User Manual

Electrocardiograph
SE-300 Series
Copyright

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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) can not 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-300A, SE-300B

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.

**Using This Label Guide**

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.

**Revision History**

<table>
<thead>
<tr>
<th>Date</th>
<th>ECO#</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006/03</td>
<td></td>
<td>V1.0</td>
<td>1st edition</td>
</tr>
<tr>
<td>2009/03</td>
<td>ECO-SE-9011</td>
<td>V1.8</td>
<td>8th edition(according with software V2.4, added net port and pacemaker description)</td>
</tr>
<tr>
<td>2009/08</td>
<td>ECO-SE-9016</td>
<td>V1.9</td>
<td>9th edition(changed battery specification and accessory list; added disposable and pacemaker detection range description)</td>
</tr>
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Chapter 1 Safety Guidance

This chapter provides important safety information related to the use of the 3-Channel Electrocardiograph.

1.1 Intended Use

The intended use of the 3-Channel Electrocardiograph is to acquire ECG signals from adult and pediatric patients through body surface ECG electrodes. The electrocardiograph is intended to be used only in hospitals or healthcare facilities by doctors and trained healthcare professionals. The cardiogram recorded by the 3-Channel Electrocardiograph can help users to analyze and diagnose heart disease. However the ECG with measurements and interpretive statements is offered to clinicians on an advisory basis only.

1.2 Warnings and Cautions

In order to use the electrocardiograph safely and effectively, and avoid possible dangers caused by improper operations, 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.

NOTE: This device is not intended for home use.

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

1.2.1 Safety Warnings

⚠️ WARNING ⚠️:

1. The electrocardiograph is provided for the use of 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.

3. Only qualified installation or service engineers can shift the mains supply shift switch (100V-115V~/220V-240V~) according to local mains supply specifications.
4. The results given by the equipment should be examined based on the overall clinical condition of the patient, and it can not substitute for regular checking.

5. This system is not intended for treatment.

6. The EQUIPMENT is protected against malfunction caused by electrosurgery according to the clause 36.202.101 in the IEC60601-2-25.

7. Electrodes of dissimilar metals should not be used; it may cause a high polarization voltage.

8. **EXPLOSION HAZARD** - Do not use the electrocardiograph in the presence of flammable anesthetic mixture with oxygen or other flammable agents.

9. **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.

10. If the integrity of the external protective conductor is in doubt, the equipment should be operated by using the built-in rechargeable battery.

11. Do not use this equipment in the presence of high static electricity or high voltage equipment which may generate sparks.

12. This equipment is not designed for direct cardiac application.

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

14. Make sure that all electrodes are connected to the patient correctly before operation.

15. Ensure that the conductive parts of electrodes and associated connectors, including neutral electrode, do not come into contact with earth or any other conducting objects.

16. Electrodes with defibrillator protection should be used while defibrillating. To avoid a polarization or DC offset voltage, use non-polarizing electrodes (which will not form a DC offset voltage when subjected to a DC current) such as silver/silver-chloride types if there is a situation where there is a likelihood that a defibrillation procedure will be necessary.

17. There is no danger for patients with pacemakers. However, if a pacemaker is used, the results given by the equipment may be invalid, or lose the clinical significance.
18. Do not touch the patient, bed, table or the equipment while using the ECG together with a defibrillator or a pacemaker.

19. In order to avoid being burned, please keep the electrodes far away from the radio knife while using electrosurgical equipment.

20. If reusable electrodes with electrode gel are used during defibrillation, ECG recovery will take more than 10 seconds. The manufacturer recommends the use of disposable electrodes at all times.

21. 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.

22. The summation of leakage currents should never exceed leakage current limits while several other units are used at the same time.

23. The potential equalization conductor can be connected to that of other equipment when necessary, to make sure that all these devices are connected to the potential equalization bus bar of the electrical installation.

1.2.2 Battery Care Warnings

⚠️ **WARNING**:  
1. Improper operation may cause the battery to be hot, ignited or exploded, and it may lead to the declination of the battery capacity. It is necessary to read the user manual carefully and pay more attention to warning messages.

2. Only qualified service engineer authorized by the manufacturer can open the battery compartment and replace the battery. The battery of the same model and specification provided by the manufacturer should be used.

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. 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.

6. 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.

1.2.3 General Cautions

CAUTION:

1. 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.

2. Do not use the equipment in a dusty environment with bad ventilation or in the presence of corrosive.

3. Make sure that there is no intense electromagnetic interference source around the equipment, such as radio transmitters, mobile phones etc. Attention: large medical electrical equipment such as electrosurgical equipment, radiological equipment and magnetic resonance imaging equipment is likely to bring electromagnetic interference.

4. Before use, the equipment, the patient cable and electrodes etc. should be checked. Replacement should be taken if there is any evident defectiveness or aging symptom which may impair the safety or the performance.

5. The following safety checks should be performed at least every 24 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 rated current and breaking characteristics.
   d) Verify 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 μA, SFC 1000μA.
g) Test the enclosure leakage current according to IEC/EN 60601-1: Limit: NC 100μA, SFC 500μA.
h) Test the patient leakage current according to IEC/EN 60601-1: Limit: NC a.c. 10μA, d.c. 10μA; SFC a.c. 50μA, d.c. 50μA.
i) Test the patient auxiliary current according to IEC/EN 60601-1: Limit: NC a.c. 10μA, d.c. 10μA; SFC a.c. 50μA, d.c. 50μA.
j) Test the patient leakage current under single fault condition with mains voltage on the applied part according to IEC/EN 60601-1: Limit: 50μA (CF)

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.

6. Ruptured fuse must only be replaced with that of the same type and rating as the original.

7. 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.

8. Batteries are hazardous waste. Do NOT dispose them together with house-hold garbage. At the end of their life 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.

9. Federal (U.S.) law restricts this device to sale by or on the order of a physician.

1.2.4 Cleaning & Disinfection Cautions

⚠️ CAUTION ⚠️:

1. Turn off the power before cleaning and disinfection. If the mains supply is used, the power cord should be dragged out of the outlet. Prevent the detergent from seeping into the equipment during cleaning.

2. Do not immerse the unit or the patient cable into liquid under any circumstances.

3. Do not clean the unit and accessories with abrasive fabric and avoid scratching
the electrodes.

4. Any remainder of detergent should be removed from the unit and the patient cable after cleaning.

5. Do not use chloric disinfectant such as chloride, sodium hypochlorite etc.

1.3 List of Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Symbol]</td>
<td>External output</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>External input</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Equipment or part of CF type with defibrillator proof</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Attention – general warning (see accompanying document)</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Potential equalization</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Mains supply</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>On (mains supply)</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Off (mains supply)</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Battery indicator</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Battery recharging indicator</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Sensitivity switch key</td>
</tr>
</tbody>
</table>
Recall key

1mV calibration key & Copy key

Mode/RST switch key

Lead switch key

ON/OFF key

Menu key

Up arrow/Down arrow key

Left arrow/Right arrow key

Print/Stop key

Recycle

Part Number

Serial Number
Date of Manufacture

Manufacturer

Authorized Representative in the European Community


The symbol indicates that the device should be sent to the special agencies according to local regulations for separate collection after its useful life and that this unit was put on the market after 13 August 2005.

It indicates that the device should be sent to the special agencies according to local regulations for separate collection after its useful life

Rx only (U.S.) Federal (U.S.) law restricts this device to sale by or on the order of a physician
Chapter 2 Introduction

SE-300 3-channel electrocardiograph gathers ECG signals of 12 leads simultaneously. It displays the operation menu, ECG parameters as well as electrocardiograms.

3-channel ECG waves can be viewed on the LCD screen and printed out by using a high-quality thermal recorder.

The auto, manual, rhythm, USB print and off modes can be chosen freely.

SE-300 can be powered by the mains supply or a built-in rechargeable lithium battery. Basic type and Net type are optional for each model, only the Net type electrocardiograph can support network transmission function. The DE12 ECG Board is optional for all the models. With the DE12 ECG Board, SE-300 would have another two DFT Filter options (0.32Hz and 0.67Hz), and SE-300 can support full-scale pacemaker detection function with DE12 ECG Board.

With a high resolution thermal recorder, a 32-bit processor and a large-capacity memorizer, SE-300 has advanced performance and high reliability. The compact size makes it suitable for clinic, hospital and ambulance use.

**Configuration:** main unit, power cord, earth wire, patient cable, electrodes, thermal recorder paper, fuses and lithium battery

⚠️ **WARNING:** This equipment is intended for use on adult and pediatric patients only.

⚠️ **WARNING:** This equipment is not designed for direct cardiac application.

⚠️ **WARNING:** The results given by the equipment should be examined based on the overall clinical condition of the patient, and it can not substitute for regular checking.
2.1 Top Panel

Figure 2-1 SE-300B (the device with the LCD screen of 320×240 dot single color)

Figure 2-2 SE-300A (the device with the LCD screen of 192×64 dot single color)
2.2 Control Panel and Keys

1) Indicator Lamp

Mains supply indicator lamp: when the device is powered by the mains supply, the lamp will be lit.

Battery indicator lamp: when the device is powered by a built-in rechargeable lithium battery, the lamp will be lit.

Battery recharging indicator lamp: when the battery is being recharged, this lamp will be lit.

2) Sensitivity Switch Key

The sensitivity switch order: $\times 10 \text{ mm/mV} \rightarrow \times 20 \text{ mm/mV} \rightarrow \text{AGC (Auto Gain Control)} \rightarrow \times 2.5 \text{ mm/mV} \rightarrow \times 5 \text{ mm/mV}.$

3) Recall Key
Press the **RECALL** key to open the recall window. For details, see chapter 7, “Managing ECG Records”.

4) **1mV/COPY** Key

![1mV/COPY key icon]

In the **Manual** mode, press this key to print a 1mV calibration mark while printing ECG reports.

In the **AUTO** mode, once the hint information **COPY** appears on the LCD screen, pressing the **1mV/Copy** key can print the ECG report which was printed out last time.

5) **MODE/RST** Key

![MODE/RST key icon]

Press this key to select a printing mode among **AUTO**, **MANUAL**, **RHYTHM**, **USBPRT** and **OFF**.

The switch order of lead groups in each mode is listed in Table 2-1.

In the **MANUAL** mode, press this key to reset the waveform quickly while printing ECG reports.

**WARNING:**

When using the device with a defibrillator, after the defibrillator discharges, you should press the **MODE/RST** key to reset the waveform quickly.

**Note:** The detailed information of the automatic mode can be set on the system setup interface.

---

**Table 2-1 Switch Order of Lead Groups in Different Modes**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Switch Order (from Left to Right)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO (Standard)</td>
<td>I/II/III aVR/aVL/aVF V1/V2/V3 V4/V5/V6</td>
</tr>
<tr>
<td>AUTO (Cabrera)</td>
<td>aVL/ I-/aVR II/aVF/ III V1/V2/V3 V4/V5/V6</td>
</tr>
<tr>
<td>MANUAL</td>
<td>In this mode, you need to press the Lead switch key to change the lead groups, the lead switch order can be that of AUTO (Standard) or AUTO (Cabrera), which is determined by settings of lead sequence and printing format on the system setup interface.</td>
</tr>
</tbody>
</table>
6) **LEAD Switch Key**

![LEAD Switch Key](image)

In the **MANUAL** mode, press this key to switch the lead groups.

For SE-300A, press this key to switch to the prev or next page of the system setup interface, or press this key to switch to the prev or next page of records in the recall window.

7) **PRINT/STOP Key**

![PRINT/STOP Key](image)

Press this key to begin or stop printing ECG reports.

8) **ON/OFF Key**

![ON/OFF Key](image)

Press this key to turn on or off the device.

9) **MENU Key**

![MENU Key](image)

Press this key to open the system setup interface.

10) **Up Arrow/Down Arrow Key**

![Up Arrow/Down Arrow Key](image)

Press the Up arrow to select an item on the LCD screen counterclockwise, and press the Down arrow to select an item on the LCD screen clockwise.

11) **Left Arrow/ Right Arrow Key**

![Left Arrow/ Right Arrow Key](image)

Press the Left or Right arrow to set the selected item.
2.3 Patient Cable Socket and Signal Interface

As the following figure shows, on the right side of the main unit are the patient cable socket, the RS232 socket, the external input/output socket and the USB interface.

The net port (optional, only for Net type) is on the back of the main unit shown in the following figure. Only the electrocardiograph with net port can support network transmission function.

1) Patient Cable Socket

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C2 (input)</td>
<td>6</td>
<td>SH</td>
<td>11</td>
<td>F (input)</td>
</tr>
<tr>
<td>2</td>
<td>C3 (input)</td>
<td>7</td>
<td>NC</td>
<td>12</td>
<td>C1(input)/ NC</td>
</tr>
<tr>
<td>3</td>
<td>C4 (input)</td>
<td>8</td>
<td>NC</td>
<td>13</td>
<td>C1(input)</td>
</tr>
<tr>
<td>4</td>
<td>C5 (input)</td>
<td>9</td>
<td>R (input)</td>
<td>14</td>
<td>RF (or called N) (input)/ NC</td>
</tr>
<tr>
<td>5</td>
<td>C6 (input)</td>
<td>10</td>
<td>L (input)</td>
<td>15</td>
<td>RF (or called N) (input)</td>
</tr>
</tbody>
</table>

خفف: Applied part of type CF with defibrillator proof

⚠️ Attention – see accompanying document

Definitions of corresponding pins:
2) RS232 Socket

![RS232 Socket Diagram]

Definitions of corresponding pins:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>4</td>
<td>NC</td>
<td>7</td>
<td>NC</td>
</tr>
<tr>
<td>2</td>
<td>RxD (input)</td>
<td>5</td>
<td>GND</td>
<td>8</td>
<td>NC</td>
</tr>
<tr>
<td>3</td>
<td>TxD (output)</td>
<td>6</td>
<td>NC</td>
<td>9</td>
<td>NC</td>
</tr>
</tbody>
</table>

3) External Input/Output Socket

![External Input/Output Socket Diagram]

Definitions of corresponding pins:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>4</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>5</td>
<td>ECG Signal (input)</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>6</td>
<td>ECG Signal (output)</td>
</tr>
</tbody>
</table>

4) USB Interface

⚠️ **WARNING**: Only the USB equipment recommended by the manufacturer can be connected to the USB interface.
Definitions of corresponding pins:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VBUS</td>
<td>3</td>
<td>D+</td>
</tr>
<tr>
<td>2</td>
<td>D-</td>
<td>4</td>
<td>GND</td>
</tr>
</tbody>
</table>

⚠️ WARNING ⚠️:

♦ 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 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.

