Q5: I want to input the patients’ phone number in the **Patient Information** window, but there is no such item. Can I add it manually?

A5: Yes, there is a user-defined item for entering patient information. It works in this way: first input the name of the item in the **User-defined** textbox in the **Patient Information Setup** window, e.g. Tel. Then return to the main screen1, and open the **Patient Information** window, the **Tel** item will be displayed in this window. Now it’s possible to input the phone number of the patient in the **Tel** textbox. For details, please refer to Section 10.5 “Patient Information Setup” and Section 4.1.2 “Entering Data”.

Q6: **Memory Full** is displayed on the main screen; Or, the hint **Memory full! Replace the earliest**

*file?* pops up every time when I save an ECG report to the electrocardiograph. What am I supposed to do?

A6: **Memory Full** is used to remind you that the amount of stored file reaches the upper limit.

The display of the pop-up hint **Memory full! Replace the earliest file?** is related to the settings of the **File Setup** window.

Select **Off** from the **Replace When Memory Full** list box, when the amount of stored files reaches the upper limit and you save an ECG report to the electrocardiograph, the hint **Memory full! Replace the earliest file?** pops up.

Select **On** from the **Replace When Memory Full** list box, when the amount of stored files reaches the upper limit and you save an ECG report to the electrocardiograph, the hint **Memory full! Replace the earliest file?** does not pop up.

You can deal with the hint as follows:

- 1) You can just delete several stored files from the electrocardiograph to ensure the amount of stored file not to reach the upper limit.
- 2) When **Memory Full** is displayed on the main screen, you can set **Auto Save** to **To U Disk** to save the new added ECG reports. However, the amount of stored files in the electrocardiograph still reaches the upper limit.

## 2. Printing Problems

Q1: I was encountered with paper-jam, what was I supposed to do?

A1: If it happened for the first time, it might be the result of an inappropriate placement of the paper. In this case, please open the recorder casing, pull the paper out of the paper tray, tear the pages with rumples, and then put the paper in the paper tray again, adjust the position of the paper carefully and close the casing.

Q2: The hint **Paper Error** is displayed on the screen, what should I do?

A2: It might be the result of unsuccessful detection of the black markers, first open the recorder casing so as to clear the error information, and then check whether the black marker is on the bottom of the paper. Reload the paper in the paper tray. If it doesn't work, change the paper.

If the problem still exists, please contact the manufacturer or the local distributor for further disposal.

Q3: The hint **No Paper** is displayed on the screen, what should I do?

A3: Check whether the paper runs out, or the black marker is just facing the black marker detection window on the thermal printing head, as the following figure shows.



Reload the paper in the paper tray, close the recorder casing firmly. If the problem still exists, please contact the manufacturer or the local distributor for further disposal.

Q4: I want to print the hospital name in the report, but I can't find the place to enter it, where is it?

A4: Please open the **Other Setup** window, and move the cursor to the **Institution** textbox, and then input the hospital name. The content you input in this textbox will be printed in the report. For details, please refer to Section 10.12, "Other Setup".

Q5: I pressed the **PRINT/STOP** key, but the ECG didn't start printing, what's wrong with it?

A5: The system will not respond to the **PRINT/STOP** key during the first 3s after you return to the main screen. Therefore, you have to wait for a few seconds, and then you are able to start the printing by pressing the **PRINT/STOP** key.

If you wait for a few seconds, but you still unable to start the printing by pressing the **PRINT/STOP** key, please check whether there is any error information displayed on the screen.

If the hint **No Paper** or **Paper Error** is displayed on the screen, please deal with it according to the above-mentioned measures.

If the hint **Transmitting...** is displayed on the screen, which means that the ECG is transmitting the data to the PC, please wait a few seconds. You can start the printing after the data is transmitted.

If the problem still exists, please contact the manufacturer or the local distributor for further disposal.

Q6: I set the filter, speed and gain on the main screen1, but these settings were changed after printing.

A6: The filter, speed and gain which are set on the main screen1 will not be saved, and they are changed when you exit the main screen1 or after printing. If you want to save these settings, please set them in the **Record Info Setup** window and the **Filter Setup** window.