♦ The summation of leakage current should never exceed the leakage current limit while several other units are used at the same time.

### 2.4 Mains Connection and Switch

![Diagram of Mains Connection and Switch]

**Potential Equalization Terminal**

The potential equalization conductor provides a connection between the unit and the potential equalization bus bar of the electrical installation.

**Mains Socket**

AC SOURCE: alternating current supply socket

**Mains Switch**

- On
- Off
2.5 Bottom Panel

1) Battery Compartment

The battery label indicates the rated voltage and the rated capacity of the rechargeable lithium battery.
Rated voltage: 14.8V, Rated capacity: 2200mAh.

⚠️ Attention – general warning (see accompanying document)

⚠️ WARNING: ⚠️

♦ 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.

♦ 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.

♦ Only qualified service engineer authorized by the manufacturer can open the battery compartment and replace the battery. The battery of the same model and specification provided by the manufacturer must be used.

2) Mains Supply Shift Switch

Mains supply with rated input voltage 230V (220-240V) or 115V (100-115V) can be chosen by using the shift switch according to local mains supply specifications.
**WARNING**: Only qualified installation or service engineer can shift the mains supply shift switch according to local mains supply specifications.

3) Fuse

There are two fuses of the same specifications installed on the bottom of the main unit. The specifications are shown on the fuse label: 220V-240V: T200mA; 100V -115V: T400mA; \( \Phi 5 \times 20 \).

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

### 2.6 Features

- Low weight and compact size
- High resolution thermal recorder, recording frequency response \( \leq 150 \text{Hz} \)
- ECG signals of 12 leads are gathered and amplified simultaneously, 3-channel waves are displayed and recorded simultaneously
- The auto, manual, rhythm, USB print and off modes are optional
- Measurement function and interpretation function are optional
- System setup interface for parameter settings
- Built-in rechargeable lithium battery with large capacity
- Hint information for lead off, lack of paper, low battery capacity etc.
- Automatic adjustment of baseline for optimal printing
- Standard input/output interface and RS232 communication interface
Chapter 3 About SE-300 Application Interface

The following sections provide an overview of the main functions in the SE-300 application. After you turn on the device, the main interface pops up. Then you can press the MENU key to open the system setup interface. Or press the RECALL key to open the recall window.

3.1 About the Main Interface (SE-300B)

Figure 3-1 Main Interface (SE-300B)

<table>
<thead>
<tr>
<th>ID: 210605-1812</th>
<th>Female</th>
<th>Age 30</th>
<th>AUTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The main interface includes:

**Top Row** (from left to right):

- Patient ID (generated automatically according to the examination date and time)
- Sex (Male/Female)
- Age
- Printing mode (AUTO, MANUAL, RHYTHM, USBPRT or OFF)
- Current time and the battery capacity symbol (The battery capacity symbol appears only when the built-in battery is used.)
Right Row (from top to bottom):

♦ Heart rate 🌻
♦ Electrode identifiers (The highlighted electrode identifiers show the status of Lead Off, which means electrodes fall off the patient or the patient cable falls off the unit.)
♦ Sensitivity (2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV, AGC)
♦ Printing speed (5mm/s, 6.25mm/s, 10mm/s, 12.5mm/s, 25mm/s, 50mm/s)
♦ AC filter (AC ON, AC OFF)
♦ EMG filter (EMG OFF, EMG 25Hz, EMG 35Hz, EMG 45Hz)
♦ Hint information (Paper?, Printing, Sampling, Bat Weak etc.)

Press the Up or Down arrow to select the ID, sex, age, speed, AC filter or EMG filter item, and then press the Left or Right arrow to set the selected item.

Press the MODE/RST key to select a printing mode among AUTO, MANUAL, RHYTHM, USBPRT and OFF.

Press the SENS key to switch the sensitivity.

Note: When modifying the printing mode or the sensitivity on the main interface, you should press MENU twice to save these modifications to the system. After that, you will see these modifications on the main interface when you turn on the electrocardiograph next time.

3.2 About the Main Interface (SE-300A)

Figure 3-2 Main Interface (SE-300A)

The main interface:

First Row (from left to right):

♦ Printing mode(AUTO, MANUAL, RHYTHM, USBPRT or OFF)
♦ Hint information (Paper?, Printing, Sampling, Bat Weak etc.)
♦ Sex (Male/Female)
Age

**Second Row** (from left to right):
- Current sampling lead group
- Sensitivity (2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV, AGC)
- Heart rate 🎼
- Battery capacity symbol (The battery capacity symbol appears only when the built-in battery is used.)

**Third Row:**
- ECG waves

Press the Up or Down arrow to select the sex or age item, and then press the Left or Right arrow to set the selected item.

Press the **MODE/RST** key to select a printing mode among **AUTO, MANUAL, RHYTHM, USBPRT** and **OFF**.

Press the **SENS** key to switch the sensitivity.

**Note:** When modifying the printing mode or the sensitivity on the main interface, you should press **MENU** twice to save these modifications to the system. After that, you will see these modifications on the main interface when you turn on the electrocardiograph next time.

### 3.3 About the System Setup Interface

Figure 3-3 System Setup Interface (SE-300B)

<table>
<thead>
<tr>
<th>LOGIN</th>
<th>RECORD</th>
<th>GENERAL</th>
<th>SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID : 161105-1723</td>
<td>HEIGHT&lt;cm&gt;: 170</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAME :</td>
<td>WEIGHT&lt;kg&gt;: 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGE : 30</td>
<td>BP&lt;mmHg&gt;: 80/120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEX : Male</td>
<td>HOSPITAL :</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOCTOR :</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are four tabs on the system setup interface of SE-300B: **LOGIN, RECORD, GENERAL** and **SYSTEM**.
Press the Up or Down arrow to select the Previ or Next button, and then press the Left or Right arrow to switch among these tabs.

**Figure 3-4 System Setup Interface (SE-300A)**

<table>
<thead>
<tr>
<th>AC Filter</th>
<th>EMG Filter</th>
<th>DFT Filter</th>
<th>Lowpass Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>:On</td>
<td>: Off</td>
<td>: 0.15Hz</td>
<td>: 100Hz</td>
</tr>
</tbody>
</table>

Press the Lead switch key to switch to the prev or next page of the system setup interface.

Press the Up or Down arrow to select an item, and then press the Left or Right arrow to set the selected item.

Press the **MENU** key again to exit the system setup interface.

### 3.4 About the Recall Window

**Figure 3-5 Recall Window (a) (SE-300B)**

<table>
<thead>
<tr>
<th>0610051702</th>
<th>0610051718</th>
<th>0610051725</th>
<th>0710051230</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>TRANS ALL</th>
<th>ALL to USB</th>
<th>USB to ECG</th>
<th>DEL ALL</th>
</tr>
</thead>
</table>

Press the Up or Down arrow to select the **TRANS ALL** button, and then press the **MENU** or **PRINT/STOP** key to transmit all the patient records to the PC.

Press the Up or Down arrow to select the **ALL to USB** button, and then press the **MENU** or **PRINT/STOP** key to transmit all the patient records to the U disk.

Press the Up or Down arrow to select the **USB to ECG** button, and then press the **MENU** or **PRINT/STOP** key to transmit the patient records in the U disk to the electrocardiograph.

Press the Up or Down arrow to select the **DEL ALL** button, and then press the **MENU** or **PRINT/STOP** key to delete all the patient records.

Press the Up, Down, Left or Right arrow to select a patient record, and then press the **MENU** or **PRINT/STOP** key to open the recall window (b).
Press the Up or Down arrow to select the **DELETE** button, and then press the **MENU** or **PRINT/STOP** key to delete the patient record.

Press the Up or Down arrow to select the **TRANSMIT** button, and then press the **MENU** or **PRINT/STOP** key to transmit the patient record to the PC.

Press the Up or Down arrow to select the **TO USB** button, and then press the **MENU** or **PRINT/STOP** key to transmit the patient record to the U disk.

Press the Up or Down arrow to select the **RECORD** button, and then press the **MENU** or **PRINT/STOP** key to print out the patient record.

Press the Up or Down arrow to select the **BACK** button, and then press the **MENU** or **PRINT/STOP** key to return to the recall window (a).

Press the **RECALL** key again to return to the main interface.

For SE-300A, press the Lead switch key to switch to the prev or next page of records in the recall window. Press the Left or Right arrow to switch among the **TRANS ALL**, **ALL to USB**, **USB to ECG**, **DEL ALL**, **DELETE**, **TRANSMIT**, **TO USB**, and **RECORD** buttons.

For details on managing patient records, please refer to chapter 7, “Managing ECG Records”.

---

Figure 3-6 Recall Window (b) (SE-300B)
Chapter 4 Operation Preparations

⚠️ CAUTION ⚠️:
Before use, the equipment, the 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. Make sure that the equipment is in proper working condition.

4.1 Power and Earthing

⚠️ WARNING ⚠️:
If the integrity of the external protective conductor is in doubt, the equipment should be powered by the built-in rechargeable lithium battery.

Power Supply
The electrocardiograph can be powered either by the mains supply or a built-in rechargeable lithium battery.

♦ Mains supply
The mains socket is on the left side of the unit. If the mains supply is used, connect the power cord to the socket first, and then connect the power cord to the hospital grade outlet.

- Operating voltage: 100V-115V~ / 220V-240V~
- Operating frequency: 50Hz / 60Hz
- Input power: 35VA

Make sure the mains supply meets the above requirements before power-on, and then press the mains switch. Then the mains supply indicator lamp (∧) will be lit.

If the built-in rechargeable battery is weak when the mains supply is used, it will be recharged automatically at the same time. Then both the mains supply indicator lamp (∧) and the battery recharging indicator lamp (.rectangle) will be lit. The 3-channel electrocardiograph can not be recharged when it is printing reports, and the battery recharging indicator is black; when the 3-channel electrocardiograph is switched off, the battery recharging indicator lamp (.rectangle) is black if the battery is fully recharged.
 Built-in rechargeable battery

When the built-in rechargeable lithium battery is used, turn on the unit by pressing the ON/OFF key on the control panel directly. Then the battery indicator lamp (/li) will be lit and the battery symbol (li) will be displayed on the LCD screen. Because of the consumption during the storage and transport course, the battery capacity may not be full. If the symbol (li) and the Hint information BAT WEAK are displayed, which means the battery capacity is low, please recharge the battery first.

Please refer to the maintenance section for how to recharge the battery. When the battery is being recharged, SE-300 can be powered by the mains supply at the same time.

⚠️ WARNING ⚠️: The potential equalization conductor of the unit should be connected to the potential equalization bus bar of the electrical installation when necessary.

4.2 Loading/Replacing Recorder Paper

There are two kinds of recorder paper. One is the rolled thermal paper with the width of 80mm, and the other is the folded thermal paper with the width of 80mm.

**Note:** When the folded thermal paper is used, the paper roller is unnecessary and must be taken out.

When the recorder paper runs out or is not loaded, warning message Paper? will appear on the screen. Then you should load or replace the recorder paper immediately.
Loading/Replacing Process of Rolled Thermal Paper:

1) Place fingers under the two flanges of the recorder casing, pull them upwards directly to release the casing.

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 about 2 cm of paper out with the grid side of the paper facing the thermal print head, and shut the recorder casing.

6) Press down the recorder casing firmly.

Loading/Replacing Process of Folded Thermal Paper:

1) Place fingers under the two flanges of the recorder casing, pull them upwards directly to release the casing.

2) Remove remainder paper in the paper tray if necessary.

3) Take off the wrapper of the new folded thermal paper, and then put it in the paper tray.
4) Pull about 2 cm of paper out with the grid side of the paper facing the thermal print head, and shut the recorder casing.

5) Press down the recorder casing firmly.

4.3 Preparing the Patient

4.3.1 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.

4.3.2 Preparing the Skin

Thorough skin preparation is very important. The skin is a poor conductor of electricity and frequently creates artifact that distorts the ECG signal. By performing methodical skin preparation, you can greatly reduce the possibility of the 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

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

2 Wash the area thoroughly with soap and water.

3 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.
4.4 Connecting the Patient Cable to the Electrocardiograph and Electrodes

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

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

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.

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 corresponding electrodes according to the colors and identifiers. Firmly attach them.

4.5 Attaching Electrodes to the Patient

There are two types of electrode for you to choose, one is the reusable electrodes, and the other is the disposable electrodes. The uses of the two types of electrode are as shown below:

4.5.1 Reusable Electrodes

Reusable Electrodes is divided into Limb electrode and Chest Electrode, as the following figure shows:
The identifiers and color codes of electrodes used comply with IEC/EN requirements. In order to avoid incorrect connections, the electrode identifiers and color codes are specified in Table 4-1. Moreover the equivalent codes according to American requirements are given in Table 4-1 too.

Table 4-1 Electrodes and Their identifiers and color codes

<table>
<thead>
<tr>
<th>Electrodes</th>
<th>Identifier</th>
<th>Color code</th>
<th>Identifier</th>
<th>Color code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right arm</td>
<td>R</td>
<td>Red</td>
<td>RA</td>
<td>White</td>
</tr>
<tr>
<td>Left arm</td>
<td>L</td>
<td>Yellow</td>
<td>LA</td>
<td>Black</td>
</tr>
<tr>
<td>Right leg</td>
<td>N or RF</td>
<td>Black</td>
<td>RL</td>
<td>Green</td>
</tr>
<tr>
<td>Left leg</td>
<td>F</td>
<td>Green</td>
<td>LL</td>
<td>Red</td>
</tr>
<tr>
<td>Chest 1</td>
<td>C1</td>
<td>White/red</td>
<td>V1</td>
<td>Brown/red</td>
</tr>
<tr>
<td>Chest 2</td>
<td>C2</td>
<td>White/yellow</td>
<td>V2</td>
<td>Brown/yellow</td>
</tr>
<tr>
<td>Chest 3</td>
<td>C3</td>
<td>White/green</td>
<td>V3</td>
<td>Brown/green</td>
</tr>
<tr>
<td>Chest 4</td>
<td>C4</td>
<td>White/brown</td>
<td>V4</td>
<td>Brown/blue</td>
</tr>
<tr>
<td>Chest 5</td>
<td>C5</td>
<td>White/black</td>
<td>V5</td>
<td>Brown/orange</td>
</tr>
<tr>
<td>Chest 6</td>
<td>C6</td>
<td>White/violet</td>
<td>V6</td>
<td>Brown/violet</td>
</tr>
</tbody>
</table>

As the following figure shows, the positions of chest electrodes on the body surface are

C1: Fourth intercostal space at the right border of the sternum
C2: Fourth intercostal space at the left border of the sternum
C3: Fifth rib between C2 and C4
C4: Fifth intercostal space on the left midclavicular line
C5: Left anterior axillary line at the horizontal level of C4
C6: Left midaxillary line at the horizontal level of C4

**Chest Electrode Connection:**

1) Ensure that the electrodes are clean;
2) Align all lead wires of the patient cable to avoid twisting, and connect the lead wires to the corresponding electrodes according to the colors and identifiers;
3) Clean the electrode area on the chest surface with 75% alcohol;
4) Daub the round area of 25mm in diameter on each electrode site with gel evenly;
5) Place a small amount of gel on the brim of chest electrode’s metal cup;
6) Place the electrode on the chest electrode site and squeeze the suction bulb. Unclench it and the electrode is adsorbed on the chest;
7) Attach all chest electrodes in the same way.

**Limb Electrode Connection:**

1) Ensure that the electrodes are clean;
2) Align all lead wires of the patient cable to avoid twisting, and connect the lead wires to the corresponding electrodes according to the colors and identifiers;
3) Clean the electrode area which is a short distance above the ankle or the wrist with alcohol;
4) Daub the electrode area on the limb with gel evenly;
5) Place a small amount of gel on the metal part of the limb electrode clamp;
6) 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;

7) Attach all limb electrodes in the same way.

### 4.5.2 Disposable Electrodes

Disposable electrode must be used together with the alligator clip.

The electrodes’ positions on body surface are as the following table and figures:

<table>
<thead>
<tr>
<th>American label</th>
<th>European label</th>
<th>Electrode placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>R</td>
<td>Right deltid</td>
</tr>
<tr>
<td>LA</td>
<td>L</td>
<td>Left deltid</td>
</tr>
<tr>
<td>RL</td>
<td>N or RF</td>
<td>Above right ankle (Alternate placement, upper leg as close to torso as possible)</td>
</tr>
<tr>
<td>LL</td>
<td>F</td>
<td>Above left ankle (Alternate placement, upper leg as close to torso as possible)</td>
</tr>
<tr>
<td>V1</td>
<td>C1</td>
<td>Fourth intercostals space at right border of sternum</td>
</tr>
<tr>
<td>V2</td>
<td>C2</td>
<td>Fourth intercostals space at left border of sternum</td>
</tr>
<tr>
<td>V3</td>
<td>C3</td>
<td>Fifth rib between V2 and V4</td>
</tr>
<tr>
<td>V4</td>
<td>C4</td>
<td>Fifth intercostals space on left midclavicular line</td>
</tr>
</tbody>
</table>
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 body surface.

4) Clip the disposable electrodes with the alligator clips.

The quality of ECG waveform will be affected by the contacting resistance between the patient and the electrode. In order to get a high-quality ECG, the skin-electrode resistance must be minimized when you attach electrodes to patients.

⚠️ CAUTION ⚠️: The disposable electrodes can only be used for one time.

⚠️ WARNING ⚠️: Make sure that all electrodes are connected to the patient correctly before operation.

⚠️ WARNING ⚠️: Make sure that the conductive parts of electrodes and associated connectors, including neutral electrode, do not come in contact with earth or any other conducting objects.

4.6 Inspection Before Power On

In order to avoid safety hazards and get good ECG records, the following inspection procedure is recommended before power-on and 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. Switch off these devices when necessary.
   ♦ Keep the examination room warm to avoid muscle action 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-phase outlet should be used.
   ♦ When the battery capacity is low, recharge the battery before use.

3) **Patient Cable:**
   ♦ Check whether the patient cable is connected to the unit firmly, and keep it far away from the power cord.

4) **Electrodes:**
   ♦ Check whether all electrodes are connected to lead wires of the patient cable correctly.
   ♦ Ensure that the chest electrodes do not contact.

5) **Recorder Paper:**
   ♦ Ensure that there is enough recorder paper loaded correctly.

6) **Patient:**
   ♦ The patient should not come into contact with conducting objects such as earth, metal parts etc.
   ♦ Ensure the patient is warm and relaxed, and breathe calmly.

**WARNING:** The electrocardiograph is provided for the use of qualified physicians or personnel professionally trained, and they should be familiar with the contents of this user manual before operation.
Chapter 5 Switching on the Electrocardiograph

- When the mains supply is used, connect the power cord, press the mains switch on the left side of the unit, and then the mains supply indicator lamp (∙) is lit. Then press the ON/OFF key on the control panel to turn on the unit. The equipment information such as the device name, the version number will be displayed on the LCD screen after self-test. Then SE-300 is ready for use.

- When a built-in rechargeable lithium battery is used, press the ON/OFF key on the control panel directly to turn on the unit, and then the battery indicator (_succinct_0) is lit. The equipment information such as the device name, the version number will be displayed on the LCD screen after self-test. Then SE-300 is ready for use.
Chapter 6 Sampling and Printing ECG

6.1 Entering Patient Information

After switched on, the electrocardiograph begins sampling ECG.

1. Enter the information of sex and age on the main interface.
   1) Press the Up or Down arrow to select the sex or age item.
   2) Press the Left or Right arrow to enter the information of patient sex or age.

Figure 6-1 Main Interface (SE-300B)

<table>
<thead>
<tr>
<th>ID: 210605-1812</th>
<th>Female</th>
<th>Age 30</th>
<th>AUTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. The system generates patient ID automatically according to the examination time. You can also enter patient ID manually in the following ways.
   1) Press the Up or Down arrow to select the ID item on the main interface, and then press the Left or Right arrow to set the ID item. (Only for SE-300B)
2) Or press the **MENU** key to open the system setup interface. Press the Up or Down arrow to select the ID item. Press the Left or Right arrow to set the ID item. (Only for SE-300A)

3. Or you can enter the detailed information about the patient and the doctor on the system setup interface. (Only for SE-300B)

Press the **MENU** key to open the system setup interface. Edit patient information on the login setting interface.

```plaintext
<table>
<thead>
<tr>
<th>LOGIN</th>
<th>RECORD</th>
<th>GENERAL</th>
<th>SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>161105-1723</td>
<td>HEIGHT&lt;cm&gt;: 170</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td></td>
<td>WEIGHT&lt;kg&gt;: 60</td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>30</td>
<td>BP&lt;mmHg&gt;: 80/120</td>
<td></td>
</tr>
<tr>
<td>SEX</td>
<td>Male</td>
<td>HOSPITAL:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DOCTOR:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A B C D E F G H I J K L M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N O P Q R S T U V W X Y Z</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7 8 9 _ -</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PREV</td>
<td>NEXT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DEL</td>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>
```

**Note:** The patient information can not be set or changed during the printing course.

**To Enter Name:**

1) Press the Up or Down arrow to select the **NAME** item, and a textbox appears after the **NAME** item.

2) Press the Left or Right arrow and the textbox becomes highlighted. Then press the Up, Down, Left or Right arrow to select a letter or a number on the soft keyboard. After that, press the **MENU** key to add the selected letter or number to the textbox.

3) To delete wrong letters, firstly press the Up, Down, Left or Right arrow to select the **DEL** button on the soft keyboard, and then press the **MENU** key to confirm.

4) Press the Up, Down, Left or Right arrow to select the **OK** button on the soft keyboard, and then press the **MENU** key to confirm.

You can enter the hospital name and the doctor name in the same way.

**To Enter ID:**

1) Press the Up or Down arrow to select the **ID** item.

2) Press the Left or Right arrow to set the **ID** item.

3) Press the **MENU** key to confirm.

You can enter age, BP, sex, height and weight in the same way.
6.2 Printing ECG Reports

There are four modes to print ECG reports.

In the AUTO mode, the lead groups are switched in order automatically during the printing course. There is a blank area on the recorder paper before printing the ECG signals of the next lead group. Moreover, a 1mV calibration mark will be printed at the beginning of ECG reports. The switch orders of lead groups are listed in Table 2-1.

In the MANUAL mode, you should switch the lead group manually. You can determine the lead group to be printed and set the printing settings or other parameters for different lead groups.

In the RHYTHM mode, you can print 60s rhythm-lead ECG waveforms.

In the USBPRT mode, ECG reports can be printed out through a USB printer.

**Note:** The printing mode can not be changed during the printing course. Stop printing reports before changing the printing mode.

6.2.1 AUTO Mode

1) Press the MODE/RST key to select the AUTO mode, which will be displayed in the top right corner of the LCD screen.

2) Press the SENS key to set the sensitivity.

3) Set the gain, AC filter and EMG filter to get good ECG traces. Press the Up or Down arrow to select the gain, AC filter and EMG filter item. Then press the Left or Right arrow to set them. (Only for SE-300B)

4) Or press the MENU key to open the system setup interface to set the detailed settings. Press the MENU key again to return to the main interface. For details about settings, please refer to chapter 8 “Settings (SE-300B)” and chapter 9 “Settings (SE-300A)”.

5) Press the Up or Down arrow to select the speed item. Then press the Left or Right arrow to set the speed.

6) Press the PRINT/STOP key to begin printing ECG reports. It will stop automatically after printing a complete ECG report of 12 leads. Or press the PRINT/STOP key again to stop printing reports.

Press PRINT/STOP during the printing course to stop printing ECG reports. Then when you begin printing ECG reports again, the system will print ECG reports from the first lead group, and the ID number will change automatically according to the current examination time. You can adjust the ID number manually. For details on setting the ID number, see section 6.1, “Entering Patient Information”.

- 37 -
6.2.2 MANUAL Mode

1) Press the MODE/RST key to select the MANUAL mode, which will be displayed in the top right corner of the LCD screen.

2) Press the SENS key to set the sensitivity.

3) Set the gain, AC filter and EMG filter to get good ECG traces. Press the Up or Down arrow to select the gain, AC filter and EMG filter item. Then press the Left or Right arrow to set them. (Only for SE-300B)

4) Or press the MENU key to open the system setup interface to set the detailed settings. Press the MENU key again to return to the main interface. For details about settings, please refer to chapter 8 “Settings (SE-300B)” and chapter 9 “Settings (SE-300A)”.

5) Press the Lead switch key to select the lead group to be printed.

6) Press the Up or Down arrow to select the speed item. Then press the Left or Right arrow to set the speed.

7) Press the PRINT/STOP key to begin printing reports.

8) Press the 1mV/COPY key to print out 1mV mark in the ECG report. Press the Lead switch key to switch the lead group while printing ECG reports.

9) Press the PRINT/STOP key to stop printing ECG reports.

Press PRINT/STOP during the printing course to stop printing ECG reports. Then when you begin printing ECG reports again, the ID number will change automatically according to the current examination time. You can adjust the ID number manually. For details on setting the ID number, see section 6.1, “Entering Patient Information”.

6.2.3 RHYTHM mode

1) Press the MODE/RST key to select the RHYTHM mode; which will be displayed in the top right corner of the LCD screen.

2) Press the SENS key to set the sensitivity.

3) Set the gain, AC filter and EMG filter to get good ECG traces. Press the Up or Down arrow to select the gain, AC filter and EMG filter item. Then press the Left or Right arrow to set them. (Only for SE-300B)

4) Or press the MENU key to open the system setup interface to set the RHYTHM LEAD item or other settings. Press the MENU key again to return to the main interface. For details about settings, please refer to chapter 8 “Settings (SE-300B)” and chapter 9
“Settings (SE-300A)”.

5) Press the Up or Down arrow to select the speed item. Then press the Left or Right arrow to set the speed.