### 3. Transmitting Problems

Q1: The ECG doesn't respond to any keys after a long time of transmission. It transmits nothing for there is no new data appearing on the screen of the PC software. What should I do?

A1: Some error may occur during the transmission course, for example, the connection between the ECG and the net cable may loosen. In this case, please connect the net cable well. If it doesn't work, please restart the ECG.

If the problem still exists, please contact the manufacturer or the local distributor for further disposal.

### 4. Main Unit Problems

Q1: After power-on, the ECG stays on the logo screen and doesn't open the main screen. I have restarted the machine several times, but there is no better change.

A1: The reason for this problem might be: there is a key pressed down, without springing up. Find that key, and make it spring up, the problem should be solved.

Q2: I was doing the examination when the machine suddenly gave out a sound and displayed the hint **Lead Off**. What should I do?

A2: The corresponding electrodes are not connected well. Please find out which lead is off by checking the Lead Name area on the main screen (please refer to Section 4.3.1, "About the Main Screen"). The lead whose name is highlighted is off. Please check whether the corresponding electrode of the lead is connected to the patient skin well, and then make sure that the patient cable socket is connected to the patient cable firmly.

If none of the above-mentioned measures takes effect, please contact the manufacturer or the local distributor for further disposal.



## Chapter 13 Cleaning, Care and Maintenance

Use only the EDAN-approved substances and methods listed in this chapter to clean or disinfect your equipment. Warranty does not cover damage caused by using unapproved substances or methods.

Edan Instruments has validated the cleaning and disinfection instructions provided in this User Manual. It is the responsibility of the healthcare professional to ensure that the instructions are followed so as to ensure adequate cleaning and disinfection.

### 13.1 General Points

Keep your electrocardiograph and accessories free of dust and dirt. To prevent the device from damage, please follow the instructions:

- Use only the recommended cleaning agents and disinfectants listed in this manual. Others may cause damage (not covered by warranty), reduce product lifetime or cause safety hazards.
- Always dilute according to the manufacturer's instructions.
- Unless otherwise specified, do not immerse any part of the equipment or any accessories in liquid.
- Do not pour liquid onto the equipment.
- Do not allow liquid to enter the case.
- Never use abrasive material (such as steel wool or silver polish).
- Inspect the electrocardiograph and reusable accessories after they are cleaned and disinfected.

#### **CAUTION**

If you spill liquid on the equipment or accessories, or they are accidentally immersed in liquid, contact your service personnel or EDAN service engineer.

### 13.2 Cleaning

If the equipment or accessory has been in contact with the patient, then cleaning and disinfection is required after each use.

The validated cleaning agents for cleaning the electrocardiograph and reusable accessories are:

- Mild near neutral detergent
- Ethanol (75%)
- Isopropanol (70%)

Cleaning agents should be applied or removed using a clean, soft, non-abrasive cloth or paper towel.

### 13.2.1 Cleaning the Main Unit

#### **WARNING**

Turn off the power before cleaning. The mains supply must be switched off if it is used.

1. Switch off the main unit and disconnect it from the power cord.
2. Wipe the exterior surface of the equipment using a soft cloth dampened with the cleaning solution until no visible contaminants remain.
3. Wipe off the cleaning solution with a fresh cloth or towel dampened with tap water after cleaning until no visible cleaning agent remains.
4. Dry the main unit in a ventilated and cool place.

### 13.2.2 Cleaning the Patient Cable

1. Wipe the patient cable with a soft cloth dampened with the cleaning solution until no visible contaminants remain.
2. Wipe off the cleaning solution with a fresh cloth or towel dampened with tap water after cleaning until no visible cleaning agent remains.
3. Wipe off with a dry cloth to remove residual moisture.
4. Leave the patient cable to air dry.

#### **CAUTION**

Any remainder of cleaning solution should be removed from the main unit and the patient cable after cleaning.

### 13.2.3 Cleaning the Reusable Electrodes

1. Wipe off with a soft cloth to remove residual gel.
2. Wipe the suction bulbs of chest electrodes and the clamps of limb electrodes with a soft cloth dampened with the cleaning solution until no visible contaminants remain.
3. Wipe off the cleaning solution with a fresh cloth or towel dampened with tap water after cleaning until no visible cleaning agent remains.
4. Wipe off with a dry cloth to remove residual moisture.
5. Leave the suction bulbs and clamps to air dry.