6) Press the PRINT/STOP key, the hint information Sampling will be displayed on the main interface, and the sampling time will be counted. When the sampling time reaches 60s, it begins to print ECG reports.

7) It will stop automatically after printing a complete report of rhythm-lead ECG waveforms. Or press the PRINT/STOP key again to stop printing ECG reports.

Press PRINT/STOP during the printing course to stop printing ECG reports. Then when you begin printing ECG reports again, the ID number will change automatically according to the current examination time. You can adjust the ID number manually. For details on setting the ID number, see section 6.1, “Entering Patient Information”.

### 6.2.4 USBPRT mode

1) Connect SE-300 to the USB printer recommended by the manufacturer. Please refer to section 8.2.4 “USB Printer Settings” for details.

2) Press the MODE/RST key to select the USBPRT mode, which will be displayed in the top right corner of the LCD screen.

3) Press the SENS key to set the sensitivity.

4) Set the gain, AC filter and EMG filter to get good ECG traces. Press the Up or Down arrow to select the gain, AC filter and EMG filter item. Then press the Left or Right arrow to set them. (Only for SE-300B)

5) Or press the MENU key to open the system setup interface to set the detailed settings. Press the MENU key again to return to the main interface. For details about settings, please refer to chapter 8 “Settings (SE-300B)” and chapter 9 “Settings (SE-300A)”.

6) Press the Up or Down arrow to select the speed item. Then press the Left or Right arrow to set the speed.

7) Press the PRINT/STOP key to begin printing reports. During the printing course, pressing the PRINT/STOP key again can not stop printing ECG reports. It will stop automatically after printing a complete ECG report.
6.3 Transmitting ECG Data to the PC

**Note:** To transmit ECG data to the PC, Smart ECG Viewer software of the manufacturer must be installed in the PC. You should log into the Smart ECG Viewer software before the transmission.

### 6.3.1 Transmitting ECG Data Through the Serial Port

1. Connect the RS232 socket of the PC to the RS232 socket of the electrocardiograph with a RS232 cable.
2. Or if the PC has no RS232 socket, connect the USB socket of the PC to the RS232 socket of the electrocardiograph by using the RS232-USB assembly.

![Figure 6-3 RS232-USB Assembly](image)

3. Press the **MENU** key to open the system setup interface.

   For SE-300B,
   1) Press the Up or Down arrow to select the **Next** or **Prev** button, and then press the Left or Right arrow to select **GENERAL** tab to open the general setting interface.
   2) Press the Up or Down arrow to select the **AUTO TRANSFER** item, and then press the Left or Right arrow to set the **AUTO TRANSFER** item to **UART AUTO**.

   For SE-300A, press the Up or Down arrow to select the **AUTO TRANSFER** item, and then press the Left or Right arrow to set the **AUTO TRANSFER** item to **UART AUTO**.
Press the **MENU** key again to return to the main interface.

4. In the **AUTO, OFF** or **USBPRT** mode, ECG data can be transmitted through the UART port automatically after an ECG report is printed out.

### 6.3.2 Transmitting ECG Data Through the Net Port (Optional, only for Net type)

1. Connect the PC to the electrocardiograph with an Ethernet cable recommended by the manufacturer.
2. Press the **MENU** key to open the system setup interface.
   
   For SE-300B,
   
   1) Press the Up or Down arrow to select the **Next** or **Prev** button, and then press the Left or Right arrow to select **GENERAL** tab to open the general setting interface.
   
   2) Press the Up or Down arrow to select the **AUTO TRANSFER** item, and then press the Left or Right arrow to set the **AUTO TRANSFER** item to **Net AUTO**. Press the Up or Down arrow to select the **REMOTE IP** item, and then press the Left or Right arrow to set the **REMOTE IP** item to the local IP of Smart ECG Viewer. Press the Up or Down arrow to select the **LOCAL IP** item, and then set the first three numbers of the **LOCAL IP** item to the first three numbers of the local IP of Smart ECG Viewer. The last number of the **LOCAL IP** item can be set at random, but it can’t be the same as the last number of the local IP of Smart ECG Viewer.

   For example, view the local IP on the **System Setting** interface of the Smart ECG Viewer software.

   ![System Setting Interface](image)

   Set the **REMOTE IP** item to the local IP of Smart ECG Viewer. Set the first three numbers of
the **LOCAL IP** item to the first three numbers of the local IP of Smart ECG Viewer. The last number of the **LOCAL IP** item can be set at random, but it can’t be the same as the last number of the local IP of Smart ECG Viewer.

For SE-300A, press the Up or Down arrow to select the **AUTO TRANSFER** item, and then press the Left or Right arrow to set the **AUTO TRANSFER** item to **Net AUTO**. Press the Up or Down arrow to select the **REMOTE IP** item, and then press the Left or Right arrow to set the **REMOTE IP** item to the local IP of Smart ECG Viewer. Press the Up or Down arrow to select the **LOCAL IP** item, and then set the first three numbers of the **LOCAL IP** item to the first three numbers of the local IP of Smart ECG Viewer. The last number of the **LOCAL IP** item can be set at random, but it can’t be the same as the last number of the local IP of Smart ECG Viewer.

For example, view the local IP on the **System Setting** interface of the Smart ECG Viewer software.
Set the **REMOTE IP** item to the local IP of Smart ECG Viewer. Set the first three numbers of the **LOCAL IP** item to the first three numbers of the local IP of Smart ECG Viewer. The last number of the **LOCAL IP** item can be set at random, but it can’t be the same as the last number of the local IP of Smart ECG Viewer.

![System Setting](image)

Press the **MENU** key again to return to the main interface.

3. In the **AUTO, OFF** or **USBPRT** mode, ECG data can be transmitted through the net automatically after an ECG report is printed out.
6.4 ECG Reports

6.4.1 ECG Reports in the AUTO Mode

(a)

(b)

(c)
Figure (a) shows the following contents:

10mm/mV----Sensitivity 0.15~100Hz----Filter Information
AC50----50Hz AC Filter 05-12-2007 10:06:26----Date and Time
▌----1mV Calibration Mark
I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6 ----Lead Name
ECG waves of 12 leads in the format of 3Ch/3Ch
25mm/s----Paper speed

Figure (b) shows the average template when the AVERAGE TEMPLET item is set to 2×6+1R on the system setup interface.

Figure (c) shows the measurement and interpretation information when the MEASUREMENT and INTERPRETATION items are set to ON on the system setup interface. The measurement information includes:

ID, Name, Age, Sex, BP, Height, Weight, HR (Heart Rate)
P Dur----P wave duration: the average P-wave duration from several selected dominant beats
PR int----P-R interval: the average P-R interval from several selected dominant beats;
QRS Dur----QRS complex duration: the average QRS complex duration from several selected dominant beats;
QT/QTC int----Q-T interval / Normalized QT interval;
P/QRS/T axis----dominant direction of the average integrated ECG vectors;
RV5/SV1 amp----The maximum amplitude of R or R’ wave of one selected dominant beat from lead V5 / The maximum amplitude of S or S’ wave of one selected dominant beat from lead V1;
RV5+SV1 amp---- Sum of RV5 and SV1;
RV6/SV2 amp---- The maximum amplitude of R or R’ wave of one selected dominant beat from lead V6 / The maximum amplitude of S or S’ wave of one selected dominant beat from lead V2;

The interpretation information includes: Minnesota Code, Diagnosis Information and Report Confirmed by.

**Note:** In the AUTO or MANUAL mode, if the sensitivity is set to 20mm/mV, only one calibration mark will be printed in the ECG report.
6.4.2 ECG Reports in the RHYTHM Mode

(a)

(b)
Figure (a) shows the following contents:

10mm/mV (Sensitivity)
0.15~100Hz (Filter Information)
AC50 (50Hz AC Filter)
[1mV Calibration Mark]
II (Lead Name)
60s rhythm waveform of lead II
00:00, 00:20, 00:40 (Timer)
25mm/s (Paper Speed)
‡80 (Heart Rate)

Figure (b) shows RR analysis results, including RR interval measurement information, RR histogram and RR trend chart.

RR Interval measurement information includes the following contents:

Current Date & Current Time
Patient Information (ID, Name, Age, Sex, BP, Height, Weight)
Measure Time
Total R Num (Total R-wave number)
HR (Heart Rate)
RR Avg Interval (Average RR Interval)
RR Max Interval (Maximum RR Interval)
RR Min Interval (Minimum RR Interval)
Max/Min (Ratio of Maximum RR Interval to Minimum RR Interval)
SDNN (Standard Deviation of Normal to Normal Intervals)
RMSSD (The Root Mean Square of Successive Difference)
6.4.3 ECG Reports in the USBPRT Mode
As the above figure shows, the USBPRT mode report includes:

ID, Paper Speed, Sensitivity, Date and Time;
Name, Age, Sex, BP, Height, Weight;
Heart Rate, P Duration, PR Interval, QRS Duration, QT/QTC Interval, P/QRS/T Axis, RV5/SV1 Amplitude, RV5+SV1 Amplitude, RV6/SV2 Amplitude;
Minnesota Code;
Diagnosis Information;
Unconfirmed Report, Reviewed By;
ECG waveforms of 12 leads;
Chapter 7 Managing ECG Records

If you want to save the ECG records in the electrocardiograph, you should set the SAVE OPTION item to On. The default value is On. Then the ECG records will be saved in the recall window automatically.

1. Press the MENU key to open the system setup interface.

2. For SE-300B
   1) Press the Up or Down arrow to select the Prev or Next button. Then press the Left or Right arrow to select the GENERAL tab.
   2) Press the Up or Down arrow to select the SAVE OPTION item. Then press the Left or Right arrow to set the SAVE OPTION item to On.
   3) Press the MENU key again to return to the main interface.

3. For SE-300A
   1) Press the Up or Down arrow to select the SAVE OPTION item.
   2) Press the Left or Right arrow to set the SAVE OPTION item to On.
   3) Press the MENU key again to return to the main interface.

Press the RECALL key to open the recall window where patient records are saved. The recall window allows records to be stored, deleted, printed and transmitted. When there is no space for more records to be stored in the recall window, the message MemFull will be displayed.

7.1 Transmitting ECG Records to the PC

Note: To transmit ECG records to the PC, Smart ECG Viewer software of the manufacturer must be installed in the PC. You should log into the Smart ECG Viewer software before the transmission.

7.1.1 Transmitting ECG Records Through the Serial Port

1. Connect the RS232 socket of the PC to the RS232 socket of the electrocardiograph with a RS232 cable.

2. If the PC has no RS232 socket, connect the USB socket of the PC to the RS232 socket of the electrocardiograph by using the RS232-USB assembly. For details about the RS232-USB assembly, please refer to section 6.3.1, “Transmitting ECG Data Through the Serial Port”.

3. Press the MENU key to open the system setup interface.
For SE-300B,
1) Press the Up or Down arrow to select the **Prev** or **Next** button, and then press the Left or Right arrow to select the **GENERAL** tab to open the general setting interface.
2) Press the Up or Down arrow to select the **AUTO TRANSFER** item, and then press the Left or Right arrow to set the **AUTO TRANSFER** item to **UART AUTO**.
For SE-300A, press the Up or Down arrow to select the **AUTO TRANSFER** item, and then press the Left or Right arrow to set the **AUTO TRANSFER** item to **UART AUTO**.
Press the **MENU** key again to return to the main interface.
4. Press the **RECALL** key to open the recall window (a).

Figure 7-1 Recall Window (a)

<table>
<thead>
<tr>
<th>TRANS ALL</th>
<th>ALL to USB</th>
<th>USB to ECG</th>
<th>DEL ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0610051702</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0610051718</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0610051725</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0710051230</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Press the Up and Down arrow (for SE-300B) or Left and Right arrow (for SE-300A) to select the **TRANS ALL** button, and then press the **PRINT/STOP** or **MENU** key to transmit all the records to the PC.
If the **AUTO TRANSFER** item is set to **OFF** before the transmission, **WARNING (a)** will pop up.

<table>
<thead>
<tr>
<th>WARNING (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERROR</td>
</tr>
<tr>
<td>Please Select Auto Transfer Option first!</td>
</tr>
<tr>
<td>Press PRINT/STOP return</td>
</tr>
</tbody>
</table>

6. For SE-300B, if you want to transmit a record, press the Up, Down, Left or Right arrow to select the record in the recall window. Then press the **PRINT/STOP** or **MENU** key, and the recall window (b) appears. Press the Up or Down arrow to select the **TRANSMIT** button, and then press the **PRINT/STOP** or **MENU** key to transmit the record to the PC. After the transmission, press the Up or Down arrow to select the **BACK** button, and then press the **PRINT/STOP** or **MENU** key to return to the recall window (a).
For SE-300A, if you want to transmit a record, press the Up or Down arrow to select the record, and then press the Left or Right arrow to select the **TRANSMIT** button, and then press the
PRINT/STOP or MENU key to transmit the record to the PC.

Figure 7-2 Recall Window (b)

![Recall Window](image)

**Note**: The transmission process is long, and you should be patient to wait.

7. Press the RECALL key to return to the main interface.

### 7.1.2 Transmitting ECG Records Through the Net Port (Optional, only for Net type)

1. Connect the PC to the electrocardiograph with an Ethernet cable recommended by the manufacturer.

2. Press the MENU key to open the system setup interface, and set the AUTO TRANSFER, REMOTE IP and LOCAL IP items. Then press the MENU key again to return to the main interface. For details on setting the AUTO TRANSFER, REMOTE IP and LOCAL IP items, please refer to section 6.3.2, “Transmitting ECG Data Through the Net Port (Optional, only for Net type)”.