## 13.3 Disinfection

To avoid permanent damage to the equipment, it is recommended that disinfection is performed only when it is considered as necessary according to your hospital's regulations.

Clean the equipment and reusable accessories before they are disinfected. The validated disinfectants for disinfecting the electrocardiograph and reusable accessories are:

- Ethanol (75%)
- Isopropanol (70%)

If Ethanol or Isopropanol is used for both cleaning and disinfecting, then a new cloth is required to be used for the disinfection step.

### **CAUTION**

1. Do not use high-temperature, high-pressure vapour or ionizing radiation as disinfection methods.
2. Do not use chloric disinfectant such as chloride, sodium hypochlorite etc.
3. Clean and disinfect reusable electrodes after each use.

### 13.3.1 Disinfecting the Main Unit

#### **WARNING**

Turn off the power before disinfection. The mains supply must be switched off if it is used.

1. Switch off the main unit and disconnect it from the power cord.
2. Wipe the exterior surface of the equipment using a soft cloth dampened with the disinfectant solution.
3. Wipe off the disinfectant solution with a dry cloth after disinfection if necessary.
4. Dry the main unit for at least 30 minutes in a ventilated and cool place.

### 13.3.2 Disinfecting the Patient Cable

1. Wipe the patient cable with a soft cloth dampened with the disinfectant solution.
2. Wipe off the disinfectant solution with a dry cloth after disinfection.
3. Leave the patient cable to air dry for at least 30 minutes.

### 13.3.3 Disinfecting the Reusable Electrodes

1. Wipe the suction bulbs of chest electrodes and the clamps of limb electrodes with a soft cloth dampened with the disinfectant solution.
2. Wipe off the disinfectant solution with a dry cloth after disinfection.
3. Leave the suction bulbs and clamps to air dry for at least 30 minutes.

## 13.4 Care and Maintenance

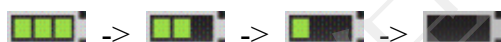
### **CAUTION**

Operate the cardiograph, charge the battery, and store the battery at a temperature of 40°C (104°F) or lower. Exposure to higher temperature may reduce battery life, damage the battery, and degrade overall cardiograph performance.

### 13.4.1 Recharge and Replacement of Battery

#### 1) Capacity Identification

The battery capacity can be identified according to the battery symbol in the top right corner of the LCD screen.



Capacity is from full to empty.

#### 2) Recharge

SE-1200 series electrocardiograph is equipped with the recharge control circuit together with the battery. When the unit is connected to the mains supply, the battery will be recharged automatically. Then the battery recharging indicator (→□) and the mains supply indicator (∞) will be lit at the same time. During the recharging course, the symbol □ flashes in the top right corner of the LCD screen. After the battery is fully recharged, the symbol stops flashing, and the battery recharging indicator (→□) is black.

Because of the capacity consumption during the storage and transport course, the battery capacity is not full when it is used for the first time. Battery recharge should be considered before the first use.

**NOTE:** The battery will automatically stop charging if you print an ECG report.

### **CAUTION**

Repeated undercharging of the battery will damage the battery and reduce battery life.

### 3) Replacement

When the useful life of the battery is over, or foul smell and leakage are found, please contact the manufacturer or the local distributor for replacement.

#### **WARNING**

1. Only qualified service engineers authorized by the manufacturer can open the battery compartment and replace the battery, and the battery of the same model and specification provided by the manufacturer must be used.
2. Danger of explosion -- Do not reverse the anode and the cathode when installing the battery.
3. When the battery's useful life is over, contact the manufacturer or the local distributor for disposal or dispose of the battery according to local regulations.
4. Remove the battery from the electrocardiograph when the electrocardiograph isn't used for a long time.
5. If the battery is stored alone and not used for a long time, we recommend that the battery be charged at least once every 6 months to prevent over-discharge.

#### **CAUTION**

If the battery has been fully charged and requires recharging after printing only a few ECGs, consider replacement.