3. Press the RECALL key to open the recall window (a) (Figure 7-1).

4. Press the Up and Down arrow (for SE-300B) or Left and Right arrow (for SE-300A) to select the TRANS ALL button, and then press the PRINT/STOP or MENU key to transmit all the records to the PC.

5. For SE-300B, if you want to transmit a record, press the Up, Down, Left or Right arrow to select the record in the recall window. Then press the PRINT/STOP or MENU key, and the recall window (b) (Figure 7-2) appears. Press the Up or Down arrow to select the TRANSMIT button, and then press the PRINT/STOP or MENU key to transmit the record to the PC. After
the transmission, press the Up or Down arrow to select the **BACK** button, and then press the PRINT/STOP or MENU key to return to the recall window (a) (Figure 7-2).

For SE-300A, if you want to transmit a record, press the Up or Down arrow to select the record, and then press the Left or Right arrow to select the **TRANSMIT** button, and then press the PRINT/STOP or MENU key to transmit the record to the PC.

**Note:** The transmission process is long, and you should be patient to wait.

6. Press the **RECALL** key to return to the main interface.

### 7.2 Copying ECG Records Between SE-300 and the U Disk

1. Connect the U disk to SE-300.
2. Press the **RECALL** key to open the recall window (a) (Figure 7-1).
3. Press the Up or Down arrow to select the **ALL to USB** button, and then press the PRINT/STOP or MENU key, and then the ECGDATA folder of all the records will be transmitted to the U disk automatically.

During the transmission, if something wrong happens, SE-300 will give the error information. Then you should check whether the U disk is connected to the electrocardiograph well.

4. If you want to import records from the ECGDATA folder of the U disk to the electrocardiograph, press the Up or Down arrow to select the **USB to ECG** button, and then press the PRINT/STOP or MENU key. The extended-name of imported records should be “.dat”.

**Note:** To import records from the U disk to the electrocardiograph, there should be some records in the folder named ECGDATA in the U disk. The folder name ECGDATA must be capital letters. You should not change the name of records in the ECGDATA folder.

During the transmission from the U disk to the electrocardiograph, if something wrong happens, the electrocardiograph will give the error information. Then you should do the following operations:

1) Firstly, check whether the U disk is connected well.
2) If the error information is still displayed, you should check whether there is the ECGDATA folder including some records with the extended-name of “.dat” in the U disk.
3) If the error information is still displayed, you should check whether the total number of records in the ECGDATA folder of the U disk and the recall window of the electrocardiograph exceeds the limit. The limit of SE-300A is 120, and the limit of SE-300B is 144. If the total number
exceeds the limit, you should remove some records from the ECGDATA folder of the U disk, and then continue to import the remainder records to the electrocardiograph.

4) If the error information *The same record found! Press PRINT/STOP return* is displayed, you should check whether there are cognominal records in the U disk and the electrocardiograph. If it is true, you should remove these records from the U disk, or delete these records in the electrocardiograph, and then continue to import records to the electrocardiograph.

After records are imported, the electrocardiograph will give a hint.

5. For SE-300B, if you want to transmit a record, press the Up, Down, Left or Right arrow to select the record in the recall window. Then press the PRINT/STOP or MENU key, and the recall window (b) (Figure 7-2) appears. Press the Up or Down arrow to select the TO USB button. Then press the PRINT/STOP or MENU key. After the transmission, press the Up or Down arrow to select the BACK button, and then press the PRINT/STOP or MENU key to return to the recall window (a) (Figure 7-2).

For SE-300A, if you want to transmit a record, press the Up or Down arrow to select the record, and then press the Left or Right arrow to select the TO USB button, and then press the PRINT/STOP or MENU key.

6. Press the RECALL key to return to the main interface.

**Note:** The transmission process is long, and you should be patient to wait. During the transmission, the U disk should not be pulled out.

**Note:** Only the U disk with FAT format can be used.

### 7.3 Deleting Patient Records

1. Press the RECALL key to open the recall window (a) (Figure 7-1).

2. If you want to delete all the records, press the Up and Down arrow (for SE-300B) or Left and Right arrow (for SE-300A) to select the DEL ALL button, and then press the PRINT/STOP or MENU key to display the WARNING (b). Then press RECALL to delete all the records or press PRINT/STOP to cancel the operation.

<table>
<thead>
<tr>
<th>WARNING (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you really want to delete all the records?</td>
</tr>
<tr>
<td>[RECALL]- &gt;OK          [PRINT/STOP]- &gt;CANCEL</td>
</tr>
</tbody>
</table>

3. For SE-300B, if you want to delete a record, press the Up, Down, Left or Right arrow to select the record in the recall window. Then press the PRINT/STOP or MENU key, and the recall
window (b) (Figure 7-2) appears. Press the Up or Down arrow to select the DELETE button, and then press the PRINT/STOP or MENU key to display the WARNING(c). Then press RECALL to delete this record or press PRINT/STOP to cancel the operation. After deleting the record, press the Up or Down arrow to select the BACK button, and then press the PRINT/STOP or MENU key to return to the recall window (a) (Figure 7-2).

For SE-300A, if you want to delete a record, press the Up or Down arrow to select the record, and then press the Left or Right arrow to select the DELETE button, and then press the PRINT/STOP or MENU key to display the WARNING(c). Then press RECALL to delete this record or press PRINT/STOP to cancel the operation.

<table>
<thead>
<tr>
<th>WARNING (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you really want to delete this record?</td>
</tr>
<tr>
<td>[RECALL] -&gt; OK [PRINT/STOP] -&gt; CANCEL</td>
</tr>
</tbody>
</table>

4. Press the RECALL key to return to the main interface.

7.4 Printing a Patient Record in the Recall Window

1. Press the MENU key to open the system setup interface.

For SE-300B, press the Up or Down arrow to select the Prev or Next button, and then press the Left or Right arrow to open the record setting interface. Then set the detailed settings on the record setting interface.

For SE-300A, set the detailed settings on the system setup interface.

Press the MENU key again to return to the main interface.

**Note**: Before printing, please set the detailed printing settings. For details, see section 8.2, “Record Settings”.

2. Press the MODE/RST key to select the printing mode. Only the AUTO mode and the USBPRT mode can support printing ECG records in the recall window.

3. Press the RECALL key to open the recall window (a) (Figure 7-1).

4. For SE-300B, press the Up, Down, Left or Right arrow to select a record in the recall window. Then press the PRINT/STOP or MENU key, and the recall window (b) (Figure 7-2) appears
Press the Up or Down arrow to select the **RECORD** button, and then press the **PRINT/STOP** or **MENU** key to print the record. Pressing **PRINT/STOP** again can stop printing the record in the **AUTO** mode.

For SE-300A, press the Up or Down arrow to select the record, and then press the Left or Right arrow to select the **RECORD** button, and then press the **PRINT/STOP** or **MENU** key to print the record. Pressing **PRINT/STOP** again can stop printing the record in the **AUTO** mode.

**Note:** If you select the **USBPRT** mode, when the **PRINT/STOP** or **MENU** key is pressed, the electrocardiograph begins to analyze data. Then the USB printer begins to print the ECG record after 8 seconds.

**Note:** The **MANUAL** or **RHYTHM** mode can not support printing ECG records in the recall window.

If you select the **MANUAL** or **RHYTHM** mode, WARNING (d) will pop up.

<table>
<thead>
<tr>
<th>ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANUAL or RHYTHM mode can not recall printing, Press PRINT/STOP return</td>
</tr>
</tbody>
</table>

5. For SE-300B, after printing the ECG record, press the Up or Down arrow to select the **BACK** button, and then press the **PRINT/STOP** or **MENU** key to return to the recall window (a) (Figure 7-2).

6. Press the **RECALL** key to return to the main interface.

### 7.5 ECG Copy

In the **AUTO** mode, once the hint information **COPY** appears on the LCD screen, 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.

**Note:** After an ECG report is printed out in the **AUTO** mode, if you change the printing mode or the printing format, the ECG report can not be printed again by pressing the **1mV/Copy** key.
Chapter 8 Settings (SE-300B)

Press the MENU key to open the system setup interface.

1. Press the Up or Down arrow to select the Prev or Next button, and then press the Left or Right arrow to select the LOGIN, RECORD, GENERAL, or SYSTEM tab.

2. Press the Up or Down arrow to select an item. Then press the Left or Right arrow to set the item. Press the MENU key to confirm.

3. For details on entering information about patient and doctor, please refer to section 6.1, “Entering Patient Information”.

8.1 Login Settings

Press the MENU key to open the system setup interface. Press the Up or Down arrow to select the Prev or Next button, and then press the Left or Right arrow to select the LOGIN tab.

On the login setting interface, you can edit patient information.

Figure 8-1 Login Setting Interface

<table>
<thead>
<tr>
<th>LOGIN</th>
<th>RECORD</th>
<th>GENERAL</th>
<th>SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>161105-1723</td>
<td>HEIGHT&lt;cm&gt;: 170</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td></td>
<td>WEIGHT&lt;kg&gt;: 60</td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>30</td>
<td>BP&lt;mmHg&gt;: 80/120</td>
<td></td>
</tr>
<tr>
<td>SEX</td>
<td>Male</td>
<td>HOSPITAL:</td>
<td></td>
</tr>
<tr>
<td>DOCTOR</td>
<td></td>
<td>DOCTOR:</td>
<td></td>
</tr>
</tbody>
</table>

Note: The patient information can not be set or changed during the printing course.

ID : Patient ID          HEIGHT<cm>: Patient Height (Range: 0~255)
NAME : Patient Name (Within 11 characters) WEIGHT<kg>: Patient Weight (Range: 0~255)
AGE : Patient Age (Range: 0~99)
BP<mmHg>: Patient Systolic Pressure/Diastolic Pressure (Range: 0~350)
SEX : Patient Gender (Male/Female)   HOSPITAL: Hospital Name
DOCTOR: Doctor Name
For the detailed information of entering patient information, please refer to section 6.1, “Entering Patient Information”.

8.2 Recording Settings

Press the **MENU** key to open the system setup interface. Press the Up or Down arrow to select the **Prev** or **Next** button, and then press the Left or Right arrow to select the **RECORD** tab.

![Figure 8-2 Record Setting Interface](image)

<table>
<thead>
<tr>
<th>LOGIN</th>
<th>RECORD</th>
<th>GENERAL</th>
<th>SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAD SEQUENCE</td>
<td>: Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHYTHM LEAD</td>
<td>: II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pacemaker Detection Sensitivity</td>
<td>: Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAMPLE MODE</td>
<td>: 12CH Simultaneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USB PRINTER</td>
<td>: HP2568</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECORD LENGTH</td>
<td>: Short</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECORD SPEED</td>
<td>: 25mm/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECORD GRID</td>
<td>: Off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECORD FORMAT</td>
<td>: 3Ch/3Ch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR ANALYSIS</td>
<td>: On</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVERAGE TEMPLT</td>
<td>: 2×6+1R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEASUREMENT</td>
<td>: On</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTERPRETATION</td>
<td>: On</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.2.1 Lead Settings

**LEAD SEQUENCE:** Standard/Cabrera

<table>
<thead>
<tr>
<th>Lead Sequence</th>
<th>Lead group 1</th>
<th>Lead group 2</th>
<th>Lead group 3</th>
<th>Lead group 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>I, II, III</td>
<td>aVR, aVL, aVF</td>
<td>V1, V2, V3</td>
<td>V4, V5, V6</td>
</tr>
<tr>
<td>Cabrera</td>
<td>aVL, I, -aVR</td>
<td>II, aVF, III</td>
<td>V1, V2, V3</td>
<td>V4, V5, V6</td>
</tr>
</tbody>
</table>

**RHYTHM LEAD:**

The rhythm lead can be one of the 12 standard leads: I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, and V6.
8.2.2 Pacemaker Detection Sensitivity Settings (Optional, with DE12 ECG Board)

When the Pacemaker Detection Sensitivity item is set to High, the pacemaker signal is easy to be detected.
When the Pacemaker Detection Sensitivity item is set to Low, the pacemaker signal is hard to be detected.
Note: Please refer to the Technical Specifications table for the detectable parameter ranges.

8.2.3 Sampling Mode Settings

1CH Sequential:
ECG signals of a lead are sampled one by one in a certain sequence.

3CH Sequential:
ECG signals of a lead group are sampled one by one in a certain sequence.

12CH Simultaneous:
ECG signals of all leads are sampled simultaneously.

8.2.4 USB Printer Settings

You can set the USB PRINTER to HP2468, HP2568, HP4368, and HP2015. HP2568 is the initial setting. In USBPRT mode, when HP2468, HP2568, HP4368 or HP2015 is selected, you should connect the corresponding USB printer to USB Socket 2 of the electrocardiograph with a special cable, and then printing can be carried out.

Note: Make sure that paper has been installed in USB printer before printing. NO Paper may results in error.

Note: You should connect the USB printer Cable after power-on, and pull out the USB printer Cable before power-off for protecting the USB printer.

WARNING: It is forbidden to frequently insert and pull out U disk or USB printer after power-on.
8.2.5 Recording Settings

RECORD LENGTH : Short
RECORD FORMAT : 3Ch/3Ch
RECORD SPEED : 25 mm/s

Take the above settings as an example, the recording speed is 25mm/s, and the recording length of each lead group is in short form.

RECORD LENGTH

When RECORD LENGTH is set to Short, ECG waves of each lead group will be printed for about 2.5 seconds.

When RECORD LENGTH is set to Medium, ECG waves of each lead group will be printed for about 5 seconds.

When RECORD LENGTH is set to Long, ECG waves of each lead group will be printed for about 7.5 seconds.

When RECORD LENGTH is set to Longest, ECG waves of each lead group will be printed for about 10 seconds.

RECORD SPEED

In the MANUAL/RHYTHM mode, RECORD SPEED can be set to 5 mm/s, 6.25 mm/s, 10 mm/s, 12.5 mm/s, 25 mm/s or 50 mm/s.

In the AUTO/OFF/USBPRT mode, RECORD SPEED can be set to 25 mm/s or 50 mm/s.

RECORD GRID

When RECORD GRID is set to On, the dashed grids which are 5 mm by 5 mm will be printed on the recorder paper.

When RECORD GRID is set to Off, dashed grids will not be printed on the recorder paper.

RECORD FORMAT

When RECORD FORMAT is set to 3Ch/3Ch, ECG waves of all leads will be printed in 4 groups of 3.

When RECORD FORMAT is set to 3Ch/2Ch, ECG waves of lead I, II, III, aVR, aVL and aVF will be printed in 2 groups of 3, and ECG waves of lead V1, V2, V3, V4, V5 and V6 will be printed in 3 groups of 2.
When RECORD FORMAT is set to **1Ch+1R**, ECG waves of all leads will be printed one by one in a sequence, with ECG waves of one rhythm lead on the bottom of the ECG reports.

When RECORD FORMAT is set to **1Ch**, ECG waves of all leads will be printed one by one in a sequence.

When RECORD FORMAT is set to **3Ch+1R**, ECG waves of all leads will be printed in 4 groups of 3, with one rhythm lead on the bottom of the ECG reports.

**RR ANALYSIS**

When RR ANALYSIS is set to **On**, RR analysis results, including RR interval measurement information, RR histogram and RR trend chart, will be printed in the **RHYTHM** mode.

When RR ANALYSIS is set to **Off**, there will be no RR analysis results printed out in the **RHYTHM** mode.

**AVERAGE TEMPLT**

When AVERAGE TEMPLT is set to **2×6+1R** or **4×3**, average template will be printed in the format of **2×6+1R** or **4×3**.

The format of **2×6+1R** means that ECG waves of all leads are printed in 2 groups of 6, with one rhythm lead at the bottom during the entire 10-second printing course.

The format of **4×3** means that ECG waves of all leads are printed in 4 groups of 3 during the entire 10-second printing course.

When AVERAGE TEMPLT is set to **Off**, there will be no average template in the ECG report.

### 8.2.6 Measurement and Interpretation

The measurement function provides the automatic measurement of these common parameters, such as heart rate, P-R interval, QRS complex duration, Q-T interval, P/QRS/T axis, RV5/SV1 amplitude etc. The interpretation function provides the automatic diagnosis of hundreds of abnormal cases, such as Arrhythmia, AV block, ventricular conduction block, myocardial infarction, ventricular hypertrophy and atria enlargement, ST-T abnormality and electrical axes deviation.

**MEASUREMENT**

When MEASUREMENT is set to **On**, the measurement information will be printed in the **AUTO** mode.
When MEASUREMENT is set to Off, there will be no measurement information printed.

**INTERPRETATION (Optional)**

When INTERPRETATION is set to On, the interpretation information will be printed.

When INTERPRETATION is set to Off, there will be no interpretation information printed.

**Note:** For details on the printed measurement and interpretation information, please refer to section 6.4, “ECG Reports”.

### 8.2.7 Parameter Options

In the following option column, the double-underlined values are default settings.

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LEAD SEQUENCE</td>
<td>Standard, Cabrera</td>
</tr>
<tr>
<td>2</td>
<td>RHYTHM LEAD</td>
<td>I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6</td>
</tr>
<tr>
<td>3</td>
<td>Pacemaker Detection</td>
<td>Low, High</td>
</tr>
<tr>
<td></td>
<td>Sensitivity( optional, with DE12 ECG Board)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SAMPLE MODE</td>
<td>1CH Sequential, 3CH Sequential, 12CH Simultaneous</td>
</tr>
<tr>
<td>4</td>
<td>USB PRINTER</td>
<td>HP2468, HP2568, HP4368, HP2015</td>
</tr>
<tr>
<td>5</td>
<td>RECORD LENGTH</td>
<td>Short, Medium, Long, Longest</td>
</tr>
<tr>
<td>6</td>
<td>RECORD SPEED</td>
<td>25mm/s, 50mm/s, 5mm/s, 6.25mm/s, 10 mm/s, 12.5mm/s</td>
</tr>
<tr>
<td>7</td>
<td>RECORD GRID</td>
<td>Off, On</td>
</tr>
<tr>
<td>8</td>
<td>RECORD FORMAT</td>
<td>3Ch/3Ch, 3Ch/2Ch, 1Ch+1R, 1Ch, 3Ch+1R</td>
</tr>
<tr>
<td>9</td>
<td>RR ANALYSIS</td>
<td>Off, On</td>
</tr>
<tr>
<td>10</td>
<td>AVERAGE TEMPLT</td>
<td>2×6+1R, Off, 4×3</td>
</tr>
<tr>
<td>11</td>
<td>MEASUREMENT</td>
<td>Off, On</td>
</tr>
<tr>
<td>12</td>
<td>INTERPRETATION(Optional)</td>
<td>Off, On</td>
</tr>
</tbody>
</table>
8.3 General Settings

Figure 8-3 General Setting Interface

<table>
<thead>
<tr>
<th>LOGIN</th>
<th>RECORD</th>
<th>GENERAL</th>
<th>SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC FILTER : On</td>
<td></td>
<td>DFT FILTER : 0.15Hz</td>
<td></td>
</tr>
<tr>
<td>DFT FILTER : 0.15Hz</td>
<td></td>
<td>EMG FILTER : Off</td>
<td></td>
</tr>
<tr>
<td>EMG FILTER : Off</td>
<td></td>
<td>LOWPASS FILTER : 150Hz</td>
<td></td>
</tr>
<tr>
<td>LOWPASS FILTER : 150Hz</td>
<td></td>
<td>EXTERN INP/OUTP : Off</td>
<td></td>
</tr>
<tr>
<td>EXTERN INP/OUTP : Off</td>
<td></td>
<td>KEY BEEP : On</td>
<td></td>
</tr>
<tr>
<td>KEY BEEP : On</td>
<td></td>
<td>QRS BEEP : Off</td>
<td></td>
</tr>
<tr>
<td>QRS BEEP : Off</td>
<td></td>
<td>REMOTE IP : 192.168.1.245</td>
<td></td>
</tr>
<tr>
<td>REMOTE IP : 192.168.1.245</td>
<td></td>
<td>LOCAL IP : 192.168.1.21</td>
<td></td>
</tr>
<tr>
<td>LOCAL IP : 192.168.1.21</td>
<td></td>
<td>AUTO TRANSFER : Off</td>
<td></td>
</tr>
<tr>
<td>AUTO TRANSFER : Off</td>
<td></td>
<td>SAVE OPTION : On</td>
<td></td>
</tr>
<tr>
<td>SAVE OPTION : On</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.3.1 Filter Settings

AC FILTER
AC filter suppresses AC interference without attenuating or distorting the ECG. There are two options: On and Off.

DFT FILTER
DFT filter greatly reduces the baseline fluctuations without affecting ECG signals. The purpose of this filter is to keep the ECG signals on the baseline of the printout. The setting value is the low limit of the frequency range, including 0.05Hz, 0.15Hz, 0.25Hz, 0.32Hz, 0.5Hz and 0.67Hz (0.32Hz and 0.67Hz are optional, with DE12 ECG Board installed). DFT FILTER is normally set to 0.15Hz.

EMG FILTER
EMG filter suppresses disturbances caused by strong muscle tremors. The cutoff frequency can be set to 25Hz, 35Hz or 45Hz. Select Off to turn off the function.

LOWPASS FILTER
Lowpass filter restricts the bandwidth of input signals. The cutoff frequency can be set to 150Hz, 100Hz or 75Hz. All the input signals whose frequency is higher than the setting cutoff frequency will be attenuated.
8.3.2 External Input/Output Settings

External input/output signal interface is equipped in SE-300, through which SE-300 can receive ECG signals from external equipment, and transmit ECG signals to external equipment. There are two options: On and Off.

8.3.3 Key Beep & QRS Beep Settings

**KEY BEEP Setting**
When KEY BEEP is set to On, there is a short beep when the keys on the control panel are pressed.
When KEY BEEP is set to Off, there is no sound when these keys are pressed.

**QRS BEEP Setting**
When QRS BEEP is set to On, there is a short beep when an R wave is detected.
When QRS BEEP is set to Off, there is no sound when an R wave is detected.

8.3.4 IP Settings (Optional, only for Net type)

**REMOTE IP**
IP address of the remote computer which receives ECG data from SE-300 through net

**LOCAL IP**
IP address of SE-300

8.3.5 Save Option Settings

When SAVE OPTION is set to On, the ECG data will be saved into the recall window automatically when ECG reports are printed in the AUTO mode.

When SAVE OPTION is set to Off, the ECG data will not be saved into the recall window when ECG reports are printed in the AUTO mode.

**Note:** When there is no space for more records to be stored in the recall window, the message MemFull is displayed.
8.3.6 Transmission Settings

Note: To transmit ECG data to the PC, Smart ECG Viewer software of the manufacturer must be installed in the PC. You should log into the Smart ECG Viewer software before the transmission.

When AUTO TRANSFER is set to OFF, the patient records can not be transmitted.

When AUTO TRANSFER is set to UART AUTO, firstly connect the serial port of the PC to the RS232 socket of SE-300 with the serial cable recommended by the manufacturer. Then open the Smart ECG Viewer software in the PC. In the AUTO or OFF mode, ECG data can be transmitted through UART port automatically after ECG reports are printed.

When AUTO TRANSFER is set to Net AUTO (optional, only for Net type), firstly connect the net interface of the PC to the net interface of SE-300 with an Ethernet cable recommended by the manufacturer. Secondly open the Smart ECG Viewer software in the PC. Then set the REMOTE IP and LOCAL IP item on the system setup interface of SE-300. In the AUTO or OFF mode, ECG data can be transmitted through net automatically after ECG reports are printed.

Note: During the course of data transmission and storage, if the power supply is suddenly cut off, the file system error may arise in the electrocardiograph. After the error information is displayed, you should format the file system.

8.3.7 Parameter Options

In the following option column, the double-underlined values are default settings.

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC FILTER</td>
<td>On, Off</td>
</tr>
<tr>
<td>2</td>
<td>DFT FILTER</td>
<td>0.05Hz, 0.15Hz, 0.25Hz, 0.32Hz, 0.5Hz and 0.67Hz (0.32 Hz and 0.67Hz are optional with DE12 ECG Board installed. In that case, 0.67Hz would be the default value)</td>
</tr>
<tr>
<td>3</td>
<td>EMG FILTER</td>
<td>OFF, 45Hz, 35Hz, 25Hz</td>
</tr>
<tr>
<td>4</td>
<td>LOWPASS FILTER</td>
<td>150Hz, 100Hz, 75Hz</td>
</tr>
<tr>
<td>5</td>
<td>EXTERN INPUT/OUTPUT</td>
<td>On, Off</td>
</tr>
<tr>
<td>6</td>
<td>KEY BEEP</td>
<td>On, Off</td>
</tr>
<tr>
<td>7</td>
<td>QRS BEEP</td>
<td>On, Off</td>
</tr>
<tr>
<td>8</td>
<td>AUTO TRANSFER</td>
<td>Off, UART AUTO, Net AUTO (Optional, only for Net type)</td>
</tr>
<tr>
<td>9</td>
<td>SAVE OPTION</td>
<td>On, Off</td>
</tr>
</tbody>
</table>
8.4 System Settings

Figure 8-4 System Setting Interface

<table>
<thead>
<tr>
<th>LOGIN</th>
<th>RECORD</th>
<th>GENERAL</th>
<th>SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE MODE: dd-mm-yyyy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DATE SETTING: 21-07-2005</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME SETTING: 20:41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEMO SETTING: Off</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANGUAGE SETTING: English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLASH FORMAT: Activate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECORD TEST: Off</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEFAULT SETTING: Restore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAPER STYLE: Folded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISPLAY MODE: 3CH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PASSWORD: 000000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.4.1 Display Mode Settings

Three display modes can be selected: 3CH, 6CH and 12CH. The display interfaces are shown as follows.

ID: 210605-1730  Female  Age 30  AUTO  11:01:43

3CH Display Mode
## DATE MODE

**DATE MODE** can be set to **dd-mm-yyyy**, **mm-dd-yyyy** or **yyyy-mm-dd**. The current date will be displayed in the selected format after setup.

## DATE & TIME SETTING

Set the current date and time. It will be printed in the ECG reports.

## DEMO SETTING

Select **On** to enter the demo mode.
LANGUAGE SETTING: You can set the system language.

FLASH FORMAT: Set FLASH FORMAT to Activate, the warning message Do you really want to format the file system? will pop up. Then press the RECALL key to format the file system; or press the PRINT/STOP key to cancel the operation.

RECORD TEST: After the recorder paper is loaded, press the Left or Right arrow to start the printing test. Then the triangle wave in effective paper width will be printed. The status of print head can be estimated from this triangle wave. Press the Left or Right arrow again to stop the printing test.

DEFAULT SETTING: Select Restore to restore the default settings.