### 13.4.2 Recorder Paper

**NOTE:** Recorder paper provided by the manufacturer should be used. Other paper may shorten the life of the thermal print head. The deteriorated print head may lead to illegible ECG reports and block the advance of the paper.

#### **Storage Requirements:**

- ◆ Recorder paper should be stored in a dry, dark and cool area, avoiding excessive temperature, humidity and sunshine.
- ◆ Do not put the recorder paper under fluorescence for a long time.
- ◆ Make sure that there is no polyvinyl chloride or other chemicals in the storage environment, which will lead to color change of the paper.
- ◆ Do not overlap the recorder paper for a long time, or else the ECG reports may trans-print each other.

### 13.4.3 Visual Inspection

Perform a visual inspection of all equipment and peripheral devices daily. If you notice any items that need repair, contact a qualified service engineer to make the repairs.

- ◆ Check the case and display screen for cracks or other damage.
- ◆ Regularly inspect all plugs, cords, cables, and connectors for fraying or other damage.
- ◆ Verify that all cords and connectors are securely seated.
- ◆ Inspect keys and controls for proper operation.

### 13.4.4 Maintenance of the Main Unit and the Patient Cable

#### **CAUTION**

Besides the maintenance requirements recommended in this manual, comply with local regulations on maintenance and measurement.

The following safety checks should be performed at least every 12 months by a qualified person who has adequate training, knowledge, and practical experience to perform these tests.

- a) Inspect the equipment and accessories for mechanical and functional damage.
- b) Inspect the safety related labels for legibility.
- c) Inspect the fuse to verify compliance with the rated current and circuit-breaking characteristics.
- d) Verify that the device functions properly as described in the instructions for use.
- e) Test the protection earth resistance according to IEC/EN 60601-1: Limit: 0.1 ohm.
- f) Test the earth leakage current according to IEC/EN 60601-1: Limit: NC 500 $\mu$ A, SFC 1000 $\mu$ A.
- g) Test the enclosure leakage current according to IEC/EN 60601-1: Limit: NC 100 $\mu$ A, SFC 500 $\mu$ A.
- h) Test the patient leakage current according to IEC/EN 60601-1: Limit: NC a.c. 10 $\mu$ A, d.c. 10 $\mu$ A; SFC a.c. 50 $\mu$ A, d.c. 50 $\mu$ A.
- i) Test the patient auxiliary current according to IEC/EN 60601-1: Limit: NC a.c. 10 $\mu$ A, d.c. 10 $\mu$ A; SFC a.c. 50 $\mu$ A, d.c. 50 $\mu$ A.
- j) Test the patient leakage current under single fault condition with mains voltage on the applied part according to IEC/EN 60601-1: Limit: 50 $\mu$ A (CF).
- k) Test the essential performance according to IEC/EN 60601-2-25, or methods recommended by the hospital or local distributor.

The leakage current should never exceed the limit. The data should be recorded in an equipment

log. If the device is not functioning properly or fails any of the above tests, the device has to be repaired.

### **WARNING**

Failure on the part of the responsible individual hospital or institution employing this equipment to implement a satisfactory maintenance schedule may cause undue equipment failures and possible health hazards.

#### **1) Main Unit**

- ◆ Avoid excessive temperature, sunshine, humidity and dirt.
- ◆ Put the dustproof coat on the main unit after use and prevent shaking it violently when moving it to another place.
- ◆ Prevent any liquid from seeping into the equipment; otherwise the safety and the performance of the electrocardiograph cannot be guaranteed.

#### **2) Patient Cable**

- ◆ Integrity of the patient cable, including the main cable and lead wires, should be checked regularly. Make sure that it is conductible.
- ◆ Do not drag or twist the patient cable with excessive stress while using it. Hold the connector plug instead of the cable when connecting or disconnecting the patient cable.
- ◆ Align the patient cable to avoid twisting, knotting or crooking in a closed angle while using it.
- ◆ Store the lead wires in a big wheel to prevent any people from stumbling.
- ◆ Once damage or aging of the patient cable is found, replace it with a new one immediately.