Note: In the parameter option column, there is no underlined option for a certain parameter, which means there is no default value for the parameter. When you restore default settings, the parameter will not change.

PAPER STYLE: Recorder paper style. The rolled thermal paper or the folded thermal paper can be selected as recorder paper.

Note: If you set PAPER STYLE to Folded, when printing reports in the Auto or RHYTHM mode, printing will not stop until a black sign is met.

PASSWORD: Password for entering the advanced control interface

8.4.2 Parameter Options

In the following option column, the double-underlined values are default settings.

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DATE MODE</td>
<td>dd-mm-yyyy, mm-dd-yyyy, yyyy-mm-dd</td>
</tr>
<tr>
<td>2</td>
<td>RECORD TEST</td>
<td>Testing, Off</td>
</tr>
<tr>
<td>3</td>
<td>DEFAULT SETTING</td>
<td>Restore</td>
</tr>
<tr>
<td>4</td>
<td>PAPER STYLE</td>
<td>Folded, Rolled</td>
</tr>
<tr>
<td>5</td>
<td>DISPLAY MODE</td>
<td>3CH, 6CH, 12CH</td>
</tr>
</tbody>
</table>
Chapter 9 Settings (SE-300A)

Note: The common settings of SE-300A and SE-300B have common functions. Please refer to the function explanation of SE-300B.

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC Filter</td>
<td>:On</td>
</tr>
<tr>
<td>2</td>
<td>EMG Filter</td>
<td>: Off</td>
</tr>
<tr>
<td>3</td>
<td>DFT Filter</td>
<td>: 0.15Hz</td>
</tr>
<tr>
<td>4</td>
<td>Lowpass Filter</td>
<td>: 100Hz</td>
</tr>
<tr>
<td>5</td>
<td>Record Format</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Record Grid</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Record Speed</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Record Length</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Average Template</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Measurement</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Interpretation</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>RR Analysis</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Lead Sequence</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Sample Mode</td>
<td></td>
</tr>
</tbody>
</table>

Press the Up or Down arrow to select an item, and then press the Left or Right arrow to set the item.

Press the Lead switch key to switch to the prev or next page of the system setup interface.

The setting items on the system setup interface of SE-300A are as follows:

AC Filter : On
EMG Filter : Off
DFT Filter : 0.15Hz
Lowpass Filter : 100Hz
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Rhythm Lead</td>
<td>Refer to Section 8.2.1</td>
</tr>
<tr>
<td>16</td>
<td>Paper Style</td>
<td>Refer to Section 8.4</td>
</tr>
<tr>
<td>17</td>
<td>Save Option</td>
<td>Refer to Section 8.3.5</td>
</tr>
<tr>
<td>18</td>
<td>Auto Transfer</td>
<td>Refer to Section 8.3.6</td>
</tr>
<tr>
<td>19</td>
<td>Local IP (Optional, only for Net type)</td>
<td>Refer to Section 8.3.4</td>
</tr>
<tr>
<td>20</td>
<td>Remote IP (Optional, only for Net type)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Key Beep</td>
<td>Refer to Section 8.3.3</td>
</tr>
<tr>
<td>22</td>
<td>QRS Beep</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Extern Inp/Outp</td>
<td>Refer to Section 8.3.2</td>
</tr>
<tr>
<td>24</td>
<td>Record Test</td>
<td>Refer to Section 8.4</td>
</tr>
<tr>
<td>25</td>
<td>Demo Setting</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Language Setting</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Flash Format</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Default Setting</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Date Mode</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Date Setting</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Time Setting</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>ID</td>
<td>Refer to Section 8.1</td>
</tr>
<tr>
<td>33</td>
<td>Password</td>
<td>Password for entering the advanced control interface</td>
</tr>
<tr>
<td>34</td>
<td>Pacemaker Detection Sensitivity (Optional, with DE12 ECG Board)</td>
<td>Refer to Section 8.2.2</td>
</tr>
<tr>
<td>35</td>
<td>USB printer</td>
<td>Refer to Section 8.2.4</td>
</tr>
</tbody>
</table>
Chapter 10 Switching off the Electrocardiograph

When the built-in battery is used, press the ON/OFF key directly to turn off the unit.

When the mains supply is used, press the ON/OFF key, and then press the mains switch on the left side of the unit. Pull out the plug from the outlet.

Note: When switching off the device, please follow the above sequence strictly, or else there will be something wrong on the screen.
11 Hint Information

Hint information will be displayed in the bottom right corner of the LCD screen when there is something wrong. Hint information provided by SE-300 and the corresponding causes are listed in Table 11-1.

Table 11-1 Hint Information and Causes

<table>
<thead>
<tr>
<th>Hint Information</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead off</td>
<td>Electrodes fall off the patient or the patient cable falls off the unit.</td>
</tr>
<tr>
<td>BAT WEAK</td>
<td>The built-in battery is weak.</td>
</tr>
<tr>
<td>Paper?</td>
<td>Recorder paper runs out or is not loaded.</td>
</tr>
<tr>
<td>PaperErr</td>
<td>The system doesn't detect any black signs while the paper style is set as &quot;Folded&quot; on the system setup interface.</td>
</tr>
<tr>
<td>Sampling/Printing</td>
<td>The system is sampling ECG signals or printing ECG reports.</td>
</tr>
<tr>
<td>Modu Err</td>
<td>There is something wrong with the ECG Board.</td>
</tr>
<tr>
<td>Demo</td>
<td>The system is in the demonstration mode.</td>
</tr>
<tr>
<td>Copy</td>
<td>The ECG report printed last time is ready to be reprinted.</td>
</tr>
<tr>
<td>Process</td>
<td>The system is processing ECG data.</td>
</tr>
<tr>
<td>Transfer</td>
<td>The system is transmitting ECG records through the UART port or Ethernet.</td>
</tr>
<tr>
<td>MemFull</td>
<td>There is no space for saving more records.</td>
</tr>
<tr>
<td>Overload</td>
<td>The direct current voltage on an electrode is too high.</td>
</tr>
<tr>
<td>Uprinter</td>
<td>A USB printer is connected to the USB interface.</td>
</tr>
<tr>
<td>USBExist</td>
<td>A U disk is connected to the USB interface.</td>
</tr>
</tbody>
</table>
Chapter 12 Cleaning, Care and Maintenance

12.1 Cleaning

⚠️ CAUTION ⚠️:

Turn off the power before cleaning and disinfection. The mains supply must be switched off if it is in use.

12.1.1 Cleaning the Main Unit and the Patient Cable

The surfaces of the main unit and the patient cable can be wiped with a clean soft cloth damped in soapy water or non-caustic neutral detergent. After that, remove detergent remainder with a clean dry cloth.

12.1.2 Cleaning the Electrodes

Remove the remainder gel from the electrodes with a clean soft cloth first. Take suction bulbs and mental cups of chest electrodes apart, and take clamps and metal parts of the limb electrodes apart. Clean them in warm water and make sure there is no remainder gel. Dry the electrodes with a clean dry cloth or air dry naturally.

12.1.3 Cleaning the Print Head

Dirty and soiled thermal print head will deteriorate the printing definition. So it should be cleaned at least once a month regularly.

Open the recorder casing and remove the recorder paper. Wipe the print head gently with a clean soft cloth damped in 75% alcohol. For stubborn stain, soak it with a little alcohol first and wipe it off with a clean soft cloth. After air dried, load the recorder paper and shut the recorder casing.

⚠️ CAUTION ⚠️:

Prevent the detergent from seeping into the main unit while cleaning. Do not immerse the unit or the patient cable into liquid under any circumstances.

⚠️ CAUTION ⚠️:

Do not clean the unit and accessories with abrasive fabric and avoid scratching the electrodes.
12.2 Disinfection

To avoid permanent damage to the equipment, disinfection can be performed only when it is considered as necessary according to your hospital’s regulations.

Before disinfection, clean the equipment first. Then wipe the surfaces of the unit and the patient cable with hospital standard disinfectant.

⚠️ CAUTION ⚠️:

Do not use chloric disinfectant such as chloride, sodium hypochlorite etc.

12.3 Care and Maintenance

12.3.1 Recharge and Replacement of Battery

1) Capacity Identification

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

- Full capacity
- Capacity is limited, and recharge should be taken into account.
- Capacity is low, and hint information BAT WEAK will be displayed on the LCD screen.

The battery should be recharged immediately.

2) Recharge

SE-300 is equipped with the recharge control circuit together with the built-in rechargeable lithium battery. When the unit is connected to the mains supply, the battery will be recharged automatically. Then the battery recharging indicator lamp (⃣) and the mains supply indicator lamp (▲) will be lit at the same time. During the recharging course, the symbol flashes in the top right corner of the LCD screen. When the battery capacity is full, the symbol ⃣ stops flashing, and the battery recharging indicator lamp (⃣) is black. When the 3-channel electrocardiograph is switched off, the battery recharging indicator lamp (⃣) is black if the battery is fully recharged.

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: If the battery has not been used for more than two months, it should be recharged before use.

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:

♦ Only qualified service engineer 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.

♦ Danger of explosion -- Do not reverse the anode and cathode when installing the battery.

♦ 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.

12.3.2 Recorder Paper

Note: Recorder paper provided by the manufacturer should be used. Other paper may shorten the life of the thermal print head. And the deteriorated print head may lead to illegible ECG reports and block the advance of 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 recorded paper for a long time, or else the ECG reports may trans-print each other.
12.3.3 Maintenance of the Main Unit, the Patient Cable and Electrodes

The following safety checks should be performed at least every 24 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 rated current and breaking characteristics.
d) Verify the device functions properly as described in the instructions for use.
e) Test the protection earth resistance according to IEC/EN 60601-1: Limit: 0.1hm.
f) Test the earth leakage current according to IEC/EN 60601-1: Limit: NC 500 μA, SFC 1000μA.
g) Test the enclosure leakage current according to IEC/EN 60601-1: Limit: NC 100μA, SFC 500μA.
h) Test the patient leakage current according to IEC/EN 60601-1: Limit: NC a.c. 10μA, d.c. 10μA; SFC a.c. 50μA, d.c. 50μA.
i) Test the patient auxiliary current according to IEC/EN 60601-1: Limit: NC a.c. 10μA, d.c. 10μA; SFC a.c. 50μA, d.c. 50μA.
j) Test the patient leakage current under single fault condition with mains voltage on the applied part according to IEC/EN 60601-1: Limit: 50μA (CF)

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 the use of 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 or 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
performance of the electrocardiograph can not 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) 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 13 Accessories

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

Table 13-1 Accessory List

<table>
<thead>
<tr>
<th>No.</th>
<th>Accessory</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power cord</td>
<td>M13R-36014</td>
</tr>
<tr>
<td>2</td>
<td>Patient cable (φ4mm, banana connector, IEC)</td>
<td>MS1R-107402-A0</td>
</tr>
<tr>
<td>3</td>
<td>Patient cable (φ4mm, banana connector, AHA)</td>
<td>MS1R-110375-A0</td>
</tr>
<tr>
<td>4</td>
<td>Adult Precordial Suction Electrodes (6 PCS/set, match φ4mm Patient cable)</td>
<td>MS15R-040163</td>
</tr>
<tr>
<td>5</td>
<td>Adult Limb Clamp Electrodes (4 PCS/set, match φ4mm Patient cable)</td>
<td>MS15R-040162</td>
</tr>
<tr>
<td>6</td>
<td>Snap/Banana Socket Adapters (10 PCS/set, match φ4mm Patient cable)</td>
<td>MS1R-107449-A0</td>
</tr>
<tr>
<td>7</td>
<td>Adult Disposable Adhesive Electrodes (1 piece)</td>
<td>M15-040159</td>
</tr>
<tr>
<td>8</td>
<td>Electrode Cream (65ml)</td>
<td>M50-78047</td>
</tr>
<tr>
<td>9</td>
<td>Paper roller</td>
<td>MS1-19993</td>
</tr>
<tr>
<td>10</td>
<td>Recorder Paper (Roll, 80mm×20m)</td>
<td>M50R-78076</td>
</tr>
<tr>
<td>11</td>
<td>Recorder Paper (Z-fold, 80mm×70mm×200P)</td>
<td>M50R-78079</td>
</tr>
<tr>
<td>12</td>
<td>Ground Cable</td>
<td>MS1-20016</td>
</tr>
<tr>
<td>13</td>
<td>Input and Output Connection Cable</td>
<td>MS1-19907</td>
</tr>
<tr>
<td>14</td>
<td>ECG Carrying Bag</td>
<td>M50-78042</td>
</tr>
<tr>
<td>15</td>
<td>Flash Disk (Kingston DT1G2, 2G, USB2.0 Protocol)</td>
<td>M50-078204</td>
</tr>
<tr>
<td>16</td>
<td>External Ink-jet Printer (HP2568)</td>
<td>M18-052192</td>
</tr>
<tr>
<td>17</td>
<td>Rolling Stand (MT-202)</td>
<td>MS9-107403</td>
</tr>
</tbody>
</table>

SE-300 and accessories are available by contacting the manufacturer or your local distributor.

Note: The Adult Precordial Suction Electrodes and Adult Limb Clamp Electrodes are not available in the U.S.
Chapter 14 Warranty & Service Policy

14.1 Warranty

EDAN warrants that EDAN’s products meet the labeled specifications of the products and are free from defects in materials and workmanship that occur within warranty period. The warranty period begins on the date the products are shipped to distributors.

The warranty is void in the cases of:

a) damage caused by handling 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 found 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.

14.2 Service Policy

All repairs on products must be performed or approved by EDAN. Unauthorized repairs will void the warranty. In addition, whether covered under warranty or not, any product repair shall be exclusively be performed by EDAN certified service personnel.

If the product fails to function properly, or if you need assistance, service, or spare parts, contact EDAN’s service center. A representative will assist you in troubleshooting the problem and will make every effort to solve it over the phone or by email, avoiding potential unnecessary returns.

In case a return can not be avoided, the representative will record all necessary information and will provide a Return Material Authorization (RMA) form that includes the appropriate return address and instructions. An RMA form must be obtained prior to any return.
**Freight policy:**

Under warranty: the service claimer is responsible for freight & insurance charges when a return is shipped to EDAN for service including custom charges. EDAN is responsible for freight, insurance & custom charges from EDAN to service claimer.

Out of warranty: the service claimer is responsible for any freight, insurance & custom charges for product.

**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.
### Appendix 1 Technical Specifications

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification</td>
<td>Anti-electric-shock type: Class I with internal power supply Anti-electric-shock degree: Type CF Degree of protection against harmful ingress of water: Ordinary equipment (Sealed equipment without liquid proof) 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: Group I, Class A</td>
</tr>
<tr>
<td>Dimensions</td>
<td>300mm×260mm×75mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 2.5kg (excluding battery and recorder paper)</td>
</tr>
<tr>
<td>Display</td>
<td>320×240 dot single color LCD Screen 192×64 dot single color LCD Screen</td>
</tr>
<tr>
<td>Environment</td>
<td>Transport &amp; Storage Working</td>
</tr>
<tr>
<td>Temperature:</td>
<td>-20 °C ~ +55 °C +5 °C ~ +40 °C</td>
</tr>
<tr>
<td>Relative Humidity:</td>
<td>25% ~ 93% 25% ~ 80%</td>
</tr>
<tr>
<td>Atmospheric Pressure:</td>
<td>700hPa ~ 1060hPa 860hPa ~ 1060hPa</td>
</tr>
<tr>
<td>Power Supply</td>
<td>Operating voltage =100V-115V~/220V-240V~ Operating frequency = 50Hz / 60Hz input power = 35VA</td>
</tr>
<tr>
<td>Mains Supply:</td>
<td></td>
</tr>
<tr>
<td>Built-in Lithium Battery Pack:</td>
<td>Rated voltage = 14.8V Rated capacity = 2200mAh When the battery is fully charged, the 3-channel electrocardiograph can work normally about 6.5 hours. It can continuously record about 3 hours in Manual mode, and record 330 reports at most in the AUTO mode</td>
</tr>
</tbody>
</table>
### Charge Mode
- Charge mode: Constant current/voltage
- Necessary Charge time: 5 hours
- Charge current (standard) = 0.28C5A (600mA)
- Charge voltage (standard) = (16.8-0.1V)
- Cycle life ≥ 300 times

### Power Consumption
- 35VA (max)

### Fuse
- T400mA 250V Ø5×20 / T200mA 250V Ø5×20

<table>
<thead>
<tr>
<th>Recording</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorder:</td>
<td>Thermal dot-matrix recorder</td>
</tr>
</tbody>
</table>
| Printing Density | 8 dots per mm / 200 dots per inch (amplitude axes)  
40 dots per mm / 1000 dots per inch (time axes, @ 25 mm/s) |
| Recorder Paper: | Folded thermal paper, 80mm×70mm×200pages  
Rolled thermal paper, 80mm×20m |
| Effective Width: | 72mm |
| 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) |

<table>
<thead>
<tr>
<th>HR Recognition</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Technique:</td>
<td>Peak-Peak Detection</td>
</tr>
<tr>
<td>HR Range:</td>
<td>30 BPM ~ 300 BPM</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>±1BPM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECG Unit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Leads:</td>
<td>12 standard leads</td>
</tr>
<tr>
<td>Acquisition Mode:</td>
<td>simultaneously 12 leads</td>
</tr>
<tr>
<td>A/D Resolution:</td>
<td>12bits / 24bits (optional, with DE12 ECG Board)</td>
</tr>
<tr>
<td>Time Constant:</td>
<td>≥3.2s</td>
</tr>
<tr>
<td>Frequency Response:</td>
<td>0.05Hz ~ 150Hz (-3dB)</td>
</tr>
<tr>
<td>Sensitivity:</td>
<td>2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV AGC</td>
</tr>
<tr>
<td>Input Impedance:</td>
<td>50MΩ (10Hz)</td>
</tr>
<tr>
<td>Input Circuit Current:</td>
<td>≤0.05μA</td>
</tr>
<tr>
<td>Input Voltage Range</td>
<td>&lt;±5 mVpp</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Calibration Voltage:</td>
<td>1mV±3%</td>
</tr>
<tr>
<td>DC Offset Voltage:</td>
<td>±500mV / ±600mV (optional, with DE12 ECG Board)</td>
</tr>
<tr>
<td>Noise:</td>
<td>&lt;12.5μVp-p</td>
</tr>
<tr>
<td>Multi-channel Crosstalk</td>
<td>≤0.5mm</td>
</tr>
</tbody>
</table>

**Filter**

- AC Filter: On / Off
- DFT Filter: 0.05Hz / 0.15Hz / 0.25Hz / 0.32Hz / 0.5Hz / 0.67Hz (0.32Hz and 0.67Hz are configured with DE12 ECG Board)
- EMG Filter: 25Hz / 35Hz / 45Hz / OFF
- LOWPASS Filter: 150Hz / 100Hz / 75Hz

**CMRR**

- ≥110dB / ≥115dB (optional, with DE12 ECG Board)

**Sampling Frequency**

- 1000Hz

**Pacemaker detection** (optional, with DE12 ECG Board)

| Amplitude | ±2mV ~ ±700mV |
| Width     | 0.1ms ~ 2.0ms |
| Sampling Frequency | 10,000/sec/channel |

**Patient Leakage Current:**

- NC: <10μA (AC) / <10μA (DC)
- SFC: <50μA (AC) / <50μA (DC)

**Patient Auxiliary Current:**

- NC: <10μA (AC) / <10μA (DC)
- SFC: <50μA (AC) / <50μA (DC)

**Dielectric Strength:**

- 4000V rms

**External Input/Output (Optional)**

<table>
<thead>
<tr>
<th>Input</th>
<th>≥100kΩ; Sensitivity 10mm/V±5%; Single ended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>≤100Ω; Sensitivity 1V/mV±5%; Single ended</td>
</tr>
</tbody>
</table>

**Note:** Test the accuracy of input signal reproduction according to the methods described in clause 4.2.7.2 in ANSI/AAMI EC11:1991/(R) 2001, and the result complies with the clause 3.2.7.2 in ANSI/AAMI EC11:1991/(R) 2001.
## Appendix 2 EMC Information - Guidance and Manufacture’s Declaration

### Electromagnetic Emissions - for all EQUIPMENT and SYSTEMS

**Guidance and manufacture’s declaration – electromagnetic emission**

The Electrocardiograph is intended for use in the electromagnetic environment specified below. The user of the Electrocardiograph should assure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Emission test</th>
<th>Compliance</th>
<th>Electromagnetic environment – guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF emissions</td>
<td>Group 1</td>
<td>The 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.</td>
</tr>
<tr>
<td>RF emission</td>
<td>Class A</td>
<td>The 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 building used for domestic purposes.</td>
</tr>
<tr>
<td>Harmonic emissions</td>
<td>Class A</td>
<td></td>
</tr>
<tr>
<td>Voltage fluctuations/</td>
<td>Complies</td>
<td></td>
</tr>
<tr>
<td>flicker emissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEC 61000-3-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEC 61000-3-3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Electromagnetic Immunity - for all EQUIPMENT and SYSTEMS

**Guidance and manufacturer’s declaration – electromagnetic immunity**

The Electrocardiograph is intended for use in the electromagnetic environment specified below. The user of Electrocardiograph should assure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Immunity test</th>
<th>IEC 60601 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment - guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge (ESD)</td>
<td>±6 kV contact ±8 kV air</td>
<td>±6 kV contact ±8 kV air</td>
<td>It is recommended the use of antistatic materials. If floor are covered with synthetic material, the relative humidity should be at least 50%.</td>
</tr>
<tr>
<td>IEC 61000-4-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical fast transient/burst</td>
<td>±2 kV for power supply lines</td>
<td>±2 kV for power supply lines</td>
<td>It is recommended the use of filters on power input lines and enough separation between signal lines and power lines.</td>
</tr>
<tr>
<td>IEC 61000-4-4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge</td>
<td>±1 kV line to line ±2 kV line to ground</td>
<td>±1 kV line to line ±2 kV line to ground</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>IEC 61000-4-5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage dips, short interruptions and</td>
<td>&lt;5% $U_T$ (&gt;95% dip in $U_T$) for 0.5 cycle</td>
<td>&lt;5% $U_T$ (&gt;95% dip in $U_T$) for 0.5 cycle</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>voltage variations on power supply</td>
<td>40% $U_T$ (60% dip in $U_T$) for 5 cycles</td>
<td>40% $U_T$ (60% dip in $U_T$) for 5 cycles</td>
<td></td>
</tr>
<tr>
<td>input lines</td>
<td>70% $U_T$ (30% dip in $U_T$) for 25 cycles</td>
<td>70% $U_T$ (30% dip in $U_T$) for 25 cycles</td>
<td></td>
</tr>
<tr>
<td>IEC 61000-4-11</td>
<td>&lt;5% $U_T$ (&gt;95% dip in $U_T$) for 5 sec</td>
<td>&lt;5% $U_T$ (&gt;95% dip in $U_T$) for 5 sec</td>
<td></td>
</tr>
<tr>
<td>Power frequency (50Hz) magnetic field</td>
<td>3A/m</td>
<td>3A/m</td>
<td>Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>IEC 61000-4-8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE** $U_T$ is the a.c. mains voltage prior to application of the test level.
Electromagnetic Immunity - for EQUIPMENT and SYSTEMS that are not LIFE-SUPPORTING

<table>
<thead>
<tr>
<th>Immunity test</th>
<th>IEC 60601 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment - guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducted RF</td>
<td>3 V(_{\text{rms}})</td>
<td>3 V(_{\text{rms}})</td>
<td>Portable and mobile RF communications equipment should be used no closer to any part of the Electrocardiograph, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</td>
</tr>
<tr>
<td>IEC/61000-4-6</td>
<td>150 kHz to 80 MHz</td>
<td></td>
<td><strong>Recommended separation distance</strong></td>
</tr>
<tr>
<td>Radiated RF</td>
<td>3 V/m</td>
<td>3 V/m</td>
<td><em>d</em> = $1.2\sqrt{P}$</td>
</tr>
<tr>
<td>IEC 61000-4-3</td>
<td>80 MHz to 2.5 GHz</td>
<td></td>
<td>80 MHz to 800 MHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>d</em> = $2.3\sqrt{P}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>800 MHz to 2.5 GHz</td>
</tr>
</tbody>
</table>

Where \( P \) is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and \( d \) is the recommended separation distance in metres (m).

Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,\(^a\) should be less than the compliance level in each frequency range.\(^b\)

Interference may occur in the vicinity of equipment marked with the following symbol:

\[\text{Interference symbol}\]

**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.

\(^a\) 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 Electrocardiograph is used exceeds the applicable RF compliance level above, the Electrocardiograph should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Electrocardiograph.

\(^b\) Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.
### Recommended Separation Distances

<table>
<thead>
<tr>
<th>Rated maximum output power of transmitter (W)</th>
<th>Separation distance according to frequency of transmitter (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 kHz to 80 MHz</td>
</tr>
<tr>
<td></td>
<td>( d = 1.2 \sqrt{P} )</td>
</tr>
<tr>
<td>0.01</td>
<td>0.12</td>
</tr>
<tr>
<td>0.1</td>
<td>0.38</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>10</td>
<td>3.8</td>
</tr>
<tr>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>80 MHz to 800 MHz</td>
</tr>
<tr>
<td></td>
<td>( d = 1.2 \sqrt{P} )</td>
</tr>
<tr>
<td>0.01</td>
<td>0.12</td>
</tr>
<tr>
<td>0.1</td>
<td>0.38</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>10</td>
<td>3.8</td>
</tr>
<tr>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>800 MHz to 2.5 GHz</td>
</tr>
<tr>
<td></td>
<td>( d = 2.3 \sqrt{P} )</td>
</tr>
<tr>
<td>0.01</td>
<td>0.23</td>
</tr>
<tr>
<td>0.1</td>
<td>0.73</td>
</tr>
<tr>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>10</td>
<td>7.3</td>
</tr>
<tr>
<td>100</td>
<td>23</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Abbr</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>Blood Pressure</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiogram/Electrocardiograph</td>
</tr>
<tr>
<td>HR</td>
<td>Heart Rate</td>
</tr>
<tr>
<td>aVF</td>
<td>Left Foot Augmented Lead</td>
</tr>
<tr>
<td>aVL</td>
<td>Left Arm Augmented Lead</td>
</tr>
<tr>
<td>aVR</td>
<td>Right Arm Augmented Lead</td>
</tr>
<tr>
<td>LA</td>
<td>Left Arm</td>
</tr>
<tr>
<td>LL</td>
<td>Left Leg</td>
</tr>
<tr>
<td>RA</td>
<td>Right Arm</td>
</tr>
<tr>
<td>RL</td>
<td>Right Leg</td>
</tr>
<tr>
<td>ID</td>
<td>Identification</td>
</tr>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
<tr>
<td>AGC</td>
<td>Auto Gain Control</td>
</tr>
</tbody>
</table>