#### **3) Reusable Electrodes**

- ◆ Electrodes must be cleansed after use and make sure there is no remainder gel on them.
- ◆ Keep suction bulbs of chest electrodes away from sunshine and excessive temperature.
- ◆ After long-term use, the surfaces of electrodes will be oxidized because of erosion and other causes. By this time, electrodes should be replaced to achieve high-quality ECG records.

### **CAUTION**

The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal.



## Chapter 14 Accessories

### **WARNING**

Only the patient cable and other accessories supplied by the manufacturer can be used. Or else, the performance and electric shock protection cannot be guaranteed.

### 14.1 Standard Accessories

Table 14-1 Standard Accessories List

Accessory	Part Number
Power cord (European)	01.13.036638
Power cord(American)	21.13.036384
Patient Cable (European)	01.57.106902
	01.57.471500
Patient Cable (American)	01.57.107048
	01.57.471499
Adult Chest electrodes	01.57.040163
Adult Limb electrodes	01.57.040162
Thermal Recorder Paper	01.57.107371
Rechargeable Li-ion Battery (SE-1200 and SE-1200 Express Basic Type)	21.21.064149
Rechargeable Li-ion Battery (SE-1200 Express)	21.21.064146
Fuse	21.21.64073
	21.21.064172

### 14.2 Optional Accessories

Table 14-2 Optional Accessories List

Accessory	Part Number
Patient Cable (European)	01.57.107581 (Snap Style)

	01.57.107583 (Grabber Style)
Patient Cable (American)	01.57.107582 (Snap Style)
	01.57.107584 (Grabber Style)
Grounding Wire	01.13.114114
Pediatric Chest Electrodes	01.57.040168
Pediatric Limb Electrodes	01.57.040169
Adult Disposable Adhesive Electrodes	01.57.471056
Pediatric Disposable Adhesive Electrodes	01.57.471057
Disposable Resting Tab electrodes	01.57.471031
Snap/Banana Socket Adapters	01.13.107449
Clip/Snap/Banana Socket Adapter	01.57.040172
Alligator Clip/Banana Socket Adapters	01.57.040173
Thermal Recorder Paper (Rolled, 210mm×30m)	01.57.32461
Thermal Recorder Paper (Folded, 215mm×280mm×100P)	01.57.107451
ECG Bag	01.56.465625
MT-201 Trolley	83.61.111847
MT-801 Trolley	83.61.328026
U Disk	01.18.052275
CA-100 Lead wire bracket	02.04.111902
LS4208 Bar Code Reader (One-Dimension)	01.23.068023
1900GSR-2 Bar Code Reader (Two-Dimension)	21.18.052311

SE-1200 series electrocardiograph and accessories are available by contacting the manufacturer or your local distributor.

**NOTE:** The chest electrodes, limb electrodes, pediatric chest electrodes and pediatric limb electrodes are not available in the U.S.

## Chapter 15 Warranty & Service

### 15.1 Warranty

EDAN warrants that EDAN's products meet the labeled specifications of the products and will be free from defects in materials and workmanship that occur within warranty period.

The warranty is void in cases of:

- a) Damage caused by mishandling during shipping.
- b) Subsequent damage caused by improper use or maintenance.
- c) Damage caused by alteration or repair by anyone not authorized by EDAN.
- d) Damage caused by accidents.
- e) Replacement or removal of serial number label and manufacture label.

If a product covered by this warranty is determined to be defective because of defective materials, components, or workmanship, and the warranty claim is made within the warranty period, EDAN will, at its discretion, repair or replace the defective part(s) free of charge. EDAN will not provide a substitute product for use when the defective product is being repaired.

### 15.2 Contact information

If you have any question about maintenance, technical specifications or malfunctions of devices, contact your local distributor.

Alternatively, you can send an email to EDAN service department at: [support@edan.com.cn](mailto:support@edan.com.cn).

## Appendix 1 Technical Specifications

### A1.1 Safety Specifications

Comply with:	IEC 60601-1:2005/A1:2012 EN 60601-1:2006/A1:2013 IEC 60601-1-2:2007 EN 60601-1-2:2007/AC:2010 IEC 60601-2-25:2011	
Anti-electric-shock type:	Class I with internal power supply	
Anti-electric-shock degree:	CF type with defibrillation-proof	
Degree of protection against harmful ingress of water:	Ordinary equipment (Sealed equipment without liquid proof)	
Disinfection/sterilization method:	Refer to the user manual for details	
Degree of safety of application in the presence of flammable gas:	Equipment not suitable for use in the presence of flammable gas	
Working mode:	Continuous operation	
EMC:	CISPR 11, Group 1, Class A	
Patient Leakage Current:	NC	<10 $\mu$ A (AC) / <10 $\mu$ A (DC)
	SFC	<50 $\mu$ A (AC) / <50 $\mu$ A (DC)
Patient Auxiliary Current:	NC	<10 $\mu$ A (AC) / <10 $\mu$ A (DC)
	SFC	<50 $\mu$ A (AC) / <50 $\mu$ A (DC)

## A1.2 Environment Specifications

	Transport & Storage	Working
Temperature:	-20°C (-4°F) ~ +55°C (+131°F)	+5°C (+41°F) ~ +40°C (+104°F)
Relative Humidity:	25% RH~93% RH Non-Condensing	25% RH~80% RH Non-Condensing
Atmospheric Pressure:	70 kPa ~106 kPa	86 kPa ~106 kPa

## A1.3 Physical Specifications

Dimensions	420mm×330mm×105mm (16.5in×13.0in×4.1in)
Weight	Approx. 5.0kg (11.0 lbs) (Excluding recorder paper and battery)
Display	320×240 dot single color LCD Screen 800×600 multicolor LCD Screen

## A1.4 Power Supply Specifications

Mains Supply:	Operating Voltage = 100V-240V~
	Operating Frequency = 50Hz/60Hz
	Input Current = 0.9-0.4A
Internal Li-ion Battery Pack:	SE-1200 Express: Rated voltage = 14.8V SE-1200: Rated voltage = 14.8V
	SE-1200 Express: Rated capacity = 5000mAh or 2500mAh SE-1200: Rated capacity = 2500mAh
	When the battery is fully charged, SE-1200 and SE-1200 Express (Rated capacity = 2500mAh) can work normally about 3.5 hours, and it can continually print about 1.5 hours in the manual mode or print about 300 ECG reports of 3×4+1R in the auto mode; SE-1200 Express (Rated capacity = 5000mAh) can work normally about 5 hours, and it can continually print about 2.5 hours in the manual mode or print about 350 ECG reports of 3×4+1R in the auto mode.

	<p>Necessary Charge time:</p> <p>SE-1200 Express (Rated capacity = 5000mAh): 6 hours</p> <p>SE-1200 Express (Rated capacity = 2500mAh): 3 hours</p> <p>SE-1200: 3 hours</p>
Fuse:	<p>T3.15AH250V, Ø5×20mm</p> <p>T1AL250VP, Ø5×20mm (for UL device)</p>

## A1.5 Performance Specifications

<b>Recording</b>	
Recorder:	Thermal dot-matrix recorder
Printing Density	<p>8 dots per mm / 200 dots per inch (amplitude axes)</p> <p>40 dots per mm / 1000 dots per inch (time axes, @ 25 mm/s)</p>
Recorder Paper:	<p>Folded thermal paper: 210mm×295mm×100pages</p> <p>Folded thermal paper: 215mm×280mm×100pages (Optional)</p> <p>Rolled thermal paper: 210mm×30m (Optional)</p>
Effective Width:	210mm
Paper Speed:	5mm/s, 6.25mm/s, 10mm/s, 12.5mm/s, 25mm/s, 50mm/s (±3%)
Accuracy of data:	±5% (x-axis), ±5%(y-axis)
<b>HR Recognition</b>	
Technique:	Peak-peak detection
HR Range:	30 BPM ~300 BPM
Accuracy:	±1 BPM
<b>ECG Unit</b>	
Leads:	12 standard leads
Acquisition Mode:	simultaneously 12 leads
A/D:	24 bits

Resolution:	2.52uV/LSB
Time Constant:	$\geq 3.2s$
Frequency Response:	0.05Hz ~ 150Hz (-3dB)
Gain:	1.25mm/mV, 2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV, 10/5mm/mV, AGC
Input Impedance:	$\geq 50M\Omega$ (10Hz)
Input Circuit Current:	$\leq 0.01\mu A$
Input Voltage Range	$\leq \pm 5$ mVpp
Calibration Voltage:	1mV $\pm 2\%$
DC Offset Voltage:	$\pm 600mV$
Minimum Amplitude:	20 $\mu V$ p-p
Noise:	$\leq 12.5$ $\mu V$ p-p
Multichannel crosstalk	$\leq 0.5mm$
Filter	AC Filter: On/Off
	DFT Filter: 0.05Hz/0.15Hz/0.25Hz/0.32Hz/0.5Hz/0.67Hz
	EMG Filter: Off/25Hz/35Hz/45Hz
	LOWPASS Filter: 150Hz/100Hz/75Hz
CMRR	$\geq 115dB$
Sampling Frequency	1000 Hz
<b>Pacemaker Detection</b>	
Amplitude	$\pm 2$ to $\pm 700$ mV
Width	0.1 to 2.0 ms
Sampling Frequency	10,000/sec/channel
<b>External Input/Output (Optional)</b>	
Input	$\geq 100k\Omega$ ; Sensitivity 10mm/V $\pm 5\%$ ; Single ended



Output	≤100Ω; Sensitivity 1V/mV±5%; Single ended
<b>WIFI (Optional)</b>	
Transmitting Frequency	2400-2497MHz
Frequency Band	2400-2497MHz
Wireless protocol	IEEE 802.11b/g/n
Modulation Type	DSSS, CCK, OFDM
Transmitting Power	6-17dBm
Effective Radiated Power	6-17dBm

**NOTE:**

Operation of the equipment below the minimum amplitude may cause inaccurate results.

## Appendix 2 EMC Information

### Guidance and manufacture's declaration - electromagnetic emissions – for all EQUIPMENT and SYSTEMS

Guidance and manufacture's declaration – electromagnetic emission		
The 12-channel electrocardiograph is intended for use in the electromagnetic environment specified below. The customer or the user of the 12-channel electrocardiograph should assure that it is used in such an environment.		
Emission test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The 12-channel electrocardiograph uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emission CISPR 11	Class A	The 12-channel electrocardiograph is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC/EN 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC/EN 61000-3-3	Complies	


### Guidance and manufacture's declaration – electromagnetic immunity - for all EQUIPMENT and SYSTEMS

<b>Guidance and manufacture's declaration – electromagnetic immunity</b>			
The 12-channel electrocardiograph is intended for use in the electromagnetic environment specified below. The customer or the user of 12-channel electrocardiograph should assure that it is used in such an environment.			
<b>Immunity test</b>	<b>IEC/EN 60601 test level</b>	<b>Compliance level</b>	<b>Electromagnetic environment - guidance</b>
Electrostatic discharge (ESD) IEC/EN 61000-4-2	$\pm 6$ kV contact $\pm 8$ kV air	$\pm 6$ kV contact $\pm 8$ kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC/EN 61000-4-4	$\pm 2$ kV for power supply lines	$\pm 2$ kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC/EN 61000-4-5	$\pm 1$ kV line to line $\pm 2$ kV line to ground	$\pm 1$ kV line to line $\pm 2$ kV line to ground	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50Hz/60Hz) magnetic field IEC/EN 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines	$<5\% U_T$ ( $>95\%$ dip in $U_T$ ) for 0.5 cycle  $40\% U_T$	$<5\% U_T$ ( $>95\%$ dip in $U_T$ ) for 0.5 cycle  $40\% U_T$	Mains power quality should be that of a typical commercial or hospital environment. If the user of the 12-channel

IEC/EN 61000-4-11	(60% dip in $U_T$ ) for 5 cycles	(60% dip in $U_T$ ) for 5 cycles	electrocardiograph requires continued operation during power mains interruptions, it is recommended that the
	70% $U_T$ (30% dip in $U_T$ ) for 25 cycles	70% $U_T$ (30% dip in $U_T$ ) for 25 cycles	12-channel electrocardiograph be powered from an uninterruptible power
	<5% $U_T$ (>95% dip in $U_T$ ) for 5 sec	<5% $U_T$ (>95% dip in $U_T$ ) for 5 sec	supply or a battery.
NOTE $U_T$ is the a.c. mains voltage prior to application of the test level.			

**Guidance and manufacture's declaration – electromagnetic immunity - for EQUIPMENT and SYSTEMS that are not LIFE-SUPPORTING**

Guidance and manufacture's declaration – electromagnetic immunity			
The 12-channel electrocardiograph is intended for use in the electromagnetic environment specified below. The customer or the user of the 12-channel electrocardiograph should assure that it is used in such an environment.			
Immunity test	IEC/EN 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC/EN 61000-4-6	3 V <sub>rms</sub> 150 kHz to 80 MHz	3V <sub>rms</sub>	Portable and mobile RF communications equipment should be used no closer to any part of the 12-channel electrocardiograph, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. <b>Recommended separation distance</b> $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz Where $P$ is the maximum output power
Radiated RF IEC/EN 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	

		<p>rating of the transmitter in watts (W) according to the transmitter manufacturer and <math>d</math> is the recommended separation distance in metres (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,<sup>a</sup> should be less than the compliance level in each frequency range.<sup>b</sup></p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
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NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

<sup>a</sup> Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the 12-channel electrocardiograph is used exceeds the applicable RF compliance level above, the 12-channel electrocardiograph should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the 12-channel electrocardiograph.

<sup>b</sup> Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

**Recommended separation distances between portable and mobile  
RF communications equipment and the EQUIPMENT or SYSTEM - for EQUIPMENT or  
SYSTEM that is not LIFE-SUPPORTING**

<b>Recommended separation distances between portable and mobile RF communications equipment and the 12-channel Electrocardiograph</b>			
The 12-channel electrocardiograph is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the 12-channel electrocardiograph can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the 12-channel electrocardiograph as recommended below, according to the maximum output power of the communications equipment.			
<b>Rated maximum output power of transmitter (W)</b>	<b>Separation distance according to frequency of transmitter(m)</b>		
	<b>150 kHz to 80 MHz</b> $d = 1.2\sqrt{P}$	<b>80 MHz to 800 MHz</b> $d = 1.2\sqrt{P}$	<b>800 MHz to 2.5 GHz</b> $d = 2.3\sqrt{P}$
0.01	<b>0.12</b>	<b>0.12</b>	<b>0.23</b>
0.1	<b>0.38</b>	<b>0.38</b>	<b>0.73</b>
1	<b>1.2</b>	<b>1.2</b>	<b>2.3</b>
10	<b>3.8</b>	<b>3.8</b>	<b>7.3</b>
100	<b>12</b>	<b>12</b>	<b>23</b>
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.			
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

## Appendix 3 Abbreviation

Abbreviation	Statement
LCD	Liquid Crystal Display
BP	Blood Pressure
ECG	Electrocardiogram/Electrocardiograph
HR	Heart Rate
aVF	Left Foot Augmented Lead
aVL	Left Arm Augmented Lead
aVR	Right Arm Augmented Lead
LA	Left Arm
LL	Left Leg
RA	Right Arm
RL	Right Leg
ID	Identification
AC	Alternating Current
USB	Universal Serial Bus
AGC	Auto Gain Control
NC	Normal Condition
SFC	Single Fault Condition



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MPN: 01.54.106764021



**EC REPRESENTATIVE**

Shanghai International Holding Corp. GmbH (Europe)  
Eiffestrasse 80, D-20537 Hamburg Germany  
TEL: +49-40-2513175 FAX: +49-40-255726  
E-mail: shholding@hotmail.com

**EDAN INSTRUMENTS, INC.**

3/F-B, Nanshan Medical Equipments Park, Nanhai Rd 1019#,  
Shekou, Nanshan Shenzhen, 518067 P.R. CHINA  
Email: info@edan.com.cn  
TEL: +86-755-2689 8326 FAX: +86-755-2689 8330

[www.edan.com.cn](http://www.edan.com.cn)